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6:00 pm – 8:00 pm	**Networking Event**

All Live Broadcast Programs are in Eastern Time

Welcome
2:45 pm – 3:00 pm

In-Depth
Kidney
3:00 pm - 5:30 pm

Living Donor Selection Where to Draw the Line
Moderators: Didier Mandelbrot, MD, UW Health, Medical Director of Kidney Transplantation, Madison, WI, USA, Carrie Schinstock, Medical Doctor, Mayo Clinic, Dr., Rochester, MN, USA

3:00 pm **The Landscape of Live Donation/ Overall Risk Assessment**
Vineeta Kumar, MD, University of Alabama At Birmingham, Professor of Medicine, Endowded Professor in Transplant Nephrology, Birmingham, AL, USA

3:10 pm **Surgical Issues**
Lloyd Ratner, MD, MPH, Columbia University, Professor of Surgery; Director - Renal & Pancreatic Transplantation, New York, NY, USA

3:20 pm **Kidney Stones**
David Serur, MD, HMHN, Medical Director, Kidney Transplantation, Hackensack, NJ, USA

3:30 pm **Live Video Question and Answer**

4:00 pm **Break**

4:30 pm **Assessment of Kidney Function**
Andrew Rule, M.D., Mayo Clinic, Nephrologist, Rochester, MN, USA

4:40 pm **Diabetes and Obesity**
Hassan Ibrahim, Houston Methodist Hospital, Houston, TX, USA

4:50 pm **Hypertension**
Mona Doshi, MBBS, University of Michigan, Ann Arbor, MI, USA

5:00 pm **Live Video Question and Answer**

In-Depth
Liver
3:00 pm - 5:30 pm

Pushing Past the Limits of LDLT in the US: Programmatic Development
Moderators: Roberto Hernandez-Alejandro, MD, University of Rochester Medical Center, Professor of Surgery, Rochester, NY, USA, Talia Baker, MD, Uchicago Medicine, Director, Liver Transplant Oncology, Chicago, IL, USA

3:00 pm **Altruistic Donation and Social Media in LDLT**
Nazia Selzner, MD PhD, University Health Network, Medical Director LDLT, Tornto, ON, Canada

3:10 pm **Planning for an Adverse Event**
Talia Baker, MD, Uchicago medicine, Director, Liver Transplant Oncology, Chicago, IL, USA

3:20 pm **Robust Training in LDLT, Do We Need to Travel?**
Steven I Hanish, MD, UT Southwestern Medical Center, Assoc Prof of Surgery, Dallas, TX, USA

3:30 pm **Can we Weather the Storm of a LD Fatality?**
James Pomposelli, University of Colorado

3:40 pm **Live Video Question and Answer**

4:00 pm **Break**

4:30 pm **Informed (informative) Consent: Giving Support and Avoiding Coercion**
Diane La Pointe-Rudow, ANP-BC DNP FAAN, Mount Sinai Hospital, Director Of Zweig Family Center for Living Donation, New York, NY, USA

4:40 pm **How to Get a LDLT Program Up and Running - A Clinicians Perspective**
Cristiano Quintini, MD, Cleveland Clinic, Director, Liver Transplantation, Cleveland, OH, USA

4:50 pm **How Does LDLT Fit into the New Allocation Model**
James Trotter, MD, Baylor Dallas, doctor, Dallas, TX, USA

5:00 pm **Live Video Question and Answer**

In-Depth

Heart: Lung
3:00 pm - 5:30 pm

Don't Throw Them in the Bucket!!! Tricks of the Trade to Optimize Every Thoracic Donor Offer

Moderators: Shelley Hall, MD, Baylor Univ Medical Center, Chief, Transplant Cardiology, MCS and Adv HF, Dallas, TX, USA, Deborah Levine, MD, University of Texas Health, Medical Director of Lung Transplant, San Antonio, TX, USA

3:00 pm **Donor Optimization: Management of the Organ Donor for Thoracic Organs**
Hannah Copeland, MD, Lutheran Hospital of Indiana/ Indiana University School of Medicine Fort Wayne, Surgical director of heart transplant, MCS, Director of ECMO, Fort Wayne, IN, USA

3:15 pm **Improving Heart Utilization: When Should we put the Heart in a Box?**
Abbas Ardehali, MD, UCLA Medical Center, Professor, Los Angeles, CA, USA

3:30 pm **Ex-vivo Lung Perfusion How I do it?**
Pablo Sanchez, MD, PhD, UPMC Cardiothoracic Surgery, Chief, Division of Lung Transplant, Pittsburgh, PA, USA

3:45 pm **Live Video Question and Answer**

4:00 pm **Break**

4:30 pm **DCD Heart Donation: Ready for Prime Time?**
Steven Tsui, MD, Papworth Hospital NHS Foundation Trust, Cambridge, United Kingdom

4:45 pm **DCD Lung Donation: A Diamond in the Rough**
Marcelo Cypel, MD, MSC, FACS. FRCSC, University of Toronto, Associate Professor of Surgery, Toronto, ON, Canada

5:00 pm **Live Video Question and Answer**

In-Depth

Pharmacy
3:00 pm - 5:30 pm

Comprehensive Management in Multi-Organ Transplantation: It Takes a Village

Moderators: Linda Ohler, MSN, RN, CCTC, FAAN, FAST, Vienna, VA, USA, Laura Lourenco Jenkins, Doctor of Pharmacy, CareDx, Inc.; University of Chicago Medicine, Current Medical Science Liaison; former Transplant PharmD, Chicago, IL, USA

3:00 pm **SRTR Outcomes and Multi-Organ Transplants**
Jon Snyder, PhD, Hennepin Healthcare Research Institute, Director of Transplant Epidemiology, Minneapolis, MN, USA

3:10 pm **Allocation of Multi-Organ Transplants & Ethical Implications**
Peter Reese, MD, University of Penn, Philadelphia, PA, USA

3:20 pm **An Alternative Strategy: Sequential Versus Combined Transplantation - Are Two Operations Better Than One?**
Sylvester Black, MD, PhD, Ohio State University, Associate Professor of Surgery, Columbus, OH, USA

3:30 pm **Prepping the Patient: Surgical Sequence & Peri-operative Management of a Multi-organ Recipient**
Richard Daly, M.D., Mayo Clinic, Surgical Director of Heart and Lung Transplantation, Rochester, MN, USA

3:40 pm **Live Video Question and Answer**

4:00 pm **Break**

4:30 pm **An Immunologic Perspective: Can the Liver "Tolerate" the Rest?**
Annette Jackson, PhD, Sparks Glencoe, MD, USA

4:40 pm **The Multi-Multidisciplinary Team: Inpatient and Outpatient Coordination of Care for Multi-organ Transplant Recipients**
Gina Jamero, MSN, ACNP-BC, Cedars Sinai Heart Institute, Lead Nurse Practitioner, Heart Transplant/MCS Cardiology, Los Angeles, CA, USA

4:50 pm **Don't Go BKing My Heart: Infectious Complications & Anti-infective Prophylaxis in the Multi-organ Recipient**
Marcus Pereira, MD, MPH, New York Presbyterian Hospital, New York, NY, USA

5:00 pm **Nuances of Immunosuppressive Management in the Multi-organ Recipient**
Tracy Sparkes, PharmD, University of Maryland Medical Center, Transplant Clinical Pharmacy Specialist, Baltimore, MD, USA

5:10 pm **Live Video Question and Answer**

In-Depth

ID

3:00 pm - 5:30 pm

Transplant Infectious Diseases

Moderators: Nicole Theodoropoulos, MD, MS, University of Massachusetts Medical School, Associate Professor, Worcester, MA, USA, Peter Chin-Hong, MD, University of California, San Francisco, San Francisco, CA, USA

3:00 pm **Outbreaks: Nosocomial mold outbreaks (including Candida auris)**
Michele Morris, MD, FIDSA, FAST, University of Miami Miller School of Medicine, Director, Immunocompromised Host Service, Professor of Clinical Medicine, Division of Infectious Diseases, Miami, FL, USA

3:10 pm **Outbreaks: NTM Outbreaks in Transplant Centers**
Arthur Baker, MD, MPH, Duke University School of Medicine, Assistant Professor of Medicine, Division of Infectious Diseases, Durham, NC, USA

3:20 pm **Globalization of Transplant: Evaluation and Management of Hepatitis E after Transplantation**
Nassim Kamar, MD, PhD, -Toulouse University Hospital, Professor of Medicine, Toulouse, France

3:30 pm **Globalization of Transplant: Prevention and management of TB in transplant recipients**
Cybele Lara Abad, MD, University of the Philippines, Clinical Associate Professor, Manila, Philippines

3:40 pm **Live Video Question and Answer**

4:00 pm **Break**

Moderators: Aruna Subramanian, MD, Stanford University Hospital, Clinical Professor of Medicine, Stanford, CA, USA, Sarah Taimur, MD, Mount Sinai Medical Center, Associate Professor of Medicine, Division of Infectious Diseases, New York, NY, USA

4:30 pm **Optimizing the Transplant Candidate: Bacteremia and Ventricular Assist Device: Diagnosis and Management, and Optimal Timing of Transplantation**
Deeksha Jandhyala, M.D., Medical University of South Carolina, Assistant Professor of Medicine, Transplant Infectious Diseases, Charleston, SC, USA

4:40 pm **Pre-lung Transplant Patient on ECMO with Fevers: Diagnosis, Drug Dosing, and Technical Challenges Before and After Transplantation**
Philip Ponce, MD, University of Texas Health San Antonio, Infections in Pre-lung Transplant Patients on ECMO, San Antonio, TX, USA

4:50 pm **What's New & Novel in TID? Rapid Diagnostics: From Culture to ID (Include NGS)**
Kimberly Hanson, MD, University of Utah

5:00 pm **What's New & Novel in TID? Emerging Therapies**
Ghady Haidar, MD, University of Pittsburgh Medical Center, Assistant Professor of Medicine, Pittsburgh, PA, USA

5:10 pm **Live Video Question and Answer**

In-Depth

Other

3:00 pm - 5:30 pm

Using AI and Machine Learning for Organ Allocation Policy Design

Moderators: David Axelrod, MD, MBA, University of Iowa, Professor of Surgery, Iowa City, IA, USA, Peter Friend, MD, University of Oxford, Professor of Transplantation, Oxford, United Kingdom, Daniela Ladner, MD, MPH, Northwestern Memorial Hospital, Chicago, IL, USA

3:00 pm **Predicting Patients at Risk for Leaving the ED Without Being Seen Using Machine Learning**
Nikos Trichakis, PhD, MIT, Associate Professor, Cambridge, MA, USA

3:20 pm **Artificial Intelligence and Machine Learning to Facilitate Decision-making: Provider Perspective**
Héloise Cardinal, MD, PhD, CHUM, Dr, Montreal, QC, Canada

3:20 pm **Live Video Question and Answer**

4:00 pm **Break**

4:30 pm **Solving Major Problems in Organ Transplantation with Mobile Health Software**
Eric Pahl, BSE, University of Iowa, Graduate Research Fellow, Iowa City, IA, USA

4:40 pm **Machine Learning and Artificial Intelligence in Healthcare and Personality Emulation.**
Randi Foraker, PhD, Washington University in St. Louis School of Medicine, Associate Professor, Saint Louis, MO, USA

4:50 pm **Utilizing Machine Learning Based Predictions**
Sanjay Mehrotra, PhD, Northwestern University, Professor, Evanston, IL, USA

5:00 pm **Supporting the Future Today in Artificial Intelligence in Organ Transplantation: The UNOS Perspective**
David Klassen, MD, United Network for Organ Sharing, Chief Medical Officer, Richmond, VA, USA

5:10 pm **Live Video Question and Answer**

In-Depth

Other

3:00 pm - 5:30 pm

Racism in Transplantation: Current State and Future Directions

Moderators: Marie Chisholm-Burns, PharmD, MPH, MBA, University of Tennessee Health Science Center College of Pharmacy, Memphis, TN, USA, Andre Dick, MD, MPH, University of Washington School of Medicine Seattle, Seattle, WA, USA, Valeria Valbuena, MD, University of Michigan, Resident Physician, Ann Arbor, MI, USA

3:00 pm **Clinical Care**
Juan Caicedo, MD, Northwestern University, Associate Professor of Surgery, Chicago, IL, USA

3:15 pm **Research**
Tanjala Purnell, PhD, MPH, Johns Hopkins School of Medicine, Baltimore, MD, USA

3:30 pm **Education and Workforce**
Benjamin Samstein, MD, Weill Cornell Medical Center, Chief of Liver Transplantation, New York, NY, USA

3:45 pm **Activism/Community Engagement**
Remonia Chapman, Detroit MOTTEP, Detroit, MI, USA

4:00 pm **Live Video Question and Answer**

In-Depth
Prof Develop
3:00 pm - 5:30 pm

Mastering the Transplant Essentials
Moderators: Georgeine Smith, MS, PA-C, MHS, Hospital of the University of Pennsylvania, Philadelphia, PA, USA, Jennifer Sharp, MS, University of Michigan, Ann Arbor, MI, USA

3:00 pm **Basic Immunology Overview**
Leonardo Riella, MD, PhD, Massachusetts General Hospital, Medical Director of Kidney Transplantation, Boston, MA, USA

3:10 pm **Pharmacology Basics for Transplantation**
Christin Rogers Marks, PharmD BCPS FAST FCCP, Massachusetts General Hospital Transplant Center, Norton, MA, USA

3:20 pm **Anxiety, Depression, and Non-compliance in Transplant**
Mary Amanda Dew, PhD, University of Pittsburgh School of Medicine and Medical Center, Professor of Psychiatry, Psychology, Epidemiology, Nursing, Biostatistics, and Clinical and Translational Science, Pittsburgh, PA, USA

3:30 pm **Transplant Drug Abuse and Caregiver Concerns**
Regina Miller, BA, BSN, MSS,LCSW, Penn Medicine-HUP, Social Work Transplant Manager, Philadelphia, PA, USA

3:40 pm **Live Video Question and Answer**

4:00 pm **Break**

4:30 pm **Abdominal Complications**
Katherine Klingenberg, PA-C, University of Colorado, Director of Transplant Advanced Practice, Evergreen, CO, USA

4:40 pm **Early Infections in Transplant Patients - Case Studies**
Mark Burns, DNP, FNP, Mayo Clinic, NP, Gilbert, AZ, USA

4:50 pm **Live Video Question and Answer**

In-Depth
Basic: Translational
3:00 pm - 5:30 pm

New Approaches to Tackling Alloimmunity
Moderators: Reza Abdi, MD, Brigham & Womens Hosp, Boston, MA, USA, Ginny Bumgardner, MD PhD FACS, Ohio State University, Professor of Surgery, Columbus, OH, USA

3:00 pm **Cellular Therapy to Modify the Recipient Immune System**
Suzanne Ildstad, MD, University of Louisville / Talaris Therapeutics, Inc, Founder and CSO, Louisville, KY, USA

3:15 pm **Delivery of Targeted Immunosuppression**
Evan Scott, PhD, Northwestern University, Kay Davis Professor of Biomedical Engineering, Evanston, IL, USA

3:30 pm **Live Video Question and Answer**

4:00 pm **Break**

Moderators: Sunil Kurian, PhD, Scripps Health, Research Scientist, La Jolla, CA, USA

4:30 pm **Modifying the Immune Trafficking**
Jonathan Bromberg, MD, PhD, University of Maryland School of Medicine, Professor of Surgery and Microbiology and Immunology, Baltimore, MD, USA

4:45 pm **Single Cell Analysis for Diagnostics?**
Andrew Malone, MD, Washington University School of Medicine, Saint Louis, MO, USA

5:00 pm **Update on Tolerance Induction Protocols**
Megan Sykes, MD, Columbia University, Professor, Columbia University, Director, Columbia Center for Translational Immunology, Columbia University, New York, NY, USA

5:15 pm **Live Video Question and Answer**

5:30 pm **Break**

Networking Event

Prof Develop: Women's Health
6:00 pm - 8:00 pm

ATC's Women's Networking Event

6:00 pm **Strategies to Enhance Health & Wellness**
Elizabeth Pomfret, MD PhD, University of Colorado, Chief of Transplant Surgery, Aurora, CO, USA

Christina Klein, MD, Piedmont Transplant Institute, Medical Director, Kidney and Pancreas Transplant, Atlanta, GA, USA

6:00 pm **Tips for Managing Your Time**
Debra Sudan, MD, Duke University Medical Center, Prifessor if Surgery, Durham, NC, USA

Kathryn Tinckam, MD, MBA, MMSc,FRCPC, FAST, University Health Network, Physician-in-Chief, Toronto, ON, Canada

6:00 pm **Optimizing Mentor/Mentee Interactions**
Wendy Grant, MD, University of Nebraska Medical Center, College of Medicine, Professor of Surgery, Associate Dean for Admissions and Student Affairs, Omaha, NE, USA

Deirdre Sawinski, MD, University of Pennsylvania, Associate Professor of Medicine, Philadelphia, PA, USA

6:00 pm **Productive Communication**
Julie Heimbach, MD, Mayo Clinic, Chair, Division of Transplanation Surgery, Rochester, MN, USA

Maryjane Farr, MD, NewYork-Presbyterian/Columbia University Medical Center, Associate Professor, Medical Director, Adult Heart Transplant, New York, NY, USA

6:00 pm **Tips to Launching a Research Program**
Linda Cendales, MD, Duke University Medical Center, Durham, NC, USA

Lisa Van Wagner, IL, USA

6:00 pm **Enhancing Your Letters of Recommendation**
Ginny Bumgardner, MD PhD, Ohio State University, Professor of Surgery, Columbus, OH, USA

Deborah Adey, MD, UCSF, Professor of Medicine, Orinda, CA, USA

6:00 pm **Building Professional Connections**
Irene Kim, MD, Cedars-Sinai Medical Center, Los Angeles, Co-Director, Comprehensive Transplant Center, Associate Professor of Surgery, Los Angeles, CA, USA

Lori West, MD, D.Phil, University of Alberta, Professor, Edmonton, AB, Canada

AMERICAN TRANSPLANT CONGRESS

Day-at-a-Glance, Saturday, June 5, 2021

All Live Broadcast Programs are in Eastern Time

8:45 am – 9:00 am	**Welcome**
9:00 am – 10:00 am	**IMPACT Sessions**
10:00 am – 10:30 am	**Break**
10:30 am – 11:30 am	**Plenary Oral Abstract Session 1**
11:30 am – 12:00 pm	**Sponsor Networking**
12:00 pm – 12:30 pm	**ASTS Presidential Address**
12:30 pm – 1:30 pm	**ASTS Research Grants & Pioneer Award**
1:30 pm – 2:30 pm	**Satellite Symposia**
2:30 pm – 3:00 pm	**Break**
3:00 pm – 4:00 pm	**IMPACT Sessions**
4:00 pm – 4:30 pm	**Sponsor Networking**
4:30 pm – 5:30 pm	**Rapid Fire Oral Abstract**
4:30 pm – 7:00 pm	**Focus in Transplantation**
5:30 pm – 6:00 pm	**Break**
6:00 pm – 7:00 pm	**Rapid Fire Oral Abstract**
7:00 pm – 7:30 pm	**Break**
7:00 pm – 7:30 pm	**Sponsor Networking**
7:30 pm – 8:30 pm	**Poster Video Chat**
8:30 pm – 8:45 pm	**Break**
8:45 pm – 9:30 pm	**Expert VIP Meet Up**

Welcome
8:45 am – 9:00 am

IMPACT Sessions
Kidney
9:00 am - 10:00 am

How Low Can You Go? Assessing GFR in Living Kidney Donor Candidates
Moderators: Martha Pavlakis, MD, FAST, FASN, Beth Israel Deaconess Medical Center, Medical Director, Kidney and Pancreas Transplantaion, Boston, MA, USA, Edmund Huang, M.D., Cedars-Sinai Medical Center, Associate Professor of Medicine, Los Angeles, CA, USA

9:00 am **Association of Pre-Donation GFR on Post-Donation Outcomes - Defining the Appropriate GFR Threshold for Kidney Donation**
Emilio Poggio, MD, Cleveland Clinic, Medical Director, Kidney Transplant Program, Cleveland, OH, USA

9:20 am **Principles of GFR Measurement and Estimation - How to Evaluate GFR in Living Kidney Donor Candidates**
Nicolae Leca, MD, University of Washington, Medical Director Kidney and Pancreas Transplant Program, Seattle, WA, USA

9:10 am **Impact of Estimation Versus Measurement of GFR on the Eligibility of Potential Living Kidney Donors**
Francois Gaillard, M.D. PhD, Assistance Publique Hopitaux de Paris, Nephrology Fellow, Paris, France

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Kidney
9:00 am - 10:00 am

To Band or not to Band? AVF Access Ligation after Kidney Transplantation
Moderators: Chris Freise, MD, Univ of California-San Francisco, Interim CHief of Abdominal Transplant, San Francisco, CA, USA, Sagar Nigwekar, MD, MMSc, Massachusetts General Hospital, Dr, Boston, MA, USA

9:00 am **AVF Banding in Post-transplantation: Nephrologist's Point of View**
Claudio Rigatto, MD, University of Manitoba, AVF Banding in Post-transplantation: Nephrologist's Point of View, Winnipeg, MB, Canada

9:10 am **AVF Banding in Post-transplantation: Cardiologist's Point of View**
Ronald Zolty, University of Nebraska Medical Center, UNMC, Omaha, NE, USA

9:20 am **Live Video Question and Answer**

IMPACT Sessions
Liver
9:00 am - 10:00 am

Technical Versus Oncologic Approaches to Resectability
Moderators: M B Majella Doyle, Saint Louis, MO, USA, Charles Rosen, MD, Mayo Clinic, Professor of Surgery, Rochester, MN, USA

9:00 am **Colorectal Metastases to Deliver: Resection vs. Transplantation**
Roberto Hernandez-Alejandro, MD, University of Rochester Medical Center, Professor of Surgery, Rochester, NY, USA

9:10 am **Liver Transplantation for HCC: Resection vs. Liver Transplantation**
Timothy Pawlik, MD, MPH, PhD, The Ohio State University Wexner Medical Center, Professor and Chair of Surgery, Columbus, OH, USA

9:20 am **Criteria for Ex vivo Resection for Unresectable Tumors**
Tomoaki Kato, MD, MBA, Columbia University - College of Physicians & Surgeons, Professor of Surgery, New York, NY, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Heart
9:00 am - 10:00 am

DCD Donors for Heart Transplantation - The Devil is in the Details

Moderators: Lavanya Bellumkonda, MD, Yale School of Medicine, Associate Professor, New Haven, CT, USA, Francis Pagani, MD PhD, University of Michigan, Otto Gago MD Professor of Cardiac Surgery, Ann Arbor, MI, USA

9:00 am **Ethics and Legal Consideration in Accepting DCD Donors for Heart Transplantation**
Alexandra Glazier, JD, MPH, New England Donor Services, Inc., Waltham, MA, USA

9:10 am **The DCD Heart Trial: Study Design and Inclusion Criteria**
Jason Smith, MD, University of Wisconsin, Surgical Director of Heart Transplant and Mechanical Support, Madison, WI, USA

9:20 am **DCD Hearts Are Well Supported By Normothermic Regional Perfusion But There Are Transplant and OPO Challenges in Program Initiation**
Nader Moazami, MD, NYU Langone Transplant Institute, Professor of Cardiothoracic Surgery, New York, NY, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Pediatric
9:00 am - 10:00 am

When is a Combined Organ Transplant an Appropriate use of Organs in the Pediatric Recipient?

Moderators: Amy Gallo, Stanford, Palo Alto, CA, USA, Dominique Jan, MD, Montefiore-Albert Einstein College of Medicine, Professor of Surgery, Bronx, NY, USA

9:00 am **Updates on Heart/Liver Transplantation**
C. Andrew Bonham, MD, Stanford University Medical Center, Associate Professor, Palo Alto, CA, USA

9:10 am **Post Fontan Heart Liver Transplantation - How to Evaluate and Manage**
Lee Goldberg, MD, MPH, University of Pennsylvania, Professor of Medicine, Section Chief Advanced Heart Failure and Cardiac Transplant, Philadelphia, PA, USA

9:20 am **The Case for Combined Liver-Intestine or Multi-Visceral Transplants?**
Kishore Iyer, MBBS, FRCS, FACS,, Mount Sinai Hospital, Professor of Surgery & Pediatrics, New York, NY, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Basic: Basic
9:00 am - 10:00 am

Extracellular Vesicles in Transplantation

Moderators: Angus Thomson, PhD,DSc, University of Pittsburgh, Gilles Benichou, MD PhD, Mass Gen Hosp Harvard Med Sch, Associate Professor of surgery and immunology, Boston, MA, USA

9:00 am **Exosomes in B Cell Sensitization**
Adrian Morelli, MD, PhD, Univ of Pittsburgh, Professor, Pittsburgh, PA, USA

9:10 am **Exosomes as a Biomarker for Tissue Rejection**
Prashanth Vallabhajosyula, MD, MS, Yale University School of Medicine, Associate Professor of Surgery, New Haven, CT, USA

9:20 am **IL-35: Exokine, How Transplant Tolerance Gets Local**
William Burlingham, PhD, University of Wisconsin, Professor-Emeritus, Madison, WI, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Translational
9:00 am - 10:00 am

The Infection Rejection Connection in Solid Organ Transplantation

Moderators: Deepali Kumar, MD, University Health Network, Toronto, ON, Canada, Hans H. Hirsch, MD, MSc, University of Basel / Department Biomedicne, Professor, Basel, Switzerland

9:00 am **T cell Mediated Protection to CMV**
Jonathan Maltzman, MD, PhD, FAST, Stanford University, Associate Professor, Palo Alto, CA, USA

9:10 am **Infection and Lung Transplantation**
Daniel Calabrese, MD, University of California, San Francisco, Assistant Professor, San Francisco, CA, USA

9:20 am **BK and Rejection**
Michelle Josephson, MD, University of Chicago, Medical Director, Kidney and Pancreas Transplantation, Chicago, IL, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

ID
9:00 am - 10:00 am

The Infected Donor and Recipient: When is it Safe to Transplant

Moderators: Jennifer Chow, MD, MS, Tufts Medical Center, Associate Professor Of Medicine, Boston, MA, USA, Michael Ison, MD, MS, Northwestern University Comprehensive Transplant Center, Professor, Chicago, IL, USA

9:00 am **Endemic Mycosis**
Rachel Miller, MD, Duke University, Professor of Medicine, DURHAM, NC, USA

9:15 am **Multi-drug Resistant Organisms**
Fernanda Silveira, MD, University of Pittsburgh and UPMC, Associate Professor of Medicine, Pittsburgh, PA, USA

9:30 am **Chagas Seropositive Donor for Heart Transplant Candidate**
Ricardo La Hoz, MD, University of Texas Southwestern Medical Center, Associate Professor of Internal Medicine, Dallas, TX, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Pharmacy
9:00 am - 10:00 am

Stop the Pain! Novel Opioid Minimization Strategies to Mitigate Pain in the Pre-, Peri-, and Post-Operative Transplant Phases

Moderators: Erika Meredith, PharmD, BS, Emory Healthcare, Clinical Pharmacy Specialist, Solid Organ Transplant, Atlanta, GA, USA, Nicole Pilch, PharmD, MS, BCPS, Medical University of South Carolina, Quality and Safety Operations Director, Associate Professor of Clinical Pharmacy, Charleston, SC, USA

9:00 am **Role of ERAS Protocols and Blocks for the Elimination of Opioids in the Post-operative Transplant Phase**
Jeanette Avery, DNP, AGACNP-BC, VCU Health, Richmond, VA, USA

9:10 am **Non-opioid Pharmacologic Alternatives for Pain Control Pearls/Pitfalls**
Maya Campara, PharmD, UIC, Clinical Associate Professor/Transplant Clinical Pharmacist, Chicago, IL, USA

9:20 am **Peri-operative Strategies to Mitigate Opioid Utilization Post Kidney Transplant**
Vinayak Rohan, MD, Medical University of South Carolina, Assistant Professor, Charleston, SC, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Public Policy
9:00 am - 10:00 am

US Organ Allocation - An Update

Moderators: Nicole Turgeon, MD, Dell Seton Medical Center at The University of Texas, Professor of Surgery, Austin, TX, USA, Sean Pinney, MD, University of Chicago, Chicago, IL, USA

9:00 am **The Times, They Are a Changing - Lungs**
Maryam Valapour, MD, MPP, Cleveland, OH, USA

9:10 am **The Times, They Are a Changing - Liver**
James Trotter, MD, Baylor Dallas, doctor, Dallas, TX, USA

9:20 am **The Times They Are a Changing - Heart**
Shelley Hall, MD, Baylor Univ Medical Center, Chief, Transplant Cardiology, MCS and Adv HF, Dallas, TX, USA

9:30 am **The Times, They Are a Changing - Kidney**
Vincent Casingal, MD, Atrium Health-Carolinas Medical Center, Chief, Division of Abdominal Transplant, Charlotte, NC, USA

9:40 am **Live Video Question and Answer**

IMPACT Sessions

Ethics
9:00 am - 10:00 am

We Said Yes; Transplanting Patients with Alcoholic Liver Disease: Time to Focus on Aftercare

Moderators: Sheila Jowsey-Gregoire, MD, Mayo Clinic, Associate Professor of Psychiatyr, Rochester, MN, USA, Jared White, MD, Medical University of South Carolina Transplant Center, Associate Professor of Surgery, Charleston, SC, USA

9:00 am **The Risk and Protective Factors Preventing Relapse (The Six-month Rule is so Yesterday.)**
Jody Jones, PhD, University of Iowa Hospitals and Clinics, Clinical Associate Professor, Department of Surgery, Iowa City, IA, USA

9:10 am **When the Carrot is Gone: Utilizing an Integrative Group Therapy Approach with Alcohol Liver Transplant Recipients to Reduce Relapse after Transplant**
Wendy Balliet, Ph.D., Medical University of South Carolina, Associate Professor; Clinical Psychologist, Charleston, SC, USA

9:20 am **Live Video Question and Answer**

10:00 am **Break**

Plenary Session 1

10:30 am - 11:30 am

Moderators: Marwan Abouljoud, MD, CPE, FACS, MMM, Henry Ford Transplant, Detroit, MI, USA, Richard Formica, MD, FAST, Yale Univ School of Medicine, New Haven, CT, USA

10:30 am **Donor Derived Transmissions 2019: Analysis of the OPTN Ad Hoc Disease Transmission Advisory Committee (DTAC)**
L. Danziger-Isakov[1], M. G. Michaels[1], A. Agarwal[1], S. Aslam[1], K. Dunn[1], J. Goldman[1], D. Levine[1], C. Marboe[1], G. Marklin[1], S. Pouch[1], M. Rana[1], R. Razonable[1], H. L. Stevenson[1], H. S. Te[1], A. Woolley[1], E. Ward[2], C. Jett[2], L. Cartwright[2], R. La Hoz[1], [1]OPTN DTAC, Richmond, VA, USA, [2]UNOS, Richmond, VA, USA

10:40 am **Combined CD11b/CD40 Blockade is Superior to CD40 Blockade Alone in Prolonging Survival in Pig-to-Nonhuman Primate Renal Xenotransplantation**
D. A. Faber[1], B. Lovasik[1], A. Matar[1], C. Breeden[1], S. Kim[1], A. Adams[2], [1]Surgery, Emory University School of Medicine, Atlanta, GA, USA, [2]Surgery, University of Minnesota, Minneapolis, MN, USA

10:50 am **Engineered Human Glomerular Endothelial Cells to Identify Non-hla Antibodies and Decipher Their Pathogenicity After Kidney Transplantation**
B. Lamarthée[1], C. Burger[1], C. Leclaire[1], L. Morin[1], F. Terzi[1], C. Tinel[1], D. Anglicheau[2], [1]Inserm U1151, Necker-Enfants Malades Institute, Paris, France, [2]Necker Hospital, AP-HP, Department of Nephrology and Kidney Transplantation, Paris, France

11:00 am **Myeloid Foxo1-β-catenin Axis Regulates Hedgehog/Gli1 Signaling and Controls NLRP3-Mediated Innate Immune Responses in Sterile Inflammatory Liver Injury**
D. Xu, C. Li, M. Sheng, Y. Lin, Y. Tian, Y. Zhan, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, Surgery, Dumont - UCLA Transplant Center, Los Angeles, CA, USA

11:10 am **Live Video Question and Answer**

Sponsor Networking

11:30 am - 12:00 pm

These symposia are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Sanofi - Going the Distance: The Changing Map of Kidney Allocation - Hosted by Dr John Friedewald

Veloxis - Real World Application of ENVARSUS XR® (PART 1) – De Novo Dosing and Monitoring

ASTS Presidential Address

All Topics
12:00 pm - 12:30 pm

ASTS Presidential Address

12:00 pm **Introduction**
Lloyd Ratner, MD, MPH, Columbia University, New York, NY, USA

12:10 pm **Presidential Address**
Marwan Abouljoud, MD, CPE, FACS, MMM, Henry Ford Transplant Institute, Detroit, MI, USA

Society Awards

All Topics
12:30 pm - 1:30 pm

ASTS Research Grants & Pioneer Award

12:30 pm **Research Grants Presentations**
John Roberts, MD, University of California San Francisco, San Francisco, CA, USA

1:00 pm **Research Grants & Pioneer Award Presentation**
Marwan Abouljoud, MD, CPE, FACS, MMM, Henry Ford Transplant Institute, Detroit, MI, USA

Sponsored Satellite Symposia

1:30 pm - 2:30 pm

These symposia are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

dd-cfDNA and GEP in Kidney Transplantation – Redundant or Complementary?

Supported by Eurofins Transplant Diagnostics

Fresh Perspectives on Rejection Assessment with cfDNA

Supported by Natera

IMPACT

Basic

3:00 pm - 4:00 pm

Fc Region: The Business End of Antibody Regulation

Moderators: William Baldwin, MD, PhD, Cleveland Clinic, Staff, Cleveland, OH, USA, Rebecca Sosa, Ph.D., UCLA, Postdoctoral Fellow, Los Angeles, CA, USA

3:00 pm **Fc Receptor Polymorphisms and DSA**
Nicole Valenzuela, PhD, UCLA, Assistant Professor, Los Angeles, CA, USA

3:10 pm **Live Video Question and Answer**

IMPACT

Heart

3:00 pm - 4:00 pm

Rise of the Machines: The Evolution of Patient Management in the New Heart Allocation System

Moderators: Hannah Copeland, MD, Lutheran Hospital / Indiana University School of Medicine Fort Wayne, Surgical Director of Heart Transplant, MCS and Director of ECMO, Fort Wayne, IN, USA, Richard Daly, M.D., Mayo Clinic, Surgical Director of Heart and Lung Transplantation, Rochester, MN, USA

3:00 pm **All Aboard the ECMO Train: How, When, and Why Not?**
Barbara Pisani, DO, FACC, Wake Forest Medical Center, Winston Salem, NC, USA

3:10 pm **What Do You Mean? Cardiogenic Shock Classification and Practical Applications**
David Baran, MD, Sentara Heart Hospital, System Director, Advanced HF, Tx and MCS, Norfolk, VA, USA

3:20 pm **Trains, Planes, and Automobiles: Percutaneous MCS Devices for Cardiogenic Shock**
Danny Ramzy, MD, Cedars Sinai, Vice Chair Innovation, Los Angeles, CA, USA

3:30 pm **Live Video Question and Answer**

IMPACT

ID

3:00 pm - 4:00 pm

Herpes Just Keeps Coming Back: How to Manage Difficult Herpes Virus Infections

Moderators: Maricar Malinis, MD, Yale School of Medicine, Associate Professor of Medicine and Surgery (Transplant), New Haven, CT, USA, Atul Humar, MD, MSC, Toronto General Hospital, Dr., Toronto, ON, Canada

3:00 pm **Treatment of Resistant and Refractory CMV - Where do we Stand in 2021?**
Daniel Kaul, MD, University of Michigan, Director Transplant Infectious Disease, Ann Arbor, MI, USA

3:10 pm **CTL as Antiviral Therapy Option in Solid Organ Transplant Recipients**
Susan Prockop, MD, Memorial Sloan Kettering Cancer Center, Associate Attending, New York, NY, USA

3:20 pm **It's not just CMV and EBV: The Other Herpes Viruses Cause and Major Problems too!**
Jonathan Hand, MD, Ochsner Medical Center, New Orleans, LA, USA

3:30 pm **Live Video Question and Answer**

IMPACT

Kidney
3:00 pm - 4:00 pm

Kidney Paired Donation: Innovation & Evolution Leading to Improved Outcomes

Moderators: Didier Mandelbrot, MD, UW Health, Madison, WI, USA, Jeff Veale, MD, UCLA, Professor, Director Kidney Exchange Program, Los Angeles, CA, USA

3:00 pm **Bigger is better: Is There Still a Case to Be Made for Single Center Paired Exchanges?**
Asif Sharfuddin, MD, Indiana University School of Medicine, Associate Professor of Clinical Medicine, Indianapolis, IN, USA

3:10 pm **Benefits of Compatible Pairs: Do We Even Need To Debate This Further?**
Dorry Segev, MD, PhD, Johns Hopkins University, Professor of Surgery, Baltimore, MD, USA

3:20 pm **Advanced Donation Programs: Past, Present and Future**
Matthew Cooper, MD, MedStar Georgetown Transplant Institute, Director, Kidney and Pancreas Transplantation, Washington, DC, USA

3:30 pm **Live Video Question and Answer**

IMPACT

Kidney
3:00 pm - 4:00 pm

KDPI: Time for a New Look?

Moderators: David Klassen, MD, United Network for Organ Sharing, Chief Medical Officer, Richmond, VA, USA, Sandra Amaral, MD, MHS, Children's Hospital of Philadelphia, Associate Professor, Philadelphia, PA, USA

3:00 pm **The Source of Truth? APOL1 and KDPI**
Barry Freedman, MD, Wake Forest, Professor and Chief, Section on Nephrology, Winston-Salem, NC, USA

3:10 pm **KDPI Doesn't Work for Kids**
Lainie Ross, MD, PhD, University of Chicago, Carolyn & Matthew Bucksbaum Professor of Clinical Ethics, Chicago, IL, USA

3:20 pm **Is KDPI Correct in the New Hepatitis C World?**
Darren Stewart, MS, United Network for Organ Sharing, Principal Research Scientist, Richmond, VA, USA

3:30 pm **Live Video Question and Answer**

IMPACT

Liver
3:00 pm - 4:00 pm

Beyond Survival: When MELD isn't Enough

Moderators: Josh Levitsky, MD, MS, northwestern, Professor of Medicine, Evanston, IL, USA, Elizabeth Pomfret, MD, PhD, FACS, University of Colorado, Chief, Transplant Surgery, Aurora, CO, USA

3:00 pm **The Hidden Risks of Low MELD Patients**
Daniela Ladner, MD, MPH, Northwestern Memorial Hospital, Professor of Surgery, Chicago, IL, USA

3:10 pm **Determining Timing of LDLT: An Approach to Assess Quality of Life in Addition to Survival**
Abhinav Humar, MD, Thomas E Starzl Transplant Inst, Pittsburgh, PA, USA

3:20 pm **Eye on the Prize: Metrics to Strive for after Liver Transplant in Addition to Patient and Graft Survival**
David Goldberg, MD, MSCE, University of Miami, Associate professor of Medicine, Miami, FL, USA

3:30 pm **Live Video Question and Answer**

IMPACT

Lung
3:00 pm - 4:00 pm

Taking a Step Further: Ex Vivo Lung Perfusion: (EVLP): The Clinical, Therapeutic and Scientific Opportunities

Moderators: Daniel Dilling, MD, Loyola University Medical Center, Professor of Medicine, Maywood, IL, USA, Norihisa Shigemura, MD, PhD, Temple University Health System and Lewis Katz School of Medicine, Professor of Surgery and Surgical Director of Lung Transplant and Lung Failure, Philadelphia, PA, USA

3:00 pm **Creating an EVLP Program and Incorporating it into your Center: Which Protocol, Which Donors, and Troubleshooting**
Bryan Whitson, MD, PhD, The Ohio State University, Columbus, OH, USA

3:10 pm **EVLP in DCD**
Edward Cantu, MD, MSCE, University of Pennsylvania, EVLP in DCD, Philadelphia, PA, USA

3:20 pm **EVLP as a Therapeutic Platform to Recondition and Treat Injured Lungs**
Marcelo Cypel, MD, MSC, FACS. FRCSC, University of Toronto, Associate Professor of Surgery, Toronto, ON, Canada

3:30 pm **EVLP: The Economics and Analytic Decision Model**
Matthew Hartwig, MD, Duke University, Associate Professor of Surgery with tenure, Durham, NC, USA

3:40 pm **Live Video Question and Answer**

IMPACT

Pancreas
3:00 pm - 4:00 pm

The Multidisciplinary Approach to Total Pancreatectomy with Islet Auto Transplantation Patient Care

Moderators: Kristin Kuntz, Ph.D., The Ohio State University Medical Center, Associate Professor of Psychiatry, Columbus, OH, USA, Srinath Chinnakotla, MD, University of Minnesota, Surgical Director, Liver Transplantation, Minneapolis, MN, USA

3:00 pm **The Pharmacist's Role in Caring for the TPIAT Patient**
Abbie Leino, PharmD, MS, University of Michigan, Clinical Pharmacist, Ann Arbor, MI, USA

3:10 pm **The Physician's Role in Caring for the TPIAT Patient**
Luis F Lara, MD, The Ohio State University Wexner Medical Center, Professor of Clinical Medicine, Columbus, OH, USA

3:20 pm **Live Video Question and Answer**

IMPACT

Pharmacy
3:00 pm - 4:00 pm

Role of Biomarkers in Current Clinical Practice - Remote Monitoring for the Spectrum of Solid Organ Transplantation

Moderators: Ryan Winstead, PharmD, Virginia Commonwealth University Heath, Clinical Pharmacist, Richmond, VA, USA, Shelley Hall, MD, Baylor University Medical Center – Heart Center, Dallas, Chief, Transplant Cardiology, MCS and Adv HF, Dallas, TX, USA

3:00 pm **Hitting the Mark with Biomarkers in Kidney Transplant**
Alicia Lichvar, PharmD, University of Illinois at Chicago, Clinical Assistant Professor, Chicago, IL, USA

3:10 pm **Hitting the Mark with Biomarkers in Heart Transplant**
Jill Krisl, PharmD, Houston Methodist Hospital, Clinical Pharmacy Specialist, Houston, TX, USA

3:20 pm **Hitting the Mark with Biomarkers in Liver Transplant**
David Salerno, Pharm.D., New York Presbyterian/Weill Cornell Medical Center, Clinical Pharmacy Manager - Liver Transplantation, New York, NY, USA

3:30 pm **Hitting the Mark with Biomarkers in Lung Transplant**
Deborah Levine, MD, University of Texas, Medical Director Lung Transplantation, San Antonio, TX, USA

3:40 pm **Live Video Question and Answer**

IMPACT

Translational
3:00 pm - 4:00 pm

Nanotherapeutics in Organ Transplantation: How Close are We?

Moderators: Mark Saltzman, PhD, Yale University, Goizueta Foundation Professor of Chemical and Biomedical Engineering, New Haven, CT, USA, Carl Atkinson, PhD, Medical University of South Carolina, Charleston, SC, USA

3:00 pm **Nanotherapy: Past, Present and Future**
Gregory Tietjen, PhD, Yale University, New Haven, CT, USA

3:10 pm **"On Target": Systemic Delivery of Nanotherapeutics in Transplantation**
Reza Abdi, MD, Brigham & Womens Hosp, Professor of Medicine, Boston, MA, USA

3:20 pm **Live Video Question and Answer**

IMPACT

VCA
3:00 pm - 4:00 pm

Psychosocial and Bioethical Aspects of VCA: An Update

Moderators: David Sarwer, Ph.D., Temple University College of Public Health, Associate Dean for Research, Philadelphia, PA, USA, Elisa Gordon, PhD, MPH, Elisa's Mastercard, Professor, Oak Park, IL, USA

3:00 pm **Medical Decision Making for VCA Candidates**
Sheila Jowsey-Gregorie, MD, Associate Professor of Psychiatry, Mayo Clinic, Transplant Psychiatrist, Rochester, MN, USA

3:10 pm **Development of a Social Media Campaign to Promote VCA Donation**
Macey Henderson, JD, PhD, Johns Hopkins University, Assistant Professor of Surgery, Baltimore, MD, USA

3:20 pm **Why Consenting to VCA is the Only Thing that Makes Sense**
Amy Friedman, MD, LiveOnNY, Chief Medical Officer & Executive Vice President, New York, NY, USA

3:30 pm **How Much Does the VCA Caregiver Matter?**
Simon Talbot, MD, Brigham and Women's Hospital, Associate Professor, Harvard Medical School, Boston, MA, USA

3:30 pm **Live Video Question and Answer**

Sponsor Networking

4:00 pm – 4:30 pm

Take this time to visit our partners in the ATC Virtual Sponsor Lounge. Check out all of the lounges and the interact with the sponsors directly. Don't miss out on the Virtual Connection Sessions! This is content curated by the sponsors and hosted in an interactive forum.

Rapid Fire Oral Abstracts

Basic
4:30 pm - 5:30 pm

Biomarkers, Immune Assessment and Clinical Outcomes - I

Moderators: Lorenzo Gallon, MD, Northwestern University, MD, Professor of Medicine, Chicago, IL, USA, Daniel Maluf, MD, University of Maryland School of Medicine, Director, Program in Transplantation, Baltimore, MD, USA

4:30 pm **A Single Nucleotide Polymorphism within the FCGR3A 158 F/V Gene is Associated with Decreased Survival of Renal Allografts with Chronic Active Antibody-Mediated Rejection**
N. H. Litjens, A. M. Peeters, J. A. Kal-van Gestel, M. Klepper, M. G. Betjes, *Internal Medicine, Nephrology and Transplantation, Erasmus MC, University Medical Center, Rotterdam, Netherlands*

4:35 pm **T-cell-Mediated Immunity to Sars-cov-2 Defines Covid-19 Risk and Severity in Transplanted and Non-Transplanted Individuals and Associates with Myeloid-Derived Suppressor Cells**
C. Ashokkumar[1], V. Rohan[2], A. H. Kroemer[3], S. Rao[4], G. Mazariegos[5], B. W. Higgs[5], S. Nadig[2], M. Ningappa[5], T. Fishbein[3], S. Subramaniam[6], R. Sindhi[7], *[1]Plexision, Pittsburgh, PA, [2]Medical University of South Carolina, Charleston, SC, [3]MedStar Georgetown Transplant Institute, Georgetown, DC, [4]DHR Health Institute for Research and Development, Texas, TX, [5]University of Pittsburgh, Pittsburgh, PA, [6]University of California, San Diego, CA, [7]University of Pittsburgh, pittsburgh, PA*

4:40 pm **Precision Medicine Tools in Kidney Transplant (KTx): Implications for Individualized Immunosupression Therapy and Downstream Cost-savings**
S. Anand, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*

4:45 pm **Characterisation of Distinct Graft Infiltrates Following Cellular Therapy in Kidney Transplant Recipients**
M. O. Brook[1], P. N. Harden[2], I. Roberts[2], W. R. Mulley[3], J. Hester[1], M. E. Reinders[4], F. Issa[1], *[1]Nuffield Department of Surgical Sciences, University of Oxford, Oxford, United Kingdom, [2]Oxford University Hospitals NHS Foundation Trust, Oxford, United Kingdom, [3]Department of Nephrology, Monash Medical Centre, Melbourne, Australia, [4]Division of Nephrology and Transplant Center, Leiden University Medical Center, Leiden, Netherlands*

4:50 pm **Integrative Analyses of Circulating Small Rnas and Paired Kidney Graft Transcriptome in Transplant Glomerulopathy**
C. Kuscu[1], K. Manjari[2], M. Akram[3], C. Kuscu[4], A. Wolen,[4], A. Bajwa[4], J. Eason[4], D. G. Maluf[5], V. Mas[6], E. Akalin[7], *[1]Surgery, James D Eason Transplant Institute, UTHSC, Memphis, TN, [2]Department of Systems and Computational Biology, School of Life Sciences, University of Hyderabad,, Hyderabad,, India, [3]Center for Biomedical Informatics, University of Tennessee Health Science Center, Memphis, TN, [4]Surgery, James D Eason Transplant Institute, Memphis, TN, [5]Surgery, Program in Transplantation, University of Maryland, Baltimore, MD, [6]Surgery, Division Surgical Science, University of Maryland, Baltimore, MD, [7]Medicine, Montefiore Medical Center, Abdominal Transplant Program, Albert Einstein College of Medicine,, NYC, NY*

4:55 pm **Utility of Follow-up Biopsies After Acute Rejection in Pediatric Kidney Transplantation**
S. S. Raza[1], V. Hauptfeld-Dolejsek[1], F. Rosenblum[1], E. C. Mroczek-Musulman[2], D. R. Kelly[2], M. Seifert[1], *[1]Department of Nephrology, UAB School of Medicine, Birmingham, AL, [2]Children's of Alabama, Birmingham, AL*

5:00 pm **The Gut Microbiome in Heart Transplantation: A Prospective Pilot Study**
M. Dela Cruz[1], E. Littmann[2], R. Nayak[2], C. Lehmann[2], R. Keskey[3], T. Baker[3], H. Lin[2], A. Bennett[1], G. Kim[1], S. Pinney[1], E. Pamer[2], A. B. Nguyen[1], *[1]Cardiology, University of Chicago, Chicago, IL, [2]Medicine, University of Chicago, Chicago, IL, [3]Surgery, University of Chicago, Chicago, IL*

5:05 pm **Peripheral Blood Hematopoietic Chimerism: A Robust Biomarker for Transplantation Tolerance**
D. Tollerud[1], E. Gornstein[1], J. Leventhal[2], K. V. Ravindra[3], S. Ildstad[1], *[1]Talaris Therapeutics, Louisville, KY, [2]Division of Organ Transplantation, Northwestern Medical Group, Chicago, IL, [3]Department of Surgery, Duke University Medical Center, Durham, NC*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

ID
4:30 pm - 5:30 pm

COVID-19 Session 1
Moderators: Joanna Schaenman, MD, PhD, David Geffen School of Medicine at UCLA, Los Angeles, CA, USA, Paschalis Vergidis, MD, MSc, Mayo Clinic, Assistant Professor, Rochester, MN, USA

4:30 pm **Solid Organ Transplant Recipient Attitudes Towards a SARS-CoV-2 Vaccine**
M. Ou[1], B. Boyarsky[1], L. Zeiser[1], T. Chiang[1], J. Ruddy[1], S. Rasmussen[1], J. Martin[2], J. Russell[2], C. Durand[1], R. Avery[1], W. Werbel[1], M. Cooper[3], A. Massie[1], D. Segev[1], J. Garonzik-Wang[1], *[1]Johns Hopkins, Baltimore, MD, [2]National Kidney Foundation, New York, NY, [3]Medstar Georgetown Transplant Institute, Washington, DC*

4:35 pm **Systematic Screening of Kidney Transplant Patients Points Towards Deficits in Neutralizing Antibody Capacity Against Sars-cov-2**
V. Wijtvliet[1], K. K. Ariën[2], J. Mariën[2], B. Peeters[3], R. Hellemans[4], A. Massart[4], S. Van Hees[1], P. Moons[5], H. Theeten[6], P. Van Damme[6], H. Goossens[7], B. Y. De Winter[1], K. J. Ledeganck[1], D. Abramowicz[4], *[1]Laboratory of Experimental Medicine and Pediatrics, University of Antwerp, Antwerp, Belgium, [2]Department of Biomedical Sciences, Institute of Tropical Medicine and University of Antwerp, Antwerp, Belgium, [3]Department of Laboratory Medicine, Antwerp University Hospital, Antwerp, Belgium, [4]Department of Nephrology and Hypertension, Antwerp University Hospital, Antwerp, Belgium, [5]Biobank, Antwerp University Hospital, Antwerp, Belgium, [6]Centre for the Evaluation of Vaccination, Vaccine and Infectious Disease Institute, University of Antwerp, Antwerp, Belgium, [7]Department of Medical Microbiology, Vaccine & Infectious Disease Institute, University of Antwerp, Antwerp, Belgium*

4:40 pm **Clinical Outcomes of Solid Organ Transplant Recipients Treated with Remdesivir and Convalescent Plasma for Covid-19 at the Largest Transplant Center in the United States**
A. Fernandez, S. Anjan, A. Chandorkar, D. de Lima, R. Zamora, L. A. Mendez-Castaner, J. Simkins, J. Camargo, M. Morris, M. Loebe, J. Bauerlein, C. O'Brien, N. Sinha, G. Burke, G. Ciancio, A. Mattiazzi, R. Vianna, L. Abbo, G. Guerra, Y. Natori, *Miami Transplant Institute, Jackson Health System, Miami, FL*

4:45 pm **Development and Durability of Sars-cov-2 Antibodies Among Solid Organ Transplant Recipients**
B. Boyarsky, M. Ou, R. Greenberg, M. Krach, R. Wang, T. P. Chiang, W. Werbel, R. Avery, W. Clarke, A. Tobian, A. Massie, D. Segev, J. Garonzik-Wang, *Johns Hopkins, Baltimore, MD*

4:50 pm **Polyfunctional T-cell Impairment to Sars-cov-2 Coronavirus in Solid Organ Transplant Recipients with Acute Covid-19 Infection**
A. Favà[1], L. Donadeu[2], V. Pernin[3], M. Meneghini[1], E. Crespo[2], N. Sabé[4], L. Lladó[5], J. Gonzalez-Costello[6], O. Thaunat[7], O. Bestard[1], *[1]Kidney Transplantation Unit, Bellvitge University Hospital- IDIBELL, L'Hospitalet de Llobregat. Barcelona, Spain, [2]Experimental Nephrology Laboratory, IDIBELL, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [3]Kidney Transplant Unit, Hospital de Montpellier, Montpellier, France, [4]Infectious Disease Department, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [5]Liver Transplant Unit, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [6]Heart Transplantation Unit, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [7]Department of Transplantation, Edouard Herriot Hospital Lyon, Lyon, France*

4:55 pm **Longitudinal Antibody Response and Viral Loads in Covid-infected Organ Transplant Recipients**
T. M. Marinelli, V. H. Ferreira, M. Ierullo, V. Kulasingham, B. Majchrzak-Kita, C. Rotstein, S. Husain, S. Hosseini, A. Humar, D. Kumar, *UHN, Toronto, ON, Canada*

5:00 pm **Attitudes Towards Covid-19 Vaccination in an Inner-city Population of Kidney Transplant Patients (Ktx)**
P. Kerner, A. Imas, G. Udod, L. Gruffi, M. Goldberg, A. Saleh, K. Cruickshank, M. Markell, *SUNY Downstate Health Sciences University, Brooklyn, NY*

5:05 pm **Early Detection of SARS-CoV-2 and Other Infections in Solid Organ Transplant Recipients and Household Members Using Wearable Devices**
E. H. Li[1], E. Mukhtar[1], E. D. Elftmann[1], F. R. Eweje[1], H. Gao[1], L. I. Ibrahim[1], R. G. Kathawate[1], A. C. Lee[1], K. A. Moore[1], N. Nair[1], S. Amaral[2], M. Snyder[3], B. J. Keating[1], *[1]Department of Surgery, Penn Transplant Institute, Division of Transplantation, Philadelphia, PA, [2]Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA, [3]Department of Genetics, Stanford University, Palo Alto, CA*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Heart
4:30 pm - 5:30 pm

Heart: Triple "D" in Heart Transplantation: DCD, Dual-Organ and Declined Hearts

Moderators: Hannah Copeland, MD, Lutheran Hospital / Indiana University School of Medicine Fort Wayne, Surgical Director of Heart Transplant, MCS and Director of ECMO, Fort Wayne, IN, USA, Jacob Schroder, MD, Duke University School of Medicine, Surgical Director, Heart Transplantation Program, Durham, NC, USA

4:30 pm **Steroid-free Immunosuppression in Heart-Kidney Transplant Patients: Is It Safe?**
R. Skorka, J. Patel, M. Kittleson, N. Patel, T. Singer-Englar, A. Velleca, B. Azarbal, D. Chang, E. Kransdorf, L. Czer, D. Megna, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

4:35 pm **Adult Combined Liver-Heart Transplantation: The United States Experience**
I. A. Ziogas[1], S. P. Alexopoulos[1], W. K. Wu[1], L. K. Matsuoka[1], M. A. Rauf[1], M. Izzy[2], R. Perri[2], K. H. Schlendorf[3], J. N. Menachem[3], A. S. Shah[4], *[1]Division of Hepatobiliary Surgery and Liver Transplantation, Vanderbilt University Medical Center, Nashville, TN, [2]Department of Medicine, Division of Gastroenterology, Hepatology and Nutrition, Vanderbilt University Medical Center, Nashville, TN, [3]Division of Cardiovascular Medicine, Vanderbilt University Medical Center, Nashville, TN, [4]Department of Cardiac Surgery, Vanderbilt University Medical Center, Nashville, TN*

4:40 pm **High Degree of Center Variation in Simultaneous Heart Kidney Transplant: Opportunities for Standardization**
B. I. Shaw[1], M. L. Samoylova[1], S. J. Kesseli[1], D. Olaso[2], A. S. Barbas[1], D. L. Sudan[1], L. E. Boulware[3], L. M. McElroy[1], *[1]Surgery, Duke University, Durham, NC, [2]School of Medicine, Duke University, Durham, NC, [3]Medicine-Nephrology, Duke University, Durham, NC*

4:45 pm **Allograft Discard Risk Index for Heart Transplantation**
R. M. Reul[1], A. A. Saleem[1], C. N. Keller[1], T. H. Malik[1], J. A. Goss[2], A. A. Rana[2], *[1]Office of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

4:50 pm **Waitlist and Post-Transplant Outcomes of Candidates With Lvad: Comparison of Old and New Heart Allocation Policies**
M. Colvin[1], Y. Ahn[2], S. Hall[3], M. Walsh[4], A. Israni[2], *[1]Univ of Michigan, Ann Arbor, MI, [2]SRTR, Minneapolis, MN, [3]Baylor Univ, Dallas, TX, [4]St. Vincent Heart Ctr, Indianapolis, IN*

4:55 pm **Liver Biopsy as a Predictor in Risk Stratification for Heart Transplant Candidates**
S. Tolia[1], T. Al Saadi[1], N. Narang[2], A. Joshi[2], C. Sciamanna[2], S. Pauwaa[2], G. Macaluso[2], M. Dia[2], A. Tatooles[3], P. Pappas[3], W. Cotts[2], A. Andrade[2], *[1]Internal Medicine, Advocate Christ Medical Center, Oak Lawn, IL, [2]Cardiology, Advocate Christ Medical Center, Oak Lawn, IL, [3]Cardiovascular Surgery, Advocate Christ Medical Center, Oak Lawn, IL*

5:00 pm **Donor Factors Associated with In-field Decline of Heart Allografts**
L. Piechura, F. Yazdchi, M. Harloff, H. Shim, M. Keshk, A. Coppolino, III, D. Rinewalt, H. Mallidi, *Brigham and Women's Hospital, Boston, MA*

5:05 pm **Waitlist and Post-Transplant Outcomes of Candidates with Iabp or Ecmo: Comparison of Old and New Heart Allocation Policies**
M. Colvin[1], Y. Ahn[2], S. Hall[3], M. Skeans[2], M. Walsh[4], A. Israni[2], *[1]Univ of Michigan, Ann Arbor, MI, [2]SRTR, Minneapolis, MN, [3]Baylor Univ, Dallas, TX, [4]St. Vincent Heart Ctr, Indianapolis, IN*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
4:30 pm - 5:30 pm

Kidney Deceased Donor Allocation
Moderators: Susan Lerner, MD, Mount Sinai Hospital, Associate Professor of Surgery, New York, NY, USA, Darren Stewart, MS, United Network for Organ Sharing, Principal Research Scientist, Richmond, VA, USA

4:30 pm **Clinical Outcomes and Racial Impact of HLA Matching in the Australian Deceased Donor Kidney Transplantation Program, 2000-2018**
M. Gramlick, M. Heer, *Department of Surgery, John Hunter Hospital, Newcastle, Australia*

4:35 pm **Allocating Kidneys in Optimized Circles: Logistics are More Important Than Distance**
R. Saidi, R. Shahbazov, M. Hanlon, M. laftavi, *SUNY Upstate, Syracuse, NY*

4:40 pm **Status of Kidney Allocation in Liver-kidney Transplants Before and After the UNOS/OPTN Policy**
J. Oveyssi, M. Hussain, P. Homkrailas, S. Bunnapradist, *Department of Internal Medicine: Division of Transplant Nephrology, UCLA, Los Angeles, CA*

4:45 pm **The Association Between Environmental Determinants and High KDRI Organ Offer Acceptance Ratios**
A. M. Placona, C. Martinez, M. Stuart, *United Network for Organ Sharing, Henrico, VA*

4:50 pm **Kidney Transplantation in Very Highly-Sensitized Patients with Maastricht Type III Non-heart-Beating Donors**
F. Villanego[1], A. Mazuecos[1], L. Vigara[1], V. Lopez[2], G. Bernal[3], A. Rodriguez-Benot[4], M. de Gracia[5], P. Castro[6], A. Alvarez[6], *[1]Department of Nephrology, Hospital Puerta del Mar, Cadiz, Spain, [2]Department of Nephrology, Hospital Carlos Haya, Malaga, Spain, [3]Department of Nephrology, Hospital Virgen del Rocio, Sevilla, Spain, [4]Department of Nephrology, Hospital Reina Sofia, Cordoba, Spain, [5]Department of Nephrology, Hospital Virgen de las Nieves, Granada, Spain, [6]Andalusian Transplant Coordination, Sevilla, Spain*

4:55 pm **Impact of CHA2DS2-VASc Score on Postoperative Mortality Following Kidney Transplant**
J. Klein[1], M. Rangel[1], Z. Spigel[2], E. Hollinger[1], D. Olaitan[1], M. Hertl[1], E. Chan[1], *[1]Surgery, Rush University Medical Center, Chicago, IL, [2]Surgery, Allegheny Health Network, Pittsburgh, PA*

5:00 pm **Renal Transplant Outcomes of Kidney-only vs. Multi-organ Deceased Donors**
J. Espinales[1], Z. C. Giffen[1], D. Schneider[2], R. James[3], N. Koizumi[3], O. Ekwenna[1], J. Ortiz[4], *[1]University of Toledo Medical Center, Toledo, OH, [2]UC Irvine School of Medicine, Irvine, CA, [3]George Mason University, Arlington, VA, [4]Albany Medical Center, Albany, NY*

5:05 pm **Construction of a Waiting Time Predictive Model for Kidney Transplant with Deceased Donor in the State of São Paulo**
J. Silva[1], M. Contti[1], M. Valiatti[1], H. Nga[1], G. Santos[1], M. Perosa[2], G. Ferreira[3], L. Modelli de Andrade[1], *[1]UNESP, Botucatu, Brazil, [2]Hospital Leforte, São Paulo, Brazil, [3]Santa Casa de Juiz de Fora, Juiz de Fora, Brazil*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
4:30 pm - 5:30 pm

Living Donor Liver Transplant and Partial Grafts

Moderators: Roberto Hernandez-Alejandro, MD, University of Rochester Medical Center, Professor of Surgery, Rochester, NY, USA, Tarunjeet Klair, M.D., University of Texas Health San Antonio, Assistant Professor of Surgery, Director Living Donor Liver Transplantation, San Antonio, TX, USA

4:30 pm **Paired Exchanges in LDLT- A Good Option for Patients with Incompatible Donors**
A. Humar, C. Hughes, G. Mazariegos, S. Kyle, A. Gallatin, K. Emmett, A. Tevar, M. Molinari, A. Ganoza, V. Gunabushanam, S. Ganesh, *University of Pittsburgh, Pittsburgh, PA*

4:35 pm **Impact of Advanced Renal Dysfunction on Post-Transplant Outcomes After Living Donor Liver Transplantation in the United States**
T. Bittermann[1], N. Kaur[2], P. L. Abt[1], K. M. Olthoff[1], J. K. Heimbach[3], J. Emamaullee[2], *[1]University of Pennsylvania, Philadelphia, PA, [2]University of Southern California, Los Angeles, CA, [3]Mayo Clinic College of Medicine, Rochester, MN*

4:40 pm **Impact of Community- Targeted Educational Campaign on Living Donor Transplants**
S. Ganesh, A. Humar, *Transplant, UPMC, Pittsburgh, PA*

4:45 pm **Trends in Liver Donors for Liver Transplantation Over Twenty Years: Donor Changes in Gender, Relationships, and Education, but Racial Disparities Remain**
A. Kaplan, B. Fortune, R. Brown, MD, MPH, B. Samstein, K. Halazun, R. Rosenblatt, *Gastroenterology and Hepatology, New York Presbyterian/Weill Cornell, New York, NY*

4:50 pm **The Impact of Splenectomy on Living Donor Liver Transplantation Using Small Grafts**
M. Fujiki, E. Aleassa, C. Quintini, F. Aucejo, K. Sasaki, B. Eghtesad, T. Diago, D. Kwon, C. Miller, K. Hashimoto, *Cleveland Clinic Foundation, Cleveland, OH*

4:55 pm **Re-Do Hepatic Artery Reconstruction for Thrombosis Can Save Grafts and Patients without Retransplantation: Lessons Learned from 1,355 Adult Living Donor Liver Transplantations**
S. Hong, N. Yi, K. Hong, E. Han, S. Suh, J. Lee, S. Hong, Y. Choi, U. Jin, H. Chang, K. Lee, K. Suh, *Seoul National University Hospital, Seoul, Korea, Republic of*

5:00 pm **Death Among Living Liver Donors- Are We Overestimating the Risk?**
H. J. Braun, A. M. Shui, N. L. Ascher, J. P. Roberts, *University of California, San Francisco, San Francisco, CA*

5:05 pm **Liver Live Donor Champion: Advocacy Training to Facilitate Identification of Living Liver Donors**
L. R. Herbst, Y. Yu, A. Love, K. Lee, A. Wells, K. Mohr, A. Massie, A. Gurakar, B. King, D. L. Segev, A. M. Cameron, J. Garonzik Wang, *Johns Hopkins University, Baltimore, MD*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

VCA
4:30 pm - 5:30 pm

VCA: Basic and Clinical

Moderators: Rolf Barth, MD, University of Chicago, Professor of Surgery, Chicago, IL, USA, Amer Hatem

4:30 pm **Twelve Live Births After Uterus Transplantation in the Dallas Uterus Transplant Study**
L. Johannesson, G. J. McKenna, A. Wall, J. Bayer, G. Testa, *Baylor University Medical Center, Dallas, TX*

4:35 pm **Immunosuppression in Uterine Transplant Recipients: Experience from the Largest Uterine Transplant Program**
N. Wilson, R. Patel, L. Johannesson, G. Testa, T. Sam, *Baylor University Medical Center at Dallas, Dallas, TX*

4:40 pm **A Multi-institutional Study of Renal Outcomes in Uterus Transplantation**
D. Sawinski[1], L. Johannesson[2], J. Kristen[3], J. Fronek[3], P. Porrett[4], *[1]Hospital of the University of Pennsylvania, Philadelphia, PA, [2]Department of Surgery, Baylor University Medical Center, Dallas, TX, [3]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [4]University of Alabama at Birmingham, Birmingham, AL*

4:45 pm **Stem Cell and Novel Neurotrophic Factors to Promote Functional Outcomes in Limb Transplantation**
S. K. Salgar[1], J. Weiss[2], C. Phillips[2], E. Malin[2], V. Gorantla[3], J. Harding[4], *[1]Clinical Investigation, United States Army, Tacoma, WA, [2]Clinical Investigation, Madigan Army Medical Center, Tacoma, WA, [3]Surgery, Wake Forest University, Winston-Salem, NC, [4]Neuroscience, Washington State Universisty, Pullman, WA*

4:50 pm **Recovery After Extended Static Cold Storage Preservation Using Subnormothermic Machine Perfusion in VCA**
M. Goutard[1], R. J. de Vries[1], A. G. Lellouch[1], E. Lupon[1], C. Pendexter[1], S. N. Tessier[1], M. A. Randolph[1], L. Lantieri[2], C. L. Cetrulo[1], K. Uygun[1], *[1]Massachusetts General Hospital, Harvard Medical School, Shriners Hospitals for Children, Boston, MA, [2]Hôpital Européen Georges Pompidou, Paris, France*

4:55 pm **A Noninvasive Diagnostic Approach for Molecular Monitoring of Face Transplant Recipients**
C. Snopkowski[1], P. Rabbani[2], H. Yang[1], Z. Berman[2], G. Diep[2], C. Li[1], T. Muthukumar[1], R. Ding[1], D. Ceradini[2], M. Suthanthiran[1], *[1]Weill Cornell Medical Institute, Department of Medicine, Division of Nephrology, NY, NY, [2]NYU Langone Health, Hansjörg Wyss Department of Plastic Surgery, NY, NY*

5:00 pm **Live Video Question and Answer**

Focus in Transplantation

Basic
4:30 pm - 7:00 pm

Basic: New Roles of Secondary Immune Organs in Rejection

Moderators: Reza Abdi, MD, Brigham & Womens Hosp, Professor of Medicine, Boston, MA, USA, Daniel Streblow, PhD, Oregon Health and Science University, Professor, Beaverton, OR, USA

4:30 pm **Lymphatic Vessels Regulate Immune Microenvironments in Cancer and Infectious Immunity**
Amanda Lund, PhD, NYU Grossman School of Medicine, Associate Professor, New York, NY, USA

4:45 pm **Sphingosine 1-Phosphate Receptors and Afferent Lymphatic Migration**
Jonathan Bromberg, MD, PhD, University of Maryland School of Medicine, Professor of Surgery and Microbiology and Immunology, Baltimore, MD, USA

5:00 pm **Live Video Question and Answer**

5:30 pm **Break**

6:00 pm **DC Subset and Localization in the LN determines Tfh Priming**
Stephanie Eisenbarth, MD PhD, Yale, Associate Professor, New haven, CT, USA

6:15 pm **The Role of BALT in Lung Transplant Rejection and Tolerance**
Daniel Kreisel, MD, PhD, Washington University St Louis, Professor of Surgery, Pathology and Immunology, St. Louis, MO, USA

6:30 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

ID: COVID-19
6:00 pm - 7:00 pm

COVID-19 in Kidney Recipients

Moderators: Deeksha Jandhyala, M.D., Medical University of South Carolina, M.D., Assistant Professor of Medicine, Transplant Infectious Diseases, Charleston, SC, USA, Paschalis Vergidis, MD, MSc, Mayo Clinic, Assistant Professor, Rochester, MN, USA

6:00 pm **COVID-19 in the Kidney Transplant Waitlist Population**
A. C. Johnson[1], C. P. Larsen[1], H. Gebel[2], R. Bray[2], *[1]Surgery, Emory University, Atlanta, GA, [2]Pathology, Emory University, Atlanta, GA*

6:05 pm **Predictors of Severe Covid-19 in Kidney Transplant Recipients in the First and Second Waves: Analysis of the Spanish Registry**
M. Crespo[1], A. Mazuecos[2], I. Pérez-Flores[3], F. Moreso[4], A. Andrés[5], C. Jimenez[6], M. Molina[7], C. Canal[8], L. Sánchez-Cámara[9], S. Zárraga[10], M. Ruiz Fuentes[11], M. Aladrén[12], E. Melilli[13], V. López[14], E. Sanchez[15], J. Pascual for Spanish Nephro Society Covid-Registry[1], *[1]Nephrology, Hospital del Mar, Barcelona, Spain, [2]Nephrology, Hospital Puerta del Mar, Cadiz, Spain, [3]Nephrology, Hospital Clinico San Carlos, Madrid, Spain, [4]Nephrology, Hospital Valle Hebrón, Barcelona, Spain, [5]Nephrology, Hospital 12 Octubre, Madrid, Spain, [6]Nephrology, Hospital La Paz, Madrid, Spain, [7]Nephrology, Hospital Germans Trias i Pujol, Barcelona, Spain, [8]Nephrology, Fundacio Puigvert, Barcelona, Spain, [9]Nephrology, Hospital Gregorio Marañón, Madrid, Spain, [10]Nephrology, Hospital de Cruces, Bilbao, Spain, [11]Nephrology, Hospital Virgen de las Nieves, Granada, Spain, [12]Nephrology, Hospital Miguel Servet, Zaragoza, Spain, [13]Nephrology and Kidney Transplantation, Hospital de Bellvitge, Barcelona, Spain, [14]Nephrology, Hospital Regional de Málaga, Malaga, Spain, [15]Nephrology, Hospital de Cabueñes, Gijon, Spain*

6:10 pm **SARS-CoV-2 Antibody Response After Induction Therapy in Kidney Transplant Recipients**
M. Lubetzky[1], S. Sultan[2], Z. Zhao[3], M. Cushing[3], Z. Kapur[1], S. Albakry[1], N. Hauser[1], J. Marku-Podvorica[1], R. Craig-Schapiro[2], J. Lee[1], T. Salinas[1], M. Aull[2], S. Kapur[2], M. Suthanthiran[1], D. Dadhania[1], *[1]Nephrology, Weill Cornell-NYPresbyterian, New York, NY, [2]Transplant Surgery, Weill Cornell-NYPresbyterian, New York, NY, [3]Pathology, Weill Cornell-NYPresbyterian, New York, NY*

6:15 pm **Characterizing Kidney Transplant Recipients with SARS-CoV-2: An Academic Single Center Experience**
S. Nahi, A. Shetty, S. Tanna, J. Leventhal, *Northwestern University, Chicago, IL*

6:20 pm **Prevalence and Dynamics of SARS-COV-2 IgG in Kidney Transplant Recipients**
Y. Al Azzi, P. Loarte, C. Pynadath, O. Alani, L. Liriano-Ward, M. Ajaimy, R. Bartash, J. Graham, M. Le, H. Yaffe, S. Greenstein, J. Rocca, M. Kinkhabwala, E. Akalin, *Montefiore Medical Center, New York, NY*

6:25 pm **The Impact of Covid-19 in Kidney Transplant Recipients: A Systematic Review and Meta-analysis**
J. Kumar[1], J. Pyda[2], I. Reccia[3], F. VIrdis[4], P. Bachul[1], R. Barth[1], Y. Becker[1], J. Fung[1], P. Witkowski[1], *[1]University of Chicago, Chicago, IL, [2]Beth Israel, Boston, MA, [3]Imperial College, London, United Kingdom, [4]Royal London, London, United Kingdom*

6:30 pm **Profile of SARS-CoV-2 Antibodies in Patients Awaiting Kidney Transplantation**
L. Muir[1], A. Jaffer[2], C. Rees-Spear[1], V. Gopalan[2], F. Chang[2], G. Vaitkute[1], R. Fernando[3], C. Roustan[4], A. Rosa[4], C. Earl[4], A. Salama[2], P. Cherepanov[4], L. E. McCoy[1], R. Motallebzadeh[2], *[1]Institute of Immunity & Transplantation, University College London, London, United Kingdom, [2]Nephrology & Transplantation, Royal Free London Hospital NHS Trust, London, United Kingdom, [3]Anthony Nolan Institute, Royal Free London Hospital NHS Trust, London, United Kingdom, [4]The Francis Crick Institute, London, United Kingdom*

6:35 pm **Modification in Immunosuppression Regimens to Safely Perform Kidney Transplants Amid the Covid-19 Pandemic**
L. Von Stein, O. Witkowsky, L. Samidurai, K. Flores, M. Doraiswamy, T. Pesavento, P. Singh, *The Ohio State University Wexner Medical Center, Columbus, OH*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Lung
6:00 pm - 7:00 pm

How to Expect the Unexpected-Incorporating Predictors into Lung Transplant Decision Making

Moderators: Hannah Mannem, MD, University of Virginia, Assistant Professor of Medicine, Charlottesville, VA, USA, Wayne Tsuang, MD MHS, Cleveland Clinic, Assistant Professor Medicine, Cleveland Clinic Lerner College of Medicine, Cleveland, OH, USA

6:00 pm **A Molecular Classifier Identifies Antibody-Mediated Rejection-Associated Changes in Lung Transplant Biopsies**
K. S. Madill-Thomsen[1], K. M. Halloran[2], M. Parkes[1], P. F. Halloran[1], &. the INTERLUNG Study Group[3], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]University of Alberta, Edmonton, AB, Canada, [3]AB, Canada*

6:05 pm **Molecular Classifiers for Chronic Lung Allograft Dysfunction Transbronchial and Mucosal Biopsies Predict Clinical CLAD and Graft Loss**
M. D. Parkes[1], P. F. Halloran[2], K. M. Halloran[3], &. the INTERLUNG Study Group[4], *[1]Alberta Transplant Applied Genomics Centre, Edmonton AB, AB, Canada, [2]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [3]University of Alberta, Edmonton AB, AB, Canada, [4]AB, Canada*

6:10 pm **Assessing the Accuracy of the Lung Allocation Score**
N. Dussault[1], W. Parker[1], R. Jablonski[1], E. Garrity[1], M. Churpek[2], *[1]University of Chicago, Chicago, IL, [2]University of Wisconsin-Madison, Madison, WI*

6:15 pm **Liver Kinase B1 Knockdown Induces Platelet-Derived Growth Factor Receptor B Expression in Human Airway Epithelial Cells: A Potential Mechanism for Development of Fibrosis Leading to Chronic Lung Allograft Dysfunction**
M. Rahman, J. Lee, R. Ravichandran, T. Fleming, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

6:20 pm **Allograft Discard Risk Index for Lung Transplantation**
R. M. Reul, G. Loor, P. S. Garcha, A. A. Rana, *Baylor College of Medicine, Houston, TX*

6:25 pm **Perioperative Blood Transfusion is Associated with the Development of New HLA Antibodies After Adult Lung Transplantation**
A. Hicks[1], A. Stoker[2], M. Cooter[2], A. Ali[3], J. Klapper[4], J. Poisson[5], D. Chen[5], J. Haney[4], K. Ghadimi[2], M. Hartwig[4], I. Welsby[2], B. Bottiger[2], *[1]Anesthesiology, Duke University Hospital, South Portland, ME, [2]Anesthesiology, Duke University Hospital, Durham, NC, [3]Pulmonology, Allergy and Critical Care Medicine, Duke University Hospital, Durham, NC, [4]Cardiothoracic Surgery, Duke University Hospital, Durham, NC, [5]Pathology, Duke University Hospital, Durham, NC*

6:30 pm **A Randomized, Multicenter, Blinded Study Assessing the Effects of Gaseous Nitric Oxide in an Ex Vivo System of Human Lungs**
M. G. Hartwig[1], J. A. Klapper[1], N. Poola[2], A. Banga[3], P. G. Sanchez[4], J. S. Murala[3], J. L. Potenziano[2], *[1]Duke University Medical Center, Durham, NC, [2]Mallinckrodt Pharmaceuticals, Bedminster, NJ, [3]University of Texas Southwestern Medical Center, Dallas, TX, [4]University of Pittsburgh Medical Center, Pittsburgh, PA*

6:35 pm **Outcomes of Cytomegalovirus Status Determining Induction Therapy in Lung Transplant**
K. Heagler[1], J. Lyons[1], B. Bemiss[2], P. Stracener[1], *[1]Pharmacy, Loyola University Medical Center, Maywood, IL, [2]Loyola University Medical Center, Maywood, IL*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
6:00 pm - 7:00 pm

Kidney: Cardiovascular and Metabolic Complications

Moderators: Anita Mehrotra, MD, Lourdes Medical Associates Transplant Nephrology, Dr., Camden, NJ, USA, Mita Shah, MD, University of California San Diego, Medical Director, San Diego, CA, USA

6:00 pm **Cognition After Belatacept Conversion (CAB) Trial**
W. Asch[1], K. Belfield[2], V. Do[2], E. Cohen[1], *[1]Yale University, New Haven, CT, [2]Yale New Haven Hospital, New Haven, CT*

6:05 pm **The Impact of 4-weeks of Supervised Exercise on Frailty and Lower Extremity (LE) Function in Patients with Advanced Chronic Kidney Disease (CKD)**
E. Lorenz, L. Hickson, R. Weatherly, K. Thompson, M. Hogan, C. Kennedy, *Mayo Clinic, Rochester, MN*

6:10 pm **Growth Differentiation Factor 15 Predictor Value is Superior to Troponin I in the Evaluation of Kidney Transplant Candidates**
M. de Cos Gomez[1], M. Garcia Unzueta[2], A. Benito Hernandez[1], J. Mazon Ruiz[1], M. Perez Arnedo[1], A. Aguilera Fernandez[1], R. Valero San Cecilio[1], J. Ruiz San Millan[1], E. Rodrigo Calabia[1], *[1]Nephrology, Marques de Valdecilla University Hospital - IDIVAL, Santander, Spain, [2]Clinical Analysis, Marques de Valdecilla University Hospital - IDIVAL, Santander, Spain*

6:15 pm **Intensive Blood Pressure Control Preserves Kidney Allograft Function**
K. A. Agarwal[1], U. K. Agarwal[2], G. S. Silva[3], K. J. Pollick[3], M. Pavlakis[1], *[1]Transplant Institute, Beth Israel Deaconess Medical Center, Boston, MA, [2]Biostatistics consultant, Boston, MA, [3]Beth Israel Deaconess Medical Center, Boston, MA*

6:20 pm **Outcomes of Kidney Transplantation in Patients with Prosthetic Heart Valves**
H. Ouahmi, *Nephrology, Dialysis, Transplantation, Nice University Hospital, Nice, France*

6:25 pm **Correlation of Coronary Anatomy and Interventions with Post-kidney Transplantation Outcomes**
A. Sharma, T. Teigeler, D. Kumar, S. Moldowan, C. Bhati, G. Gupta, L. Kang, M. Levy, *Virginia Commonwealth University, Richmond, VA*

6:30 pm **Kidney Transplant Recipients Who Had Covid-19 Prior to Transplant: A Single-center Experience**
S. Sultan, M. Aull, R. Craig-Schapiro, E. C. Liu, J. H. Lee, S. Kapur, *New York Presbyterian / Weill Cornell, New York, NY*

6:35 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
6:00 pm - 7:00 pm

Liver Transplant Oncology
Moderators: Talia Baker, MD, Uchicago Medicine, Director, Liver Transplant Oncology, Chicago, IL, USA, Varvara Kirchner, MD, University of Minnesota, Minneapolis, MN, USA

6:00 pm **Outcomes of Downstaging Hepatocellular Carcinoma (HCC) to within Milan Criteria Before Liver Transplantation (LT): A Multicenter Analysis of the "All-comers" Protocol**
B. Natarajan[1], P. Tabrizian[2], M. Hoteit[3], C. Frenette[4], T. Ghaziani[5], R. Dhanasekaran[5], N. Parikh[6], J. Guy[7], A. Shui[1], S. Florman[2], F. Yao[1], N. Mehta[1], *[1]UCSF, SF, CA, [2]Mt Sinai, NY, NY, [3]U Penn, Philadelphia, PA, [4]Scripps, La Jolla, CA, [5]Stanford, Palo Alto, CA, [6]U Michigan, Ann Arbor, MI, [7]CPMC, SF, CA*

6:05 pm **Role of Baseline PD-1 Checkpoint Inhibitor Pathway Expression in Bridge to Liver Transplant Hepatocellular Carcinoma**
K. Nunez, T. Sandow, M. Hibino, A. Cohen, P. Thevenot, *Ochsner Health, New Orleans, LA*

6:10 pm **NASH-Related HCC is Associated with Lower Rates of Post-Transplant HCC Recurrence: A Large Database Analysis**
P. J. Altshuler, R. Lamm, K. Patel, H. Dang, O. Shaheen, A. P. Shah, J. Glorioso, C. G. Ramirez, A. M. Frank, W. R. Maley, A. S. Bodzin, *Department of Surgery, Thomas Jefferson University, Philadelphia, PA*

6:15 pm **Adjuvant Immunotherapy for Liver Transplant Recipients with Hepatocellular Carcinoma Using Donor Liver-derived Natural Killer Cells**
M. Ohira[1], R. Hotta[1], Y. Imaoka[1], K. Sato[1], N. Tanimine[1], Y. Tanaka[1], S. Nishida[2], A. Tzakis[2], H. Ohdan[1], *[1]Hiroshima University, Hiroshima, Japan, [2]University of Miami, Miami, FL*

6:20 pm **T Cell Repertoire Diversity in HCV-Associated Hepatocellular Carcinoma Patients Waitlisted for Liver Transplantation and Receiving Liver-Directed Therapy**
K. Nunez, T. Sandow, A. Cohen, P. Thevenot, *Ochsner Health, New Orleans, LA*

6:25 pm **Living Donor Liver Transplant for Unresectable Colorectal Metastasis: A Case Series**
B. Emmanuel, H. Al-Harakeh, A. Humar, C. Hughes, A. Tevar, M. Molinari, A. Ganoza, *Starzl Transplant Institute, UPMC, Pittsburgh, PA*

6:30 pm **Liver Transplantation for Unresectable Colorectal Cancer Liver Metastases: A Multicenter Experience**
L. I. Ruffolo[1], K. Sasaki[2], K. Tomiyama[1], A. Nair[1], M. Orloff[1], B. Al-Judaibi[3], M. Levstik[3], M. Laryea[3], K. Dokus[1], J. Errigo[1], A. Moro[2], C. Quintini[2], K. Hashimoto[2], M. Fujiki[2], K. Menon[2], C. Kwon[2], T. Diago Uso[2], R. Hernandez-Alejandro[1], F. Aucejo[2], *[1]Surgery, University of Rochester Medical Center, Rochester, NY, [2]Surgery, The Cleveland Clinic Foundation, Cleveland, OH, [3]Transplant Hepatology, University of Rochester Medical Center, Rochester, NY*

6:35 pm **Outcomes of Liver Transplantation for Combined Hepatocellular Cholangiocarcinoma: A Single-center Experience**
Y. Liu[1], C. Hanlon[1], S. Zhou[1], D. Toy[1], K. King[2], K. Zhou[3], J. Kahn[3], L. Yuan[3], *[1]Internal Medicine, USC Keck School of Medicine, Los Angeles, CA, [2]Radiology, USC Keck School of Medicine, Los Angeles, CA, [3]Internal Medicine - Gastrointestinal and Liver Disease, USC Keck School of Medicine, Los Angeles, CA*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Pancreas: Small Bowel
6:00 pm - 7:00 pm

Pancreas & Small Bowel
Moderator: Alan Langnas, DO, University of Nebraska Medical Center, Professor of Surgery, Omaha, NE, USA

6:00 pm **Risk Factors for the Development of Posttransplant Lymphoproliferative Disorder (ptld) After Pancreas Transplantation- A Registry Analysis**
A. Gruessner, S. Saggi, J. Renz, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

6:05 pm **Evaluation and Experience with Hepatitis C Positive to Negative Pancreas Transplantation**
B. K. Lindner, B. Thomas, M. Cooper, S. Yi, P. Abrams, *Medstar Georgetown University Hospital, Washington, DC*

6:10 pm **Simultaneous Pancreas-kidney Transplantation (spk) and, Simultaneous Deceased Donor Pancreas and Living Donor Kidney Transplantation (splk) in Diabetic Patients with End Stage Renal Disease**
Y. Ko, *Department of Surgery, Asan Medical Center, Seoul, Korea, Republic of*

6:15 pm **Outcomes of Simultaneous Pancreas-Kidney Transplants from Donation After Circulatory Death Donors in the UK: A National Registry Analysis**
N. Karydis[1], M. Ibrahim[2], C. Counter[2], J. Casey[3], P. Friend[4], C. Watson[5], C. Callaghan[1], *[1]Nephrology and Transplantation, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, [2]NHS Blood and Transplant, Bristol, United Kingdom, [3]Transplant Unit, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom, [4]Nuffield Department of Surgical Sciences, University of Oxford, Oxford, United Kingdom, [5]Department of Surgery, Addenbrooke's Hospital and Cambridge NIHR Biomedical Research Campus, Cambridge, United Kingdom*

6:20 pm **Two Hundred Total Pancreatectomy with Islet Autotransplantation Cases: A Single Center Experience**
K. Kumano[1], S. Bruer[1], G. Saracino[1], M. Lawrence[1], G. Testa[1], A. Gupta[1], N. Onaca[1], E. Beecherl[1], M. F. Levy[2], B. Naziruddin[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Virginia Commonwealth University, Richmond, VA*

6:25 pm **Segmental Susceptibility of Intestinal Stem Cells to Cold Storage Preservation Injury in a Porcine Model**
E. K. Ludwig[1], N. Abraham[2], D. Sudan[2], A. Barbas[2], C. Schaaf[1], J. Freund[1], A. S. Stewart[1], B. Veerasammy[1], L. M. Gonzalez[1], *[1]North Carolina State University, Raleigh, NC, [2]Duke University, Durham, NC*

6:30 pm **Islet Allotransplantation Into Prevascularized Sernova Cell Pouch™ - Preliminary Results from the University of Chicago**
P. J. Bachul[1], P. E. Borek[1], G. S. Generette[1], A. Perez-Gutierrez[1], K. Jayant[1], K. Golab[1], L. Basto[1], L. Perea[1], M. Tibudan[1], C. Thomas[2], L. Philipson[2], J. Fung[1], P. Witkowski[1], *[1]Surgery, University of Chicago, Chicago, IL, [2]Medicine, University of Chicago, Chicago, IL*

6:35 pm **The Impact of Early Narcotic Administration on Intestinal Transplantation Survival at an Urban Medical Center**
L. Maliekal[1], N. Beltran[2], Y. Muszkat[2], S. Nagai[2], S. Jafri[2], *[1]School of Medicine, Wayne State University School of Medicine, Detroit, MI, [2]Department of Gastroenterology, Henry Ford Hospital, Detroit, MI*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
6:00 pm - 7:00 pm

Pediatric Kidney
Moderators: Patrick Healey, MD, Seattle Children's Hospital, Chief, Pediatric Transplant, Seattle, WA, USA, Jaimie Nathan, MD, Cincinnati Children's Hospital Medical Center, Associate Professor of Surgery and Pediatrics, Cincinnati, OH, USA

6:00 pm **Racial and Ethnic Disparities in Pediatric Kidney Transplantation - Has KAS Made a Difference?**
O. Charnaya[1], S. Yu[2], A. Goldberg[3], J. Garonzik-Wang[2], D. Segev[2], P. Verghese[4], *[1]Pediatrics, Johns Hopkins University, Baltimore, MD, [2]Transplant Surgery, Johns Hopkins University, Baltimore, MD, [3]University of Manitoba, Winninpeg, MB, Canada, [4]Northwestern University Feinberg School of Medicine, Chicago, IL*

6:05 pm **Hla Antigens and Recurrence of Focal Segmental Glomerulosclerosis in Pediatric Kidney Transplantation**
B. I. Shaw[1], A. Ochoa[2], C. Chan[2], R. A. Gbadegesin[3], A. M. Jackson[1], E. T. Chambers[3], *[1]Surgery, Duke University, Durham, NC, [2]Biostatistics and Bioinformatics, Duke University, Durham, NC, [3]Pediatrics, Duke University, Durham, NC*

6:10 pm **Kidney Paired Donation in Pediatrics: An Underused Opportunity?**
J. Smith[1], M. Skeans[2], R. Engen[3], S. Bartosh[4], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN, [3]Lurie Children's Hospital, Chicago, IL, [4]Univ of Wisconsin, Madison, WI*

6:15 pm **Drivers of Graft Failure in Pediatric Kidney Transplant Change Over Time**
E. Benz[1], D. Schaubel[2], S. Amaral[1], *[1]Children's Hospital of Philadelphia, Philadelphia, PA, [2]Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania, Philadelphia, PA*

6:20 pm **Long Term Safety and Efficacy of Tocilizumab (anti-il6r, Tcz) Therapy in the Treatment of Refractory Chronic Antibody Mediated Rejection (cabmr) in 25 Pediatric Renal Transplant Recipients**
M. Pearl[1], P. Weng[1], A. Dokras[2], H. Pizzo[3], J. Garrison[3], C. Butler[1], J. Q. Zhang[1], K. Lim[3], E. Reed[1], I. Kim[3], M. Haas[3], X. Zhang[3], R. Ettenger[1], S. Jordan[3], D. Puliyanda[3], *[1]Pediatric Nephrology, UCLA Medical Center, Los Angeles, CA, [2]Pediatric Nephrology, UT South Western, Dallas, CA, [3]Pediatric Nephrology, Cedars Sinai Medical Center, West Hollywood, CA*

6:25 pm **Leflunomide Therapy for Treatment of Bk Viremia in Pediatric Kidney Transplant Recipients**
A. Aldieri[1], M. Chandran[2], D. Matossian[3], B. Magella[4], D. Lazear[4], M. Bock[2], E. Blanchette[2], *[1]Children's Hospital Colorado, Denver, CO, [2]Children's Hospital Colorado, Aurora, CO, [3]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [4]Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

6:30 pm **Risk Factors Predicting Outcomes in Long-Term Pediatric Kidney Transplant Graft Survival**
A. Anand, T. H. Malik, J. Dunson, M. F. McDonald, C. R. Christmann, N. Nguyen Galvan, C. O'Mahony, J. A. Goss, P. R. Srivaths, E. D. Brewer, A. Rana, *Baylor College of Medicine, Houston, TX*

6:35 pm **Delayed Graft Function in Pediatric Living Donor Kidney Transplantation**
M. MacConmara, J. Shah, L. de Gregorio, D. Desai, P. Vagefi, C. S. Hwang, *Surgery, UT Southwestern Medical Center, Dallas, TX*

6:40 pm **Live Video Question and Answer**

7:00 pm **Break**

Poster Video Chat

Basic
7:30 pm - 8:30 pm

Biomarkers, Immune Assessment and Clinical Outcomes

Moderators: Alessandro Alessandrini, PhD, Massachusetts General Hospital, Harvard, Assistant Professor, Boston, MA, USA, Sunil Kurian, PhD, Scripps Health, Research Scientist, La Jolla, CA, USA

7:30 pm **Utility of Screening-Bead Assay in Post-Transplant Testing of Donor-Specific Antibodies (DSA) and Antibody-mediated Rejection (ABMR) in Renal Allografts**
A. Agrawal[1], E. Dijke[2], A. Murray[3], P. Campbell[3], *[1]Transplant Nephrology, Mayo Clinic, Rochester, MN, [2]Lab. Medicine and Pathology, University of Alberta Hospital, Edmonton, AB, Canada, [3]Division of Nephrology, Dept. of Medicine, University of Alberta Hospital, Edmonton, AB, Canada*

7:40 pm **A Multimodal Interrogation of Human Renal Allografts**
D. Dadhania[1], R. Ding[1], H. Xu[2], C. Lee[1], C. Snopkowski[1], T. Salinas[1], T. Muthukumar[1], J. Lee[1], R. Woodward[2], M. Grskovic[2], S. Dholakia[2], M. Suthanthiran[1], *[1]Weill Cornell Medicine - NYPH, New York, NY, [2]CareDx, New York, NY*

7:50 pm **A Patient-Centered Perspective on Progress in Transplantation**
B. Hickner[1], N. Galvan[2], R. Cotton[2], C. O'Mahony[2], J. Goss[2], A. Rana[2], *[1]Department of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Department of Surgery, Baylor College of Medicine, Houston, TX*

8:00 pm **Peripheral Blood Inflammatory Chemokines Uncover Rejection in the Absence of Histological Lesions**
E. Van Loon[1], T. Barba[2], B. Lamarthée[1], A. Senev[1], O. Thaunat[2], D. Schols[3], M. Naesens[1], *[1]Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium, [2]Department of Transplantation, Nephrology and Clinical Immunology, Edouard Herriot Hospital Lyon, Lyon, France, [3]Laboratory of Virology and Chemotherapy, KU Leuven, Leuven, Belgium*

8:10 pm **Live Video Question and Answer**

Poster Video Chat

Heart
7:30 pm - 8:30 pm

Heart/LVAD: All Topics
Moderators: Leway Chen, MD, MPH, U of Rochester Medical Center, Medical Director, Advanced Heart Failure Program, Rochester, NY, USA, Sara Shumway, MD, Univ of Minnesota Hosp, Minneapolis, MN, USA

7:30 pm **Clinical Features and Outcomes of Candidemia in Patients with Left Ventricular Assist Devices**
G. Krishnan, Y. Hamad, I. George, *Infectious Diseases, Washington University School of Medicine, St Louis, MO*

7:40 pm **Significance of Repeated 1r Rejections in Heart Transplantation**
C. Hsueh[1], L. Wilson[2], L. Bow[2], L. Bellumkonda[2], *[1]Yale New Haven Hospital, New Haven, CT, [2]Yale University School of Medicine, New Haven, CT*

7:50 pm **When is the Optimal Time to Initiate the Renal-Sparing Protocol with Calcineurin Inhibitor Withdrawal?**
N. Patel, M. Kittleson, J. Patel, T. Singer-Englar, S. Kim, D. Chang, B. Azarbal, A. Nikolova, L. Czer, F. Esmailian, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

8:00 pm **Are Pre-Transplant Diabetics on ACE Inhibitors at Risk for More Renal Dysfunction After Heart Transplantation?**
M. Kittleson, J. Patel, D. Chang, N. Patel, S. Kim, T. Singer-Englar, R. Skorka, A. Hage, L. Czer, F. Esmailian, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

8:10 pm **Management of Drug Interactions During Protocolized Implementation of Posaconazole Immediately Post Heart Transplant**
G. Waldman, C. Rogers Marks, J. Clark, A. Woo, L. Irwin, A. Gerlach, G. D. Lewis, J. A. Fishman, *Massachusetts General Hospital, Boston, MA*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

Kidney
7:30 pm - 8:30 pm

Kidney Deceased Donor Allocation 1
Moderators: Stuart Flechner, MD FAST, Cleveland Clinic Lerner College of Medicine, Professor pf Surgery, Cleveland, OH, USA, Joshua Weiner, MD, Columbia University Irving Medical Center, Assistant Professor of Surgery, New York, NY, USA

7:30 pm **Donor-Recipient BSA Matching is Prognostically Significant in Solitary and En-bloc Kidney Transplantation from Pediatric Circulatory Death Donors**
C. J. Little, A. A. Dick, J. D. Perkins, J. D. Reyes, *Department of Surgery, University of Washington, Seattle, WA*

7:40 pm **Characterizing the Early Impact of the Kidney Accelerated Placement Project on Hard-to-place Kidneys**
J. D. Motter, A. Kernodle, M. Levan, D. Segev, J. Garonzik-Wang, A. Massie, *Johns Hopkins University, Baltimore, MD*

7:50 pm **Comparison of Outcomes of Hepatitis C Virus (hcv) Nucleic Acid (nat) Positive Donor Between Hcv-naïVe and Hcv + Recpients - A Donor Mate Analysis**
J. Kamal, B. Sharma, A. Doyle, A. Kumar, A. Nishio-Lucar, S. Rao, *University of Virginia, Charlottesville, VA*

8:00 pm **Centers Avoided 67% of Kidney Offers by Participating in the OPTN's Multifactorial Offer Filter Pilot Project**
A. Toll, H. McGehee, D. Stewart, R. McTier, *Research, United Network for Organ Sharing, Richmond, VA*

8:10 pm **Can Procurement Biopsy Data Tell Us Anything? The Influence of Glomerulosclerosis on Long-term Kidney Graft Survival**
D. Stewart[1], L. Kamal[2], J. Foutz[3], H. McGehee[3], P. Saravanane[2], S. Yu[2], R. Yousfi[2], G. Gupta[2], *[1]United Network for Organ Sharing, Richmond, VA, [2]Virginia Commonwealth University Health, Richmond, VA, [3]Research, United Network for Organ Sharing, Richmond, VA*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

Pancreas & Small Bowel
7:30 pm - 8:30 pm

Pancreas & Small Bowel
Moderators: Kishore Iyer, FACS, MBBS, FRCS, Mount Sinai Hospital/Icahn School of Medicine at Mount Sinai, Professor of Surgery & Pediatrics, New York, NY, USA, Stephanie Yi, MD, MPH, Houston Methodist Hospital, Transplant Surgeon, Houston, TX, USA

7:30 pm **Do Pretransplant C-peptide Levels Influence Outcomes in Simultaneous Pancreas-Kidney Transplantation? A Matched Case-Control Study**
K. B. Gurung, V. Gurram, J. Rogers, A. C. Farney, G. Orlando, C. L. Jay, A. Reeves-Daniel, A. Mena-Gutierrez, N. Sakhovskaya, W. Doares, S. Kaczmorski, M. D. Gautreaux, R. J. Stratta, *Abdominal Transplant Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC*

7:40 pm **Peri-covid Trends on the Intestinal Transplant Waiting List**
M. L. Samoylova[1], S. Jafri[2], M. I. Fiel[3], S. Horslen[4], A. Mavis[5], T. Schiano[6], B. Summers[7], M. C. Segovia[8], *[1]Surgery, Duke University, Durham, NC, [2]Gastroenterology and Hepatology, Henry Ford Hospital, Detroit, MI, [3]Pathology, Mount Sinai, New York, NY, [4]Transplantation, Seattle Children's Hospital, Seattle, WA, [5]Pediatric Gastroenterology, Duke University, Durham, NC, [6]Hepatology, Mount Sinai Medical Center, New York, NY, [7]Pharmacy, Henry Ford Hospital, Detroit, MI, [8]Gastroenterology, Duke University, Durham, NC*

7:50 pm **Prevalence of Diabetic Changes on Kidney Allograft Biopsies of Normoglycemic Simultaneous Pancreas-Kidney Transplant Recipients**
C. Mejia, G. Giannini, D. C. Brennan, A. Rosenberg, S. Alasfar, *Johns Hopkins University, Baltimore, MD*

8:00 pm **Evaluation of Preperitoneal Space as an Extrahepatic Transplant Site in Clinical Total Pancreatectomy with Islet Autotransplantation**
K. Kumano, B. Naziruddin, S. Bruer, G. Saracino, M. Lawrence, G. Testa, A. Gupta, E. Beecherl, N. Onaca, *Baylor University Medical Ctr, Dallas, TX*

8:10 pm **Simultaneous Pancreas-Kidney Transplantation in Caucasian versus African American Patients: Does Recipient Ethnicity Influence Outcomes?**
J. Rogers[1], A. Farney[2], G. Orlando[2], C. Jay[2], K. Gurung[2], B. Sharda[2], A. Reeves-Daniel[3], A. Mena-Gutierrez[3], N. Sakhovskaya[3], W. Doares[4], S. Kaczmorski[4], M. Magid[4], M. Gautreaux[2], R. Stratta[2], *[1]Wake Forest Baptist Medical Center, Winston-Salem, NC, [2]Department of Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC, [3]Internal Medicine, Wake Forest Baptist Medical Center, Winston-Salem, NC, [4]Department of Pharmacy, Wake Forest Baptist Medical Center, Winston-Salem, NC*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

VCA
7:30 pm - 8:30 pm

VCA: Basic and Clinical
Moderators: Gerald Lipshutz, MD, UCLA, Los Angeles, CA, USA, Mark Wakefield, MD, University of Missouri, Associate Professor and Program Director, Columbia, MO, USA

7:30 pm **A Delphi Panel to Develop Public Educational Materials About Vascular Composite Allotransplantation (VCA)**
C. Sidoti[1], A. Ferzola[2], H. Sung[2], S. Rasmussen[2], E. Gordon[3], N. Anderson[3], J. Uriarte[3], C. Cooney[4], G. Brandacher[4], M. Levan[2], *[1]Department of Surgery, Johns Hopkins School of Medicine, East Islip, NY, [2]Department of Surgery, Johns Hopkins School of Medicine, Baltimore, MD, [3]Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, [4]Department of Plastic and Reconstructive Surgery, Johns Hopkins School of Medicine, Baltimore, MD*

7:40 pm **Trends in Vascularized Composite Allograft (VCA) Waiting List and Transplant Activity in the U.S**
J. Wainright[1], K. Swanner[2], W. Cherikh[1], D. Klassen[3], *[1]Research, UNOS, Richmond, VA, [2]Policy and Community Relations, UNOS, Richmond, VA, [3]Office of the Chief Medical Officer, UNOS, Richmond, VA*

7:50 pm **Live Video Question and Answer**

Expert VIP Meet Up

Kidney
8:45 pm - 9:30 pm

What is the Big Deal with a Little Fatty Liver in a Living Kidney Donor Candidate?

Moderators: Vineeta Kumar, MD, University of Alabama At Birmingham, Professor of Medicine, Endowded Professor in Transplant Nephrology, Birmingham, AL, USA, AnnMarie Liapakis, MD, Yale School of Medicine, Digestive Disease, Medical Director Living Donor Liver Transplant Yale New Haven Transplantation Center, New Haven, CT, USA

8:45 pm **Non-alcoholic Fatty Liver Disease and Chronic Kidney Disease**
William Asch, MD, PhD, Yale New Haven Transplantation Center, Associate Professor of Medicine and Surgery, New Haven, CT, USA

8:55 pm **Non-alcoholic Fatty Liver Disease: Update for the Non-hepatologist**
Wajahat Mehal, MD, PhD, Yale School of Medicine

9:05 pm **Live Video Question and Answer**

Expert VIP Meet Up

Kidney
8:45 pm - 9:30 pm

Cytomegalovirus Prevention: Best Practices and Emerging Innovations

Moderators: Abhijit (Ajit) Limaye, MD, University of Washington, Professor of Medicine, Seattle, WA, USA, Jonathan Maltzman, MD, PhD, FAST, Stanford University, Associate Professor, Palo Alto, CA, USA

8:45 pm **CMV Serostatus and Outcomes in Kidney Transplantation**
Martha Pavlakis, MD, FAST, FASN, Beth Israel Deaconess Medical Center, Medical Director, Kidney and Pancreas Transplantaion, Boston, MA, USA

8:55 pm **An Economic Analysis of CMV Seromatching in Kidney Transplantation**
David Axelrod, MD, MBA, University of Iowa, Professor of Surgery, Iowa City, IA, USA

9:05 pm **CMV Matching in Deceased Donor Kidney Transplantation: Waitlist and Patient Outcomes**
Joe Lockridge, MD, Portland VA - Oregon Health and Sciences University, CMV Matching in Deceased Donor Kidney Transplantation: Waitlist and Patient Outcomes, Portland, OR, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Liver
8:45 pm - 9:30 pm

Minimal Invasive Surgery in Living Donor Liver Transplantation

Moderators: Dean Kim, MD FACS, Henry Ford Health System, Surgical Director, Kidney and Pancreas Transplantation, Detroit, MI, USA, David Mulligan, MD FACS, FAASLD, FAST, Yale University/Yale New Haven Health System, Professor and Chair, Transplantation and Immunology, New Haven, CT, USA

8:45 pm **How To Incorporate Advanced Minimal Invasive Technique In A Transplant Program and Training Tools**
Atsushi Yoshida, MD, FACS, Henry Ford Hospital, Detroit, MI, USA

8:55 pm **Minimal Invasive Live Donor Hepatectomy : Laparoscopic Approach**
Benjamin Samstein, MD, Weill Cornell Medical Center, Chief of Liver Transplantation, New York, NY, USA

9:05 pm **Minimal Invasive Live Donor Hepatectomy : Robotic Approach**
Yee Lee J. Cheah, MD, Lahey Hospital & Medical Center, Director, Living Donor Liver Transplantation, Burlington, MA, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Liver
8:45 pm - 9:30 pm

The Role of Exercise in Advanced Liver Disease

Moderators: Puneeta Tandon, MD, FRCP(C), MSc, University of Alberta, Associate Professor, Edmonton, AB, Canada, Jennifer Lai, MD/MBA, University of California, San Francisco, Exercise in Liver Transplantation, San Francisco, CA, USA

8:45 pm **The Exercise Prescription in ESLD: Establishing a Prehabilitation Program**
Andres Duarte-Rojo, MD MS DSc, University of Pittsburgh Medical Center, Pittsburgh, PA, USA

8:55 pm **Impact of Frailty and Sarcopenia on Pre- and Post-transplant Outcomes**
Elizabeth Carey, MD, Mayo Clinic Scottsdale, Phoenix, AZ, USA

9:05 pm **When and How to Provide Specialized Nutritional Support**
Jeanette Hasse, PhD, RD, Baylor University Medical Center, Transplant Nutrition Manager, Dallas, TX, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Liver
8:45 pm - 9:30 pm

The Kidney in Liver Disease

Moderators: Josh Levitsky, MD, MS, Northwestern, Professor of Medicine, Chicago, IL, USA, Marina Serper, MD, MS, UPenn, Assistant Professor of Medicine, Philadelphia, PA, USA

8:45 pm **Re (de) fining the Role of Renal Replacement Therapy in Liver Disease**
Mitra Nadim, MD, University of Southern California, Professor of Clinical Medicine, Los Angeles, CA, USA

8:55 pm **Adding Insult to Injury: Role of Biomarkers in Acute Kidney Injury and Dual Organ Transplantation**
Claire Francoz, Beaujon Hospital

9:05 pm **End of Road for Serum Creatinine? Time to Revise the MELD Score**
Sumeet Asrani, MD MSc, Baylor University Medical Center, Transplant Hepatology, Dallas, TX, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Heart: Lung
8:45 pm - 9:30 pm

Complex Thoracic Desensitization Cases: What makes Sense?

8:45 pm **Complex Desensitization Cases**
Jon Kobashigawa, MD, Cedars-Sinai Smidt Heart Institute, Director, Cedars-Sinai Heart Transplant Program, Los Angeles, CA, USA

8:55 pm **Complex Desensitization Cases**
Anat Tambur, PhD, DMD, Northwestern University, Chicago, IL, USA

9:05 pm **Complex Desensitization Cases**
Ramsey Hachem, MD, Washington University of St. Louis, Professor of Medicine, St. Louis, MO, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Small Bowel
8:45 pm - 9:30 pm

Quality of Life after Intestine Transplant

Moderators: David Mercer, MD, FRCSC, PhD, University of Nebraska Medical Center, Professor of Surgery, Omaha, NE, USA, Mercedes Martinez, MD, Columbia University, Associate Professor of Pediatric and Medicine, New York, NY, USA

8:45 pm **Pain management after intestine transplant – the pharmacist perspective**
Bryant Summers, Pharm D, Henry Ford Hospital, Transplant Pharmacist, Detroit, MI, USA

8:50 pm **Psychological obstacles in adults after intestine transplant**
Benson Hoffman, Ph.D., Duke University, Associate Clinical Professor of Psychiatry and Behavioral Sciences, Durham, NC, USA

8:55 pm **Growth and socialization in children after intestine transplant**
Jennifer Garcia, MD, Miami Transplant Institute, University of Miami, Medical Director, Adult and Pediatric Intestinal Transplant, Miami, FL, USA

9:00 pm **Live Video Question and Answer**

Expert VIP Meet Up

Pancreas: Prof Develop
8:45 pm - 9:30 pm

Expanding your Pancreas Transplant Program

8:45 pm **Expanding Your Pancreas Transplant Program**
Kunam Reddy, MD, Mayo Clinic Arizona, Professor, Mayo Clinic School of Medicine, Phoenix, AZ, USA

8:50 pm **Expanding Your Pancreas Transplant Program**
Raja Kandaswamy, MD, FACS, University of Minnesota, Professor of Surgery, Minneapolis, MN, USA

8:55 pm **Expanding Your Pancreas Transplant Program**
George Burke, MD, Univ of Miami School of Medicine, Professor of Surgery, Miami, FL, USA

9:00 pm **Live Video Question and Answer**

Expert VIP Meet Up

ID
8:45 pm - 9:30 pm

Controversies and Updates in Management of Hepatitis B Virus in Solid Organ Transplantation

Moderators: Kapil Saharia, M.D, University of Maryland School of Medicine, Assistant Professor, Baltimore, MD, USA, Nicole Theodoropoulos, MD, MS, University of Massachusetts Medical School, Associate Professor, Worcester, MA, USA

8:45 pm **Controversies and Updates in HBV Management**
Josh Levitsky, MD, MS, northwestern, Professor of Medicine, Chicago, IL, USA

8:50 pm **Pro: Use of HBsAg Positive Donors - Safe Expansion of the Donor Pool**
Paolo Antonio Grossi, MD, PhD, University of Insubria, Professor of Infectious Diseases, Varese, Italy

8:55 pm **Con: HBsAg Positive Donors: Too much risk for HBV Negative Recipients**
Karen Doucette, MD, MSc, University of Alberta, Professor of Medicine, Edmonton, AB, Canada

9:00 pm **Live Video Question and Answer**

Expert VIP Meet Up

Pediatric
8:45 pm - 9:30 pm

Recurrent Disease in Pediatric Transplantation

Moderators: Sharad Wadhwani, MD MPH, University of California San Francisco, Assistant Professor of Pediatrics, Oakland, CA, USA, Daniella Levy Erez, MD MTR, Schneider Children's Medical Center, Israel, Attending Physician, Petach Tikva, Israel

8:45 pm **Non Pharmacologic Strategies to Prevent Recurrent Kidney Disease**
Priya Verghese, MD, MPH, Ann & Robert H. Lurie Children's Hospital of Chicago, Professor, Division Head, Chicago, IL, USA

8:55 pm **Therapeutic Advancements for the Pharmacologic Management of Recurrent Disease**
Michael Somers, MD, Boston Children's Hospital, Associate Chief, Division of Nephrology, Boston, MA, USA

9:05 pm **Recurrent Diseases in Pediatric Transplantation: Who, What, and Why**
Sharon Bartosh, MD, University of Wisconsin, Professor of Pediatrics, Madison, WI, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Women's Health
8:45 pm - 9:30 pm

Uterus Transplantation - Meet the New Kid on the Block

Moderators: Andreas Tzakis, MD, Cleveland Clinic, Emeritus Director Transplantation Enterprise, Cleveland, OH, USA, Giuliano Testa, MD, FACS, MBA, Simmons Transplant Institute, MD, Dallas, TX, USA

8:45 pm **Uterus Donors - Living, Diseased, and Selection**
Liza Johannesson, MD, PhD, Baylor University Medical Center, Medical Director, Uterus Transplantation, Dallas, TX, USA

8:55 pm **Filling Knowledge Gaps with Uterus Transplantation Research**
Paige Porrett, MD, PhD, University of Alabama at Birmingham, Associate Professor of Surgery; Director of VCA Transplantation at UAB, Birmingham, AL, USA

9:05 pm **Uterus Reproductive Endocrinology and Supply/Demand for Uterus Transplantation**
Cristiano Quintini, MD, Cleveland Clinic, Director, Uterus Transplantation, Cleveland, OH, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Public Policy
8:45 pm - 9:30 pm

The Practical Implementation of Imminent Death Donation

Moderators: Paul Morrissey, MD, Rhode Island Hospital, Professor of Surgery, Providence, RI, USA, Joshua Mezrich, MD, University of Wisconsin, X, Madison, WI, USA

8:55 pm **What are the Barriers to Implementation of Imminent Death Donation**
N. Thao Galvan, MD, MPH, FACS, Baylor College of Medicine, Assistant Professor, Houston, TX, USA

8:45 pm **Engaging the Stakeholders that Need to be Involved with the Development of Imminent Death Donation**
Kevin Myer, MSHA, LifeGift, CEO, Houston, TX, USA

9:05 pm **The Practical Implementation of Imminent Death Donation**
Tim Pruett, MD, University of Minnesota, Professor of Surgery and Internal Medicine, Minneapolis, MN, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Other
8:45 pm - 9:30 pm

"Check with your PCP…"- Primary Care for the Transplant Provider

Moderators: Nicholas Lim, MD, University of Minnesota, Assistant Professor of Medicine, Minneapolis, MN, USA

8:45 pm **Diabetes in the Health of the SOT Patient**
Ann Hackett, APRN, Vanderbilt University, APRN, Nashville, TN, USA

8:55 pm **Vaccination of the SOT Patient**
Emily Blodget, MD MPH, University of Southern California, Associate Professor of Clinical Medicine, Los Angeles, CA, USA

9:05 pm **Live Video Question and Answer**

Expert VIP Meet Up

Prof Develop

8:45 pm - 9:30 pm

Real Talk: Process and Strategy for Clinical Trial Grant Writing

Moderators: Norah Terrault, MD, MPH, University of Southern California, Professor of Medicine, Los Angeles, CA, USA, Mark Stegall, MD, Mayo Clinic, Rochester, MN, USA

8:45 pm **Formulating the Question**
Peter Heeger, MD, Icahn School of Medicine at Mount Sinai, Professor of Medicine, New York, NY, USA

8:55 pm **Partnerships and Collaborations with Other Centers**
Sandy Feng, MD, PhD, University of California San Francisco, San Francisco, CA, USA

9:05 pm **The NIH Perspective**
Nancy Bridges, MD, NIAID/NIH, Branch Chief and Senior Scientific Officer, Potomac, MD, USA

9:15 pm **Live Video Question and Answer**

AMERICAN TRANSPLANT CONGRESS
Day-at-a-Glance, Sunday, June 6, 2021

All Live Broadcast Programs are in Eastern Time

8:45 am – 9:00 am	**Welcome**
9:00 am – 10:00 am	**IMPACT Sessions**
10:00 am – 10:30 am	**Break**
10:30 am – 11:30 am	**Plenary Oral Abstract 2**
11:30 am – 12:00 pm	**Sponsor Networking**
12:00 pm – 12:30 pm	**AST Presidential Address**
12:30 pm – 1:30 pm	**AST Achievement Awards & Lifetime Achievement Awards**
1:30 pm – 2:30 pm	**Satellite Symposia**
2:30 pm – 3:00 pm	**Break**
3:00 pm – 4:00 pm	**IMPACT Sessions**
4:00 pm – 4:30 pm	**Sponsor Networking**
4:30 pm – 5:30 pm	**Rapid Fire Oral Abstract**
4:30 pm – 7:00 pm	**Focus in TX**
5:30 pm – 6:00 pm	**Break**
6:00 pm – 7:00 pm	**Rapid Fire Oral Abstract**
7:00 pm – 7:30 pm	**Break**
7:30 pm – 8:30 pm	**Sponsor Networking**
7:30 pm – 8:30 pm	**Poster Video Chat**

Welcome
8:45 am – 9:00 am

IMPACT Sessions
Kidney
9:00 am - 10:00 am

TCMR After Kidney Transplantation in 2021: Are We Moving Forward?
Moderators: Peter Nickerson, MD, University of Manitoba, Distinguished Professor, Vice Dean (Research), Winnipeg, MB, Canada, Roslyn Mannon, MD, University of Nebraska Medical Center, Professor of Medicine, Omaha, NE, USA

9:00 am **Innovative Therapies in Horizon for the Treatment of TCMR.**
Flavio Vincenti, MD, University of California San Francisco, Professor of clinical medicine, San Francisco, CA, USA

9:10 am **Strengths and Limitations of Histology**
Mark Haas, MD, PhD, Cedars-Sinai Medical Center, Dept. of Pathology, Attending Pathologist, Professor, Los Angeles, CA, USA

9:20 am **Clinical and Sub-clinical TCMR in 2019 and its Relevance to Clinicians and Researchers**
Sundaram Hariharan, MD, Starzl Transplant Institute, Univ of Pittsburgh Med Center, Professor of Medicine and Surgery, Pittsburgh, PA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Kidney
9:00 am - 10:00 am

Blood Pressure Screening and Associated Outcomes in Living Kidney Donors
Moderators: Nagaraju Sarabu, MD, University Hospitals Cleveland Medical Center, MD, Cleveland, OH, USA, Brian Lee, MD, University of Texas in Austin, Professor in Medicine, Austin, TX, USA

9:00 am **Post-donation Outcomes Related to Hypertension in Living Kidney Donors**
Asif Sharfuddin, Indiana University School of Medicine, Indianapolis, IN, USA

9:10 am **Interpreting Blood Pressure in Living Donor Candidates: How to Measure? What Cutoffs to Use?**
Joshua Augustine, MD, Cleveland Clinic Foundation, Cleveland, OH, USA

9:20 am **Update on National Guidelines for Hypertension and Monitoring for Hypertension in the General Population**
Sandra Taler, MD, Mayo Clinic, Professor of Medicine, Nephrology and Hypertension, Rochester, MN, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Liver
9:00 am - 10:00 am

Evolution of Living Liver Donation in North America: 2020 and Beyond
Moderators: Amit Mathur, MD MS FACS, Mayo Clinic in Arizona, Associate Professor of Surgery, Consultant, Division of Transplant Surgery, Phoenix, AZ, USA, Mark Cattral, MD, MSc, Toronto General Hospital, Professor of Surgery, Toronto ON, Canada

9:00 am **Successes and Challenges in Developing Non-Directed Liver Donation Programs: Donor Safety and Recipient Selections**
Nazia Selzner, MD PhD, Toronto, ON, Canada

9:10 am **Living Donor Liver Transplantation in North America: Where are we Going?**
Tarunjeet Klair, MD, University of Texas Health San Antonio, Assistant Professor of Surgery, Director Living Donor Liver Trasnsplantation, San Antonio, TX, USA

9:20 am **Implementation of Paired Liver Donation in a LDLT Program**
Nabil Dagher, MD, NYU Langone Transplant Institute, Chief, Abdominal Transplant Surgery Program, New York, NY, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Heart
9:00 am - 10:00 am

Examine Well Your Blood: Heart Transplant Management Without a Biopsy

Moderators: Howard Eisen, MD, Pennsylvania State University, Medical Director, Advanced Heart Failure and Transplant Programs, Hershey, PA, USA, Shelley Hall, MD, Baylor University Medical Center, Chief, Transplant Cardiology, MCS and Adv HF, Dallas, TX, USA

9:00 am **The Coast is Clear: Gene Expression Profiling for Asymptomatic Screening**
Mario Deng, MD, UCLA

9:10 am **All's Quiet on the Western Front**
Kiran Khush, MD, Stanford, Professor of Medicine, Stanford, CA, USA

9:20 am **Enter the Exosome**
Prashanth Vallabhajosyula, MD, MS, Yale University School of Medicine, Associate Professor of Surgery, New Haven, CT, USA

9:30 am **Putting It All Together**
Cesar Guerrero-Miranda, MD, FACC, Baylor University Medical Center, Advanced Heart Failure and Transplant Cardiologist, Dallas, TX, USA

9:40 am **Live Video Question and Answer**

IMPACT Sessions

Pediatric
9:00 am - 10:00 am

What is This Spot on My…….? What Every Transplant Physician should know about Treating Skin Problems in Pediatric Transplant Patients

Moderators: Joshua Blatter, MD, MPH, Washington University School of Medicine in St. Louis, Assistant Professor, Saint Louis, MO, USA, Cadence Kuklinski, DO, Washington University, Saint Louis, MO, USA

9:00 am **It's Spreading: Common Infectious Skin Lesions after Transplantation**
Bernard Cohen, MD, Johns Hopkins University, Professor of Pediatrics and Dermatology, Baltimore, MD, USA

9:10 am **I was Fine Before I Started Taking that Drug: Common Drug Related Skin Reactions in Transplantation**
Nicole Pilch, PharmD, MS, BCPS, Medical University of South Carolina, Charleston, SC, USA

9:20 am **Picture This: Dermatologic Case Review and Treatment Options**
Carrie Coughlin, MD, Washington University School of Medicine St. Louis, St. Louis, MO, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Basic
9:00 am - 10:00 am

Ischemia Reperfusion-Alloimmunity Interface

Moderators: Robert Fairchild, PhD, Cleveland Clinic, Professor of Molecular Medicine, Cleveland, OH, USA, Anita Chong, PhD, The University of Chicago Medicine, Professor, Chicago, IL, USA

9:00 am **IRI and Tolerance**
Anna Valujskikh, PhD, The Cleveland Clinic Fdn, Cleveland, OH, USA

9:10 am **IRI, Complement and the Allo-immune Response**
Dan Jane-wit, MD, PhD, Yale University School of Medicine, Assistant Professor, New Haven, CT, USA

9:20 am **Hepatic C-CAM-1 Expression Indicates Donor Quality and Predicts IRI Injury in Liver Transplant**
Jerzy Kupiec-Weglinski, MD, PhD, UCLA Medical Center, Professor of Surgery, Los Angeles, CA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Translational
9:00 am - 10:00 am

Spatial and Single Cell Profiling in Transplant Immune Injury

Moderators: Vikas Dharnidharka, MD, MPH, Washington University, Professor and Vice-Chair, Pediatrics, St. Louis, MO, USA, MIchael Mengel, MD, University of Alberta, Professor, Edmonton, AB, Canada

9:00 am **To Know What Single Cell RNA Sequencing Technology Is**
Benjamin Humphreys, MD, PhD, Washington University, Friedman Professor and Chief of Nephrology, St. Louis, MO, USA

9:10 am **Single Cell Transcriptomics in Renal Transplant**
Menna Clatworthy, PhD MD FRCP FMedSci, University of Cambridge, Professor of Translational Immunology, cambridge, United Kingdom

9:20 am **Single Cell Imaging Analysis and Integration with Single Cell Transcriptomics**
Andrew Malone, MD, Washington University School of Medicine, Assistant Professor, St Louis, MO, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

ID
9:00 am - 10:00 am

Is the Microbiome a Therapeutic Target in Transplantation?

Moderators: Elizabeth Verna, MD, MS, Hartsdale, NY, USA, Carlos Gomez, MD, University of Utah School of Medicine, Assistant Professor, Salt Lake City, UT, USA

9:00 am **Microbiome 101: What is it, How do you Measure it, and Why is it Important?**
Jasmohan Bajaj, MD, Virginia Commonwealth University, Professor, Richmond, VA, USA

9:10 am **Restoring the Microbiome to Prevent and Treat Infection**
Sahil Khanna, MBBS, MS, Mayo Clinic, Professor of Medicine, Rochester, MN, USA

9:20 am **Targeting the Microbiome to Prevent Post-Transplant Metabolic Disease and Rejection**
Mamatha Bhat, MD, PhD, University Health Network, Assistant Professor of Medicine, Toronto, ON, Canada

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Pharmacy: Pediatric
9:00 am - 10:00 am

The Road Less Traveled: Experience with Unique Immunosuppression in Pediatric Transplantation

9:10 am **Proliferation Signal Inhibitor Avenue: Use of mTORi/PSI Immunosuppression in Pediatric Heart Transplantation**
Kevin Daly, MD, Children's Hospital Boston, Assistant Professor of Pediatrics, Boston, MA, USA

9:00 am **Belatacept Lane: Use of Belatacept in Pediatric Kidney Transplantation**
Rochelle Liverman, Pharm.D., Children's Healthcare of Atlanta, Transplant Pharmacist Specialist, Atlanta, GA, USA

9:20 am **Tacrolimus Highway: Use of Extended Release Tacrolimus Products in Pediatric Heart, Liver, and Kidney Transplantation**
Mary Chandran, PharmD, Children's Hospital Colorado, Clinical Pharmacy Specialist, Denver, CO, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Public Policy
9:00 am - 10:00 am

Doctors, Patients, Lawyers, and Legislators: Who Decides for Whom?

Moderators: Ryutaro Hirose, MD, Univ of California-San Francisco, Professor, San Francisco, CA, USA, Jeffrey Edelman, MD, University of Washington, Associate Professor, Seattle, WA, USA

9:00 am **How Do We Define and Measure Transplant Benefit**
Elisa Gordon, PhD, MPH, Northwestern U Feinberg Sch of Medicine, Professor, Oak Park, IL, USA

9:10 am **What Forces Govern and Influence Organ Allocation Policy**
Yolanda Becker, MD, University of Chicago, Professor of Surgery, CHICAGO, IL, USA

9:20 am **What is Continuous Distribution and Why is it the Way to Go?**
Kevin O'Connor, MS, Life Center Northwest, President & CEO, Bellevue, WA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Ethics
9:00 am - 10:00 am

Palliative Care & Solid Organ Transplantation: A Spectrum of Care

Moderators: Kristin Kuntz, Ph.D., The Ohio State University Medical Center, Associate Professor of Psychiatry, Columbus, OH, USA, Nicole McCormick, DNP, MBA, NP-C, CCTC, University of Colorado, Assistant Professor, Denver, CO, USA

9:00 am **Overview of Palliative Care**
Brittany Waterman, MD, The Ohio State University Wexner Medical Center, Assistant Professor, Columbus, OH, USA

9:10 am **Palliative Care in the Pre-Transplant Setting**
Kristin Kronsnoble, PhD, Transplant Psychology, Tampa General Hospital, Director, Transplant Psychology, Tampa, FL, USA

9:20 am **Palliative Care in the Post-Transplant Setting**
Maha Mohamed, Medical Doctor (MD), Department of Nephrology, Associate Professor, Madison, WI, USA

9:30 am **Live Video Question and Answer**

10:00 pm **Break**

Plenary Session 2

10:30 am - 11:30 am

Moderators: Emily Blumberg, MD, FAST, University of Pennsylvania, Philadelphia, PA, USA, Lloyd Ratner, MD, MPH, Columbia University, Professor of Surgery; Director-Renal & Pancreatic Transplantation, New York, NY, USA

10:30 am **Trends in Mortality Among Solid Organ Transplant Recipients Hospitalized for Covid-19 During the Course of the Pandemic**
M. R. Heldman, O. S. Kates, R. M. Rakita, E. D. Lease, C. E. Fisher, A. P. Limaye, University of Washington, Seattle, WA, USA

10:40 am **Treg Engagement of Lymphotoxin Beta Receptor in Lymphatic Endothelial Cells is Required for Allograft Protection**
V. Saxena[1], W. Piao[1], L. Li[1], Y. Xiong[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], [1]U Maryland, Baltimore, MD, USA, [2]Harvard U, Boston, MA, USA

10:50 am **DCD Heart Donation: Impact on Organ Yield**
K. Gauntt, B. Carrico, D. Klassen, United Network for Organ Sharing, Richmond, VA, USA

11:00 am **Anti-CD8 Immuno-PET for Non-invasive Tracking of Early Graft Rejection in a Non-human Primate Kidney Transplant Model**
K. Bruestle[1], R. Tavare[2], F. Fredriksson[1], E. Duggan[1], F. Huang[1], B. Bhola[1], J. Giurleo[2], R. Foster[2], P. Krueger[2], M. Dobosz[2], D. Ekanayake-Alper[1], H. Sakai[1], B. Piegari[1], J. Castrillion[1], S. M. Coley[1], O. Harari[2], A. Mintz[1], D. Ma[2], A. Griesemer[1], [1]Columbia University Medical Center, New York City, NY, USA, [2]Regeneron Pharmaceuticals, Inc, New York City, NY, USA

11:10 am **Live Video Question and Answer**

Sponsor Networking

11:30 am - 12:00 pm

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Natera - Prospera: The Power & Potential of cell-free DNA in Transplantation & Oncology

Sanofi - One Year Later: Vaccines, Transplant, and Where We Go From Here - A Conversation with Dr Dorry Segev

Talaris Therapeutics - FCR001 Investigational Cellular Therapy in Living Donor Kidney Transplantation

Veloxis - Real World Application of ENVARSUS XR® (PART 2) – Conversion Dosing and Monitoring

Presidential Addresses

12:00 pm - 12:30 pm

AST Presidential Address

12:00 pm **Introduction**
Emily Blumberg, MD, FAST, University of Pennsylvania, Philadelphia, PA, USA

12:10 pm **Presidential Address**
Richard Formica, MD, FAST, Yale Univ School of Medicine, New Haven, CT, USA

Society Awards

12:30 pm - 1:30 pm

AST Achievement Awards & Lifetime Achievement Awards

12:30 pm **2020 Transplant Advocacy Award and Lifetime Achievement Awards**
Emily Blumberg, MD, FAST, University of Pennsylvania, Philadelphia, PA, USA

1:00 pm **2021 Award Presentations**
Richard Formica, MD, Yale Univ School of Medicine, New Haven, CT, USA

Satellite Symposia

1:30 pm - 2:30 pm

These symposia are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Updates in the Diagnosis and Management of Chronic Active Antibody Mediated Rejection

Supported by CSL Behring

AlloSure Lung: Donor-Derived Cell-Free DNA as an Innovative Biomarker for Lung Transplant Patients

Supported by CareDx

Let's Get "Real": Strategies to Reduce Rejection in Renal Transplantation – Applying the Evidence to Real World Scenarios

Supported by an independent educational grant from Sanofi

IMPACT Sessions

COVID-19

3:00 pm - 4:00 pm

Late-Breaking: COVID Vaccination and Immunotherapy in Transplant Patients

Moderators: Tim Pruett, MD, University of Minnesota, Professor of Surgery and Internal Medicine, Minneapolis, MN, USA, Andre Dick, MD, MPH, University of Washington School of Medicine Seattle, Associate Professor of Surgery, Seattle, WA, USA

3:00 pm **A US-wide study of COVID Vaccine Safety, Immune Response, and Durability in 3000 Transplant Patients**
Dorry Segev, MD, PhD, Johns Hopkins University, Professor of Surgery and Epidemiology, Baltimore, MD, USA

3:15 pm **Immunotherapy and Immunomodulation for COVID-19 in Transplant Patients**
Robin Avery, MD, Johns Hopkins, Professor of Medicine, Baltimore, MD, USA

3:30 pm **Making Sense of Vaccine and COVID Outcomes for Up to Date Clinical Recommendations**
Michael Ison, MD, MS, Northwestern University Feinberg SoM, Professor, Chicago, IL, USA

3:45 pm **Live Video Question and Answer**

IMPACT Sessions

Kidney

3:00 pm - 4:00 pm

Role of Genetic Testing in Potential Living Donor Candidates

Moderators: Brian Lee, MD, University of Texas in Austin, Professor in Medicine, Austin, TX, USA, Ethan Marin, MD, PhD, Regeneron Pharmaceuticals, Associate Medical Director, New Haven, CT, USA

3:00 pm **NGS, WES, WGS - The Genomic Era for Nephrologic Diagnosis and Therapy vis-à-vis Living Kidney Donation**
Ali Gharavi, M.D., Columbia University, Professor Of Mediicne, Chief Div Of Nephrology, New York, NY, USA

3:10 pm **Genetic Implications for Living Kidney Donors with a Family History of ADPKD and other Inheritable Kidney Diseases**
Meyeon Park, MD MAS, UCSF, Associate Professor, San Francisco, CA, USA

3:20 pm **Ethical Stewardship in Genetic Testing of Living Kidney Donors - Are We Crossing the Rubicon?**
Christie Thomas, MD, University of Iowa, Iowa City, IA, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Kidney
3:00 pm - 4:00 pm

Medical Risks in Young Donors

Moderators: Anuja Java, MD, Washington University School of Medicine in St. Louis, MO, Assistant Professor Of Medicine, Saint Louis, MO, USA

3:00 pm **Pregnancy Risks after Live Kidney Donation**
Arthur Matas, MD, University of Minnesota Medical School, Professor of Surgery, Minneapolis, MN, USA

3:10 pm **Assessing Emotional Maturity and Readiness to Consent as an Organ Donor**
Sheila Jowsey-Gregoire, MD, Mayo Clinic, Associate Professor of Psychiatry, Rochester, MN, USA

3:20 pm **Medical Risks in Young Donors**
Robert Steiner, MD, UCSD Medical Center, Transplant Nephrology, San Diego, CA, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Liver
3:00 pm - 4:00 pm

Responsible Expansion of Living Donor Liver Transplantation in the United States

Moderators: Whitney Jackson, MD, University of Colorado, Aurora, CO, USA, Kim Olthoff, MD, University of Pennsylvania, Donald Guthrie Professor of Surgery, Chief Division of Transplant Surgery, Philadelphia, PA, USA

3:00 pm **Obesity & Metabolic Considerations: Iron Discussions**
AnnMarie Liapakis, MD, Yale School of Medicine, Digestive Disease, Medical Director Living Donor Liver Transplant Yale New Haven Transplantation Center, New Haven, CT, USA

3:10 pm **The Hypercoaguable Work up of a Living Liver Donor - What's Revelant and Necessary?**
Whitney Jackson, MD, University of Colorado, Medical Director, Living Donor Liver Transplantation, Denver, CO, USA

3:20 pm **Too Young or Too Old, Discussion on Donor Age**
Elizabeth Pomfret, MD PhD, School of Medicine University of Colorado, Chief of Transplant Surgery, Aurora, CO, USA

3:40 pm **Live Video Question and Answer**

IMPACT Sessions

Lung: Heart
3:00 pm - 4:00 pm

Controversies in Candidate Selection for Cardiothoracic Transplantation

Moderators: Keith Wille, MD, Univ of Alabama at Birmingham, Professor of Medicine, Birmingham, AL, USA, Simon Urschel, MD, University of Alberta /Stollery Children's Hospital, Assoc Prof. Director Pediatric Cardiac Transplant, Edmonton, AB, Canada

3:00 pm **Frailty Assessment Tools and Risk Stratification in Cardiothoracic Transplant Candidates**
Palak Shah, MD, MS, Inova Heart and Vascular Institute, Director, Cardiovascular Genomics Center, Falls Church, VA, USA

3:10 pm **Marijuana Use and Cardiothoracic Transplant Candidacy - Current Views and Experiences**
Lorriana Leard, MD, University of California San Francisco, Professor of Clinical Medicine, San Francisco, CA, USA

3:20 pm **HIV or Viral Hepatitis Positive - A New Era in Potential Candidate Selection**
Christine Koval, MD, Cleveland Clinic Foundation, Associate Professor of Medicine, Section Head, Transplant Infectious Diseases, Cleveland, OH, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Heart: Kidney
3:00 pm - 4:00 pm

The Results of the Consensus Conference on Heart-Kidney Transplantation

Moderators: Darshana Dadhania, M.D., Weill Cornell Medicine - NYPH, Associate Professor of Medicine, New York, NY, USA, Allen Anderson, MD, FACC, FAHA, University of Texas Health San Antonio, Chief, Division of Cardiology, San Antonio, TX, USA

3:00 pm **The Pathophysiology of Cardiorenal Disease Leading to End Organ Failure**
W. H. Wilson Tang, MD, Cleveland Clinic, Professor, Cleveland, OH, USA

3:10 pm **A Prognostic Index for Combined Heart/ Kidney Transplantation- Which Biomarkers are Important? Review of Pertinent Studies**
Xingxing Cheng, MD MS, Stanford University, Clinical Assistant Professor, Palo Alto, CA, USA

3:20 pm **The Ethics of Fual Organ Transplantation: Evaluating Fairness in Organ Allocation**
Savitri Fedson, MD, Baylor College of Medicine- Michael E DeBakey VA Medical Center, MD, Houston, TX, USA

3:30 pm **Consensus Statements from the Heart/ Kidney Workgroup**
Jon Kobashigawa, MD, Cedars-Sinai Smidt Heart Institute, Director, Cedars-Sinai Heart Transplant Program, Los Angeles, CA, USA

3:40 pm **Live Video Question and Answer**

IMPACT Sessions

Ethics
3:00 pm - 4:00 pm

Reaching for the Elusive Brass Ring: Challenges Faced by Donor and Recipient Minorities when Accessing Transplant

Moderators: Paulo Martins, MD, PhD, University of Massachusetts, Worcester, MA, USA, Angie Nishio Lucar, MD, University of Virginia, Associate Professor, Charllotesville, VA, USA

3:00 pm **Using an Intersectionality Framework to Address Disparities in access to Kidney Transplantation**
Camilla Nonterah, PhD, University of Richmond, Assistant Professor of Health Psychology, Richmond, VA, USA

3:10 pm **Educational Outreach to Potential Recipients and Prospective Donors from Minority Groups**
Amy Waterman, PhD, UCLA, Transplant Research and Education Center, Professor in Residence, Deputy Director, Los Angeles, CA, USA

3:20 pm **Community-Engagement Approaches to Addressing Disparities in Transplantation**
Tanjala Purnell, PhD, MPH, Johns Hopkins University, Associate Director, Center for Health Equity, Baltimore, MD, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Translational
3:00 pm - 4:00 pm

Regulatory T cell therapy for Clinical Autoimmune and Transplantation Tolerance

Moderators: James Mathew, PhD, Northwestern University, Professor, Chicago, IL, USA, Giovanna Lombardi, BSc, PhD, FMedSci, King's College, Professor of Human Transplant Immunology, London, United Kingdom

3:00 pm **CAR Tregs**
Megan Levings, PhD, BC Children's Hospital Research Institute, Vancouver, BC, Canada

3:10 pm **Regulatory T cells Therapies Being Conducted at UCSF**
Qizhi Tang, PhD, UCSF, Professor, San Francisco, CA, USA

3:20 pm **Regulatory T cells Studies Being Undertaken in the UK**
Alberto Sanchez-Fueyo, King's College, London, England

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

ID
3:00 pm - 4:00 pm

Don't Give up HOPE: Evolving Standard Transplant Care for HIV Infected Patients

Moderators: Emily Blumberg, MD, FAST, Hospital of the University of Penn, Perelman School of Medicine at the University of Pennsylvania, Professor of Medicine, Director, Transplant Infectious Diseases, Philadelphia, PA, USA, Ghady Haidar, MD, University of Pittsburgh Medical Center, Assistant Professor of Medicine, Pittsburgh, PA, USA

3:00 pm **HIV+/+ Kidney Transplantation: Time to Expand**
Dong Heun Lee, MD, University of California San Francisco, Associate Professor, San Francisco, CA, USA

3:10 pm **HIV+/+ Heart and Lung Transplantation: Novel Strategies for a Hopeful World**
Marcus Pereira, MD, MPH, New York Presbyterian Hospital, New York, NY, USA

3:20 pm **HIV+/+ Liver Transplantation: Who, Why, When, Where to Refer**
Meenakshi Rana, MD, Icahn School of Medicine at Mount Sinai, Associate Professor of Medicine, Division of Infectious Disease, New York, NY, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Pharmacy
3:00 pm - 4:00 pm

Advanced Ambulatory Practice Models in Solid Organ Transplant

Moderators: Christina Doligalski, PharmD, UNC Hospitals and Clinics, Clinical Pharmacist Practitioner, Chapel Hill, NC, USA, Nicole McCormick, DNP, MBA, NP-C, CCTC, University of Colorado, Assistant Professor, Denver, CO, USA

3:00 pm **Development of an Advanced Practice Pharmacist Clinic for Outpatient Transplant Recipients**
Holli Winters, PharmD, BCPS, Ohio State University Wexner Medical Center, Clinical Pharmacy Specialist, Columbus, OH, USA

3:10 pm **Learning the Value of Pharmacy Learners in Transplant**
Matt Harris, PharmD, Duke, Director Transplant Pharmacy Programs, Durham, NC, USA

3:20 pm **Use of Pharmacy Technicians in the Outpatient Transplant Clinic**
Kristen Belfield, PharmD, BCPS, Yale New Haven Hospital, Clinical Pharmacy Specialist, Solid Organ Transplant, New Haven, CT, USA

3:30 pm **Role Delineations in a Multi-Disciplinary Outpatient Transplant Clinic**
Kristen Ryland, BS BSN MSN NP, Mayo Clinic

3:40 pm **Live Video Question and Answer**

Sponsor Networking

4:00 pm - 4:30 pm

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Natera - Renasight: Changing the Landscape of Renal Genetic Testing

Rapid Fire Oral Abstracts

Basic
4:30 pm - 5:30 pm

Biomarkers, Immune Assessment and Clinical Outcomes - II

Moderators: John Friedewald, MD, FAST, Northwestern University, Professor, Chicago, IL, USA, Sunil Kurian, MD, Scripps Health, Research Scientist, La Jolla, CA, USA

4:30 pm **Development and Validation of a Novel Peripheral Blood Based Gene Signature for Acute Rejection Following Renal Transplantation**
D. Zhang, Y. Wang, X. Hu, *Department of Urology, Beijing Chao-Yang Hospital, Capital Medical University, Beijing, China*

4:35 pm **Multiplexed Imaging Mass Cytometry of the Alloimmune Landscape of Rejection in Clinical Liver Transplantation**
J. Emamaullee, N. Ung, C. Man, J. Hoeflich, C. Goldbeck, A. Barbetta, R. Sun, N. Matasci, J. Katz, J. Lee, S. Chopra, L. Sher, S. Asgharzadeh, O. Akbari, Y. Genyk, *University of Southern California, Los Angeles, CA*

4:40 pm **Hypothermic Oxygenated Machine Perfusion Protects Against Cholangiocyte and Hepatocyte Injury and Mitigates Inflammation vs Static Cold Storage: Preliminary Results from a Single Center**
G. Panayotova, F. Paterno, M. McCarty, G. Dikdan, S. Simonishvili, Y. Qin, L. Brown, A. Amin, K. E. Lunsford, J. V. Guarrera, *Transplant Surgery, Rutgers NJMS, Newark, NJ*

4:45 pm **The Effect of the Affordable Care Act on Insurance Status, Waitlist, and Transplant Outcomes in Liver Transplantation**
B. I. Shaw[1], M. L. Samoylova[1], V. Wang[2], T. Risoli Jr[3], S. Peskoe[3], K. Caddell[3], L. M. McElroy[1], *[1]Surgery, Duke University, Durham, NC, [2]Population Health Sciences, Duke University, Durham, NC, [3]Biostatistics, Duke University, Durham, NC*

4:50 pm **Gain of Function Mutations in Latent Membrane Protein 1 of Epstein Barr Virus are Associated with Increased Risk of Post-Transplant Lymphoproliferative Disorder**
O. M. Martinez[1], S. M. Krams[1], M. Robien[2], M. Lapasaran[1], M. Arvedson[1], K. Weinberg[1], S. Boyd[1], B. Armstrong[3], C. Twist[4], D. Gratzinger[1], B. Tan[1], A. Trickey[1], M. Sever[3], M. Brown[2], D. Bernstein[1], C. O. Esquivel[1], *[1]Stanford University Sch of Med, Stanford, CA, [2]NIAID, Rockville, MD, [3]Rho, Durham, NC, [4]Roswell Park, Buffalo, NY*

4:55 pm **Clinical and Molecular Profiling Can Help in Predicting the Response to Alemtuzumab Treatment in Kidney Transplant Recipients with Severe or Glucocorticoid-Resistant Acute Rejection**
D. M. Peelen[1], M. van der Zwan[1], M. C. Clahsen-van Groningen[2], D. A. Mustafa[2], C. C. Baan[1], D. A. Hesselink[1], *[1]Internal Medicine - Nephrology & Transplantation, Erasmus MC, Rotterdam, Netherlands, [2]Pathology, Erasmus MC, Rotterdam, Netherlands*

5:00 pm **Identification of Distinct Blood Monocyte Phenotypes from Transplant Kidney Recipients Undergoing Cellular (TCMR) and Mixed Antibody Mediated Rejection (ABMR)**
C. Macedo, E. Bailly, K. Louis, M. Lucas, A. Zeevi, P. Randhawa, D. Metes, *Starzl Transplantation Institute, Pittsburgh, PA*

5:05 pm **Validation of a Novel Gene Expression Biomarker of Rejection Following Liver Transplantation**
J. Levitsky[1], M. Kandpal[1], T. Whisenant[2], K. Guo[1], S. Kurian[3], M. Abecassis[4], *[1]Gastroenterology & Hepatology; Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]University of California San Diego, San Diego, CA, [3]Scripps Clinic, La Jolla, CA, [4]University of Arizona College of Medicine Tucson, Tucson, AZ*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

ID
4:30 pm - 5:30 pm

COVID-19 Session 2
Moderators: Alfred Luk, M.D., Tulane University, Assistant Professor of Medicine, New Orleans, LA, USA, Rachel Miller, MD, Duke University, Professor of Medicine, Durham, NC, USA

4:30 pm **COVID-19 Potential Donor Derived Transmission Events Investigations: Early DTAC Experience**
R. La Hoz, A. Agarwal, S. Aslam, K. Dunn, J. Goldman, D. Levine, C. Marboe, G. F. Marklin, S. M. Pouch, M. Rana, R. Razonable, H. L. Stevenson, H. Te, A. E. Woolley, M. Michaels, L. Danziger-Isakov, *OPTN DTAC, Richmond, VA*

4:35 pm **The Impact of Covid-19 Pandemic on Living Donor Liver and Renal Transplantations in Japan: A Nationwide Survey**
S. Yamanaga[1], T. Hibi[2], R. Osawa[3], K. Yuzawa[4], H. Egawa[5], K. Kuramitsu[6], *[1]General Surgery, Japanese Red Cross Kumamoto Hospital, Kumamoto, Japan, [2]Pediatric Surgery and Transplantation, Kumamoto University, Kumamoto, Japan, [3]Infectious disease, Kameda medical center, Kamogawa, Japan, [4]Transplant Surgery, Mito Medical Center, Higashiibaraki District, Japan, [5]Gastrointestinal Surgery, Tokyo Women's Medical University Hospital, Shinjyuku-ku, Japan, [6]HBP surgery, Kobe University, Kobe, Japan*

4:40 pm **T-Cell Responses in Solid Organ Transplant Recipients with SARS-CoV-2 Infection**
V. H. Ferreira, T. M. Marinelli, T. Ku, M. Ierullo, B. Majchrzak-Kita, I. Bahinskaya, N. Pinzon, A. Humar, D. Kumar, *University Health Network, Toronto, ON, Canada*

4:45 pm **Mortality, Risk Factors, and Treatment of Covid-19 Infection in Solid Organ Transplants: A Systematic Review and Meta-analysis**
S. Yin, T. Song, Q. Zhong, T. Lin, *Urology Institute and Organ Transplantation Center, West China Hospital, Chengdu, China*

4:50 pm **Propensity Matched Analysis of Death and Non-favorable Discharge Among Hospitalized Transplant Recipients with COVID-19**
J. T. Swan[1], E. Rizk[2], S. L. Jones[1], N. Nwana[1], J. C. Nicolas[1], A. Tran[1], T. Nisar[1], T. Menser[1], S. G. Yi[2], L. W. Moore[1], A. O. Gaber[2], R. J. Knight[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX*

4:55 pm **Covid-19 Related Deaths Across the U.S. in Kidney Transplant Recipients**
K. Goli, N. T. Galvan, R. Cotton, J. A. Goss, C. A. O'Mahony, A. Rana, *Department of Abdominal Transplantation, Baylor College of Medicine, Houston, TX*

5:00 pm **Impact of COVID-19 on Solid Organ Transplantation**
E. Sampson[1], S. Hall[2], K. Robichaux[3], A. Kumar[2], N. Kemmer[4], J. Buggs[5], *[1]Lake Erie College of Osteopathic Medicine, Tampa, FL, [2]Morsani College of Medicine, University of South Florida, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Hepatology, Tampa General Hospital, Tampa, FL, [5]Transplant Surgery, Tampa General Hospital, Tampa, FL*

5:05 pm **Covid-19 in Solid Organ Transplantation (SOT): Results of the National Covid Cohort Collaborative (N3C)**
G. Agarwal[1], A. Vinson[2], R. Dai[3], E. French[4], S. Lee[5], A. Olex[4], A. Anzalone[6], V. Madhira[7], R. B. Mannon[8], *[1]Medicine, University of Alabama at Birmingham, Birmingham, AL, [2]Medicine/Nephrology, Nova Scotia Health Authority, Halifax, NS, Canada, [3]Biostatistics, University of Nebraska Medical Center, Omaha, NE, [4]Wright Center for Clinical and Translational Research, VIrginia Commonwealth University, Richmond, VA, [5]Medicine/Infectious Disease, University of Saskatchewan, Saskatoon, SK, Canada, [6]Neurology, University of Nebraska Medical Center, Omaha, NE, [7]Palia Software, Not sure, OR, [8]Medicine/Nephrology, University of Nebraska Medical Center, Omaha, NE*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Heart
4:30 pm - 5:30 pm

Do's and Don'ts of Heart Transplant Care
Moderators: Sean Pinney, MD, University of Chicago, Director, Advanced Heart Failure & Transplantation, Chicago, IL, USA, Palak Shah, MD, MS, Inova Heart and Vascular Institute, Director, Cardiovascular Genomics Center, Falls Church, VA, USA

4:30 pm **Pregnancy Outcomes in 108 Heart Transplant Recipients**
L. A. Coscia[1], A. Yusuf[1], S. Rao[2], S. Constantinescu[3], M. J. Moritz[4], *[1]Transplant Pregnancy Registry International, Philadelphia, PA, [2]University of Virginia Heath System, Charlottesville, VA, [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, [4]Surgery, Lehigh Valley Health Network, Allentown, PA*

4:35 pm **DSA is Associated with Molecular Changes in Many Hearts with Minor Abnormalities but Not Diagnosed as Antibody-Mediated Rejection**
P. Halloran[1], K. S. Madill-Thomsen[1], &. the INTERHEART Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

4:40 pm **Quilty Lesions are Associated with a Tolerance Profile in Heart Allografts Biopsies**
J. Torrealba, S. Moore, S. Sathirareuangchai, L. De Las Casas, Q. Cai, *Pathology, UTSW Medical Ctr, Dallas, TX*

4:45 pm **The Pathology of Heart Allograft Biopsies: Discrepancies in Interpretation Between Conventional Histology and the Molecular Microscope Diagnostic (MMDx®) System**
P. Randhawa[1], A. Seitz[2], Y. Huang[1], B. Feingold[2], *[1]Department of Pathology, Pittsburgh, PA, [2]Pediatrics, University of Pittsburgh, Pittsburgh, PA*

4:50 pm **Impact of Statin Intensity on the Incidence of Vascular Events and Graft Survival in Heart Transplant Recipients**
E. Kim[1], I. Booth[2], R. Madathil[3], B. Ravichandran[1], M. Demehin[2], M. Plazak[2], *[1]University of Maryland School of Pharmacy, Baltimore, MD, [2]Pharmacy, University of Maryland Medical Center, Baltimore, MD, [3]University of Maryland School of Medicine, Baltimore, MD*

4:55 pm **Assessing the Impact of Acute Major Adverse Kidney Events on Clinical Outcomes in Heart Transplant Recipients**
J. E. Kelly[1], C. Perez[1], D. Taber[1], R. J. Tedford[2], B. McMahon[2], S. Alzaidi[1], H. B. Meadows[1], *[1]Pharmacy, MUSC Health, Charleston, SC, [2]Medicine, MUSC Health, Charleston, SC*

5:00 pm **Acute Kidney Injury Requiring Dialysis in Heart Transplant Recipients is a Risk Factor for Graft Failure and Overall Mortality**
M. A. Merzkani, H. Murad, A. Pottebaum, A. Java, A. Malone, J. Schilling, A. Itoh, R. Delos Santos, T. Alhamad, *Transplant, Washington University, Saint Louis, MO*

5:05 pm **Acute Dialysis, Mortality and Renal Failure After Heart Alone Transplant by Egfr and Dialysis Requirement in the United States**
M. Aljuhani[1], T. Alexy[1], S. Jackson[2], C. Martin[1], R. Kandaswamy[3], S. Riad[1], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Complex Care Analytics, Fairview Health Services, Minneapolis, MN, [3]Surgery, University of Minnesota, Minneapolis, MN*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
4:30 pm - 5:30 pm

Hemodynamic Consequences of Portal Hypertension Including Kidney Issues

Moderators: Catherine Frenette, MD, FAST, AGAF, FAASLD, Scripps Clinic Department of Organ Transplant, Medical Director of Liver Transplant, La Jolla, CA, USA, Keri Lunsford, MD, PhD, Rutgers New Jersey Medical Schoo, Assistant Professor of Surgery, Newark, NJ, USA

4:30 pm **The Rate of Hospitalization Among Patients with Cirrhosis is More Than Twice as High as Patients Over 85 Years**
N. R. Mazumder[1], K. Guo[2], L. Zhao[3], A. Kho[1], K. Walters[4], T. S. Carey[4], C. Loftus[1], D. P. Ladner[1], *[1]Northwestern Memorial Hospital, Chicago, IL, [2]Biostatistics, Northwestern Memorial Hospital, Chicago, IL, [3]Biostatistcs, Northwestern Memorial Hospital, Chicago, IL, [4]University of North Carolina Chapel Hill, Chapel Hill, NC*

4:35 pm **A Novel Liver Assist Device as a Bridge to Liver Transplantation in Acute on Chronic Liver Failure Patients with Multi-Organ Failure**
S. Ahmad[1], I. W. Liou[1], J. Reyes[2], R. Bakthavatsalam[3], N. C. Smith[4], R. L. Carithers[1], C. Martin[1], D. Gao[5], *[1]Medicine, University of Washington, Seattle, WA, [2]Surgery, University of Washington, SEATTLE, WA, [3]Surgery, University of Washington, Seattle, WA, [4]Nursing, University of Washington, Seattle, WA, [5]Engineering, University of Washington, Seattle, WA*

4:40 pm **Rabbit Anti-thymocyte Globulin Induction is Not Associated with Improved Outcomes in Liver Transplant Recipients**
P. Nguyen, N. Wilson, G. Saracino, R. Patel, S. K. Asrani, G. Testa, T. Sam, *Baylor University Medical Center, Dallas, TX*

4:45 pm **Effects of Timing of Everolimus Transition on Renal Outcomes in Liver Transplant Recipients**
M. Leick[1], H. Belleau[2], T. McCashland[3], *[1]Nebraska Medicine, Omaha, NE, [2]Bryan Health, Lincoln, NE, [3]University of Nebraska Medical Center, Omaha, NE*

4:50 pm **Machine Perfusion of Kidney Grafts in Simultaneous Liver Kidney Transplantation: National Trends and Outcomes**
A. Chang[1], M. Chen[1], P. Abt[1], T. Bittermann[2], *[1]Surgery, University of Pennsylvania, Philadelphia, PA, [2]Gastroenterology, University of Pennsylvania, Philadelphia, PA*

4:55 pm **Outcomes of Transjugular Intrahepatic Portosystemic Shunts (TIPS) in Dialysis-Dependent ESLD Patients: The ALTA Study**
J. Ge[1], J. Boike[2], M. German[3], G. J. Morelli[4], E. Spengler[3], A. Said[3], A. S. Lee[3], A. Hristov[3], A. Desai[5], T. Couri[6], S. Paul[6], C. Frenette[7], N. Christian-Miller[7], M. Laurito[8], E. Verna[8], U. Rahim[9], A. Goel[9], D. Gregory[2], L. VanWagner[2], K. P. Kolli[1], J. Lai[1], *[1]University of California, San Francisco, San Francisco, CA, [2]Northwestern Memorial Hospital, Chicago, IL, [3]University of Wisconsin, Madison, WI, [4]University of Florida Health, Gainsville, FL, [5]Indiana University School of Medicine, Indianapolis, IN, [6]University of Chicago, Chicago, IL, [7]The Scripps Clinic, La Jolla, CA, [8]Columbia University, New York, NY, [9]Stanford University, Stanford, CA*

5:00 pm **Home-based Liver Frailty Intervention (lift) in Liver Transplant Candidates: A Pilot Study**
A. J. Thuluvath[1], K. Belfanti[1], S. Morrissey[1], O. Siddiqui[1], J. Peipert[1], A. Daud[1], J. Levitsky[1], T. Bogg[2], A. Flores[1], D. P. Ladner[1], *[1]Northwestern University Transplant Research Collaborative, Chicago, IL, [2]Department of Psychology, Wayne State University, Detroit, MI*

5:05 pm **Kidney Transplantation Alone in Patients with Compensated Cirrhosis: A Multicenter Study**
A. Kassem[1], S. Asrani[1], S. W. Biggins[2], Y. Darwish[1], M. Nadim[3], B. Fischbach[1], T. Fong[3], *[1]Baylor University Medical Center at Dallas, Dallas, TX, [2]University of Washington, Seattle, WA, [3]USC - Keck, Los Angeles, CA*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
4:30 pm - 5:30 pm

Kidney Deceased Donor Selection
Moderators: Frank Darras, MD, SUNY - Stony Brook, Clinical Professor of Urology/ Renal Transplantation, Stony Brook, NY, USA, Samuel Sultan, MD, Weill Cornell Medicine, Assistant Professor of Surgery, New York, NY, USA

4:30 pm **Findings from the Bareto Study: Associations Between Chronic Vascular Changes and 10-year Transplant Graft Outcomes**
L. Kamal[1], D. Stewart[2], J. Foutz[2], H. McGehee[2], P. Saravanane[1], S. Yu[1], R. Yusfi[1], G. Gupta[1], *[1]Virginia Commonwealth University, Richmond, VA, [2]UNOS, Richmond, VA*

4:35 pm **An HLA Class II Matching Strategy That Predicts De Novo Donor-specific HLA Antibody Formation Using Low Resolution HLA Types**
L. Hidalgo[1], I. Martinez Juarez[2], L. Morales Buenrostro[2], S. Shojai[3], P. Campbell[1], *[1]University of Wisconsin Madison, Madison, WI, [2]Instituto Nacional de Ciencias Medicas Y Nutricion Salvador Zubrian, Mexico City, Mexico, [3]Medicine, University of Alberta, Edmonton, AB, Canada*

4:40 pm **Outcomes from High KDPI Kidneys Utilized for Dual Kidney Transplantation**
J. Wagler[1], K. Mitchell[2], S. Ohara[3], R. Heilman[2], S. K. Reddy[2], H. Khamash[2], C. Jadlowiec[2], *[1]Mayo Clinic Arizona, Phoenix, AZ, [2]Mayo Clinic, Phoenix, AZ, [3]Valleywise Health General Surgery Residency Program, Phoenix, AZ*

4:45 pm **Successful Outcomes from Selected Akin3 Donors Requiring Renal Replacement: Avenue for Increase in Organ Utilization**
P. Budhiraja[1], R. L. Heilman[1], M. L. Smith[2], H. A. Khamash[1], L. Kodali[1], A. A. Moss[3], A. K. Mathur[3], C. Jadlowiec[3], K. S. Reddy[3], *[1]Medicine, Mayo Clinic, Phoenix, AZ, [2]Pathology, Mayo Clinic, Phoenix, AZ, [3]Surgery, Mayo Clinic, Phoenix, AZ*

4:55 pm **Outcomes of Kidney Transplant Recipients (KTRs) Comparing Brain Dead Donors' vs Donation After Cardiac Death Stratified by KDPI, Focus on Marginal Kidneys: A UNOS Database Analysis**
B. Chopra[1], K. K. Sureshkumar[1], D. Rajasundaram[2], E. C. Rodrigo[3], *[1]Allegheny Health Network, Pittsburgh, PA, [2]UPMC, Pittsburgh, PA, [3]University Hospital Marqués de Valdecilla, Santander, Spain*

5:00 pm **Expanding A_2 to B Kidney Transplantation: Safe and Effective Use of Recipients with High Titer Antibodies**
A. Gilbert[1], S. Radomski[2], J. Verbesey[1], J. Vucci[1], M. Cooper[1], *[1]Medstar Georgetown Transplant Institute, Washington, DC, [2]Department of Surgery, Johns Hopkins Medical Center, Baltimore, MD*

5:05 pm **How Long is the Wait Worthwhile: Cost-Effectiveness of Accepting a Kidney from a Donor with Apolipoprotein L1 High-Risk Genotype**
K. Lentine[1], D. Brennan[2], M. Wang[3], M. Schnitzler[4], H. Xiao[4], D. Axelrod[5], J. Snyder[6], K. Lentine[4], *[1]Saint Louis University, St. Louis, MO, [2]Johns Hopkins, Baltimore, MD, [3]Washington Univ, Saint Louis, MO, [4]Saint Louis Univ, Saint Louis, MO, [5]Univ of Iowa, Iowa City, IA, [6]SRTR, Minneapolis, MN*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Public Policy: Ethics
4:30 pm - 5:30 pm

Potpourri of Public Policy and Allocation
Moderators: Jonathan Berger, MD, MHS, NYU Langone Transplant Insttitute, Assistant Professor, New York, NY, USA, Evelyn Hsu, MD, Seattle Children's Hospital, Associate Professor of Pediatrics, Seattle, WA, USA

4:30 pm **Changes to Adult Heart Allocation Improve Candidate Stratification**
K. Bradbrook[1], K. Lindblad[1], R. R. Goff[1], R. Daly[2], S. Hall[3], *[1]Research, United Network for Organ Sharing, Richmond, VA, [2]Mayo Clinic, Rochester, MN, [3]Baylor University Medical Center, Dallas, TX*

4:35 pm **Incorporation of Donor Liver Macrovesicular Steatosis Into Srtr Risk Adjustment Models for Deceased Donor Yield and Post-Transplant Outcome**
A. Kwong[1], C. Wang[2], A. Wey[3], N. Salkowski[3], J. Snyder[4], J. Wetmore[2], A. Israni[2], J. Lake[4], P. Stock[5], W. Kim[1], *[1]Stanford University, Redwood City, CA, [2]Medicine, Hennepin Healthcare, Minneapolis, MN, [3]Scientific Registry of Transplant Recipients, Minneapolis, MN, [4]University of Minnesota, Minneapolis, MN, [5]University of California, San Francisco, San Francisco, CA*

4:40 pm **Increasing Survival on the Kidney Transplant Waiting List: A Thirty-Three Year Analysis**
E. L. Godfrey[1], P. T. Kambhampati[1], J. A. Goss[2], A. Rana[2], *[1]Baylor College of Medicine, Houston, TX, [2]Division of Abdominal Transplantation, Department of Surgery, Baylor College of Medicine, Houston, TX*

4:45 pm **The Evolution of the National Liver Review Board**
S. Noreen[1], J. Trotter[2], J. Pomposelli[3], M. Cafarella[1], J. Heimbach[4], *[1]UNOS, Richmond, VA, [2]BSWHealth, Dallas, TX, [3]UCHealth, Aurora, CO, [4]Mayo Clinic, Rochester, MN*

4:50 pm **Profound Opportunities Lost: Patients with High Priority for Ideal Donor Kidneys That are Not Placed on the Kidney Transplant Waiting List**
J. Schold[1], A. Huml[1], E. Poggio[1], J. Sedor[1], S. Husain[2], K. L. King[2], S. Mohan[2], *[1]Cleveland Clinic Foundation, Cleveland, OH, [2]Columbia University, New York, NY*

4:55 pm **Impact of Donor Kidney Biopsy on Kidney Yield and Post-Transplant Outcomes**
C. Wang[1], J. Wetmore[1], A. Wey[2], N. Salkowski[2], J. Snyder[2], A. Israni[1], *[1]Nephrology, Hennepin County Medical Center, Minneapolis, MN, [2]Scientific Registry of Transplant Recipients, Minneapolis, MN*

5:00 pm **Predicting Post-transplant Death and Graft Loss Risk: Insight at Listing**
N. Dzebisashvili[1], M. Schnitzler[2], K. Lentine[2], K. Venkataramani[1], S. Ghosh[1], *[1]CareDx, Brisbane, CA, [2]Saint Louis University, St. Louis, MO*

5:05 pm **Framing the Conceptualization of Uterus Transplantation: A Mixed Methods Study**
A. Wall[1], L. Johannesson[1], M. Sok[2], A. Warren[3], E. Gordon[4], G. Testa[1], *[1]Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX, [2]Obstetrics and Gynecology, Baylor University Medical Center, Dallas, TX, [3]Trauma and Critical Care, Baylor University Medical Center, Dallas, TX, [4]Northwestern University, Dallas, TX*

5:10 pm **Live Video Question and Answer**

Focus in TX

Translational
4:30 pm - 7:00 pm

Translational: Solving the Donor Shortage with Science

Moderators: Robert Montgomery, MD,D.Phil, FACS, NYU Langone Transplant Institute, H. Leon Pachter Chair and Professor of Surgery, New York, NY, USA, Markus Selzner, MD, University of Toronto, Associate Professor of Surgery, Toronto, ON, Canada

4:30 pm **Organ Rejuvenation/Perfusion- Ex-vivo and in Animals**
Sarah Hosgood, PhD, University of Cambridge, Dr, Cambridge, United Kingdom

4:40 pm **Organ Preservation/Cryopreservation**
Heidi Yeh, MD, Massachusetts General Hospital, Transplant Surgeon, Boston, MA, USA

4:50 pm **Biofabrication**
Jeffrey Lawson, M.D., Ph.D., Professor of Vascular Surgery, Humacyte, Inc, Chief Surgical Officer, Durham, NC, USA

5:00 pm **Live Video Question and Answer**

5:30 pm **Break**

6:00 pm **Xeno/Chimeric Organs**
Megan Sykes, MD, Columbia University, Professor, Columbia University, Director, Columbia Center for Translational Immunology, New York, NY, USA

6:10 pm **Stem Cell/Recellularization**
Anthony Atala, MD, Wake Forest Institute for Regenerative Medicine, Director, Winston Salem, NC, USA

6:20 pm **The Ethics of Novels Means of Expanding the Donor Pool**
Arthur L. Caplan, PhD, NY, USA

6:30 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

ID
6:00 pm - 7:00 pm

Infections in Kidney Recipients

Moderators: Elena Beam, M.D, Mayo Clinic College of Medicine, Consultant, Infectious Disease, Rochester, MN, USA, Maricar Malinis, MD, Yale School of Medicine, Associate Professor of Medicine and Surgery (Transplant), New Haven, CT, USA

6:00 pm **Posttransplant Malignancy in HIV+ Kidney Transplant Recipients**
D. Sawinski[1], R. Fitzsimmons[1], J. Locke[2], J. Trofe-Clark[1], B. Shelton[2], P. Reese[1], E. Blumberg[1], *[1]Hospital of the University of Pennsylvania, Philadelphia, PA, [2]University of Alabama at Birmingham, Birmingham, AL*

6:05 pm **Influence of Induction Therapy and Antiretroviral Regimen on Outcomes in HIV Positive Renal Transplant Recipients**
C. Rogers Marks[1], C. Durand[2], J. Hand[3], M. Abidi[4], M. Malinis[5], B. Barnaba[2], H. Patel[6], C. D. Alonso[6], *[1]Massachussetts General Hospital, Boston, MA, [2]Johns Hopkins Medical Center, Baltimore, MD, [3]Ochsner Medical Center, New Orleans, LA, [4]Univ. of Colorado, Aurora, CO, [5]Yale, New Haven, CT, [6]Beth Israel Deaconess Medical Center, Boston, MA*

6:10 pm **Outcomes of Kidney Transplantation in HIV Positive Highly Sensitized Recipients**
S. Karhadkar, J. Panichella, H. Resweber, K. Nguyen, A. Di Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

6:15 pm **Infectious Complications After Belatacept Conversion in Kidney Transplant**
J. E. Marvin[1], D. Amenyedor[1], M. M. Azar[2], K. Belfield[1], V. Do[1], R. Formica[3], E. Cohen[1], *[1]Pharmacy, Yale New Haven Hospital, New Haven, CT, [2]Section of Infectious Diseases, Yale School of Medicine, New Haven, CT, [3]Section of Nephrology, Yale School of Medicine, New Haven, CT*

6:20 pm **Optimal Antimicrobial Duration for Donor Positive Cultures in Kidney Transplant Recipients**
J. Ferrante, K. Schnelle, M. Palettas, S. Sarwar, H. Winters, M. Chunduru, *Pharmacy, The Ohio State University Wexner Medical Center, Columbus, OH*

6:25 pm **Treatment of Biopsy-Proven Pyelonephritis of the Transplanted Kidney is Associated with Better Graft Outcomes**
F. Aziz, C. Saddler, J. Alstott, K. Swanson, S. Parajuli, N. Garg, A. Djamali, D. Mandelbrot, *University of Wisconsin, Madison, WI*

6:30 pm **The Metagenomic Landscape of Renal Transplant**
A. Johnson[1], G. Karadkhele[2], C. Larsen[2], *[1]Emory University, Atlanta, GA, [2]Surgery, Emory University, Atlanta, GA*

6:35 pm **Impact of High-Risk EBV Discordance Status on Survival Outcomes in Kidney Transplant Recipients: A Multivariable Analysis**
A. Dinesh[1], S. Jackson[2], T. L. Pruett[1], S. Riad[3], *[1]Division of Transplantation, Department of Surgery, University of Minnesota, Minneapolis, MN, [2]Biostatistics, Analytics Consulting Services- Solid Organ Transplant, M Health Fairview, Minneapolis, MN, [3]Department of Medicine, University of Minnesota, Minneapolis, MN*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
6:00 pm - 7:00 pm

Kidney Complications

Moderators: Aala Amtul, MD, Beth Israel Deaconess Medical Center, MD, Boston, MA, USA, Larry Melton, MD PhD, Mercy Regional Medical Center, Transplant Nephrologist, Durango, CO, USA

6:00 pm **Mapping Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI) in Kidney Transplant Biopsies Reveals Two Classes of Early AKI That Differ in Their Response-to-Wounding**
P. Halloran[1], J. Reeve[1], G. Böhmig[2], O. Viklicky[3], M. Myslak[4], G. Gupta[5], &. the INTERCOMEX Study Group[6], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Medical University of Vienna, Vienna, Austria, [3]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [4]Pomeranian Medical University, Szczecin, Poland, [5]Virginia Commonwealth University, Richmond, VA, [6]AB, Canada*

6:05 pm **Oxalate Nephropathy After Kidney Transplant: Defining Histological Patterns, Contributing Factors and Graft Outcome**
N. Jakob[1], A. Chuu[1], J. Ninan[1], E. Lim[1], N. Zhang[1], H. Amer[2], F. Cosio[2], H. Wadei[3], M. Ryan[1], C. Cortese[3], L. Cornell[2], M. Keddis[1], *[1]Nephrology, Mayo Clinic, Scottsdale, AZ, [2]Nephrology, Mayo Clinic, Rochester, MN, [3]Nephrology, Mayo Clinic, Jacksonville, FL*

6:10 pm **Kidney Donor Risk Index: Significance as a Predictor of Kidney Transplant Outcomes Beyond Allograft Survival, Analysis of 18 Adjusted Regression Models Involving Adult Deceased Donor Kidney Recipients**
A. Santos, E. Bueno, M. A. Leghrouz, *University of Florida, Gainesville, FL*

6:15 pm **The Effect of Delayed Graft Function on Early versus Late Mortality Following Kidney Transplantation**
W. Irish[1], Y. Fu[2], D. B. Leeser[1], K. V. Ravindra[3], C. Haisch[1], J. Tuttle[1], *[1]Surgery, East Carolina University, Greenville, NC, [2]Mathematics, East Carolina University, Greenville, NC, [3]Surgery, Duke University, Durham, NC*

6:20 pm **Outcomes of Kidney Transplant Recipients With Sickle Cell Disease: An Analysis of the 2000-2019 UNOS/OPTN Database**
N. Leeaphorn[1], C. Thongprayoon[2], C. Jadlowiec[3], A. Chewcharat[4], P. Hansrivijit[5], S. Katari[1], P. Vaitla[6], L. Cummings[1], M. Cooper[7], W. Cheungpasitporn[2], *[1]Saint Luke's Health System, Kansas City, MO, [2]Mayo Clinic, Rochester, MN, [3]Mayo Clinic, Phoenix, AZ, [4]Mount Auburn Hospital, Cambridge, MA, [5]University of Pittsburgh Medical Center Pinnacle, Harrisburg, PA, [6]University of Mississippi Medical Center, Jackson, MS, [7]Medstar Georgetown Transplant Institute, Washington, DC*

6:25 pm **Worsening Impact of Acute Kidney Rejection on Long Term Graft Survival from 2000 to 2014**
D. Leeser[1], W. Irish[1], K. Ravindra[2], V. Villani[2], A. Connor[2], J. Tuttle[1], *[1]Surgery, East Carolina University, Greenville, NC, [2]Surgery, Duke University, Durham, NC*

6:30 pm **Angiotensin II Type-1 Receptor Antibodies are Associated with Inferior Renal Allograft Survival**
P. Martin, E. Santos, N. Gunby, M. Willicombe, *Renal Department, Imperial College Healthcare NHS Trust, London, United Kingdom*

6:35 pm **Post-Transplant Idiopathic Immune Complex Glomerulonephritis**
F. Aziz, T. Singh, N. Garg, D. Mandelbrot, *University of Wisconsin, Madison, WI*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
6:00 pm - 7:00 pm

Kidney Desensitization/KPD

Moderators: Stanley Jordan, MD, Cedars Sinai Medical Ctr, X, West Hollywood, CA, USA, Julie Yabu, MD, University of California, Los Angeles, Associate Professor, Los Angeles, CA, USA

6:00 pm **Desensitization Using Clazakizumab® (anti-il-6) in Highly-hla Sensitized Patients Awaiting Kidney Transplant (nct03380962)**
A. A. Vo[1], N. Ammerman[1], E. Huang[1], M. Toyoda[2], S. Ge[2], A. Peng[1], R. Najjar[1], S. Sethi[1], S. Williamson[1], C. Myers[1], K. Lim[1], M. Gillespie[1], S. Jordan[1], *[1]Kidney Transplant, Cedars Sinai Medical Ctr, Los Angeles, CA, [2]Transplant Immunology Laboratory, Cedars Sinai Medical Ctr, Los Angeles, CA*

6:05 pm **The Effect of Daratumumab (Dara, Humanized Anti-CD38 Monoclonal Antibody) on Immune Cells In Vitro and in a HLA-Sensitized Kidney Transplant Patient (HS KTx Pt) Desensitized (DES) with Dara**
S. Ge[1], M. Chu[1], A. De Guzman[1], E. Ortiz[1], A. Vo[2], N. Ammerman[2], S. C. Jordan[2], M. Toyoda[1], *[1]Transplant Immunology Laboratory, Cedars Sinai Medical Center, Los Angeles, CA, [2]Comprehensive Transplant Center, Cedars Sinai Medical Center, Los Angeles, CA*

6:10 pm **Additional Value to Participation in a National Paired Kidney Exchange Program: Exploring Characteristics of Chain End Living Donors and Waitlist Recipients**
N. Osbun[1], A. Thomas[2], M. Cooper[3], S. Flechner[4], D. Segev[2], J. Veale[1], *[1]Urology, University of California Los Angeles, Los Angeles, CA, [2]Johns Hopkins University, Baltimore, MD, [3]Medstar Georgetown Transplant Institute, Washington DC, DC, [4]Cleveland Clinic, Cleveland, OH*

6:15 pm **Kidney Paired Exchange in Children in the United-states**
J. Hogan[1], A. G. Thomas[2], J. Verbesey[3], D. L. Segev[4], *[1]Transplant Research Center, Department of Surgery, Emory University, Atlanta, GA, [2]Department of Epidemiology, University of North Carolina, Chapel Hill, NC, [3]Department of Surgery, Medstar Georgetown Transplant Institute, Washington, DC, [4]Department of Surgery, Johns Hopkins University, Baltimore, MD*

6:20 pm **Right Kidneys and Kidneys with Complex Anatomy are More Likely to be Transplanted to the Waiting List in a National Kidney Paired Donation Program**
N. Osbun[1], A. Thomas[2], A. Waterman[3], J. Veale[1], D. Segev[2], D. Leeser[4], *[1]Urology, University of California Los Angeles, Los Angeles, CA, [2]Johns Hopkins University, Baltimore, MD, [3]University of California Los Angeles, Los Angeles, CA, [4]East Carolina University, Greenville, NC*

6:25 pm **The Benefits of Sharing Non-Directed Donors Nationally Through Paired Exchange**
J. Verbesey[1], A. G. Thomas[2], A. D. Waterman[3], J. Vucci[1], G. Vranic[1], A. Gilbert[1], S. Ghasemian[1], M. Cooper[1], *[1]Georgetown University Hospital, Washington, DC, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]UCLA, Los Angeles, CA*

6:30 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
6:00 pm - 7:00 pm

MELD, Allocation and Donor Issues
Moderators: Adam Bodzin, MD, Thomas Jefferson University, Philadelphia, PA, USA, Daniela Ladner, MD, MPH, Northwestern Memorial Hospital, X, Chicago, IL, USA

6:00 pm **Improved Outcomes Over Time of Extended Criteria Donor Grafts for Acute-on-chronic Liver Failure**
T. Kitajima, T. Ivanics, D. Moonka, T. Shamaa, A. Mohamed, K. Delvecchio, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

6:05 pm **Impact of Transplant Center Volume on Utilization of and Outcomes Following Donation After Circulatory Death Liver Transplantation in the United States**
S. Kumar[1], S. Lin[2], J. D. Schold[2], *[1]Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates, [2]Department of Quantitative Health Sciences, Cleveland Clinic Foundation, Cleveland, OH*

6:10 pm **The Impact of Donor and Recipient Age Differenceon Long Term Prognosis in Young Liver Transplant Recipients**
A. Pita, A. Moro, J. C. McVey, D. J. Firl, M. Fujiki, T. Diago, C. Quintini, F. Aucejo, C. D. Kwon, K. V. Menon, K. Hashimoto, B. Eghtesad, C. Miller, K. Sasaki, *The Cleveland Clinic, Cleveland, OH*

6:15 pm **State-level Trend in the Prevalence of Non-alcoholic Steatohepatitis for Liver Transplant Candidates in the United States, 2001-2017**
S. Chang[1], M. Wang[1], M. Pozo[2], D. Ladner[2], D. Borja-Cacho[2], *[1]Washington University School of Medicine, Saint Louis, MO, [2]Northwestern University, Chicago, IL*

6:20 pm **Liver Transplant Justified at Any Meld Score?**
H. Oden-Brunson, E. Godfrey, H. Flores, A. Rana, *Baylor College of Medicine, Houston, TX*

6:25 pm **Impact of Graft Quality on Patient Survival in Sick Patients**
G. Handing[1], S. Keeling[1], C. Christmann[1], N. Galvan[2], C. O'Mahony[2], J. Goss[2], R. Cotton[2], A. Rana[2], *[1]School of Medicine, Baylor College of Medicine, Houston, TX, [2]Michael E DeBakey Department of Surgery, Division of Abdominal Transplant, Houston, TX*

6:30 pm **Classification of Distinct Patterns of Ischemic Cholangiopathy Following DCD Liver Transplantation: Distinct Clinical Courses and Long-Term Outcomes from a Multicenter Cohort**
K. P. Croome[1], A. K. Mathur[2], B. Aqel[2], L. Yang[1], J. K. Heimbach[3], T. Taner[3], C. B. Rosen[3], R. Paz-Fumagalli[1], C. Taner[1], *[1]Mayo Clinic Jacksonville, Jacksonville, FL, [2]Mayo Clinic Arizona, Scottsdale, AZ, [3]Mayo Clinic Rochester, Rochester, MN*

6:35 pm **The Unintended Financial Consequences of Acuity Circles for Liver Allocation - Two-fold Increase in Import Fees and Higher Organ Acquisition Cost Despite Unchanged Travel Patterns**
A. Wall, S. Asrani, G. McKenna, E. Martinez, R. Ruiz, H. Fernandez, J. Bayer, A. Gupta, N. Onaca, R. Goldstein, J. Trotter, G. Testa, *Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Pharmacy
6:00 pm - 7:00 pm

The Metabolism Milleu: Updates in Pharmacokinetics and Pharmacogenomics

Moderators: Rita Alloway, Pharm D, FCCP, Univ of Cincinnati Coll of Med, Research Professor, Cincinnati, OH, USA, Patricia West-Thielke, PharmD, University of Illinois, Chicago, IL, USA

6:00 pm **Economic and Clinical Benefit of Cmv Matching in Kidney Transplantation**

D. Axelrod[1], S. Chang[2], A. Olyaei[3], D. Malinoski[3], D. Norman[3], K. Lentine[4], M. Schnitzler[4], D. Segev[5], J. Lockridge[3], *[1]Univ of Iowa, Iowa City, IA, [2]Washington Univ, Seattle, WA, [3]Oregon Health Sciences Univ, Portland, OR, [4]Saint Louis Univ, Saint Louis, MO, [5]Johns Hopkins, Baltimore, MD*

6:05 pm **Belatacept Pharmacokinetic Analysis Comparing Belatacept Early Steroid Withdrawal Trial (BEST) with Benefit and Benefit-ext Trials**

A. Bickenbach[1], M. McGowan[1], B. Miyagawa[2], T. Mizuno[2], A. Shields[3], A. Christianson[1], P. West-Thielke[4], J. Leone[5], E. Woodle[1], D. Kaufman[6], A. Wiseman[7], A. Matas[8], A. Vinks[2], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Childrens Med Center, Cincinnati, OH, [3]Christ Hospital, Cincinnati, OH, [4]UIC, Chicago, IL, [5]Tampa Gen, Tampa, FL, [6]U Wisconsin, Madison, WI, [7]Centura Transplant, Denver, CO, [8]U Minnesota, Minneapolis, MN*

6:10 pm **Cyp3a5 Extensive Metabolizer Phenotype May be Associated with an Increase in Class 2 Donor Specific Antibodies and Antibody-Mediated Rejection**

S. Mirza[1], N. Wilson[2], J. Van Zyl[2], P. Nguyen[2], T. Sam[2], S. Hall[2], M. Askar[2], R. Patel[2], *[1]Texas Tech Univeristy Health Sciences Center Jerry H. Hodge School of Pharmacy, Dallas, TX, [2]Baylor University Medical Center at Dallas, Dallas, TX*

6:15 pm **Evaluate the Effect of Cresemba (isavuconazonium Sulfate) Capsule and Noxafil (posaconazole) Delayed Release Tablets on Tacrolimus Dose to Concentration (D/C) Ratios in Lung Transplant Recipients**

H. Sweiss[1], E. Kincaide[1], D. Levine[2], R. Hall[1], *[1]University Health, San Antonio, Department of Pharmacotherapy and Pharmacy Services, The University of Texas at Austin, Pharmacotherapy Division, College of Pharmacy, San Antonio, TX, [2]University Health, San Antonio, University of Texas Health Science Center at San Antonio, San Antonio, TX*

6:20 pm ***ABCC2* Haplotypes Associations to Mycophenolic Acid Pharmacokinetics in Stable Renal Transplant Recipients**

K. Tornatore[1], D. Brazeau[2], C. Meaney[3], J. Consiglio[4], A. Gundroo[5], S. Chang[6], G. Wilding[4], L. Cooper[3], *[1]Pharmacy Practice, School of Pharmacy; University at Buffalo- SUNY, Buffalo, NY, [2]Pharmacy Practice, Marshall University, Huntington, WV, [3]Pharmacy Practice, School of Pharmacy; University at Buffalo, Buffalo, NY, [4]Biostatistics, School of Public Health; University at Buffalo, Buffalo, NY, [5]Medicine, School of Medicine; Ohio State University, Columbus, OH, [6]Medicine, School of Medicine; University at Buffalo, Buffalo, NY*

6:25 pm **Impact of Cypa5 Status on the Clinical and Financial Outcomes of Kidney Transplant**

J. Obayemi[1], B. Keating[2], K. Lentine[3], M. Schnitzler[3], H. Xiao[3], V. Dharnidharka[4], D. Axelrod[5], *[1]Univ of Michigan, Ann Arbor, MI, [2]Univ of Pennsylvania, Philadelphia, PA, [3]Saint Louis Univ, Saint Louis, MO, [4]Washington Univ, Seattle, WA, [5]Univ of Iowa, Iowa City, IA*

6:30 pm **Pharmacokinetic Analysis of Direct Acting Antiviral Use on Weight-Adjusted FK506 Trough/dose Ratios in Obese Kidney Transplant Recipients**
A. Demirag[1], P. L. Lobo[2], J. Oberholzer[1], A. Kumar[2], B. Rawashdeh[1], S. L. Lennon[1], H. N. Guvener Demirag[1], A. Doyle[2], J. Geystone[3], K. L. Brayman[1], *[1]Transplantation, University of Virginia Medical Center, Charlottesville, VA, [2]Transplantation Nephrology, University of Virginia Medical Center, Charlottesville, VA, [3]Clinical Pharmacy, University of Virginia Medical Center, Charlottesville, VA*

6:35 pm **De-novo Use Comparison Between Extended-release Once-daily Tacrolimus (Envarsus Xr®) and Immediate-release Twice-daily Tacrolimus (Prograf®) - A Single Center's Experience**
N. Singh[1], T. Le[1], M. S. Naseer[1], S. Asmil[1], A. Palermini[1], A. Qamar[1], R. Chand[1], S. Tandukar[1], D. Aultman[2], H. Shokouh-Amiri[2], G. Zibari[2], *[1]Transplant, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA, [2]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Lung
6:00 pm - 7:00 pm

When Opportunity Knocks... Identifying Interventions to Optimize Lung Transplant Outcomes

Moderators: Hilary Goldberg, MD, MPH, -Brigham and Women's Hospital, Clinical Director, Pulmonary and Critical Care Medicine, Needham, MA, USA, Matthew Hartwig, MD, Duke University, Durham, NC, USA

6:00 pm **Pregnancy Outcomes in 39 Lung Transplant Recipients**
S. Constantinescu[1], L. A. Coscia[2], A. Yusuf[2], S. Rao[3], M. J. Moritz[4], *[1]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, [2]Transplant Pregnancy Registry International, Philadelphia, PA, [3]University of Virginia Heath System, Charlottesville, VA, [4]Lehigh Valley Health Network, Allentown, PA*

6:05 pm **Guiding Therapeutic Plasma Exchange for Amr Treatment in Lung Transplant Recipients Using Serial Dilution in Single Antigen Bead Assay**
O. A. Timofeeva[1], J. Choe[2], M. Alsammak[2], E. J. Yoon[2], S. Geier[2], K. Carney[2], J. Au[2], A. Diamond[2], J. A. Galli[2], K. Shenoy[2], A. Mamary[2], S. Seghal[2], P. Mullhal[2], Y. Toyoda[2], N. Shigemura[2], F. Cordova[2], G. Criner[2], J. Brown[2], *[1]MedStar Georgetown University Hospital, Washington, DC, [2]Temple University Hospital, Philadelphia, PA*

6:10 pm **Renal Preservation with Belatacept-Based versus Everolimus-Based Immunosuppression in Lung Transplant Recipients**
E. Sartain[1], K. Schoeppler[1], B. Crowther[1], J. Smith[2], A. Gray[2], *[1]University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Aurora, CO, [2]Department of Medicine, Division of Pulmonary Sciences and Critical Care, University of Colorado, Denver, CO*

6:15 pm **Elexacaftor/ivacaftor/tezacaftor in Lung Transplant Recipients: A Case Series**
L. M. Potter[1], B. Vargas[2], S. M. Rotolo[1], C. McEwen[1], K. Tsui[1], *[1]University of Chicago Medicine, Chicago, IL, [2]Roosevelt University, Chicago, IL*

6:20 pm **Use of Granulocyte Colony Stimulating Factor After Lung Transplantation is Not Associated with Increased Likelihood of Acute Cellular Rejection**
S. Fredrick[1], C. Iasella[2], L. Sacha[3], R. Rivosecchi[3], M. Morrell[3], P. Sanchez[3], J. Pilewski[3], M. Snyder[3], J. McDyer[3], C. Moore[3], *[1]University of Rochester Medical Center, Rochester, NY, [2]University of Pittsburgh School of Pharmacy, Pittsburgh, PA, [3]University of Pittsburgh Medical Center, Pittsburgh, PA*

6:25 pm **Impact Analysis of Virtual Transplant Ambulatory Pharmacist During Covid-19**
L. Park, G. Waldman, J. Kim, C. Rogers, J. Clark, *Massachusetts General Hospital, Boston, MA*

6:30 pm **Outcomes of IVIG Monotherapy for Donor-Specific Antibodies After Lung Transplantation**
K. Spence, S. Heeney, M. Morrison, S. A. Rega, F. D. Irene, K. B. Harrison, C. M. Shaver, *Vanderbilt University Medical Center, Nashville, TN*

6:35 pm **Liver Dysfunction Following Lung Transplantation**
E. J. Hyzny[1], E. G. Chan[1], J. P. Ryan[1], T. Harano[1], M. R. Morrell[2], P. G. Sanchez[1], *[1]Cardiothoracic Surgery, University of Pittsburgh School of Medicine, Pittsburgh, PA, [2]Pulmonary, Allergy and Critical Care Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA*

6:40 pm **Live Video Question and Answer**

Poster Video Chat

Public Policy & Ethics
7:30 pm - 8:30 pm

Adherence, Economics, and Ethics

7:30 pm **Early Outcome of Heart-Kidney Transplantation in the Current Heart Allocation System in the United States**
S. Rao[1], A. Doyle[1], D. Brennan[2], S. Constantinescu[3], *[1]University of Virginia, Charlottesville, VA, [2]Johns Hopkins Medical Institute, Baltimore, MD, [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA*

7:40 pm **Liver Simulated Allocation Model Does Not Accurately Predict Organ Offer Decisions in Pediatric Liver Transplant Candidates**
N. L. Wood[1], D. B. Mogul[2], E. K. Hsu[3], E. R. Perito[4], G. V. Mazariegos[5], D. Vanderwerken[1], D. L. Segev[2], S. Gentry[1], *[1]US Naval Academy, Annapolis, MD, [2]Johns Hopkins, Baltimore, MD, [3]Univ of Washington, Seattle, WA, [4]UCSF, San Francisco, CA, [5]Univ of Pittsburgh, Pittsburgh, PA*

7:50 pm **Impact of Covid-19 in Transplant Care: Attitudes, Feeling and Behaviors of Liver, and Kidney Pre and Post Transplant Patients**
J. Ramos-Ayes, *Beth Israel Deaconess Medical Center, Boston, MA*

8:00 pm **Influence of Frailty on Psychometric Factors and Health-related Quality of Life in Patients on the Waitlist for Liver Transplantation**
C. G. Klein, J. Latuske, E. Malamutmann, A. Paul, A. Oezcelik, *University Medicine Essen, Essen, Germany*

8:10 pm **Psychosocial Factors Influencing Patients' Decision Making About Upper Extremity Vca**
B. Kuramitsu[1], J. Gacki-Smith[1], A. Ferzola[2], K. Vanterpool[2], C. Kunkle[3], M. Hewitt[3], A. Schultheis[3], T. Riggleman[3], J. Taylor[3], C. Cooney[2], M. Levan[2], S. Tintle[3], G. Brandacher[2], E. Gordon[1], *[1]Northwestern University, Chicago, IL, [2]Johns Hopkins University, Baltimore, MD, [3]Walter Reed National Military Medical Center, Bethesda, MD*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

Kidney
7:30 pm - 8:30 pm

Kidney Deceased Donor Allocation 2
Moderators: Dan Brennan, MD, Johns Hopkins, Professor of Medicine, Baltimore, MD, USA, Kenneth Newell, MD, PhD, Emory University School of Medicine, Professor of Surery and Vice Chair for Academic Affairs, Atlanta, GA, USA

7:30 pm **The Impact of Combined Warm and Cold Ischemia Times on Post Transplant Outcomes**
M. E. Foley[1], A. J. Vinson[2], K. K. Tennankore[2], *[1]Faculty of Medicine, Dalhousie University, Halifax, NS, Canada, [2]Division of Nephrology, Medicine, Dalhousie University/ Nova Scotia Health, Halifax, NS, Canada*

7:40 pm **Non-Invasive Measurement of Transplant Kidney Fibrosis Using Photoacoustic Imaging**
E. Hysi[1], X. He[1], A. Krizova[1], M. Ordon[1], K. T. Pace[1], M. Farcas[1], M. C. Kolios[2], D. A. Yuen[1], *[1]St. Michael's Hospital, Toronto, ON, Canada, [2]Ryerson University, Toronto, ON, Canada*

7:50 pm **Towards National Organ Sharing: Fair Distribution of Eplets in Canada**
S. Parto, B. Liu, W. Klement, S. Oikonomopoulos, I. Ragoussis, R. Sapir-Pichhadze, *McGill University, Montreal, QC, Canada*

8:00 pm **Effect of Multi-Organ Transplant Allocation on Pediatric Kidney Waitlist Candidates**
D. Shepherd, R. M. Engen, *Pediatric Nephrology, Ann & Robert H. Lurie Children's Hospital, Chicago, IL*

8:10 pm **Response to a Pandemic: The Fall and Rise of Kidney Transplantation in the US**
S. Bisen[1], B. Boyarsky[1], W. Werbel[1], J. Snyder[2], J. Garonzik-Wang[1], D. Segev[1], A. Massie[1], *[1]JHU, Baltimore, MD, [2]SRTR, Minneapolis, MN*

Live Video Question and Answer

Poster Video Chat

Liver
7:30 pm - 8:30 pm

Liver 1
Moderators: Koji Hashimoto, MD, PhD, Cleveland Clinic, Director, Living Donor Liver Transplantation, Cleveland, OH, USA, Anne-Marie Huysman

7:30 pm **Developing and Validation of a Liver Transplantation Donation After Cardiac Death Risk Index Using the UNOS Database**
L. Chau, K. Delvecchio, A. Mohamed, M. Lu, T. Kitajima, S. Yedulla, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Division of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

7:40 pm **Systematic Implementation of Alcohol Screening Program Using Urine Ethyl Glucuronide Can Identify Post-transplant Alcohol Use and Aid Return to Sobriety in Liver Transplant Recipients**
N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[1], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Division of Transplantation, University of Minnesota, Minneapolis, MN*

7:50 pm **Impact of Extended Living Donor Criteria on Donor Safety in Living Donor Liver Transplantation**
J. KIM, *Department of Surgery, Catholic University of Daegu College of Medicine, Daegu, Korea, Republic of*

8:00 pm **Live Video Question and Answer**

Poster Video Chat

Lung
7:30 pm - 8:30 pm

Lung Transplant Topics
Moderators: Kelly Pennington, MD, Rochester, MN, USA, Rhea Varughese, MD MSc FRCPC, University of Alberta, Assistant Professor, Edmonton, AB, Canada

7:30 pm **Pre Transplant Estimated Glomerular Filtration Rate and Other Predictors of Mortality and End Stage Kidney Disease After Lung Transplantation**
A. Kumar[1], L. N. Bonnell[2], C. Thomas[3], *[1]Internal Medicine, University of Vermont, Burlington, VT, [2]Department of General Internal Medicine Research, University of Vermont, Burlington, VT, [3]Internal Medicine, University of Iowa, Iowa City, IA*

7:40 pm **20 Year Survival Following Lung Transplantation**
R. M. Reul, Jr[1], S. Barrett[1], A. Alnajar[2], J. Dunson[1], P. S. Garcha[3], G. Loor[4], J. A. Goss[4], A. A. Rana[4], *[1]Office of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Department of Surgery, University of Miami Health System, Miami, FL, [3]Department of Medicine, Baylor College of Medicine, Houston, TX, [4]Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

7:50 pm **Basiliximab versus Alemtuzumab: The Association Between Induction Agent and Airway Complications Following Lung Transplantation**
M. Furukawa[1], E. G. Chan[1], T. Harano[1], J. Ryan[1], R. Rivosecchi[2], M. R. Morrell[1], P. G. Sanchez[1], *[1]Cardiothoracic Surgery, UPMC, Pittsburgh, PA, [2]PUH-Pharmacy, UPMC, Pittsburgh, PA*

8:00 pm **Sensitized Lung Candidates Experience Reduced Access to Donor Organs**
K. Lindblad[1], R. Goff[2], D. Stewart[2], *[1]UNOS, Richmond, VA, [2]UNOS, Richmnd, VA*

8:10 pm **Lung Transplant Recipients with Severe Acute Respiratory Syndrome-Coronavirus 2 Infection and Asymptomatic Carriers Waiting for Lung Transplantation Induce Circulating Exosomes with Severe Acute Respiratory Syndrome-Coronavirus 2 Spike Protein S2**
S. Bansal, S. Tokman, T. Fleming, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Live Video Question and Answer

Poster Video Chat

Pharmacy
7:30 pm - 8:30 pm

Pharmacokinetics, Pharmacogenetics, and Drug Interactions, Oh My!
Moderators: Kelly Birdwell, MD, MSCI, Vanderbilt University Medical Center, Assistant Professor of Medicine, Nashville, TN, USA, Teena Sam, PharmD, Baylor University Medical Center, Clinical Pharmacy Coordinator; Transplant Pharmacist, Dallas, TX, USA

7:30 pm **Higher Number of Tacrolimus Dose Adjustments and Trough Level Measurements in Kidney Transplant Recipients with CYP3A5*1 Alleles**
K. Reininger[1], G. Onyeaghala[2], T. Anderson-Haag[1], B. Wu[2], W. Guan[2], C. R. Dorr[2], R. Remmel[2], R. Mannon[3], A. Matas[2], W. Oetting[2], A. Israni[1], P. Stahler[1], P. Jacobson[2], *[1]Hennepin County Medical Center, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN, [3]University of Nebraska Medical Center, Omaha, NE*

7:40 pm **The Impact of De Novo Dose-Adjustment Strategies with Tacrolimus XR (LCP-Tac) in Kidney Transplant Recipients**

T. Carcella, F. Bartlett, N. Patel, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

7:50 pm **Managing the Significant Drug-Drug Interaction Between Tacrolimus and Letermovir in Solid Organ Transplant Recipients**

J. Hedvat, J. Choe, D. Salerno, J. Scheffert, D. Bley, A. Anamisis, T. Shertel, J. Lee, E. Liu, N. W. Lange, *NewYork-Presbyterian Hospital, New York, NY*

8:00 pm **Tacrolimus Therapeutic Exposure is Not Consistently Predicted by Target Troughs or CYP3A5 Variants in Stable Renal Transplant Recipients**

K. Tornatore[1], K. Attwood[2], D. Brazeau[3], B. Murray[4], *[1]Pharmacy Practice, School of Pharmacy; University at Buffalo, Buffalo, NY, [2]Biostatistics, School of Public Health; University at Buffalo, Buffalo, NY, [3]Pharmacy Practice, School of Pharmacy; Marshall University, Huntington, WV, [4]Medicine, Erie County Medical Center Corp., Buffalo, NY*

8:10 pm **Live Video Question and Answer**

All Live Broadcast Programs are in Eastern Time

8:45 am – 9:00 am	**Welcome**
9:00 am – 10:00 am	**IMPACT Sessions**
10:00 am – 10:30 am	**Break**
10:30 am – 11:30 am	**Plenary Oral Abstract 3**
11:30 am – 12:00 pm	**Sponsor Networking**
12:00 pm – 12:30 pm	**AJT 21st Anniversary Celebration & Awards**
12:30 pm – 1:00 pm	**State-of-the-Art**
1:00 pm – 1:30 pm	**Break**
1:30 pm – 2:30 pm	**Satellite Symposia**
2:00 pm – 2:30 pm	**Break**
3:00 pm – 4:00 pm	**IMPACT Sessions**
4:00 pm – 4:30 pm	**Sponsor Networking**
4:30 pm – 5:30 pm	**Rapid Fire Oral Abstract**
5:30 pm – 6:00 pm	**Break**
6:00 pm – 7:00 pm	**Rapid Fire Oral Abstract**
7:00 pm – 7:30 pm	**Sponsor Networking**
7:30 pm – 8:30 pm	**Poster Video Chat**
7:30 pm – 8:30 pm	**AST Town Hall**

Welcome
8:45 am – 9:00 am

IMPACT Sessions
Kidney
9:00 am - 11:00 am

How Best to Optimize Deceased Donor Kidneys for Organ Transplantation in 2021?
Moderators: Sundaram Hariharan, MD, Starzl Transplant Institute, Univ of Pittsburgh Med Center, Professor of Medicine and Surgery, Pittsburgh, PA, USA

9:00 am **Use of AKI Kidneys from Deceased Donors for Kidney Transplantation**
Raymond Heilman, MD, Mayo Clinic, Expanding the Utilization of Kidneys from Donors with Acute, Phoenix, AZ, USA

9:10 am **Can we Utilize Some of the Organs that are Being Discarded in USA?**
Sumit Mohan, MD, MPH, Columbia University Medical Center, New York, NY, USA

9:20 am **Optimizing Kidney Transplant Outcome with High KDPI Kidneys**
Michele Molinari, MD, MSc, FACS, Michele Molinari, Associate Professor, University of Pittsburgh Medical Center, Associate Professor, pittsburgh, PA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Kidney
9:00 am - 10:00 am

APOL1 and Living Donation: Donors and Recipients
Moderators: Caroline Jadlowiec, MD, Mayo Clinic Arizona, Dr., Phoenix, AZ, USA, Nadeen Khoury, MD, Henry Ford Transplant Institute, Transplant Nephrologist, Detroit, MI, USA

9:00 am **APOL1 and Transplant Recipient Outcomes**
Amber Reeves-Daniel, DO, Wake Forest School of Medicine, Associate Professor, Winston Salem, NC, USA

9:10 am **APOL1, Potential Donors, and Living Donation**
Mona Doshi, MBBS, University of Michigan, Professor, Ann Arbor, MI, USA

9:20 am **APOL1, Hypertension and Chronic Kidney Disease, Ethics of Genetic Testing and Psychosocial Implications**
John Friedewald, MD, FAST, Northwestern University, Professor of Medicine & Surgery, Chicago, IL, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Liver
9:00 am - 10:00 am

Above and Below the Diaphragm: Pulmonary Vascular Disease and Liver Transplantation
Moderators: Keith Wille, MD, Univ of Alabama at Birmingham, Professor of Medicine, Birmingham, AL, USA, Lindsay King, MD, MPH, Duke, Assistant Professor of Medicine, Durham, NC, USA

9:00 am **Diagnostic Strategies for the Evaluation of Pulmonary Vascular Disease in Chronic Liver Disease**
Deborah Levine, MD, University of Texas Health, Medical Director of Lung Transplantation/Director of Pulmonary Hypertension, San Antonio, TX, USA

9:10 am **Outcomes of Liver Transplantation for Hepatopulmonary Syndrome - Should Transplantation be Performed in Patients with Severe Hypoxemia?**
Michael Fallon, MD, FACP, AGAF, FAASLD, UArizona College of Medicine-Phoenix, Professor of Medicine and Chair Department of Medicine, Phoenix, AZ, USA

9:20 am **Management of Portopulmonary Hypertension Pre and Post Liver Transplantation**
Michael Krowka, MD, Mayo Clinic, Professor of medicine, Rochester, MN, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

VCA
9:00 am - 10:00 am

Novel Strategies to Modulate Innate and Adaptive Immunity in VCA

Moderators: Bruce Gelb, M.D., NYU Langone Medical Center, Medical Director, VCA Transplant Program, New York, NY, USA, Sue McDiarmid, MD, UCLA Medical Center, Professor of Pediatrics and Surgery, Pacific Palisades, CA, USA

9:00 am **The Science of Immunosupression in VCA**
Stefan Tullius, MD, PhD, Brigham & Women's Hospital, Chief, Division of Transplant Surgery, Boston, MA, USA

9:10 am **Novel Insights into Mechanisms of Ischemia Reperfusion Injury in VCA**
Jerzy Kupiec-Weglinski, MD, PhD, UCLA Medical Center, PROFESSOR OF SURGERY, Los Angeles, CA, USA

9:20 am **Immunological Opportunities and Hurdles for Tolerance Induction in VCA**
Wayne Hancock, MD PhD, Childrens Hospital of Philadelphia, Professor of Pathology and Laboratory Medicine, Philadelphia, PA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Pediatric
9:00 am - 10:00 am

Walking the Tightrope: Malignancies after Pediatric Solid Organ Transplantation (SOT)

Moderators: Vikas Dharnidharka, MD, MPH, Washington University in St. Louis, Professor and Vice-Chair, Pediatrics, St. Louis, MO, USA, Nicole Hayde, MD, MS, Montefiore Medical Center, Medical Director, Pediatric Kidney Transplantation, Bronx, NY, USA

9:00 am **Graft Outcomes Following Malignancies in Pediatric SOT**
Lars Pape, M.D., PhD, University Hospital of Essen, Prof. Dr. med., Essen, Germany

9:10 am **Where are We At: Current Status of Malignancies after Pediatric Solid Organ Transplantation**
Rahul Chanchlani, MD, McMaster University, Hamilton, Ontario, Canada

9:20 am **Prevention Strategies, Including the One Vaccine That Can Prevent Cancer: HPV Vaccine**
Corina Nailescu, MD, Riley Hospital for Children, Associate Professor of Clinical Pediatrics, Indianapolis, IN, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Basic
9:00 am - 10:00 am

Novel Approaches for Immune Modulation of the CD154 Pathway in Transplantation: New Tricks for an Old Dog

Moderators: Christian Larsen, MD, PhD, Emory University, Co_Director Emory Transplant Center, Atlanta, GA, USA, Marilia Cascalho, MD PhD, University of Michigan, Associate Professor, Ann Arbor, MI, USA

9:00 am **Costimulation Blockade Promote Donor-specific B cells Differentiation into Suppressors of B cell Responses**
Anita Chong, PhD, The University of Chicago Medicine, Professor, Chicago, IL, USA

9:10 am **CD11b is a Novel Alternate Receptor for CD154 during Alloimmunity**
Mandy Ford, PhD, Emory University, Professor, Atlanta, GA, USA

9:20 am **Anti-CD40 in Combination with Apoptotic Donor Cells to Promote Islet Allograft Tolerance**
Xunrong Luo, MD,PhD, Duke University School of Medicine, Professor of Medicine, Durham, NC, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Translational
9:00 am - 10:00 am

Taking the Next Step in Organ Perfusion: From Preservation to Personalized Repair

Moderators: Korkut Uygun, PhD, Massachusetts General Hospital, Assoc Prof Surgery, Boston, MA, USA, Andrew Barbas, MD, Duke University, Assistant Professor of Surgery, Division of Abdominal Transplant, Durham, NC, USA

9:00 am **Clinical Trial Design for Marginal Organ Utilization after Pre-transplant Repair**
Peter Friend, MD, University of Oxford, Professor of Transplantation, Oxford, United Kingdom

9:10 am **Pre-transplant Therapies During Organ Perfusion: The State of the Art**
Gregory Tietjen, PhD, Yale University School of Medicine, Assistant Professor, New Haven, CT, USA

9:20 am **Where Should Pre-transplant Organ Repair Happen? The Pros and Cons of Centers-of-Care Versus Recipient Centers**
Shaf Keshavjee, MD, Toronto General Hospital, Toronto, ON, Canada

9:30 am **Live Video Question and Answer**

IMPACT Sessions

ID
9:00 am - 10:00 am

Population Health Improves Transplant Outcomes

Moderators: Lilian Abbo, MD, University Of Miami Miller School of Medicine, Professor of Clinical Infectious Diseases, Miami, FL, USA, Cameron Wolfe, MBBS, MPH, Duke University Medical Center, Associate Professor of Medicine, Durham, NC, USA

9:10 am **Antimicrobials as Precision Medicine: Opportunities for Individualized Care**
Graeme Forrest, MBBS, Rush University medical Center, Professor of Medicine, Chicago, IL, USA

9:00 am **Improving Patient Outcomes Together: Engaging in Stewardship Across Disciplines**
Margaret Jorgenson, UW Health, Madison, WI, USA

9:20 am **Standardizing Infection Prevention and Control Strategies: Where is the Evidence?**
Elena Beam, M.D, Mayo Clinic College of Medicine, Assistant Professor, Rochester, MN, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Pharmacy: Liver
9:00 am - 10:00 am

Help Me Stay Sober After Liver Transplantation – Multimodal Multidisciplinary Approach

Moderators: Sheila Jowsey-Gregoire, MD, Mayo Clinic, Shirley Tsunoda, PharmD, University of California San Diego, San Diego, CA, USA

9:00 am **Staying Sober: Pre-Transplant Assessment and Post-Transplant Monitoring**
Vinay Sundaram, MD, Cedars Sinai, Director, Hepatology Outcomes Research, Los Angeles, CA, USA

9:10 am **Multidisciplinary Approaches to Achieve Success in Maintaining Patient Sobriety Post-Liver Transplantation**
Gerald Scott Winder, MD MSc, University of Michigan, Clinical Associate Professor, Ann Arbor, MI, USA

9:20 am **Therapeutic Strategies for Treating Alcohol Relapse Post-Transplantation**
Jeong Park, MS, PharmD, University of Michigan, Clinical Professor, Ann Arbor, MI, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

APP
9:00 am - 10:00 am

Pathway to Publishing
Moderators: Karen Kerepesi, PA-C, MPAS, Cleveland Clinic, Cleveland, OH, USA

9:00 am **Recognizing Clinical Opportunities for Translational Research and Initial Steps**
Annette Needham, DNP, NP-C, CCTC, UC Davis Transplant Center, Transplant Quality Manager, Sacramento, CA, USA

9:10 am **Implementing Fundamental Steps in the Research Process**
Haley Hoy, PhD, NP, University of Alabama Huntsville/Vanderbilt Medical Center, Nurse Practitioner, Huntsville, AL, USA

9:20 am **Pearls for the Clinician in Addressing Common Barriers to Research**
Stacee Lerret, PhD, CPNP-AC/PC, CCTC, FAAN, Medical College of Wisconsin, Associate Professor, Milwaukee, WI, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Ethics
9:00 am - 10:00 am

Incorporating New Data into Selection of Living Kidney Donors: Minor Modifications or Fundamental Changes?
Moderators: Kenneth Newell, MD, PhD, Emory University School of Medicine, Professor of Surgery and Vice Chair for Faculty Affairs, Atlanta, GA, USA, Emilio Poggio, MD, Cleveland Clinic, MD, Cleveland, OH, USA

9:00 am **Review the Old and New Outcome Data Underlying the Classic and New Paradigms for Selection of Living Kidney Donors**
Vineeta Kumar, M.D., University of Alabama at Birmingham, Professor of Medicine, Endowded Professor in Transplant Nephrology, Birmingham, AL, USA

9:10 am **Time for a Change: Unacceptable Candidates of the Past may be Acceptable; It's Time to Redefine Acceptable Candidates for Living Kidney Donation**
Robert Steiner, MD, UCSD Medical Center, Transplant Nephrology, San Diego, CA, USA

9:20 am **Old is Gold: The Classic Selection Paradigm was "Almost Right" and will Continue to Serve us well, Perhaps with Minor Modifications**
Arthur Matas, MD, University of Minnesota Medical School, Professor of Surgery, Minneapolis, MN, USA

9:30 am **Live Video Question and Answer**

Plenary Session 3
10:30 am - 11:30 am
Moderators: A. Osama Gaber, MD, Houston Methodist Hospital, Houston, TX, USA, John Gill, MD, MS, University of British Columbia, Professor of Medicine, Vancouver, BC, Canada

10:30 am **Overall Survival by Best Overall Response with Tabelecleucel in Patients with Epstein-Barr Virus-Driven Post-Transplant Lymphoproliferative Disease After Solid Organ Transplant**
S. Prockop[1], L. Gamelin[2], R. Dinavahi[2], Y. Sun[2], N. Guzman-Becerra[2], H. Parmar[2], [1]Memorial Sloan Kettering Cancer Center, New York, NY, USA, [2]Atara Biotherapeutics, South San Francisco, CA, USA

10:40 am **TIGIT Agonism Improves Immunosuppression of Cd8 T Cells by Ctla-4ig in a Treg Dependent Manner**
C. R. Hartigan, D. Liu, M. L. Ford, Emory University Transplant Center, Emory University, Atlanta, GA, USA

10:50 am **Donor-derived Cell-free DNA Distinguishes Acute Rejection from Other Causes of Graft Injury in Liver Transplant Recipients**
J. Levitsky[1], M. Miller[2], R. Sinha[2], E. Bixler[2], A. Al-Turck[2], J. Weems[2], M. Altrich[2], S. Kleiboeker[2], M. Abecassis[3], [1]Gastroenterology & Hepatology; Comprehensive Transplant Center, Northwestern University, Chicago, IL, USA, [2]Viracor Eurofins, Lees Summit, MO, USA, [3]University of Arizona College of Medicine Tucson, Tucson, AZ, USA

11:00 am **Measuring the Impact of Targeting FcRn-Mediated IgG Recycling on Donor-Specific Alloantibodies in a Sensitized NHP Model**
M. Manook[1], W. Flores[2], R. Schmitz[1], Z. Fitch[1], J. Yoon[1], Y. Bae[1], B. I. Shaw[1], M. Harnois[3], S. Permar[3], A. Kirk[1], D. Magnani[2], J. Kwun[1], S. Knechtle[1], [1]Duke Transplant Center, Duke University Medical Center, Durham, NC, USA, [2]Massbiologics, University of Massachusetts Medical School, Boston, MA, [3]Human Vaccine Institute, Duke University Medical Center, Durham, NC, USA

11:10 am **Live Video Question and Answer**

Sponsor Networking

11:30 am - 12:00 pm

These symposia are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Talaris Therapeutics - FCR001 Investigational Cellular Therapy in Living Donor Kidney Transplantation

Awards

12:00 pm - 12:30 pm

AJT 21st Anniversary Celebration & Awards

12:00 pm **Introduction & Awards**
Sandy Feng, MD, PhD, University of California San Francisco, San Francisco, CA, USA

12:10 pm **Past Editor-in-Chief**
Allan Kirk, MD, PhD, Duke University Medical Center, Durham, NC, USA

12:05 pm **Past Editor-in-Chief**
Philip Halloran, MD, University of Alberta, Edmonton AB, AB, Canada

12:15 pm **Editor-in-Chief**
Sandy Feng, MD, PhD, University of California San Francisco, San Francisco, CA, USA

State-of-the-Art

12:30 pm - 1:00 pm

Thomas Starzl State of the Art Lecture

12:35 pm **Development of Microbiota-Directed Complementary Foods for Treating Childhood Undernutrition**
Jeffrey Gordon, MD, Washington University School of Medicine , St. Louis, MO, USA

1:00 pm **Break**

Sponsored Satellite Symposia

1:30 pm - 2:30 pm

These symposia are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Advancing Care in Kidney Transplantation – Groundbreaking Findings from the ADMIRAL and K-OAR Studies

Supported by CareDx

Redefining the Management of CMV in SOT: Emerging Options for High-Risk Patients

Supported by an independent education grant from Takeda

2:30 pm **Break**

IMPACT Sessions

COVID-19

3:00 pm - 4:00 pm

Late-Breaking: Immune Response to COVID-19 Infection and Vaccination in Kidney Transplant Recipients

Moderators: Jonathan Maltzman, MD, PhD, FAST, Stanford University, Associate Professor, Palo Alto, CA, USA, Madhav Menon, MBBS, MD, Yale University School of Medicine, Associate Professor, New York, NY, USA

3:00 pm **Prevalence and Dynamics of SARS-COV-2 IgG in Kidney Transplant Recipients**
Yorg Azzi, MD, Montefiore Medical Center, Assistant Professor of Medicine, New York, NY, USA

3:15 pm **T Cell Immune Response to SARS-CoV-2 in Kidney Transplant Recipients**
Paolo Cravedi, MD, PhD, Mount Sinai, Associate professor, New York, NY, USA

3:30 pm **Antibody Response to mRNA Vaccination in Kidney Transplant Recipients**
Enver Akalin, M.D., Albert Einstein College of Medicine, Montefiore Medical Ctr, Professor of Medicine and Surgery, Bronx, NY, USA

3:45 pm **Live Video Question and Answer**

IMPACT Sessions

Kidney

3:00 pm - 4:00 pm

Is There Still a Role for Desensitization for Kidney Transplantation in the Modern Era?

Moderators: Robert Montgomery, MD, D Phil, FACS, NYU Langone Transplant Institute, H. Leon Pachter Chair and Professor of Surgery, New York, NY, USA, Carrie Schinstock, Medical Doctor, Mayo Clinic, Dr., Rochester, MN, USA

3:00 pm **Is There Still a Role for ABOi Kidney Transplantation**
Bonnie Lonze, MD, PhD, NYU Langone Transplant Institute, Assistant Professor, NEW YORK, NY, USA

3:10 pm **New Options for Desensitization for Kidney Transplantation**
Stanley Jordan, MD, Cedars Sinai Medical Ctr, Director Nephrology & Transplant Immunology, West Hollywood, CA, USA

3:20 pm **Have KAS and KPD Solved the Problem for Highly Sensitized Patients?**
Mark Stegall, MD, Mayo Clinic, James C. Masson Professor of Surgery Research, Rochester, MN, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Kidney
3:00 pm - 4:00 pm

Role of Surveillance Biopsy and Currently Approved Biomarkers for Diagnosing Acute Kidney Rejection: Clinical Application and Cost-effectiveness

Moderators: Jayme Locke, MD MPH FACS FAST, University of Birmingham at Alabama, Professor of Surgery | Chief, Division of Transplantation | Director, Comprehensive Transplant Institute, Birmingham, AL, USA, Sundaram Hariharan, MD, University of Pittsburgh Medical Center, Professor of Medicine and Surgery, Pittsburgh, PA, USA

3:00 pm **Use of Donor Derived cfDNA in Diagnosing Acute Kidney Transplant Rejection**
Alexander Weisman, MD, University of Colorado, Denver, CO, USA

3:10 pm **Use of Blood-based and Allograft Gene Biomarkers for Diagnosing Acute Kidney Transplant Rejection**
John Friedewald, MD, North Western University, Chicago, IL, USA

3:20 pm **Cost Effectiveness of Surveillance Biopsy and Currently Approved Biomarkers for Subclinical Kidney Transplant Rejection**
Chethan Puttarajappa, MD, University of Pittsburgh Medical Center, UPMC, Pittsburgh, PA, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Liver
3:00 pm - 4:00 pm

Liver Transplantation for Alcoholic Hepatitis

Moderators: Deepika Devuni, M.D, University of Massachusetts medical School, Assistant Professor, Worcester, MA, USA

3:00 pm **Standardization of Criteria for LT for AAH: Need for Guideline**
Andrew Cameron, MD, PhD, Johns hopkins

3:10 pm **Where are we now? Transplantation for Alcoholic Hepatitis: Current Status/ How to Improve the Reporting and Listing in UNOS?**
Gene Im, M.D., Icahn School of Medicine, Associate Professor of Medicine, New York, NY, USA

3:20 pm **Alcohol Use Disorders and Psychosocial Management: The Elephant in the Room**
Jessica Mellinger, MD, MSc, University of Michigan, Assistant Professor, Ann Arbor, MI, USA

3:30 pm **Case Against Liver Transplantation for Acute Alcoholic Hepatitis**
James Trotter, MD, Baylor Dallas, doctor, Dallas, TX, USA

3:40 pm **Live Video Question and Answer**

IMPACT Sessions

Liver
3:00 pm - 4:00 pm

Disparities in Liver Transplantation

Moderators: Therese Bittermann, MD, MSCE, University of Pennsylvania, Assistant Professor of Medicine and Epidemiology, Philadelphia, PA, USA, Anji Wall, MD PhD, Baylor University Medical Center, Abdominal Transplant Surgeon, Dallas, TX, USA

3:00 pm **Impact of Race on Candidacy and Outcomes**
Dinee Simpson, MD, Northwestern University, Chicago, IL, USA

3:10 pm **Impact of Socioeconomic Factors on Candidacy and Outcomes**
Jayme Locke, MD, MPH, FACS, FAST, University of Alabama at Birmingham, Professor of Surgery | Chief, Division of Transplantation | Director, Comprehensive Transplant Institute, Birmingham, AL, USA

3:20 pm **Impact of Obesity on Candidacy**
Jeffrey Kahn, MD, USC, Associate Professor of Clinical Medicine, Los Angeles, CA, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Prof Develop
3:00 pm - 4:00 pm

#MeToo in Academia: Enough is Enough!

Moderators: Deirdre Sawinski, MD, U Penn, Associate Professor of Medicine, Philadelphia, PA, USA, Samira Farouk, MD MS FASN, Icahn School of Medicine at Mount Sinai, Assistant Professor of Medicine & Medical Education, New York, NY, USA

3:00 pm **Let's Get Real (World): Dealing with Bias, Negotiation and Microaggressions Case Study**
Bethany Foster, MD, Montreal Children's Hospital of the McGill University Health Centre, Professor of Pediatrics, Montreal, QC, Canada

3:10 pm **The State of Women in Transplant Medicine: Summary of the Report by the AAMC**
Dianne McKay, MD, Scripps Research Institute

3:20 pm **Live Video Question and Answer**

IMPACT Sessions

Basic
3:00 pm - 4:00 pm

Innate Immune Cells and Allograft Rejection

Moderators: Valeria Mas, PhD, FAST, University of Maryland, Professor of Surgery, Baltimore, MD, USA, Anna Valujskikh, Cleveland Clinic, Cleveland, OH, USA

3:00 pm **Eosinophils in Lung Alloimmunity**
A. Sasha Krupnick, MD, University of Maryland, Professor of Surgery, Baltimore, MD, USA

3:10 pm **Neutrophils in Rejection**
Ankit Bharat, MD, Northwestern University, Harold & Margaret Method Professor, Chicago, IL, USA

3:20 pm **Live Video Question and Answer**

IMPACT Sessions

Basic
3:00 pm - 4:00 pm

Novel Targets for Transplant Immunosuppression

Moderators: Olivia Martinez, PhD, Stanford University School of Medicine, Professor and Director, Stanford, CA, USA, William Burlingham, PhD, University of Wisconsin, Professor Emeritus, Madison, WI, USA

3:00 pm **Disrupting Coronin 1 Signaling in T cell Promotes Allograft Tolerance While Maintaining Pathogen Responses**
Jean Pieters, PhD, University of Basel, Professor, Basel, Switzerland

3:10 pm **Ablating IRF4 Promotes Transplant Acceptance by Driving T cell Dysfunction**
Wenhao Chen, PhD, Houston Methodist, Role of IRF4 in transplant rejection and tolerance, Houston, TX, USA

3:20 pm **Live Video Question and Answer**

IMPACT Sessions

Translational
3:00 pm - 4:00 pm

The Science of Biomarkers, or the Lack Thereof

Moderators: Matthew Levine, MD PhD, University of Pennsylvania, Associate Professor of Surgery, Philadelphia, PA, USA

3:00 pm **Biomarkers of Rejection**
Peter Heeger, MD, Icahn School of Medicine at Mount Sinai, Professor of Medicine, New York, NY, USA

3:10 pm **Biomarkers in Acute Kidney Injury**
Joseph Bonventre, MD PhD, Brigham and Women's Hospital, Samuel A Levine Distinguished Professor of Medicine, Harvard Medical School. Chief Division of Renal Medicine, Boston, MA, USA

3:20 pm **Challenges in Practical Application of Biomarkers in Transplantation**
Roslyn Mannon, MD, University of Alabama, Professor of Medicine, Birmingham, AL, USA

3:30 pm **Live Video Controversy Discussion: Should We HLA Match in Organ Allocation - Yes**
Peter Nickerson, MD, University of Manitoba, Distinguished Professor, Vice Dean (Research), Winnipeg, MB, Canada

3:35 pm **Live Video Controversy Discussion: Should We HLA Match in Organ Allocation - No**
Howard Gebel, PhD, Emory University, Atlanta, GA, USA

3:40 pm **Live Video Question and Answer**

IMPACT Sessions

ID
3:00 pm - 4:00 pm

Optimizing the Use of HCV-Infected Organs - The Implementation Phase: When to Treat and Why?

Moderators: Christine Durand, MD, Johns Hopkins University, Associate Professor, Baltimore, MD, USA, David Goldberg, MD, MSCE, University of Miami, Associate professor of Medicine, Miami, FL, USA

3:00 pm **Impact on Utilization, Procurement and Waiting Times: Have HCV-viremic Organs Fulfilled their Promise?**
Ann Woolley, MD, MPH, Brigham and Womens Hospital, Infectious Diseases, Boston, MA, USA

3:10 pm **Practical Approaches to Antiviral Therapy: How and When to Treat, and What to do When Treatment Fails**
Norah Terrault, MD, MPH, University of Southern California, Professor of Medicine, Los Angeles, CA, USA

3:20 pm **When Chronic HCV has Company**
Michael Leise, MD, Mayo Clinic, Associate Professor of Medicine, Rochester, MN, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Pharmacy
3:00 pm - 4:00 pm

Innovative and Effective Tools to Reduce Hospital Readmissions Post-Transplant from the Viewpoint of a Transplant Physician, Pharmacist and Advance Practice Provider

Moderators: Demetra Tsapepas, PharmD, MBA, New York Presbyterian Hospital, New York, NY, USA

3:00 pm **Impact of Adverse Drug Events Contributing to Hospital Readmissions in Kidney Transplant Recipients and Strategies to Overcome**
David Taber, PharmD, MS, BCPS, Med Univ of South Carolina, Professor, Charleston, SC, USA

3:10 pm **Not Just Physicians: The Expanded Role of Advanced Practice Providers to Improve Care Continuity and Reduce Hospital Readmissions Post Transplantation**
Samantha Halpern, MSN, CRNP, Hospital of the University of Pennsylvania, Transplant Nurse Practitioner, Philadelphia, PA, USA

3:20 pm **See you at Home: Telemedicine-based Home Monitoring Program to Reduce Readmissions Post Liver Transplantation.**
Shimul Shah, MD, MHCM, University of Cincinnati, Professor and Chief, Solid Organ Transplantation, Cincinnati, OH, USA

3:30 pm **Live Video Question and Answer**

Sponsor Networking
4:00 pm - 4:30 pm

Rapid Fire Oral Abstracts

Basic
4:30 pm - 5:30 pm

B cell/Antibody and Histocompatibility

Moderator: Malek Kamoun, MD PhD, Hospital Univ of Pennsylvania, Professor, Pathology and Laboratory Medicine, Philadelphia, PA, USA

4:30 pm **The Role of Notch2 in Antibody-mediated Alloimmune Response**
R. Benedetti Gassen[1], N. Murakami[2], T. J Borges[1], A. Al Jurdi[1], A. Alessandrini[1], L. V Riella[1], *[1]Center of Transplantation Science, Massachusetts General Hospital, Boston, MA, [2]Brigham and Women's Hospital, Boston, MA*

4:35 pm **Marginal Zone B Cells Support Donor-Specific Alloantibody Responses to Heart Allografts**
V. Gorbacheva, R. Fan, W. Baldwin, R. Fairchild, A. Valujskikh, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

4:40 pm **Acoustofluidic Device to Remove Donor Specific Antibody in a Sensitized Animal Model**
J. Kwun[1], E. David[2], Y. Gu[3], Z. Ma[3], M. Kuchibhatla[4], G. Arepally[5], T. J. Huang[3], E. T. Chambers[2], *[1]Surgery, Duke University, Durham, NC, [2]Pediatrics, Duke University, Durham, NC, [3]Biomedical Engineering, Duke University, Durham, NC, [4]Biostatistics and Bioinformatics, Duke University, Durham, NC, [5]Internal Medicine, Duke University, Durham, NC*

4:45 pm **Cd4 T Cells Can Trigger Nk-dependent Chronic Rejection Independent of Antibodies**
R. G. Gill[1], B. Mehrad[2], C. M. Lin[2], *[1]Surgery, University of Colorado Denver, Aurora, CO, [2]Medicine, University of Florida, Gainesville, FL*

4:50 pm **Blood Type A2/a2b to B Renal Transplantation: A Single Center Retrospective Cohort Study**
V. S. Tatapudi, N. Alnazari, R. Chand, N. M. Ali, B. E. Lonze, R. A. Montgomery, *NYU Langone Transplant Institute, NYU Langone Health, New York, NY*

4:55 pm **Low Immunogenic Donors Improve Kidney Transplant Survival in Sensitized Recipients**
D. Bekbolsynov[1], R. Green[2], B. Mierzejewska[1], M. Rees[1], S. Stepkowski[1], *[1]University of Toledo, Toledo, OH, [2]Bowling Green State University, Bowling Green, OH*

5:00 pm **Association Between HLA Class II and TLR4 Regulates HLA-II Stimulated P-selectin Expression and Monocyte Capture to Endothelial Cells**
Y. Jin, J. Nevarez-Mejia, E. F. Reed, *Pathology and Laboratory Medicine, University of California Los Angeles, Los Angeles, CA*

5:05 pm **Risk Stratification of Kidney Transplant Patients According to the Different Level of HLA-DQ Disparities**
A. Senev[1], A. R. Tambur[2], M. Naesens[1], *[1]Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium, [2]Northwestern University, Chicago, IL*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Basic
4:30 pm - 5:30 pm

Biomarkers, Immune Assessment and Clinical Outcomes - III

Moderators: Mamatha Bhat, MD, MSc, FRCPC, University Health Network, Assistant Professor of Medicine, Toronto, ON, Canada, Juliet Emamaullee, MD, PhD, FRCSC FACS, University of Southern California, Assistant Professor of Clinical Surgery, Los Angeles, CA, USA

4:30 pm **Use of a Novel Bead-based Assay to Measure the Impact of Imlifidase on ABO IgG Antibodies**
A. Halpin[1], B. Motyka[2], T. Ellis[2], J. Pearcey[2], T. L. Lowary[3], A. Runström[4], L. Winstedt[4], R. Bockermann[4], S. Järnum[4], A. Robertson[4], L. J. West[5], *[1]Department of Pediatrics and Laboratory Medicine and Pathology, University of Alberta and Alberta Precision Laboratories, Edmonton, AB, Canada, [2]Department of Pediatrics, University of Alberta, Edmonton, AB, Canada, [3]Department of Chemistry, University of Alberta, Edmonton, AB, Canada, [4]Hansa Biopharma, Lund, Sweden, [5]Department of Pediatrics and Laboratory Medicine and Pathology, University of Alberta, Edmonton, AB, Canada*

4:35 pm **High Levels of Donor-Derived Cell-Free DNA Predict EGFR Decline After Kidney Transplantation**
T. Alhamad[1], V. Bowers[2], E. Stites[3], S. Anand[4], J. S. Bromberg[5], H. Murad[1], G. Gupta[6], I. Moinuddin[6], L. Bu[7], S. Ghosh[8], J. Zeng[8], A. Pai[9], *[1]Washington University in St. Louis, St. Louis, MO, [2]Tampa General Hospital, Tampa, FL, [3]University of Colorado, Aurora, CO, [4]Intermountain Medical Center, Murray, UT, [5]University of Maryland School of Medicine, Baltimore, MD, [6]Virginia Commonwealth University, Richmond, VA, [7]University of Minnesota, Minneapolis, MN, [8]CareDx, Brisbane, CA, [9]University of Texas McGovern Medical School, Houston, TX*

4:40 pm **Assessment of Donor-Derived Cell-Free DNA Performance Characteristics Across the Spectrum of TCMR and ABMR After Kidney Transplant**
L. Bu[1], S. Anand[2], A. Pai[3], J. S. Bromberg[4], T. Alhamad[5], V. Bowers[6], I. Moinuddin[7], S. Ghosh[8], W. Tian[8], E. Stites[9], G. Gupta[7], *[1]University of Minnesota, Minneapolis, MN, [2]Intermountain Medical Center, Murray, UT, [3]University of Texas McGovern Medical School, Houston, TX, [4]University of Maryland School of Medicine, Baltimore, MD, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]Virginia Commonwealth University, Richmond, VA, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*

4:45 pm **Intrarenal B-cell Activating Factor (BAFF) Levels are Increased in Transplant Glomerulopathy**
S. Panzer, K. Swanson, G. Pandya, L. Hidalgo, S. Reese, *University of Wisconsin Madison, Madison, WI*

4:50 pm **Utility of Non-Invasive Rejection Biomarkers to Guide Immunomodulation in Kidney Transplant Patients with Active Covid-19 Infection**
J. Christensen, G. Gupta, A. Bryson, S. Paluri, R. Thompson, S. Sterling, N. Vissichelli, P. Kimball, D. Kumar, *VCUHealth, Richmond, VA*

4:55 pm **The Role of Donor-derived Cell-free DNA to Detect Subclinical Acute Rejection in Kidney Allograft**
S. Park[1], K. Guo[2], R. Heilman[3], E. Poggio[4], D. Taber[5], C. Marsh[6], S. Kurian[7], S. Kleiboeker[8], J. Weems[9], J. Holman[10], L. Zhao[2], R. Sinha[8], S. Brietigam[2], C. Rebello[2], M. Abecassis[11], J. Friedewald[1], *[1]Transplant nephrology, Northwestern University, Chicago, IL, [2]Feinberg School of Medicine, Northwestern University, Chicago, IL, [3]Transplant nephrology, Mayo Clinic College of Medicine and Science, Phoenix, AZ, [4]Department of Nephrology and Hypertension, Cleveland Clinic, Cleveland, OH, [5]Division of Transplant Surgery, Medical University of South Carolina, Charleston, SC, [6]Department of Medicine and Surgery, Scripps Clinic and Green Hospital, La Jolla, CA, [7]Scripps Health, La Jolla, CA, [8]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [9]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [10]Transplant Genomics, Inc, Mansfield, MA, [11]University of Arizona College of Medicine, Northwestern University, Tucson, AZ*

5:00 pm **MDR-101-MLK-MERCURY Kidney Transplant Tolerance Study Update**
D. Kaufman[1], S. Akkina[2], M. Stegall[3], J. Piper[4], A. O. Gaber[5], E. Marin[6], S. Busque[7], D. Alonso[8], M. De Vera[9], A. Shah[10], A. Patel[11], K. Chavin[12], M. Laftavi[13], S. Collette[14], E. Stites[15], M. Mai[16], M. Cooper[17], D. Brennan[18], *[1]Surgery, UW, Madison, WI, [2]Surgery, Loyola, Chicago, IL, [3]Surgery, Mayo, Rochester, MN, [4]Surgery, Inova, Fairfax, VA, [5]Surgery, Houston Methodist, Houston, TX, [6]Nephrology, Yale, New Haven, CT, [7]Surgery, Stanford, San Francisco, CA, [8]Surgery, Intermountain, Murray, UT, [9]Surgery, Loma Linda, Loma Linda, CA, [10]Surgery, TJU, Philadelphia, PA, [11]Nephrology, St. Barnabas, Livingston, NJ, [12]Surgery, UHH, Cincinnati, OH, [13]Surgery, Upstate, Syracuse, NY, [14]Surgery, CIUSSS, Montreal, ON, Canada, [15]Nephrology, UC Denver, Denver, CO, [16]Nephrology, Mayo - FL, Jacksonville, FL, [17]Surgery, Georgetown, Washington, DC, [18]Medeor, San Francisco, CA*

5:05 pm **Kidney Transplant Rejection Can Be Diagnosed or Even Predicted by Tracking Donor Reactive T Cell Clones in Post-transplant Samples**
Y. Sambandam[1], M. Kandpal[1], J. He[1], X. Huang[1], T. S. Taylor[1], A. A. Shetty[2], J. M. Mathew[1], J. R. Leventhal[1], *[1]Surgery-Comprehensive Transplant Center, Northwestern University Feinberg School of Medicine, Chicago, IL, [2]Medicine, Nephrology Division, Northwestern University Feinberg School of Medicine, Chicago, IL*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

ID
4:30 pm - 5:30 pm

Infectious Disease Poutpouri
Moderators: John Baddley, MD, MSPH, University of Maryland School of Medicine, Professor of Medicine, Baltimore, MD, USA, Theresa Madigan, MD, Mayo Clinic, Assistant Professor of Pediatrics, Rochester, MN, USA

4:30 pm **Molecular Epidemiology of Extended-Spectrum Cephalosporin-Resistant Enterobacterales Bloodstream Infections Among Solid Organ Transplant Recipients**
J. A. Anesi[1], E. Lautenbach[1], P. D. Tamma[2], K. A. Thom[3], K. Alby[4], E. A. Blumberg[1], W. Bilker[1], J. Omorogbe[1], P. Tolomeo[1], A. Werzen[3], J. Han[5], *[1]University of Pennsylvania, Philadelphia, PA, [2]Johns Hopkins University, Baltimore, MD, [3]University of Maryland, Baltimore, MD, [4]University of North Carolina, Chapel Hill, NC, [5]GlaxoSmithKline, Rockville, MD*

4:35 pm **Cytomegalovirus (CMV) D+/R- Serostatus is Independently Associated with Mortality and Graft Loss After Liver Transplantation (LTx)**
P. Vutien, J. Perkins, S. Biggins, J. Reyes, A. Limaye, *Internal Medicine, University of Washington Medical Center, Seattle, WA*

4:40 pm **Cmv Specific Cellmediated Immune Reconstitution During Letermovir Prophylaxis in High Risk Hematopoietic Cell Transplant Recipients**
M. Abidi[1], J. Gutman[2], A. Weinberg[2], *[1]University of Colorado Denver/Anschutz Medical Campus, Aurora, CO, [2]University of Colorado Denver, Denver, CO*

4:45 pm **Impact of a Cmv Cell Mediated Immunity Based Protocol on Guiding Cmv Prophylaxis Following Pediatric Liver Transplantation - A Single Center Experience**
G. Kalkan[1], S. Ball[2], L. McConnell[2], D. M. Desai[3], A. Aqul[3], P. K. Sue[1], *[1]Infectious Disease, University of Texas Southwestern Medical Center, Dallas, TX, [2]Solid Organ Transplant Program, Children's Health, Dallas, TX, [3]Solid Organ Transplant Program, University of Texas Southwestern Medical Center, Dallas, TX*

4:50 pm **Outcomes of Abdominal Transplant Recipients Who Receive Organs from Donors with Positive Cultures**
A. Perez Cortes Villalobos, A. Humar, D. Kumar, *University Health Network, Toronto, ON, Canada*

4:55 pm **Evaluating Pneumocystis Jiroveci Pneumonia Prophylaxis in Lung Transplant Recipients**
J. Sharkey, K. McMurry, J. Park, C. Carlson, K. Gregg, D. Kaul, D. Lyu, L. Fitzgerald, *Michigan Medicine, Ann Arbor, MI*

5:00 pm **Epidemiology and Risk Factors for Invasive Fungal Infection in Pancreas Transplant in the Absence of Fungal Prophylaxis**
J. Burkey[1], J. M. Chen[2], A. A. Sharfuddin[2], M. S. Yaqub[2], A. J. Lutz[2], J. A. Powelson[2], J. A. Fridell[2], N. Barros[2], *[1]Butler University College of Pharmacy and Health Sciences, Indianapolis, IN, [2]Indiana University Health, Indianapolis, IN*

5:05 pm **Impact of a Pharmacist-driven Immunization Clinic on Vaccination Rates in Pre-liver Transplant Patients**
A. Poparad-Stezar[1], B. Summers[1], M. Fitzmaurice[1], K. Hakamiun[2], N. Sulejmani[3], A. Jantz[1], *[1]Henry Ford Hospital, Detroit, MI, [2]Select Medical, Wyandotte, MI, [3]CareDx, Inc., Sterling Heights, MI*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
4:30 pm - 5:30 pm

Kidney: Acute Cellular Rejection
Moderators: Simin Goral, MD, University of Pennsylvania, Professor of Medicine, Philadelphia, PA, USA, James Rice, MD, Scripps Organ and Cell Transplantation, Medical Director, Kidney and Pancreas Transplant, La Jolla, CA, USA

4:30 pm **Belatacept Exposure Not Associated With Rejection. Can Doses be Lowered without Compromising Efficacy?**
M. McGowan[1], A. Bickenbach[1], B. Miyagawa[2], A. Christianson[1], T. Mizuno[2], P. West-Thielke[3], J. Leone[4], E. Woodle[1], D. Kaufman[5], A. Wiseman[6], A. Matas[7], A. Vinks[2], R. Alloway[1], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Children's Med Center, Cincinnati, OH, [3]U Illinois, Chicago, IL, [4]Tampa Gen, Tampa, FL, [5]U Wisconsin, Madison, OH, [6]Centura Transplant, Denver, CO, [7]U Minnesota, Minneapolis, MN*

4:35 pm **The Effect of the Different Donor-Derived HLA T-Cell Epitope Targets on the Development of T Cell-Mediated Rejection After Kidney Transplantation**
A. Senev, E. Van Loon, M. Emonds, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

4:40 pm **Reducing Rejection in Pediatric Kidney Transplantation: The Improving Renal Outcomes Collaborative (iroc)**
C. Varnell[1], A. Warmin[1], G. Barletta[2], C. Belsha[3], L. Harshman[4], D. Kershaw[5], C. Pruette[6], S. Ranabothu[7], M. Seifert[8], P. Singer[9], M. Yanik[10], K. Rich[1], A. Modi[1], D. Hooper[1], *[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [2]Phoenix Children's Hospital, University of Arizona, Phoenix, AZ, [3]SSM Health Cardinal Glennon Children's Hospital, St Louis, MO, [4]University of Iowa Stead Family Children's Hospital, Iowa City, IA, [5]C.S. Mott Children's Hospital, Ann Arbor, MI, [6]Johns Hopkins University School of Medicine, Baltimore, MD, [7]Arkansas Children's Hospital, Little Rock, AR, [8]University of Alabama at Birmingham, Children's of Alabama, Birmingham, AL, [9]Cohen Children's Hospital, Brooklyn, NY, [10]Levine Children's Hospital, Charlotte, NC*

4:45 pm **Reassessing TCMR in Kidney Transplant Indication Biopsies: Emerging Evidence for Partial Exhaustion in Late TCMR**
P. Halloran[1], J. Reeve[1], &. the INTERCOMEX Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

4:50 pm **Development of Diagnosis Method of Acute Graft Rejection After Kidney Transplantation Using Metabolome Analysis by Liquid Biopsy Approach**
H. Iwamoto[1], M. Sugimoto[2], O. Konno[1], I. Akashi[3], M. Okihara[1], Y. Kihara[1], T. Ueno[1], *[1]Kidney Transplantation Surgery, Tokyo Medical University, Hachioji Medical Center, Tokyo, Japan, [2]Research and Development Center for Minimally Invasive and Preemptive Medicine, Institute of Medi, Tokyo Medical University, Tokyo, Japan, [3]Kidney transplantation Surgery, Tokyo Medical University, Hachioji Medical Center, Tokyo, Japan*

4:55 pm **Late Subclinical Rejection and Borderline Rejection in Kidney Transplant Patients is Associated with Increased Incidence of Subsequent Clinical Rejections**
V. Viswanathan[1], I. Melgarejo[2], C. Puttarajappa[2], P. Sood[2], M. Molinari[2], S. Hariharan[2], C. Wu[2], A. Sharma[2], N. Shah[2], R. Mehta[2], *[1]Department of Medicine, Renal-Electrolyte Division, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Surgery, Thomas E. Starzl Transplantation Institute, University of Pittsburgh Medical Center, Pittsburgh, PA*

5:00 pm **Therapeutic Response of Late Clinical Cell Mediated Rejection is Modeled by Chronicity Changes**
I. Melgarejo[1], V. Visnawathan[2], A. Sharma[1], P. Sood[1], C. Puttarajappa[1], C. Wu[1], N. Shah[1], M. Molinari[1], S. Hariharan[1], R. Mehta[1], *[1]Starzl Transplant Institute, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Medicine, Renal-Electrolyte Division, University of Pittsburgh Medical Center, Pittsburgh, PA*

5:05 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

COVID-19
4:30 pm - 5:30 pm

Late-Breaking: COVID-19
Moderator: Raymund Razonable, MD, Mayo Clinic College of Medicine, Professor of Medicine, Rochester, MN, USA

4:30 pm **Safety of Sars-cov-2 Mrna Vaccines in Solid Organ Transplant Recipients**
M. Ou, B. Boyarsky, J. Motter, R. Greenberg, A. Teles, J. Ruddy, M. Krach, W. Werbel, R. Avery, A. Massie, D. Segev, J. Garonzik-Wang, *Johns Hopkins School of Medicine, Baltimore, MD*

4:35 pm **A Mechanistic Evaluation to Guide the Optimal Immunosuppression Adjustment Strategy in Transplant Patients with COVID-19**
V. Hall, V. Ferreira, D. Kumar, A. Humar, *UHN, Toronto, ON, Canada*

4:40 pm **Monoclonal Antibody Therapy for COVID-19 in Solid Organ Transplant Recipients**
Z. A. Yetmar[1], E. Beam[1], J. C. O'Horo[1], R. Ganesh[2], D. M. Bierle[2], L. Brumble[3], M. T. Seville[4], R. R. Razonable[1], *[1]Infectious Diseases, Mayo Clinic, Rochester, MN, [2]General Internal Medicine, Mayo Clinic, Rochester, MN, [3]Infectious Diseases, Mayo Clinic, Jacksonville, FL, [4]Infectious Diseases, Mayo Clinic, Scottsdale, AZ*

4:45 pm **Reduction in Hospitalizations and Deaths in Covid-19 Positive Abdominal Organ Transplant Recipients Following Implementation of A Protocol for Early Treatment with Bamlanivimab**
A. Ahearn, T. Maw, J. Emamaullee, J. Kim, E. Blodget, J. Kahn, C. Goldbeck, L. Sher, Y. Genyk, *Abdominal Transplantation, Keck Medical Center of USC, Los Angeles, CA*

4:50 pm **Mortality in Organ Transplant Recipients with Covid-19 Compared to Non-transplant or Waitlisted Patients: A Meta-analysis**
A. H. Lerner, E. Klein, D. Farmakiotis, *Rhode Island Hospital/Brown University, Providence, RI*

4:55 pm **Effect of HLA Class II Polymorphism on Predicted Cellular Immunity Against SARS-CoV-2 at the Individual Level and Within Twenty Five Race/ethnic Groups**
H. C. Copley[1], L. Gragert[2], A. R. Leach[3], V. Kosmoliaptsis[1], *[1]Department of Surgery, University of Cambridge, Cambridge, United Kingdom, [2]Department of Pathology, Tulane University School of Medicine, New Orleans, LA, [3]European Bioinformatics Institute (EMBL-EBI), Hinxton, United Kingdom*

5:00 pm **Limited Immunogenicity of a Single Dose of Sars-cov-2 Mrna Vaccine in Solid Organ Transplant Recipients**
B. Boyarsky, M. Ou, R. Greenberg, A. Teles, W. Werbel, R. Avery, A. Tobian, A. Massie, D. Segev, J. Garonzik Wang, *Johns Hopkins, Baltimore, MD*

5:05 pm **Dd-cfdna Can Guide Safe Reintroduction of Immunosuppression in Kidney Transplant Recipients with Covid-19**
J. Miles[1], J. Leonard[2], V. Tatapudi[2], M. Fei[1], R. Montgomery[2], N. M. Ali[2], *[1]CareDx, Brisbane, CA, [2]Transplant Institute, NYU Langone Health, New York, NY*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
4:30 pm - 5:30 pm

Liver Recipient Selection
Moderators: Leigh Anne Dageforde, MD, MPH, Massachusetts General Hospital, Assistant Professor of Surgery, Boston, MA, USA, John Fung, MD, PhD, The University of Chicago, Co-Director UCM Transplantation Institute, Chicago, IL, USA

4:30 pm **Pre-Transplant Frailty is Associated with 30-Day Mortality but Not Long-Term Survival After Liver Transplantation**
M. Anderson, V. Valbuena, M. Englesbe, C. Sonnenday, *Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

4:35 pm **Relationship of Functional Frailty and Radiographic Sarcopenia to Outcomes After Liver Transplant**
S. L. Olson, P. Polineni, W. Schwartz, O. Siddiqui, L. Zhao, D. Ganger, D. P. Ladner, *Comprehensive Transplant Center, Northwestern University, Chicago, IL*

4:40 pm **Comorbidity Burden is Associated with Increased Waitlist Mortality Among NASH Patients**
J. R. Montgomery[1], M. J. Englesbe[1], C. Connelly[2], *[1]Michigan Medicine, Ann Arbor, MI, [2]General Surgery, Oregon Health & Science University, Portland, OR*

4:45 pm **Coronary Computed Tomography Angiography for Pre-Liver Transplant Cardiovascular Risk Assessment: A Single Center Experience**
J. Rice[1], T. Genders[2], D. Groves[2], J. R. Burton[1], J. Moloo[2], R. Quaife[2], D. Vargas[3], M. Kriss[1], *[1]Division of Gastroenterology and Hepatology, University of Colorado, Aurora, CO, [2]Division of Cardiology, University of Colorado, Aurora, CO, [3]Division of Radiology, University of Colorado, Aurora, CO*

4:50 pm **Recipient Selector for Donation After Cardiac Death Allografts**
G. Handing[1], S. Ganni[2], S. Barrett[1], N. Galvan[2], C. O'Mahony[2], J. Goss[2], R. Cotton[2], A. Rana[2], *[1]School of Medicine, Baylor College of Medicine, Houston, TX, [2]Michael E DeBakey Department of Surgery, Division of Abdominal Transplant, Houston, TX*

4:55 pm **Cardiac Risk Assessment in Liver Transplant Candidates: Survey of National Practice Patterns**
P. Barman[1], R. Chadha[2], L. VanWagner[3], *[1]Div. of GI/Hepatology, University of California, San Diego, San Diego, CA, [2]Anesthesiology, Mayo Clinic, Jacksonville, FL, [3]Div. of GI/Hepatology, Northwestern University, Chicago, IL*

5:00 pm **Outcomes After Liver Transplantation With Steatotic Grafts: Redefining Acceptable Cutoffs for Moderately Steatotic Grafts**
B. L. Da[1], J. Satiya[2], R. P. Heda[3], Y. Jiang[4], L. Lau[5], A. Fahmy[1], A. Winnick[1], N. Roth[1], E. Grodstein[1], P. J. Thuluvath[6], A. K. Singal[7], T. D. Schiano[8], L. W. Teperman[1], S. K. Satapathy[1], *[1]Liver Disease, Northwell Health, Manhasset, NY, [2]Beth Israel Deaconess Medical Center, Boston, MA, [3]Tulane Medical Center, Memphis, TN, [4]The University of Memphis, Memphis, TN, [5]Northwell Health, Manhasset, NY, [6]University of Maryland School of Medicine, Baltimore, MD, [7]Liver Disease, Avera McKenna University Health Center and Transplant Institute, Manhasset, NY, [8]Icahn School of Medicine at Mount Sinai, New York City, NY*

5:05 pm **The Utility of PET/ CT Testing in Cardiac Risk Stratification of Adult Liver Transplant Candidates**
M. A. Tincopa[1], R. Weinberg[1], S. Sengupta[1], J. Slivnick[2], J. Corbett[1], C. Sonnenday[1], R. Fontana[1], P. Sharma[1], *[1]Internal Medicine, University of Michigan, Ann Arbor, MI, [2]Internal Medicine, Ohio State University, Columbus, OH*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Admin
4:30 pm - 5:30 pm

Quality Assurance and Regulatory Issues
Moderators: Gwen McNatt, APRN, PhD, University of Iowa Hospitals and Clinics, Chief Administrative Officer, Iowa City, IA, USA, Luke Preczewski, Jackson Memorial Hospital, Vice President, Miami, FL, USA

4:30 pm **Automated Electronic Donor Referrals Have Increased Transplantation**
J. Piano, *Transplant Connect, Santa Monica, CA*

4:35 pm **The Initial Impact of Covid-19 on Reported Graft Failure Rates and Potential Confounding of Srtr Psrs**
A. Wey[1], J. Miller[1], D. Musgrove[1], Y. Ahn[1], M. Valapour[2], N. Salkowski[1], M. Skeans[1], A. Massie[3], R. Hirose[4], D. Segev[3], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Cleveland Clinic, Cleveland, OH, [3]Johns Hopkins, Baltimore, MD, [4]Univ of California, San Francisco, San Francisco, CA*

4:40 pm **The Effect of Covid-19 on Offer Acceptance Rates by Age and Race Groups**
A. Wey[1], J. Miller[1], Y. Ahn[1], D. Musgrove[1], A. Hart[1], N. Salkowski[1], M. Skeans[1], R. Hirose[2], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Univ of San Fransico, San Francisco, CA*

4:45 pm **Covid-19 Impact of the Pandemic Surge on Patients Waiting for Renal Transplantation at a Single New York City Transplant Center**
G. Boyd, D. Tsapepas, R. Bonifacio, L. Brinkers, C. Brennan, A. Chang, M. Dalangin, L. Lowe, J. K. Mendoza, J. V. Mendoza, C. McNulty, M. Morris, M. Muttiah, K. Nickason, L. Ratner, *Transplant, NYP - Columbia University Medical Center, New York, NY*

4:50 pm **Impact of Lung Allocation Score Cohort Update**
M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH*

4:55 pm **Effective Patient Throughput on the Transplant Surgery Service**
E. M. Thomas[1], P. K. Shah[1], S. Beasley[2], A. Saad[1], M. Rani[1], F. Cigarroa[1], *[1]UT Health San Antonio, San Antonio, TX, [2]University Health, San Antonio, TX*

5:00 pm **The Learning Curve Associated with De Novo Tacrolimus XR Use in a Racially Diverse Kidney Transplant Population**
F. Bartlett, T. Carcella, N. Patel, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

5:05 pm **Early Stent Removal in Kidney Transplant Recipients - A Quality Improvement Project**
V. Rohan, N. Pilch, M. Altiti, S. Nadig, A. Lin, D. DuBay, P. Baliga, *Surgery, Medical University of South Carolina, Charleston, SC*

5:10 pm **Live Video Question and Answer**

5:30 pm **Break**

Rapid Fire Oral Abstracts

ID
6:00 pm - 7:00 pm

BK virus in Kidney Recipients
Moderators: Benjamin Adam, MD, University of Alberta, Anatomical Pathologist, Edmonton, AB, Canada, Hans H. Hirsch, MD, MSc, University of Basel / Department Biomedicne, Professor, Basel, Switzerland

6:00 pm **VP2 MRNA Distinguishes the Direct Injury and Inflammation Effects of Polyoma Virus (BK) Infection from the Cognate TCMR Response That Follows Immunosuppressive Minimization**
P. F. Halloran[1], K. Famulski[1], K. S. Madill-Thomsen[1], G. Böhmig[2], G. Gupta[3], M. Myślak[4], O. Viklicky[5], &. the INTERCOMEX Study Group[6], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Medical University of Vienna, Vienna, Austria, [3]Virginia Commonwealth University, Richmond, VA, [4]Pomeranian Medical University, Szczecin, Poland, [5]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [6]., Edmonton, AB, Canada*

6:05 pm **Coexistence of BKPyV Lytic Infection and Viral Integration in the Development of BKPyV Diseases After Renal Transplantation**
S. Yan[1], Y. Wang[1], Y. Liu[1], W. Deng[1], Z. Yan[1], J. Xu[1], C. Wu[2], Y. Miao[1], *[1]Department of Organ Transplantation, Nanfang Hospital, Southern Medical University, Guangzhou, China, [2]Departments of Urology & Pathology, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

6:10 pm **Duration and Magnitude of BK Viremia Do Not Predict Outcome in Patients After Kidney Transplantation**
E. A. Farkash[1], J. T. Rajagopal[2], M. Vincent[2], M. D. Doshi[3], *[1]Dept of Pathology, Michigan Medicine, Ann Arbor, MI, [2]University of Michigan, Ann Arbor, MI, [3]Dept of Nephrology, Michigan Medicine, Ann Arbor, MI*

6:15 pm **Donor-Derived Cell-Free DNA Levels Risk-Stratify Polyoma BK Viremia and Associated Clinical Events After Kidney Transplantation - Preliminary Results from ADMIRAL Study**
A. Pai[1], L. Bu[2], J. S. Bromberg[3], G. Gupta[4], I. Moinuddin[4], T. Alhamad[5], V. Bowers[6], S. Ghosh[7], W. Tian[7], E. Stites[8], S. Anand[9], *[1]University of Texas McGovern Medical School, Houston, TX, [2]University of Minnesota, Minneapolis, MN, [3]University of Maryland School of Medicine, Baltimore, MD, [4]Virginia Commonwealth University, Richmond, VA, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]CareDx, Brisbane, CA, [8]University of Colorado, Aurora, CO, [9]Intermountain Medical Center, Murray, UT*

6:20 pm **Characterization of Retransplantation Following Graft Failure Due to Bkvn**
K. Nguyen[1], H. Curtis[2], J. Panichella[2], H. Resweber[3], A. Di Carlo[2], S. Karhadkar[1], *[1]Surgery, Temple University School of Medicine, Philadelphia, PA, [2]Surgery, Temple University School of Medicine, Philadephia, PA, [3]Surgery, Temple University School of Medicine, Gladwyne, PA*

6:25 pm **Transcriptomics and Proteomics Profiling of Complement Pathway (cp) Proteins in Biopsies With Polyomavirus Bk Nephropathy (bkvn)**
P. Randhawa[1], F. Fei[2], Y. Huang[1], G. Tseng[3], K. Xiao[4], *[1]Departments of Pathology, Pittsburgh, PA, [2]Pharmacology and Chemical Biology, Pittsburgh, PA, [3]Biostatistics, Pittsburgh, PA, [4]Pharmacology and Chemical Biology, University of Pittsburgh, Pittsburgh, PA*

6:30 pm **Efficacy of MAU868, a Novel BKV Neutralizing Monoclonal Antibody (mAb), for the Treatment of Severe BK Virus Nephropathy (BKVN) After Kidney Transplant**
S. C. Jordan[1], N. Ammerman[2], M. Toyoda[3], K. Lim[2], J. R. Abend[4], A. Patick[5], M. R. Hodges[5], A. Vo[2], S. J. Kovacs[6], *[1]Comprehensive Transplant Center, Cedars Sinai Medical Ctr, West Hollywood, CA, [2]Comprehensive Transplant Center, Cedars Sinai Medical Ctr, Los Angeles, CA, [3]Cedars Sinai Medical Ctr, Los Angeles, CA, [4]Novartis Institutes for BioMedical Research, Virology Research, Emeryville, CA, [5]Amplyx Pharmaceuticals, San Diego, CA, [6]Novartis Institutes for BioMedical Research, Translational Medicine, East Hanover, NJ*

6:35 pm **Immunosuppression Reduction Strategies for Polyoma BK Viremia in Kidney Transplant Patients on Belatacept-Based Immunosuppression**
O. Roe[1], E. Meredith[1], A. Reid[2], A. Basu[3], *[1]Emory University Hospital, Atlanta, GA, [2]University of California San Francisco Medical Center, San Francisco, CA, [3]Emory Transplant Center, Atlanta, GA*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

All Organs
6:00 pm - 7:00 pm

Disparities in Access and Outcomes in Kidney Transplantation

Moderator: Liise Kayler, MD MS, Erie County Medical Center, Buffalo, NY, USA

6:00 pm **Initial Kidney Transplant Evaluations with Telehealth: Is it a Pandemic Only Practice?**
A. Govil[1], E. Tims[2], C. Siemer[2], J. Harris[2], C. King[2], S. Shah[1], C. Thakar[1], *[1]Univ of Cincinnati, Cincinnati, OH, [2]UC Health, Cincinnati, OH*

6:05 pm **Low Socio-economic Status is Associated with Lower Kidney Graft Survival and Increased Risk of Graft Failure Due to Acute Rejection**
W. Xie[1], G. Vrakas[1], S. H. Gray[1], A. Haririan[2], J. R. Scalea[1], J. S. Bromberg[1], D. G. Maluf[1], R. P. Meier[1], *[1]Department of Surgery, University of Maryland School of Medicine, Baltimore, MD, [2]Department of Medicine, University of Maryland School of Medicine, Baltimore, MD*

6:10 pm **Geospatial Analysis of Organ Procurement Organizations and Its Impact on Organ Donation Rates**
D. Chyou[1], K. Ross-Driscoll[2], R. Lynch[2], D. S. Goldberg[1], *[1]University of Miami, Miami, FL, [2]Emory University School of Medicine, Atlanta, GA*

6:15 pm **Obesity is Associated with Greater Gender Disparity in Access to Kidney Transplantation**
S. S. Sheikh, B. Orandi, P. MacLennan, H. Qu, R. M. Cannon, D. Anderson, M. Hanaway, S. Mehta, V. Kumar, R. Reed, J. Locke, *Surgery, University of Alabama at Birmingham, Birmingham, AL*

6:20 pm **Age and Racial Disparities in Access to Re-kidney Transplantation**
S. S. Patole[1], J. Ahn[1], S. Sandal[2], D. Segev[1], M. McAdams Demarco[3], *[1]Department of Transplantation Surgery, Johns Hopkins School of Medicine, Baltimore, MD, [2]McGill University, Montreal, QC, Canada, [3]Department of Epidemiology, Johns Hopkins School of Medicine, Baltimore, MD*

6:25 pm **Impact of a Latinx Kidney Transplant Clinic**
P. Serrano Rodriguez, *Abdominal Transplant Surgery, University of North Carolina at Chapel Hill, Chapel Hill, NC*

6:30 pm **Disparities in Access to Listing in Rural Populations Post-KAS Implementation**
S. H. Nguyen[1], R. R. Redfield[2], N. Neidlinger[1], D. P. Foley[1], D. B. Kaufman[1], J. T. Adler[3], *[1]Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI, [2]Department of Surgery, University of Pennsylvania, Philadelphia, PA, [3]Department of Surgery, Brigham and Women's Hospital, Boston, MA*

6:35 pm **Rural Dialysis Facilities are Associated with Better Dialysis Quality but Less Home Dialysis Use**
J. T. Adler[1], L. Xiang[1], S. S. Waikar[2], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Medicine, Boston Medical Center, Boston, MA*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
6:00 pm - 7:00 pm

Kidney Immunosuppression

Moderators: Anil Chandraker, Brigham and Women's Hospital, Boston, MA, USA, Beatrice Concepcion, MD, Vanderbilt University Medical Center, Kidney Immunosuppression, Nashville, TN, USA

6:00 pm **A Phase 1 Study to Evaluate the Safety, Tolerability and Pharmacokinetics of At-1501**
S. Perrin[1], A. Gill[2], C. Gill[2], P. Gustafson[1], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

6:05 pm **Evaluation of a Weight-Based Mycophenolate Mofetil Dosing Protocol for Kidney Transplant Maintenance Immunosuppression**
M. Mahoney[1], E. Kincaide[1], J. Nelson[1], K. Klein[1], R. Hall[1], S. Bhayana[2], *[1]University Health, San Antonio, Department of Pharmacotherapy and Pharmacy Services, The University of Texas at Austin, Pharmacotherapy Division, College of Pharmacy, San Antonio, TX, [2]University Transplant Center, University Health, San Antonio, Department of Nephrology, The University of Texas Health Science Center at San Antonio, San Antonio, TX*

6:10 pm **The Clinical Validation of a Dried Blood Spot Method for Simultaneous Tacrolimus and Creatinine Measurement**
M. I. Francke[1], S. Bouarfa[2], B. van Domburg[2], D. van de Velde[2], M. E. Hellemons[3], O. C. Manintveld[4], S. M. Last-Koopmans[5], M. B. Mulder[2], D. A. Hesselink[1], B. C. de Winter[2], *[1]Internal medicine, nephrology and transplantation, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [2]Hospital Pharmacy, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [3]Pulmonary medicine, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [4]Cardiology, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [5]Hematology, Erasmus MC, University Medical Center, Rotterdam, Netherlands*

6:15 pm **CD40 Blockade by the Fc-Silent Immunosuppressive Antibody Iscalimab Results in Diminished B Cell Activation and Differentiation and is Paralleled by Whole Blood Gene Expression Data**
R. Kraaijeveld[1], M. W. van den Hoogen[1], A. E. de Weerd[1], E. Ferroro[2], G. Robert[2], U. Laessing[2], B. Haraldsson[2], J. S. Rush[2], C. C. Baan[1], *[1]Erasmus MC, Rotterdam, Netherlands, [2]Novartis Pharmaceuticals AG, Basel, Switzerland*

6:20 pm **Conversion to Belatacept Based Immunosuppression Regimen in Kidney Transplant Patients: Lessons Learned**
R. Saidi, N. Huang, C. Yang, I. Movileanu, K. Ecal, A. Senay, O. Pankewycz, R. Dvorai, R. Shahbazov, M. Laftavi, *SUNY Upstate, Syracuse, NY*

6:25 pm **Immunosuppression and Cancer Risk in Kidney Transplant Recipients: A Retrospective Cohort Study**
R. Sapir-Pichhadze[1], C. Laprise[1], X. Zhang[1], M. Abrahamowicz[1], M. Beauchamp[2], A. Della Vecchia[1], L. Azoulay[1], E. Franco[1], B. Nicolau[1], *[1]McGill University, Montreal, QC, Canada, [2]McGill University Health Centre, Montreal, QC, Canada*

6:30 pm **Clinical Outcomes Associated with Induction Therapy Regimens for Kidney Transplantation in Children: A NAPRTCS and PHIS Collaborative Report**
H. Pizzo[1], D. Levy Erez[2], N. M. Rodig[3], T. Richardson[4], M. Somers[3], *[1]Pediatric Nephrology, Cedars-Sinai Medical Center, Los Angeles, CA, [2]Nephrology Institute, Schneider Children's Medical Center, Tel Aviv, Israel, [3]Nephrology, Boston Children's Hospital, Boston, MA, [4]Children's Hospital Association, Lenexa, KS*

6:35 pm **Single-Dose Basiliximab Induction Therapy in Low-Immunologic Risk Kidney Transplant Recipients**
A. Hutchins, J. Schoen, J. S. McMullen, *Pharmacy, Nebraska Medicine, Omaha, NE*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Basic
6:00 pm - 7:00 pm

Late Breaking: Basic & ID
Moderators: Vikas Dharnidharka, MD, MPH, Washington University in St. Louis, Professor, Saint Louis, MO, USA, Matthew Levine, MD PhD, University of Pennsylvania, Associate Professor of Surgery, Philadelphia, PA, USA

6:00 pm **Life-supporting Multi-gene Cardiac Xenografts From Swine Demonstrate Survival >8 Months and Preclinical Efficacy for Human Clinical Trials**
C. Goerlich[1], B. Griffith[1], A. Singh[1], T. Zhang[1], I. Tatarov[1], B. Lewis[1], F. Sentz[1], A. Hershfeld[1], P. Odonkor[1], B. Williams[1], E. Strauss[1], A. Tabatabai[2], A. Bhutta[3], D. Ayares[4], D. Kaczorowski[1], M. Mohiuddin[1], *[1]Surgery, University of Maryland School of Medicine, Baltimore, MD, [2]Department of Medicine, Division of Pulmonary and Critical Care Medicine, University of Maryland School of Medicine, Baltimore, MD, [3]Pediatrics, Pediatric Critical Care Medicine, University of Maryland School of Medicine, Baltimore, MD, [4]Revivicor, Inc., Blacksburg, VA*

6:05 pm **Immunologic Endotypes of Ischemia-reperfusion Injury in Human Liver Transplantation**
R. A. Sosa, A. Q. Terry, F. M. Kaldas, B. V. Naini, T. Ito, R. W. Busuttil, D. W. Gjertson, J. W. Kupiec-Weglinski, E. F. Reed, *UCLA, Los Angeles, CA*

6:10 pm **One-year Outcomes of a Multicenter Trial of Transplantation of Hcv Viremic Kidney Donors into Hcv Uninfected Recipients**
M. Sise[1], D. Goldberg[2], D. Schaubel[3], J. Kort[4], R. Alloway[5], J. Friedewald[6], R. Fontana[7], S. Sultan[8], N. Desai[9], R. Chung[1], P. Reese[10], *[1]Mass General Hospital, Boston, MA, [2]U-Miami, Miami, FL, [3]U. Pennsylvania, Philadelphia, PA, [4]Abbvie, Chicago, IL, [5]U Cincinnati, Cincinnati, OH, [6]Northwestern U., Evanston, IL, [7]U. Michigan, Ann Arbor, MI, [8]Cornell, New York City, NY, [9]Johns Hopkins, Baltimore, MD, [10]U. Pennslyvania, Philadelpha, PA*

6:15 pm **Comprehensive Utilization of HCV Viremic and Non-Viremic Donor Livers and Kidneys into HCV-negative Patients**
M. E. de Vera, J. Woloszyn, J. Sterris, M. Robinson, R. Evans, S. Blais, B. Elhazin, C. Amador, c. Berk, M. Volk, R. Villicana, *Transplant Institute, Loma Linda University Health, San Bernardino, CA*

6:20 pm **Detection of SARS-CoV-2 Specific Functional T Cells Using a Seven Color Flow Cytometry Assay**
L. Flebbe-Rehwaldt, J. Hayden, K. Mickey, S. Manley, S. Kleiboeker, *Eurofins-Viracor, Lees Summit, MO*

6:25 pm **Impaired Antibody Responses to Spike Protein Antigens of Sars-cov-2 in Solid Organ Transplant (sot) Recipients**
C. Ashokkumar[1], S. Nadig[2], V. Rohan[2], A. Kroemer[3], H. Dhani[3], S. Rao[4], R. Sindhi[5], *[1]Plexision, pittsburgh, PA, [2]Medical University of South Carolina, Charleston, SC, [3]MedStar Georgetown Transplant Institute, Georgetown, DC, [4]DHR Health Institute for Research and Development, Texas, TX, [5]University of Pittsburgh, Pittsburgh, PA*

6:30 pm **Precision Medicine in Renal Transplantation: Structural Biology of HLA Defines Allelic Binding of Cardinal Pathogenic Viruses in Transplantation**
K. R. Sherwood[1], A. Nguyen[2], J. Tran[1], O. Gunther[3], A. Nellore[2], R. Thompson[2], J. Lan[1], L. Allan[1], P. A. Keown[1], *[1]Vancouver General Hospital, Vancouver, BC, Canada, [2]Biomedical Engineering, Oregon Health & Science University, Portland, OR, [3]Gunther Analytics, Vancouver, BC, Canada*

6:35 pm **Randomized Phase 3 Open-label Study of Maribavir vs Investigator-assigned Therapy for Refractory/ resistant Cytomegalovirus Infection in Transplant Recipients: Subgroup Analyses of Efficacy by Organ**
R. K. Avery[1], E. A. Blumberg[2], D. Florescu[3], N. Kamar[4], D. Kumar[5], J. Wu[6], A. Sundberg[6], *[1]Johns Hopkins Hospital, Baltimore, MD, [2]University of Pennsylvania, Philadelphia, PA, [3]University of Nebraska School of Medicine, Omaha, NE, [4]Hôpital de Rangueil, Toulouse, France, [5]University Health Network, Toronto, ON, Canada, [6]Shire Human Genetic Therapies, Inc., a Takeda company, Lexington, KY*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
6:00 pm - 7:00 pm

Liver Pediatrics
Moderator: Khashayar Vakili, MD, Boston Children's Hospital, Surgical Director of Liver, Kidney, Intestine, and Multivisceral Transplant Programs, Boston, MA, USA,

6:00 pm **Pediatric Donation During COVID-19 Pandemic**
M. MacConmara, B. Wang, L. de Gregorio, J. Shah, D. Desai, S. Hanish, P. Vagefi, C. S. Hwang, *Surgery, UT Southwestern Medical Center, Dallas, TX*

6:05 pm **The Pediatric National Liver Review Board: What Happens to Waitlist Registrations with Denied Exception Forms?**
J. Foutz[1], C. Martinez[1], A. Henderson[1], E. K. Hsu[2], E. R. Perito[3], J. Heimbach[4], *[1]United Network for Organ Sharing, Richmond, VA, [2]Seattle Children's Hospital, Seattle, WA, [3]UCSF, San Francisco, CA, [4]Mayo Clinic, Rochester, MN*

6:10 pm **The Confluence of Race, Socioeconomic Deprivation, and Waitlist Mortality for Children Awaiting Liver Transplant**
S. Wadhwani[1], J. Ge[1], L. Gottlieb[1], C. Lyles[1], A. F. Beck[2], J. Bucuvalas[3], U. Kotagal[2], J. C. Lai[1], *[1]University of California San Francisco, San Francisco, CA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [3]Icahn School of Medicine at Mount Sinai, New York, NY*

6:15 pm **Clinical Value of Surveillance Biopsies in Pediatric Liver Transplantation: A Single Center Experience with >800 Biopsies**
B. Rocque[1], A. Zaldana[1], C. Weaver[2], J. Huang[1], A. Barbetta[1], V. Shakhin[2], C. Goldbeck[1], G. Yanni[2], R. Kohli[2], Y. Genyk[1], J. Emamaullee[1], *[1]Surgery, University of Southern California Keck School of Medicine, Los Angeles, CA, [2]Pediatrics, Children's Hospital-Los Angeles, Los Angeles, CA*

6:20 pm **Degree of T Cell Infiltration Predicts Treatment Response in Pediatric Liver Late Acute Cellular Rejection**
M. Rogers, G. Begum, Q. Sun, A. Peters, *Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

6:25 pm **Are All DSA's the Same? Are We Ready for Precision Medicine in Pediatric LT?**
S. E. Shin[1], M. Lee[1], N. Yazigi[2], K. Khan[2], S. Kaufman[2], J. Ahn[3], O. Timofeeva[4], U. Ekong[2], *[1]Georgetown University School of Medicine, Washington, DC, [2]Medstar Georgetown Transplant Institute, Medstar Georgetown University Hospital, Washington, DC, [3]Biostatistics, Bioinformatics, & Biomathematics, Georgetown University, Washington, DC, [4]Histocompatibility Laboratory, Dept. of Pathology & Laboratory Medicine, Georgetown University, Washington, DC*

6:30 pm **Center Use of Technical Variant Grafts Impacts Pediatric Liver Transplant Waitlist and Recipient Outcomes in the United States**
G. Mazariegos[1], E. R. Perito[2], J. Squires[1], K. Soltys[1], A. Griesemer[3], S. A. Taylor[4], E. Pahl[5], *[1]Childrens Hosp of Pittsburgh, Pittsburgh, PA, [2]UCSF, San Francisco, CA, [3]Columbia University Irving Medical Center, New York, NY, [4]Lurie Children's Hospital of Chicago, Chicago, IL, [5]Omnilife, Lexington, KY*

6:35 pm **Cost Effectiveness Analysis Comparing Treatments of Biliary Strictures in Pediatric Liver Transplant Patients**
B. Whitehead[1], C. Lemoine[2], R. Superina[2], J. Green[3], S. Mohammad[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [2]Division of Transplant Surgery, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [3]Division of Interventional Radiology, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Basic
6:00 pm - 7:00 pm

Lymphocyte Biology and Tolerance
Moderators: Douglas Anderson, MD, University of Alabama at Birmingham, Assistant Professor, Birmingham, AL, USA, Ginny Bumgardner, MD PhD FACS, Ohio State University, Professor of Surgery, Columbus, OH, USA

6:00 pm **Sequential Analysis of Renal Allograft Rejection at Single Cell Resolution**
T. Shi[1], C. Castro-Rojas[1], A. Burg[1], K. Roskin[1], J. Rush[2], B. Haraldsson[2], A. Shields[3], R. Alloway[3], E. Woodle[3], D. Hildeman[1], *[1]Immunobiology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [2]Novartis Pharmaceuticals AG, Basel, Switzerland, [3]University of Cincinnati Medical Center, Cincinnati, OH*

6:05 pm **LTβR Engagement Regulates Treg Migration, Stability and Suppressor Function**
V. Saxena[1], W. Piao[1], L. Li[1], Y. Xiong[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

6:10 pm **CEACAM1 Signaling is Essential to Elicit Tim-3 Inhibitory Regulation in Liver Transplantation**
H. Kojima, H. Hirao, T. Ito, K. Kadono, K. J. Dery, F. M. Kaldas, J. W. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

6:15 pm **Laminins Differentially Regulate Adaptive Alloimmune Responses**
L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[1], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MA*

6:20 pm **TIGIT Identifies Polyfunctional Donor-Specific CD4+ T Cells Lost After Kidney Transplantation**
A. C. van der List, N. H. Litjens, M. G. Betjes, M. Klepper, *Nephrology and Transplantation, Erasmus MC, Rotterdam, Netherlands*

6:25 pm **TOLS are Novel Regulatory TLOs with A B Cell Signature**
I. Rosales[1], Q. Yuan[1], C. Yang[1], P. Russell[1], J. Madsen[1], A. Alessandrini[1], R. Colvin[1], -. AA and RC[2], *[1]Massachusetts General Hospital, Boston, MA, [2]Co-Senior Authors, Boston, MA*

6:30 pm **Successful Induction of Hematopoietic Chimerism by Dual Inhibition of Mcl-1 and Bcl-2 Without Myeloablative Treatments in Nonhuman Primates**
T. Hirose, D. Ma, G. Lassiter, T. Kawai, *Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA*

6:35 pm **Increased T Cell Cross-dressing in Accepted Kidney Allografts**
Q. Yuan[1], S. Hong[2], E. Szuter[2], I. Rosales[2], Y. Zhao[2], B. Gonzalez-Nolasco[2], G. Benichou[2], P. Russell[2], J. Madsen[2], R. Colvin[2], A. Alessandrini[2], *[1]Massachusetts General Hospital/Chinese PLA General Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Basic
6:00 pm - 7:00 pm

Rejection, Innate Immunity and Allorecognition

Moderators: Naoka Murakami, MD PhD, Brigham and Women's Hospital, Instructor, Boston, MA, USA, Heth Turnquist, PhD, Univ of Pittsburgh, T.E. Starzl Transplant Institute, Associate Professor, Pittsburgh, PA, USA

6:00 pm **Dna-pkcs Regulation of the Allogeneic Immune Response**
L. Burdine, M. Burdine, Z. Waldrip, D. Harrison, *University of Arkansas, Little Rock, AR*

6:05 pm **P40 Homodimers Induce Il-15 to Promote Endogenous Donor-reactive Memory Cd8 T Cell Activation within High-risk Cardiac Allografts**
H. Tsuda, A. Valujskikh, R. Fairchild, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

6:10 pm **Contribution of T-bet Expressing CD27+ CD21- Activated Memory B Cells Poised for Plasma Cell Differentiation to Antibody-mediated Rejection of Kidney Transplants**
K. Louis[1], E. Bailly[1], C. Macedo[1], B. Ramaswami[1], X. Gu[1], G. Chalasani[1], A. Zeevi[1], P. Randhawa[1], H. Singh[2], C. Lefaucheur[3], D. Metes[1], *[1]Surgery, University of Pittsburgh, Pittsburgh, PA, [2]Center for Systems immunology, Department of Immunology, University of Pittsburgh, Pittsburgh, PA, [3]Human Immunology and Immunopathology, INSERM U976, Paris, France*

6:15 pm **Donor Mhc-independent Islet Rejection in Autoimmune Diabetes: Implications for Stem Cell Therapy**
R. G. Gill[1], M. Coulombe[2], K. S. Beard[1], A. L. Burrack[3], *[1]University of Colorado, Aurora, CO, [2]Surgery, University of Colorado, Aurora, CO, [3]Mircrobiology and Immunology, University of Minnesota, Minneapolis, MN*

6:20 pm **Accelerated Bronchiolitis Obliterans After Lung Transplant Promoted by an ATG16L1 Mutation is Coupled to Mitochondrial Damage and Metabolic Alterations in Monocyte-derived Antigen Presenting Cells**
M. Cano[1], D. Zhou[1], D. Kreisel[1], C. Chen[2], K. Pugh[1], D. Byers[1], R. Hachem[1], A. Gelman[1], *[1]Washington University, Saint Louis, MO, [2]UT Southwestern Medical Center, Dallas, TX*

6:25 pm **Resolution of Endothelial Inflammation is Delayed Following IFNγ, Which Provokes a Long-lasting Pro-adhesive Phenotype Dependent on JAK/STAT Signaling**
N. M. Valenzuela, *Pathology and Laboratory Medicine, UCLA, Los Angeles, CA*

6:30 pm **PD-1/PD-L1 Selectively Regulates Treg Lymphatic Migration**
W. Piao[1], L. Li[1], C. Paluskievicz[1], Y. Zhang[2], V. Saxena[3], K. Hippen[2], B. Blazar[2], L. Riella[4], J. Bromberg[1], *[1]Surgery, U Maryland, Baltimore, MD, [2]U Minnesota, Minneapolis, MN, [3]U Maryland, Baltimore, MD, [4]Harvard U, Boston, MA*

6:35 pm **Ikaros-SIRT1 Signaling Axis Regulates Macrophage Polarization and Ischemia Reperfusion Injury in Mouse and Human Liver Transplantation**
K. Kadono[1], H. Hirao[1], H. Kojima[1], K. J. Dery[1], X. Li[2], J. W. Kupiec-Weglinski[1], *[1]The Dumont-UCLA Transplant Center, Los Angeles, CA, [2]NIEHS, Durham, NC*

6:40 pm **Live Video Question and Answer**

7:00 pm **Break**

Sponsor Networking
7:30 pm - 8:30 pm

Poster Video Chat

Basic
7:30 pm - 8:30 pm

Basic 1
Moderators: Megan Sykes, MD, Columbia University, Professor, Columbia University, Director, Columbia Center for Translational Immunology, New York, NY, USA, Stefan Tullius, MD, PhD, Brigham & Women's Hospital, Chief, Division of Transplant Surgery, Boston, MA, USA

7:30 pm **Atg16l-Dependent Autophagy Attenuates Procession of Renal Interstitial Fibrosis in Chronic Renal Graft Dysfunction via Regulating Tumor Necrosis Factor Alpha (tnf-α) Induced Endmt**
Z. Gui, Z. Wang, Z. Han, J. Tao, X. Ju, R. Tan, M. Gu, *The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

7:40 pm **Single-Cell RNA-seq Identifies Intra-Graft Population Heterogeneity in Acute Heart Allograft Rejection in the Mouse**
C. Wu[1], Y. Tang[1], X. Shi[1], X. He[1], X. Li[2], *[1]The First Affiliated Hospital,Sun Yat-sen University, Guangzhou, China, [2]Immunobiology & Transplant Sciences Houston Methodist Hospital, Houston, TX*

7:50 pm **Extracellular Matrix Injury of Kidney Allografts in Antibody-mediated Rejection**

S. Clotet Freixas[1], C. McEvoy[1], I. Batruch[2], C. Pastrello[3], M. Kotlyar[3], J. Van[1], M. Arambewela[1], A. Boshart[1], S. Farkona[1], Y. Niu[3], Y. Li[1], O. Famure[1], A. Bozovic[4], V. Kulasingam[4], P. Chen[1], J. S. Kim[1], E. Chan[5], S. Moshkelgosha[1], S. A. Rahman[6], J. Das[6], T. Martinu[1], S. Juvet[1], I. Jurisica[3], A. Chruscinski[1], R. John[1], A. Konvalinka[1], *[1]Toronto General Hospital Research Institute, University Health Network, Toronto, ON, Canada, [2]Department of Laboratory Medicine and Pathobiology, Lunenfeld-Tanenbaum Research Institute, Mount Sinai Hospital, Toronto, ON, Canada, [3]Krembil Research Institute, University Health Network, Toronto, ON, Canada, [4]Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, ON, Canada, [5]Department of Medicine, Division of Nephrology, University Health Network, Toronto, ON, Canada, [6]Center for Systems Immunology, University of Pittsburgh School of Medicine, Pittsburgh, PA*

8:00 pm **Laminin Alpha 4 and Alpha5 Differentially Regulate Lymph Node Tolerogenic Structure**

L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[1], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MD*

8:10 pm **Short-term Therapy with Anti-icam-1 Monoclonal Antibody Induced Long-term Liver Allograft Survival in Non-human Primates**

S. Hong[1], D. Han[2], S. Lee[2], J. Kim[3], E. Hwang[3], H. Kim[4], J. Lee[5], K. Hong[1], E. Han[1], J. Cho[1], J. Lee[1], Y. Choi[1], K. Lee[1], N. Yi[1], J. Yang[1], K. Suh[1], *[1]Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of, [2]Biomedical Research Institute, Seoul National University College of Medicine, Seoul, Korea, Republic of, [3]Microbiology and Immunology, Seoul National University College of Medicine, Seoul, Korea, Republic of, [4]Pathology, Seoul National University College of Medicine, Seoul, Korea, Republic of, [5]Medicine, Seoul National University College of Medicine, Seoul, Korea, Republic of*

Live Video Question and Answer

Poster Video Chat

ID
7:30 pm - 8:30 pm

Infectious Disease 1

Moderators: Stephanie Pouch, MD, MS, FAST, Emory University School of Medicine, Associate Professor of Medicine, Atlanta, GA, USA, Ann Woolley, MD, MPH, Brigham and Women's Hospital, Associate Clinical Director of Transplant Infectious Diseases, Boston, MA, USA

7:30 pm **T-Cell Exhaustion in EBV DNAemic Solid Organ Transplant Recipients**

S. Kothari, T. Ku, D. Kumar, A. Humar, V. H. Ferreira, *Multi-Organ Transplant Program, University Health Network, Toronto, ON, Canada*

7:40 pm **Development of De Novo Antibody in Renal Transplant Recipients with BK Viremia Managed with Immunosuppression Reduction**

R. Hod Dvorai[1], R. Lee[2], P. Muluhngwi[2], M. Raijmakers[3], A. Shetty[2], A. Tambur[2], M. Ison[2], *[1]SUNY Upstate Medical University, Syracuse, NY, [2]Northwestern University, Chicago, IL, [3]University of Santiago, Santiago, Chile*

7:50 pm **De Novo Hepatitis B Infection Following Liver Transplant with Hepatitis B Core Antibody Positive Graft**
L. J. Myhre[1], K. D. Watt[2], B. A. Aqel[3], *[1]Pharmacy, Mayo Clinic, Rochester, MN, [2]Gastroenterology/Hepatology, Mayo Clinic, Rochester, MN, [3]Gastroenterology/Hepatology, Mayo Clinic, Phoenix, AZ*

8:00 pm **Live Video Question and Answer**

Poster Video Chat

Kidney
7:30 pm - 8:30 pm

Kidney Alloimmune Responses
Moderators: Samy Riad, MD, MS, University of Minnesota, Assistant Professor of Medicine, Eden Prairie, MN, USA, Kim Rice, Dallas, TX, USA

7:30 pm **Digital Spatial Mrna Profiling Reveals Distinct Endothelial Transcripts in Dsa+ and Dsa- Endarteritis in Kidney Allografts**
K. Tomaszewski[1], M. Araujo Medina[1], A. Bruce[1], P. Divakar[2], R. Smith[1], T. Kawai[3], R. Colvin[1], I. Rosales[1], *[1]Department of Pathology, Massachusetts General Hospital, Boston, MA, [2]NanoString Technologies, Inc., Seattle, WA, [3]Department of Surgery, Massachusetts General Hospital, Boston, MA*

7:40 pm **Endothelial-to-Myofibroblast Transition (en-mt) and Low Expression of Capillary Vegf Enhance the Development of Interstitial Fibrosis and Glomerulosclerosis Induced by Microvascular Destruction in Antibody-Mediated Rejection (abmr) Patients**
B. Ozdemir[1], E. Akcay[1], A. Ok Atilgan[1], M. Haberal[2], *[1]Department of Pathology, Baskent University, Ankara, Turkey, [2]Division of Transplantation, Department of General Surgery, Baskent University, Ankara, Turkey*

7:50 pm **A Comparison of Plasmapheresis Methods in the Treatment of Late Antibody Mediated Rejection**
Y. Caliskan[1], H. Yazici[2], A. B. Dirim[2], E. Aksoy[2], S. Safak[2], N. Garayeva[2], S. Mirioglu[2], O. Yegit[2], O. A. Oto[2], Y. Ozluk[3], S. Besisik[4], A. Turkmen[2], K. Lentine[1], *[1]Saint Louis University, Saint Louis, MO, [2]Division of Nephrology, Istanbul University, Istanbul, Turkey, [3]Department of Pathology, Istanbul University, Istanbul, Turkey, [4]Division of Hematology, Istanbul University, Istanbul, Turkey*

8:00 pm **Investigating the HLA Alloimmune Background of the Histological Changes Suggestive of Antibody-mediated Injury in the Absence of Donor-specific Anti-HLA Antibodies**
A. Senev, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

Live Video Question and Answer

Poster Video Chat

All Organs
7:30 pm - 8:30 pm

Organ Inclusive
Moderators: Claus Niemann, MD, UCSF, San Francisco, CA, USA, Raj Patel, Northwestern University, Phoenix, AZ, USA

7:30 pm **Impact of Machine Perfusion of the Heart on Abdominal Organ Procurement from Donation After Cardiac Death Donors**
C. Feizpour, C. Hwang, A. Shubin, J. Shah, L. DeGregoria, S. Hanish, P. Vagefi, M. MacConmara, *Department of Surgery, Division of Surgical Transplantation, University of Texas Southwestern Medical Center, Dallas, TX*

7:40 pm **Risk Classification Models for Kidney Graft Failure**
M. G. Naik[1], K. Budde[1], D. Telmo Neves[2], *[1]Medical Department, Division of Nephrology and Internal Intensive Care Medicine, Charité, Berlin, Germany, [2]Intelligent Analytics for Massive Data, German Research Center for Artificial Intelligence, Berlin, Germany*

7:50 pm **Associations of Mammalian Target of Rapamycin Inhibitors with Post-Transplant Malignancies and All-Cause Mortality: Cause-Specific Competing Risks and Composite Outcomes Analyses**
A. H. Santos[1], E. Bueno[1], M. A. Leghrouz[1], W. Xuerong[2], *[1]University of Florida, Gainesville, FL, [2]University of Rhode Island, Kingston, RI*

8:00 pm **Feasibility of Normothermic Ex Vivo Kidney Perfusion for Human Kidney Transplantation: First North American Results**
L. I. Mazilescu[1], P. Urbanellis[1], J. S. Kim[1], A. Konvalinka[1], T. W. Reichman[1], L. A. Robinson[2], A. Ghanekar[1], M. Selzner[1], *[1]Ajmera Transplant Program, Toronto General Hospital, Toronto, ON, Canada, [2]Department of Nephrology, The Hospital for Sick Children, Toronto, ON, Canada*

8:10 pm **Change in Deceased Donor Demographics with Drug Intoxication Deaths: 2010 - 2019**
D. Musgrove, D. Zaun, A. Israni, J. Snyder, *SRTR, Minneapolis, MN*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

Admin
7:30 pm - 8:30 pm

Quality Assurance Process Improvement & Regulatory Issues

Moderators: Angelina Korsun, RN MSN MPA, University of Iowa Hospital and Clinics, Iowa City, IA, USA, Andrea Tietjen, MBA, Saint Barnabas Medical Center, AVP Transplant Administration, Finance and Quality, Livingston, NJ, USA

7:30 pm **Results of the APP Practice Survey: Do APPs Practice at the Top of Their Scope of Practice?**
H. Domingo[1], D. Krieger[2], B. Muth[3], A. Frank[4], A. Borth[5], H. McDade[5], K. Paolini[6], A. Mayfield[5], M. Siegfired[7], J. Yoo[8], H. Hoy[9], N. McCormick[10], *[1]Northwestern University, Chicago, IL, [2]University of California-San Francisco, San Francisco, CA, [3]University of Wisconsin, Madison, WI, [4]Medstar Georgetown University, Annandale, VA, [5]University of Maryland, Baltimore, MD, [6]Erie County Medical Center, Grand Island, NY, [7]Swedish Organ Transplant, Seattle, WA, [8]Rush University, Chicago, IL, [9]University of Alabama - Huntsville, Huntsville, AL, [10]University of Colorado-Denver, Denver, CO*

7:40 pm **Covid-19 Incidence Was Initially Associated with Posttransplant Kidney Graft Failure**
A. Wey[1], J. Miller[1], D. Musgrove[1], N. Salkowski[1], M. Tabaka[1], R. Hirose[2], A. Massie[3], D. Segev[3], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Univ of San Francisco, San Francisco, CA, [3]Johns Hopkins, Baltimore, MD*

7:50 pm **Centre Variation in Emergency Hospital Readmissions Following Renal Transplantation in England**
J. Peracha[1], D. Pitcher[1], R. Steenkamp[1], J. Medcalf[2], G. Lipkin[3], D. Nitsch[4], W. McKane[5], *[1]UK Renal Registry, Bristol, United Kingdom, [2]John Walls Renal Unit, Leicester General Hospital, Leicester, United Kingdom, [3]University Hospitals Birmingham, Birmingham, United Kingdom, [4]London School of Hygiene and Trpoical Medicine, London, United Kingdom, [5]Sheffield Kidney Institute, Northern General Hospital, Sheffield, United Kingdom*

8:00 pm **Results of the Transplant Advance Practice Provider Survey: Opportunities for APPs to Contribute to Academic Pursuits**
B. Muth[1], D. Krieger[2], N. McCormick[3], M. Siegfired[4], H. Domingo[5], J. Yoo[6], A. Frank[7], K. Paolini[8], A. Mayfield[9], H. McDade[9], A. Borth[9], H. Hoy[10], *[1]University of Wisconsin, Madison, WI, [2]UCSF, San Francisco, CA, [3]University of Colorado, Denver, CO, [4]Swedish Organ Transplant, Seattle, WA, [5]Northwestern, Chicago, IL, [6]Rush, Chicago, IL, [7]Medstar Georgetown University, Annandale, VA, [8]Erie County Medical Center, Grand Island, NY, [9]University of Maryland, Baltimore, MD, [10]University of Alabama - Huntsville, Huntsville, AL*

8:10 pm **A Comparison of Pediatric Intestine Transplant Between the Current Era (2015-2019) and the Peak Period (2002-2006)**
S. Horslen[1], T. Weaver[2], M. Skeans[2], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN*

8:20 pm **Live Video Question and Answer**

AMERICAN TRANSPLANT CONGRESS
Day-at-a-Glance, Tuesday, June 8, 2021

All Live Broadcast Programs are in Eastern Time

8:45 am – 9:00 am	**Welcome**
9:00 am – 10:00 am	**IMPACT Sessions**
10:00 am – 10:30 am	**Break**
10:30 am – 10:50 am	**Innovations in Transplantation**
10:50 am – 11:50 am	**Plenary Oral Abstract 4**
11:50 am – 12:00 pm	**ATC's People's Choice Award**
12:00 pm – 12:30 pm	**Sponsor Networking**
12:30 pm – 1:00 pm	**State-of-the-Art**
1:00 pm – 1:30 pm	**Break**
1:30 pm – 2:30 pm	**Satellite Symposia**
2:30 pm – 3:00 pm	**Break**
3:00 pm – 4:00 pm	**IMPACT Sessions**
4:00 pm – 4:30 pm	**Sponsor Networking**
4:30 pm – 5:30 pm	**Rapid Fire Oral Abstract**
4:30 pm – 5:30 pm	**Year in Review**
6:00 pm – 7:00 pm	**Rapid Fire Oral Abstract**
7:00 pm – 7:30 pm	**Break**
7:30 pm – 8:30 pm	**Sponsor Networking**
7:30 pm – 8:30 pm	**Poster Video Chat**
8:45 pm – 9:30 pm	**Expert VIP Meet Up**

Welcome
8:45 am – 9:00 am

IMPACT Sessions
Kidney
9:00 am - 10:00 am

What's New in the KDIGO Clinical Practice Guideline on the Evaluation and Management of Candidates for Kidney Transplantation?
Moderators: Greg Knoll, MD, The Ottawa Hospital, Head, Division of Nephrology, Ottawa, ON, Canada, Steve Chadban, MD, Royal Prince Alfred Hospital, Professor, Sydney, Australia

9:00 am **Perioperative Challenges in Managing Patients with Obesity, Frailty and Patients Requiring Perioperative Anticoagulation**
David Axelrod, MD, MBA, University of Iowa, Professor of Surgery, Iowa City, IA, USA

9:10 am **Patients with Prior Advanced Stage Cancer- What Should be Considered?**
Germaine Wong, MBBS PhD FRACP, University of Sydney, Professor, Sydney, Australia

9:20 am **Unique Considerations for Screening and Prevention of Infectious Diseases in Kidney Transplant Candidates**
Deepali Kumar, MD, University Health Network, Toronto, ON, Canada

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Kidney
9:00 am - 10:00 am

To Stent or Not to Stent - That is the Ureteral Question
Moderators: Vikas Dharnidharka, MD, MPH, Washington University, Professor and Vice-Chair, Pediatrics, St. Louis, MO, USA, Hans Gritsch, MD, UCLA, Surgical Director of Kidney Transplantation, Los Angeles, CA, USA

9:00 am **To Stent or Not to Stent - That is the Ureteral Question - Setting the Stage**
Dan Brennan, MD, FACP, Johns Hopkins Medical Institute, Professor of Medicine, Baltimore, MD, USA

9:10 am **Pro: To Stent or Not to Stent - That is the Ureteral Question**
Hans Gritsch, MD, UCLA, Surgical Director of Kidney Transplant, Los Angeles, CA, USA

9:20 am **Con: To Stent or Not to Stent - That is the Ureteral Question**
Vikas Dharnidharka, MD, MPH, Washington University, Professor and Vice-Chair, Pediatrics, St. Louis, MO, USA

9:30 am **Live Video Rebuttal, Question and Answer**

IMPACT Sessions
Liver
9:00 am - 10:00 am

Weighing in on Bariatric Surgery and Liver Transplantation
Moderators: Elizabeth Carey, MD, Mayo Clinic Scottsdale, Phoenix, AZ, USA, Andrew Posselt, MD, UCSF, Professor of Surgery, San Francisco, CA, USA

9:00 am **Facing the Obesity Challenge in the Liver Transplant Candidate**
Elizabeth Carey, MD, Mayo Clinic, Transplant Hepatologist, Phoenix, AZ, USA

9:10 am **Pro: Bariatric Surgery Cures Obesity and Improves Outcomes after Transplant**
Caroline Jadlowiec, MD, Mayo Clinic Arizona, Dr., Phoenix, AZ, USA

9:20 am **Con: Bariatric Surgery is Not the Answer**
Sumeet Asrani, MD, Liver Consultants of Texas, Dallas, TX, USA

9:30 am **Live Video Rebuttal, Question and Answer**

IMPACT Sessions

VCA
9:00 am - 10:00 am

VCA - Is there a way Forward to Standard of Care?

Moderators: William Kitchens, MD, PhD, Emory University School of Medicine, Assistant Professor of Surgery, Atlanta, GA, USA, Darla Granger, MD, MBA, Ascension St John Hospital, Section Chief, Transplant Surgery, Detroit, MI, USA

9:00 am **Insurance Coverage for VCA**
Jon Friedman, MD, FAST, Optum Health Medical Benefit Management, Chief Medical Officer, Manhattan Beach, CA, USA

9:10 am **Outcomes Analysis in VCA**
Hatem Amer, MD, Mayo Clinic, Associate Professor of Medicine, Rochester, MN, USA

9:20 am **Ethical Considerations in VCA**
Jim Rodrigue, PhD, Department of Surgery, Beth Israel Deaconess Medical Center, Professor & Vice Chair (Surgery), Boston, MA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Pediatric
9:00 am - 10:00 am

Vaccinating the Unvaccinated Prior to Transplant: Challenges and Opportunities

Moderators: Asha Moudgil, MD, Children's National Med. Ctr., Director, Pediatric Transplant, Washington, DC, USA

9:00 am **What are the Risks and Benefits of Vaccination in Transplant Candidates and Recipients**
Marian Michaels, MD MPH, Childrens Hosp of Pittsburgh, Pittsburgh, PA, USA

9:10 am **The Epidemiology of Non-vaccination in 2021**
Priya Verghese, MD, MPH, Ann & Robert H. Lurie Children's Hospital of Chicago, Professor & Division Head, Chicago, IL, USA

9:20 am **To Transplant or Not to Transplant if Families Do Not Comply**
Paul Grimm, MD, Stanford University, Prof. of Pediatrics, Stanford, CA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Basic
9:00 am - 10:00 am

Integrated Molecular Approach to Chronic Allograft Injury

Moderators: Enver Akalin, M.D., Albert Einstein College of Medicine, Montefiore Medical Ctr, Professor of Medicine and Surgery, Bronx, NY, USA

9:00 am **Small RNA Sequencing of Human Kidney Allografts with or without Tubulointerstitial Fibrosis**
Manikkam Suthanthiran, MD, Weill Cornell Med Ctr., New York, NY, USA

9:10 am **Molecular Pathways and Chronic Kidney Disease**
Katalin Susztak, University of Pennsylvania, Philadelphia, PA, USA

9:20 am **Effect of Epigenetic Modifications on Molecular Pathways Leading to Chronic Allograft Injury and Dysfunction: Application of Integrated Approaches**
Valeria Mas, PhD, FAST, University of Maryland, Professor of Surgery, Baltimore, MD, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

HLA
9:00 am - 10:00 am

ABO Incompatible Transplantation from Genetics to Transplantation

Moderators: Kristina Davis, MD, University of Michigan, Ann Arbor, MI, USA; Jayme Locke, MD, MPH, University of Alabama at Birmingham, Birmingham, AL, USA

9:00 am **New Tools for ABO Characterization**
Anne Halpin, MSc CHS, University Alberta, Ms, Edmonton, AB, Canada

9:10 am **Clinical Implementation of ABO Incompatible Transplantation and Immunosuppression**
Andrew Bentall, MBChB, Mayo Clinic, Transplant Nephrologist, Rochester, MN, USA

9:20 am **ABOi Transplantation and Unmet Needs**
Lori West, MD, DPhil, FRCPC, University of Alberta, Professor, Edmonton, AB, Canada

9:30 am **ABO Subtypes & Clinical Implementation**
Simon Ball, MD, University Hospital Birmingham, Dr, Birmingham, United Kingdom

9:40 am **Live Video Question and Answer**

IMPACT Sessions

ID
9:00 am - 10:00 am

Travel, Food, and Leisure

Moderators: Yoram Puius, MD, PhD, Montefiore Medical Center, Bronx, NY, USA, Nancy Law, D.O, M.P.H, Universtiy of California, San Diego, San Diego, CA, USA

9:00 am **Travel - Can I Travel There?**
Camille Kotton, MD, Infectious Diseases Division, Clinical Director, Transplant Infectious DIseases, Newton, MA, USA

9:10 am **Food - Can I Eat This?**
Maricar Malinis, MD, Yale School of Medicine, Associate Professor of Medicine and Surgery (Transplant), New Haven, CT, USA

9:20 am **Leisure - Can I do That?**
Steven Pergam, MD, Fred Hutchinson Cancer Research Center, Associate Professor, Seattle, WA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Other: Heart
9:00 am - 10:00 am

Uh Oh, My New Home is a Lemon: Cardiovascular Disease after Solid Organ Transplant

Moderators: Darshana Dadhania, M.D., Weill Cornell Medicine - NYPH, Associate Professor of Medicine, New York, NY, USA, Lisa Van Wagner, MD MSc FAST FAHA, Northwestern University, Assistant Professor, Chicago, IL, USA

9:00 am **How Much Does the Plumber Want for Clogged Pipes? Coronary Artery Disease after Transplant**
Jagbir Gill, MD, Univ of British Columbia

9:10 am **Put on the Sweater, the Heat Circulation is Broken. Heart Failure After**
Maryse Palardy, MD, University of Michigan, Clinical Assistant Professor, Ann Arbor, MI, USA

9:20 am **Has the Ground Shifted? These Doors Won't Close: Valvular Disease after Transplant**
Jose Tallaj, MD, Univ of Alabama at Birmingham (UAB), Professor of Medicine, Birmingham, AL, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Admin
9:00 am - 10:00 am

Bridge Over Troubled Water: OPTN Policy Development, Directions, and Innovations

Moderators: David Klassen, MD, United Network for Organ Sharing, Chief Medical Officer, Richmond, VA, USA, Lloyd Ratner, MD, Columbia, Professor of Surgery; Director - Renal & Pancreatic Transplantation, New York, NY, USA

9:00 am **OPTN Policy Development: How You Can Shape Policy**
Matthew Cooper, MD, Georgetown, Director, Kidney and Pancreas Transplantation, Washington, DC, USA

9:10 am **Geography and Allocation: a Continuous Evolution**
Darren Stewart, MS, United Network for Organ Sharing, Principal Research Scientist, Richmond, VA, USA

9:20 am **Expedited Kidney Placement Project Results: It's Not What you Think**
Samantha Noreen, PhD, UNOS, Research Scientist, Richmond, VA, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Women's Health
9:00 am - 10:00 am

Surgical Approaches to Address Sex-based Disparities in Access to Appropriately Sized Organs

Moderators: Matthew Hartwig, MD, Duke University, Durham, NC, USA, Waldo Concepcion, MD Professor of Surgery, Mohammed Bin Rashid University of Medicine, Director of Transplantation Services Al Jalila Children's Specialty Hospital, Dubai, United Arab Emirates

9:00 am **Cutting it Down to Size - Lung Resizing**
Jasleen Kukreja, MD, UCSF Medical Center, MD, San Francisco, CA, USA

9:10 am **Two for the Price of One - Split Livers**
Jorge Reyes, Professor of Surgery, University of Washington, Chief Transplant Surgery University of Washington, Director of Transplantation Seattle Children's Ho, Seattle, WA, USA

9:20 am **Small for Small - Broader use of Pediatric Donor Organs**
Richard Perez, MD, University California Davis Medical Center, Sacramento, CA, USA

9:30 am **Live Video Question and Answer**

10:00 am **Break**

Innovations in Transplantation
10:30 am - 10:50 am

Innovations in Transplantation

Moderators: Maryl Johnson, MD, Univ of Wisconsin-Madison, Madison, WI, USA, Linda Cendales, MD, Duke University Medical Center, Durham, NC, USA

10:30 am **Human Tracheal Transplantation**
Eric Genden, MD, MAH, The Icahn School of Medicine at Mount Sinai, New York, NY, USA

10:40 am **Live Video Question and Answer**

Plenary Session 4

10:50 am - 11:50 am

Moderators: Linda Cendales, MD, Duke University Medical Center, Durham, NC, USA, Maryl Johnson, MD, Univ of Wisconsin-Madison, Professor of Medicine, Madison, WI, USA

10:50 am **Superior Post-transplant Clinical Outcomes Using Portable Normothermic Perfusion and Assessment with the Organ Care System (ocs) Liver System: 1-year Outcomes of the Ocs Liver Protect Randomized Controlled Trial**

J. Markmann[1], M. Abouljoud[2], M. Ghobrial[3], C. Bhati[4], S. Pelletier[5], J. Magliocca[6], T. Pruett[7], A. Lu[8], M. Rizzari[9], S. Ottmann[10], T. Klair[11], C. Eymard[12], G. Roll[13], G. Reyes[14], S. Black[15], S. Florman[16], S. Mirani[17], C. Marsh[18], G. Schnickel[19], M. Kinkhabwala[20], A. Demetris[21], H. Yeh[22], P. Vagefi[23], M. MacConmara[23], [1]MGH, Boston, MA, USA, [2]Henry Ford, Detroit, MI, USA, [3]Houston Methodist, Houston, TX, USA, [4]Virginia Commonwealth, Richmond, VA, USA, [5]UVA, Charlottesville, VA, USA, [6]Emory, Atlanta, GA, USA, [7]U. Minnesota, Minneapolis, MN, USA, [8]Tampa General, Tampa, FL, USA, [9]Henry Ford, Detriot, MI, USA, [10]Johns Hopkins, Baltimore, MD, USA, [11]University of Texas HSC, San Antonio, TX, USA, [12]University of Tennessee HSC, Memphis, TN, USA, [13]UCSF, San Francisco, CA, USA, [14]U. Washington, Seattle, WA, USA, [15]Ohio State, Columbus, OH, USA, [16]Mt. Sinai, New York, NY, USA, [17]U. Nebraska, Omaha, NE, USA, [18]Scripps Clinic, San Diego, CA, USA, [19]U. San Diego, San Diego, CA, USA, [20]Montefiore, New York, MA, USA, [21]UPMC, Pittsburgh, PA, USA, [22]Massachusetts General Hospital, Boston, MA, USA, [23]UT Southwestern, Dallas, TX, USA

11:00 am **Novel Discovery of Super-antigen That Mobilize Regulatory Cd8 T Cells Inhibits Donor-specific Antibody and Protects Heart Allografts from Antibody-mediated Rejection**

J. Y. Choi[1], H. Nakagawa[2], Z. Solhjou[1], K. Yatim[1], H. Zhang[3], P. Patel[3], M. Tawfeek Mohammed[3], L. Riella[4], H. Kim[2], H. Cantor[2], J. Azzi[1], [1]Brigham and Women's Hospital/Harvard Medical School, Boston, MA, USA, [2]Dana Farber Cancer Institute/ Harvard Medical School, Boston, MA, USA, [3]Brigham and Women's Hospital, Boston, MA, USA, [4]Massachusetts General Hospital/Harvard Medical School, Boston, MA, USA

11:10 am **Extreme Phenotype Sampling and Next Generation Sequencing to Identify Genetic Variants Associated with Tacrolimus Metabolism in African American Kidney Transplant Recipients**

C. R. Dorr[1], B. Guo[2], B. Wu[2], J. Abrahante[2], D. Schladt[3], R. Remmel[2], W. Guan[2], A. Muthusamy[3], G. Onyeaghala[3], N. Pankratz[2], A. Matas[2], R. Mannon[4], W. Oetting[2], P. Jacobson[2], A. K. Israni[3], [1]Hennepin Healthcare Research Institute, Minneapolis, MN, USA, [2]University of Minnesota, Minneapolis, MN, USA, [3]Nephrology, Hennepin Healthcare Research Institute, Minneapolis, MN, USA, [4]University of Nebraska Medical Center, Omaha, NE, USA

11:20 am **Role of Ferroptosis Inhibitors in Mitigating Ischemia-Reperfusion Injury in Marginal Livers Using a Novel Protect Model**

M. D. Nazzal, J. Van Nispen, A. Armstrong, V. Murali, E. Song, M. Voigt, A. Samaddar, E. Madsen, C. Manithody, J. Krebs, D. Blackall, D. Carpenter, C. Varma, J. Teckman, A. Jain, Saint Louis University, Saint Louis, MO, USA

11:30 am **Live Video Question and Answer**

Awards

11:50 am - 12:00 pm

ATC's Peoples Choice Award

Moderators: Maryl Johnson, MD, Univ of Wisconsin-Madison, Madison, WI, USA, Linda Cendales, MD, Duke University Medical Center, Durham, NC, USA

Sponsor Networking

12:00 pm - 12:30 pm

This symposium are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Takeda - CMV Infection Scientific Connection

State-of-the-Art

12:30 pm - 1:00 pm

Paul I. Terasaki State of the Art Lecture; Sponsored by the Paul I. Terasaki Research Fund

12:35 pm **Inclusive Excellence in Biomedical Research: Applying Genomics To Unravel Health Disparities In Organ Transplantation**
Hannah Valantine, MD, Stanford University School of Medicine, Stanford, CA, USA

1:00 pm **Break**

Sponsored Satellite Symposia

1:30 pm - 2:30 pm

These symposia are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Comprehensive Testing, Comprehensive Care: Renal Genetic Testing in Kidney Transplantation

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IMPACT Sessions

Kidney

3:00 pm - 4:00 pm

Recurrent Glomerulonephritis in Transplant and the Role of Ancillary Tools in Diagnosis and Prognosis

Moderators: Fernando Cosio, MD, Mayo Clinic, Moderator, Rochester, MN, USA, Lynn Cornell, MD, Mayo Clinic, Professor of Laboratory Medicine and Pathology, Rochester, MN, USA

3:00 pm **Recurrent AL-amyloidosis in the Transplant**
Andrew Bentall, MD, Mayo Clinic, Transplant Nephrologist, Rochester, MN, USA

3:10 pm **The Role of Genetic Evaluation in the Management of Patients with a Diagnosis of Focal Segmental Glomerulosclerosis**
Mireille EL Ters, MD, Mayo Clinic, MD, Rochester, MN, USA

3:20 pm **Clinical Findings, Pathology, and Outcomes of C3GN After Kidney Transplantation**
Ladan Zand, Mayo Clinic Rochester, Rochester, MN, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Kidney
3:00 pm - 4:00 pm

Should We Abolish Cardiac Screening for Asymptomatic Kidney Transplant Candidates?

Moderators: G V Ramesh Prasad, MBBS PhD FRCPC, St. Michael's Hospital, University of Toronto, Professor of Medicine, Toronto, ON, Canada

3:00 pm **The Burden of Cardiovascular Disease among Potential Kidney Transplant Candidates**
Krista Lentine, MD,PhD, Saint Louis University Medical Center, Professor, Saint Louis, MO, USA

3:10 pm **Pro: The Argument FOR Abolishing Cardiac Screening of Asymptomatic Kidney Transplant Candidates**
Adnan Sharif, MD, University Hospitals Birmingham, Dr, Birmingham, United Kingdom

3:20 pm **Con: The Argument AGAINST Abolishing Cardiac Screening of Asymptomatic Kidney Transplant Candidates**
James Rice, MD, Scripps Center for Organ Transplantation, Medical Dir,, Kidney and Pancreas Transplant, La Jolla, CA, USA

3:30 pm **Live Video Rebuttal, Question and Answer**

IMPACT Sessions

Liver
3:00 pm - 4:00 pm

Rising Stars Surgeon Scientists

Moderators: Roberto Hernandez-Alejandro, MD, University of Rochester Medical Center, Profesor of Surgery, Chief Division of Transplantation, Rochester, NY, USA, John Fung, MD, PhD, University of Chicago, Professor of Surgery, Chicago, IL, USA

3:00 pm **Basic/Translational Research in LTx**
Burcin Ekser, MD, Indiana University - Transplant Section

3:10 pm **Expanding Recipient Pool with Transplant Oncology**
Koji Tomiyama, MD, PhD, University of Rochester Medical Center, Assistant Professor, Rochester, NY, USA

3:20 pm **Translational Research in Liver Transplantation**
Varvara Kirchner, MD, University of Minnesota, Assistant Professor of Surgery, Division of Transplantation, Minneapolis, MN, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Other
3:00 pm - 4:00 pm

Utilizing Genomic and Omics for Discovery and Application in Solid-organ Transplantation

Moderators: Loren Gragert, PhD, Tulane University School of Medicine, Assistant Professor, New Orleans, LA, USA, Ajay Israni, Md, MS, Hennepin Healthcare and Univ of Minnesota, Professor of Medicine, Minneapolis, MN, USA

3:00 pm **Multi-Omic approaches in Transplantation**
Brian Piening, PhD, Earle A. Chiles Research Institute, Providence, Assistant Member, Portland, OR, USA

3:10 pm **The International Genetics & Translational Research in Transplantation Network (iGeneTRAiN)**
Brendan Keating, PhD, University of Pennsylvania, Associate Professor of Transplant Research, Philadelphia, PA, USA

3:20 pm **Leveraging Genome-wide Data from Millions of Patients Linked to Medical Records**
David Crosslin, PhD, University of Washington

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Small Bowel
3:00 pm - 4:00 pm

Surgical Management Before and After Intestine Transplant – Timing is Everything

Moderators: Shunji Nagai, MD, PhD, Henry Ford Hospital, MD, PhD, Detroit, MI, USA, Robert Venick, MD, Mattel Children's Hospital At UCLA, Professor of Pediatrics and Surgery, UCLA, Los Angeles, CA, USA

3:00 pm **Management of Entero-cutaneous Fistulae and the Complex Surgical Abdomen - Before or During Transplant?**
Richard Mangus, MD, MS, FACS, Indiana University, Professor of Surgery, Indianapolis, IN, USA

3:10 pm **Stoma vs no Stoma and Timing of Ostomy take Down**
Kishore Iyer, FACS, MBBS, FRCS, Mount Sinai Hospital, Professor of Surgery & Pediatrics, New York, NY, USA

3:20 pm **As the Graft Gradually Fails, when Should Enterectomy be Performed?**
Tomoaki Kato, MD, MBA, Columbia University - College of Physicians & Surgeons, Professor of Surgery, New York, NY, USA

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Pancreas: Kidney
3:00 pm - 4:00 pm

Pancreas After Kidney Transplantation: Unlocking The Survival Advantage

Moderators: Ty Dunn, MD MS, UPenn, Professor of Surgery, Philadelphia, PA, USA, Matthew Cooper, MD, MedStar Georgetown Transplant Institute, Director, Kidney and Pancreas Transplantation, Washington, DC, USA

3:00 pm **New PAK Data Opens Up Opportunities**
Silke Niederhaus, Maryland

3:10 pm **Getting Facile at PAK**
Jonathan Fridell, MD, Indiana University School of Medicine, Chief, Abdominal Transplant Surgery, Indianapolis, IN, USA

3:20 pm **Navigating All the Options for Uremic Diabetic Patients**
Jon Odorico, Wisconsin

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

Basic
3:00 pm - 4:00 pm

Checkpoints for B cells and Antibody Production

Moderators: Anita Chong, PhD, University of Chicago, Professor, Chicago, IL, USA, Jean Kwun, PhD, Duke University, Assistant Professor, Durham, NC, USA

3:00 pm **Regulation of Plasma Cell Differentiation**
Jeremy Boss, PhD, Emory University, Professor and Chair, Atlanta, GA, USA

3:10 pm **Live Video Question and Answer**

IMPACT Sessions

Translational
3:00 pm - 4:00 pm

Perspectives in Progress in Clinical Transplant Research: What have We Learned, Where are we Going?

Moderators: Sandy Feng, MD PhD, UCSF, Professor of Surgery, San Francisco, CA, USA, Allan Kirk, MD, PhD, Duke University Medical Center, Chair, Surgery, Durham, NC, USA

3:00 pm **Perspective from NIH/CTOT**
Nancy Bridges, MD, NIAID, Chief, Transplantation Branch; Senior Scientific Officer, Rockville, MD, USA

3:10 pm **Perspective from the Immune Tolerance Network**
Gerald Nepom, MD, PhD, Immune Tolerance Network, Director, Seattle, WA, USA

3:20 pm **Canadian Transplant Research Perspective**
Lori West, MD, D.Phil, University of Alberta, Professor, Edmonton, AB, Canada

3:30 pm **Live Video Question and Answer**

IMPACT Sessions

HLA
3:00 pm - 4:00 pm

New Insights and Controversies in HLA Testing: HLA Epitope Matching a Pro and Con Debate

Moderators: Howard Gebel, PhD, Emory University Hospital, Professor of Pathology, Atlanta, GA, USA, Katherine Twombley, MD, Medical University of South Carolina, Professor, Charleston, SC, USA

3:00 pm **New Insights and Controversies in HLA Testing: Pro and Con Debate -Setting the Stage**
Katherine Twombley, MD, Medical University of South Carolina, Professor of Pediatrics, Charleston, SC, USA

3:10 pm **Pro: Why Wait: We Should be Doing Epitope Matching Now**
Peter Nickerson, MD, University of Manitoba, Distinguished Professor, Vice Dean (Research), Winnipeg, MB, Canada

3:20 pm **Con: Stop in the Name of HLA: We are Not Ready for Epitope Matching**
Tom Blydt-Hansen, MDCM, FRCPC, University of British Columbia, Medical Director, Pediatric Transplantation, Vancouver, BC, Canada

3:30 pm **Live Video Rebuttal and Question and Answer**

IMPACT Sessions

Pediatric: Liver
3:00 pm - 4:00 pm

Mandatory Splitting of an Adult Liver Offer: Help a Child – Disadvantage an Adult?

Moderators: Walter Andrews, MD, University of Missouri Kansas City, Professor of Pediatric Surgery, Kansas City, MO, USA, Srinath Chinnakotla, MD, University of Minnesota, Surgical Director, Liver Transplantation, Minneapolis, MN, USA

3:00 pm **Overview: Review of Split Liver Transplantation**
Jaimie Nathan, MD, Cincinnati Children's Hospital Medical Center, Associate Professor of Surgery and Pediatrics, Cincinnati, OH, USA

3:10 pm **PRO: Split Liver Transplantation Can Help Children and Not Disadvantage an Adult Recipient or Transplant Program.**
Dominique Jan, MD, Montefiore-Albert Einstein College of Medicine, Professor of Surgery, New York, NY, USA

3:20 pm **CON: Split Liver Transplantation May Help a Child but can Disadvantage an Adult Recipient and Transplant Program.**
James Pomposelli, University of Colorado, Denver, CO, USA

3:30 pm **Live Video Rebuttal, Question and Answer**

IMPACT Sessions

COVID-19
3:00 pm - 4:00 pm

Late-Breaking: Factors Contributing to Outcomes of Transplant Patients with COVID-19

Moderators: Jeffrey Edelman, MD, University of Washington, VAMC Seattle, Associate Professor of Medicine, Seaqttle, WA, USA, Graeme Forrest, MBBS, Rush University medical Center, Professor of Medicine, Chicago, IL, USA

3:00 pm **HLA and COVID -19 Outcomes in Kidney Recipients**
Yasir Qazi, MD, Keck Medical Center At USC, Director , Kidney and Pancreas Transplant Fellowship and Outreach, Los Angeles, CA, USA

3:10 pm **Challenges to Decision Making in the Setting of COVID 19 Infections**
Elizabeth Thomas, DO, UT Health San Antonio, Associate Professor of Surgery, San Antonio, TX, USA

3:20 pm **Transplant Outcomes of COVID-Positive Candidates**
Ankit Bharat, Northwestern, Chicago, IL, USA

3:30 pm **Live Video Question and Answer**

Sponsor Networking

4:00 pm - 4:30 pm

This symposium are not part of the ATC official educational program and the sessions and content are not endorsed by ATC.

Takeda - CMV Infection Scientific Connection

Rapid Fire Oral Abstracts

Basic
4:30 pm - 5:30 pm

Biomarkers and Cellular Therapies

Moderators: Caroline Lamarche, MD, MSc, FRCPC, Université de Montréal, Assistant Clinical Professor, Montreal, QC, Canada, Anna Morris, PhD, Emory University, Dr., Atlanta, GA, USA

4:30 pm **Lymphotoxin Beta Receptor Regulates Treg Migration and Suppression by Modulating Draining Lymphatic Structure**
V. Saxena[1], W. Piao[1], L. Li[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

4:35 pm **CD47-Mediated Gli1/Notch1 Signaling is a Key Regulator of Mesenchymal Stem Cell Immunomodulation in Liver Inflammatory Injury**
D. Xu, M. Sheng, Y. Lin, Y. Tian, Y. Zhan, C. Li, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, *Surgery, Dumont - UCLA Transplant Center, Los Angeles, CA*

4:40 pm **Double Negative T Cells Mediate Cd39-Dependent Protection in Hepatic Ischemia and Reperfusion Injury**
H. Jin, M. Li, C. Zhang, G. Sun, D. Zhang, *Beijing Key Laboratory of Tolerance Induction and Organ Protection in Transplantation, Beijing Friendship Hospital, Capital Medical University, Beijing, China*

4:45 pm **The Gut Microbiotainduces Local and Systemic Immune Modulation**
V. Saxena, R. Lakhan, J. Iyyathurai, W. Piao, L. Li, T. Zhang, M. W. Shirkey, B. Ma, E. F. Mongodin, J. Bromberg, *U Maryland, Baltimore, MD*

4:50 pm **Single Cell Rna-Sequencing of Urinary Cells and Defining the Immune Landscape of Rejection in Human Kidney Allografts**
T. Muthukumar[1], H. Yang[1], A. Belkadi[2], G. Thareja[2], C. Li[1], C. Snopkowski[1], K. Chen[1], T. Salinas[1], M. Lubetzky[1], J. Lee[1], D. Dadhania[1], K. Suhre[2], M. Suthanthiran[1], *[1]Nephrology, NY Presbyterian- Weill Cornell Medical College, New York, NY, [2]Physiology and Biophysics, Weill Cornell Medicine-Qatar, Doha, Qatar*

4:55 pm **Gm2a: A Novel Regulatory Pathway Controlling Alloimmunity**
K. M. Baecher[1], P. S. Heeger[2], P. Cravedi[2], M. Fribourg[2], M. L. Ford[1], *[1]Department of Surgery, Emory University, Atlanta, GA, [2]Mount Sinai School of Medicine, New York, NY*

5:00 pm **Nanoparticle Mediated Drug Delivery for Lung Transplantation**
P. M. Patel[1], S. Jung[2], C. L. Miller[1], J. M. O[1], T. Costa[1], A. Dehnadi[1], I. Hanekamp[1], X. F. Li[2], L. Jiang[2], H. Ichimura[2], A. Azimzadeh[1], J. C. Madsen[3], R. Abdi[2], *[1]Surgery, Center for Transplantation Sciences, Massachusetts General Hospital/Harvard Medical School, Boston, MA, [2]Medicine, Transplant Research Center, Brigham and Women's Hospital, Boston, MA, [3]Surgery, Center for Transplantation Sciences, Division of Cardiac Surgery, Massachusetts General Hospital/Harvard Medical School, Boston, MA*

5:05 pm **Targeting Calcineurin/nfatc2 Signaling to Restore Pancreatic Beta-cell Function in Islet Transplantation**
C. Darden[1], J. Mattke[1], S. Vasu[1], K. Kumano[1], Y. Liu[1], B. Naziruddin[2], M. C. Lawrence[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Baylor University Medical Ctr, Allen, TX*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

All Organs
4:30 pm - 5:30 pm

Disparities in Access and Machine Learning Outcomes in Solid Organ Transplantation

Moderator: Koren Axelrod, CPHQ, CareDx, Sr Business Analyst, Brisbane, CA, USA

4:30 pm **A Fresh Look at Urbanicity and Its Impact on Additions to the Kidney and Liver Transplant Wait Lists**
W. R. Johnson, S. A. Rega, I. D. Feurer, S. J. Karp, *General Surgery, Vanderbilt University Medical Center, Nashville, TN*

4:35 pm **Racial and Sexual Disparities in Solid Organ Transplant Outcomes Since Implementation of the Affordable Care Act Insurance Expansion Across Some States**
H. Mohamed[1], C. Conceicao[2], A. Kumar[1], J. Buggs[3], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL*

4:40 pm **The Impact of the Covid-19 Pandemic on Measures of Transplant Activity is Higher in Lower-Income Countries: A Multinational Survey Study**
S. Sandal[1], B. Boyarsky[2], P. Chiang[2], A. Massie[2], D. Segev[2], M. Cantarovich[1], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

4:45 pm **Black Patients with Cirrhosis Have Longer Length of Stay and Higher Mortality When Hospitalized**
A. Thomas[1], D. Simpson[2], D. P. Ladner[2], R. Berkowitz[2], *[1]ACS Clinical Scholar, Chicago, IL, [2]Transplant Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL*

4:50 pm **Prediction of Renal Allograft Tolerance by Machine Learning**
Q. Fu[1], K. Deng[2], H. Yang[1], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA*

4:55 pm **The Role of Pre-transplant Rectal Screening for Azole-resistant Candida Species in Liver Transplant Candidates**
K. K. Patel[1], M. M. Azar[2], A. Koff[3], K. Belfield[4], D. R. Peaper[5], J. Topal[2], M. Malinis[2], *[1]Yale School of Medicine, New Haven, CT, [2]Section of Infectious Diseases, Yale School of Medicine, New Haven, CT, [3]Section of Infectious Diseases, UC Davis, Sacramento, CA, [4]Department of Pharmacy, Yale New Haven Hospital, New Haven, CT, [5]Department of Laboratory Medicine, Yale School of Medicine, New Haven, CT*

5:00 pm **A Machine Learning-Based Predictive Model for Outcome of Covid-19 in Kidney Transplant Recipients**
I. Revuelta[1], F. Santos-Arteaga[2], D. Di Caprio[3], E. Montagud-Marrahi[1], F. Cofan[1], J. Torregrosa[1], M. Bodro[4], A. Moreno[4], P. Ventura-Aguiar[1], D. Cucchiari[1], N. Esforzado[1], G. Piñeiro[1], J. Ugalde-Altamirano[1], J. Campistol[1], A. Alcaraz[5], B. Bayès[1], E. Poch[1], F. Oppenheimer[1], F. Diekmann[1], *[1]Department of Nephrology and Kidney Transplant, Hospital Clinic, Barcelona, Spain, [2]Faculty of Economics and Management, Free University of Bolzano, Bolzano, Italy, [3]Department of Economics and Management, University of Trento, Trento, Italy, [4]Department of Infectious Diseases, Hospital Clinic, Barcelona, Spain, [5]Department of Urology, Hospital Clinic, Barcelona, Spain*

5:05 pm **Improving Policy-constrained Kidney Exchange via Pre-screening**
D. C. McElfresh[1], M. Curry[2], S. Booker[3], M. Stuart[3], D. Stewart[3], R. Leishman[3], T. Sandholm[4], J. Dickerson[2], *[1]Applied Mathematics, University of Maryland, College Park, MD, [2]University of Maryland, College Park, MD, [3]United Network for Organ Sharing, Richmond, VA, [4]Carnegie Mellon University, Pittsburgh, PA*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
4:30 pm - 5:30 pm

Kidney Antibody Mediated Rejection
Moderator: Sundaram Hariharan, MD, Starzl Transplant Institute, Univ of Pittsburgh Med Center, Professor of Medicine and Surgery, Pittsburgh, PA, USA

4:30 pm **DSA Causes Mild Molecular ABMR-like Changes in Many Biopsies Not Diagnosed as Rejection**
P. F. Halloran[1], K. S. Madill-Thomsen[1], &. the INTERCOMEX Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

4:35 pm **Beyond Microarrays: Insights from Ncounter Transcript Analysis of Routine Archival Kidney Allograft Biopsies**
I. Rosales, K. Tomaszewski, A. Milagros, T. Kawai, R. Smith, R. Colvin, *Massachusetts General Hospital, Boston, MA*

4:40 pm **Transplant Glomerulopathy in the Absence of Donor-specific HLA Antibodies: Risk Factors, Histopathological Features and Graft Outcome**
A. Senev, E. Van Loon, M. Emonds, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

4:45 pm **High Donor-Derived Cell-Free DNA Levels Predict Development of De Novo HLA Donor-Specific Antibodies After Kidney Transplantation - Data from the ADMIRAL Study**
G. Gupta[1], T. Alhamad[2], V. Bowers[3], I. Moinuddin[1], S. Ghosh[4], J. Zeng[4], E. Stites[5], A. Pai[6], J. S. Bromberg[7], S. Anand[8], *[1]Virginia Commonwealth University, Richmond, VA, [2]Washington University in St. Louis, St. Louis, MO, [3]Tampa General Hospital, Tampa, FL, [4]CareDx, Brisbane, CA, [5]University of Colorado, Aurora, CO, [6]University of Texas McGovern Medical School, Houston, TX, [7]University of Maryland School of Medicine, Baltimore, MD, [8]Intermountain Medical Center, Murray, UT*

4:50 pm **Novel Mixed Lymphocyte Reaction Monitoring System That Predicts Chronic Antibody- Mediated Rejection in Kidney Transplant Recipients**
N. Iwahara[1], K. Hotta[1], T. Tanabe[1], D. Iwami[2], Y. Takada[3], H. Higuchi[1], H. Sasaki[3], H. Harada[3], N. Shinohara[1], *[1]Hokkaido Univercity, Sapporo, Japan, [2]Jichi Medical University, Shimotsuke, Japan, [3]Sapporo City General Hospital, Sapporo, Japan*

4:55 pm **The Trifecta Study: Calibrating Circulating Donor-Derived Cell-Free DNA at the Time of Indication Biopsies Against the Molecular Phenotype of the Biopsy Reveals a Prominent Association with NK Cell Genes**
P. Halloran[1], Z. Demko[2], A. Prewett[2], J. Reeve[1], P. Billings[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Natera Inc., San Carlos, CA*

5:00 pm **Prospective Intensive Monitoring for Anamnestic DSA Responses Allows Near Elimination of Early Clinical AMR**
M. McGowan[1], A. Bickenbach[1], A. R. Shields[2], R. R. Alloway[1], P. Brailey[1], E. Portwood[1], C. Alquist[1], A. Christianson[1], B. Abu Jawdeh[1], M. Cuffy[1], J. Kremer[2], S. Bumb[1], A. Govil[1], M. Anand[1], T. Kaur[1], E. S. Woodle[1], *[1]U Cincinnati, Cincinnati, OH, [2]Christ Hospital, Cincinnati, OH*

5:05 pm **CD56^{dim}CD16^{bright} NK Cells from Kidney Transplant Recipients with Antibody-mediated Rejection Display Increased Proliferation, Type-1 Activation and Cytotoxic Profile**
E. Bailly[1], C. Macedo[1], K. Louis[1], B. Ramaswami[1], M. Lucas[1], C. Bentlejewski[1], P. Randhawa[1], A. Zeevi[1], C. Lefaucheur[2], D. Metes[1], *[1]Department of Surgery, Thomas E. Starzl Transplantation Institute, Pittsburgh, PA, [2]INSERM UMR-S976. Endothelium, Inflammation & Alloreactivity, Université de Paris, Paris, France*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
4:30 pm - 5:30 pm

Kidney Psychosocial

Moderators: Wendy Balliet, Ph.D., Medical University of South Carolina, Charleston, SC, USA, Zeeshan Butt, PhD, Northwestern University Feinberg School of Medicine, Associate Professor of Medical Social Sciences, Surgery, and Psychiatry, Chicago, IL, USA

4:30 pm **The Relationship Between Health Literacy and Adverse Outcomes After Kidney Transplantation**
E. Lorenz, T. Petterson, C. Schinstock, W. Sanchez, K. Yost, *Mayo Clinic, Rochester, MN*

4:35 pm **Evolving Trends in Risk Profiles and Outcomes in Older Adults Undergoing Kidney Re-Transplantation**
S. Sandal[1], J. Ahn[2], M. Cantarovich[1], N. Chu[2], D. Segev[2], M. McAdams DeMarco[2], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

4:40 pm **Journey to Transplant: A Pilot Feasibility Trial of a Virtual Counseling Intervention for Patients and Their Social Support Networks to Improve Access to Kidney Transplant**
A. Hart[1], R. Edpuganti[2], H. D'Cunha[2], S. Kurschner[2], W. T. McKinney[1], A. Matas[1], R. Patzer[1], S. Chu[1], M. Bruin[1], M. Partin[1], *[1]Hennepin Healthcare, University of Minnesota, Minneaplis, MN, [2]Hennepin Healthcare Research Institute, Minneaplis, MN*

4:45 pm **Understanding Transplant Decision Making Concerns for African, Caribbean and Black Canadian Patients with End-Stage Kidney Disease**
N. Singh[1], A. Wasim[1], W. Hajjar[1], K. Mohan[1], N. El-Dassouki[1], H. Habbal[1], L. Angarso[1], A. Dychiao[1], S. Macanovic[1], A. D. Waterman[2], I. Mucsi[1], *[1]University Health Network, Toronto, ON, Canada, [2]David Geffen School of Medicine, UCLA, Los Angeles, CA*

4:50 pm **Depressive Symptoms and Listing for Kidney Transplantation**
X. Chen, N. Chu, P. Sharma Basyal, W. Vihokrut, D. Crews, D. Brennan, S. Andrews, T. Vannorsdall, D. Segev, M. McAdams DeMarco, *Johns Hopkins University School of Medicine, Baltimore, MD*

4:55 pm **Multistep Algorithm to Achieve Weight Loss Goal in Advanced Stage Obesity Kidney Transplant Candidates: A Single Center Preliminary Report**
A. Shah, J. Galpern, L. Castaldo, P. Touhy, M. Thomas, A. Aaron, M. Fruscione, L. Dageforde, N. Elias, *Transplant Surgery, Massachusetts General Hospital, Boston, MA*

5:00 pm **Challenges and Stressors of COVID-19 Kidney and Transplant Patients: A Mixed Methods Study**
Y. A. Iraheta[1], A. L. Murillo[2], E. H. Wood[1], S. M. Advani[3], R. Pines[4], A. D. Waterman[1], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Terasaki Institute, Los Angeles, CA, [3]National Human Genome Research Institute (NIH), Bethesda, MD, [4]Santa Barbara Cottage Hospital, Santa Barbara, CA*

5:05 pm **Early Transplant Education Increases CKD 3-5 Patients' Knowledge and Informed Decision-Making About Chronic Kidney Disease and Living Donor Kidney Transplant**
A. D. Waterman[1], S. H. Kawakita[2], B. Dub[3], Y. A. Iraheta[1], A. L. Murillo[2], T. Menser[4], B. Mittman[3], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Terasaki Institute, Los Angeles, CA, [3]Research and Evaluation, Kaiser Permanente, Pasadena, CA, [4]The Houston Methodist Research Institute, Houston, CA*

5:10 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Liver
4:30 pm - 5:30 pm

Post Liver Transplant Management and Complications

Moderator: Sander Florman, MD, Mount Sinai Medical Center, Director, Recanati/Miller Transplantation Institute, New York, NY, USA

4:30 pm **A Meta-Analysis of Endoscopic Stents in the Treatment of Anastomotic Biliary Strictures After Liver Transplantation**
F. Zhou[1], M. Mieth[1], C. Rupp[2], A. Mehrabi[1], A. Nickkholgh[1], *[1]Department of General, Abdominal and Transplant Surgery, University of Heidelberg, Heidelberg, Germany, [2]Department of Internal Medicine, University of Heidelberg, Heidelberg, Germany*

4:35 pm **Effect of Early Biopsy-Proven Rejection on Liver Transplant Outcomes**
D. D. Aufhauser, N. Marka, L. Stalter, G. Levenson, D. Al-Adra, D. P. Foley, *Surgery, University of Wisconsin, Madison, WI*

4:40 pm **The Predictive Factors of Survival in Re-listed Patients Who Received Initial Liver Transplants Using Donation After Circulatory Death Grafts**
Y. Fouda, A. Moro, J. Mcvey, D. Firl, M. Fujiki, D. Teresa, F. Aucejo, C. Quintini, C. H. Kwon, K. Hashimoto, B. Eghtesad, K. Narayanan Menon, C. Miller, K. Sasaki, *Cleveland Clinic, Cleveland, OH*

4:45 pm **Molecular Assessment of Fibrosis and Steatohepatitis in the INTERLIVER Study**
K. S. Madill-Thomsen[1], P. F. Halloran[1], &. the INTERLIVER Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

4:50 pm **Predictive Index for Liver Retransplantation**
C. Christmann, G. Handing, M. McDonald, A. Anand, S. Keeling, N. T. Galván, R. Cotton, C. O'Mahony, J. Goss, A. Rana, *Baylor College of Medicine, Houston, TX*

4:55 pm **Is There a Role for Donor-Specific Antibody Testing in Simultaneous Liver-Kidney Transplantation? A Single Center Analysis of Outcomes**
A. Das, A. Barbetta, D. Remulla, C. Goldbeck, T. Maw, J. Kim, *University of Southern California, Los Angeles, CA*

5:00 pm **High and Low Frequency Domino Liver Transplantation Centers Demonstrate Similar Outcomes**
J. Panichella, H. Resweber, H. Curtis, K. Nguyen, A. Di Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

5:05 pm **Nutritional Inadequacy is an Independent Predictor of Sepsis Post-liver Transplantation**
J. V. Nolte Fong, M. Elshawwaf, L. W. Moore, E. A. Graviss, D. T. Nguyen, R. Angell, A. Uosef, T. Hirase, C. M. Mobley, R. Ghobrial, *Houston Methodist Hospital, Houston, TX*

5:10 pm **Live Video Question and Answer**

Year in Review

ID

4:30 pm - 5:30 pm

Most Impactful Papers in Transplant ID

Moderators: Lara Danziger-Isakov, MD, MPH, Cincinnati Children's Hosp Med Cntr, Aruna Subramanian, MD, Stanford University

4:30 pm **Impactful Fungal Papers**
John Baddley, University of Maryland, Baltimore, MD, USA

4:40 pm **Impactful Bacterial Papers**
Stephanie Pouch, MD, Emory University, Atlanta, GA, USA

4:50 pm **Impactful Viral Papers**
Oriol Manuel, MD, Infectious Diseases Service

5:00 pm **Live Video Question and Answer**

5:30 pm **Break**

Rapid Fire Oral Abstracts

Public Policy: Ethics
6:00 pm - 7:00 pm

A Penny for Your Thoughts: The Economics and Psychosocial Aspects of Transplant

Moderators: Daryle Blackstock, PA-C, MPH, CCTC, New York Presbyterian Hospital, Director of Transplant Operations, New York, NY, USA, Gregory McKenna, MD, Baylor Simmons Transplant Inst, Dr., Dallas, TX, USA

6:00 pm **Economic Impact of a Pharmacist-Led Medication Safety Intervention: Report from the Transafe Rx Randomized Controlled Trial**
D. Taber, J. Fleming, Z. Su, P. Mauldin, M. Gebregziabher, *Med Univ of South Carolina, Charleston, SC*

6:05 pm **A Cost Benefit Analysis of Different Minimal Access Donor Nephrectomy Techniques Performed at a Busy Transplant Centre**
H. Sharma[1], A. Odougoudar[2], A. Sharma[2], D. Ridgway[2], A. Hammad[2], S. Mehra[2], *[1]Transplant and Vascular Access Surgery, Royal Liverpool University Hospital, Liverpool, United Kingdom, [2]Transplant and Vascular Access Surgery, Royal Liverpool Hospital, Liverpool, United Kingdom*

6:10 pm **The Use of Hcv Nat+ Organs in Hcv Negative Recipients with On-site Specialty Pharmacy Services: A Win for the Patient, the Transplant Center, and Society?**
M. Person, N. Patel, W. Simerlein, H. Meadows, D. DuBay, D. Taber, *Medical University of South Carolina, Charleston, SC*

6:15 pm **Addressing a Need in Transplant Clinical Care: Creation of the Organ Transplant Caregiver Toolkit**
H. Bruschwein[1], G. Chen[2], A. Ortega[3], W. Balliet[4], T. Coco[5], C. Thomas[6], B. Hansen[5], D. Richardson[7], K. Canavan[8], C. Burch[9], A. Yaldo[10], M. Jesse[11], *[1]University of Virginia School of Medicine, Charlottesville, VA, [2]Memorial Hermann Transplant Center, Houston, TX, [3]Memorial Transplant Institute, Miami, FL, [4]Medical University of South Carolina, Charleston, SC, [5]Mayo Clinic, Pheonix, AZ, [6]Banner Transplant Institute, Pheonix, AZ, [7]Caregiver, Minburn, IA, [8]National Kidney Foundation, New York, NY, [9]Stanford Children's Hospital, Palo Alto, CA, [10]University of Michigan, Ann Arbor, MI, [11]Henry Ford Transplant Institute, Detroit, MI*

6:20 pm **Mhealth Family Self-Management Intervention for Families of Transplanted Children**
S. M. Lerret[1], R. White-Traut[2], B. Medoff-Cooper[3], S. I. Ahamed[4], P. Simpson[5], R. Schiffman[6], *[1]Department of Pediatrics, Medical College of Wisconsin, Milwaukee, WI, [2]Children's Wisconsin, Milwaukee, WI, [3]University of Pennsylvania, Philadelphia, PA, [4]Department of Computer Science, Marquette University, Milwaukee, WI, [5]Department of Biostatistics, Medical College of Wisconsin, Milwaukee, WI, [6]University of Wisconsin Milwaukee, Milwaukee, WI*

6:25 pm **Psychosocial Determinants of Regimen Adherence Among Kidney Transplant Recipients**
A. Balakrishnan, S. Bailey, D. Mroczek, M. Serper, D. P. Ladner, M. S. Wolf, *Northwestern University, Chicago, IL*

6:30 pm **Frequency and Types of Pharmacist Interventions and Risk Assessments Occurring During the 12-Month Transafe Rx Randomized Controlled Trial**
H. M. Gonzales, J. N. Fleming, D. J. Taber, *MUSC, Charleston, SC*

6:35 pm **Noninferiority Outcomes Among Undocumented Immigrant Kidney Transplant Recipients in California**
H. Ichii[1], N. Eguchi[1], E. Tantisattamo[2], U. Reddy[2], A. Ferrey[2], D. Dafoe[1], *[1]Surgery, University of California Irvine, Orange, CA, [2]Medicine, University of California Irvine, Orange, CA*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

ID
6:00 pm - 7:00 pm

Hepatitis C
Moderators: Judith Anesi, MD, MSCE, University of Pennsylvania, Assistant Professor of Medicine and Epidemiology, Philadelphia, PA, USA, Karen Doucette, MD, University of Alberta, Professor of Medicine, Edmonton, AB, Canada

6:00 pm **Association of Donor Hepatitis C Virus Infection Status and Risk of Bk Polyomavirus Viremia After Kidney Transplantation**
V. S. Potluri[1], D. E. Schaubel[1], M. E. Sise[2], B. P. Concepcion[3], R. C. Forbes[1], E. A. Blumberg[1], D. Goldberg[4], P. P. Reese[1], R. Bloom[1], D. Shaffer[3], R. Chung[2], D. Sawinski[1], I. Strohben[2], N. Elias[2], A. Azhar[5], M. Shah[1], J. Eason[5], L. A. Binari[3], M. Talwar[5], V. Balaraman[5], A. Bhalla[5], B. Besharatian[1], M. Z. Molnar[5], *[1]University of Pennsylvania, Philadelphia, PA, [2]Massachusetts General Hospital, Boston, MA, [3]Vanderbilt University Medical Center, Nashville, TN, [4]University of Miami Miller School of Medicine, Miami, FL, [5]Methodist University Hospital, Memphis, TN*

6:05 pm **Outcomes of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants**
G. Gupta, I. Yakubu, P. Kimball, L. Kang, K. Mitchell, M. Shinbashi, D. Kumar, I. Moinuddin, L. Kamal, A. King, C. Bhati, M. Levy, A. Cotterell, A. Sharma, R. Sterling, *Virginia Commonwealth University Health System, Richmond, VA*

6:10 pm **Cost-Effectiveness Analysis of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants**
I. Yakubu, Y. Zhang, S. Ijioma, N. V. Carroll, J. Patterson, R. Sterling, G. Gupta, *Virginia Commonwealth University Health System, Richmond, VA*

6:15 pm **Are Tacrolimus Concentrations Reduced with Direct-acting Antiviral Administration in Transplant Recipients?**
K. Huang, K. Farrow, M. Christian, *Pharmacy, Penn State Health Hershey Medical Center, Hershey, PA*

6:20 pm **Outcomes of Kidney Transplantation from Hepatitis C Virus (HCV) Infected Donors Stratified by Recipient HCV Serostatus: A Mate Kidney Analysis**
K. K. Sureshkumar[1], B. Chopra[1], R. L. McGill[2], *[1]Nephrology and Hypertension, Allegheny General Hospital, Pittsburgh, PA, [2]Nephrology, University of Chicago, Chicago, IL*

6:25 pm **Outcomes of Hepatitis C Nucleic Acid Testing Positive Donors in Aviremic Recipients With Delayed Direct-Acting Antiviral Initiation**
M. Hudson, A. Webb, A. Logan, A. Silverman, A. Brueckner, *Pharmacy, Tampa General Hospital, Tampa, FL*

6:30 pm **Transplanting Hepatitis C Infected Organs Into Uninfected Recipients: A Pharmacy Perspective**
M. L. Holt, A. James, K. Gutierrez, T. Sparkman, J. Banbury, D. Jones, *University of Alabama at Birmingham Hospital, Birmingham, AL*

6:35 pm **Use of Donor Blood Expedites HCV Genotyping and Allows Earlier DAA Initiation for Recipients of HCV+ Kidneys**
B. Lonze, N. Ali, R. Montgomery, Z. Stewart Lewis, *Tranplant Institute, NYU Langone Health, New York, NY*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Basic
6:00 pm - 7:00 pm

Ischemia Reperfusion & Organ Rehabilitation

Moderators: Andrew Barbas, MD, Duke University, Assistant Professor of Surgery, Division of Abdominal Transplant, Durham, NC, USA, Rebecca Sosa, Ph.D., UCLA, Postdoctoral Fellow, West Hills, CA, USA

6:00 pm **Beneficial Effects of Argon Inhalation on Reducing Lung Ischemia-reperfusion Injury in Miniature Swine**
H. Sahara, *Div. Organ Replacement and Xeno Tx, Center for Advanced Biomedical Science and Swine Research, Kagoshima University, Kagoshima, Japan*

6:05 pm **Eosinophils Attenuate Hepatic Ischemia Reperfusion Injury in Mice Through St2-Dependent Il-13 Production**
Y. Yang, Y. Wang, M. Wang, J. Jeong, L. Xu, Y. Wen, C. Emontzpohl, W. Dar, C. Ju, *Department of Anesthesiology, McGovern Medical School University of Texas Health Science Center at Houston, Houston, TX*

6:10 pm **Neutrophil Extracellular Trap-induced Thrombotic Microangiopathy in Steatotic Mouse Recipients Impacts Liver Transplant Outcomes**
H. Hirao, H. Kojima, K. Kadono, K. J. Dery, D. G. Farmer, F. M. Kaldas, J. W. Kupiec-Weglinski, *UCLA Medical Center, Los Angeles, CA*

6:15 pm **Single Cell Analysis of Living Donor Kidneys Reveals Sex-based Diversity in Proximal Tubulargene Expression**
C. M. McEvoy[1], J. M. Szusz[2], S. Clotet-Freixas[1], J. An[2], S. MacParland[2], G. Bader[3], S. Q. Crome[2], A. Konvalinka[1], *[1]Ajmera Transplant Centre, Toronto General Hospital Research Institute, Toronto, ON, Canada, [2]Immunology and Molecular Genetics, University of Toronto, Toronto General Hospital Research Institute, Toronto, ON, Canada, [3]Donnolly Centre for Cellular and Biomolecular Research, University of Toronto, Toronto, ON, Canada*

6:20 pm **Hepatocyte SIRT1 Suppresses Atf4-mediated Apoptosis Triggered by Cold Stress in Mouse and Human Liver Transplantation**
K. Kadono[1], H. Hirao[1], H. Kojima[1], K. J. Dery[1], J. Aziz[1], X. Li[2], J. W. Kupiec-Weglinski[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]NIEHS, Durham, NC*

6:25 pm **Estrogen Receptor Beta Deletion is Protective in Renal Ischemia Reperfusion Injury in a Renal Specific Manner**
C. S. O'Brien, P. Hernandez, Z. Wang, G. Ge, W. Hancock, M. H. Levine, *Surgery, University of Pennsylvania, Philadelphia, PA*

6:30 pm **Cellular Landscape of Steatotic Livers Revealed by Single-nuclei Rna Sequencing**
C. Kuscu[1], C. Kuscu[1], A. Shetty[2], E. Bardhi[3], T. Rousselle[4], J. Eason[1], M. Sraj[5], D. Maluf[6], V. Mas[4], *[1]Surgery, James D Eason Transplant Institute, Memphis, TN, [2]University of Maryland, Institute for Genome Sciences, Baltimore, MD, [3]Program in Transplantation - University of Maryland, Baltimore, MD, [4]Surgery, Division of Surgical Science, Baltimore, MD, [5]Surgery, University of Maryland, Baltimore, MD, [6]Surgery, Program in Transplantation - University of Maryland, Baltimore, MD*

6:35 pm **Cross-Circulation for Extracorporeal Liver Support in a Swine Model**
W. K. Wu[1], A. Tumen[1], J. W. Stokes[2], R. Ukita[2], A. E. Hozain[3], C. R. Flynn[2], M. J. Lee[3], J. R. Talackine[2], N. L. Cardwell[2], J. A. Reimer[3], M. Pinezich[3], C. Benson[2], G. Vunjak-Novakovic[3], S. P. Alexopoulos[2], M. Bacchetta[2], *[1]co-first authors, Vanderbilt University Medical Center, Nashville, TN, [2]Vanderbilt University Medical Center, Nashville, TN, [3]Columbia University Medical Center, New York, NY*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

All Organs
6:00 pm - 7:00 pm

Late Breaking: All Organs
Moderator: Daniela Ladner, MD, MPH, Northwestern Memorial Hospital, Chicago, IL, USA

6:00 pm **Primary Outcome of OPTIMAL: A Prospective Multicenter Trial of Immunosuppression Withdrawal (ISW) in Stable Adult Liver Transplant (LT) Recipients**
S. Chandran[1], K. Mason[2], L. F. Sun[1], N. Tanimine[3], M. DesMarais[1], B. Burrell[1], J. F. Markmann[3], *[1]ITN, San Francisco, CA, [2]Rho, Inc., Durham, NC, [3]MGH, Boston, MA*

6:05 pm **Survival After Heart Transplant vs. Simultaneous Heart Kidney Transplant by Degrees of Renal Dysfunction at Engraftment in the United States: A Multivariable Analysis**
S. M. Riad[1], M. Aljuhani[1], S. Jackson[2], T. Alexy[1], H. Wadie[3], C. Martin[1], R. Kandaswamy[4], *[1]Medicine, University of Minnesota, Eden Prairie, MN, [2]Complex Care Analytics, Fairview Health Services, Minneapolis, MN, [3]Transplant, Mayo Clinic, Jacksonville, FL, [4]Surgery, University of Minnesota, Minneapolis, MN*

6:10 pm **Relationship Between %dd-cfDNA, MMDx Molecular Diagnoses, and Donor-specific Antibody in the Trifecta Study**
P. F. Halloran[1], L. G. Hildago[2], J. Reeve[1], Z. Demko[3], A. Prewett[3], P. Billings[3], J. Truong[4], P. Vander Horn[4], &. Trifecta Study Group[5], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]University of Wisconsin, Madison, WI, [3]Natera Inc., San Carlos, CA, [4]One Lambda Inc., West Hills, CA, [5]AB, Canada*

6:15 pm **Disparities in Living Donor Follow-up During the COVID-19 Emergency Suspension of OPTN Follow-up Reporting Requirements**
S. E. Booker, A. Henderson, L. A. Cartwright, S. Taranto, D. Klassen, J. L. Wainright, *UNOS, Richmond, VA*

6:20 pm **Kidney Programs Can Filter Off a Majority of Their Unwanted Organ Offers without Harming Transplant Volumes**
A. Toll, H. McGehee, R. McTier, D. Stewart, *Research, United Network for Organ Sharing, Richmond, VA*

6:25 pm **Athena - Effect of Primary Immunosuppression on Development of De Novo Donor Specific Antibodies within First Year After Kidney Transplantation**
W. Arns[1], A. Philippe[1], V. Ditt[1], I. A. Hauser[1], F. Thaiss[1], C. Sommerer[1], B. Suwelack[1], A. Finkel[2], C. Schiedel[2], D. Dragun[1], B. Nashan[1], *[1]ATHENA, Study Group, Germany, [2]Novartis Pharma GmbH, Nuremberg, Germany*

6:30 pm **Predicted Heart Mass Difference as a Risk Factor for Severe Primary Graft Dysfunction in the Contemporary Era of Heart Transplantation: A Report from the International Consortium on Primary Graft Dysfunction**
F. Foroutan[1], L. K. Truby[2], Y. Moayedi[1], J. Han[3], J. Guzman[4], M. Farrero[4], E. Baughan[5], M. Farr[5], H. Zafar[6], J. Felius[6], J. van Zyl[7], D. Law[8], S. Chih[8], P. Angleitner[9], M. Sabatino[10], A. DeVore[2], R. J. Miller[11], L. Potena[10], A. Zuckermann[9], K. K. Khush[3], S. A. Hall[6], H. J. Ross[1], *[1]Ted Rogers Centre for Heart Research, Toronto, ON, Canada, [2]Duke University School of Medicine, Durham, NC, [3]Stanford University, Stanford, CA, [4]Clinic Barcelona Hospital Universitari, Barcelona, Spain, [5]Columbia University Medical Center, New York, NY, [6]Baylor University Medical Center, Dallas, TX, [7]Dallas University Medical Center, Dallas, TX, [8]University of Ottawa Heart Institute, Ottawa, ON, Canada, [9]Medical University of Vienna, Vienna, Austria, [10]Bologna University Hospital, Bologna, Italy, [11]University of Calgary, Calgary, AB, Canada*

6:35 pm **Liver Transplantation for COVID-19-associated Cholangiopathy**
J. Blondeel[1], P. Meersseman[2], N. Gilbo[1], I. Jochmans[1], M. Sainz-Barriga[1], J. Pirenne[1], D. Monbaliu[1], *[1]Abdominal Transplantation Surgery, University Hospitals Leuven, Leuven, Belgium, [2]Medical Intensive Care Unit, University Hospitals Leuven, Leuven, Belgium*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Kidney
6:00 pm - 7:00 pm

Live Kidney Donation
Moderators: Deborah Adey, MD, UCSF, Professor of Medicine, San Francisco, CA, USA, Gabriel Danovitch, MD, University of California Los Angeles, X, Los Angeles, CA, USA

6:00 pm **Long Term Outcomes of Kidney Donors with Fibromuscular Dysplasia**
H. N. Adrogue[1], A. Evans[1], S. A. Hebert[1], H. E. Adrogue[1], D. T. Nguyen[2], D. Murad[1], E. A. Graviss[2], *[1]Medicine, Houston Methodist Hospital, Houston, TX, [2]Pathology and Genomic Medicine, Houston Methodist Hospital, Houston, TX*

6:05 pm **Pre- Kidney Donation Pregnancy Complications and Long-Term Outcomes**
E. Helgeson[1], E. F. Palzer[1], D. Vock[1], A. Matas[2], *[1]University of Minnesota School of Public Health, Minneapolis, MN, [2]University of Minnesota Medical School, Minneapolis, MN*

6:10 pm **The Risk of Post-donation Kidney Function Impairment for Prospective Living Kidney Donors with Persistent Isolated Microscopic Hematuria**
J. v. Weijden[1], M. van Londen[1], I. M. Nolte[2], M. H. De Borst[1], S. P. Berger[1], *[1]Nephrology, University Medical Center Groningen, Groningen, Netherlands, [2]Epidemiology, University Medical Center Groningen, Groningen, Netherlands*

6:15 pm **Living Donor Kidney Transplantation Racial Disparities Persist Independent of Social Vulnerability**
A. C. Killian[1], M. C. McLeod[1], B. Shelton[1], R. D. Reed[1], P. MacLennan[1], H. Qu[1], B. J. Orandi[1], V. Kumar[1], D. Sawinski[2], R. M. Cannon[1], D. J. Anderson[1], M. J. Hanaway[1], J. E. Locke[1], *[1]University of Alabama at Birmingham Hospital, Birmingham, AL, [2]Hospital of the University of Pennsylvania, Philadelphia, PA*

6:20 pm **Implications of Trends in Child to Parent Kidney Donation in Whites and African Americans**
N. Jean, S. Krishnamoorthy, Y. Kyeso, P. Cunningham, N. Murthy, R. McGill, M. Josephson, *Nephrology, University of Chicago, Chicago, IL*

6:25 pm **Associations of Lack of Insurance and Other Sociodemographic Traits with Deficiencies in Follow-Up After Living Kidney Donation**
K. Lentine[1], R. Hays[2], N. Lam[3], A. Tietjen[4], A. Muiru[5], H. Xiao[1], A. Garg[6], C. Thomas[7], G. McNatt[7], R. Howey[8], U. Lebron-Banks[9], M. Cooper[10], M. Conboy[11], B. Kasiske[11], *[1]Saint Louis Univ, Saint Louis, MO, [2]Univ of Wisconsin, Madison, WI, [3]Univ of Calgary, Calgary, AB, Canada, [4]St. Barnabas, Livingston, NJ, [5]Univ of California, San Francisco, San Francisco, CA, [6]Western Univ, London, ON, Canada, [7]Univ of Iowa, Iowa City, IA, [8]Toyon Associates, Concord, CA, [9]New York Presb Hosp, New York, NY, [10]Medstar-Georgetown, Washington, DC, [11]SRTR, Minneapolis, MN*

6:30 pm **Launching a National Living Donor Registry**
J. E. Milton[1], M. Cooper[2], B. Hippen[3], *[1]Transplant Center, University of Texas Health San Antonio, San Antonio, TX, [2]MedStar Georgetown Transplant Institute, Washington, Colombia, [3]Metrolina Nephrology Associates, PA, Charlotte, NC*

6:35 pm **CT-measured Cortical Volume Ratio is an Alternative to Nuclear Medicine Split Scan Ratio Among Living Kidney Donors**
J. Montgomery, C. Brown, A. Zondlak, K. Walsh, J. Kozlowski, A. Pinsky, E. Herriman, J. Sussman, Y. Lu, E. Stein, P. Shankar, R. Sung, K. Woodside, *Michigan Medicine, Ann Arbor, MI*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

All Organs
6:00 pm - 7:00 pm

Surgical Issues and Deceased Donor Management

Moderators: Kiran Dhanireddy, MD, Tampa General Hospital, Executive Director, Transplant Institute; Surgical Director, Liver Transplant, Tampa, FL, USA, Rakesh Sindhi, MD, UPMC Children's Hospital of Pittsburgh, Professor of Surgery, Pittsburgh, PA, USA

6:00 pm **Cleveland Clinic Experience with Cadaveric Uterus Transplant**
L. Del Prete[1], C. Quintini[1], K. Hashimoto[1], B. Eghtesad[1], G. D'Amico[1], C. Kwon[1], D. Priebe[1], E. Richards[1], S. Ricci[1], U. Perni[1], C. Ferrando[1], A. Chiesa-Vottero[1], S. Mawhorter[1], N. Yeaney[1], R. Farrell[1], R. Flyckt[2], C. Miller[1], T. Falcone[1], A. Tzakis[1], *[1]Cleveland Clinic, Cleveland, OH, [2]University Hospital, Cleveland, OH*

6:05 pm **Pilot Study for the Use of Shortened Preemptive Therapy with Glecaprevir/pibrentasvir (g/p) and Ezetimibe in Hepatitis C Seronegative Solid Organ Transplant Recipients (Kidney and Heart) of Hepatitis C Viremic Donors**
B. Aqel[1], H. Khamash[2], A. Moss[3], D. E. Steidley[4], R. C. Dickson[1], *[1]Gastroenterology and Hepatology, Mayo Clinic, Phoenix, AZ, [2]Nephrology and Hypertension, Mayo Clinic, Phoenix, AZ, [3]Transplant Surgery, Mayo Clinic, Phoenix, AZ, [4]Cardiology, Mayo Clinic, Phoenix, AZ*

6:10 pm **Donor Service Area Characteristics Impacting Liver and Kidney Deceased Donor Population**
C. O. Warren, A. Zarrinpar, *Surgery, -University of Florida, Gaiinesville, FL*

6:15 pm **Drones and Airplanes: Modeling the Potentially Deleterious Effects of Transportation on Shipped Organs**
Y. S. Lee, J. S. Bromberg, J. R. Scalea, *Surgery, University of Maryland, Baltimore, MD*

6:20 pm **Primary Uretero-ureterostomy in Renal Transplantation**
H. Shokouh-Amiri[1], M. S. Naseer[1], D. Aultman[1], R. McMillan[1], S. Tandukar[2], F. T. Siskron[3], N. Singh[2], G. Zibari[1], *[1]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [2]Transplant Nephrology, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [3]Urology, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA*

6:25 pm **Robotic Donor Nephrectomy: Advantages Offered by a Minimally Invasive Approach to Kidney Transplantation**
A. Popovic[1], R. Shahbazov[1], A. Hoste[1], S. Loerzel[1], B. Gallay[2], J. Leggat[2], O. Pankewycz[1], R. Saidi[1], R. H. Dvorai[3], M. J. Hanlon[1], S. Narsipur[2], M. R. Laftavi[1], *[1]Surgery, SUNY Upstate Medical University, Syracuse, NY, [2]Medicine, SUNY Upstate Medical University, Syracuse, NY, [3]Pathology, SUNY Upstate Medical University, Syracuse, NY*

6:30 pm **Does the NSQIP-Transplant Experience Demonstrate That Obese Kidney Transplant Recipients are Still at Increased Risk for Surgical Site Infections?**
H. C. Yaffe[1], A. K. Belli[1], J. R. Parekh[2], D. L. Sudan[3], N. Elias[4], K. D. Conzen[5], D. P. Foley[6], R. Hirose[7], S. M. Greenstein[1], *[1]Surgery, Montefiore-Einstein Center for Transplantation, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY, [2]Surgery, University of California San Diego, San Diego, CA, [3]Surgery, Division of Abdominal Transplant Surgery, Duke University Medical Center, Durham, NC, [4]Surgery, Transplant Surgery Division, Massachusetts General Hospital, Boston, MA, [5]Surgery, Division of Transplant Surgery, University of Colorado Hospital, Aurora, CO, [6]Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI, [7]Surgery, University of California San Francisco, San Francisco, CA*

6:35 pm **Successful Long Term Survival of Vascularized Composite Allografts After Extended Preservation at Subzero Temperatures Using Bioinspired Next Generation Cryoprotectants**
M. Kline[1], S. Fidder[2], A. Callegari[1], A. Matoso[2], B. Oh[2], K. Lombardo[2], J. Etra[2], D. Vasilic[3], A. Childs[1], R. Redett[2], G. Brandacher[2], X. Wei[1], *[1]X-Therma Inc., Richmond, CA, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]Erasmus MC, Rotterdam, Netherlands*

6:40 pm **Live Video Question and Answer**

Rapid Fire Oral Abstracts

Basic
6:00 pm - 7:00 pm

Xenotranplantation and Preclinical Studies

Moderators: Ping Li, PhD, Indiana University School of Medicine, Associate Research Professor, Indianapolis, IN, USA, Blayne Amir Sayed, MD, PhD, University of Toronto, Assistant Professor, Toronto, ON, Canada

6:00 pm **Natural Sensitization by Pregnancy, Testing Desensitization Strategies in Female NHPs Across Repeat Mismatches**
M. Manook, J. Yoon, Z. Fitch, R. Schmitz, A. M. Jackson, J. Kwun, S. Knechtle, *Duke Transplant Center, Duke University Medical Center, Durham, NC*

6:05 pm **AT-1501, a Novel and Clinically Applicable CD40L Specific Monoclonal Antibody, Promotes Islet Allograft Survival in Nonhuman Primates**
D. Berman[1], N. Kenyon[1], M. Willman[1], A. Gill[2], S. Perrin[3], C. Ricordi[1], *[1]University of Miami, Miami, FL, [2]ALS Therapy Development Institute, Cambridge, MA, [3]Novus Therapeutics, Irvine, CA*

6:10 pm **Interruption of Notch Signaling via Blockade of Delta-Like Ligand 4 Prevents Co-Stimulation Blockade Resistant Allograft Rejection**
A. J. Matar, B. P. Lovasik, Y. Dong, D. A. Faber, J. Habib, C. Breeden, J. Regenold, A. Ghosh, A. Stephenson, W. H. Kitchens, A. B. Adams, *Emory University Department of Surgery, Atlanta, GA*

6:15 pm **Belatacept and Carfilzomib-based Treatment of Active Antibody-mediated Rejection in a Sensitized Nonhuman Primate Model**
J. Kwun[1], R. Schmitz[1], M. Manook[1], Z. Fitch[1], D. Olaso[1], A. Choi[1], J. Yoon[1], Y. Bae[1], J. Lambris[2], S. Knechtle[1], *[1]Surgery, Duke University, Durham, NC, [2]Pathology & Laboratory Medicine, University of Pennsylvania, Philadelphia, PA*

6:20 pm **Alpha 1-antitrypsin Reduces Cytokine Elaboration in a Xenogeneic Lung Transplantation Model**
L. Burdorf[1], C. Laird[2], T. Zhang[2], M. R. Connolly[1], Z. Habibabady[1], S. Pratts[1], S. Miura[1], F. Pollok[1], W. Eyestone[3], C. J. Phelps[3], D. L. Ayares[3], A. M. Azimzadeh[1], R. N. Pierson III[1], *[1]Surgery, Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Surgery, University of Maryland, Baltimore, MD, [3]Revivicor, Blacksburg, VA*

6:25 pm **Pig Orthotopic Heart Transplantation (ohtx) in Baboons: Is an Acute Pulmonary Inflammatory Response the Key Problem?**
A. Jagdale[1], D. Cleveland[2], M. Bikhet[1], J. Foote[3], G. Walcott[4], H. Iwase[1], T. Yamamoto[1], H. Hara[1], C. Hansens-Estruch[1], D. Ayares[5], S. Litovsky[6], L. Rhodes[2], W. Carlo[7], J. Crawford[2], R. Dabal[2], S. Borasino[2], D. Cooper[1], *[1]Surgery, University of Alabama at Birmingham, Birmingham, AL, [2]Cardiothoracic Surgery, Children's of Alabama, Birmingham, AL, [3]Medicine and Cardiovascular Diseases, University of Alabama at Birmingham, Birmingham, AL, [4]Medicine, University of Alabama at Birmingham, Birmingham, AL, [5]Surgery, Revivicor, Blacksburg, VA, [6]Pathology, University of Alabama at Birmingham, Birmingham, AL, [7]Division of Pediatric Cardiology, Department of Pediatrics, University of Alabama at Birmingham, Children's of Alabama, Birmingham, AL*

6:30 pm **Successful Long-Term TMA- and Rejection-Free Survival of a Kidney Xenograft With Triple Xenoantigen Knockout Plus Insertion of Multiple Human Transgenes**
T. Hirose[1], D. Ma[1], G. Lassiter[1], H. Sasaki[1], I. Rosales[2], T. Coe[1], C. Rickert[1], R. Matheson[1], R. Colvin[2], W. Qin[3], Y. Kan[3], J. Layer[3], K. Stiede[3], K. Hall[3], M. Youd[3], W. Westlin[3], M. Curtis[3], J. F. Markmann[1], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Pathology, Massachusetts General Hospital, Boston, MA, [3]eGenesis Inc, Cambridge, MA*

6:35 pm **Impact of Allosensitization on Xenotransplantation**
D. Olaso[1], M. Manook[1], J. Yoon[1], Y. Bae[1], A. Barbas[1], A. Adams[2], S. Knechtle[1], J. Kwun[1], *[1]Department of Surgery, Duke Transplantation Center, Durham, NC, [2]Department of Surgery, University of Minnesota, Minneapolis, MN*

6:40 pm **Live Video Question and Answer**

7:00 pm **Break**

Poster Video Chat

Basic
7:30 pm - 8:30 pm

Basic 2

Moderators: Mandy Ford, PhD, Emory University, Professor, Atlanta, GA, USA, Peter Heeger, MD, Icahn School of Medicine at Mount Sinai, Professor of Medicine, New York, NY, USA

7:30 pm **Complement Blockade Improves Renal Xenograft Survival in Primates in the Absence of Transgenic Complement Regulatory Proteins**
D. A. Faber[1], B. Lovasik[1], A. Matar[1], C. Breeden[1], A. B. Farris[2], M. Tector[3], A. Tector[3], A. Adams[4], *[1]Surgery, Emory University School of Medicine, Atlanta, GA, [2]Pathology, Emory University School of Medicine, Atlanta, GA, [3]Surgery, University of Miami, Miami, FL, [4]Surgery, University of Minnesota, Minneapolis, MN*

7:40 pm **Exosomal DAMP Proteins Released During Islet Isolation Affects TPIAT Outcomes**
P. Saravanan, J. Kalivarathan, M. Levy, M. Kanak, *Hume Lee Islet Cell Transplantation Lab, Department of Surgery, VCU Health, Richmond, VA*

7:50 pm **Selective Regulatory T Cell Expansion by a Novel IL-2 Mutein Prolongs Skin Transplant Survival in Mice**
T. J. Borges[1], O. Effe[1], R. B. Gassen[1], A. Al Jurdi[1], I. T. Lape[1], G. J. Babcock[2], S. M. Carlson[2], J. C. Madsen[1], L. V. Riella[1], *[1]Center For Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Visterra, Inc., Waltham, MA*

8:00 pm **Allograft Function and Baseline Donor Derived Cell Free DNA in Kidney Transplant Recipients: One Size Doesn't Fit All**
K. K. Sureshkumar, A. Grazier, B. Chopra, *Allegheny General Hospital, Allegheny Health Network, Pittsburgh, PA*

8:10 pm **Single Cell RNA Sequencing of Tim1- B Cells and Tim1+ Regulatory B Cells**
Q. Fu[1], K. Lee[2], K. Deng[2], D. Agarwal[3], P. v. Galen[4], C. G. Rickert[2], G. Huai[2], H. Yang[1], C. LeGuern[2], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA, [3]Division of Transplantation, Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, [4]Division of Hematology, Brigham and Women's Hospital, Boston, MA*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

ID
7:30 pm - 8:30 pm

Infectious Disease 2

Moderators: Catherine Small, MD, Weill Cornell Medical College/New York Presbyterian Hospital, New York, NY, USA, Cameron Wolfe, MD, Duke University Medical Center, Chapel Hill, NC, USA

7:30 pm **Prevalence of Hepatitis E Virus Infection in Solid Organ Transplant Recipients: A Systematic Review and Meta-analysis**
P. Hansrivijit[1], A. Trongtorsak[2], B. Boonpheng[3], C. Thongprayoon[4], W. Cheungpasitporn[4], *[1]Department of Internal Medicine, UPMC Pinnacle, Harrisburg, PA, [2]Department of Internal Medicine, Amita Health Saint Francis Hospital, Evanston, IL, [3]Division of Nephrology, David Geffen School of Medicine, University of California, Los Angeles, CA, [4]Division of Nephrology and Hypertension, Mayo Clinic, Rochester, MN*

7:40 pm **Belatacept for Kidney Transplantation in the Age of Covid19, is it Safe?**
J. Pagan[1], S. Anjan[2], Y. Natori[3], A. Fernandez[3], R. Zamora-Gonzalez[2], A. Mattiazzi[1], L. Mendez[1], G. Guerra[1], *[1]Nephrology, University of Miami, Miami, FL, [2]Infectious Diseases, University of Miami, Miami, FL, [3]Infectious Disease, University of Miami, Miami, FL*

7:50 pm **Pre-transplant Lower Urinary Tract Dysfunction in Men is a Risk Factor for Adverse Outcomes Following Renal Transplantation**
M. J. Goldstein[1], B. R. Schleich[2], T. Carrea[1], Y. Yushkov[1], N. Cheng[3], R. Harrison[3], R. Munver[3], D. Fromer[3], *[1]Organ Transplant, Hackensack University Medical Center, Hackensack, NJ, [2]Patient Safety and Quality, Hackensack University Medical Center, Hackensack, NJ, [3]Urology, Hackensack University Medical Center, Hackensack, NJ*

8:00 pm **Impact of SARS-CoV 2 Infection on Graft Function in Kidney Transplant Recipients: An Academic Single Center Experience**
S. Nahi, A. Shetty, S. Tanna, J. Leventhal, *Northwestern University, Chicago, IL*

8:10 pm **Live Video Question and Answer**

Poster Video Chat

Kidney
7:30 pm - 8:30 pm

Kidney Living Donor
Moderators: Ernesto Molmenti, MD, MBA, PhD, Northwell Health, Vice Chair of Surgery, Manhasset, NY, USA

7:30 pm **The Australian and New Zealand Living Kidney Donor Profile Index**
G. L. Irish[1], S. Chadban[1], N. Boudville[2], S. B. Campbell[3], J. Kanellis[4], P. A. Clayton[1], *[1]Australian and New Zealand Dialysis and Transplant Registry, South Australian Health and Medical Research Institute, Adelaide, Australia, [2]Medical School, University of Western Australia, Perth, Australia, [3]Department of Nephrology, Princess Alexandra Hospital, Brisbane, Australia, [4]Department of Nephrology, Monash Health, Melbourne, Australia*

7:40 pm **Recipient and Kidney Allograft Outcomes from Hypertensive Live-Donor in the United States**
S. Riad[1], S. Jackson[2], D. Vock[3], A. Matas[4], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Complex Care Analytics, M-Health Fairview, Minneapolis, MN, [3]School of Public Health, University of Minnesota, Minneapolis, MN, [4]Surgery, University of Minnesota, Minneapolis, MN*

7:50 pm **Managing the Costs of Routine Follow-up Care After Living Kidney Donation: A Survey of Contemporary Experience, Practice & Challenges**
K. Lentine[1], G. McNatt[2], R. Howey[3], C. Thomas[2], R. Hays[4], U. Lebron-Banks[5], S. Ainapurapu[1], A. Tietjen[6], *[1]Saint Louis University, Saint Louis, MO, [2]Univ. Iowa, Iowa City, IA, [3]Toyon Associates, Concord, CA, [4]Univ. Wisconsin, Madison, WI, [5]New York-Presbyterian Hosp., New York, NY, [6]St. Barnabas, Livingston, NJ*

8:00 pm **Compatible Paired Donation in Paired Kidney Exchange: A Look at the Road Not Taken**
G. Vranic, A. Gilbert, B. Thomas, S. Ghasemian, M. Cooper, J. Verbesey, *MedStar Georgetown Transplant Institute, Washington, DC*

8:10 pm **High Interest, Low Payoff: Understanding Opportunities for Intervention for Those Exploring but Not Pursuing Paired Kidney Donation**
A. D. Waterman[1], E. H. Wood[1], A. Thomas[2], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Johns Hopkins, Baltimore, MD*

8:20 pm **Live Video Question and Answer**

Poster Video Chat

Liver
7:30 pm - 8:30 pm

Liver 2

Moderators: Ernesto Molmenti, MD, MBA, PhD, Northwell Health, Vice Chair of Surgery, Manhasset, NY, USA, Pooja Singh, MD, Thomas Jefferson University Hospital, Medical Director, Kidney Transplantation, Philadelphia, PA, USA

7:30 pm **Waitlist Outcomes for Patients with Hepatocellular Carcinoma Following the 2019 Exception Policy Change**
K. Young[1], C. Enestvedt[2], W. Naugler[1], E. Maynard[2], A. Mitra[1], M. Wungiranirun[1], J. Jou[1], J. Ahn[1], M. Chang[1], D. Lhewa[1], *[1]Division of Gastroenterology and Hepatology, OHSU, Portland, OR, [2]Division of Abdominal Organ Transplant, OHSU, Portland, OR*

7:40 pm **Severe Hypoxemia After Liver Transplantation in the Hepatopulmonary Syndrome**
J. Doi, M. Fujiki, G. DAmico, K. Sasaki, T. Diago, F. Aucejo, C. Kwon, B. Eghtesad, K. Hashimoto, C. Miller, Q. Cristiano, *Cleveland Clinic, Cleveland, OH*

7:50 pm **Long Term Survival After Liver Transplantation for Advanced, Unresectable Intrahepatic Cholangiocarcinoma**
R. R. McMillan[1], S. Kodali[1], M. Javle[2], A. Saharia[1], C. M. Mobley[1], M. J. Hobeika[1], A. Shetty[1], D. W. Victor[1], R. McFadden[1], M. Abdelrahim[1], K. Heyne[1], A. O. Gaber[1], R. M. Ghobrial[1], *[1]Houston Methodist Hospital, Houston, TX, [2]MD Anderson Cancer Center, Houston, TX*

8:00 pm **Should We Curtail the Importance of Non-modifiable Risk Factors in Dcd Liver Risk Stratification?**
R. Meier[1], Y. Kelly[2], S. Yamaguchi[2], H. Braun[2], T. Lunow-Luke[2], D. Adelmann[2], C. Niemann[2], D. Maluf[1], Z. Dietch[2], P. Stock[2], S. Kang[2], S. Feng[2], A. Posselt[2], J. Gardner[2], C. Freise[2], R. Hirose[2], C. Freise[2], N. Ascher[2], J. Roberts[2], G. Roll[2], *[1]University of Maryland, Baltimore, Baltimore, MD, [2]UCSF, San Francisco, CA*

8:10 pm **The Intersection of Cost, Quality, and Volume in Liver Transplant**
D. Axelrod[1], R. Balakrishnan[1], A. Harris[2], S. Hohmann[2], J. Snyder[3], B. Kasiske[3], M. Schnitzler[4], K. Lentine[4], *[1]Univ of Iowa, Iowa City, IA, [2]Vizient Inc., Irving, TX, [3]SRTR, Minneapolis, MN, [4]Saint Louis Univ, Saint Louis, MO*

8:20 pm **Live Video Question and Answer**

8:30 pm **Break**

Expert VIP Meet Up

Kidney
8:45 pm - 9:30 pm

The Effect of Race and Ethnicity on Clinical Risk Assessment Equations and Scores

Moderators: Asif Sharfuddin, MD, Indiana University School of Medicine, Associate Professor of Clinical Medicine, Indianapolis, IN, USA, Mona Doshi, MBBS, University of Michigan

8:45 pm **The Effect of Replacing Race with APOL1 Gene in the KDPI Calculator**
Sumit Mohan, MD, MPH, Columbia University Medical Center

8:55 pm **The Impact of Removing Race from GFR Calculation Among African American Living Kidney Donor Candidates**
Andrew S Levey, M.D., Tufts Medical Center, Chief Emeritus, Division of Nephrology, Boston, MA, USA

9:05 pm **Reconsidering and Re-Imagining eGFR when Referring and Listing African Americans with CKD for Pre-emptive Transplantation.**
Peter Reese, MD, University of Penn, Philadelphia, PA, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Liver
8:45 pm - 9:30 pm

When Does the Recipient Cross the Line?

Moderators: Nancy Ascher, MD, PhD, Univ of California-San Francis, Professor Surgery, San Francisco, CA, USA, Juan Caicedo, MD, Northwestern University, Associate Professor of Surgery, Chicago, IL, USA

8:45 pm **How Old is too Old for Liver Transplantation?**
Josh Levitsky, MD, MS, northwestern, Professor of Medicine, Evanston, IL, USA

8:55 pm **Liver Transplantation at the Extreme of the BMI's: Should there be a Cutoff?**
Linda Sher, M.D., University of Southern California Keck School of Medicine, Professor, Los Angeles, CA, USA

9:05 pm **LDLT in Critically Ill Patients : Are We Ready for This ?**
Yuri Genyk, University of Southern California, Los Angeles, CA, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Liver
8:45 pm - 9:30 pm

Risk Prediction in Low-MELD Patients - What is the best Personalized Therapeutic Approach?

Moderator: Roberto Alejandro-Hernandez, MD, University of Rochester, Rochester, NY, USA

8:45 pm **Risk Prediction in Low-MELD Patients - What is the best Personalized Therapeutic Approach?**
Scott Biggins, MD, University of Washington, Chief of Hepatology, Seattle, WA, USA

8:55 pm **Risk Prediction in Low-MELD Patients - What is the best Personalized Therapeutic Approach?**
Kim Olthoff, MD, University of Pennsylvania, Donald Guthrie Professor of Surgery, Chief Division of Transplant Surgery, Merion Station, PA, USA

9:05 pm **Live Video Question and Answer**

Expert VIP Meet Up

Pediatric: Liver
8:45 pm - 9:30 pm

Pediatric Liver Re Transplantation: Indications, Surgical Techniques and Outcomes

Moderator: Talia Baker, MD, Northwestern University, Chicago, IL, USA

8:45 pm **Outcomes of Pediatric Liver Re Transplantation in USA**
Carlos O. Esquivel, MD, PhD, Stanford University School of Medicine, Professor of Surgery, Stanford, CA, USA

8:55 pm **Surgical Techniques: Pearls and Pit Falls in Pediatric Liver Transplantation**
John Goss, MD, Baylor College of Medicine, Professor of Surgery, Houston, TX, USA

9:05 pm **Indications and Contradictions for Pediatric Liver Re Transplantation**
Simon Horslen, MB, ChB, Seattle Childrens Hospital, Medical Director of Solid Organ Transplantation, Seattle, WA, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Prof Develop
8:45 pm - 9:30 pm

Looking Under the Hood of High Impact Research: From Idea to AJT Publication

Moderator: Carli Lehr, MD, MS, Cleveland Clinic, Assistant Professor, Cleveland, OH, USA

8:45 pm **Introduction**
Deepika Devuni, MD, University of Massachusetts Medical School, Assistant Professor, Worcester, MA, USA

8:50 pm **How to Get Published in AJT**
Sandy Feng, MD, PhD, University of California , San Francisco, San Francisco, CA, USA

9:05 pm **High Impact Journal Article Presentation**
Thomas Cotter, MD MS, University of Chicago Medicine, Doctor, Chicago, IL, USA

9:10 pm **Editorial Fellowship: How to Get Involved as a Trainee and Young Faculty**
Ilkka Helanterä, MD, PhD, Helsinki University Hospital, Dr., Helsinki, Finland

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

ID
8:45 pm - 9:30 pm

Preventing Fungal Infections after Transplantation

Moderators: Paschalis Vergidis, MD, MSc, Mayo Clinic, Assistant Professor of Medicine, Rochester, MN, USA

8:45 pm **Preventing Fungal Infections after Transplantation**
Barbara Alexander, MD, MHS, Duke University, Professor of Medicine and Pathology, Durham, NC, USA

8:50 pm **Preventing Fungal Infections after Transplantation**
Shahid Husain, MD,MS, University Health Network, Professor of Medicine, Toronto, ON, Canada

8:55 pm **Live Video Question and Answer**

Expert VIP Meet Up

Public Policy
8:45 pm - 9:30 pm

Implementing Successful Outreach and Telemedicine Programs in Transplantation: Breaking Down the Barriers

Moderators: Courtney Sherman, MD, UCSF, Assistant Professor of Medicine, San Francisco, CA, USA, Adnan Said, MD, UW School of Medicine and Public Health, Professor, Gastronterology and Hepatology, Chief VA GI and Hepatology, Director liver transplant fellowship, Madison, WI, USA

8:45 pm **Implementation of a Telemedicine Program to Improve Timeliness to Kidney Transplant Evaluation**
Rachel Forbes, MD, MBA, Vanderbilt University Medical Center, Division Chief, Kidney and Pancreas Transplantation Surgery, Nashville, TN, USA

9:00 pm **Live Video Question and Answer**

Expert VIP Meet Up

Other
8:45 pm - 9:30 pm

Bringing Living Donor Programs into the XXI Century: Incorporating Social Media to Enhance Living Donation

Moderators: Krista Lentine, MD,PhD, Saint Louis University Medical Center, Professor, St. Louis, MO, USA, Randolph Schaffer, MD, Scripps Clinic and Green Hospital, Director, Living Donor Transplantation, La Jolla, CA, USA

8:45 pm **Practice Patterns and Barriers to Social Media Utilization to Identify Living Donors: Results of an OPTN National Survey**
Angie Nishio Lucar, MD, University of Virginia, Associated Professor, Charlottesville, VA, USA

8:55 pm **Best Practices for Safe Utilization of Social Media in Living Donation**
Heather Hunt, Living Liver Donor, UNOS Living Donor Committee Chair, Chair, Osterville, MA, USA

9:05 pm **Challenges and Ethical Complexities Surrounding Social Media Utilization in Living Donation**
Macey Henderson, JD, Johns Hopkins Hospital

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Prof Develop
8:45 pm - 9:30 pm

Can Improved Cultural Competence, and Tools for Conflict Resolution Reduce Physician Burnout in Transplantation?

Moderators: Roshan George, MD, Emory University and Children's Healthcare of Atlanta, Associate Professor, Atlanta, GA, USA, Bethany Foster, MD, Montreal Children's Hospital of the McGill University Health Centre, Professor of Pediatrics, Montreal, QC, Canada, Rebecca Duke, MSN, DNP, APRN-CNP, Northwestern Memorial Hospital, Transplant surgery nurse practitioner, Chicago, IL, USA

8:45 pm **From Fatigue to not Caring: The Path to Compassion Fatigue**
Charlie Thomas, LCSW, ACSW, FNKF, Banner Transplant Institute, Transplant Social Worker, Phoenix, AZ, USA

8:55 pm **How Conflict Resolution Strategies Can Improve Burnout**
Jennifer Guy, MD, MAS, CPMC, San Francisco, CA, USA

9:05 pm **Live Video Question and Answer**

Expert VIP Meet Up

Women's Health
8:45 pm - 9:30 pm

Now or Later? Timing Pregnancy and Transplantation

Moderators: Deirdre Sawinski, MD, Hospital of the U of Pennsylvania, Associate Professor of Medicine, Philadelphia, PA, USA, Christina Klein, MD, Piedmont Transplant Institute, MD, Atlanta, GA, USA

8:45 pm **Ethical Issues in Pregnancy and Transplantation**
Brendan Parent, JD, NYU, Assistant Professor; Director of Transplant Ethics and Policy Research, New York, NY, USA

8:55 pm **Pro: Pre-transplant Pregnancy is Better**
Michelle Hladunewich, MD, FRCP(C), M.Sc., Sunnybrook Health Sciences Centre, Toronto, ON, Canada

9:05 pm **Con: Post-Transplant Pregnancy is Preferred**
Monika Sarkar, MD, MAS, UCSF, Associate Professor of Medicine, San Francisco, CA, USA

9:15 pm **Live Video Rebuttal, Question and Answer**

Expert VIP Meet Up

APP
8:45 pm - 9:30 pm

Stuck in the Middle: The Transition from Pediatric to Adult Care

Moderators: Beverly Kosmach-Park, DNP, RN, FAAN, Children's Hospital of Pittsburgh, Clinical Nurse Specialist, Clinical Assistant Professor of Surgery, Pittsburgh, PA, USA

8:45 pm **Stuck in the Middle: The Transition from Pediatric to Adult Care**
Danielle Krieger, MSN, NP-C, University of California at San Francisco, Nurse Practitioner, San Francisco, CA, USA

8:55 pm **Stuck in the Middle: The Transition from Pediatric to Adult Care**
Emily Fredericks, PhD, C.S. Mott Children's Hospital, Michigan Medicine, Professor of Pediatrics, Ann Arbor, MI, USA

9:15 pm **Live Video Question and Answer**

Expert VIP Meet Up

Ethics
8:45 pm - 9:30 pm

Amplifying the Patient's Voice in Transplant Research and Care: Guidance on Using Patient Reported Outcomes in Your Work

Moderators: Zeeshan Butt, PhD, Northwestern University Feinberg School of Medicine, Associate Professor of Medical Social Sciences, Surgery, and Psychiatry, Chicago, IL, USA, Larissa Myaskovsky, PhD, University of New Mexico, School of Medicine, Professor and Director, Center for Healthcare Equity in Kidney Disease (CHEK-D), Albuquerque, NM, USA

8:45 pm **How can Patient Reported Measures be used to Facilitate Transplant Educational Discussions and Evaluate Transplant Educational Interventions?**
John Peipert, PhD, Northwestern University, Assistant Professor, Chicago, IL, USA

8:55 pm **How can Patient-reported Outcomes be Useful Routine Clinical Patient Management?**
Istvan Mucsi, MD, PhD, Division of Nephrology and Multi-Organ Transplant Program

9:05 pm **Live Video Question and Answer**

Expert VIP Meet Up

Other
8:45 pm - 9:30 pm

The New Age Transplantation Professional

Moderators: Samira Farouk, MD, MSCR, FASN, Icahn School of Medicine at Mount Sinai, Assitant Professor of Medicine & Medical Education, New York, NY, USA, Joanna Schaenman, MD, PhD, David Geffen School of Medicine at UCLA

8:45 pm **Educating the Public about Transplant: Reversing Misconceptions**
Brianna Doby, BA, Johns Hopkins, OPO Community Consultant, Baltimore, MD, USA

8:55 pm **Rethinking Medical Education Through Innovation and Social Media**
Peter Chin-Hong, MD, University of California, San Francisco, Associate Dean for Regional Campuses and Professor of Medicine, San Francisco, CA, USA

9:05 pm **Live Video Question and Answer**

Expert VIP Meet Up

Prof Develop
8:45 pm - 9:30 pm

Write Better Research Grants: Tips from the Other Side

Moderators: Mandy Ford, PhD, Emory University, Atlanta, GA, USA, Lisa McElroy, MD, Duke University, Durham, NC, USA

8:45 pm **R01 Grants**
Daniel Kreisel, MD, PhD, Washington University St Louis, Professor of Surgery, St. Louis, MO, USA

8:55 pm **K Grants**
Maria-Luisa Alegre, MD PhD, University of Chicago, Professor of Medicine, Chicago, IL, USA

9:05 pm **Live Video Question and Answer**

AMERICAN TRANSPLANT CONGRESS
Day-at-a-Glance, Wednesday, June 9, 2021

All Live Broadcast Programs are in Eastern Time

8:45 am – 9:00 am	**Welcome**
9:00 am – 10:00 am	**IMPACT Sessions**
10:00 am – 10:30 am	**Break**
10:30 am – 11:30 am	**Controversies in Transplantation**
11:30 am – 12:00 pm	**Break**
12:00 pm – 12:45 pm	**What's Hot / What's New**

Welcome
8:45 am – 9:00 am

IMPACT Sessions
Small Bowel
9:00 am - 10:00 am

When is Multivisceral Transplant Indicated and When can it be Avoided
Moderators: Rodrigo Vianna, MD, University of Miami/Jackson Memorial Hospital, Director of Transplant Services, Miami, FL, USA, Jang Moon, MD, Mount Sinai Medical Center, Associate Professor of Surgery, New York, NY, USA

9:00 am **Extensive Porto-Mesenteric Thrombosis: Isolated Intestine Transplant or MVT?**
Alan Langnas, DO, University of Nebraska Medical Center, Omaha, NE, USA

9:10 am **The Patient with Pre-Transplant High DSA Titers - Is There a Role for MVT to Manage Immunogenicity?**
Debra Sudan, MD, Duke University Medical Center, Professor of Surgery, Durham, NC, USA

9:20 am **Multivisceral Transplant: Is it ever Necessary for Patients with well Compensated Cirrhosis and Hepatic Fibrosis?**
Kareem Abu-Elmagd, MD, PhD, Cleveland Clinic, Prof., Cleveland, OH, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Lung: Liver
9:00 am - 10:00 am

Lung and Liver Transplant in the Era of CFTR Modulator Therapies
Moderators: Josh Levitsky, MD, MS, northwestern, Professor of Medicine, Chicago, IL, USA, Maryam Valapour, MD, MPP, Cleveland Clinic

9:00 am **Dual-Organ Transplant - How Does Improving Pulmonary Function Impact Liver-Lung Transplant?**
Lindsay King, MD, MPH, Duke, Assistant Professor of Medicine, Durham, NC, USA

9:10 am **How Can CFTR Modulators Affect Referral to Lung Transplant and Be Used Post Transplant?**
Joseph Pilewski, MD, University of Pittsburgh

9:20 am **Considerations of CFTR Modulators and Transplant Medications**
Sara Strout, PharmD, Johns Hopkins Hospital, Cardiothoracic Transplant Clinical Pharmacist, Baltimore, MD, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions
Pancreas
9:00 am - 10:00 am

Broader Distribution of Pancreata Should Require Fewer Pancreas Transplant Programs
Moderators: Jose Oberholzer, MD, University of Illinois at Chicago, Director, Transplant Center, Charlottesville, VA, USA, Dixon Kaufman, MD, PhD, University of Wisconsin, Ray D. Owen Professor, Madison, WI, USA

9:00 am **A Debate Around Broader Distribution of Pancreata and Fewer Pancreas Transplant Programs**
Matthew Cooper, MD, MedStar Georgetown Transplant Institute, Director, Kidney and Pancreas Transplantation, Washington, DC, USA

9:10 am **Pro: Less Programs, Greater Resources, Greater Commitment, Better Patient Service**
Ty Dunn, MD, Univ. of Pennsylvania, Professor of Surgery, Philadelphia, PA, USA

9:20 am **Con: Less Programs, Less Options, Less Access, Poorer Patient Service**
Christian Kuhr, MD, Virgina Mason Medical Center, Surgical Director of Kidney/Pancreas Transplantation, Seattle, WA, USA

9:30 am **Live Video Rebuttal and Question and Answer**

IMPACT Sessions

Pediatric: Kidney
9:00 am - 10:00 am

Biomarkers of Immune Status after Pediatric Kidney Transplantation - the Yin/Yang of Rejection Versus Infection

Moderators: Katherine Twombley, MD, Medical University of South Carolina, Professor, Charleston, SC, USA, Joshua Blatter, MD, MPH, Washington University School of Medicine in St. Louis, Assistant Professor, Saint Louis, MO, USA

9:00 am **Urinary Biomarker Profiles in Children**
Brendan Keating, D.Phil, Univesity of Pennsylvania, Associate Professor of Transplant Research, Philadelphia, PA, USA

9:10 am **The Blood Gene Expression Profile - Are Children Different?**
Sarah Kizilbash, MD, MS, University of MInnesota, Assistant Professor, Minneapolis, MN, USA

9:20 am **Putting the Biomarkers Together - A Panel Approach**
Vikas Dharnidharka, MD, MPH, Washington University in St. Louis, Professor and Vice-Chair, Pediatrics, St. Louis, MO, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Basic
9:00 am - 10:00 am

Non-HLA Antibodies and Graft Rejection

Moderators: Mélanie Dieudé, PhD, Université de Montréal, Professor, Montréal, QC, Canada, Stanley Jordan, MD, Cedars Sinai Medical Ctr, Director Nephrology & Transplant Immunology Medical Director Kidney Transplant Program, West Hollywood, CA, USA

9:10 am **Clinical Relevance of Non-HLA Antibodies**
Dany Anglicheau, MD PhD, Department of Nephrolgy and Transplantation, Necker Hospital, Paris, France, Professor, Paris, France

9:20 am **Functional Properties of Non-HLA Antibodies**
Marie-Josee Hebert, MD, CHUM - Hospital Notre-Dame, Montreal, QC, Canada

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Translational
9:00 am - 10:00 am

Novel Imaging Techniques for Allorejection

Moderators: Geoffrey Camirand, PhD, University of Pittsburgh, Assistant Professor, Pittsburgh, PA, USA, Jonathan Bromberg, MD, PhD, University of Maryland School of Medicine, Professor of Surgery and Microbiology and Immunology, Baltimore, MD, USA

9:00 am **Live Imaging of T Cells and Rejection**
Martin Oberbarnscheidt, University of Pittsburgh, Pittsburgh, PA, USA

9:10 am **Quantifying in Situ Adaptive Immune Cell Cognate Interactions in Humans**
Marcus Clark, M.D., University of Chicago, Professor, Chicago, IL, USA

9:20 am **Live Video Question and Answer**

IMPACT Sessions

Other
9:00 am - 10:00 am

The Hidden Threat of Pulmonary Hypertension in Solid Organ Transplant Patients

Moderators: Helen Te, MD, Univ of Chicago Medicine, Professor of Medicine, Chicago, IL, USA, Salvatore Costa, MD, FACC, Dartmouth Hitchcock Medical Center, Associate Professor of Medicine, Hanover, NH, USA

9:00 am **Pulmonary Hypertension in the Transplant Candidate and Recipient: Diagnostic Challenges**
Deborah Levine, MD, UT San Antonio, Professor of Medicine, San Antonio, TX, USA

9:10 am **Pathophysiology of Pulmonary Hypertension in the Transplant Candidate: Understanding an Under-recognized Condition in Kidney, Liver and Lung transplant Candidates**
James Runo, MD, University of Wisconsin

9:20 am **Live Video Question and Answer**

IMPACT Sessions

Small Bowel
9:00 am - 10:00 am

Intestine Transplant: Strategies to Manage Disease Recurrence and Failure to Thrive

Moderators: Thiago Beduschi, MD, University of Florida, Chief of Transplantation and Hepatobiliary Surgery, Gainesville, FL, USA, Simon Horslen, MB, ChB, Seattle Childrens Hospital, Medical Director of Solid Organ Transplantation, Seattle, WA, USA

9:00 am **Metabolic and Renal Complications Post-Transplant**
Maria Cristina Segovia, MD, Duke University Hospital, Medical Director Intestine Transplant Program, Durham, NC, USA

9:10 am **Recurrence of Disease after Transplant: IBD, Thrombosis, Dysmotility**
Syed-Mohammed Jafri, MD, Henry Ford Health System, Doctor, Detroit, MI, USA

9:20 am **Management of Debility, TPN Dependence and Failure to Thrive after Transplant**
Thomas Fishbein, MedStar Georgetown Transplant Institute, Washington, DC, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Admin
9:00 am - 10:00 am

The Role of the US Federal Government in Solid Organ Transplantation

Moderators: Melissa Greenwald, MD, Chicago, IL, USA, Yolanda Becker, MD, University of Chicago, Professor of Surgery, CHICAGO, IL, USA

9:00 am **FDA involvement in Solid Organ Transplantation**
Scott Brubaker, Silver Spring, MD, USA

9:10 am **The Role of the CDC in Transplantation**
Sridhar Basavaraju, MD, CDC, Director-Office of Blood, Organ, and Other Tissue Safety, Atlanta, GA, USA

9:20 am **HRSA and Solid Organ Transplantation**
Marilyn Levi, MD, HRSA/Health Systems Bureau/Division of Transplantation, Physician, Washington, DC, USA

9:30 am **Live Video Question and Answer**

IMPACT Sessions

Women's Health
9:00 am - 10:00 am

Emerging Hot Topics in Pregnancy and Transplant

Moderators: Monika Sarkar, MD, MAS, UCSF, Associate Professor of Medicine, San Francisco, CA, USA, Patricia West-Thielke, PharmD, University of Illinois, Chicago, IL, USA

9:00 am **Pregnancy After Living Liver and Kidney Donation**
Krista Lentine, MD,PhD, Saint Louis University Medical Center, Professor, St. Louis, MO, USA

9:10 am **Immunosuppression Safety in Transplant: The Road Less Traveled**
Lisa Coscia, RN, BSN, CCTC, National Transplantation Pregnancy Regis, Senior Registry Research Coordinator, Philadelphia, PA, USA

9:20 am **Assisted Reproductive Technology After Transplant: Safe and Successful Options in Men and Women**
Kathleen O'Neill, MD, University of Pennsylvania, Assistant Professor, Philadelphia, PA, USA

9:30 am **Live Video Question and Answer**

10:00 am **Break**

Controversies in Transplantation

Public Policy
10:30 am - 11:30 am

Processes to Assure Referral of Patients with End Stage Organ Disease for Transplant Evaluation

Moderators: Matthew Cooper, MD, MedStar Georgetown Transplant Institute, Director, Kidney and Pancreas Transplantation, Washington, DC, USA, Benjamin Hippen, MD, Metrolina Nephrology Associates, PA, Transplant Nephrologist, Charlotte, NC, USA

10:30 am **We Don't Know What We Don't Know: Lack of Access to Kidney Waitlists and Transplantation**
Sumit Mohan, MD, MPH, Columbia University Medical Center

10:40 am **PRO - An Opt Out Referral System for Kidney Transplant Referral is the Solution**
Rachel Patzer, PhD, MPH, Emory University

10:50 am **CON- An Opt Out System for Kidney Transplant Referral will Overwhelm Transplant Programs and Without Significant Financial Support will Harm Patients and Transplantation**
Lloyd Ratner, MD, MPH, Columbia University, Professor of Surgery; Director - Renal & Pancreatic Transplantation, New York, NY, USA

11:00 am **Live Video Question and Answer**

Controversies in Transplantation

Basic: Translational
10:30 am - 11:30 am

Self-tolerance vs. Islet Transplantation

Moderators: Maria-Luisa Alegre, MD PhD, Univ of Chicago, Professor, Chicago, IL, USA, Peter Stock, MD, PhD, Univ of California-San Francisco, Professor of Surgery, San Francisco, CA, USA

10:30 am **Autoimmune Diabetes at the Crossroads - Where Do We Stand for Transplant Based Therapies?**
James Markmann, MD, PhD, Massachusetts General Hospital, Boston, MA, USA

10:40 am **PRO: Regulatory Tcells Are Ready for Prime Time in Autoimmune Diabetes (and Organ Transplantation)**
Ronald Gill, PhD, University of Colorado, Professor of Surgery, Aurora, CO, USA

10:50 am **CON: Islet Cell Therapy (Allogenic or Engineered) Is The Path Forward**
Kevan Herold, MD, Yale School of Medicine, New Haven, CT, USA

11:00 am **Live Video Question and Answer**

What's Hot / What's New

All Topics: All Organs
12:00 pm - 12:45 pm

Virtual Connect Abstract Highlights

12:05 pm **Clinical Abstracts**
Sylvester Black, MD, PhD, Ohio State University, Associate Professor of Surgery, Columbus, OH, USA

12:25 pm **Basic Abstracts**
Leonardo Riella, MD, PhD, Massachusetts General Hospital, Director of Kidney Transplantation, Boston, MA, USA

Plenary Oral Abstracts

All Topics

Plenary 1

1 **Donor Derived Transmissions 2019: Analysis of the OPTN Ad Hoc Disease Transmission Advisory Committee (DTAC)**
L. Danziger-Isakov[1], M. G. Michaels[1], A. Agarwal[1], S. Aslam[1], K. Dunn[1], J. Goldman[1], D. Levine[1], C. Marboe[1], G. Marklin[1], S. Pouch[1], M. Rana[1], R. Razonable[1], H. L. Stevenson[1], H. S. Te[1], A. Woolley[1], E. Ward[2], C. Jett[2], L. Cartwright[2], R. La Hoz[1], *[1]OPTN DTAC, Richmond, VA, [2]UNOS, Richmond, VA*

2 **Combined CD11b/CD40 Blockade is Superior to CD40 Blockade Alone in Prolonging Survival in Pig-to-Nonhuman Primate Renal Xenotransplantation**
D. A. Faber[1], B. Lovasik[1], A. Matar[1], C. Breeden[1], S. Kim[1], A. Adams[2], *[1]Surgery, Emory University School of Medicine, Atlanta, GA, [2]Surgery, University of Minnesota, Minneapolis, MN*

3 **Engineered Human Glomerular Endothelial Cells to Identify Non-hla Antibodies and Decipher Their Pathogenicity After Kidney Transplantation**
B. Lamarthée[1], C. Burger[1], C. Leclaire[1], L. Morin[1], F. Terzi[1], C. Tinel[1], D. Anglicheau[2], *[1]Inserm U1151, Necker-Enfants Malades Institute, PARIS, France, [2]Necker Hospital, AP-HP, Department of Nephrology and Kidney Transplantation, PARIS, France*

4 **Myeloid Foxo1-β-catenin Axis Regulates Hedgehog/Gli1 Signaling and Controls NLRP3-Mediated Innate Immune Responses in Sterile Inflammatory Liver Injury**
D. Xu, C. Li, M. Sheng, Y. Lin, Y. Tian, Y. Zhan, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, *Surgery, Dumont - UCLA Transplant Center, Los Angeles, CA*

Live Video Question and Answer

Plenary 2

99 **Trends in Mortality Among Solid Organ Transplant Recipients Hospitalized for Covid-19 During the Course of the Pandemic**
M. R. Heldman, O. S. Kates, R. M. Rakita, E. D. Lease, C. E. Fisher, A. P. Limaye, *University of Washington, Seattle, WA*

100 **Treg Engagement of Lymphotoxin Beta Receptor in Lymphatic Endothelial Cells is Required for Allograft Protection**
V. Saxena[1], W. Piao[1], L. Li[1], Y. Xiong[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

101 **DCD Heart Donation: Impact on Organ Yield**
K. Gauntt, B. Carrico, D. Klassen, *United Network for Organ Sharing, Richmond, VA*

102 **Anti-CD8 Immuno-PET for Non-invasive Tracking of Early Graft Rejection in a Non-human Primate Kidney Transplant Model**
K. Bruestle[1], R. Tavare[2], F. Fredriksson[1], E. Duggan[1], F. Huang[1], B. Bhola[1], J. Giurleo[2], R. Foster[2], P. Krueger[2], M. Dobosz[2], D. Ekanayake-Alper[1], H. Sakai[1], B. Piegari[1], J. Castrillion[1], S. M. Coley[1], O. Harari[2], A. Mintz[1], D. Ma[2], A. Griesemer[1], *[1]Columbia University Medical Center, New York City, NY, [2]Regeneron Pharmaceuticals, Inc, New York City, NY*

Live Video Question and Answer

Plenary 3

197 **Overall Survival by Best Overall Response with Tabelecleucel in Patients with Epstein-Barr Virus-Driven Post-Transplant Lymphoproliferative Disease After Solid Organ Transplant**
S. Prockop[1], L. Gamelin[2], R. Dinavahi[2], Y. Sun[2], N. Guzman-Becerra[2], H. Parmar[2], *[1]Memorial Sloan Kettering Cancer Center, New York, NY, [2]Atara Biotherapeutics, South San Francisco, CA*

198 **TIGIT Agonism Improves Immunosuppression of Cd8 T Cells by Ctla-4ig in a Treg Dependent Manner**
C. R. Hartigan, D. Liu, M. L. Ford, *Emory University Transplant Center, Emory University, Atlanta, GA*

199 **Donor-derived Cell-free DNA Distinguishes Acute Rejection from Other Causes of Graft Injury in Liver Transplant Recipients**
J. Levitsky[1], M. Miller[2], R. Sinha[2], E. Bixler[2], A. Al-Turck[2], J. Weems[2], M. Altrich[2], S. Kleiboeker[2], M. Abecassis[3], *[1]Gastroenterology & Hepatology; Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]Viracor Eurofins, Lees Summit, MO, [3]University of Arizona College of Medicine Tucson, Tucson, AZ*

200 **Measuring the Impact of Targeting FcRn-Mediated IgG Recycling on Donor-Specific Alloantibodies in a Sensitized NHP Model**
M. Manook[1], W. Flores[2], R. Schmitz[1], Z. Fitch[1], J. Yoon[1], Y. Bae[1], B. I. Shaw[1], M. Harnois[3], S. Permar[3], A. Kirk[1], D. Magnani[2], J. Kwun[1], S. Knechtle[1], *[1]Duke Transplant Center, Duke University Medical Center, Durham, NC, [2]Massbiologics, University of Massachusetts Medical School, Boston, MA, [3]Human Vaccine Institute, Duke University Medical Center, Durham, NC*

Live Video Question and Answer

Plenary 4

297 **Superior Post-transplant Clinical Outcomes Using Portable Normothermic Perfusion and Assessment with the Organ Care System (ocs) Liver System: 1-year Outcomes of the Ocs Liver Protect Randomized Controlled Trial**
J. Markmann[1], M. Abouljoud[2], M. Ghobrial[3], C. Bhati[4], S. Pelletier[5], J. Magliocca[6], T. Pruett[7], A. Lu[8], M. Rizzari[9], S. Ottmann[10], T. Klair[11], C. Eymard[12], G. Roll[13], G. Reyes[14], S. Black[15], S. Florman[16], S. Mirani[17], C. Marsh[18], G. Schnickel[19], M. Kinkhabwala[20], A. Demetris[21], H. Yeh[22], P. Vagefi[23], M. MacConmara[23], *[1]MGH, Boston, MA, [2]Henry Ford, Detroit, MI, [3]Houston Methodist, Houston, TX, [4]Virginia Commonwealth, Richmond, VA, [5]UVA, Charlottesville, VA, [6]Emory, Atlanta, GA, [7]U. Minnesota, Minneapolis, MN, [8]Tampa General, Tampa, FL, [9]Henry Ford, Detriot, MI, [10]Johns Hopkins, Baltimore, MD, [11]University of Texas HSC, San Antonio, TX, [12]University of Tennessee HSC, Memphis, TN, [13]UCSF, San Francisco, CA, [14]U. Washington, Seattle, WA, [15]Ohio State, Columbus, OH, [16]Mt. Sinai, New York, NY, [17]U. Nebraska, Omaha, NE, [18]Scripps Clinic, San Diego, CA, [19]U. San Diego, San Diego, CA, [20]Montefiore, New York, MA, [21]UPMC, Pittsburgh, PA, [22]Massachusetts General Hospital, Boston, MA, [23]UT Southwestern, Dallas, TX*

298 **Novel Discovery of Super-antigen That Mobilize Regulatory Cd8 T Cells Inhibits Donor-specific Antibody and Protects Heart Allografts from Antibody-mediated Rejection**
J. Y. Choi[1], H. Nakagawa[2], Z. Solhjou[1], K. Yatim[1], H. Zhang[3], P. Patel[3], M. Tawfeek Mohammed[3], L. Riella[4], H. Kim[2], H. Cantor[2], J. Azzi[1], *[1]Brigham and Women's Hospital/Harvard Medical School, Boston, MA, [2]Dana Farber Cancer Institute/ Harvard Medical School, Boston, MA, [3]Brigham and Women's Hospital, Boston, MA, [4]Massachusetts General Hospital/ Harvard Medical School, Boston, MA*

299 **Extreme Phenotype Sampling and Next Generation Sequencing to Identify Genetic Variants Associated with Tacrolimus Metabolism in African American Kidney Transplant Recipients**

C. R. Dorr[1], B. Guo[2], B. Wu[2], J. Abrahante[2], D. Schladt[3], R. Remmel[2], W. Guan[2], A. Muthusamy[3], G. Onyeaghala[3], N. Pankratz[2], A. Matas[2], R. Mannon[4], W. Oetting[2], P. Jacobson[2], A. K. Israni[3], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN, [3]Nephrology, Hennepin Healthcare Research Institute, Minneapolis, MN, [4]University of Nebraska Medical Center, Omaha, NE*

300 **Role of Ferroptosis Inhibitors in Mitigating Ischemia-Reperfusion Injury in Marginal Livers Using a Novel Protect Model**

M. D. Nazzal, J. Van Nispen, A. Armstrong, V. Murali, E. Song, M. Voigt, A. Samaddar, E. Madsen, C. Manithody, J. Krebs, D. Blackall, D. Carpenter, C. Varma, J. Teckman, A. Jain, *Saint Louis University, Saint Louis, MO*

Live Video Question and Answer

Poster Video Chat Abstracts

Admin

Quality Assurance Process Improvement & Regulatory Issues

437 **Results of the APP Practice Survey: Do APPs Practice at the Top of Their Scope of Practice?**

H. Domingo[1], D. Krieger[2], B. Muth[3], A. Frank[4], A. Borth[5], H. McDade[5], K. Paolini[6], A. Mayfield[5], M. Siegfired[7], J. Yoo[8], H. Hoy[9], N. McCormick[10], *[1]Northwestern University, Chicago, IL, [2]University of California-San Francisco, San Francisco, CA, [3]University of Wisconsin, Madison, WI, [4]Medstar Georgetown University, Annandale, VA, [5]University of Maryland, Baltimore, MD, [6]Erie County Medical Center, Grand Island, NY, [7]Swedish Organ Transplant, Seattle, WA, [8]Rush University, Chicago, IL, [9]University of Alabama - Huntsville, Huntsville, AL, [10]University of Colorado-Denver, Denver, CO*

438 **Covid-19 Incidence Was Initially Associated with Posttransplant Kidney Graft Failure**

A. Wey[1], J. Miller[1], D. Musgrove[1], N. Salkowski[1], M. Tabaka[1], R. Hirose[2], A. Massie[3], D. Segev[3], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Univ of San Francisco, San Francisco, CA, [3]Johns Hopkins, Baltimore, MD*

439 **Centre Variation in Emergency Hospital Readmissions Following Renal Transplantation in England**

J. Peracha[1], D. Pitcher[1], R. Steenkamp[1], J. Medcalf[2], G. Lipkin[3], D. Nitsch[4], W. McKane[5], *[1]UK Renal Registry, Bristol, United Kingdom, [2]John Walls Renal Unit, Leicester General Hospital, Leicester, United Kingdom, [3]University Hospitals Birmingham, Birmingham, United Kingdom, [4]London School of Hygiene and Trpoical Medicine, London, United Kingdom, [5]Sheffield Kidney Institute, Northern General Hospital, Sheffield, United Kingdom*

440 **Results of the Transplant Advance Practice Provider Survey: Opportunities for APPs to Contribute to Academic Pursuits**

B. Muth[1], D. Krieger[2], N. McCormick[3], M. Siegfired[4], H. Domingo[5], J. Yoo[6], A. Frank[7], K. Paolini[8], A. Mayfield[9], H. McDade[9], A. Borth[9], H. Hoy[10], *[1]University of Wisconsin, Madison, WI, [2]UCSF, San Francisco, CA, [3]University of Colorado, Denver, CO, [4]Swedish Organ Transplant, Seattle, WA, [5]Northwestern, Chicago, IL, [6]Rush, Chicago, IL, [7]Medstar Georgetown University, Annandale, VA, [8]Erie County Medical Center, Grand Island, NY, [9]University of Maryland, Baltimore, MD, [10]University of Alabama - Huntsville, Huntsville, AL*

441 **A Comparison of Pediatric Intestine Transplant Between the Current Era (2015-2019) and the Peak Period (2002-2006)**

S. Horslen[1], T. Weaver[2], M. Skeans[2], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN*

Live Video Question and Answer

All Organs

Organ Inclusive

455 **Impact of Machine Perfusion of the Heart on Abdominal Organ Procurement from Donation After Cardiac Death Donors**
C. Feizpour, C. Hwang, A. Shubin, J. Shah, L. DeGregoria, S. Hanish, P. Vagefi, M. MacConmara, *Department of Surgery, Division of Surgical Transplantation, University of Texas Southwestern Medical Center, Dallas, TX*

456 **Risk Classification Models for Kidney Graft Failure**
M. G. Naik[1], K. Budde[1], D. Telmo Neves[2], *[1]Medical Department, Division of Nephrology and Internal Intensive Care Medicine, Charité, Berlin, Germany, [2]Intelligent Analytics for Massive Data, German Research Center for Artificial Intelligence, Berlin, Germany*

457 **Associations of Mammalian Target of Rapamycin Inhibitors with Post-Transplant Malignancies and All-Cause Mortality: Cause-Specific Competing Risks and Composite Outcomes Analyses**
A. H. Santos[1], E. Bueno[1], M. A. Leghrouz[1], W. Xuerong[2], *[1]University of Florida, Gainesville, FL, [2]University of Rhode Island, Kingston, RI*

458 **Feasibility of Normothermic Ex Vivo Kidney Perfusion for Human Kidney Transplantation: First North American Results**
L. I. Mazilescu[1], P. Urbanellis[1], J. S. Kim[1], A. Konvalinka[1], T. W. Reichman[1], L. A. Robinson[2], A. Ghanekar[1], M. Selzner[1], *[1]Ajmera Transplant Program, Toronto General Hospital, Toronto, ON, Canada, [2]Department of Nephrology, The Hospital for Sick Children, Toronto, ON, Canada*

459 **Change in Deceased Donor Demographics with Drug Intoxication Deaths: 2010 - 2019**
D. Musgrove, D. Zaun, A. Israni, J. Snyder, *SRTR, Minneapolis, MN*

Live Video Question and Answer

Basic

Basic 1

442 **Atg16l-Dependent Autophagy Attenuates Procession of Renal Interstitial Fibrosis in Chronic Renal Graft Dysfunction via Regulating Tumor Necrosis Factor Alpha (tnf-α) Induced Endmt**
Z. Gui, Z. Wang, Z. Han, J. Tao, X. Ju, R. Tan, M. Gu, *The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

443 **Single-Cell RNA-seq Identifies Intra-Graft Population Heterogeneity in Acute Heart Allograft Rejection in the Mouse**
C. Wu[1], Y. Tang[1], X. Shi[1], X. He[1], X. Li[2], *[1]The First Affiliated Hospital,Sun Yat-sen University, Guangzhou, China, [2]Immunobiology & Transplant Sciences Houston Methodist Hospital, Houston, TX*

444 **Extracellular Matrix Injury of Kidney Allografts in Antibody-mediated Rejection**
S. Clotet Freixas[1], C. McEvoy[1], I. Batruch[2], C. Pastrello[3], M. Kotlyar[3], J. Van[1], M. Arambewela[1], A. Boshart[1], S. Farkona[1], Y. Niu[3], Y. Li[1], O. Famure[1], A. Bozovic[4], V. Kulasingam[4], P. Chen[1], J. S. Kim[1], E. Chan[5], S. Moshkelgosha[1], S. A. Rahman[6], J. Das[6], T. Martinu[1], S. Juvet[1], I. Jurisica[3], A. Chruscinski[1], R. John[1], A. Konvalinka[1], *[1]Toronto General Hospital Research Institute, University Health Network, Toronto, ON, Canada, [2]Department of Laboratory Medicine and Pathobiology, Lunenfeld-Tanenbaum Research Institute, Mount Sinai Hospital, Toronto, ON, Canada, [3]Krembil Research Institute, University Health Network, Toronto, ON, Canada, [4]Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, ON, Canada, [5]Department of Medicine, Division of Nephrology, University Health Network, Toronto, ON, Canada, [6]Center for Systems Immunology, University of Pittsburgh School of Medicine, Pittsburgh, PA*

445 **Laminin Alpha 4 and Alpha5 Differentially Regulate Lymph Node Tolerogenic Structure**

L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[1], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MD*

446 **Short-term Therapy with Anti-icam-1 Monoclonal Antibody Induced Long-term Liver Allograft Survival in Non-human Primates**

S. Hong[1], D. Han[2], S. Lee[2], J. Kim[3], E. Hwang[3], H. Kim[4], J. Lee[5], K. Hong[1], E. Han[1], J. Cho[1], J. Lee[1], Y. Choi[1], K. Lee[1], N. Yi[1], J. Yang[1], K. Suh[1], *[1]Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of, [2]Biomedical Research Institute, Seoul National University College of Medicine, Seoul, Korea, Republic of, [3]Microbiology and Immunology, Seoul National University College of Medicine, Seoul, Korea, Republic of, [4]Pathology, Seoul National University College of Medicine, Seoul, Korea, Republic of, [5]Medicine, Seoul National University College of Medicine, Seoul, Korea, Republic of*

Live Video Question and Answer

Basic 2

460 **Complement Blockade Improves Renal Xenograft Survival in Primates in the Absence of Transgenic Complement Regulatory Proteins**

D. A. Faber[1], B. Lovasik[1], A. Matar[1], C. Breeden[1], A. B. Farris[2], M. Tector[3], A. Tector[3], A. Adams[4], *[1]Surgery, Emory University School of Medicine, Atlanta, GA, [2]Pathology, Emory University School of Medicine, Atlanta, GA, [3]Surgery, University of Miami, Miami, FL, [4]Surgery, University of Minnesota, Minneapolis, MN*

461 **Exosomal DAMP Proteins Released During Islet Isolation Affects TPIAT Outcomes**

P. Saravanan, J. Kalivarathan, M. Levy, M. Kanak, *Hume Lee Islet Cell Transplantation Lab, Department of Surgery, VCU Health, Richmond, VA*

462 **Selective Regulatory T Cell Expansion by a Novel IL-2 Mutein Prolongs Skin Transplant Survival in Mice**

T. J. Borges[1], O. Effe[1], R. B. Gassen[1], A. Al Jurdi[1], I. T. Lape[1], G. J. Babcock[2], S. M. Carlson[2], J. C. Madsen[1], L. V. Riella[1], *[1]Center For Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Visterra, Inc., Waltham, MA*

463 **Allograft Function and Baseline Donor Derived Cell Free DNA in Kidney Transplant Recipients: One Size Doesn't Fit All**

K. K. Sureshkumar, A. Grazier, B. Chopra, *Allegheny General Hospital, Allegheny Health Network, Pittsburgh, PA*

464 **Single Cell RNA Sequencing of Tim1- B Cells and Tim1+ Regulatory B Cells**

Q. Fu[1], K. Lee[2], K. Deng[2], D. Agarwal[3], P. v. Galen[4], C. G. Rickert[2], G. Huai[2], H. Yang[1], C. LeGuern[2], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA, [3]Division of Transplantation, Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, [4]Division of Hematology, Brigham and Women's Hospital, Boston, MA*

Live Video Question and Answer

Biomarkers, Immune Assessment and Clinical Outcomes

393 **Utility of Screening-Bead Assay in Post-Transplant Testing of Donor-Specific Antibodies (DSA) and Antibody-mediated Rejection (ABMR) in Renal Allografts**

A. Agrawal[1], E. Dijke[2], A. Murray[3], P. Campbell[3], *[1]Transplant Nephrology, Mayo Clinic, Rochester, MN, [2]Lab. Medicine and Pathology, University of Alberta Hospital, Edmonton, AB, Canada, [3]Division of Nephrology, Dept. of Medicine, University of Alberta Hospital, Edmonton, AB, Canada*

394 **A Multimodal Interrogation of Human Renal Allografts**
D. Dadhania[1], R. Ding[1], H. Xu[2], C. Lee[1], C. Snopkowski[1], T. Salinas[1], T. Muthukumar[1], J. Lee[1], R. Woodward[2], M. Grskovic[2], S. Dholakia[2], M. Suthanthiran[1], *[1]Weill Cornell Medicine - NYPH, New York, NY, [2]CareDx, New York, NY*

395 **A Patient-Centered Perspective on Progress in Transplantation**
B. Hickner[1], N. Galvan[2], R. Cotton[2], C. O'Mahony[2], J. Goss[2], A. Rana[2], *[1]Department of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Department of Surgery, Baylor College of Medicine, Houston, TX*

396 **Peripheral Blood Inflammatory Chemokines Uncover Rejection in the Absence of Histological Lesions**
E. Van Loon[1], T. Barba[2], B. Lamarthée[1], A. Senev[1], O. Thaunat[2], D. Schols[3], M. Naesens[1], *[1]Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium, [2]Department of Transplantation, Nephrology and Clinical Immunology, Edouard Herriot Hospital Lyon, Lyon, France, [3]Laboratory of Virology and Chemotherapy, KU Leuven, Leuven, Belgium*

Live Video Question and Answer

Heart

Heart/LVAD: All Topics

403 **Clinical Features and Outcomes of Candidemia in Patients with Left Ventricular Assist Devices**
G. Krishnan, Y. Hamad, I. George, *Infectious Diseases, Washington University School of Medicine, St Louis, MO*

404 **Significance of Repeated 1r Rejections in Heart Transplantation**
C. Hsueh[1], L. Wilson[2], L. Bow[2], L. Bellumkonda[2], *[1]Yale New Haven Hospital, New Haven, CT, [2]Yale University School of Medicine, New Haven, CT*

405 **When is the Optimal Time to Initiate the Renal-Sparing Protocol with Calcineurin Inhibitor Withdrawal?**
N. Patel, M. Kittleson, J. Patel, T. Singer-Englar, S. Kim, D. Chang, B. Azarbal, A. Nikolova, L. Czer, F. Esmailian, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

406 **Are Pre-Transplant Diabetics on ACE Inhibitors at Risk for More Renal Dysfunction After Heart Transplantation?**
M. Kittleson, J. Patel, D. Chang, N. Patel, S. Kim, T. Singer-Englar, R. Skorka, A. Hage, L. Czer, F. Esmailian, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

407 **Management of Drug Interactions During Protocolized Implementation of Posaconazole Immediately Post Heart Transplant**
G. Waldman, C. Rogers Marks, J. Clark, A. Woo, L. Irwin, A. Gerlach, G. D. Lewis, J. A. Fishman, *Massachusetts General Hospital, Boston, MA*

Live Video Question and Answer

ID

Infectious Disease 1

447 **T-Cell Exhaustion in EBV DNAemic Solid Organ Transplant Recipients**
S. Kothari, T. Ku, D. Kumar, A. Humar, V. H. Ferreira, *Multi-Organ Transplant Program, University Health Network, Toronto, ON, Canada*

448 **Development of De Novo Antibody in Renal Transplant Recipients with BK Viremia Managed with Immunosuppression Reduction**
R. Hod Dvorai[1], R. Lee[2], P. Muluhngwi[2], M. Raijmakers[3], A. Shetty[2], A. Tambur[2], M. Ison[2], *[1]SUNY Upstate Medical University, Syracuse, NY, [2]Northwestern University, Chicago, IL, [3]University of Santiago, Santiago, Chile*

449 **De Novo Hepatitis B Infection Following Liver Transplant with Hepatitis B Core Antibody Positive Graft**

L. J. Myhre[1], K. D. Watt[2], B. A. Aqel[3], *[1]Pharmacy, Mayo Clinic, Rochester, MN, [2]Gastroenterology/Hepatology, Mayo Clinic, Rochester, MN, [3]Gastroenterology/Hepatology, Mayo Clinic, Phoenix, AZ*

Live Video Question and Answer

Infectious Disease 2

465 **Prevalence of Hepatitis E Virus Infection in Solid Organ Transplant Recipients: A Systematic Review and Meta-analysis**

P. Hansrivijit[1], A. Trongtorsak[2], B. Boonpheng[3], C. Thongprayoon[4], W. Cheungpasitporn[4], *[1]Department of Internal Medicine, UPMC Pinnacle, Harrisburg, PA, [2]Department of Internal Medicine, Amita Health Saint Francis Hospital, Evanston, IL, [3]Division of Nephrology, David Geffen School of Medicine, University of California, Los Angeles, CA, [4]Division of Nephrology and Hypertension, Mayo Clinic, Rochester, MN*

466 **Belatacept for Kidney Transplantation in the Age of Covid19, is it Safe?**

J. Pagan[1], S. Anjan[2], Y. Natori[3], A. Fernandez[3], R. Zamora-Gonzalez[2], A. Mattiazzi[1], L. Mendez[1], G. Guerra[1], *[1]Nephrology, University of Miami, Miami, FL, [2]Infectious Diseases, University of Miami, Miami, FL, [3]Infectious Disease, University of Miami, Miami, FL*

467 **Pre-transplant Lower Urinary Tract Dysfunction in Men is a Risk Factor for Adverse Outcomes Following Renal Transplantation**

M. J. Goldstein[1], B. R. Schleich[2], T. Carrea[1], Y. Yushkov[1], N. Cheng[3], R. Harrison[3], R. Munver[3], D. Fromer[3], *[1]Organ Transplant, Hackensack University Medical Center, Hackensack, NJ, [2]Patient Safety and Quality, Hackensack University Medical Center, Hackensack, NJ, [3]Urology, Hackensack University Medical Center, Hackensack, NJ*

468 **Impact of SARS-CoV 2 Infection on Graft Function in Kidney Transplant Recipients: An Academic Single Center Experience**

S. Nahi, A. Shetty, S. Tanna, J. Leventhal, *Northwestern University, Chicago, IL*

Live Video Question and Answer

Kidney

Kidney Alloimmune Responses

450 **Digital Spatial Mrna Profiling Reveals Distinct Endothelial Transcripts in Dsa+ and Dsa- Endarteritis in Kidney Allografts**

K. Tomaszewski[1], M. Araujo Medina[1], A. Bruce[1], P. Divakar[2], R. Smith[1], T. Kawai[3], R. Colvin[1], I. Rosales[1], *[1]Department of Pathology, Massachusetts General Hospital, Boston, MA, [2]NanoString Technologies, Inc., Seattle, WA, [3]Department of Surgery, Massachusetts General Hospital, Boston, MA*

451 **Endothelial-to-Myofibroblast Transition (en-mt) and Low Expression of Capillary Vegf Enhance the Development of Interstitial Fibrosis and Glomerulosclerosis Induced by Microvascular Destruction in Antibody-Mediated Rejection (abmr) Patients**

B. Ozdemir[1], E. Akcay[1], A. Ok Atilgan[1], M. Haberal[2], *[1]Department of Pathology, Baskent University, Ankara, Turkey, [2]Division of Transplantation, Department of General Surgery, Baskent University, Ankara, Turkey*

453 **A Comparison of Plasmapheresis Methods in the Treatment of Late Antibody Mediated Rejection**

Y. Caliskan[1], H. Yazici[2], A. B. Dirim[2], E. Aksoy[2], S. Safak[2], N. Garayeva[2], S. Mirioglu[2], O. Yegit[2], O. A. Oto[2], Y. Ozluk[3], S. Besisik[4], A. Turkmen[2], K. Lentine[1], *[1]Saint Louis University, Saint Louis, MO, [2]Division of Nephrology, Istanbul University, Istanbul, Turkey, [3]Department of Pathology, Istanbul University, Istanbul, Turkey, [4]Division of Hematology, Istanbul University, Istanbul, Turkey*

454 **Investigating the HLA Alloimmune Background of the Histological Changes Suggestive of Antibody-mediated Injury in the Absence of Donor-specific Anti-HLA Antibodies**
A. Senev, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

Live Video Question and Answer

Kidney Deceased Donor Allocation 1

398 **Donor-Recipient BSA Matching is Prognostically Significant in Solitary and En-bloc Kidney Transplantation from Pediatric Circulatory Death Donors**
C. J. Little, A. A. Dick, J. D. Perkins, J. D. Reyes, *Department of Surgery, University of Washington, Seattle, WA*

399 **Characterizing the Early Impact of the Kidney Accelerated Placement Project on Hard-to-place Kidneys**
J. D. Motter, A. Kernodle, M. Levan, D. Segev, J. Garonzik-Wang, A. Massie, *Johns Hopkins University, Baltimore, MD*

400 **Comparison of Outcomes of Hepatitis C Virus (hcv) Nucleic Acid (nat) Positive Donor Between Hcv-naïVe and Hcv + Recpients - A Donor Mate Analysis**
J. Kamal, B. Sharma, A. Doyle, A. Kumar, A. Nishio-Lucar, S. Rao, *University of Virginia, Charlottesville, VA*

401 **Centers Avoided 67% of Kidney Offers by Participating in the OPTN's Multifactorial Offer Filter Pilot Project**
A. Toll, H. McGehee, D. Stewart, R. McTier, *Research, United Network for Organ Sharing, Richmond, VA*

402 **Can Procurement Biopsy Data Tell Us Anything? The Influence of Glomerulosclerosis on Long-term Kidney Graft Survival**
D. Stewart[1], L. Kamal[2], J. Foutz[3], H. McGehee[3], P. Saravanane[2], S. Yu[2], R. Yousfi[2], G. Gupta[2], *[1]United Network for Organ Sharing, Richmond, VA, [2]Virginia Commonwealth University Health, Richmond, VA, [3]Research, United Network for Organ Sharing, Richmond, VA*

Live Video Question and Answer

Kidney Deceased Donor Allocation 2

422 **The Impact of Combined Warm and Cold Ischemia Times on Post Transplant Outcomes**
M. E. Foley[1], A. J. Vinson[2], K. K. Tennankore[2], *[1]Faculty of Medicine, Dalhousie University, Halifax, NS, Canada, [2]Division of Nephrology, Medicine, Dalhousie University/ Nova Scotia Health, Halifax, NS, Canada*

423 **Non-Invasive Measurement of Transplant Kidney Fibrosis Using Photoacoustic Imaging**
E. Hysi[1], X. He[1], A. Krizova[1], M. Ordon[1], K. T. Pace[1], M. Farcas[1], M. C. Kolios[2], D. A. Yuen[1], *[1]St. Michael's Hospital, Toronto, ON, Canada, [2]Ryerson University, Toronto, ON, Canada*

424 **Towards National Organ Sharing: Fair Distribution of Eplets in Canada**
S. Parto, B. Liu, W. Klement, S. Oikonomopoulos, I. Ragoussis, R. Sapir-Pichhadze, *McGill University, Montreal, QC, Canada*

425 **Effect of Multi-Organ Transplant Allocation on Pediatric Kidney Waitlist Candidates**
D. Shepherd, R. M. Engen, *Pediatric Nephrology, Ann & Robert H. Lurie Children's Hospital, Chicago, IL*

426 **Response to a Pandemic: The Fall and Rise of Kidney Transplantation in the US**
S. Bisen[1], B. Boyarsky[1], W. Werbel[1], J. Snyder[2], J. Garonzik-Wang[1], D. Segev[1], A. Massie[1], *[1]JHU, Baltimore, MD, [2]SRTR, Minneapolis, MN*

Live Video Question and Answer

Kidney Living Donor

469 **The Australian and New Zealand Living Kidney Donor Profile Index**

G. L. Irish[1], S. Chadban[1], N. Boudville[2], S. B. Campbell[3], J. Kanellis[4], P. A. Clayton[1], *[1]Australian and New Zealand Dialysis and Transplant Registry, South Australian Health and Medical Research Institute, Adelaide, Australia, [2]Medical School, University of Western Australia, Perth, Australia, [3]Department of Nephrology, Princess Alexandra Hospital, Brisbane, Australia, [4]Department of Nephrology, Monash Health, Melbourne, Australia*

470 **Recipient and Kidney Allograft Outcomes from Hypertensive Live-Donor in the United States**

S. Riad[1], S. Jackson[2], D. Vock[3], A. Matas[4], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Complex Care Analytics, M-Health Fairview, Minneapolis, MN, [3]School of Public Health, University of Minnesota, Minneapolis, MN, [4]Surgery, University of Minnesota, Minneapolis, MN*

471 **Managing the Costs of Routine Follow-up Care After Living Kidney Donation: A Survey of Contemporary Experience, Practice & Challenges**

K. Lentine[1], G. McNatt[2], R. Howey[3], C. Thomas[2], R. Hays[4], U. Lebron-Banks[5], S. Ainapurapu[1], A. Tietjen[6], *[1]Saint Louis University, Saint Louis, MO, [2]Univ. Iowa, Iowa City, IA, [3]Toyon Associates, Concord, CA, [4]Univ. Wisconsin, Madison, WI, [5]New York-Presbyterian Hosp., New York, NY, [6]St. Barnabas, Livingston, NJ*

472 **Compatible Paired Donation in Paired Kidney Exchange: A Look at the Road Not Taken**

G. Vranic, A. Gilbert, B. Thomas, S. Ghasemian, M. Cooper, J. Verbesey, *MedStar Georgetown Transplant Institute, Washington, DC*

473 **High Interest, Low Payoff: Understanding Opportunities for Intervention for Those Exploring but Not Pursuing Paired Kidney Donation**

A. D. Waterman[1], E. H. Wood[1], A. Thomas[2], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Johns Hopkins, Baltimore, MD*

Live Video Question and Answer

Liver

Liver 1

427 **Developing and Validation of a Liver Transplantation Donation After Cardiac Death Risk Index Using the UNOS Database**

L. Chau, K. Delvecchio, A. Mohamed, M. Lu, T. Kitajima, S. Yedulla, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Division of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

429 **Systematic Implementation of Alcohol Screening Program Using Urine Ethyl Glucuronide Can Identify Post-transplant Alcohol Use and Aid Return to Sobriety in Liver Transplant Recipients**

N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[1], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Division of Transplantation, University of Minnesota, Minneapolis, MN*

431 **Impact of Extended Living Donor Criteria on Donor Safety in Living Donor Liver Transplantation**

J. KIM, *Department of Surgery, Catholic University of Daegu College of Medicine, Daegu, Korea, Republic of*

Live Video Question and Answer

Liver 2

474 **Waitlist Outcomes for Patients with Hepatocellular Carcinoma Following the 2019 Exception Policy Change**

K. Young[1], C. Enestvedt[2], W. Naugler[1], E. Maynard[2], A. Mitra[1], M. Wungiranirun[1], J. Jou[1], J. Ahn[1], M. Chang[1], D. Lhewa[1], *[1]Division of Gastroenterology and Hepatology, OHSU, Portland, OR, [2]Division of Abdominal Organ Transplant, OHSU, Portland, OR*

475 **Severe Hypoxemia After Liver Transplantation in the Hepatopulmonary Syndrome**
J. Doi, M. Fujiki, G. DAmico, K. Sasaki, T. Diago, F. Aucejo, C. Kwon, B. Eghtesad, K. Hashimoto, C. Miller, Q. Cristiano, *Cleveland Clinic, Cleveland, OH*

476 **Long Term Survival After Liver Transplantation for Advanced, Unresectable Intrahepatic Cholangiocarcinoma**
R. R. McMillan[1], S. Kodali[1], M. Javle[2], A. Saharia[1], C. M. Mobley[1], M. J. Hobeika[1], A. Shetty[1], D. W. Victor[1], R. McFadden[1], M. Abdelrahim[1], K. Heyne[1], A. O. Gaber[1], R. M. Ghobrial[1], *[1]Houston Methodist Hospital, Houston, TX, [2]MD Anderson Cancer Center, Houston, TX*

477 **Should We Curtail the Importance of Non-modifiable Risk Factors in Dcd Liver Risk Stratification?**
R. Meier[1], Y. Kelly[2], S. Yamaguchi[2], H. Braun[2], T. Lunow-Luke[2], D. Adelmann[2], C. Niemann[2], D. Maluf[1], Z. Dietch[2], P. Stock[2], S. Kang[2], S. Feng[2], A. Posselt[2], J. Gardner[2], C. Freise[2], R. Hirose[2], C. Freise[2], N. Ascher[2], J. Roberts[2], G. Roll[2], *[1]University of Maryland, Baltimore, Baltimore, MD, [2]UCSF, San Francisco, CA*

478 **The Intersection of Cost, Quality, and Volume in Liver Transplant**
D. Axelrod[1], R. Balakrishnan[1], A. Harris[2], S. Hohmann[2], J. Snyder[3], B. Kasiske[3], M. Schnitzler[4], K. Lentine[4], *[1]Univ of Iowa, Iowa City, IA, [2]Vizient Inc., Irving, TX, [3]SRTR, Minneapolis, MN, [4]Saint Louis Univ, Saint Louis, MO*

Live Video Question and Answer

Lung

Lung Transplant Topics

432 **Pre Transplant Estimated Glomerular Filtration Rate and Other Predictors of Mortality and End Stage Kidney Disease After Lung Transplantation**
A. Kumar[1], L. N. Bonnell[2], C. Thomas[3], *[1]Internal Medicine, University of Vermont, Burlington, VT, [2]Department of General Internal Medicine Research, University of Vermont, Burlington, VT, [3]Internal Medicine, University of Iowa, Iowa City, IA*

433 **20 Year Survival Following Lung Transplantation**
R. M. Reul, Jr[1], S. Barrett[1], A. Alnajar[2], J. Dunson[1], P. S. Garcha[3], G. Loor[4], J. A. Goss[4], A. A. Rana[4], *[1]Office of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Department of Surgery, University of Miami Health System, Miami, FL, [3]Department of Medicine, Baylor College of Medicine, Houston, TX, [4]Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

434 **Basiliximab versus Alemtuzumab: The Association Between Induction Agent and Airway Complications Following Lung Transplantation**
M. Furukawa[1], E. G. Chan[1], T. Harano[1], J. Ryan[1], R. Rivosecchi[2], M. R. Morrell[1], P. G. Sanchez[1], *[1]Cardiothoracic Surgery, UPMC, Pittsburgh, PA, [2]PUH-Pharmacy, UPMC, Pittsburgh, PA*

435 **Sensitized Lung Candidates Experience Reduced Access to Donor Organs**
K. Lindblad[1], R. Goff[2], D. Stewart[2], *[1]UNOS, Richmond, VA, [2]UNOS, Richmnd, VA*

436 **Lung Transplant Recipients with Severe Acute Respiratory Syndrome-Coronavirus 2 Infection and Asymptomatic Carriers Waiting for Lung Transplantation Induce Circulating Exosomes with Severe Acute Respiratory Syndrome-Coronavirus 2 Spike Protein S2**
S. Bansal, S. Tokman, T. Fleming, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Live Video Question and Answer

Pancreas: Small Bowel

Pancreas & Small Bowel

408 **Do Pretransplant C-peptide Levels Influence Outcomes in Simultaneous Pancreas-Kidney Transplantation? A Matched Case-Control Study**
K. B. Gurung, V. Gurram, J. Rogers, A. C. Farney, G. Orlando, C. L. Jay, A. Reeves-Daniel, A. Mena-Gutierrez, N. Sakhovskaya, W. Doares, S. Kaczmorski, M. D. Gautreaux, R. J. Stratta, *Abdominal Transplant Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC*

409 **Peri-covid Trends on the Intestinal Transplant Waiting List**
M. L. Samoylova[1], S. Jafri[2], M. I. Fiel[3], S. Horslen[4], A. Mavis[5], T. Schiano[6], B. Summers[7], M. C. Segovia[8], *[1]Surgery, Duke University, Durham, NC, [2]Gastroenterology and Hepatology, Henry Ford Hospital, Detroit, MI, [3]Pathology, Mount Sinai, New York, NY, [4]Transplantation, Seattle Children's Hospital, Seattle, WA, [5]Pediatric Gastroenterology, Duke University, Durham, NC, [6]Hepatology, Mount Sinai Medical Center, New York, NY, [7]Pharmacy, Henry Ford Hospital, Detroit, MI, [8]Gastroenterology, Duke University, Durham, NC*

410 **Prevalence of Diabetic Changes on Kidney Allograft Biopsies of Normoglycemic Simultaneous Pancreas-Kidney Transplant Recipients**
C. Mejia, G. Giannini, D. C. Brennan, A. Rosenberg, S. Alasfar, *Johns Hopkins University, Baltimore, MD*

411 **Evaluation of Preperitoneal Space as an Extrahepatic Transplant Site in Clinical Total Pancreatectomy with Islet Autotransplantation**
K. Kumano, B. Naziruddin, S. Bruer, G. Saracino, M. Lawrence, G. Testa, A. Gupta, E. Beecherl, N. Onaca, *Baylor University Medical Ctr, Dallas, TX*

412 **Simultaneous Pancreas-Kidney Transplantation in Caucasian versus African American Patients: Does Recipient Ethnicity Influence Outcomes?**
J. Rogers[1], A. Farney[2], G. Orlando[2], C. Jay[2], K. Gurung[2], B. Sharda[2], A. Reeves-Daniel[3], A. Mena-Gutierrez[3], N. Sakhovskaya[3], W. Doares[4], S. Kaczmorski[4], M. Magid[4], M. Gautreaux[2], R. Stratta[2], *[1]Wake Forest Baptist Medical Center, Winston-Salem, NC, [2]Department of Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC, [3]Internal Medicine, Wake Forest Baptist Medical Center, Winston-Salem, NC, [4]Department of Pharmacy, Wake Forest Baptist Medical Center, Winston-Salem, NC*

Live Video Question and Answer

Pharmacy

Pharmacokinetics, Pharmacogenetics, and Drug Interactions, Oh My!

418 **Higher Number of Tacrolimus Dose Adjustments and Trough Level Measurements in Kidney Transplant Recipients with CYP3A5*1 Alleles**
K. Reininger[1], G. Onyeaghala[2], T. Anderson-Haag[1], B. Wu[2], W. Guan[2], C. R. Dorr[2], R. Remmel[2], R. Mannon[3], A. Matas[2], W. Oetting[2], A. Israni[1], P. Stahler[1], P. Jacobson[2], *[1]Hennepin County Medical Center, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN, [3]University of Nebraska Medical Center, Omaha, NE*

419 **The Impact of De Novo Dose-Adjustment Strategies with Tacrolimus XR (LCP-Tac) in Kidney Transplant Recipients**
T. Carcella, F. Bartlett, N. Patel, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

420 **Managing the Significant Drug-Drug Interaction Between Tacrolimus and Letermovir in Solid Organ Transplant Recipients**
J. Hedvat, J. Choe, D. Salerno, J. Scheffert, D. Bley, A. Anamisis, T. Shertel, J. Lee, E. Liu, N. W. Lange, *NewYork-Presbyterian Hospital, New York, NY*

421 **Tacrolimus Therapeutic Exposure is Not Consistently Predicted by Target Troughs or CYP3A5 Variants in Stable Renal Transplant Recipients**
K. Tornatore[1], K. Attwood[2], D. Brazeau[3], B. Murray[4], *[1]Pharmacy Practice, School of Pharmacy; University at Buffalo, Buffalo, NY, [2]Biostatistics, School of Public Health; University at Buffalo, Buffalo, NY, [3]Pharmacy Practice, School of Pharmacy; Marshall University, Huntington, WV, [4]Medicine, Erie County Medical Center Corp., Buffalo, NY*

Live Video Question and Answer

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Adherence, Economics, and Ethics

413 **Early Outcome of Heart-Kidney Transplantation in the Current Heart Allocation System in the United States**
S. Rao[1], A. Doyle[1], D. Brennan[2], S. Constantinescu[3], *[1]University of Virginia, Charlottesville, VA, [2]Johns Hopkins Medical Institute, Baltimore, MD, [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA*

414 **Liver Simulated Allocation Model Does Not Accurately Predict Organ Offer Decisions in Pediatric Liver Transplant Candidates**
N. L. Wood[1], D. B. Mogul[2], E. K. Hsu[3], E. R. Perito[4], G. V. Mazariegos[5], D. Vanderwerken[1], D. L. Segev[2], S. Gentry[1], *[1]US Naval Academy, Annapolis, MD, [2]Johns Hopkins, Baltimore, MD, [3]Univ of Washington, Seattle, WA, [4]UCSF, San Francisco, CA, [5]Univ of Pittsburgh, Pittsburgh, PA*

415 **Impact of Covid-19 in Transplant Care: Attitudes, Feeling and Behaviors of Liver, and Kidney Pre and Post Transplant Patients**
J. Ramos-Ayes, *Beth Israel Deaconess Medical Center, Boston, MA*

416 **Influence of Frailty on Psychometric Factors and Health-related Quality of Life in Patients on the Waitlist for Liver Transplantation**
C. G. Klein, J. Latuske, E. Malamutmann, A. Paul, A. Oezcelik, *University Medicine Essen, Essen, Germany*

417 **Psychosocial Factors Influencing Patients' Decision Making About Upper Extremity Vca**
B. Kuramitsu[1], J. Gacki-Smith[1], A. Ferzola[2], K. Vanterpool[2], C. Kunkle[3], M. Hewitt[3], A. Schultheis[3], T. Riggleman[3], J. Taylor[3], C. Cooney[2], M. Levan[2], S. Tintle[3], G. Brandacher[2], E. Gordon[1], *[1]Northwestern University, Chicago, IL, [2]Johns Hopkins University, Baltimore, MD, [3]Walter Reed National Military Medical Center, Bethesda, MD*

Live Video Question and Answer

VCA

VCA: Basic and Clinical

390 **A Delphi Panel to Develop Public Educational Materials About Vascular Composite Allotransplantation (VCA)**
C. Sidoti[1], A. Ferzola[2], H. Sung[2], S. Rasmussen[2], E. Gordon[3], N. Anderson[3], J. Uriarte[3], C. Cooney[4], G. Brandacher[4], M. Levan[2], *[1]Department of Surgery, Johns Hopkins School of Medicine, East Islip, NY, [2]Department of Surgery, Johns Hopkins School of Medicine, Baltimore, MD, [3]Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, [4]Department of Plastic and Reconstructive Surgery, Johns Hopkins School of Medicine, Baltimore, MD*

392 **Trends in Vascularized Composite Allograft (VCA) Waiting List and Transplant Activity in the U.S**
J. Wainright[1], K. Swanner[2], W. Cherikh[1], D. Klassen[3], *[1]Research, UNOS, Richmond, VA, [2]Policy and Community Relations, UNOS, Richmond, VA, [3]Office of the Chief Medical Officer, UNOS, Richmond, VA*

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201 **Automated Electronic Donor Referrals Have Increased Transplantation**
J. Piano, *Transplant Connect, Santa Monica, CA*

202 **The Initial Impact of Covid-19 on Reported Graft Failure Rates and Potential Confounding of Srtr Psrs**
A. Wey[1], J. Miller[1], D. Musgrove[1], Y. Ahn[1], M. Valapour[2], N. Salkowski[1], M. Skeans[1], A. Massie[3], R. Hirose[4], D. Segev[3], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Cleveland Clinic, Cleveland, OH, [3]Johns Hopkins, Baltimore, MD, [4]Univ of California, San Francisco, San Francisco, CA*

203 **The Effect of Covid-19 on Offer Acceptance Rates by Age and Race Groups**
A. Wey[1], J. Miller[1], Y. Ahn[1], D. Musgrove[1], A. Hart[1], N. Salkowski[1], M. Skeans[1], R. Hirose[2], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Univ of San Fransico, San Francisco, CA*

204 **Covid-19 Impact of the Pandemic Surge on Patients Waiting for Renal Transplantation at a Single New York City Transplant Center**
G. Boyd, D. Tsapepas, R. Bonifacio, L. Brinkers, C. Brennan, A. Chang, M. Dalangin, L. Lowe, J. K. Mendoza, J. V. Mendoza, C. McNulty, M. Morris, M. Muttiah, K. Nickason, L. Ratner, *Transplant, NYP - Columbia University Medical Center, New York, NY*

205 **Impact of Lung Allocation Score Cohort Update**
M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH*

206 **Effective Patient Throughput on the Transplant Surgery Service**
E. M. Thomas[1], P. K. Shah[1], S. Beasley[2], A. Saad[1], M. Rani[1], F. Cigarroa[1], *[1]UT Health San Antonio, San Antonio, TX, [2]University Health, San Antonio, TX*

207 **The Learning Curve Associated with De Novo Tacrolimus XR Use in a Racially Diverse Kidney Transplant Population**
F. Bartlett, T. Carcella, N. Patel, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

208 **Early Stent Removal in Kidney Transplant Recipients - A Quality Improvement Project**
V. Rohan, N. Pilch, M. Altiti, S. Nadig, A. Lin, D. DuBay, P. Baliga, *Surgery, Medical University of South Carolina, Charleston, SC*

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All Organs

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281 **Initial Kidney Transplant Evaluations with Telehealth: Is it a Pandemic Only Practice?**
A. Govil[1], E. Tims[2], C. Siemer[2], J. Harris[2], C. King[2], S. Shah[1], C. Thakar[1], *[1]Univ of Cincinnati, Cincinnati, OH, [2]UC Health, Cincinnati, OH*

282 **Low Socio-economic Status is Associated with Lower Kidney Graft Survival and Increased Risk of Graft Failure Due to Acute Rejection**
W. Xie[1], G. Vrakas[1], S. H. Gray[1], A. Haririan[2], J. R. Scalea[1], J. S. Bromberg[1], D. G. Maluf[1], R. P. Meier[1], *[1]Department of Surgery, University of Maryland School of Medicine, Baltimore, MD, [2]Department of Medicine, University of Maryland School of Medicine, Baltimore, MD*

283 **Geospatial Analysis of Organ Procurement Organizations and Its Impact on Organ Donation Rates**
D. Chyou[1], K. Ross-Driscoll[2], R. Lynch[2], D. S. Goldberg[1], *[1]University of Miami, Miami, FL, [2]Emory University School of Medicine, Atlanta, GA*

284 **Obesity is Associated with Greater Gender Disparity in Access to Kidney Transplantation**
S. S. Sheikh, B. Orandi, P. MacLennan, H. Qu, R. M. Cannon, D. Anderson, M. Hanaway, S. Mehta, V. Kumar, R. Reed, J. Locke, *Surgery, University of Alabama at Birmingham, Birmingham, AL*

285 **Age and Racial Disparities in Access to Re-kidney Transplantation**
S. S. Patole[1], J. Ahn[1], S. Sandal[2], D. Segev[1], M. McAdams Demarco[3], *[1]Department of Transplantation Surgery, Johns Hopkins School of Medicine, Baltimore, MD, [2]McGill University, Montreal, QC, Canada, [3]Department of Epidemiology, Johns Hopkins School of Medicine, Baltimore, MD*

286 **Impact of a Latinx Kidney Transplant Clinic**
P. Serrano Rodriguez, *Abdominal Transplant Surgery, University of North Carolina at Chapel Hill, Chapel Hill, NC*

287 **Disparities in Access to Listing in Rural Populations Post-KAS Implementation**
S. H. Nguyen[1], R. R. Redfield[2], N. Neidlinger[1], D. P. Foley[1], D. B. Kaufman[1], J. T. Adler[3], *[1]Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI, [2]Department of Surgery, University of Pennsylvania, Philadelphia, PA, [3]Department of Surgery, Brigham and Women's Hospital, Boston, MA*

288 **Rural Dialysis Facilities are Associated with Better Dialysis Quality but Less Home Dialysis Use**
J. T. Adler[1], L. Xiang[1], S. S. Waikar[2], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Medicine, Boston Medical Center, Boston, MA*

Live Video Question and Answer

Disparities in Access and Machine Learning Outcomes in Solid Organ Transplantation

309 **A Fresh Look at Urbanicity and Its Impact on Additions to the Kidney and Liver Transplant Wait Lists**
W. R. Johnson, S. A. Rega, I. D. Feurer, S. J. Karp, *General Surgery, Vanderbilt University Medical Center, Nashville, TN*

310 **Racial and Sexual Disparities in Solid Organ Transplant Outcomes Since Implementation of the Affordable Care Act Insurance Expansion Across Some States**
H. Mohamed[1], C. Conceicao[2], A. Kumar[1], J. Buggs[3], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL*

311 **The Impact of the Covid-19 Pandemic on Measures of Transplant Activity is Higher in Lower-Income Countries: A Multinational Survey Study**
S. Sandal[1], B. Boyarsky[2], P. Chiang[2], A. Massie[2], D. Segev[2], M. Cantarovich[1], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

312 **Black Patients with Cirrhosis Have Longer Length of Stay and Higher Mortality When Hospitalized**
A. Thomas[1], D. Simpson[2], D. P. Ladner[2], R. Berkowitz[2], *[1]ACS Clinical Scholar, Chicago, IL, [2]Transplant Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL*

313 **Prediction of Renal Allograft Tolerance by Machine Learning**
Q. Fu[1], K. Deng[2], H. Yang[1], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA*

314 **The Role of Pre-transplant Rectal Screening for Azole-resistant Candida Species in Liver Transplant Candidates**
K. K. Patel[1], M. M. Azar[2], A. Koff[3], K. Belfield[4], D. R. Peaper[5], J. Topal[2], M. Malinis[2], *[1]Yale School of Medicine, New Haven, CT, [2]Section of Infectious Diseases, Yale School of Medicine, New Haven, CT, [3]Section of Infectious Diseases, UC Davis, Sacramento, CA, [4]Department of Pharmacy, Yale New Haven Hospital, New Haven, CT, [5]Department of Laboratory Medicine, Yale School of Medicine, New Haven, CT*

315 **A Machine Learning-Based Predictive Model for Outcome of Covid-19 in Kidney Transplant Recipients**

I. Revuelta[1], F. Santos-Arteaga[2], D. Di Caprio[3], E. Montagud-Marrahi[1], F. Cofan[1], J. Torregrosa[1], M. Bodro[4], A. Moreno[4], P. Ventura-Aguiar[1], D. Cucchiari[1], N. Esforzado[1], G. Piñeiro[1], J. Ugalde-Altamirano[1], J. Campistol[1], A. Alcaraz[5], B. Bayès[1], E. Poch[1], F. Oppenheimer[1], F. Diekmann[1], *[1]Department of Nephrology and Kidney Transplant, Hospital Clinic, Barcelona, Spain, [2]Faculty of Economics and Management, Free University of Bolzano, Bolzano, Italy, [3]Department of Economics and Management, University of Trento, Trento, Italy, [4]Department of Infectious Diseases, Hospital Clinic, Barcelona, Spain, [5]Department of Urology, Hospital Clinic, Barcelona, Spain*

316 **Improving Policy-constrained Kidney Exchange via Pre-screening**

D. C. McElfresh[1], M. Curry[2], S. Booker[3], M. Stuart[3], D. Stewart[3], R. Leishman[3], T. Sandholm[4], J. Dickerson[2], *[1]Applied Mathematics, University of Maryland, College Park, MD, [2]University of Maryland, College Park, MD, [3]United Network for Organ Sharing, Richmond, VA, [4]Carnegie Mellon University, Pittsburgh, PA*

Live Video Question and Answer

Surgical Issues and Deceased Donor Management

374 **Cleveland Clinic Experience with Cadaveric Uterus Transplant**

L. Del Prete[1], C. Quintini[1], K. Hashimoto[1], B. Eghtesad[1], G. D'Amico[1], C. Kwon[1], D. Priebe[1], E. Richards[1], S. Ricci[1], U. Perni[1], C. Ferrando[1], A. Chiesa-Vottero[1], S. Mawhorter[1], N. Yeaney[1], R. Farrell[1], R. Flyckt[2], C. Miller[1], T. Falcone[1], A. Tzakis[1], *[1]Cleveland Clinic, Cleveland, OH, [2]University Hospital, Cleveland, OH*

375 **Pilot Study for the Use of Shortened Preemptive Therapy with Glecaprevir/pibrentasvir (g/p) and Ezetimibe in Hepatitis C Seronegative Solid Organ Transplant Recipients (Kidney and Heart) of Hepatitis C Viremic Donors**

B. Aqel[1], H. Khamash[2], A. Moss[3], D. E. Steidley[4], R. C. Dickson[1], *[1]Gastroenterology and Hepatology, Mayo Clinic, Phoenix, AZ, [2]Nephrology and Hypertension, Mayo Clinic, Phoenix, AZ, [3]Transplant Surgery, Mayo Clinic, Phoenix, AZ, [4]Cardiology, Mayo Clinic, Phoenix, AZ*

376 **Donor Service Area Characteristics Impacting Liver and Kidney Deceased Donor Population**

C. O. Warren, A. Zarrinpar, *Surgery, -University of Florida, Gaiinesville, FL*

377 **Drones and Airplanes: Modeling the Potentially Deleterious Effects of Transportation on Shipped Organs**

Y. S. Lee, J. S. Bromberg, J. R. Scalea, *Surgery, University of Maryland, Baltimore, MD*

378 **Primary Uretero-ureterostomy in Renal Transplantation**

H. Shokouh-Amiri[1], M. S. Naseer[1], D. Aultman[1], R. McMillan[1], S. Tandukar[2], F. T. Siskron[3], N. Singh[2], G. Zibari[1], *[1]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [2]Transplant Nephrology, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [3]Urology, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA*

379 **Robotic Donor Nephrectomy: Advantages Offered by a Minimally Invasive Approach to Kidney Transplantation**

A. Popovic[1], R. Shahbazov[1], A. Hoste[1], S. Loerzel[1], B. Gallay[2], J. Leggat[2], O. Pankewycz[1], R. Saidi[1], R. H. Dvorai[3], M. J. Hanlon[1], S. Narsipur[2], M. R. Laftavi[1], *[1]Surgery, SUNY Upstate Medical University, Syracuse, NY, [2]Medicine, SUNY Upstate Medical University, Syracuse, NY, [3]Pathology, SUNY Upstate Medical University, Syracuse, NY*

380 **Does the NSQIP-Transplant Experience Demonstrate That Obese Kidney Transplant Recipients are Still at Increased Risk for Surgical Site Infections?**

H. C. Yaffe[1], A. K. Belli[1], J. R. Parekh[2], D. L. Sudan[3], N. Elias[4], K. D. Conzen[5], D. P. Foley[6], R. Hirose[7], S. M. Greenstein[1], *[1]Surgery, Montefiore-Einstein Center for Transplantation, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY, [2]Surgery, University of California San Diego, San Diego, CA, [3]Surgery, Division of Abdominal Transplant Surgery, Duke University Medical Center, Durham, NC, [4]Surgery, Transplant Surgery Division, Massachusetts General Hospital, Boston, MA, [5]Surgery, Division of Transplant Surgery, University of Colorado Hospital, Aurora, CO, [6]Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI, [7]Surgery, University of California San Francisco, San Francisco, CA*

381 **Successful Long Term Survival of Vascularized Composite Allografts After Extended Preservation at Subzero Temperatures Using Bioinspired Next Generation Cryoprotectants**

M. Kline[1], S. Fidder[2], A. Callegari[1], A. Matoso[2], B. Oh[2], K. Lombardo[2], J. Etra[2], D. Vasilic[3], A. Childs[1], R. Redett[2], G. Brandacher[2], X. Wei[1], *[1]X-Therma Inc., Richmond, CA, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]Erasmus MC, Rotterdam, Netherlands*

Live Video Question and Answer

Late Breaking: All Organs

LB 17 **Primary Outcome of OPTIMAL: A Prospective Multicenter Trial of Immunosuppression Withdrawal (ISW) in Stable Adult Liver Transplant (LT) Recipients**

S. Chandran[1], K. Mason[2], L. F. Sun[1], N. Tanimine[3], M. DesMarais[1], B. Burrell[1], J. F. Markmann[3], *[1]ITN, San Francisco, CA, [2]Rho, Inc., Durham, NC, [3]MGH, Boston, MA*

LB 18 **Survival After Heart Transplant vs. Simultaneous Heart Kidney Transplant by Degrees of Renal Dysfunction at Engraftment in the United States: A Multivariable Analysis**

S. M. Riad[1], M. Aljuhani[1], S. Jackson[2], T. Alexy[1], H. Wadie[3], C. Martin[1], R. Kandaswamy[4], *[1]Medicine, University of Minnesota, Eden Prairie, MN, [2]Complex Care Analytics, Fairview Health Services, Minneapolis, MN, [3]Transplant, Mayo Clinic, Jacksonville, FL, [4]Surgery, University of Minnesota, Minneapolis, MN*

LB 19 **Relationship Between %dd-cfDNA, MMDx Molecular Diagnoses, and Donor-specific Antibody in the Trifecta Study**

P. F. Halloran[1], L. G. Hildago[2], J. Reeve[1], Z. Demko[3], A. Prewett[3], P. Billings[3], J. Truong[4], P. Vander Horn[4], &. Trifecta Study Group[5], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]University of Wisconsin, Madison, WI, [3]Natera Inc., San Carlos, CA, [4]One Lambda Inc., West Hills, CA, [5]AB, Canada*

LB 20 **Disparities in Living Donor Follow-up During the COVID-19 Emergency Suspension of OPTN Follow-up Reporting Requirements**

S. E. Booker, A. Henderson, L. A. Cartwright, S. Taranto, D. Klassen, J. L. Wainright, *UNOS, Richmond, VA*

LB 21 **Kidney Programs Can Filter Off a Majority of Their Unwanted Organ Offers without Harming Transplant Volumes**

A. Toll, H. McGehee, R. McTier, D. Stewart, *Research, United Network for Organ Sharing, Richmond, VA*

LB 22 **Athena - Effect of Primary Immunosuppression on Development of De Novo Donor Specific Antibodies within First Year After Kidney Transplantation**

W. Arns[1], A. Philippe[1], V. Ditt[1], I. A. Hauser[1], F. Thaiss[1], C. Sommerer[1], B. Suwelack[1], A. Finkel[2], C. Schiedel[2], D. Dragun[1], B. Nashan[1], *[1]ATHENA, Study Group, Germany, [2]Novartis Pharma GmbH, Nuremberg, Germany*

LB 23 **Predicted Heart Mass Difference as a Risk Factor for Severe Primary Graft Dysfunction in the Contemporary Era of Heart Transplantation: A Report from the International Consortium on Primary Graft Dysfunction**
F. Foroutan[1], L. K. Truby[2], Y. Moayedi[1], J. Han[3], J. Guzman[4], M. Farrero[4], E. Baughan[5], M. Farr[5], H. Zafar[6], J. Felius[6], J. van Zyl[7], D. Law[8], S. Chih[8], P. Angleitner[9], M. Sabatino[10], A. DeVore[2], R. J. Miller[11], L. Potena[10], A. Zuckermann[9], K. K. Khush[3], S. A. Hall[6], H. J. Ross[1], *[1]Ted Rogers Centre for Heart Research, Toronto, ON, Canada, [2]Duke University School of Medicine, Durham, NC, [3]Stanford University, Stanford, CA, [4]Clinic Barcelona Hospital Universitari, Barcelona, Spain, [5]Columbia University Medical Center, New York, NY, [6]Baylor University Medical Center, Dallas, TX, [7]Dallas University Medical Center, Dallas, TX, [8]University of Ottawa Heart Institute, Ottawa, ON, Canada, [9]Medical University of Vienna, Vienna, Austria, [10]Bologna University Hospital, Bologna, Italy, [11]University of Calgary, Calgary, AB, Canada*

LB 24 **Liver Transplantation for COVID-19-associated Cholangiopathy**
J. Blondeel[1], P. Meersseman[2], N. Gilbo[1], I. Jochmans[1], M. Sainz-Barriga[1], J. Pirenne[1], D. Monbaliu[1], *[1]Abdominal Transplantation Surgery, University Hospitals Leuven, Leuven, Belgium, [2]Medical Intensive Care Unit, University Hospitals Leuven, Leuven, Belgium*

Live Video Question and Answer

Basic

B cell/Antibody and Histocompatibility

209 **The Role of Notch2 in Antibody-mediated Alloimmune Response**
R. Benedetti Gassen[1], N. Murakami[2], T. J Borges[1], A. Al Jurdi[1], A. Alessandrini[1], L. V Riella[1], *[1]Center of Transplantation Science, Massachusetts General Hospital, Boston, MA, [2]Brigham and Women's Hospital, Boston, MA*

210 **Marginal Zone B Cells Support Donor-Specific Alloantibody Responses to Heart Allografts**
V. Gorbacheva, R. Fan, W. Baldwin, R. Fairchild, A. Valujskikh, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

211 **Acoustofluidic Device to Remove Donor Specific Antibody in a Sensitized Animal Model**
J. Kwun[1], E. David[2], Y. Gu[3], Z. Ma[3], M. Kuchibhatla[4], G. Arepally[5], T. J. Huang[3], E. T. Chambers[2], *[1]Surgery, Duke University, Durham, NC, [2]Pediatrics, Duke University, Durham, NC, [3]Biomedical Engineering, Duke University, Durham, NC, [4]Biostatistics and Bioinformatics, Duke University, Durham, NC, [5]Internal Medicine, Duke University, Durham, NC*

212 **Cd4 T Cells Can Trigger Nk-dependent Chronic Rejection Independent of Antibodies**
R. G. Gill[1], B. Mehrad[2], C. M. Lin[2], *[1]Surgery, University of Colorado Denver, Aurora, CO, [2]Medicine, University of Florida, Gainesville, FL*

213 **Blood Type A2/a2b to B Renal Transplantation: A Single Center Retrospective Cohort Study**
V. S. Tatapudi, N. Alnazari, R. Chand, N. M. Ali, B. E. Lonze, R. A. Montgomery, *NYU Langone Transplant Institute, NYU Langone Health, New York, NY*

214 **Low Immunogenic Donors Improve Kidney Transplant Survival in Sensitized Recipients**
D. Bekbolsynov[1], R. Green[2], B. Mierzejewska[1], M. Rees[1], S. Stepkowski[1], *[1]University of Toledo, Toledo, OH, [2]Bowling Green State University, Bowling Green, OH*

215 **Association Between HLA Class II and TLR4 Regulates HLA-II Stimulated P-selectin Expression and Monocyte Capture to Endothelial Cells**
Y. Jin, J. Nevarez-Mejia, E. F. Reed, *Pathology and Laboratory Medicine, University of California Los Angeles, Los Angeles, CA*

216 **Risk Stratification of Kidney Transplant Patients According to the Different Level of HLA-DQ Disparities**
A. Senev[1], A. R. Tambur[2], M. Naesens[1], *[1]Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium, [2]Northwestern University, Chicago, IL*

Live Video Question and Answer

Biomarkers and Cellular Therapies

301 **Lymphotoxin Beta Receptor Regulates Treg Migration and Suppression by Modulating Draining Lymphatic Structure**
V. Saxena[1], W. Piao[1], L. Li[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

302 **CD47-Mediated Gli1/Notch1 Signaling is a Key Regulator of Mesenchymal Stem Cell Immunomodulation in Liver Inflammatory Injury**
D. Xu, M. Sheng, Y. Lin, Y. Tian, Y. Zhan, C. Li, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, *Surgery, Dumont - UCLA Transplant Center, Los Angeles, CA*

303 **Double Negative T Cells Mediate Cd39-Dependent Protection in Hepatic Ischemia and Reperfusion Injury**
H. Jin, M. Li, C. Zhang, G. Sun, D. Zhang, *Beijing Key Laboratory of Tolerance Induction and Organ Protection in Transplantation, Beijing Friendship Hospital, Capital Medical University, Beijing, China*

304 **The Gut Microbiotainduces Local and Systemic Immune Modulation**
V. Saxena, R. Lakhan, J. Iyyathurai, W. Piao, L. Li, T. Zhang, M. W. Shirkey, B. Ma, E. F. Mongodin, J. Bromberg, *U Maryland, Baltimore, MD*

305 **Single Cell Rna-Sequencing of Urinary Cells and Defining the Immune Landscape of Rejection in Human Kidney Allografts**
T. Muthukumar[1], H. Yang[1], A. Belkadi[2], G. Thareja[2], C. Li[1], C. Snopkowski[1], K. Chen[1], T. Salinas[1], M. Lubetzky[1], J. Lee[1], D. Dadhania[1], K. Suhre[2], M. Suthanthiran[1], *[1]Nephrology, NY Presbyterian- Weill Cornell Medical College, New York, NY, [2]Physiology and Biophysics, Weill Cornell Medicine-Qatar, Doha, Qatar*

306 **Gm2a: A Novel Regulatory Pathway Controlling Alloimmunity**
K. M. Baecher[1], P. S. Heeger[2], P. Cravedi[2], M. Fribourg[2], M. L. Ford[1], *[1]Department of Surgery, Emory University, Atlanta, GA, [2]Mount Sinai School of Medicine, New York, NY*

307 **Nanoparticle Mediated Drug Delivery for Lung Transplantation**
P. M. Patel[1], S. Jung[2], C. L. Miller[1], J. M. O[1], T. Costa[1], A. Dehnadi[1], I. Hanekamp[1], X. F. Li[2], L. Jiang[2], H. Ichimura[2], A. Azimzadeh[1], J. C. Madsen[3], R. Abdi[2], *[1]Surgery, Center for Transplantation Sciences, Massachusetts General Hospital/Harvard Medical School, Boston, MA, [2]Medicine, Transplant Research Center, Brigham and Women's Hospital, Boston, MA, [3]Surgery, Center for Transplantation Sciences, Division of Cardiac Surgery, Massachusetts General Hospital/Harvard Medical School, Boston, MA*

308 **Targeting Calcineurin/nfatc2 Signaling to Restore Pancreatic Beta-cell Function in Islet Transplantation**
C. Darden[1], J. Mattke[1], S. Vasu[1], K. Kumano[1], Y. Liu[1], B. Naziruddin[2], M. C. Lawrence[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Baylor University Medical Ctr, Allen, TX*

Live Video Question and Answer

Biomarkers, Immune Assessment and Clinical Outcomes - I

11 **A Single Nucleotide Polymorphism within the FCGR3A 158 F/V Gene is Associated with Decreased Survival of Renal Allografts with Chronic Active Antibody-Mediated Rejection**

N. H. Litjens, A. M. Peeters, J. A. Kal-van Gestel, M. Klepper, M. G. Betjes, *Internal Medicine, Nephrology and Transplantation, Erasmus MC, University Medical Center, Rotterdam, Netherlands*

12 **T-cell-Mediated Immunity to Sars-cov-2 Defines Covid-19 Risk and Severity in Transplanted and Non-Transplanted Individuals and Associates with Myeloid-Derived Suppressor Cells**

C. Ashokkumar[1], V. Rohan[2], A. H. Kroemer[3], S. Rao[4], G. Mazariegos[5], B. W. Higgs[5], S. Nadig[2], M. Ningappa[5], T. Fishbein[3], S. Subramaniam[6], R. Sindhi[7], *[1]Plexision, Pittsburgh, PA, [2]Medical University of South Carolina, Charleston, SC, [3]MedStar Georgetown Transplant Institute, Georgetown, DC, [4]DHR Health Institute for Research and Development, Texas, TX, [5]University of Pittsburgh, Pittsburgh, PA, [6]University of California, San Diego, CA, [7]University of Pittsburgh, pittsburgh, PA*

13 **Precision Medicine Tools in Kidney Transplant (KTx): Implications for Individualized Immunosupression Therapy and Downstream Cost-savings**

S. Anand, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*

14 **Characterisation of Distinct Graft Infiltrates Following Cellular Therapy in Kidney Transplant Recipients**

M. O. Brook[1], P. N. Harden[2], I. Roberts[2], W. R. Mulley[3], J. Hester[1], M. E. Reinders[4], F. Issa[1], *[1]Nuffield Department of Surgical Sciences, University of Oxford, Oxford, United Kingdom, [2]Oxford University Hospitals NHS Foundation Trust, Oxford, United Kingdom, [3]Department of Nephrology, Monash Medical Centre, Melbourne, Australia, [4]Division of Nephrology and Transplant Center, Leiden University Medical Center, Leiden, Netherlands*

15 **Integrative Analyses of Circulating Small Rnas and Paired Kidney Graft Transcriptome in Transplant Glomerulopathy**

C. Kuscu[1], K. Manjari[2], M. Akram[3], C. Kuscu[4], A. Wolen,[4], A. Bajwa[4], J. Eason[4], D. G. Maluf[5], V. Mas[6], E. Akalin[7], *[1]Surgery, James D Eason Transplant Institute, UTHSC, Memphis, TN, [2]Department of Systems and Computational Biology, School of Life Sciences, University of Hyderabad,, Hyderabad,, India, [3]Center for Biomedical Informatics, University of Tennessee Health Science Center, Memphis, TN, [4]Surgery, James D Eason Transplant Institute, Memphis, TN, [5]Surgery, Program in Transplantation, University of Maryland, Baltimore, MD, [6]Surgery, Division Surgical Science, University of Maryland, Baltimore, MD, [7]Medicine, Montefiore Medical Center, Abdominal Transplant Program, Albert Einstein College of Medicine,, NYC, NY*

16 **Utility of Follow-up Biopsies After Acute Rejection in Pediatric Kidney Transplantation**

S. S. Raza[1], V. Hauptfeld-Dolejsek[1], F. Rosenblum[1], E. C. Mroczek-Musulman[2], D. R. Kelly[2], M. Seifert[1], *[1]Department of Nephrology, UAB School of Medicine, Birmingham, AL, [2]Children's of Alabama, Birmingham, AL*

17 **The Gut Microbiome in Heart Transplantation: A Prospective Pilot Study**

M. Dela Cruz[1], E. Littmann[2], R. Nayak[2], C. Lehmann[2], R. Keskey[3], T. Baker[3], H. Lin[2], A. Bennett[1], G. Kim[1], S. Pinney[1], E. Pamer[2], A. B. Nguyen[1], *[1]Cardiology, University of Chicago, Chicago, IL, [2]Medicine, University of Chicago, Chicago, IL, [3]Surgery, University of Chicago, Chicago, IL*

18 **Peripheral Blood Hematopoietic Chimerism: A Robust Biomarker for Transplantation Tolerance**

D. Tollerud[1], E. Gornstein[1], J. Leventhal[2], K. V. Ravindra[3], S. Ildstad[1], *[1]Talaris Therapeutics, Louisville, KY, [2]Division of Organ Transplantation, Northwestern Medical Group, Chicago, IL, [3]Department of Surgery, Duke University Medical Center, Durham, NC*

Live Video Question and Answer

Biomarkers, Immune Assessment and Clinical Outcomes - II

111 **Development and Validation of a Novel Peripheral Blood Based Gene Signature for Acute Rejection Following Renal Transplantation**
D. Zhang, Y. Wang, X. Hu, *Department of Urology, Beijing Chao-Yang Hospital, Capital Medical University, Beijing, China*

112 **Multiplexed Imaging Mass Cytometry of the Alloimmune Landscape of Rejection in Clinical Liver Transplantation**
J. Emamaullee, N. Ung, C. Man, J. Hoeflich, C. Goldbeck, A. Barbetta, R. Sun, N. Matasci, J. Katz, J. Lee, S. Chopra, L. Sher, S. Asgharzadeh, O. Akbari, Y. Genyk, *University of Southern California, Los Angeles, CA*

113 **Hypothermic Oxygenated Machine Perfusion Protects Against Cholangiocyte and Hepatocyte Injury and Mitigates Inflammation vs Static Cold Storage: Preliminary Results from a Single Center**
G. Panayotova, F. Paterno, M. McCarty, G. Dikdan, S. Simonishvili, Y. Qin, L. Brown, A. Amin, K. E. Lunsford, J. V. Guarrera, *Transplant Surgery, Rutgers NJMS, Newark, NJ*

114 **The Effect of the Affordable Care Act on Insurance Status, Waitlist, and Transplant Outcomes in Liver Transplantation**
B. I. Shaw[1], M. L. Samoylova[1], V. Wang[2], T. Risoli Jr[3], S. Peskoe[3], K. Caddell[3], L. M. McElroy[1], *[1]Surgery, Duke University, Durham, NC, [2]Population Health Sciences, Duke University, Durham, NC, [3]Biostatistics, Duke University, Durham, NC*

115 **Gain of Function Mutations in Latent Membrane Protein 1 of Epstein Barr Virus are Associated with Increased Risk of Post-Transplant Lymphoproliferative Disorder**
O. M. Martinez[1], S. M. Krams[1], M. Robien[2], M. Lapasaran[1], M. Arvedson[1], K. Weinberg[1], S. Boyd[1], B. Armstrong[3], C. Twist[4], D. Gratzinger[1], B. Tan[1], A. Trickey[1], M. Sever[3], M. Brown[2], D. Bernstein[1], C. O. Esquivel[1], *[1]Stanford University Sch of Med, Stanford, CA, [2]NIAID, Rockville, MD, [3]Rho, Durham, NC, [4]Roswell Park, Buffalo, NY*

116 **Clinical and Molecular Profiling Can Help in Predicting the Response to Alemtuzumab Treatment in Kidney Transplant Recipients with Severe or Glucocorticoid-Resistant Acute Rejection**
D. M. Peelen[1], M. van der Zwan[1], M. C. Clahsen-van Groningen[2], D. A. Mustafa[2], C. C. Baan[1], D. A. Hesselink[1], *[1]Internal Medicine - Nephrology & Transplantation, Erasmus MC, Rotterdam, Netherlands, [2]Pathology, Erasmus MC, Rotterdam, Netherlands*

117 **Identification of Distinct Blood Monocyte Phenotypes from Transplant Kidney Recipients Undergoing Cellular (TCMR) and Mixed Antibody Mediated Rejection (ABMR)**
C. Macedo, E. Bailly, K. Louis, M. Lucas, A. Zeevi, P. Randhawa, D. Metes, *Starzl Transplantation Institute, Pittsburgh, PA*

118 **Validation of a Novel Gene Expression Biomarker of Rejection Following Liver Transplantation**
J. Levitsky[1], M. Kandpal[1], T. Whisenant[2], K. Guo[1], S. Kurian[3], M. Abecassis[4], *[1]Gastroenterology & Hepatology; Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]University of California San Diego, San Diego, CA, [3]Scripps Clinic, La Jolla, CA, [4]University of Arizona College of Medicine Tucson, Tucson, AZ*

Live Video Question and Answer

Biomarkers, Immune Assessment and Clinical Outcomes - III

217 **Use of a Novel Bead-based Assay to Measure the Impact of Imlifidase on ABO IgG Antibodies**

A. Halpin[1], B. Motyka[2], T. Ellis[2], J. Pearcey[2], T. L. Lowary[3], A. Runström[4], L. Winstedt[4], R. Bockermann[4], S. Järnum[4], A. Robertson[4], L. J. West[5], *[1]Department of Pediatrics and Laboratory Medicine and Pathology, University of Alberta and Alberta Precision Laboratories, Edmonton, AB, Canada, [2]Department of Pediatrics, University of Alberta, Edmonton, AB, Canada, [3]Department of Chemistry, University of Alberta, Edmonton, AB, Canada, [4]Hansa Biopharma, Lund, Sweden, [5]Department of Pediatrics and Laboratory Medicine and Pathology, University of Alberta, Edmonton, AB, Canada*

218 **High Levels of Donor-Derived Cell-Free DNA Predict EGFR Decline After Kidney Transplantation**

T. Alhamad[1], V. Bowers[2], E. Stites[3], S. Anand[4], J. S. Bromberg[5], H. Murad[1], G. Gupta[6], I. Moinuddin[6], L. Bu[7], S. Ghosh[8], J. Zeng[8], A. Pai[9], *[1]Washington University in St. Louis, St. Louis, MO, [2]Tampa General Hospital, Tampa, FL, [3]University of Colorado, Aurora, CO, [4]Intermountain Medical Center, Murray, UT, [5]University of Maryland School of Medicine, Baltimore, MD, [6]Virginia Commonwealth University, Richmond, VA, [7]University of Minnesota, Minneapolis, MN, [8]CareDx, Brisbane, CA, [9]University of Texas McGovern Medical School, Houston, TX*

219 **Assessment of Donor-Derived Cell-Free DNA Performance Characteristics Across the Spectrum of TCMR and ABMR After Kidney Transplant**

L. Bu[1], S. Anand[2], A. Pai[3], J. S. Bromberg[4], T. Alhamad[5], V. Bowers[6], I. Moinuddin[7], S. Ghosh[8], W. Tian[8], E. Stites[9], G. Gupta[7], *[1]University of Minnesota, Minneapolis, MN, [2]Intermountain Medical Center, Murray, UT, [3]University of Texas McGovern Medical School, Houston, TX, [4]University of Maryland School of Medicine, Baltimore, MD, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]Virginia Commonwealth University, Richmond, VA, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*

220 **Intrarenal B-cell Activating Factor (BAFF) Levels are Increased in Transplant Glomerulopathy**

S. Panzer, K. Swanson, G. Pandya, L. Hidalgo, S. Reese, *University of Wisconsin Madison, Madison, WI*

221 **Utility of Non-Invasive Rejection Biomarkers to Guide Immunomodulation in Kidney Transplant Patients with Active Covid-19 Infection**

J. Christensen, G. Gupta, A. Bryson, S. Paluri, R. Thompson, S. Sterling, N. Vissichelli, P. Kimball, D. Kumar, *VCUHealth, Richmond, VA*

222 **The Role of Donor-derived Cell-free DNA to Detect Subclinical Acute Rejection in Kidney Allograft**

S. Park[1], K. Guo[2], R. Heilman[3], E. Poggio[4], D. Taber[5], C. Marsh[6], S. Kurian[7], S. Kleiboeker[8], J. Weems[9], J. Holman[10], L. Zhao[2], R. Sinha[8], S. Brietigam[2], C. Rebello[2], M. Abecassis[11], J. Friedewald[1], *[1]Transplant nephrology, Northwestern University, Chicago, IL, [2]Feinberg School of Medicine, Northwestern University, Chicago, IL, [3]Transplant nephrology, Mayo Clinic College of Medicine and Science, Phoenix, AZ, [4]Department of Nephrology and Hypertension, Cleveland Clinic, Cleveland, OH, [5]Division of Transplant Surgery, Medical University of South Carolina, Charleston, SC, [6]Department of Medicine and Surgery, Scripps Clinic and Green Hospital, La Jolla, CA, [7]Scripps Health, La Jolla, CA, [8]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [9]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [10]Transplant Genomics, Inc, Mansfield, MA, [11]University of Arizona College of Medicine, Northwestern University, Tucson, AZ*

223 **MDR-101-MLK-MERCURY Kidney Transplant Tolerance Study Update**

D. Kaufman[1], S. Akkina[2], M. Stegall[3], J. Piper[4], A. O. Gaber[5], E. Marin[6], S. Busque[7], D. Alonso[8], M. De Vera[9], A. Shah[10], A. Patel[11], K. Chavin[12], M. Laftavi[13], S. Collette[14], E. Stites[15], M. Mai[16], M. Cooper[17], D. Brennan[18], *[1]Surgery, UW, Madison, WI, [2]Surgery, Loyola, Chicago, IL, [3]Surgery, Mayo, Rochester, MN, [4]Surgery, Inova, Fairfax, VA, [5]Surgery, Houston Methodist, Houston, TX, [6]Nephrology, Yale, New Haven, CT, [7]Surgery, Stanford, San Francisco, CA, [8]Surgery, Intermountain, Murray, UT, [9]Surgery, Loma Linda, Loma Linda, CA, [10]Surgery, TJU, Philadelphia, PA, [11]Nephrology, St. Barnabas, Livingston, NJ, [12]Surgery, UHH, Cincinnati, OH, [13]Surgery, Upstate, Syracuse, NY, [14]Surgery, CIUSSS, Montreal, ON, Canada, [15]Nephrology, UC Denver, Denver, CO, [16]Nephrology, Mayo - FL, Jacksonville, FL, [17]Surgery, Georgetown, Washington, DC, [18]Medeor, San Francisco, CA*

224 **Kidney Transplant Rejection Can Be Diagnosed or Even Predicted by Tracking Donor Reactive T Cell Clones in Post-transplant Samples**

Y. Sambandam[1], M. Kandpal[1], J. He[1], X. Huang[1], T. S. Taylor[1], A. A. Shetty[2], J. M. Mathew[1], J. R. Leventhal[1], *[1]Surgery-Comprehensive Transplant Center, Northwestern University Feinberg School of Medicine, Chicago, IL, [2]Medicine, Nephrology Division, Northwestern University Feinberg School of Medicine, Chicago, IL*

Live Video Question and Answer

Ischemia Reperfusion & Organ Rehabilitation

350 **Beneficial Effects of Argon Inhalation on Reducing Lung Ischemia-reperfusion Injury in Miniature Swine**

H. Sahara, *Div. Organ Replacement and Xeno Tx, Center for Advanced Biomedical Science and Swine Research, Kagoshima University, Kagoshima, Japan*

351 **Eosinophils Attenuate Hepatic Ischemia Reperfusion Injury in Mice Through St2-Dependent Il-13 Production**

Y. Yang, Y. Wang, M. Wang, J. Jeong, L. Xu, Y. Wen, C. Emontzpohl, W. Dar, C. Ju, *Department of Anesthesiology, McGovern Medical School University of Texas Health Science Center at Houston, Houston, TX*

352 **Neutrophil Extracellular Trap-induced Thrombotic Microangiopathy in Steatotic Mouse Recipients Impacts Liver Transplant Outcomes**

H. Hirao, H. Kojima, K. Kadono, K. J. Dery, D. G. Farmer, F. M. Kaldas, J. W. Kupiec-Weglinski, *UCLA Medical Center, Los Angeles, CA*

353 **Single Cell Analysis of Living Donor Kidneys Reveals Sex-based Diversity in Proximal Tubulargene Expression**

C. M. McEvoy[1], J. M. Szusz[2], S. Clotet-Freixas[1], J. An[2], S. MacParland[2], G. Bader[3], S. Q. Crome[2], A. Konvalinka[1], *[1]Ajmera Transplant Centre, Toronto General Hospital Research Institute, Toronto, ON, Canada, [2]Immunology and Molecular Genetics, University of Toronto, Toronto General Hospital Research Institute, Toronto, ON, Canada, [3]Donnolly Centre for Cellular and Biomolecular Research, University of Toronto, Toronto, ON, Canada*

354 **Hepatocyte SIRT1 Suppresses Atf4-mediated Apoptosis Triggered by Cold Stress in Mouse and Human Liver Transplantation**

K. Kadono[1], H. Hirao[1], H. Kojima[1], K. J. Dery[1], J. Aziz[1], X. Li[2], J. W. Kupiec-Weglinski[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]NIEHS, Durham, NC*

355 **Estrogen Receptor Beta Deletion is Protective in Renal Ischemia Reperfusion Injury in a Renal Specific Manner**

C. S. O'Brien, P. Hernandez, Z. Wang, G. Ge, W. Hancock, M. H. Levine, *Surgery, University of Pennsylvania, Philadelphia, PA*

356 **Cellular Landscape of Steatotic Livers Revealed by Single-nuclei Rna Sequencing**

C. Kuscu[1], C. Kuscu[1], A. Shetty[2], E. Bardhi[3], T. Rousselle[4], J. Eason[1], M. Sraj[5], D. Maluf[6], V. Mas[4], *[1]Surgery, James D Eason Transplant Institute, Memphis, TN, [2]University of Maryland, Institute for Genome Sciences, Baltimore, MD, [3]Program in Transplantation - University of Maryland, Baltimore, MD, [4]Surgery, Division of Surgical Science, Baltimore, MD, [5]Surgery, University of Maryland, Baltimore, MD, [6]Surgery, Program in Transplantation - University of Maryland, Baltimore, MD*

357 **Cross-Circulation for Extracorporeal Liver Support in a Swine Model**

W. K. Wu[1], A. Tumen[1], J. W. Stokes[2], R. Ukita[2], A. E. Hozain[3], C. R. Flynn[2], M. J. Lee[3], J. R. Talackine[2], N. L. Cardwell[2], J. A. Reimer[3], M. Pinezich[3], C. Benson[2], G. Vunjak-Novakovic[3], S. P. Alexopoulos[2], M. Bacchetta[2], *[1]co-first authors, Vanderbilt University Medical Center, Nashville, TN, [2]Vanderbilt University Medical Center, Nashville, TN, [3]Columbia University Medical Center, New York, NY*

Live Video Question and Answer

Lymphocyte Biology and Tolerance

257 **Sequential Analysis of Renal Allograft Rejection at Single Cell Resolution**

T. Shi[1], C. Castro-Rojas[1], A. Burg[1], K. Roskin[1], J. Rush[2], B. Haraldsson[2], A. Shields[3], R. Alloway[3], E. Woodle[3], D. Hildeman[1], *[1]Immunobiology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [2]Novartis Pharmaceuticals AG, Basel, Switzerland, [3]University of Cincinnati Medical Center, Cincinnati, OH*

258 **LTβR Engagement Regulates Treg Migration, Stability and Suppressor Function**

V. Saxena[1], W. Piao[1], L. Li[1], Y. Xiong[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

259 **CEACAM1 Signaling is Essential to Elicit Tim-3 Inhibitory Regulation in Liver Transplantation**

H. Kojima, H. Hirao, T. Ito, K. Kadono, K. J. Dery, F. M. Kaldas, J. W. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

260 **Laminins Differentially Regulate Adaptive Alloimmune Responses**

L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[1], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MA*

261 **TIGIT Identifies Polyfunctional Donor-Specific CD4+ T Cells Lost After Kidney Transplantation**
A. C. van der List, N. H. Litjens, M. G. Betjes, M. Klepper, *Nephrology and Transplantation, Erasmus MC, Rotterdam, Netherlands*

262 **TOLS are Novel Regulatory TLOs with A B Cell Signature**
I. Rosales[1], Q. Yuan[1], C. Yang[1], P. Russell[1], J. Madsen[1], A. Alessandrini[1], R. Colvin[1], -. AA and RC[2], *[1]Massachusetts General Hospital, Boston, MA, [2]Co-Senior Authors, Boston, MA*

263 **Successful Induction of Hematopoietic Chimerism by Dual Inhibition of Mcl-1 and Bcl-2 Without Myeloablative Treatments in Nonhuman Primates**
T. Hirose, D. Ma, G. Lassiter, T. Kawai, *Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA*

264 **Increased T Cell Cross-dressing in Accepted Kidney Allografts**
Q. Yuan[1], S. Hong[2], E. Szuter[2], I. Rosales[2], Y. Zhao[2], B. Gonzalez-Nolasco[2], G. Benichou[2], P. Russell[2], J. Madsen[2], R. Colvin[2], A. Alessandrini[2], *[1]Massachusetts General Hospital/Chinese PLA General Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

Live Video Question and Answer

Rejection, Innate Immunity and Allorecognition

249 **Dna-pkcs Regulation of the Allogeneic Immune Response**
L. Burdine, M. Burdine, Z. Waldrip, D. Harrison, *University of Arkansas, Little Rock, AR*

250 **P40 Homodimers Induce Il-15 to Promote Endogenous Donor-reactive Memory Cd8 T Cell Activation within High-risk Cardiac Allografts**
H. Tsuda, A. Valujskikh, R. Fairchild, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

251 **Contribution of T-bet Expressing CD27+ CD21- Activated Memory B Cells Poised for Plasma Cell Differentiation to Antibody-mediated Rejection of Kidney Transplants**
K. Louis[1], E. Bailly[1], C. Macedo[1], B. Ramaswami[1], X. Gu[1], G. Chalasani[1], A. Zeevi[1], P. Randhawa[1], H. Singh[2], C. Lefaucheur[3], D. Metes[1], *[1]Surgery, University of Pittsburgh, Pittsburgh, PA, [2]Center for Systems immunology, Department of Immunology, University of Pittsburgh, Pittsburgh, PA, [3]Human Immunology and Immunopathology, INSERM U976, Paris, France*

252 **Donor Mhc-independent Islet Rejection in Autoimmune Diabetes: Implications for Stem Cell Therapy**
R. G. Gill[1], M. Coulombe[2], K. S. Beard[1], A. L. Burrack[3], *[1]University of Colorado, Aurora, CO, [2]Surgery, University of Colorado, Aurora, CO, [3]Mircrobiology and Immunology, University of Minnesota, Minneapolis, MN*

253 **Accelerated Bronchiolitis Obliterans After Lung Transplant Promoted by an ATG16L1 Mutation is Coupled to Mitochondrial Damage and Metabolic Alterations in Monocyte-derived Antigen Presenting Cells**
M. Cano[1], D. Zhou[1], D. Kreisel[1], C. Chen[2], K. Pugh[1], D. Byers[1], R. Hachem[1], A. Gelman[1], *[1]Washington University, Saint Louis, MO, [2]UT Southwestern Medical Center, Dallas, TX*

254 **Resolution of Endothelial Inflammation is Delayed Following IFNγ, Which Provokes a Long-lasting Pro-adhesive Phenotype Dependent on JAK/STAT Signaling**
N. M. Valenzuela, *Pathology and Laboratory Medicine, UCLA, Los Angeles, CA*

255 **PD-1/PD-L1 Selectively Regulates Treg Lymphatic Migration**
W. Piao[1], L. Li[1], C. Paluskievicz[1], Y. Zhang[2], V. Saxena[3], K. Hippen[2], B. Blazar[2], L. Riella[4], J. Bromberg[1], *[1]Surgery, U Maryland, Baltimore, MD, [2]U Minnesota, Minneapolis, MN, [3]U Maryland, Baltimore, MD, [4]Harvard U, Boston, MA*

256 **Ikaros-SIRT1 Signaling Axis Regulates Macrophage Polarization and Ischemia Reperfusion Injury in Mouse and Human Liver Transplantation**
K. Kadono[1], H. Hirao[1], H. Kojima[1], K. J. Dery[1], X. Li[2], J. W. Kupiec-Weglinski[1], *[1]The Dumont-UCLA Transplant Center, Los Angeles, CA, [2]NIEHS, Durham, NC*

Live Video Question and Answer

Xenotranplantation and Preclinical Studies

342 **Natural Sensitization by Pregnancy, Testing Desensitization Strategies in Female NHPs Across Repeat Mismatches**
M. Manook, J. Yoon, Z. Fitch, R. Schmitz, A. M. Jackson, J. Kwun, S. Knechtle, *Duke Transplant Center, Duke University Medical Center, Durham, NC*

343 **AT-1501, a Novel and Clinically Applicable CD40L Specific Monoclonal Antibody, Promotes Islet Allograft Survival in Nonhuman Primates**
D. Berman[1], N. Kenyon[1], M. Willman[1], A. Gill[2], S. Perrin[3], C. Ricordi[1], *[1]University of Miami, Miami, FL, [2]ALS Therapy Development Institute, Cambridge, MA, [3]Novus Therapeutics, Irvine, CA*

344 **Interruption of Notch Signaling via Blockade of Delta-Like Ligand 4 Prevents Co-Stimulation Blockade Resistant Allograft Rejection**
A. J. Matar, B. P. Lovasik, Y. Dong, D. A. Faber, J. Habib, C. Breeden, J. Regenold, A. Ghosh, A. Stephenson, W. H. Kitchens, A. B. Adams, *Emory University Department of Surgery, Atlanta, GA*

345 **Belatacept and Carfilzomib-based Treatment of Active Antibody-mediated Rejection in a Sensitized Nonhuman Primate Model**
J. Kwun[1], R. Schmitz[1], M. Manook[1], Z. Fitch[1], D. Olaso[1], A. Choi[1], J. Yoon[1], Y. Bae[1], J. Lambris[2], S. Knechtle[1], *[1]Surgery, Duke University, Durham, NC, [2]Pathology & Laboratory Medicine, University of Pennsylvania, Philadelphia, PA*

346 **Alpha 1-antitrypsin Reduces Cytokine Elaboration in a Xenogeneic Lung Transplantation Model**
L. Burdorf[1], C. Laird[2], T. Zhang[2], M. R. Connolly[1], Z. Habibabady[1], S. Pratts[1], S. Miura[1], F. Pollok[1], W. Eyestone[3], C. J. Phelps[3], D. L. Ayares[3], A. M. Azimzadeh[1], R. N. Pierson III[1], *[1]Surgery, Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Surgery, University of Maryland, Baltimore, MD, [3]Revivicor, Blacksburg, VA*

347 **Pig Orthotopic Heart Transplantation (ohtx) in Baboons: Is an Acute Pulmonary Inflammatory Response the Key Problem?**
A. Jagdale[1], D. Cleveland[2], M. Bikhet[1], J. Foote[3], G. Walcott[4], H. Iwase[1], T. Yamamoto[1], H. Hara[1], C. Hansens-Estruch[1], D. Ayares[5], S. Litovsky[6], L. Rhodes[2], W. Carlo[7], J. Crawford[2], R. Dabal[2], S. Borasino[2], D. Cooper[1], *[1]Surgery, University of Alabama at Birmingham, Birmingham, AL, [2]Cardiothoracic Surgery, Children's of Alabama, Birmingham, AL, [3]Medicine and Cardiovascular Diseases, University of Alabama at Birmingham, Birmingham, AL, [4]Medicine, University of Alabama at Birmingham, Birmingham, AL, [5]Surgery, Revivicor, Blacksburg, VA, [6]Pathology, University of Alabama at Birmingham, Birmingham, AL, [7]Division of Pediatric Cardiology, Department of Pediatrics, University of Alabama at Birmingham, Children's of Alabama, Birmingham, AL*

348 **Successful Long-Term TMA- and Rejection-Free Survival of a Kidney Xenograft With Triple Xenoantigen Knockout Plus Insertion of Multiple Human Transgenes**
T. Hirose[1], D. Ma[1], G. Lassiter[1], H. Sasaki[1], I. Rosales[2], T. Coe[1], C. Rickert[1], R. Matheson[1], R. Colvin[2], W. Qin[3], Y. Kan[3], J. Layer[3], K. Stiede[3], K. Hall[3], M. Youd[3], W. Westlin[3], M. Curtis[3], J. F. Markmann[1], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Pathology, Massachusetts General Hospital, Boston, MA, [3]eGenesis Inc, Cambridge, MA*

349 **Impact of Allosensitization on Xenotransplantation**
D. Olaso[1], M. Manook[1], J. Yoon[1], Y. Bae[1], A. Barbas[1], A. Adams[2], S. Knechtle[1], J. Kwun[1], *[1]Department of Surgery, Duke Transplantation Center, Durham, NC, [2]Department of Surgery, University of Minnesota, Minneapolis, MN*

Live Video Question and Answer

Basic: ID

Late Breaking: Basic & ID

LB 10 **Life-supporting Multi-gene Cardiac Xenografts From Swine Demonstrate Survival >8 Months and Preclinical Efficacy for Human Clinical Trials**
C. Goerlich[1], B. Griffith[1], A. Singh[1], T. Zhang[1], I. Tatarov[1], B. Lewis[1], F. Sentz[1], A. Hershfeld[1], P. Odonkor[1], B. Williams[1], E. Strauss[1], A. Tabatabai[2], A. Bhutta[3], D. Ayares[4], D. Kaczorowski[1], M. Mohiuddin[1], *[1]Surgery, University of Maryland School of Medicine, Baltimore, MD, [2]Department of Medicine, Division of Pulmonary and Critical Care Medicine, University of Maryland School of Medicine, Baltimore, MD, [3]Pediatrics, Pediatric Critical Care Medicine, University of Maryland School of Medicine, Baltimore, MD, [4]Revivicor, Inc., Blacksburg, VA*

LB 11 **Immunologic Endotypes of Ischemia-reperfusion Injury in Human Liver Transplantation**
R. A. Sosa, A. Q. Terry, F. M. Kaldas, B. V. Naini, T. Ito, R. W. Busuttil, D. W. Gjertson, J. W. Kupiec-Weglinski, E. F. Reed, *UCLA, Los Angeles, CA*

LB 12 **One-year Outcomes of a Multicenter Trial of Transplantation of Hcv Viremic Kidney Donors into Hcv Uninfected Recipients**
M. Sise[1], D. Goldberg[2], D. Schaubel[3], J. Kort[4], R. Alloway[5], J. Friedewald[6], R. Fontana[7], S. Sultan[8], N. Desai[9], R. Chung[1], P. Reese[10], *[1]Mass General Hospital, Boston, MA, [2]U-Miami, Miami, FL, [3]U. Pennsylvania, Philadelphia, PA, [4]Abbvie, Chicago, IL, [5]U Cincinnati, Cincinnati, OH, [6]Northwestern U., Evanston, IL, [7]U. Michigan, Ann Arbor, MI, [8]Cornell, New York City, NY, [9]Johns Hopkins, Baltimore, MD, [10]U. Pennslyvania, Philadelpha, PA*

LB 13 **Comprehensive Utilization of HCV Viremic and Non-Viremic Donor Livers and Kidneys into HCV-negative Patients**
M. E. de Vera, J. Woloszyn, J. Sterris, M. Robinson, R. Evans, S. Blais, B. Elhazin, C. Amador, c. Berk, M. Volk, R. Villicana, *Transplant Institute, Loma Linda University Health, San Bernardino, CA*

LB 14 **Detection of SARS-CoV-2 Specific Functional T Cells Using a Seven Color Flow Cytometry Assay**
L. Flebbe-Rehwaldt, J. Hayden, K. Mickey, S. Manley, S. Kleiboeker, *Eurofins-Viracor, Lees Summit, MO*

LB 15 **Impaired Antibody Responses to Spike Protein Antigens of Sars-cov-2 in Solid Organ Transplant (sot) Recipients**
C. Ashokkumar[1], S. Nadig[2], V. Rohan[2], A. Kroemer[3], H. Dhani[3], S. Rao[4], R. Sindhi[5], *[1]Plexision, pittsburgh, PA, [2]Medical University of South Carolina, Charleston, SC, [3]MedStar Georgetown Transplant Institute, Georgetown, DC, [4]DHR Health Institute for Research and Development, Texas, TX, [5]University of Pittsburgh, Pittsburgh, PA*

LB 16 **Precision Medicine in Renal Transplantation: Structural Biology of HLA Defines Allelic Binding of Cardinal Pathogenic Viruses in Transplantation**
K. R. Sherwood[1], A. Nguyen[2], J. Tran[1], O. Gunther[3], A. Nellore[2], R. Thompson[2], J. Lan[1], L. Allan[1], P. A. Keown[1], *[1]Vancouver General Hospital, Vancouver, BC, Canada, [2]Biomedical Engineering, Oregon Health & Science University, Portland, OR, [3]Gunther Analytics, Vancouver, BC, Canada*

LB 9 **Randomized Phase 3 Open-label Study of Maribavir vs Investigator-assigned Therapy for Refractory/ resistant Cytomegalovirus Infection in Transplant Recipients: Subgroup Analyses of Efficacy by Organ**
R. K. Avery[1], E. A. Blumberg[2], D. Florescu[3], N. Kamar[4], D. Kumar[5], J. Wu[6], A. Sundberg[6], *[1]Johns Hopkins Hospital, Baltimore, MD, [2]University of Pennsylvania, Philadelphia, PA, [3]University of Nebraska School of Medicine, Omaha, NE, [4]Hôpital de Rangueil, Toulouse, France, [5]University Health Network, Toronto, ON, Canada, [6]Shire Human Genetic Therapies, Inc., a Takeda company, Lexington, KY*

Live Video Question and Answer

COVID-19

Late-Breaking: COVID-19

LB 1 **Safety of Sars-cov-2 Mrna Vaccines in Solid Organ Transplant Recipients**
M. Ou, B. Boyarsky, J. Motter, R. Greenberg, A. Teles, J. Ruddy, M. Krach, W. Werbel, R. Avery, A. Massie, D. Segev, J. Garonzik-Wang, *Johns Hopkins School of Medicine, Baltimore, MD*

LB 2 **A Mechanistic Evaluation to Guide the Optimal Immunosuppression Adjustment Strategy in Transplant Patients with COVID-19**
V. Hall, V. Ferreira, D. Kumar, A. Humar, *UHN, Toronto, ON, Canada*

LB 3 **Monoclonal Antibody Therapy for COVID-19 in Solid Organ Transplant Recipients**
Z. A. Yetmar[1], E. Beam[1], J. C. O'Horo[1], R. Ganesh[2], D. M. Bierle[2], L. Brumble[3], M. T. Seville[4], R. R. Razonable[1], *[1]Infectious Diseases, Mayo Clinic, Rochester, MN, [2]General Internal Medicine, Mayo Clinic, Rochester, MN, [3]Infectious Diseases, Mayo Clinic, Jacksonville, FL, [4]Infectious Diseases, Mayo Clinic, Scottsdale, AZ*

LB 4 **Reduction in Hospitalizations and Deaths in Covid-19 Positive Abdominal Organ Transplant Recipients Following Implementation of A Protocol for Early Treatment with Bamlanivimab**
A. Ahearn, T. Maw, J. Emamaullee, J. Kim, E. Blodget, J. Kahn, C. Goldbeck, L. Sher, Y. Genyk, *Abdominal Transplantation, Keck Medical Center of USC, Los Angeles, CA*

LB 5 **Mortality in Organ Transplant Recipients with Covid-19 Compared to Non-transplant or Waitlisted Patients: A Meta-analysis**
A. H. Lerner, E. Klein, D. Farmakiotis, *Rhode Island Hospital/Brown University, Providence, RI*

LB 6 **Effect of HLA Class II Polymorphism on Predicted Cellular Immunity Against SARS-CoV-2 at the Individual Level and Within Twenty Five Race/ethnic Groups**
H. C. Copley[1], L. Gragert[2], A. R. Leach[3], V. Kosmoliaptsis[1], *[1]Department of Surgery, University of Cambridge, Cambridge, United Kingdom, [2]Department of Pathology, Tulane University School of Medicine, New Orleans, LA, [3]European Bioinformatics Institute (EMBL-EBI), Hinxton, United Kingdom*

LB 7 **Limited Immunogenicity of a Single Dose of Sars-cov-2 Mrna Vaccine in Solid Organ Transplant Recipients**
B. Boyarsky, M. Ou, R. Greenberg, A. Teles, W. Werbel, R. Avery, A. Tobian, A. Massie, D. Segev, J. Garonzik Wang, *Johns Hopkins, Baltimore, MD*

LB 8 **Dd-cfdna Can Guide Safe Reintroduction of Immunosuppression in Kidney Transplant Recipients with Covid-19**
J. Miles[1], J. Leonard[2], V. Tatapudi[2], M. Fei[1], R. Montgomery[2], N. M. Ali[2], *[1]CareDx, Brisbane, CA, [2]Transplant Institute, NYU Langone Health, New York, NY*

Live Video Question and Answer

Heart

Do's and Don'ts of Heart Transplant Care

142 **Pregnancy Outcomes in 108 Heart Transplant Recipients**
L. A. Coscia[1], A. Yusuf[1], S. Rao[2], S. Constantinescu[3], M. J. Moritz[4], *[1]Transplant Pregnancy Registry International, Philadelphia, PA, [2]University of Virginia Heath System, Charlottesville, VA, [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, [4]Surgery, Lehigh Valley Health Network, Allentown, PA*

143 **DSA is Associated with Molecular Changes in Many Hearts with Minor Abnormalities but Not Diagnosed as Antibody-Mediated Rejection**
P. Halloran[1], K. S. Madill-Thomsen[1], &. the INTERHEART Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

144 **Quilty Lesions are Associated with a Tolerance Profile in Heart Allografts Biopsies**
J. Torrealba, S. Moore, S. Sathirareuangchai, L. De Las Casas, Q. Cai, *Pathology, UTSW Medical Ctr, Dallas, TX*

145 **The Pathology of Heart Allograft Biopsies: Discrepancies in Interpretation Between Conventional Histology and the Molecular Microscope Diagnostic (MMDx®) System**
P. Randhawa[1], A. Seitz[2], Y. Huang[1], B. Feingold[2], *[1]Department of Pathology, Pittsburgh, PA, [2]Pediatrics, University of Pittsburgh, Pittsburgh, PA*

146 **Impact of Statin Intensity on the Incidence of Vascular Events and Graft Survival in Heart Transplant Recipients**
E. Kim[1], I. Booth[2], R. Madathil[3], B. Ravichandran[1], M. Demehin[2], M. Plazak[2], *[1]University of Maryland School of Pharmacy, Baltimore, MD, [2]Pharmacy, University of Maryland Medical Center, Baltimore, MD, [3]University of Maryland School of Medicine, Baltimore, MD*

147 **Assessing the Impact of Acute Major Adverse Kidney Events on Clinical Outcomes in Heart Transplant Recipients**
J. E. Kelly[1], C. Perez[1], D. Taber[1], R. J. Tedford[2], B. McMahon[2], S. Alzaidi[1], H. B. Meadows[1], *[1]Pharmacy, MUSC Health, Charleston, SC, [2]Medicine, MUSC Health, Charleston, SC*

148 **Acute Kidney Injury Requiring Dialysis in Heart Transplant Recipients is a Risk Factor for Graft Failure and Overall Mortality**
M. A. Merzkani, H. Murad, A. Pottebaum, A. Java, A. Malone, J. Schilling, A. Itoh, R. Delos Santos, T. Alhamad, *Transplant, Washington University, Saint Louis, MO*

149 **Acute Dialysis, Mortality and Renal Failure After Heart Alone Transplant by Egfr and Dialysis Requirement in the United States**
M. Aljuhani[1], T. Alexy[1], S. Jackson[2], C. Martin[1], R. Kandaswamy[3], S. Riad[1], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Complex Care Analytics, Fairview Health Services, Minneapolis, MN, [3]Surgery, University of Minnesota, Minneapolis, MN*

Live Video Question and Answer

Heart: Triple "D" in Heart Transplantation: DCD, Dual-Organ and Declined Hearts

43 **Steroid-free Immunosuppression in Heart-Kidney Transplant Patients: Is It Safe?**
R. Skorka, J. Patel, M. Kittleson, N. Patel, T. Singer-Englar, A. Velleca, B. Azarbal, D. Chang, E. Kransdorf, L. Czer, D. Megna, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

44 **Adult Combined Liver-Heart Transplantation: The United States Experience**

I. A. Ziogas[1], S. P. Alexopoulos[1], W. K. Wu[1], L. K. Matsuoka[1], M. A. Rauf[1], M. Izzy[2], R. Perri[2], K. H. Schlendorf[3], J. N. Menachem[3], A. S. Shah[4], *[1]Division of Hepatobiliary Surgery and Liver Transplantation, Vanderbilt University Medical Center, Nashville, TN, [2]Department of Medicine, Division of Gastroenterology, Hepatology and Nutrition, Vanderbilt University Medical Center, Nashville, TN, [3]Division of Cardiovascular Medicine, Vanderbilt University Medical Center, Nashville, TN, [4]Department of Cardiac Surgery, Vanderbilt University Medical Center, Nashville, TN*

45 **High Degree of Center Variation in Simultaneous Heart Kidney Transplant: Opportunities for Standardization**

B. I. Shaw[1], M. L. Samoylova[1], S. J. Kesseli[1], D. Olaso[2], A. S. Barbas[1], D. L. Sudan[1], L. E. Boulware[3], L. M. McElroy[1], *[1]Surgery, Duke University, Durham, NC, [2]School of Medicine, Duke University, Durham, NC, [3]Medicine-Nephrology, Duke University, Durham, NC*

46 **Allograft Discard Risk Index for Heart Transplantation**

R. M. Reul[1], A. A. Saleem[1], C. N. Keller[1], T. H. Malik[1], J. A. Goss[2], A. A. Rana[2], *[1]Office of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

47 **Waitlist and Post-Transplant Outcomes of Candidates With Lvad: Comparison of Old and New Heart Allocation Policies**

M. Colvin[1], Y. Ahn[2], S. Hall[3], M. Walsh[4], A. Israni[2], *[1]Univ of Michigan, Ann Arbor, MI, [2]SRTR, Minneapolis, MN, [3]Baylor Univ, Dallas, TX, [4]St. Vincent Heart Ctr, Indianapolis, IN*

48 **Liver Biopsy as a Predictor in Risk Stratification for Heart Transplant Candidates**

S. Tolia[1], T. Al Saadi[1], N. Narang[2], A. Joshi[2], C. Sciamanna[2], S. Pauwaa[2], G. Macaluso[2], M. Dia[2], A. Tatooles[3], P. Pappas[3], W. Cotts[2], A. Andrade[2], *[1]Internal Medicine, Advocate Christ Medical Center, Oak Lawn, IL, [2]Cardiology, Advocate Christ Medical Center, Oak Lawn, IL, [3]Cardiovascular Surgery, Advocate Christ Medical Center, Oak Lawn, IL*

49 **Donor Factors Associated with In-field Decline of Heart Allografts**

L. Piechura, F. Yazdchi, M. Harloff, H. Shim, M. Keshk, A. Coppolino, III, D. Rinewalt, H. Mallidi, *Brigham and Women's Hospital, Boston, MA*

50 **Waitlist and Post-Transplant Outcomes of Candidates with Iabp or Ecmo: Comparison of Old and New Heart Allocation Policies**

M. Colvin[1], Y. Ahn[2], S. Hall[3], M. Skeans[2], M. Walsh[4], A. Israni[2], *[1]Univ of Michigan, Ann Arbor, MI, [2]SRTR, Minneapolis, MN, [3]Baylor Univ, Dallas, TX, [4]St. Vincent Heart Ctr, Indianapolis, IN*

Live Video Question and Answer

ID

BK virus in Kidney Recipients

265 **VP2 MRNA Distinguishes the Direct Injury and Inflammation Effects of Polyoma Virus (BK) Infection from the Cognate TCMR Response That Follows Immunosuppressive Minimization**

P. F. Halloran[1], K. Famulski[1], K. S. Madill-Thomsen[1], G. Böhmig[2], G. Gupta[3], M. Myślak[4], O. Viklicky[5], &. the INTERCOMEX Study Group[6], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Medical University of Vienna, Vienna, Austria, [3]Virginia Commonwealth University, Richmond, VA, [4]Pomeranian Medical University, Szczecin, Poland, [5]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [6]., Edmonton, AB, Canada*

266 **Coexistence of BKPyV Lytic Infection and Viral Integration in the Development of BKPyV Diseases After Renal Transplantation**

S. Yan[1], Y. Wang[1], Y. Liu[1], W. Deng[1], Z. Yan[1], J. Xu[1], C. Wu[2], Y. Miao[1], *[1]Department of Organ Transplantation, Nanfang Hospital, Southern Medical University, Guangzhou, China, [2]Departments of Urology & Pathology, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

267 **Duration and Magnitude of BK Viremia Do Not Predict Outcome in Patients After Kidney Transplantation**

E. A. Farkash[1], J. T. Rajagopal[2], M. Vincent[2], M. D. Doshi[3], *[1]Dept of Pathology, Michigan Medicine, Ann Arbor, MI, [2]University of Michigan, Ann Arbor, MI, [3]Dept of Nephrology, Michigan Medicine, Ann Arbor, MI*

268 **Donor-Derived Cell-Free DNA Levels Risk-Stratify Polyoma BK Viremia and Associated Clinical Events After Kidney Transplantation - Preliminary Results from ADMIRAL Study**

A. Pai[1], L. Bu[2], J. S. Bromberg[3], G. Gupta[4], I. Moinuddin[4], T. Alhamad[5], V. Bowers[6], S. Ghosh[7], W. Tian[7], E. Stites[8], S. Anand[9], *[1]University of Texas McGovern Medical School, Houston, TX, [2]University of Minnesota, Minneapolis, MN, [3]University of Maryland School of Medicine, Baltimore, MD, [4]Virginia Commonwealth University, Richmond, VA, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]CareDx, Brisbane, CA, [8]University of Colorado, Aurora, CO, [9]Intermountain Medical Center, Murray, UT*

269 **Characterization of Retransplantation Following Graft Failure Due to Bkvn**

K. Nguyen[1], H. Curtis[2], J. Panichella[2], H. Resweber[3], A. Di Carlo[2], S. Karhadkar[1], *[1]Surgery, Temple University School of Medicine, Philadelphia, PA, [2]Surgery, Temple University School of Medicine, Philadephia, PA, [3]Surgery, Temple University School of Medicine, Gladwyne, PA*

270 **Transcriptomics and Proteomics Profiling of Complement Pathway (cp) Proteins in Biopsies With Polyomavirus Bk Nephropathy (bkvn)**

P. Randhawa[1], F. Fei[2], Y. Huang[1], G. Tseng[3], K. Xiao[4], *[1]Departments of Pathology, Pittsburgh, PA, [2]Pharmacology and Chemical Biology, Pittsburgh, PA, [3]Biostatistics, Pittsburgh, PA, [4]Pharmacology and Chemical Biology, University of Pittsburgh, Pittsburgh, PA*

271 **Efficacy of MAU868, a Novel BKV Neutralizing Monoclonal Antibody (mAb), for the Treatment of Severe BK Virus Nephropathy (BKVN) After Kidney Transplant**

S. C. Jordan[1], N. Ammerman[2], M. Toyoda[3], K. Lim[2], J. R. Abend[4], A. Patick[5], M. R. Hodges[5], A. Vo[2], S. J. Kovacs[6], *[1]Comprehensive Transplant Center, Cedars Sinai Medical Ctr, West Hollywood, CA, [2]Comprehensive Transplant Center, Cedars Sinai Medical Ctr, Los Angeles, CA, [3]Cedars Sinai Medical Ctr, Los Angeles, CA, [4]Novartis Institutes for BioMedical Research, Virology Research, Emeryville, CA, [5]Amplyx Pharmaceuticals, San Diego, CA, [6]Novartis Institutes for BioMedical Research, Translational Medicine, East Hanover, NJ*

272 **Immunosuppression Reduction Strategies for Polyoma BK Viremia in Kidney Transplant Patients on Belatacept-Based Immunosuppression**

O. Roe[1], E. Meredith[1], A. Reid[2], A. Basu[3], *[1]Emory University Hospital, Atlanta, GA, [2]University of California San Francisco Medical Center, San Francisco, CA, [3]Emory Transplant Center, Atlanta, GA*

Live Video Question and Answer

COVID-19 Session 1

19 **Solid Organ Transplant Recipient Attitudes Towards a SARS-CoV-2 Vaccine**

M. Ou[1], B. Boyarsky[1], L. Zeiser[1], T. Chiang[1], J. Ruddy[1], S. Rasmussen[1], J. Martin[2], J. Russell[2], C. Durand[1], R. Avery[1], W. Werbel[1], M. Cooper[3], A. Massie[1], D. Segev[1], J. Garonzik-Wang[1], *[1]Johns Hopkins, Baltimore, MD, [2]National Kidney Foundation, New York, NY, [3]Medstar Georgetown Transplant Institute, Washington, DC*

20 **Systematic Screening of Kidney Transplant Patients Points Towards Deficits in Neutralizing Antibody Capacity Against Sars-cov-2**

V. Wijtvliet[1], K. K. Ariën[2], J. Mariën[2], B. Peeters[3], R. Hellemans[4], A. Massart[4], S. Van Hees[1], P. Moons[5], H. Theeten[6], P. Van Damme[6], H. Goossens[7], B. Y. De Winter[1], K. J. Ledeganck[1], D. Abramowicz[4], *[1]Laboratory of Experimental Medicine and Pediatrics, University of Antwerp, Antwerp, Belgium, [2]Department of Biomedical Sciences, Institute of Tropical Medicine and University of Antwerp, Antwerp, Belgium, [3]Department of Laboratory Medicine, Antwerp University Hospital, Antwerp, Belgium, [4]Department of Nephrology and Hypertension, Antwerp University Hospital, Antwerp, Belgium, [5]Biobank, Antwerp University Hospital, Antwerp, Belgium, [6]Centre for the Evaluation of Vaccination, Vaccine and Infectious Disease Institute, University of Antwerp, Antwerp, Belgium, [7]Department of Medical Microbiology, Vaccine & Infectious Disease Institute, University of Antwerp, Antwerp, Belgium*

21 **Clinical Outcomes of Solid Organ Transplant Recipients Treated with Remdesivir and Convalescent Plasma for Covid-19 at the Largest Transplant Center in the United States**

A. Fernandez, S. Anjan, A. Chandorkar, D. de Lima, R. Zamora, L. A. Mendez-Castaner, J. Simkins, J. Camargo, M. Morris, M. Loebe, J. Bauerlein, C. O'Brien, N. Sinha, G. Burke, G. Ciancio, A. Mattiazzi, R. Vianna, L. Abbo, G. Guerra, Y. Natori, *Miami Transplant Institute, Jackson Health System, Miami, FL*

22 **Development and Durability of Sars-cov-2 Antibodies Among Solid Organ Transplant Recipients**

B. Boyarsky, M. Ou, R. Greenberg, M. Krach, R. Wang, T. P. Chiang, W. Werbel, R. Avery, W. Clarke, A. Tobian, A. Massie, D. Segev, J. Garonzik-Wang, *Johns Hopkins, Baltimore, MD*

23 **Polyfunctional T-cell Impairment to Sars-cov-2 Coronavirus in Solid Organ Transplant Recipients with Acute Covid-19 Infection**

A. Favà[1], L. Donadeu[2], V. Pernin[3], M. Meneghini[1], E. Crespo[2], N. Sabé[4], L. Lladó[5], J. Gonzalez-Costello[6], O. Thaunat[7], O. Bestard[1], *[1]Kidney Transplantation Unit, Bellvitge University Hospital- IDIBELL, L'Hospitalet de Llobregat. Barcelona, Spain, [2]Experimental Nephrology Laboratory, IDIBELL, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [3]Kidney Transplant Unit, Hospital de Montpellier, Montpellier, France, [4]Infectious Disease Department, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [5]Liver Transplant Unit, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [6]Heart Transplantation Unit, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [7]Department of Transplantation, Edouard Herriot Hospital Lyon, Lyon, France*

24 **Longitudinal Antibody Response and Viral Loads in Covid-infected Organ Transplant Recipients**

T. M. Marinelli, V. H. Ferreira, M. Ierullo, V. Kulasingham, B. Majchrzak-Kita, C. Rotstein, S. Husain, S. Hosseini, A. Humar, D. Kumar, *UHN, Toronto, ON, Canada*

25 **Attitudes Towards Covid-19 Vaccination in an Inner-city Population of Kidney Transplant Patients (Ktx)**

P. Kerner, A. Imas, G. Udod, L. Gruffi, M. Goldberg, A. Saleh, K. Cruickshank, M. Markell, *SUNY Downstate Health Sciences University, Brooklyn, NY*

26 **Early Detection of SARS-CoV-2 and Other Infections in Solid Organ Transplant Recipients and Household Members Using Wearable Devices**

E. H. Li[1], E. Mukhtar[1], E. D. Elftmann[1], F. R. Eweje[1], H. Gao[1], L. I. Ibrahim[1], R. G. Kathawate[1], A. C. Lee[1], K. A. Moore[1], N. Nair[1], S. Amaral[2], M. Snyder[3], B. J. Keating[1], *[1]Department of Surgery, Penn Transplant Institute, Division of Transplantation, Philadelphia, PA, [2]Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA, [3]Department of Genetics, Stanford University, Palo Alto, CA*

Live Video Question and Answer

COVID-19 Session 2

119 **COVID-19 Potential Donor Derived Transmission Events Investigations: Early DTAC Experience**

R. La Hoz, A. Agarwal, S. Aslam, K. Dunn, J. Goldman, D. Levine, C. Marboe, G. F. Marklin, S. M. Pouch, M. Rana, R. Razonable, H. L. Stevenson, H. Te, A. E. Woolley, M. Michaels, L. Danziger-Isakov, *OPTN DTAC, Richmond, VA*

120 **The Impact of Covid-19 Pandemic on Living Donor Liver and Renal Transplantations in Japan: A Nationwide Survey**

S. Yamanaga[1], T. Hibi[2], R. Osawa[3], K. Yuzawa[4], H. Egawa[5], K. Kuramitsu[6], *[1]General Surgery, Japanese Red Cross Kumamoto Hospital, Kumamoto, Japan, [2]Pediatric Surgery and Transplantation, Kumamoto University, Kumamoto, Japan, [3]Infectious disease, Kameda medical center, Kamogawa, Japan, [4]Transplant Surgery, Mito Medical Center, Higashiibaraki District, Japan, [5]Gastrointestinal Surgery, Tokyo Women's Medical University Hospital, Shinjyuku-ku, Japan, [6]HBP surgery, Kobe University, Kobe, Japan*

121 **T-Cell Responses in Solid Organ Transplant Recipients with SARS-CoV-2 Infection**

V. H. Ferreira, T. M. Marinelli, T. Ku, M. Ierullo, B. Majchrzak-Kita, I. Bahinskaya, N. Pinzon, A. Humar, D. Kumar, *University Health Network, Toronto, ON, Canada*

122 **Mortality, Risk Factors, and Treatment of Covid-19 Infection in Solid Organ Transplants: A Systematic Review and Meta-analysis**

S. Yin, T. Song, Q. Zhong, T. Lin, *Urology Institute and Organ Transplantation Center, West China Hospital, Chengdu, China*

123 **Propensity Matched Analysis of Death and Non-favorable Discharge Among Hospitalized Transplant Recipients with COVID-19**

J. T. Swan[1], E. Rizk[2], S. L. Jones[1], N. Nwana[1], J. C. Nicolas[1], A. Tran[1], T. Nisar[1], T. Menser[1], S. G. Yi[2], L. W. Moore[1], A. O. Gaber[2], R. J. Knight[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX*

124 **Covid-19 Related Deaths Across the U.S. in Kidney Transplant Recipients**

K. Goli, N. T. Galvan, R. Cotton, J. A. Goss, C. A. O'Mahony, A. Rana, *Department of Abdominal Transplantation, Baylor College of Medicine, Houston, TX*

125 **Impact of COVID-19 on Solid Organ Transplantation**

E. Sampson[1], S. Hall[2], K. Robichaux[3], A. Kumar[2], N. Kemmer[4], J. Buggs[5], *[1]Lake Erie College of Osteopathic Medicine, Tampa, FL, [2]Morsani College of Medicine, University of South Florida, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Hepatology, Tampa General Hospital, Tampa, FL, [5]Transplant Surgery, Tampa General Hospital, Tampa, FL*

126 **Covid-19 in Solid Organ Transplantation (SOT): Results of the National Covid Cohort Collaborative (N3C)**

G. Agarwal[1], A. Vinson[2], R. Dai[3], E. French[4], S. Lee[5], A. Olex[4], A. Anzalone[6], V. Madhira[7], R. B. Mannon[8], *[1]Medicine, University of Alabama at Birmingham, Birmingham, AL, [2]Medicine/Nephrology, Nova Scotia Health Authority, Halifax, NS, Canada, [3]Biostatistics, University of Nebraska Medical Center, Omaha, NE, [4]Wright Center for Clinical and Translational Research, VIrginia Commonwealth University, Richmond, VA, [5]Medicine/Infectious Disease, University of Saskatchewan, Saskatoon, SK, Canada, [6]Neurology, University of Nebraska Medical Center, Omaha, NE, [7]Palia Software, Not sure, OR, [8]Medicine/Nephrology, University of Nebraska Medical Center, Omaha, NE*

Live Video Question and Answer

Hepatitis C

358 **Association of Donor Hepatitis C Virus Infection Status and Risk of Bk Polyomavirus Viremia After Kidney Transplantation**

V. S. Potluri[1], D. E. Schaubel[1], M. E. Sise[2], B. P. Concepcion[3], R. C. Forbes[1], E. A. Blumberg[1], D. Goldberg[4], P. P. Reese[1], R. Bloom[1], D. Shaffer[3], R. Chung[2], D. Sawinski[1], I. Strohben[2], N. Elias[2], A. Azhar[5], M. Shah[1], J. Eason[5], L. A. Binari[3], M. Talwar[5], V. Balaraman[5], A. Bhalla[5], B. Besharatian[1], M. Z. Molnar[5], *[1]University of Pennsylvania, Philadelphia, PA, [2]Massachusetts General Hospital, Boston, MA, [3]Vanderbilt University Medical Center, Nashville, TN, [4]University of Miami Miller School of Medicine, Miami, FL, [5]Methodist University Hospital, Memphis, TN*

359 **Outcomes of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants**

G. Gupta, I. Yakubu, P. Kimball, L. Kang, K. Mitchell, M. Shinbashi, D. Kumar, I. Moinuddin, L. Kamal, A. King, C. Bhati, M. Levy, A. Cotterell, A. Sharma, R. Sterling, *Virginia Commonwealth University Health System, Richmond, VA*

360 **Cost-Effectiveness Analysis of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants**

I. Yakubu, Y. Zhang, S. Ijioma, N. V. Carroll, J. Patterson, R. Sterling, G. Gupta, *Virginia Commonwealth University Health System, Richmond, VA*

361 **Are Tacrolimus Concentrations Reduced with Direct-acting Antiviral Administration in Transplant Recipients?**

K. Huang, K. Farrow, M. Christian, *Pharmacy, Penn State Health Hershey Medical Center, Hershey, PA*

362 **Outcomes of Kidney Transplantation from Hepatitis C Virus (HCV) Infected Donors Stratified by Recipient HCV Serostatus: A Mate Kidney Analysis**

K. K. Sureshkumar[1], B. Chopra[1], R. L. McGill[2], *[1]Nephrology and Hypertension, Allegheny General Hospital, Pittsburgh, PA, [2]Nephrology, University of Chicago, Chicago, IL*

363 **Outcomes of Hepatitis C Nucleic Acid Testing Positive Donors in Aviremic Recipients With Delayed Direct-Acting Antiviral Initiation**

M. Hudson, A. Webb, A. Logan, A. Silverman, A. Brueckner, *Pharmacy, Tampa General Hospital, Tampa, FL*

364 **Transplanting Hepatitis C Infected Organs Into Uninfected Recipients: A Pharmacy Perspective**

M. L. Holt, A. James, K. Gutierrez, T. Sparkman, J. Banbury, D. Jones, *University of Alabama at Birmingham Hospital, Birmingham, AL*

365 **Use of Donor Blood Expedites HCV Genotyping and Allows Earlier DAA Initiation for Recipients of HCV+ Kidneys**

B. Lonze, N. Ali, R. Montgomery, Z. Stewart Lewis, *Tranplant Institute, NYU Langone Health, New York, NY*

Live Video Question and Answer

Infections in Kidney Recipients

158 **Posttransplant Malignancy in HIV+ Kidney Transplant Recipients**
D. Sawinski[1], R. Fitzsimmons[1], J. Locke[2], J. Trofe-Clark[1], B. Shelton[2], P. Reese[1], E. Blumberg[1], *[1]Hospital of the University of Pennsylvania, Philadelphia, PA, [2]University of Alabama at Birmingham, Birmingham, AL*

159 **Influence of Induction Therapy and Antiretroviral Regimen on Outcomes in HIV Positive Renal Transplant Recipients**
C. Rogers Marks[1], C. Durand[2], J. Hand[3], M. Abidi[4], M. Malinis[5], B. Barnaba[2], H. Patel[6], C. D. Alonso[6], *[1]Massachussetts General Hospital, Boston, MA, [2]Johns Hopkins Medical Center, Baltimore, MD, [3]Ochsner Medical Center, New Orleans, LA, [4]Univ. of Colorado, Aurora, CO, [5]Yale, New Haven, CT, [6]Beth Israel Deaconess Medical Center, Boston, MA*

160 **Outcomes of Kidney Transplantation in HIV Positive Highly Sensitized Recipients**
S. Karhadkar, J. Panichella, H. Resweber, K. Nguyen, A. Di Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

161 **Infectious Complications After Belatacept Conversion in Kidney Transplant**
J. E. Marvin[1], D. Amenyedor[1], M. M. Azar[2], K. Belfield[1], V. Do[1], R. Formica[3], E. Cohen[1], *[1]Pharmacy, Yale New Haven Hospital, New Haven, CT, [2]Section of Infectious Diseases, Yale School of Medicine, New Haven, CT, [3]Section of Nephrology, Yale School of Medicine, New Haven, CT*

162 **Optimal Antimicrobial Duration for Donor Positive Cultures in Kidney Transplant Recipients**
J. Ferrante, K. Schnelle, M. Palettas, S. Sarwar, H. Winters, M. Chunduru, *Pharmacy, The Ohio State University Wexner Medical Center, Columbus, OH*

163 **Treatment of Biopsy-Proven Pyelonephritis of the Transplanted Kidney is Associated with Better Graft Outcomes**
F. Aziz, C. Saddler, J. Alstott, K. Swanson, S. Parajuli, N. Garg, A. Djamali, D. Mandelbrot, *University of Wisconsin, Madison, WI*

164 **The Metagenomic Landscape of Renal Transplant**
A. Johnson[1], G. Karadkhele[2], C. Larsen[2], *[1]Emory University, Atlanta, GA, [2]Surgery, Emory University, Atlanta, GA*

165 **Impact of High-Risk EBV Discordance Status on Survival Outcomes in Kidney Transplant Recipients: A Multivariable Analysis**
A. Dinesh[1], S. Jackson[2], T. L. Pruett[1], S. Riad[3], *[1]Division of Transplantation, Department of Surgery, University of Minnesota, Minneapolis, MN, [2]Biostatistics, Analytics Consulting Services- Solid Organ Transplant, M Health Fairview, Minneapolis, MN, [3]Department of Medicine, University of Minnesota, Minneapolis, MN*

Live Video Question and Answer

Infectious Disease Poutpouri

225 **Molecular Epidemiology of Extended-Spectrum Cephalosporin-Resistant Enterobacterales Bloodstream Infections Among Solid Organ Transplant Recipients**
J. A. Anesi[1], E. Lautenbach[1], P. D. Tamma[2], K. A. Thom[3], K. Alby[4], E. A. Blumberg[1], W. Bilker[1], J. Omorogbe[1], P. Tolomeo[1], A. Werzen[3], J. Han[5], *[1]University of Pennsylvania, Philadelphia, PA, [2]Johns Hopkins University, Baltimore, MD, [3]University of Maryland, Baltimore, MD, [4]University of North Carolina, Chapel Hill, NC, [5]GlaxoSmithKline, Rockville, MD*

226 **Cytomegalovirus (CMV) D+/R- Serostatus is Independently Associated with Mortality and Graft Loss After Liver Transplantation (LTx)**
P. Vutien, J. Perkins, S. Biggins, J. Reyes, A. Limaye, *Internal Medicine, University of Washington Medical Center, Seattle, WA*

227 **Cmv Specific Cellmediated Immune Reconstitution During Letermovir Prophylaxis in High Risk Hematopoietic Cell Transplant Recipients**
M. Abidi[1], J. Gutman[2], A. Weinberg[2], *[1]University of Colorado Denver/Anschutz Medical Campus, Aurora, CO, [2]University of Colorado Denver, Denver, CO*

228 **Impact of a Cmv Cell Mediated Immunity Based Protocol on Guiding Cmv Prophylaxis Following Pediatric Liver Transplantation - A Single Center Experience**
G. Kalkan[1], S. Ball[2], L. McConnell[2], D. M. Desai[3], A. Aqul[3], P. K. Sue[1], *[1]Infectious Disease, University of Texas Southwestern Medical Center, Dallas, TX, [2]Solid Organ Transplant Program, Children's Health, Dallas, TX, [3]Solid Organ Transplant Program, University of Texas Southwestern Medical Center, Dallas, TX*

229 **Outcomes of Abdominal Transplant Recipients Who Receive Organs from Donors with Positive Cultures**
A. Perez Cortes Villalobos, A. Humar, D. Kumar, *University Health Network, Toronto, ON, Canada*

230 **Evaluating Pneumocystis Jiroveci Pneumonia Prophylaxis in Lung Transplant Recipients**
J. Sharkey, K. McMurry, J. Park, C. Carlson, K. Gregg, D. Kaul, D. Lyu, L. Fitzgerald, *Michigan Medicine, Ann Arbor, MI*

231 **Epidemiology and Risk Factors for Invasive Fungal Infection in Pancreas Transplant in the Absence of Fungal Prophylaxis**
J. Burkey[1], J. M. Chen[2], A. A. Sharfuddin[2], M. S. Yaqub[2], A. J. Lutz[2], J. A. Powelson[2], J. A. Fridell[2], N. Barros[2], *[1]Butler University College of Pharmacy and Health Sciences, Indianapolis, IN, [2]Indiana University Health, Indianapolis, IN*

232 **Impact of a Pharmacist-driven Immunization Clinic on Vaccination Rates in Pre-liver Transplant Patients**
A. Poparad-Stezar[1], B. Summers[1], M. Fitzmaurice[1], K. Hakamiun[2], N. Sulejmani[3], A. Jantz[1], *[1]Henry Ford Hospital, Detroit, MI, [2]Select Medical, Wyandotte, MI, [3]CareDx, Inc., Sterling Heights, MI*

Live Video Question and Answer

ID: COVID-19

COVID-19 in Kidney Recipients

59 **COVID-19 in the Kidney Transplant Waitlist Population**
A. C. Johnson[1], C. P. Larsen[1], H. Gebel[2], R. Bray[2], *[1]Surgery, Emory University, Atlanta, GA, [2]Pathology, Emory University, Atlanta, GA*

60 **Predictors of Severe Covid-19 in Kidney Transplant Recipients in the First and Second Waves: Analysis of the Spanish Registry**
M. Crespo[1], A. Mazuecos[2], I. Pérez-Flores[3], F. Moreso[4], A. Andrés[5], C. Jimenez[6], M. Molina[7], C. Canal[8], L. Sánchez-Cámara[9], S. Zárraga[10], M. Ruiz Fuentes[11], M. Aladrén[12], E. Melilli[13], V. López[14], E. Sanchez[15], J. Pascual for Spanish Nephro Society Covid-Registry[1], *[1]Nephrology, Hospital del Mar, Barcelona, Spain, [2]Nephrology, Hospital Puerta del Mar, Cadiz, Spain, [3]Nephrology, Hospital Clinico San Carlos, Madrid, Spain, [4]Nephrology, Hospital Valle Hebrón, Barcelona, Spain, [5]Nephrology, Hospital 12 Octubre, Madrid, Spain, [6]Nephrology, Hospital La Paz, Madrid, Spain, [7]Nephrology, Hospital Germans Trias i Pujol, Barcelona, Spain, [8]Nephrology, Fundacio Puigvert, Barcelona, Spain, [9]Nephrology, Hospital Gregorio Marañón, Madrid, Spain, [10]Nephrology, Hospital de Cruces, Bilbao, Spain, [11]Nephrology, Hospital Virgen de las Nieves, Granada, Spain, [12]Nephrology, Hospital Miguel Servet, Zaragoza, Spain, [13]Nephrology and Kidney Transplantation, Hospital de Bellvitge, Barcelona, Spain, [14]Nephrology, Hospital Regional de Málaga, Malaga, Spain, [15]Nephrology, Hospital de Cabueñes, Gijon, Spain*

61 **SARS-CoV-2 Antibody Response After Induction Therapy in Kidney Transplant Recipients**
M. Lubetzky[1], S. Sultan[2], Z. Zhao[3], M. Cushing[3], Z. Kapur[1], S. Albakry[1], N. Hauser[1], J. Marku-Podvorica[1], R. Craig-Schapiro[2], J. Lee[1], T. Salinas[1], M. Aull[2], S. Kapur[2], M. Suthanthiran[1], D. Dadhania[1], *[1]Nephrology, Weill Cornell-NYPresbyterian, New York, NY, [2]Transplant Surgery, Weill Cornell-NYPresbyterian, New York, NY, [3]Pathology, Weill Cornell-NYPresbyterian, New York, NY*

62 **Characterizing Kidney Transplant Recipients with SARS-CoV-2: An Academic Single Center Experience**
S. Nahi, A. Shetty, S. Tanna, J. Leventhal, *Northwestern University, Chicago, IL*

63 **Prevalence and Dynamics of SARS-COV-2 IgG in Kidney Transplant Recipients**
Y. Al Azzi, P. Loarte, C. Pynadath, O. Alani, L. Liriano-Ward, M. Ajaimy, R. Bartash, J. Graham, M. Le, H. Yaffe, S. Greenstein, J. Rocca, M. Kinkhabwala, E. Akalin, *Montefiore Medical Center, New York, NY*

64 **The Impact of Covid-19 in Kidney Transplant Recipients: A Systematic Review and Meta-analysis**
J. Kumar[1], J. Pyda[2], I. Reccia[3], F. VIrdis[4], P. Bachul[1], R. Barth[1], Y. Becker[1], J. Fung[1], P. Witkowski[1], *[1]University of Chicago, Chicago, IL, [2]Beth Israel, Boston, MA, [3]Imperial College, London, United Kingdom, [4]Royal London, London, United Kingdom*

65 **Profile of SARS-CoV-2 Antibodies in Patients Awaiting Kidney Transplantation**
L. Muir[1], A. Jaffer[2], C. Rees-Spear[1], V. Gopalan[2], F. Chang[2], G. Vaitkute[1], R. Fernando[3], C. Roustan[4], A. Rosa[4], C. Earl[4], A. Salama[2], P. Cherepanov[4], L. E. McCoy[1], R. Motallebzadeh[2], *[1]Institute of Immunity & Transplantation, University College London, London, United Kingdom, [2]Nephrology & Transplantation, Royal Free London Hospital NHS Trust, London, United Kingdom, [3]Anthony Nolan Institute, Royal Free London Hospital NHS Trust, London, United Kingdom, [4]The Francis Crick Institute, London, United Kingdom*

66 **Modification in Immunosuppression Regimens to Safely Perform Kidney Transplants Amid the Covid-19 Pandemic**
L. Von Stein, O. Witkowsky, L. Samidurai, K. Flores, M. Doraiswamy, T. Pesavento, P. Singh, *The Ohio State University Wexner Medical Center, Columbus, OH*

Live Video Question and Answer

Kidney

Kidney Antibody Mediated Rejection

317 **DSA Causes Mild Molecular ABMR-like Changes in Many Biopsies Not Diagnosed as Rejection**
P. F. Halloran[1], K. S. Madill-Thomsen[1], &. the INTERCOMEX Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

318 **Beyond Microarrays: Insights from Ncounter Transcript Analysis of Routine Archival Kidney Allograft Biopsies**
I. Rosales, K. Tomaszewski, A. Milagros, T. Kawai, R. Smith, R. Colvin, *Massachusetts General Hospital, Boston, MA*

319 **Transplant Glomerulopathy in the Absence of Donor-specific HLA Antibodies: Risk Factors, Histopathological Features and Graft Outcome**
A. Senev, E. Van Loon, M. Emonds, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

320 **High Donor-Derived Cell-Free DNA Levels Predict Development of De Novo HLA Donor-Specific Antibodies After Kidney Transplantation - Data from the ADMIRAL Study**
G. Gupta[1], T. Alhamad[2], V. Bowers[3], I. Moinuddin[1], S. Ghosh[4], J. Zeng[4], E. Stites[5], A. Pai[6], J. S. Bromberg[7], S. Anand[8], *[1]Virginia Commonwealth University, Richmond, VA, [2]Washington University in St. Louis, St. Louis, MO, [3]Tampa General Hospital, Tampa, FL, [4]CareDx, Brisbane, CA, [5]University of Colorado, Aurora, CO, [6]University of Texas McGovern Medical School, Houston, TX, [7]University of Maryland School of Medicine, Baltimore, MD, [8]Intermountain Medical Center, Murray, UT*

321 **Novel Mixed Lymphocyte Reaction Monitoring System That Predicts Chronic Antibody- Mediated Rejection in Kidney Transplant Recipients**
N. Iwahara[1], K. Hotta[1], T. Tanabe[1], D. Iwami[2], Y. Takada[3], H. Higuchi[1], H. Sasaki[3], H. Harada[3], N. Shinohara[1], *[1]Hokkaido Univercity, Sapporo, Japan, [2]Jichi Medical University, Shimotsuke, Japan, [3]Sapporo City General Hospital, Sapporo, Japan*

322 **The Trifecta Study: Calibrating Circulating Donor-Derived Cell-Free DNA at the Time of Indication Biopsies Against the Molecular Phenotype of the Biopsy Reveals a Prominent Association with NK Cell Genes**
P. Halloran[1], Z. Demko[2], A. Prewett[2], J. Reeve[1], P. Billings[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Natera Inc., San Carlos, CA*

323 **Prospective Intensive Monitoring for Anamnestic DSA Responses Allows Near Elimination of Early Clinical AMR**
M. McGowan[1], A. Bickenbach[1], A. R. Shields[2], R. R. Alloway[1], P. Brailey[1], E. Portwood[1], C. Alquist[1], A. Christianson[1], B. Abu Jawdeh[1], M. Cuffy[1], J. Kremer[2], S. Bumb[1], A. Govil[1], M. Anand[1], T. Kaur[1], E. S. Woodle[1], *[1]U Cincinnati, Cincinnati, OH, [2]Christ Hospital, Cincinnati, OH*

324 **$CD56^{dim}CD16^{bright}$ NK Cells from Kidney Transplant Recipients with Antibody-mediated Rejection Display Increased Proliferation, Type-1 Activation and Cytotoxic Profile**
E. Bailly[1], C. Macedo[1], K. Louis[1], B. Ramaswami[1], M. Lucas[1], C. Bentlejewski[1], P. Randhawa[1], A. Zeevi[1], C. Lefaucheur[2], D. Metes[1], *[1]Department of Surgery, Thomas E. Starzl Transplantation Institute, Pittsburgh, PA, [2]INSERM UMR-S976. Endothelium, Inflammation & Alloreactivity, Université de Paris, Paris, France*

Live Video Question and Answer

Kidney Complications

173 **Mapping Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI) in Kidney Transplant Biopsies Reveals Two Classes of Early AKI That Differ in Their Response-to-Wounding**
P. Halloran[1], J. Reeve[1], G. Böhmig[2], O. Viklicky[3], M. Myslak[4], G. Gupta[5], &. the INTERCOMEX Study Group[6], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Medical University of Vienna, Vienna, Austria, [3]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [4]Pomeranian Medical University, Szczecin, Poland, [5]Virginia Commonwealth University, Richmond, VA, [6]AB, Canada*

174 **Oxalate Nephropathy After Kidney Transplant: Defining Histological Patterns, Contributing Factors and Graft Outcome**
N. Jakob[1], A. Chuu[1], J. Ninan[1], E. Lim[1], N. Zhang[1], H. Amer[2], F. Cosio[2], H. Wadei[3], M. Ryan[1], C. Cortese[3], L. Cornell[2], M. Keddis[1], *[1]Nephrology, Mayo Clinic, Scottsdale, AZ, [2]Nephrology, Mayo Clinic, Rochester, MN, [3]Nephrology, Mayo Clinic, Jacksonville, FL*

175 **Kidney Donor Risk Index: Significance as a Predictor of Kidney Transplant Outcomes Beyond Allograft Survival, Analysis of 18 Adjusted Regression Models Involving Adult Deceased Donor Kidney Recipients**
A. Santos, E. Bueno, M. A. Leghrouz, *University of Florida, Gainesville, FL*

176 **The Effect of Delayed Graft Function on Early versus Late Mortality Following Kidney Transplantation**
W. Irish[1], Y. Fu[2], D. B. Leeser[1], K. V. Ravindra[3], C. Haisch[1], J. Tuttle[1], *[1]Surgery, East Carolina University, Greenville, NC, [2]Mathematics, East Carolina University, Greenville, NC, [3]Surgery, Duke University, Durham, NC*

177 **Outcomes of Kidney Transplant Recipients With Sickle Cell Disease: An Analysis of the 2000-2019 UNOS/ OPTN Database**
N. Leeaphorn[1], C. Thongprayoon[2], C. Jadlowiec[3], A. Chewcharat[4], P. Hansrivijit[5], S. Katari[1], P. Vaitla[6], L. Cummings[1], M. Cooper[7], W. Cheungpasitporn[2], *[1]Saint Luke's Health System, Kansas City, MO, [2]Mayo Clinic, Rochester, MN, [3]Mayo Clinic, Phoenix, AZ, [4]Mount Auburn Hospital, Cambridge, MA, [5]University of Pittsburgh Medical Center Pinnacle, Harrisburg, PA, [6]University of Mississippi Medical Center, Jackson, MS, [7]Medstar Georgetown Transplant Institute, Washington, DC*

178 **Worsening Impact of Acute Kidney Rejection on Long Term Graft Survival from 2000 to 2014**
D. Leeser[1], W. Irish[1], K. Ravindra[2], V. Villani[2], A. Connor[2], J. Tuttle[1], *[1]Surgery, East Carolina University, Greenville, NC, [2]Surgery, Duke University, Durham, NC*

179 **Angiotensin II Type-1 Receptor Antibodies are Associated with Inferior Renal Allograft Survival**
P. Martin, E. Santos, N. Gunby, M. Willicombe, *Renal Department, Imperial College Healthcare NHS Trust, London, United Kingdom*

180 **Post-Transplant Idiopathic Immune Complex Glomerulonephritis**
F. Aziz, T. Singh, N. Garg, D. Mandelbrot, *University of Wisconsin, Madison, WI*

Live Video Question and Answer

Kidney Deceased Donor Allocation

27 **Clinical Outcomes and Racial Impact of HLA Matching in the Australian Deceased Donor Kidney Transplantation Program, 2000-2018**
M. Gramlick, M. Heer, *Department of Surgery, John Hunter Hospital, Newcastle, Australia*

28 **Allocating Kidneys in Optimized Circles: Logistics are More Important Than Distance**
R. Saidi, R. Shahbazov, M. Hanlon, M. laftavi, *SUNY Upstate, Syracuse, NY*

29 **Status of Kidney Allocation in Liver-kidney Transplants Before and After the UNOS/OPTN Policy**
J. Oveyssi, M. Hussain, P. Homkrailas, S. Bunnapradist, *Department of Internal Medicine: Division of Transplant Nephrology, UCLA, Los Angeles, CA*

30 **The Association Between Environmental Determinants and High KDRI Organ Offer Acceptance Ratios**
A. M. Placona, C. Martinez, M. Stuart, *United Network for Organ Sharing, Henrico, VA*

31 **Kidney Transplantation in Very Highly-Sensitized Patients with Maastricht Type III Non-heart-Beating Donors**
F. Villanego[1], A. Mazuecos[1], L. Vigara[1], V. Lopez[2], G. Bernal[3], A. Rodriguez-Benot[4], M. de Gracia[5], P. Castro[6], A. Alvarez[6], *[1]Department of Nephrology, Hospital Puerta del Mar, Cadiz, Spain, [2]Department of Nephrology, Hospital Carlos Haya, Malaga, Spain, [3]Department of Nephrology, Hospital Virgen del Rocio, Sevilla, Spain, [4]Department of Nephrology, Hospital Reina Sofia, Cordoba, Spain, [5]Department of Nephrology, Hospital Virgen de las Nieves, Granada, Spain, [6]Andalusian Transplant Coordination, Sevilla, Spain*

32 **Impact of CHA2DS2-VASc Score on Postoperative Mortality Following Kidney Transplant**
J. Klein[1], M. Rangel[1], Z. Spigel[2], E. Hollinger[1], D. Olaitan[1], M. Hertl[1], E. Chan[1], *[1]Surgery, Rush University Medical Center, Chicago, IL, [2]Surgery, Allegheny Health Network, Pittsburgh, PA*

33 **Renal Transplant Outcomes of Kidney-only vs. Multi-organ Deceased Donors**
J. Espinales[1], Z. C. Giffen[1], D. Schneider[2], R. James[3], N. Koizumi[3], O. Ekwenna[1], J. Ortiz[4], *[1]University of Toledo Medical Center, Toledo, OH, [2]UC Irvine School of Medicine, Irvine, CA, [3]George Mason University, Arlington, VA, [4]Albany Medical Center, Albany, NY*

34 **Construction of a Waiting Time Predictive Model for Kidney Transplant with Deceased Donor in the State of São Paulo**
J. Silva[1], M. Contti[1], M. Valiatti[1], H. Nga[1], G. Santos[1], M. Perosa[2], G. Ferreira[3], L. Modelli de Andrade[1], *[1]UNESP, Botucatu, Brazil, [2]Hospital Leforte, São Paulo, Brazil, [3]Santa Casa de Juiz de Fora, Juiz de Fora, Brazil*

Live Video Question and Answer

Kidney Deceased Donor Selection

127 **Findings from the Bareto Study: Associations Between Chronic Vascular Changes and 10-year Transplant Graft Outcomes**
L. Kamal[1], D. Stewart[2], J. Foutz[2], H. McGehee[2], P. Saravanane[1], S. Yu[1], R. Yusfi[1], G. Gupta[1], *[1]Virginia Commonwealth University, Richmond, VA, [2]UNOS, Richmond, VA*

128 **An HLA Class II Matching Strategy That Predicts De Novo Donor-specific HLA Antibody Formation Using Low Resolution HLA Types**
L. Hidalgo[1], I. Martinez Juarez[2], L. Morales Buenrostro[2], S. Shojai[3], P. Campbell[1], *[1]University of Wisconsin Madison, Madison, WI, [2]Instituto Nacional de Ciencias Medicas Y Nutricion Salvador Zubrian, Mexico City, Mexico, [3]Medicine, University of Alberta, Edmonton, AB, Canada*

129 **Outcomes from High KDPI Kidneys Utilized for Dual Kidney Transplantation**
J. Wagler[1], K. Mitchell[2], S. Ohara[3], R. Heilman[2], S. K. Reddy[2], H. Khamash[2], C. Jadlowiec[2], *[1]Mayo Clinic Arizona, Phoenix, AZ, [2]Mayo Clinic, Phoenix, AZ, [3]Valleywise Health General Surgery Residency Program, Phoenix, AZ*

130 **Successful Outcomes from Selected Akin3 Donors Requiring Renal Replacement: Avenue for Increase in Organ Utilization**
P. Budhiraja[1], R. L. Heilman[1], M. L. Smith[2], H. A. Khamash[1], L. Kodali[1], A. A. Moss[3], A. K. Mathur[3], C. Jadlowiec[3], K. S. Reddy[3], *[1]Medicine, Mayo Clinic, Phoenix, AZ, [2]Pathology, Mayo Clinic, Phoenix, AZ, [3]Surgery, Mayo Clinic, Phoenix, AZ*

131 **Outcomes of Kidney Transplant Recipients (KTRs) Comparing Brain Dead Donors' vs Donation After Cardiac Death Stratified by KDPI, Focus on Marginal Kidneys: A UNOS Database Analysis**
B. Chopra[1], K. K. Sureshkumar[1], D. Rajasundaram[2], E. C. Rodrigo[3], *[1]Allegheny Health Network, Pittsburgh, PA, [2]UPMC, Pittsburgh, PA, [3]University Hospital Marqués de Valdecilla, Santander, Spain*

132 **Expanding A_2 to B Kidney Transplantation: Safe and Effective Use of Recipients with High Titer Antibodies**
A. Gilbert[1], S. Radomski[2], J. Verbesey[1], J. Vucci[1], M. Cooper[1], *[1]Medstar Georgetown Transplant Institute, Washington, DC, [2]Department of Surgery, Johns Hopkins Medical Center, Baltimore, MD*

133 **How Long is the Wait Worthwhile: Cost-Effectiveness of Accepting a Kidney from a Donor with Apolipoprotein L1 High-Risk Genotype**
K. Lentine[1], D. Brennan[2], M. Wang[3], M. Schnitzler[4], H. Xiao[4], D. Axelrod[5], J. Snyder[6], K. Lentine[4], *[1]Saint Louis University, St. Louis, MO, [2]Johns Hopkins, Baltimore, MD, [3]Washington Univ, Saint Louis, MO, [4]Saint Louis Univ, Saint Louis, MO, [5]Univ of Iowa, Iowa City, IA, [6]SRTR, Minneapolis, MN*

Live Video Question and Answer

Kidney Desensitization/KPD

166 **Desensitization Using Clazakizumab® (anti-il-6) in Highly-hla Sensitized Patients Awaiting Kidney Transplant (nct03380962)**

A. A. Vo[1], N. Ammerman[1], E. Huang[1], M. Toyoda[2], S. Ge[2], A. Peng[1], R. Najjar[1], S. Sethi[1], S. Williamson[1], C. Myers[1], K. Lim[1], M. Gillespie[1], S. Jordan[1], *[1]Kidney Transplant, Cedars Sinai Medical Ctr, Los Angeles, CA, [2]Transplant Immunology Laboratory, Cedars Sinai Medical Ctr, Los Angeles, CA*

167 **The Effect of Daratumumab (Dara, Humanized Anti-CD38 Monoclonal Antibody) on Immune Cells In Vitro and in a HLA-Sensitized Kidney Transplant Patient (HS KTx Pt) Desensitized (DES) with Dara**

S. Ge[1], M. Chu[1], A. De Guzman[1], E. Ortiz[1], A. Vo[2], N. Ammerman[2], S. C. Jordan[2], M. Toyoda[1], *[1]Transplant Immunology Laboratory, Cedars Sinai Medical Center, Los Angeles, CA, [2]Comprehensive Transplant Center, Cedars Sinai Medical Center, Los Angeles, CA*

169 **Additional Value to Participation in a National Paired Kidney Exchange Program: Exploring Characteristics of Chain End Living Donors and Waitlist Recipients**

N. Osbun[1], A. Thomas[2], M. Cooper[3], S. Flechner[4], D. Segev[2], J. Veale[1], *[1]Urology, University of California Los Angeles, Los Angeles, CA, [2]Johns Hopkins University, Baltimore, MD, [3]Medstar Georgetown Transplant Institute, Washington DC, DC, [4]Cleveland Clinic, Cleveland, OH*

170 **Kidney Paired Exchange in Children in the United-states**

J. Hogan[1], A. G. Thomas[2], J. Verbesey[3], D. L. Segev[4], *[1]Transplant Research Center, Department of Surgery, Emory University, Atlanta, GA, [2]Department of Epidemiology, University of North Carolina, Chapel Hill, NC, [3]Department of Surgery, Medstar Georgetown Transplant Institute, Washington, DC, [4]Department of Surgery, Johns Hopkins University, Baltimore, MD*

171 **Right Kidneys and Kidneys with Complex Anatomy are More Likely to be Transplanted to the Waiting List in a National Kidney Paired Donation Program**

N. Osbun[1], A. Thomas[2], A. Waterman[3], J. Veale[1], D. Segev[2], D. Leeser[4], *[1]Urology, University of California Los Angeles, Los Angeles, CA, [2]Johns Hopkins University, Baltimore, MD, [3]University of California Los Angeles, Los Angeles, CA, [4]East Carolina University, Greenville, NC*

172 **The Benefits of Sharing Non-Directed Donors Nationally Through Paired Exchange**

J. Verbesey[1], A. G. Thomas[2], A. D. Waterman[3], J. Vucci[1], G. Vranic[1], A. Gilbert[1], S. Ghasemian[1], M. Cooper[1], *[1]Georgetown University Hospital, Washington, DC, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]UCLA, Los Angeles, CA*

Live Video Question and Answer

Kidney Immunosuppression

273 **A Phase 1 Study to Evaluate the Safety, Tolerability and Pharmacokinetics of At-1501**

S. Perrin[1], A. Gill[2], C. Gill[2], P. Gustafson[1], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

274 **Evaluation of a Weight-Based Mycophenolate Mofetil Dosing Protocol for Kidney Transplant Maintenance Immunosuppression**

M. Mahoney[1], E. Kincaide[1], J. Nelson[1], K. Klein[1], R. Hall[1], S. Bhayana[2], *[1]University Health, San Antonio, Department of Pharmacotherapy and Pharmacy Services, The University of Texas at Austin, Pharmacotherapy Division, College of Pharmacy, San Antonio, TX, [2]University Transplant Center, University Health, San Antonio, Department of Nephrology, The University of Texas Health Science Center at San Antonio, San Antonio, TX*

275 **The Clinical Validation of a Dried Blood Spot Method for Simultaneous Tacrolimus and Creatinine Measurement**

M. I. Francke[1], S. Bouarfa[2], B. van Domburg[2], D. van de Velde[2], M. E. Hellemons[3], O. C. Manintveld[4], S. M. Last-Koopmans[5], M. B. Mulder[2], D. A. Hesselink[1], B. C. de Winter[2], *[1]Internal medicine, nephrology and transplantation, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [2]Hospital Pharmacy, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [3]Pulmonary medicine, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [4]Cardiology, Erasmus MC, University Medical Center, Rotterdam, Netherlands, [5]Hematology, Erasmus MC, University Medical Center, Rotterdam, Netherlands*

276 **CD40 Blockade by the Fc-Silent Immunosuppressive Antibody Iscalimab Results in Diminished B Cell Activation and Differentiation and is Paralleled by Whole Blood Gene Expression Data**

R. Kraaijeveld[1], M. W. van den Hoogen[1], A. E. de Weerd[1], E. Ferroro[2], G. Robert[2], U. Laessing[2], B. Haraldsson[2], J. S. Rush[2], C. C. Baan[1], *[1]Erasmus MC, Rotterdam, Netherlands, [2]Novartis Pharmaceuticals AG, Basel, Switzerland*

277 **Conversion to Belatacept Based Immunosuppression Regimen in Kidney Transplant Patients: Lessons Learned**

R. Saidi, N. Huang, C. Yang, I. Movileanu, K. Ecal, A. Senay, O. Pankewycz, R. Dvorai, R. Shahbazov, M. Laftavi, *SUNY Upstate, Syracuse, NY*

278 **Immunosuppression and Cancer Risk in Kidney Transplant Recipients: A Retrospective Cohort Study**

R. Sapir-Pichhadze[1], C. Laprise[1], X. Zhang[1], M. Abrahamowicz[1], M. Beauchamp[2], A. Della Vecchia[1], L. Azoulay[1], E. Franco[1], B. Nicolau[1], *[1]McGill University, Montreal, QC, Canada, [2]McGill University Health Centre, Montreal, QC, Canada*

279 **Clinical Outcomes Associated with Induction Therapy Regimens for Kidney Transplantation in Children: A NAPRTCS and PHIS Collaborative Report**

H. Pizzo[1], D. Levy Erez[2], N. M. Rodig[3], T. Richardson[4], M. Somers[3], *[1]Pediatric Nephrology, Cedars-Sinai Medical Center, Los Angeles, CA, [2]Nephrology Institute, Schneider Children's Medical Center, Tel Aviv, Israel, [3]Nephrology, Boston Children's Hospital, Boston, MA, [4]Children's Hospital Association, Lenexa, KS*

280 **Single-Dose Basiliximab Induction Therapy in Low-Immunologic Risk Kidney Transplant Recipients**

A. Hutchins, J. Schoen, J. S. McMullen, *Pharmacy, Nebraska Medicine, Omaha, NE*

Live Video Question and Answer

Kidney Psychosocial

325 **The Relationship Between Health Literacy and Adverse Outcomes After Kidney Transplantation**

E. Lorenz, T. Petterson, C. Schinstock, W. Sanchez, K. Yost, *Mayo Clinic, Rochester, MN*

326 **Evolving Trends in Risk Profiles and Outcomes in Older Adults Undergoing Kidney Re-Transplantation**

S. Sandal[1], J. Ahn[2], M. Cantarovich[1], N. Chu[2], D. Segev[2], M. McAdams DeMarco[2], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

327 **Journey to Transplant: A Pilot Feasibility Trial of a Virtual Counseling Intervention for Patients and Their Social Support Networks to Improve Access to Kidney Transplant**

A. Hart[1], R. Edpuganti[2], H. D'Cunha[2], S. Kurschner[2], W. T. McKinney[1], A. Matas[1], R. Patzer[1], S. Chu[1], M. Bruin[1], M. Partin[1], *[1]Hennepin Healthcare, University of Minnesota, Minneaplis, MN, [2]Hennepin Healthcare Research Institute, Minneaplis, MN*

328 **Understanding Transplant Decision Making Concerns for African, Caribbean and Black Canadian Patients with End-Stage Kidney Disease**

N. Singh[1], A. Wasim[1], W. Hajjar[1], K. Mohan[1], N. El-Dassouki[1], H. Habbal[1], L. Angarso[1], A. Dychiao[1], S. Macanovic[1], A. D. Waterman[2], I. Mucsi[1], *[1]University Health Network, Toronto, ON, Canada, [2]David Geffen School of Medicine, UCLA, Los Angeles, CA*

329 **Depressive Symptoms and Listing for Kidney Transplantation**

X. Chen, N. Chu, P. Sharma Basyal, W. Vihokrut, D. Crews, D. Brennan, S. Andrews, T. Vannorsdall, D. Segev, M. McAdams DeMarco, *Johns Hopkins University School of Medicine, Baltimore, MD*

330 **Multistep Algorithm to Achieve Weight Loss Goal in Advanced Stage Obesity Kidney Transplant Candidates: A Single Center Preliminary Report**

A. Shah, J. Galpern, L. Castaldo, P. Touhy, M. Thomas, A. Aaron, M. Fruscione, L. Dageforde, N. Elias, *Transplant Surgery, Massachusetts General Hospital, Boston, MA*

331 **Challenges and Stressors of COVID-19 Kidney and Transplant Patients: A Mixed Methods Study**

Y. A. Iraheta[1], A. L. Murillo[2], E. H. Wood[1], S. M. Advani[3], R. Pines[4], A. D. Waterman[1], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Terasaki Institute, Los Angeles, CA, [3]National Human Genome Research Institute (NIH), Bethesda, MD, [4]Santa Barbara Cottage Hospital, Santa Barbara, CA*

333 **Early Transplant Education Increases CKD 3-5 Patients' Knowledge and Informed Decision-Making About Chronic Kidney Disease and Living Donor Kidney Transplant**

A. D. Waterman[1], S. H. Kawakita[2], B. Dub[3], Y. A. Iraheta[1], A. L. Murillo[2], T. Menser[4], B. Mittman[3], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Terasaki Institute, Los Angeles, CA, [3]Research and Evaluation, Kaiser Permanente, Pasadena, CA, [4]The Houston Methodist Research Institute, Houston, CA*

Live Video Question and Answer

Kidney: Acute Cellular Rejection

233 **Belatacept Exposure Not Associated With Rejection. Can Doses be Lowered without Compromising Efficacy?**

M. McGowan[1], A. Bickenbach[1], B. Miyagawa[2], A. Christianson[1], T. Mizuno[2], P. West-Thielke[3], J. Leone[4], E. Woodle[1], D. Kaufman[5], A. Wiseman[6], A. Matas[7], A. Vinks[2], R. Alloway[1], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Children's Med Center, Cincinnati, OH, [3]U Illinois, Chicago, IL, [4]Tampa Gen, Tampa, FL, [5]U Wisconsin, Madison, OH, [6]Centura Transplant, Denver, CO, [7]U Minnesota, Minneapolis, MN*

234 **The Effect of the Different Donor-Derived HLA T-Cell Epitope Targets on the Development of T Cell-Mediated Rejection After Kidney Transplantation**

A. Senev, E. Van Loon, M. Emonds, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

235 **Reducing Rejection in Pediatric Kidney Transplantation: The Improving Renal Outcomes Collaborative (iroc)**

C. Varnell[1], A. Warmin[1], G. Barletta[2], C. Belsha[3], L. Harshman[4], D. Kershaw[5], C. Pruette[6], S. Ranabothu[7], M. Seifert[8], P. Singer[9], M. Yanik[10], K. Rich[1], A. Modi[1], D. Hooper[1], *[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [2]Phoenix Children's Hospital, University of Arizona, Phoenix, AZ, [3]SSM Health Cardinal Glennon Children's Hospital, St Louis, MO, [4]University of Iowa Stead Family Children's Hospital, Iowa City, IA, [5]C.S. Mott Children's Hospital, Ann Arbor, MI, [6]Johns Hopkins University School of Medicine, Baltimore, MD, [7]Arkansas Children's Hospital, Little Rock, AR, [8]University of Alabama at Birmingham, Children's of Alabama, Birmingham, AL, [9]Cohen Children's Hospital, Brooklyn, NY, [10]Levine Children's Hospital, Charlotte, NC*

236 **Reassessing TCMR in Kidney Transplant Indication Biopsies: Emerging Evidence for Partial Exhaustion in Late TCMR**
P. Halloran[1], J. Reeve[1], &. the INTERCOMEX Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

237 **Development of Diagnosis Method of Acute Graft Rejection After Kidney Transplantation Using Metabolome Analysis by Liquid Biopsy Approach**
H. Iwamoto[1], M. Sugimoto[2], O. Konno[1], I. Akashi[3], M. Okihara[1], Y. Kihara[1], T. Ueno[1], *[1]Kidney Transplantation Surgery, Tokyo Medical University, Hachioji Medical Center, Tokyo, Japan, [2]Research and Development Center for Minimally Invasive and Preemptive Medicine, Institute of Medi, Tokyo Medical University, Tokyo, Japan, [3]Kidney transplantation Surgery, Tokyo Medical University, Hachioji Medical Center, Tokyo, Japan*

239 **Late Subclinical Rejection and Borderline Rejection in Kidney Transplant Patients is Associated with Increased Incidence of Subsequent Clinical Rejections**
V. Viswanathan[1], I. Melgarejo[2], C. Puttarajappa[2], P. Sood[2], M. Molinari[2], S. Hariharan[2], C. Wu[2], A. Sharma[2], N. Shah[2], R. Mehta[2], *[1]Department of Medicine, Renal-Electrolyte Division, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Surgery, Thomas E. Starzl Transplantation Institute, University of Pittsburgh Medical Center, Pittsburgh, PA*

240 **Therapeutic Response of Late Clinical Cell Mediated Rejection is Modeled by Chronicity Changes**
I. Melgarejo[1], V. Visnawathan[2], A. Sharma[1], P. Sood[1], C. Puttarajappa[1], C. Wu[1], N. Shah[1], M. Molinari[1], S. Hariharan[1], R. Mehta[1], *[1]Starzl Transplant Institute, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Medicine, Renal-Electrolyte Division, University of Pittsburgh Medical Center, Pittsburgh, PA*

Live Video Question and Answer

Kidney: Cardiovascular and Metabolic Complications

67 **Cognition After Belatacept Conversion (CAB) Trial**
W. Asch[1], K. Belfield[2], V. Do[2], E. Cohen[1], *[1]Yale University, New Haven, CT, [2]Yale New Haven Hospital, New Haven, CT*

69 **The Impact of 4-weeks of Supervised Exercise on Frailty and Lower Extremity (LE) Function in Patients with Advanced Chronic Kidney Disease (CKD)**
E. Lorenz, L. Hickson, R. Weatherly, K. Thompson, M. Hogan, C. Kennedy, *Mayo Clinic, Rochester, MN*

70 **Growth Differentiation Factor 15 Predictor Value is Superior to Troponin I in the Evaluation of Kidney Transplant Candidates**
M. de Cos Gomez[1], M. Garcia Unzueta[2], A. Benito Hernandez[1], J. Mazon Ruiz[1], M. Perez Arnedo[1], A. Aguilera Fernandez[1], R. Valero San Cecilio[1], J. Ruiz San Millan[1], E. Rodrigo Calabia[1], *[1]Nephrology, Marques de Valdecilla University Hospital - IDIVAL, Santander, Spain, [2]Clinical Analysis, Marques de Valdecilla University Hospital - IDIVAL, Santander, Spain*

71 **Intensive Blood Pressure Control Preserves Kidney Allograft Function**
K. A. Agarwal[1], U. K. Agarwal[2], G. S. Silva[3], K. J. Pollick[3], M. Pavlakis[1], *[1]Transplant Institute, Beth Israel Deaconess Medical Center, Boston, MA, [2]Biostatistics consultant, Boston, MA, [3]Beth Israel Deaconess Medical Center, Boston, MA*

72 **Outcomes of Kidney Transplantation in Patients with Prosthetic Heart Valves**
H. Ouahmi, *Nephrology, Dialysis, Transplantation, Nice University Hospital, Nice, France*

73 **Correlation of Coronary Anatomy and Interventions with Post-kidney Transplantation Outcomes**
A. Sharma, T. Teigeler, D. Kumar, S. Moldowan, C. Bhati, G. Gupta, L. Kang, M. Levy, *Virginia Commonwealth University, Richmond, VA*

74 **Kidney Transplant Recipients Who Had Covid-19 Prior to Transplant: A Single-center Experience**
S. Sultan, M. Aull, R. Craig-Schapiro, E. C. Liu, J. H. Lee, S. Kapur, *New York Presbyterian / Weill Cornell, New York, NY*

Live Video Question and Answer

Live Kidney Donation

366 **Long Term Outcomes of Kidney Donors with Fibromuscular Dysplasia**
H. N. Adrogue[1], A. Evans[1], S. A. Hebert[1], H. E. Adrogue[1], D. T. Nguyen[2], D. Murad[1], E. A. Graviss[2], *[1]Medicine, Houston Methodist Hospital, Houston, TX, [2]Pathology and Genomic Medicine, Houston Methodist Hospital, Houston, TX*

367 **Pre- Kidney Donation Pregnancy Complications and Long-Term Outcomes**
E. Helgeson[1], E. F. Palzer[1], D. Vock[1], A. Matas[2], *[1]University of Minnesota School of Public Health, Minneapolis, MN, [2]University of Minnesota Medical School, Minneapolis, MN*

368 **The Risk of Post-donation Kidney Function Impairment for Prospective Living Kidney Donors with Persistent Isolated Microscopic Hematuria**
J. v. Weijden[1], M. van Londen[1], I. M. Nolte[2], M. H. De Borst[1], S. P. Berger[1], *[1]Nephrology, University Medical Center Groningen, Groningen, Netherlands, [2]Epidemiology, University Medical Center Groningen, Groningen, Netherlands*

369 **Living Donor Kidney Transplantation Racial Disparities Persist Independent of Social Vulnerability**
A. C. Killian[1], M. C. McLeod[1], B. Shelton[1], R. D. Reed[1], P. MacLennan[1], H. Qu[1], B. J. Orandi[1], V. Kumar[1], D. Sawinski[2], R. M. Cannon[1], D. J. Anderson[1], M. J. Hanaway[1], J. E. Locke[1], *[1]University of Alabama at Birmingham Hospital, Birmingham, AL, [2]Hospital of the University of Pennsylvania, Philadelphia, PA*

370 **Implications of Trends in Child to Parent Kidney Donation in Whites and African Americans**
N. Jean, S. Krishnamoorthy, Y. Kyeso, P. Cunningham, N. Murthy, R. McGill, M. Josephson, *Nephrology, University of Chicago, Chicago, IL*

371 **Associations of Lack of Insurance and Other Sociodemographic Traits with Deficiencies in Follow-Up After Living Kidney Donation**
K. Lentine[1], R. Hays[2], N. Lam[3], A. Tietjen[4], A. Muiru[5], H. Xiao[1], A. Garg[6], C. Thomas[7], G. McNatt[7], R. Howey[8], U. Lebron-Banks[9], M. Cooper[10], M. Conboy[11], B. Kasiske[11], *[1]Saint Louis Univ, Saint Louis, MO, [2]Univ of Wisconsin, Madison, WI, [3]Univ of Calgary, Calgary, AB, Canada, [4]St. Barnabas, Livingston, NJ, [5]Univ of California, San Francisco, San Francisco, CA, [6]Western Univ, London, ON, Canada, [7]Univ of Iowa, Iowa City, IA, [8]Toyon Associates, Concord, CA, [9]New York Presb Hosp, New York, NY, [10]Medstar-Georgetown, Washington, DC, [11]SRTR, Minneapolis, MN*

372 **Launching a National Living Donor Registry**
J. E. Milton[1], M. Cooper[2], B. Hippen[3], *[1]Transplant Center, University of Texas Health San Antonio, San Antonio, TX, [2]MedStar Georgetown Transplant Institute, Washington, Colombia, [3]Metrolina Nephrology Associates, PA, Charlotte, NC*

373 **CT-measured Cortical Volume Ratio is an Alternative to Nuclear Medicine Split Scan Ratio Among Living Kidney Donors**
J. Montgomery, C. Brown, A. Zondlak, K. Walsh, J. Kozlowski, A. Pinsky, E. Herriman, J. Sussman, Y. Lu, E. Stein, P. Shankar, R. Sung, K. Woodside, *Michigan Medicine, Ann Arbor, MI*

Live Video Question and Answer

Pediatric Kidney

75 **Racial and Ethnic Disparities in Pediatric Kidney Transplantation - Has KAS Made a Difference?**
O. Charnaya[1], S. Yu[2], A. Goldberg[3], J. Garonzik-Wang[2], D. Segev[2], P. Verghese[4], *[1]Pediatrics, Johns Hopkins University, Baltimore, MD, [2]Transplant Surgery, Johns Hopkins University, Baltimore, MD, [3]University of Manitoba, Winninpeg, MB, Canada, [4]Northwestern University Feinberg School of Medicine, Chicago, IL*

76 **Hla Antigens and Recurrence of Focal Segmental Glomerulosclerosis in Pediatric Kidney Transplantation**
B. I. Shaw[1], A. Ochoa[2], C. Chan[2], R. A. Gbadegesin[3], A. M. Jackson[1], E. T. Chambers[3], *[1]Surgery, Duke University, Durham, NC, [2]Biostatistics and Bioinformatics, Duke University, Durham, NC, [3]Pediatrics, Duke University, Durham, NC*

77 **Kidney Paired Donation in Pediatrics: An Underused Opportunity?**
J. Smith[1], M. Skeans[2], R. Engen[3], S. Bartosh[4], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN, [3]Lurie Children's Hospital, Chicago, IL, [4]Univ of Wisconsin, Madison, WI*

78 **Drivers of Graft Failure in Pediatric Kidney Transplant Change Over Time**
E. Benz[1], D. Schaubel[2], S. Amaral[1], *[1]Children's Hospital of Philadelphia, Philadelphia, PA, [2]Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania, Philadelphia, PA*

79 **Long Term Safety and Efficacy of Tocilizumab (anti-il6r, Tcz) Therapy in the Treatment of Refractory Chronic Antibody Mediated Rejection (cabmr) in 25 Pediatric Renal Transplant Recipients**
M. Pearl[1], P. Weng[1], A. Dokras[2], H. Pizzo[3], J. Garrison[3], C. Butler[1], J. Q. Zhang[1], K. Lim[3], E. Reed[1], I. Kim[3], M. Haas[3], X. Zhang[3], R. Ettenger[1], S. Jordan[3], D. Puliyanda[3], *[1]Pediatric Nephrology, UCLA Medical Center, Los Angeles, CA, [2]Pediatric Nephrology, UT South Western, Dallas, CA, [3]Pediatric Nephrology, Cedars Sinai Medical Center, West Hollywood, CA*

80 **Leflunomide Therapy for Treatment of Bk Viremia in Pediatric Kidney Transplant Recipients**
A. Aldieri[1], M. Chandran[2], D. Matossian[3], B. Magella[4], D. Lazear[4], M. Bock[2], E. Blanchette[2], *[1]Children's Hospital Colorado, Denver, CO, [2]Children's Hospital Colorado, Aurora, CO, [3]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [4]Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

81 **Risk Factors Predicting Outcomes in Long-Term Pediatric Kidney Transplant Graft Survival**
A. Anand, T. H. Malik, J. Dunson, M. F. McDonald, C. R. Christmann, N. Nguyen Galvan, C. O'Mahony, J. A. Goss, P. R. Srivaths, E. D. Brewer, A. Rana, *Baylor College of Medicine, Houston, TX*

82 **Delayed Graft Function in Pediatric Living Donor Kidney Transplantation**
M. MacConmara, J. Shah, L. de Gregorio, D. Desai, P. Vagefi, C. S. Hwang, *Surgery, UT Southwestern Medical Center, Dallas, TX*

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Liver

Hemodynamic Consequences of Portal Hypertension Including Kidney Issues

134 **The Rate of Hospitalization Among Patients with Cirrhosis is More Than Twice as High as Patients Over 85 Years**
N. R. Mazumder[1], K. Guo[2], L. Zhao[3], A. Kho[1], K. Walters[4], T. S. Carey[4], C. Loftus[1], D. P. Ladner[1], *[1]Northwestern Memorial Hospital, Chicago, IL, [2]Biostatistics, Northwestern Memorial Hospital, Chicago, IL, [3]Biostatistcs, Northwestern Memorial Hospital, Chicago, IL, [4]University of North Carolina Chapel Hill, Chapel Hill, NC*

135 **A Novel Liver Assist Device as a Bridge to Liver Transplantation in Acute on Chronic Liver Failure Patients with Multi-Organ Failure**

S. Ahmad[1], I. W. Liou[1], J. Reyes[2], R. Bakthavatsalam[3], N. C. Smith[4], R. L. Carithers[1], C. Martin[1], D. Gao[5], *[1]Medicine, University of Washington, Seattle, WA, [2]Surgery, University of Washington, SEATTLE, WA, [3]Surgery, University of Washington, Seattle, WA, [4]Nursing, University of Washington, Seattle, WA, [5]Engineering, University of Washington, Seattle, WA*

136 **Rabbit Anti-thymocyte Globulin Induction is Not Associated with Improved Outcomes in Liver Transplant Recipients**

P. Nguyen, N. Wilson, G. Saracino, R. Patel, S. K. Asrani, G. Testa, T. Sam, *Baylor University Medical Center, Dallas, TX*

137 **Effects of Timing of Everolimus Transition on Renal Outcomes in Liver Transplant Recipients**

M. Leick[1], H. Belleau[2], T. McCashland[3], *[1]Nebraska Medicine, Omaha, NE, [2]Bryan Health, Lincoln, NE, [3]University of Nebraska Medical Center, Omaha, NE*

138 **Machine Perfusion of Kidney Grafts in Simultaneous Liver Kidney Transplantation: National Trends and Outcomes**

A. Chang[1], M. Chen[1], P. Abt[1], T. Bittermann[2], *[1]Surgery, University of Pennsylvania, Philadelphia, PA, [2]Gastroenterology, University of Pennsylvania, Philadelphia, PA*

139 **Outcomes of Transjugular Intrahepatic Portosystemic Shunts (TIPS) in Dialysis-Dependent ESLD Patients: The ALTA Study**

J. Ge[1], J. Boike[2], M. German[3], G. J. Morelli[4], E. Spengler[3], A. Said[3], A. S. Lee[3], A. Hristov[3], A. Desai[5], T. Couri[6], S. Paul[6], C. Frenette[7], N. Christian-Miller[7], M. Laurito[8], E. Verna[8], U. Rahim[9], A. Goel[9], D. Gregory[2], L. VanWagner[2], K. P. Kolli[1], J. Lai[1], *[1]University of California, San Francisco, San Francisco, CA, [2]Northwestern Memorial Hospital, Chicago, IL, [3]University of Wisconsin, Madison, WI, [4]University of Florida Health, Gainsville, FL, [5]Indiana University School of Medicine, Indianapolis, IN, [6]University of Chicago, Chicago, IL, [7]The Scripps Clinic, La Jolla, CA, [8]Columbia University, New York, NY, [9]Stanford University, Stanford, CA*

140 **Home-based Liver Frailty Intervention (lift) in Liver Transplant Candidates: A Pilot Study**

A. J. Thuluvath[1], K. Belfanti[1], S. Morrissey[1], O. Siddiqui[1], J. Peipert[1], A. Daud[1], J. Levitsky[1], T. Bogg[2], A. Flores[1], D. P. Ladner[1], *[1]Northwestern University Transplant Research Collaborative, Chicago, IL, [2]Department of Psychology, Wayne State University, Detroit, MI*

141 **Kidney Transplantation Alone in Patients with Compensated Cirrhosis: A Multicenter Study**

A. Kassem[1], S. Asrani[1], S. W. Biggins[2], Y. Darwish[1], M. Nadim[3], B. Fischbach[1], T. Fong[3], *[1]Baylor University Medical Center at Dallas, Dallas, TX, [2]University of Washington, Seattle, WA, [3]USC - Keck, Los Angeles, CA*

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241 **Pre-Transplant Frailty is Associated with 30-Day Mortality but Not Long-Term Survival After Liver Transplantation**

M. Anderson, V. Valbuena, M. Englesbe, C. Sonnenday, *Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

242 **Relationship of Functional Frailty and Radiographic Sarcopenia to Outcomes After Liver Transplant**

S. L. Olson, P. Polineni, W. Schwartz, O. Siddiqui, L. Zhao, D. Ganger, D. P. Ladner, *Comprehensive Transplant Center, Northwestern University, Chicago, IL*

243 **Comorbidity Burden is Associated with Increased Waitlist Mortality Among NASH Patients**

J. R. Montgomery[1], M. J. Englesbe[1], C. Connelly[2], *[1]Michigan Medicine, Ann Arbor, MI, [2]General Surgery, Oregon Health & Science University, Portland, OR*

244 **Coronary Computed Tomography Angiography for Pre-Liver Transplant Cardiovascular Risk Assessment: A Single Center Experience**

J. Rice[1], T. Genders[2], D. Groves[2], J. R. Burton[1], J. Moloo[2], R. Quaife[2], D. Vargas[3], M. Kriss[1], *[1]Division of Gastroenterology and Hepatology, University of Colorado, Aurora, CO, [2]Division of Cardiology, University of Colorado, Aurora, CO, [3]Division of Radiology, University of Colorado, Aurora, CO*

245 **Recipient Selector for Donation After Cardiac Death Allografts**

G. Handing[1], S. Ganni[2], S. Barrett[1], N. Galvan[2], C. O'Mahony[2], J. Goss[2], R. Cotton[2], A. Rana[2], *[1]School of Medicine, Baylor College of Medicine, Houston, TX, [2]Michael E DeBakey Department of Surgery, Division of Abdominal Transplant, Houston, TX*

246 **Cardiac Risk Assessment in Liver Transplant Candidates: Survey of National Practice Patterns**

P. Barman[1], R. Chadha[2], L. VanWagner[3], *[1]Div. of GI/Hepatology, University of California, San Diego, San Diego, CA, [2]Anesthesiology, Mayo Clinic, Jacksonville, FL, [3]Div. of GI/Hepatology, Northwestern University, Chicago, IL*

247 **Outcomes After Liver Transplantation With Steatotic Grafts: Redefining Acceptable Cutoffs for Moderately Steatotic Grafts**

B. L. Da[1], J. Satiya[2], R. P. Heda[3], Y. Jiang[4], L. Lau[5], A. Fahmy[1], A. Winnick[1], N. Roth[1], E. Grodstein[1], P. J. Thuluvath[6], A. K. Singal[7], T. D. Schiano[8], L. W. Teperman[1], S. K. Satapathy[1], *[1]Liver Disease, Northwell Health, Manhasset, NY, [2]Beth Israel Deaconess Medical Center, Boston, MA, [3]Tulane Medical Center, Memphis, TN, [4]The University of Memphis, Memphis, TN, [5]Northwell Health, Manhasset, NY, [6]University of Maryland School of Medicine, Baltimore, MD, [7]Liver Disease, Avera McKenna University Health Center and Transplant Institute, Manhasset, NY, [8]Icahn School of Medicine at Mount Sinai, New York City, NY*

248 **The Utility of PET/ CT Testing in Cardiac Risk Stratification of Adult Liver Transplant Candidates**

M. A. Tincopa[1], R. Weinberg[1], S. Sengupta[1], J. Slivnick[2], J. Corbett[1], C. Sonnenday[1], R. Fontana[1], P. Sharma[1], *[1]Internal Medicine, University of Michigan, Ann Arbor, MI, [2]Internal Medicine, Ohio State University, Columbus, OH*

Live Video Question and Answer

Liver Transplant Oncology

83 **Outcomes of Downstaging Hepatocellular Carcinoma (HCC) to within Milan Criteria Before Liver Transplantation (LT): A Multicenter Analysis of the "All-comers" Protocol**

B. Natarajan[1], P. Tabrizian[2], M. Hoteit[3], C. Frenette[4], T. Ghaziani[5], R. Dhanasekaran[5], N. Parikh[6], J. Guy[7], A. Shui[1], S. Florman[2], F. Yao[1], N. Mehta[1], *[1]UCSF, SF, CA, [2]Mt Sinai, NY, NY, [3]U Penn, Philadelphia, PA, [4]Scripps, La Jolla, CA, [5]Stanford, Palo Alto, CA, [6]U Michigan, Ann Arbor, MI, [7]CPMC, SF, CA*

84 **Role of Baseline PD-1 Checkpoint Inhibitor Pathway Expression in Bridge to Liver Transplant Hepatocellular Carcinoma**

K. Nunez, T. Sandow, M. Hibino, A. Cohen, P. Thevenot, *Ochsner Health, New Orleans, LA*

85 **NASH-Related HCC is Associated with Lower Rates of Post-Transplant HCC Recurrence: A Large Database Analysis**

P. J. Altshuler, R. Lamm, K. Patel, H. Dang, O. Shaheen, A. P. Shah, J. Glorioso, C. G. Ramirez, A. M. Frank, W. R. Maley, A. S. Bodzin, *Department of Surgery, Thomas Jefferson University, Philadelphia, PA*

86 **Adjuvant Immunotherapy for Liver Transplant Recipients with Hepatocellular Carcinoma Using Donor Liver-derived Natural Killer Cells**

M. Ohira[1], R. Hotta[1], Y. Imaoka[1], K. Sato[1], N. Tanimine[1], Y. Tanaka[1], S. Nishida[2], A. Tzakis[2], H. Ohdan[1], *[1]Hiroshima University, Hiroshima, Japan, [2]University of Miami, Miami, FL*

87 **T Cell Repertoire Diversity in HCV-Associated Hepatocellular Carcinoma Patients Waitlisted for Liver Transplantation and Receiving Liver-Directed Therapy**

K. Nunez, T. Sandow, A. Cohen, P. Thevenot, *Ochsner Health, New Orleans, LA*

88 **Living Donor Liver Transplant for Unresectable Colorectal Metastasis: A Case Series**

B. Emmanuel, H. Al-Harakeh, A. Humar, C. Hughes, A. Tevar, M. Molinari, A. Ganoza, *Starzl Transplant Institute, UPMC, Pittsburgh, PA*

89 **Liver Transplantation for Unresectable Colorectal Cancer Liver Metastases: A Multicenter Experience**

L. I. Ruffolo[1], K. Sasaki[2], K. Tomiyama[1], A. Nair[1], M. Orloff[1], B. Al-Judaibi[3], M. Levstik[3], M. Laryea[3], K. Dokus[1], J. Errigo[1], A. Moro[2], C. Quintini[2], K. Hashimoto[2], M. Fujiki[2], K. Menon[2], C. Kwon[2], T. Diago Uso[2], R. Hernandez-Alejandro[1], F. Aucejo[2], *[1]Surgery, University of Rochester Medical Center, Rochester, NY, [2]Surgery, The Cleveland Clinic Foundation, Cleveland, OH, [3]Transplant Hepatology, University of Rochester Medical Center, Rochester, NY*

90 **Outcomes of Liver Transplantation for Combined Hepatocellular Cholangiocarcinoma: A Single-center Experience**

Y. Liu[1], C. Hanlon[1], S. Zhou[1], D. Toy[1], K. King[2], K. Zhou[3], J. Kahn[3], L. Yuan[3], *[1]Internal Medicine, USC Keck School of Medicine, Los Angeles, CA, [2]Radiology, USC Keck School of Medicine, Los Angeles, CA, [3]Internal Medicine - Gastrointestinal and Liver Disease, USC Keck School of Medicine, Los Angeles, CA*

Live Video Question and Answer

Living Donor Liver Transplant and Partial Grafts

35 **Paired Exchanges in LDLT- A Good Option for Patients with Incompatible Donors**

A. Humar, C. Hughes, G. Mazariegos, S. Kyle, A. Gallatin, K. Emmett, A. Tevar, M. Molinari, A. Ganoza, V. Gunabushanam, S. Ganesh, *University of Pittsburgh, Pittsburgh, PA*

36 **Impact of Advanced Renal Dysfunction on Post-Transplant Outcomes After Living Donor Liver Transplantation in the United States**

T. Bittermann[1], N. Kaur[2], P. L. Abt[1], K. M. Olthoff[1], J. K. Heimbach[3], J. Emamaullee[2], *[1]University of Pennsylvania, Philadelphia, PA, [2]University of Southern California, Los Angeles, CA, [3]Mayo Clinic College of Medicine, Rochester, MN*

37 **Impact of Community- Targeted Educational Campaign on Living Donor Transplants**

S. Ganesh, A. Humar, *Transplant, UPMC, Pittsburgh, PA*

38 **Trends in Liver Donors for Liver Transplantation Over Twenty Years: Donor Changes in Gender, Relationships, and Education, but Racial Disparities Remain**

A. Kaplan, B. Fortune, R. Brown, MD, MPH, B. Samstein, K. Halazun, R. Rosenblatt, *Gastroenterology and Hepatology, New York Presbyterian/Weill Cornell, New York, NY*

39 **The Impact of Splenectomy on Living Donor Liver Transplantation Using Small Grafts**
M. Fujiki, E. Aleassa, C. Quintini, F. Aucejo, K. Sasaki, B. Eghtesad, T. Diago, D. Kwon, C. Miller, K. Hashimoto, *Cleveland Clinic Foundation, Cleveland, OH*

40 **Re-Do Hepatic Artery Reconstruction for Thrombosis Can Save Grafts and Patients without Retransplantation: Lessons Learned from 1,355 Adult Living Donor Liver Transplantations**
S. Hong, N. Yi, K. Hong, E. Han, S. Suh, J. Lee, S. Hong, Y. Choi, U. Jin, H. Chang, K. Lee, K. Suh, *Seoul National University Hospital, Seoul, Korea, Republic of*

41 **Death Among Living Liver Donors- Are We Overestimating the Risk?**
H. J. Braun, A. M. Shui, N. L. Ascher, J. P. Roberts, *University of California, San Francisco, San Francisco, CA*

42 **Liver Live Donor Champion: Advocacy Training to Facilitate Identification of Living Liver Donors**
L. R. Herbst, Y. Yu, A. Love, K. Lee, A. Wells, K. Mohr, A. Massie, A. Gurakar, B. King, D. L. Segev, A. M. Cameron, J. Garonzik Wang, *Johns Hopkins University, Baltimore, MD*

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181 **Improved Outcomes Over Time of Extended Criteria Donor Grafts for Acute-on-chronic Liver Failure**
T. Kitajima, T. Ivanics, D. Moonka, T. Shamaa, A. Mohamed, K. Delvecchio, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

182 **Impact of Transplant Center Volume on Utilization of and Outcomes Following Donation After Circulatory Death Liver Transplantation in the United States**
S. Kumar[1], S. Lin[2], J. D. Schold[2], *[1]Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates, [2]Department of Quantitative Health Sciences, Cleveland Clinic Foundation, Cleveland, OH*

183 **The Impact of Donor and Recipient Age Differenceon Long Term Prognosis in Young Liver Transplant Recipients**
A. Pita, A. Moro, J. C. McVey, D. J. Firl, M. Fujiki, T. Diago, C. Quintini, F. Aucejo, C. D. Kwon, K. V. Menon, K. Hashimoto, B. Eghtesad, C. Miller, K. Sasaki, *The Cleveland Clinic, Cleveland, OH*

184 **State-level Trend in the Prevalence of Non-alcoholic Steatohepatitis for Liver Transplant Candidates in the United States, 2001-2017**
S. Chang[1], M. Wang[1], M. Pozo[2], D. Ladner[2], D. Borja-Cacho[2], *[1]Washington University School of Medicine, Saint Louis, MO, [2]Northwestern University, Chicago, IL*

185 **Liver Transplant Justified at Any Meld Score?**
H. Oden-Brunson, E. Godfrey, H. Flores, A. Rana, *Baylor College of Medicine, Houston, TX*

186 **Impact of Graft Quality on Patient Survival in Sick Patients**
G. Handing[1], S. Keeling[1], C. Christmann[1], N. Galvan[2], C. O'Mahony[2], J. Goss[2], R. Cotton[2], A. Rana[2], *[1]School of Medicine, Baylor College of Medicine, Houston, TX, [2]Michael E DeBakey Department of Surgery, Division of Abdominal Transplant, Houston, TX*

187 **Classification of Distinct Patterns of Ischemic Cholangiopathy Following DCD Liver Transplantation: Distinct Clinical Courses and Long-Term Outcomes from a Multicenter Cohort**
K. P. Croome[1], A. K. Mathur[2], B. Aqel[2], L. Yang[1], J. K. Heimbach[3], T. Taner[3], C. B. Rosen[3], R. Paz-Fumagalli[1], C. Taner[1], *[1]Mayo Clinic Jacksonville, Jacksonville, FL, [2]Mayo Clinic Arizona, Scottsdale, AZ, [3]Mayo Clinic Rochester, Rochester, MN*

188 **The Unintended Financial Consequences of Acuity Circles for Liver Allocation - Two-fold Increase in Import Fees and Higher Organ Acquisition Cost Despite Unchanged Travel Patterns**

A. Wall, S. Asrani, G. McKenna, E. Martinez, R. Ruiz, H. Fernandez, J. Bayer, A. Gupta, N. Onaca, R. Goldstein, J. Trotter, G. Testa, *Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX*

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Liver Pediatrics

289 **Pediatric Donation During COVID-19 Pandemic**

M. MacConmara, B. Wang, L. de Gregorio, J. Shah, D. Desai, S. Hanish, P. Vagefi, C. S. Hwang, *Surgery, UT Southwestern Medical Center, Dallas, TX*

290 **The Pediatric National Liver Review Board: What Happens to Waitlist Registrations with Denied Exception Forms?**

J. Foutz[1], C. Martinez[1], A. Henderson[1], E. K. Hsu[2], E. R. Perito[3], J. Heimbach[4], *[1]United Network for Organ Sharing, Richmond, VA, [2]Seattle Children's Hospital, Seattle, WA, [3]UCSF, San Francisco, CA, [4]Mayo Clinic, Rochester, MN*

291 **The Confluence of Race, Socioeconomic Deprivation, and Waitlist Mortality for Children Awaiting Liver Transplant**

S. Wadhwani[1], J. Ge[1], L. Gottlieb[1], C. Lyles[1], A. F. Beck[2], J. Bucuvalas[3], U. Kotagal[2], J. C. Lai[1], *[1]University of California San Francisco, San Francisco, CA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [3]Icahn School of Medicine at Mount Sinai, New York, NY*

292 **Clinical Value of Surveillance Biopsies in Pediatric Liver Transplantation: A Single Center Experience with >800 Biopsies**

B. Rocque[1], A. Zaldana[1], C. Weaver[2], J. Huang[1], A. Barbetta[1], V. Shakhin[2], C. Goldbeck[1], G. Yanni[2], R. Kohli[2], Y. Genyk[1], J. Emamaullee[1], *[1]Surgery, University of Southern California Keck School of Medicine, Los Angeles, CA, [2]Pediatrics, Children's Hospital-Los Angeles, Los Angeles, CA*

293 **Degree of T Cell Infiltration Predicts Treatment Response in Pediatric Liver Late Acute Cellular Rejection**

M. Rogers, G. Begum, Q. Sun, A. Peters, *Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

294 **Are All DSA's the Same? Are We Ready for Precision Medicine in Pediatric LT?**

S. E. Shin[1], M. Lee[1], N. Yazigi[2], K. Khan[2], S. Kaufman[2], J. Ahn[3], O. Timofeeva[4], U. Ekong[2], *[1]Georgetown University School of Medicine, Washington, DC, [2]Medstar Georgetown Transplant Institute, Medstar Georgetown University Hospital, Washington, DC, [3]Biostatistics, Bioinformatics, & Biomathematics, Georgetown University, Washington, DC, [4]Histocompatibility Laboratory, Dept. of Pathology & Laboratory Medicine, Georgetown University, Washington, DC*

295 **Center Use of Technical Variant Grafts Impacts Pediatric Liver Transplant Waitlist and Recipient Outcomes in the United States**

G. Mazariegos[1], E. R. Perito[2], J. Squires[1], K. Soltys[1], A. Griesemer[3], S. A. Taylor[4], E. Pahl[5], *[1]Childrens Hosp of Pittsburgh, Pittsburgh, PA, [2]UCSF, San Francisco, CA, [3]Columbia University Irving Medical Center, New York, NY, [4]Lurie Children's Hospital of Chicago, Chicago, IL, [5]Omnilife, Lexington, KY*

296 **Cost Effectiveness Analysis Comparing Treatments of Biliary Strictures in Pediatric Liver Transplant Patients**
B. Whitehead[1], C. Lemoine[2], R. Superina[2], J. Green[3], S. Mohammad[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [2]Division of Transplant Surgery, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [3]Division of Interventional Radiology, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL*

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334 **A Meta-Analysis of Endoscopic Stents in the Treatment of Anastomotic Biliary Strictures After Liver Transplantation**
F. Zhou[1], M. Mieth[1], C. Rupp[2], A. Mehrabi[1], A. Nickkholgh[1], *[1]Department of General, Abdominal and Transplant Surgery, University of Heidelberg, Heidelberg, Germany, [2]Department of Internal Medicine, University of Heidelberg, Heidelberg, Germany*

335 **Effect of Early Biopsy-Proven Rejection on Liver Transplant Outcomes**
D. D. Aufhauser, N. Marka, L. Stalter, G. Levenson, D. Al-Adra, D. P. Foley, *Surgery, University of Wisconsin, Madison, WI*

336 **The Predictive Factors of Survival in Re-listed Patients Who Received Initial Liver Transplants Using Donation After Circulatory Death Grafts**
Y. Fouda, A. Moro, J. Mcvey, D. Firl, M. Fujiki, D. Teresa, F. Aucejo, C. Quintini, C. H. Kwon, K. Hashimoto, B. Eghtesad, K. Narayanan Menon, C. Miller, K. Sasaki, *Cleveland Clinic, Cleveland, OH*

337 **Molecular Assessment of Fibrosis and Steatohepatitis in the INTERLIVER Study**
K. S. Madill-Thomsen[1], P. F. Halloran[1], &. the INTERLIVER Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]AB, Canada*

338 **Predictive Index for Liver Retransplantation**
C. Christmann, G. Handing, M. McDonald, A. Anand, S. Keeling, N. T. Galván, R. Cotton, C. O'Mahony, J. Goss, A. Rana, *Baylor College of Medicine, Houston, TX*

339 **Is There a Role for Donor-Specific Antibody Testing in Simultaneous Liver-Kidney Transplantation? A Single Center Analysis of Outcomes**
A. Das, A. Barbetta, D. Remulla, C. Goldbeck, T. Maw, J. Kim, *University of Southern California, Los Angeles, CA*

340 **High and Low Frequency Domino Liver Transplantation Centers Demonstrate Similar Outcomes**
J. Panichella, H. Resweber, H. Curtis, K. Nguyen, A. Di Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

341 **Nutritional Inadequacy is an Independent Predictor of Sepsis Post-liver Transplantation**
J. V. Nolte Fong, M. Elshawwaf, L. W. Moore, E. A. Graviss, D. T. Nguyen, R. Angell, A. Uosef, T. Hirase, C. M. Mobley, R. Ghobrial, *Houston Methodist Hospital, Houston, TX*

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Lung

How to Expect the Unexpected- Incorporating Predictors into Lung Transplant Decision Making

91 **A Molecular Classifier Identifies Antibody-Mediated Rejection-Associated Changes in Lung Transplant Biopsies**
K. S. Madill-Thomsen[1], K. M. Halloran[2], M. Parkes[1], P. F. Halloran[1], &. the INTER-LUNG Study Group[3], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]University of Alberta, Edmonton, AB, Canada, [3]AB, Canada*

92 **Molecular Classifiers for Chronic Lung Allograft Dysfunction Transbronchial and Mucosal Biopsies Predict Clinical CLAD and Graft Loss**

M. D. Parkes[1], P. F. Halloran[2], K. M. Halloran[3], &. the INTERLUNG Study Group[4], *[1]Alberta Transplant Applied Genomics Centre, Edmonton AB, AB, Canada, [2]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [3]University of Alberta, Edmonton AB, AB, Canada, [4]AB, Canada*

93 **Assessing the Accuracy of the Lung Allocation Score**

N. Dussault[1], W. Parker[1], R. Jablonski[1], E. Garrity[1], M. Churpek[2], *[1]University of Chicago, Chicago, IL, [2]University of Wisconsin-Madison, Madison, WI*

94 **Liver Kinase B1 Knockdown Induces Platelet-Derived Growth Factor Receptor B Expression in Human Airway Epithelial Cells: A Potential Mechanism for Development of Fibrosis Leading to Chronic Lung Allograft Dysfunction**

M. Rahman, J. Lee, R. Ravichandran, T. Fleming, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

95 **Allograft Discard Risk Index for Lung Transplantation**

R. M. Reul, G. Loor, P. S. Garcha, A. A. Rana, *Baylor College of Medicine, Houston, TX*

96 **Perioperative Blood Transfusion is Associated with the Development of New HLA Antibodies After Adult Lung Transplantation**

A. Hicks[1], A. Stoker[2], M. Cooter[2], A. Ali[3], J. Klapper[4], J. Poisson[5], D. Chen[5], J. Haney[4], K. Ghadimi[2], M. Hartwig[4], I. Welsby[2], B. Bottiger[2], *[1]Anesthesiology, Duke University Hospital, South Portland, ME, [2]Anesthesiology, Duke University Hospital, Durham, NC, [3]Pulmonology, Allergy and Critical Care Medicine, Duke University Hospital, Durham, NC, [4]Cardiothoracic Surgery, Duke University Hospital, Durham, NC, [5]Pathology, Duke University Hospital, Durham, NC*

97 **A Randomized, Multicenter, Blinded Study Assessing the Effects of Gaseous Nitric Oxide in an Ex Vivo System of Human Lungs**

M. G. Hartwig[1], J. A. Klapper[1], N. Poola[2], A. Banga[3], P. G. Sanchez[4], J. S. Murala[3], J. L. Potenziano[2], *[1]Duke University Medical Center, Durham, NC, [2]Mallinckrodt Pharmaceuticals, Bedminster, NJ, [3]University of Texas Southwestern Medical Center, Dallas, TX, [4]University of Pittsburgh Medical Center, Pittsburgh, PA*

98 **Outcomes of Cytomegalovirus Status Determining Induction Therapy in Lung Transplant**

K. Heagler[1], J. Lyons[1], B. Bemiss[2], P. Stracener[1], *[1]Pharmacy, Loyola University Medical Center, Maywood, IL, [2]Loyola University Medical Center, Maywood, IL*

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When Opportunity Knocks... Identifying Interventions to Optimize Lung Transplant Outcomes

189 **Pregnancy Outcomes in 39 Lung Transplant Recipients**

S. Constantinescu[1], L. A. Coscia[2], A. Yusuf[2], S. Rao[3], M. J. Moritz[4], *[1]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, [2]Transplant Pregnancy Registry International, Philadelphia, PA, [3]University of Virginia Heath System, Charlottesville, VA, [4]Lehigh Valley Health Network, Allentown, PA*

190 **Guiding Therapeutic Plasma Exchange for Amr Treatment in Lung Transplant Recipients Using Serial Dilution in Single Antigen Bead Assay**

O. A. Timofeeva[1], J. Choe[2], M. Alsammak[2], E. J. Yoon[2], S. Geier[2], K. Carney[2], J. Au[2], A. Diamond[2], J. A. Galli[2], K. Shenoy[2], A. Mamary[2], S. Seghal[2], P. Mullhal[2], Y. Toyoda[2], N. Shigemura[2], F. Cordova[2], G. Criner[2], J. Brown[2], *[1]MedStar Georgetown University Hospital, Washington, DC, [2]Temple University Hospital, Philadelphia, PA*

191 **Renal Preservation with Belatacept-Based versus Everolimus-Based Immunosuppression in Lung Transplant Recipients**
E. Sartain[1], K. Schoeppler[1], B. Crowther[1], J. Smith[2], A. Gray[2], *[1]University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Aurora, CO, [2]Department of Medicine, Division of Pulmonary Sciences and Critical Care, University of Colorado, Denver, CO*

192 **Elexacaftor/ivacaftor/tezacaftor in Lung Transplant Recipients: A Case Series**
L. M. Potter[1], B. Vargas[2], S. M. Rotolo[1], C. McEwen[1], K. Tsui[1], *[1]University of Chicago Medicine, Chicago, IL, [2]Roosevelt University, Chicago, IL*

193 **Use of Granulocyte Colony Stimulating Factor After Lung Transplantation is Not Associated with Increased Likelihood of Acute Cellular Rejection**
S. Fredrick[1], C. Iasella[2], L. Sacha[3], R. Rivosecchi[3], M. Morrell[3], P. Sanchez[3], J. Pilewski[3], M. Snyder[3], J. McDyer[3], C. Moore[3], *[1]University of Rochester Medical Center, Rochester, NY, [2]University of Pittsburgh School of Pharmacy, Pittsburgh, PA, [3]University of Pittsburgh Medical Center, Pittsburgh, PA*

194 **Impact Analysis of Virtual Transplant Ambulatory Pharmacist During Covid-19**
L. Park, G. Waldman, J. Kim, C. Rogers, J. Clark, *Massachusetts General Hospital, Boston, MA*

195 **Outcomes of IVIG Monotherapy for Donor-Specific Antibodies After Lung Transplantation**
K. Spence, S. Heeney, M. Morrison, S. A. Rega, F. D. Irene, K. B. Harrison, C. M. Shaver, *Vanderbilt University Medical Center, Nashville, TN*

196 **Liver Dysfunction Following Lung Transplantation**
E. J. Hyzny[1], E. G. Chan[1], J. P. Ryan[1], T. Harano[1], M. R. Morrell[2], P. G. Sanchez[1], *[1]Cardiothoracic Surgery, University of Pittsburgh School of Medicine, Pittsburgh, PA, [2]Pulmonary, Allergy and Critical Care Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA*

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Pancreas: Small Bowel

Pancreas & Small Bowel

51 **Risk Factors for the Development of Posttransplant Lymphoproliferative Disorder (ptld) After Pancreas Transplantation- A Registry Analysis**
A. Gruessner, S. Saggi, J. Renz, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

52 **Evaluation and Experience with Hepatitis C Positive to Negative Pancreas Transplantation**
B. K. Lindner, B. Thomas, M. Cooper, S. Yi, P. Abrams, *Medstar Georgetown University Hospital, Washington, DC*

53 **Simultaneous Pancreas-kidney Transplantation (spk) and, Simultaneous Deceased Donor Pancreas and Living Donor Kidney Transplantation (splk) in Diabetic Patients with End Stage Renal Disease**
Y. Ko, *Department of Surgery, Asan Medical Center, Seoul, Korea, Republic of*

54 **Outcomes of Simultaneous Pancreas-Kidney Transplants from Donation After Circulatory Death Donors in the UK: A National Registry Analysis**
N. Karydis[1], M. Ibrahim[2], C. Counter[2], J. Casey[3], P. Friend[4], C. Watson[5], C. Callaghan[1], *[1]Nephrology and Transplantation, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, [2]NHS Blood and Transplant, Bristol, United Kingdom, [3]Transplant Unit, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom, [4]Nuffield Department of Surgical Sciences, University of Oxford, Oxford, United Kingdom, [5]Department of Surgery, Addenbrooke's Hospital and Cambridge NIHR Biomedical Research Campus, Cambridge, United Kingdom*

55 **Two Hundred Total Pancreatectomy with Islet Autotransplantation Cases: A Single Center Experience**
K. Kumano[1], S. Bruer[1], G. Saracino[1], M. Lawrence[1], G. Testa[1], A. Gupta[1], N. Onaca[1], E. Beecherl[1], M. F. Levy[2], B. Naziruddin[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Virginia Commonwealth University, Richmond, VA*

56 **Segmental Susceptibility of Intestinal Stem Cells to Cold Storage Preservation Injury in a Porcine Model**
E. K. Ludwig[1], N. Abraham[2], D. Sudan[2], A. Barbas[2], C. Schaaf[1], J. Freund[1], A. S. Stewart[1], B. Veerasammy[1], L. M. Gonzalez[1], *[1]North Carolina State University, Raleigh, NC, [2]Duke University, Durham, NC*

57 **Islet Allotransplantation Into Prevascularized Sernova Cell Pouch™ - Preliminary Results from the University of Chicago**
P. J. Bachul[1], P. E. Borek[1], G. S. Generette[1], A. Perez-Gutierrez[1], K. Jayant[1], K. Golab[1], L. Basto[1], L. Perea[1], M. Tibudan[1], C. Thomas[2], L. Philipson[2], J. Fung[1], P. Witkowski[1], *[1]Surgery, University of Chicago, Chicago, IL, [2]Medicine, University of Chicago, Chicago, IL*

58 **The Impact of Early Narcotic Administration on Intestinal Transplantation Survival at an Urban Medical Center**
L. Maliekal[1], N. Beltran[2], Y. Muszkat[2], S. Nagai[2], S. Jafri[2], *[1]School of Medicine, Wayne State University School of Medicine, Detroit, MI, [2]Department of Gastroenterology, Henry Ford Hospital, Detroit, MI*

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150 **Economic and Clinical Benefit of Cmv Matching in Kidney Transplantation**
D. Axelrod[1], S. Chang[2], A. Olyaei[3], D. Malinoski[3], D. Norman[3], K. Lentine[4], M. Schnitzler[4], D. Segev[5], J. Lockridge[3], *[1]Univ of Iowa, Iowa City, IA, [2]Washington Univ, Seattle, WA, [3]Oregon Health Sciences Univ, Portland, OR, [4]Saint Louis Univ, Saint Louis, MO, [5]Johns Hopkins, Baltimore, MD*

151 **Belatacept Pharmacokinetic Analysis Comparing Belatacept Early Steroid Withdrawal Trial (BEST) with Benefit and Benefit-ext Trials**
A. Bickenbach[1], M. McGowan[1], B. Miyagawa[2], T. Mizuno[2], A. Shields[3], A. Christianson[1], P. West-Thielke[4], J. Leone[5], E. Woodle[1], D. Kaufman[6], A. Wiseman[7], A. Matas[8], A. Vinks[2], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Childrens Med Center, Cincinnati, OH, [3]Christ Hospital, Cincinnati, OH, [4]UIC, Chicago, IL, [5]Tampa Gen, Tampa, FL, [6]U Wisconsin, Madison, WI, [7]Centura Transplant, Denver, CO, [8]U Minnesota, Minneapolis, MN*

152 **Cyp3a5 Extensive Metabolizer Phenotype May be Associated with an Increase in Class 2 Donor Specific Antibodies and Antibody-Mediated Rejection**
S. Mirza[1], N. Wilson[2], J. Van Zyl[2], P. Nguyen[2], T. Sam[2], S. Hall[2], M. Askar[2], R. Patel[2], *[1]Texas Tech Univeristy Health Sciences Center Jerry H. Hodge School of Pharmacy, Dallas, TX, [2]Baylor University Medical Center at Dallas, Dallas, TX*

153 **Evaluate the Effect of Cresemba (isavuconazonium Sulfate) Capsule and Noxafil (posaconazole) Delayed Release Tablets on Tacrolimus Dose to Concentration (D/C) Ratios in Lung Transplant Recipients**
H. Sweiss[1], E. Kincaide[1], D. Levine[2], R. Hall[1], *[1]University Health, San Antonio, Department of Pharmacotherapy and Pharmacy Services, The University of Texas at Austin, Pharmacotherapy Division, College of Pharmacy, San Antonio, TX, [2]University Health, San Antonio, University of Texas Health Science Center at San Antonio, San Antonio, TX*

154 *ABCC2* **Haplotypes Associations to Mycophenolic Acid Pharmacokinetics in Stable Renal Transplant Recipients**
K. Tornatore[1], D. Brazeau[2], C. Meaney[3], J. Consiglio[4], A. Gundroo[5], S. Chang[6], G. Wilding[4], L. Cooper[3], *[1]Pharmacy Practice, School of Pharmacy; University at Buffalo- SUNY, Buffalo, NY, [2]Pharmacy Practice, Marshall University, Huntington, WV, [3]Pharmacy Practice, School of Pharmacy; University at Buffalo, Buffalo, NY, [4]Biostatistics, School of Public Health; University at Buffalo, Buffalo, NY, [5]Medicine, School of Medicine; Ohio State University, Columbus, OH, [6]Medicine, School of Medicine; University at Buffalo, Buffalo, NY*

155 **Impact of Cypa5 Status on the Clinical and Financial Outcomes of Kidney Transplant**
J. Obayemi[1], B. Keating[2], K. Lentine[3], M. Schnitzler[3], H. Xiao[3], V. Dharnidharka[4], D. Axelrod[5], *[1]Univ of Michigan, Ann Arbor, MI, [2]Univ of Pennsylvania, Philadelphia, PA, [3]Saint Louis Univ, Saint Louis, MO, [4]Washington Univ, Seattle, WA, [5]Univ of Iowa, Iowa City, IA*

156 **Pharmacokinetic Analysis of Direct Acting Antiviral Use on Weight-Adjusted FK506 Trough/dose Ratios in Obese Kidney Transplant Recipients**
A. Demirag[1], P. L. Lobo[2], J. Oberholzer[1], A. Kumar[2], B. Rawashdeh[1], S. L. Lennon[1], H. N. Guvener Demirag[1], A. Doyle[2], J. Geystone[3], K. L. Brayman[1], *[1]Transplantation, University of Virginia Medical Center, Charlottesville, VA, [2]Transplantation Nephrology, University of Virginia Medical Center, Charlottesville, VA, [3]Clinical Pharmacy, University of Virginia Medical Center, Charlottesville, VA*

157 **De-novo Use Comparison Between Extended-release Once-daily Tacrolimus (Envarsus Xr®) and Immediate-release Twice-daily Tacrolimus (Prograf®) - A Single Center's Experience**
N. Singh[1], T. Le[1], M. S. Naseer[1], S. Asmil[1], A. Palermini[1], A. Qamar[1], R. Chand[1], S. Tandukar[1], D. Aultman[2], H. Shokouh-Amiri[2], G. Zibari[2], *[1]Transplant, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA, [2]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA*

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Public Policy: Ethics

Potpourri of Public Policy and Allocation

103 **Changes to Adult Heart Allocation Improve Candidate Stratification**
K. Bradbrook[1], K. Lindblad[1], R. R. Goff[1], R. Daly[2], S. Hall[3], *[1]Research, United Network for Organ Sharing, Richmond, VA, [2]Mayo Clinic, Rochester, MN, [3]Baylor University Medical Center, Dallas, TX*

104 **Incorporation of Donor Liver Macrovesicular Steatosis Into Srtr Risk Adjustment Models for Deceased Donor Yield and Post-Transplant Outcome**
A. Kwong[1], C. Wang[2], A. Wey[3], N. Salkowski[3], J. Snyder[4], J. Wetmore[2], A. Israni[2], J. Lake[4], P. Stock[5], W. Kim[1], *[1]Stanford University, Redwood City, CA, [2]Medicine, Hennepin Healthcare, Minneapolis, MN, [3]Scientific Registry of Transplant Recipients, Minneapolis, MN, [4]University of Minnesota, Minneapolis, MN, [5]University of California, San Francisco, San Francisco, CA*

105 **Increasing Survival on the Kidney Transplant Waiting List: A Thirty-Three Year Analysis**
E. L. Godfrey[1], P. T. Kambhampati[1], J. A. Goss[2], A. Rana[2], *[1]Baylor College of Medicine, Houston, TX, [2]Division of Abdominal Transplantation, Department of Surgery, Baylor College of Medicine, Houston, TX*

106 **The Evolution of the National Liver Review Board**

S. Noreen[1], J. Trotter[2], J. Pomposelli[3], M. Cafarella[1], J. Heimbach[4], *[1]UNOS, Richmond, VA, [2]BSWHealth, Dallas, TX, [3]UCHealth, Aurora, CO, [4]Mayo Clinic, Rochester, MN*

107 **Profound Opportunities Lost: Patients with High Priority for Ideal Donor Kidneys That are Not Placed on the Kidney Transplant Waiting List**

J. Schold[1], A. Huml[1], E. Poggio[1], J. Sedor[1], S. Husain[2], K. L. King[2], S. Mohan[2], *[1]Cleveland Clinic Foundation, Cleveland, OH, [2]Columbia University, New York, NY*

108 **Impact of Donor Kidney Biopsy on Kidney Yield and Post-Transplant Outcomes**

C. Wang[1], J. Wetmore[1], A. Wey[2], N. Salkowski[2], J. Snyder[2], A. Israni[1], *[1]Nephrology, Hennepin County Medical Center, Minneapolis, MN, [2]Scientific Registry of Transplant Recipients, Minneapolis, MN*

109 **Predicting Post-transplant Death and Graft Loss Risk: Insight at Listing**

N. Dzebisashvili[1], M. Schnitzler[2], K. Lentine[2], K. Venkataramani[1], S. Ghosh[1], *[1]CareDx, Brisbane, CA, [2]Saint Louis University, St. Louis, MO*

110 **Framing the Conceptualization of Uterus Transplantation: A Mixed Methods Study**

A. Wall[1], L. Johannesson[1], M. Sok[2], A. Warren[3], E. Gordon[4], G. Testa[1], *[1]Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX, [2]Obstetrics and Gynecology, Baylor University Medical Center, Dallas, TX, [3]Trauma and Critical Care, Baylor University Medical Center, Dallas, TX, [4]Northwestern University, Dallas, TX*

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A Penny for Your Thoughts: the Economics and Psychosocial Aspects of Transplant

382 **Economic Impact of a Pharmacist-Led Medication Safety Intervention: Report from the Transafe Rx Randomized Controlled Trial**

D. Taber, J. Fleming, Z. Su, P. Mauldin, M. Gebregziabher, *Med Univ of South Carolina, Charleston, SC*

383 **A Cost Benefit Analysis of Different Minimal Access Donor Nephrectomy Techniques Performed at a Busy Transplant Centre**

H. Sharma[1], A. Odougoudar[2], A. Sharma[2], D. Ridgway[2], A. Hammad[2], S. Mehra[2], *[1]Transplant and Vascular Access Surgery, Royal Liverpool University Hospital, Liverpool, United Kingdom, [2]Transplant and Vascular Access Surgery, Royal Liverpool Hospital, Liverpool, United Kingdom*

384 **The Use of Hcv Nat+ Organs in Hcv Negative Recipients with On-site Specialty Pharmacy Services: A Win for the Patient, the Transplant Center, and Society?**

M. Person, N. Patel, W. Simerlein, H. Meadows, D. DuBay, D. Taber, *Medical University of South Carolina, Charleston, SC*

385 **Addressing a Need in Transplant Clinical Care: Creation of the Organ Transplant Caregiver Toolkit**

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386 **Mhealth Family Self-Management Intervention for Families of Transplanted Children**
S. M. Lerret[1], R. White-Traut[2], B. Medoff-Cooper[3], S. I. Ahamed[4], P. Simpson[5], R. Schiffman[6], *[1]Department of Pediatrics, Medical College of Wisconsin, Milwaukee, WI, [2]Children's Wisconsin, Milwaukee, WI, [3]University of Pennsylvania, Philadelphia, PA, [4]Department of Computer Science, Marquette University, Milwaukee, WI, [5]Department of Biostatistics, Medical College of Wisconsin, Milwaukee, WI, [6]University of Wisconsin Milwaukee, Milwaukee, WI*

387 **Psychosocial Determinants of Regimen Adherence Among Kidney Transplant Recipients**
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388 **Frequency and Types of Pharmacist Interventions and Risk Assessments Occurring During the 12-Month Transafe Rx Randomized Controlled Trial**
H. M. Gonzales, J. N. Fleming, D. J. Taber, *MUSC, Charleston, SC*

389 **Noninferiority Outcomes Among Undocumented Immigrant Kidney Transplant Recipients in California**
H. Ichii[1], N. Eguchi[1], E. Tantisattamo[2], U. Reddy[2], A. Ferrey[2], D. Dafoe[1], *[1]Surgery, University of California Irvine, Orange, CA, [2]Medicine, University of California Irvine, Orange, CA*

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5 **Twelve Live Births After Uterus Transplantation in the Dallas Uterus Transplant Study**
L. Johannesson, G. J. McKenna, A. Wall, J. Bayer, G. Testa, *Baylor University Medical Center, Dallas, TX*

6 **Immunosuppression in Uterine Transplant Recipients: Experience from the Largest Uterine Transplant Program**
N. Wilson, R. Patel, L. Johannesson, G. Testa, T. Sam, *Baylor University Medical Center at Dallas, Dallas, TX*

7 **A Multi-institutional Study of Renal Outcomes in Uterus Transplantation**
D. Sawinski[1], L. Johannesson[2], J. Kristen[3], J. Fronek[3], P. Porrett[4], *[1]Hospital of the University of Pennsylvania, Philadelphia, PA, [2]Department of Surgery, Baylor University Medical Center, Dallas, TX, [3]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [4]University of Alabama at Birmingham, Birmingham, AL*

8 **Stem Cell and Novel Neurotrophic Factors to Promote Functional Outcomes in Limb Transplantation**
S. K. Salgar[1], J. Weiss[2], C. Phillips[2], E. Malin[2], V. Gorantla[3], J. Harding[4], *[1]Clinical Investigation, United States Army, Tacoma, WA, [2]Clinical Investigation, Madigan Army Medical Center, Tacoma, WA, [3]Surgery, Wake Forest University, Winston-Salem, NC, [4]Neuroscience, Washington State Universisty, Pullman, WA*

9 **Recovery After Extended Static Cold Storage Preservation Using Subnormothermic Machine Perfusion in VCA**
M. Goutard[1], R. J. de Vries[1], A. G. Lellouch[1], E. Lupon[1], C. Pendexter[1], S. N. Tessier[1], M. A. Randolph[1], L. Lantieri[2], C. L. Cetrulo[1], K. Uygun[1], *[1]Massachusetts General Hospital, Harvard Medical School, Shriners Hospitals for Children, Boston, MA, [2]Hôpital Européen Georges Pompidou, Paris, France*

10 **A Noninvasive Diagnostic Approach for Molecular Monitoring of Face Transplant Recipients**
C. Snopkowski[1], P. Rabbani[2], H. Yang[1], Z. Berman[2], G. Diep[2], C. Li[1], T. Muthukumar[1], R. Ding[1], D. Ceradini[2], M. Suthanthiran[1], *[1]Weill Cornell Medical Institute, Department of Medicine, Division of Nephrology, NY, NY, [2]NYU Langone Health, Hansjörg Wyss Department of Plastic Surgery, NY, NY*

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V. Casingal[1], B. Thrasher[2], J. Brown[2], C. Fotiadis[2], *[1]Department of Surgery, Atrium Health, Charlotte, NC, [2]Department of Transplant, Atrium Health, Charlotte, NC*

480 **Transplant Trainee Education and Recruitment Experiences**
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481 **Assessing the Prevalence of Risk Factors for Osteoporosis and Rate of Screening by Dexa Scan in Patients Referred for Liver Transplant Evaluation**
A. France[1], J. Kirk[2], M. Dokus[2], B. Al-Judaibi[2], M. Laryea[2], *[1]Department of Internal Medicine, University of Rochester Medical Center, Rochester, NY, [2]Division of Gastroenterology and Hepatology, University of Rochester Medical Center, Rochester, NY*

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483 **Iatrogenic Sodium Exposure in Hospitalized Patients with Liver Disease**
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J. Lyons[1], K. Khalil[2], J. J. Teuteberg[3], E. J. Henricksen[4], *[1]Department of Pharmacy, Loyola University Medical Center, Maywood, IL, [2]Department of Pharmacy, NYU Langone Health, New York, NY, [3]Medicine and Section of Heart Failure, Cardiac Transplant, and Mechanical Circulatory Support, Stanford University, Stanford, CA, [4]Department of Transplant, Stanford Health Care, Stanford, CA*

485 **Reduction in Medication Errors at Discharge in the Transplant Population via Use of Novel Pharmacist / Nursing Dual Check System**
M. Norris, S. Witek, C. Whritenour, K. Sigafus, C. Chiang, C. Sammons, D. Naveiro, A. Paredes, E. Perez-Ngai, M. Kaminski, R. Westmoreland, G. Malat, *Hospital of the University of Pennsylvania, Philadelphia, PA*

486 **Review of Unos Report of Organ Offers is Supplemented with Documented Real-time Communication Messages**
E. S. Pahl[1], N. Patterson[2], *[1]University of Iowa, Iowa City, IA, [2]Iowa Methodist, Des Moines, IA*

487 **Tacrolimus Shortage and the Rush to Convert: An Unexpected Burden on the System During the Covid-19 Pandemic?**
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488 **Clinical Impact of Transplant Pharmacists on the Care of Solid Organ Transplant Recipients**

I. Shah[1], J. Au[1], A. Diamond[1], N. Sifontis[2], C. Ruggia-Check[1], *[1]Temple University Hospital, Philadelphia, PA, [2]Temple School of Pharmacy, Philadelphia, PA*

489 **Proxies of Ischemia Time Do Not Predict 1-Year Posttransplant Survival**

M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], J. Alcorn[4], R. Goff[4], D. Stewart[4], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH, [4]UNOS, Richmond, VA*

490 **Aligning Pediatric Waiting List and Post-Transplant Outcomes with the Adult Lung Allocation Score**

M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], J. Alcorn[4], R. Goff[4], D. Stewart[4], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH, [4]UNOS, Richmond, VA*

491 **The Implementation of the New Unos Policy That Relegates C-peptide and Body Mass Index Criteria Has Resulted in Shifting Recipient Demographics**

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492 **Frailty and Short-Term Outcomes in Kidney Transplant**

S. Van Arsdale[1], K. Torbert[1], R. Harland[2], A. Turner[2], B. Tanriover[3], V. Ariyamuthu[3], *[1]Banner University Medical Center, Tucson, AZ, [2]Surgery, Banner University Medical Center, Tucson, AZ, [3]Internal Medicine, Banner University Medical Center, Tucson, AZ*

493 **Single Day Centralized Approach in Kidney Transplant Workup - Lessons Learned from 2 Centers**

A. Vijay, N. Langford, K. Atiemo, S. Giusti, M. Killackey, A. Paramesh, H. Jeon, *Tulane Abdominal Transplant Institute, New Orleans, LA*

494 **Creating Efficiency in the Kidney Transplant Listing: Can We Streamline Candidate Ineligibility?**

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495 **Value of a Personal Systems Approach in Improving Medication Adherence in Adult Kidney Transplant Patients: A Cost-effectiveness Analysis of the MAGIC Randomized Clinical Trial**

M. R. Wakefield[1], M. Whittington[2], C. Ashbaugh[3], L. M. Remy[4], D. Aholt[4], C. Miller[4], D. Hathaway[5], D. Clark[5], K. Goggin[5], R. J. Ellis[6], C. L. Russell[4], *[1]Surgery/Urology, University of Missouri School of Medicine, Columbia, MO, [2]University of Kansas Medical Center, Kansas City, KS, [3]University of Missouri Health Care, Columbia, MO, [4]University of Missouri-Kansas City, Kansas City, MO, [5]Children's Mercy Kansas City, Kansas City, MO, [6]Indiana University School of Nursing, Indianapolis, IN*

496 **A New Triage-based Approach to Managing Transplant Referrals**

H. L. Walther, *Division of Kidney & Pancreas Transplantation, UCI Health, Orange, CA*

497 **The Effect of Acuity Circles on Deceased Donor Transplant and Offer Rates Across Meld and Exception Statuses**

A. Wey[1], S. Noreen[2], S. Gentry[3], N. Salkowski[1], M. Cafarella[2], R. Hirose[4], J. Trotter[5], D. Segev[6], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]UNOS, Richmond, VA, [3]USNA, Annapolis, MD, [4]Univ of San Francisco, San Francisco, CA, [5]BSW Health, Dallas, TX, [6]Johns Hopkins, Baltimore, MD*

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A. A. Yishak[1], M. S. Bhatnagar[2], A. V. Tomimatsu[3], R. La Londe[4], E. Clark[5], K. B. Rubenstein[6], S. Vupputuri[6], *[1]MAPMG, McLean, VA, [2]Kaiser Permanente |, Oakland, CA, [3]Kaiser Permanente, Oakland, CA, [4]Kaiser Permanente, Oakland,, CA, [5]Kaiser Permanente, Hyattsville, MD, [6]MAPRI, Rockville, MD*

LB 25 **Wave of the Future: Expanding Role and Necessity of the Dedicated Procurement Surgeon**
C. Strom, B. Cimsit, H. Nelson, F. Delmonico, *New England Donor Services, Waltham, MA*

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C. Crouch[1], A. Hendrickse[1], W. Stoll[2], C. Sullivan[3], M. Kaufman[4], E. Pivalizza[5], D. Damian[6], D. Sellers[7], M. Little[8], S. McCluskey[7], S. Kumar[9], L. De Marchi[10], S. Sridhar[5], T. Sakai[6], *[1]Department of Anesthesiology, University of Colorado, Aurora, CO, [2]Medical University of South Carolina, Charleston, SC, [3]Emory University, Atlanta, GA, [4]Lahey Health, Burlington, MA, [5]University of Texas Health Science Center at Houston, Houston, TX, [6]University of Pittsburgh, Pittsburgh, PA, [7]University of Toronto, Toronto, ON, Canada, [8]University of Texas Health Science Center San Antonio, San Antonio, TX, [9]University of Michigan, Ann Arbor, MI, [10]Georgetown University, Washington DC, DC*

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M. Castillo-Angeles[1], G. Li[2], P. Bain[3], A. Salim[1], J. T. Adler[1], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Brandeis University, Waltham, MA, [3]Harvard Medical School, Boston, MA*

1251 **Public Perceptions of Presumed Consent for Organ Donation in Canada: A Qualitative Descriptive Study of Public Comments from News Articles**
D. E. Fox[1], M. Donald[2], C. Chong[1], R. R. Quinn[3], P. E. Ronksley[1], M. J. Elliott[3], N. N. Lam[3], *[1]The Department of Community Health Sciences, The University of Calgary, Calgary, AB, Canada, [2]Cumming School of Medicine, The University of Calgary, Calgary, AB, Canada, [3]The Cumming School of Medicine and Department of Community Health Sciences, The University of Calgary, Calgary, AB, Canada*

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E. Larsen[1], K. Cardoza[2], K. Robichaux[3], A. Kumar[1], V. Bowers[4], J. Buggs[4], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of Tampa, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Surgery, Tampa General Hospital, Tampa, FL*

1253 **Variation in Next of Kin Authorization for Research in Deceased Donor Organ Transplantation: Experience at One Organ Procurement Organization**
K. L. Lentine[1], C. Jones[1], W. Cheungpasitporn[2], R. Rothweiler[3], H. Xiao[1], M. Ortigosa-Goggins[4], G. Marklin[3], R. B. Mannon[5], *[1]Saint Louis University, St. Louis, MO, [2]Mayo Clinic, Rochester, MN, [3]Mid-America Transplant, St. Louis, MO, [4]University of Miami, Miami, FL, [5]University of Nebraska, Omaha, NE*

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A. Demirag[1], Y. Wu[2], J. Lamp[2], S. Holland[1], A. Routt[2], L. Feng[2], *[1]Transplantation, University of Virginia Medical Cener, Charlottesville, VA, [2]Computer Science Engineering Systems & Environment, University of Virginia, Charlottesville, VA*

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C. Focht, W. Tian, J. Zeng, N. Dzebisashvili, S. Ghosh, *CareDx, Brisbane, CA*

1294 **Machine Learning Approaches for Post-transplant Kidney Outcome Prediction**
H. Ghali[1], D. Won[1], S. Yoon[1], A. Friedman[2], *[1]Systems Science and Industrial Engineering, SUNY Binghamton, Binghamton, NY, [2]LiveOnNY, New York, NY*

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A. Johnson[1], J. Zhang[1], H. Gebel[2], C. Larsen[1], *[1]Surgery, Emory University, Atlanta, GA, [2]Pathology, Emory University, Atlanta, GA*

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C. Martinez, M. Stuart, A. Placona, *United Network for Organ Sharing, Richmond, VA*

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J. D. Perkins[1], E. Clemens[2], M. Granich[3], J. Yeung[3], J. Reyes[1], *[1]Surgery, University of Washington, Seattle, WA, [2]Pharmacy, University of Washington, Seattle, WA, [3]Center of Clinical Excellence, University of Washington, Seattle, WA*

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I. Revuelta[1], E. Palou[2], R. Scandurra[3], F. Oppenheimer[1], F. Diekmann[1], J. Escarrabill[2], B. Bayés[1], *[1]Department of Nephrology and Kidney Transplant, Hospital Clinic, Barcelona, Spain, [2]Chronic care program and patient experience, Hospital Clinic, Barcelona, Spain, [3]Department of Statistics, Universidad Autónoma de Barcelona, Barcelona, Spain*

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Y. Al-Salmay, N. Jandovitz, M. Abate, A. Baez, E. Molmenti, A. Fahmy, N. Breslin, L. Teperman, V. Nair, *Organ Transplantation, Northwell Health, Manhasset, NY*

1261 **Impact of Bacterial Infection on HLA Allosensitization Among Kidney Recipients on the Waitlist**
D. P. Cina[1], K. R. Sherwood[2], S. Dobrer[2], J. Wong[3], F. Fenninger[2], M. Kadatz[4], P. Keown[4], J. Lan[4], *[1]Department of Urologic Sciences, University of British Columbia, Vancouver, BC, Canada, [2]University of British Columbia, Vancouver, BC, Canada, [3]Department of Laboratory Medicine, Vancouver General Hospital, Vancouver, BC, Canada, [4]Department of Nephrology, University of British Columbia, Vancouver, BC, Canada*

1262 **Solid Organ Transplant Telehealth Utilization Significantly Increased During the Covid-19 Pandemic: Experience at a Single, Large Volume Center**
R. Forbes, K. Kumm, H. O'Dell, K. Smith, L. Smith, A. Dreher, H. Schaefer, B. Concepcion, *Vanderbilt University Medical Center, Nashville, TN*

1263 **Racial/ethnic and Sex Disparities in Renal Transplant Waitlisting Accounting for Pre-Waitlist Mortality**
R. Hamoda[1], R. Patzer[2], M. Saunders[1], *[1]University of Chicago, Chicago, IL, [2]Emory University, Atlanta, GA*

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C. E. Jacobson[1], R. Olmeda Barrientos[2], M. A. Anderson[3], M. J. Englesbe[3], S. A. Waits[3], V. S. Valbuena[3], *[1]University of Michigan Medical School, Ann Arbor, MI, [2]University Of California – Riverside, School of Medicine, Riverside, CA, [3]Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

1265 **Regional Impact of Covid-19 on Kidney Transplant in the Southeast**

C. Jay[1], B. Sharda[1], R. Helmick[2], R. Forbes[3], V. Casingal[4], R. Stratta[1], *[1]Wake Forest Baptist Health, Division of Abdominal Organ Transplantation, Winston-Salem, NC, [2]University of Tennessee Health Science Center, James Eason Transplant Institute, Memphis, TN, [3]Vanderbilt University Medical Center, Division of Kidney and Pancreas Transplantation, Nashville, TN, [4]Atrium Health, Division of Transplant Surgery, Charlotte, NC*

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A. C. Killian[1], M. C. McLeod[1], B. Shelton[1], R. D. Reed[1], P. MacLennan[1], H. Qu[1], B. J. Orandi[1], D. Sawinski[2], J. E. Locke[1], *[1]University of Alabama at Birmingham Hospital, Birmingham, AL, [2]Hospital of the University of Pennsylvania, Philadelphia, PA*

1267 **Healthcare Disparities Amongst Dialysis Patients in North Carolina: Decreased Access to Transplant in Lowest Health Rank Counties**

D. Leto[1], W. Irish[2], C. Haisch[2], B. Tuttle[2], D. Leeser[2], *[1]Cape Fear Valley Medical Center, Fayetteville, NC, [2]East Carolina University, Greenville, NC*

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1269 **Patient Perspective of the Implementation of Virtual Medicine in a Post-kidney Transplant Clinic**

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1270 **Creating a Culturally Sensitive Report Card for African American Kidney Transplant Candidates: Preliminary Results from Pilot Interviews and Focus Groups**

W. T. McKinney[1], M. Bruin[2], B. Kasiske[3], A. Matas[4], A. K. Israni[3], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]College of Design, University of Minnesota, Minneapolis, MN, [3]Nephrology, Hennepin Healthcare, Minneapolis, MN, [4]Department of Surgery, University of Minnesota, Minneapolis, MN*

1271 **Providing Equitable Access: Language and Literacy Levels of Kidney Transplant Center Websites**

R. Olmeda Barrientos[1], C. E. Jacobson[2], V. S. Valbuena[3], M. S. Anderson[3], M. J. Englesbe[3], S. A. Waits[3], J. R. Santos-Parker[2], *[1]University Of California – Riverside, School of Medicine, Riverside, CA, [2]University of Michigan Medical School, Ann Arbor, MI, [3]Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

1272 **Gray on the Border: A Closer Look at the Gap in Access to Kidney Transplantation for Hispanic Americans**

A. Padilla, M. Mujtaba, R. Samper-Ternent, S. Al Snih, N. Perez, J. Fair, R. Kulkarni, E. Polychronopoulou, M. Kueht, *University of Texas Medical Branch, Galveston, TX*

1273 **Racial Differences in Tacrolimus Xr Dosing in De Novo Kidney Transplant Recipients**

N. Patel, T. Carcella, F. Bartlett, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

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A. Perez[1], S. Retzloff[1], T. Browne[2], A. Cruz[3], S. Wright[3], S. Pastan[4], R. Patzer[1], *[1]Department of Surgery, Emory University School of Medicine, Atlanta, GA, [2]College of Social Work, University of South Carolina, Columbia, SC, [3]IPRO ESRD Network of the South Atlantic, Morrisville, NC, [4]Department of Medicine, Emory University School of Medicine, Atlanta, GA*

1275 **AM PAC Scores and Liver Transplant Resource Utilization**
M. Pierpont[1], M. Gosselin[2], K. Robichaux[3], A. Kumar[1], J. Buggs[4], N. Kemmer[5], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of Tampa, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Surgery, Tampa General Hospital, Tampa, FL, [5]Transplant Hepatology, Tampa General Hospital, Tampa, FL*

1276 **Survey of Transplantation Providers to Assess for Implicit Bias at a Single Center**
C. Ramirez-Sanchez[1], A. Cardenas[2], S. Aslam[1], F. Ferguson[2], M. Vazquez[2], T. Magee[2], K. Mekeel[2], *[1]Infectious Diseases, University of California San Diego, La Jolla, CA, [2]University of California San Diego, La Jolla, CA*

1277 **Association of Obesity and Early Post Kidney Transplantation Complications**
V. Sandra, N. Sanichar, D. Tsapepas, K. L. King, J. Van Bever, K. Toma, A. Hussain, S. Mohan, *Columbia University Irving Medical Center, New York, NY*

1278 **Hospitalization in the First Year After Kidney Transplantation: Analyses to Identify Common Predictors of Risk Across Recipient Sensitization Groups**
A. Santos, E. Bueno, M. A. Leghrouz, *University of Florida, Gainesville, FL*

1279 **Prostate Cancer Mortality is Not Worse Among Kidney Transplant Recipients Compared to Dialysis Patients**
N. Sarabu[1], W. Dong[2], S. M. Koroukian[2], *[1]University Hospital Cleveland Medical Center, Cleveland, OH, [2]Case Western Reserve University, Cleveland, OH*

1280 **Seeing is Believing: Efficacy of a Video-based Intervention in Improving Awareness of Skin Cancer Risk for Solid Organ Transplant Recipients**
E. Shah[1], S. Michalak[1], R. Haughton[1], B. Fernandez[1], I. Ahronowitz[2], *[1]Keck School of Medicine, Los Angeles, CA, [2]Dermatology, Keck School of Medicine, Los Angeles, CA*

1281 **Increased Deceased Organ Donation Rates Among Racial and Ethnic Minorities: Not Exactly. A UNOS/ NHSBT UK Donor Data Analysis Over the Last Five Years**
H. Sharma[1], A. Pradeep[2], A. Ditchfield[3], M. Abraham[4], P. Lominchar[5], S. Mehra[1], A. Skaro[4], *[1]Transplant and Vascular Access Surgery, Royal Liverpool University Hospital, Liverpool, United Kingdom, [2]Liver Unit, King's College, London, United Kingdom, [3]Transplant and Vascular Access Surgery, Manchester Royal Infirmary, Manchester, United Kingdom, [4]Transplant Surgery, University Of Western Ontario, London, ON, Canada, [5]Visceral Surgery, Hospital General Universitario Gregorio Marañon, Madrid, Spain*

1282 **Has the Proportional Rise in Deceased Organ Donation Rate Over Last 5 Years Been Optimal? A Data-based, Forecasting Model Analysis of UNOS/ NHSBT UK Donor Data**
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1283 **Outcomes of Patients Referred for Liver Transplant Evaluation**
E. Solomon[1], M. Waykar[2], K. Robichaux[3], J. Buggs[4], A. Kumar[1], N. Kemmer[5], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of Tampa, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Surgery, Tampa General Hospital, Tampa, FL, [5]Transplant Hepatology, Tampa General Hospital, Tampa, FL*

1284 **Equity in Access to Kidney Transplants by Race/ethnicity in the Covid-19 Era**

D. Stewart[1], A. Robinson[2], K. Bradbrook[2], A. Wilk[2], D. Klassen[3], *[1]United Network for Organ Sharing, Richmond, VA, [2]Research, United Network for Organ Sharing, Richmond, VA, [3]Chief Medical Officer, United Network for Organ Sharing, Richmond, VA*

1285 **Impact of COVID-19 Crisis on Disparities in Living Kidney Donation in the US**

J. Wainright, S. Booker, J. Foutz, A. Henderson, R. Goff, L. Cartwright, D. Klassen, *Research, UNOS, Richmond, VA*

1286 **Body Mass Index >35 Does Not Impact Kidney Transplant Outcomes or Health Related Quality of Life Despite BMI Class or Recipient Race**

D. A. Walczak[1], E. Collins[2], E. Benedetti[1], *[1]Organ Transplant, University of Il Hospital and Health Sciences System, Chicago, IL, [2]College of Nursing, Dept of Biobehavioral Health Science, University of Illinois at Chicago, Chicago, IL*

1287 **Improving Well-being for Heart Transplant Recipients: Implementation of a Patient Navigator Program**

K. Ramonas, K. Ramonas, *Health Navigator Foundation, San Francisco, CA*

1288 **Genetic versus Self-reported African Ancestry and Kidney Allograft Outcome: Analysis of Two Large Multiethnic Urban Transplant Cohorts**

F. Zanoni[1], D. Neugut[1], S. Mohan[1], A. Gharavi[1], B. Keating[2], K. Kiryluk[1], *[1]Department of Medicine, Division of Nephrology, Columbia University, New York, NY, [2]Department of Surgery, Division of Transplantation, University of Pennsylvania, Philadelphia, PA*

Non-Organ Specific: Organ Preservation/ Ischemia Reperfusion Injury

1255 **Ex Situ Heart Perfusion and Standard of Care Cold Storage Differentially Affect the Ischemic Secretome of Donor Hearts in Perfusates but Not the Reperfusion Response in Recipient Plasma**

E. Chichelnitskiy[1], B. Wiegmann[2], N. Ledwoch[1], F. Ius[2], F. Wandrer[1], J. Kühne[1], K. Beushausen[1], J. Keil[1], S. V. Rojas[2], W. Sommer[2], C. Kühn[2], I. Tudorache[2], M. Avsar[2], A. Haverich[2], G. Warnecke[2], C. S. Falk[1], *[1]MHH, Institute of Transplant Immunology, Hannover, Germany, [2]MHH, Department for Cardiothoracic, Transplantation and Vascular Surgery, Hannover, Germany*

1256 **Combined Liver and Lung Transplantation with Extended Normothermic Liver Preservation Using Transmedics Organ Care System (OCS)™ Liver: A Single Center Experience**

J. Konel[1], M. Shamaa[2], O. Shamaa[2], A. Elsabbagh[2], T. Kitajima[2], T. Ivanics[2], K. Delvecchio[2], A. Mohamed[2], S. Yeddula[2], K. Collins[2], A. Yoshida[2], M. Abouljoud[2], S. Nagai[2], M. Rizzari[2], *[1]Wayne State University School of Medicine, Detroit, MI, [2]Henry Ford Transplant Institute, Detroit, MI*

1257 **Dual Lactate Clearance in the Liver Viability Assessment During Normothermic Machine Perfusion**

M. Xu[1], F. Zhou[1], O. Ahmed[1], J. Shin[1], Y. Zhu[1], G. Upadhya[1], K. Byrnes[2], B. Wong[1], J. Kim[1], Y. Lin[1], W. Chapman[1], *[1]Department of Surgery, Washington University, St. Louis, MO, [2]Department of Pathology and Immunology, Washington University, St. Louis, MO*

1258 **Intravenous Immunoglobulin Protects Liver Allograft from Ischemia Reperfusion Injury in Human Liver Transplantation**

S. Yokota, J. C. Alonso-Escalante, R. P. Tindall, K. R. Tabar, L. Machado, T. Uemura, N. L. Thai, *Department of Surgery, Allegheny General Hospital, Pittsburgh, PA*

1259 **Mitigating the Adverse Impact of Broader Kidney Sharing with Hospital-based Machine Perfusion**
Y. Yushkov, B. R. Schleich, T. Carrea, V. Wadhera, M. J. Goldstein, *Hackensack University Medical Center, Hackensack, NJ*

Non-PTLD/Malignancies

1246 **Use of Immune Checkpoint Inhibitors in Solid Organ Transplant Recipients: A Scoping Review**
A. G. Anderson, M. Eubank, K. Murray, *University of Missouri, Columbia, MO*

1247 **Pd-1 Inhibitor Treatment in Solid Organ Transplant Patients with Metastatic Cancer**
C. Chung[1], H. Ko[1], H. Kim[1], K. Choi[1], A. Han[1], S. Min[1], H. Kang[2], J. Ha[1], *[1]Department of Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of, [2]Department of Pediatrics, Seoul National University College of Medicine, Seoul, Korea, Republic of*

1248 **Cancer-Specific Mortality in Solid Organ Transplant Recipients with a Prior Cancer Diagnosis**
E. Engels[1], G. Haber[1], A. Hart[2], C. Lynch[3], J. Li[4], K. Pawlish[4], B. Qiao[5], K. Yu[1], R. Pfeiffer[1], *[1]Natl Cancer Inst, Bethesda, MD, [2]Univ of Minnesota, Minneapolis, MN, [3]Univ of Iowa, Iowa City, IA, [4]New Jersey Dept of Health, Trenton, NJ, [5]New York State Dept of Health, Albany, NY*

1249 **Review of Outcomes After Diagnosis of Malignancy in Kidney Transplant Patients: Unos Database**
H. Patel[1], N. Agrawal[1], R. Gupta[1], P. Geetha[2], A. Abdul Razzack[3], F. Cardarelli[1], *[1]Transplant Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [2]Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [3]Medicine, Dr. NTR University of Health Sciences, Vijaywada, India*

Surgical Issues (Open, Minimally Invasive):All Organs

1289 **Wound Infection After Kidney Transplantation: A Single Center Study**
A. Demirag, J. Oberholzer, A. Agarwal, B. Rawashdeh, E. McCraken, K. Brayman, *Transplantation, University of Virginia Medical Cener, Charlottesville, VA*

1290 **The Impact of Thromboelastography on Decreasing Blood Product Usage in Liver Transplantation**
A. Mohamed[1], T. Kitajima[1], S. Angappan[2], K. Delvecchio[1], A. M. Elsabbagh[1], S. Yeddula[1], M. Shamaa[1], K. Collins[1], M. Rizzari[1], A. Yoshida[1], M. Abouljoud[1], J. El-Bashir[2], S. Nagai[1], *[1]Department of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI, [2]Department of Anesthesiology, Henry Ford Hospital, Detroit, MI*

1291 **Benign Pneumatosis Intestinalis with Pneumoperitoneum in the Immunocompromised Patient: Three Cases**
A. Mohamed, K. Delvecchio, T. Kitajima, M. Rizzari, K. Collins, A. Yoshida, S. Nagai, J. Denny, M. Abouljoud, *Department of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

Basic

Acute Rejection

499 **Epigenetic & Functional Changes Associated with Alloreactive Memory CD8 T Cell Subsets in Liver Transplant Patients**
H. Abdelsamed[1], S. Liu[1], M. Juya[1], D. Metes[2], F. Lakkis[1], A. Thomson[1], *[1]University of Pittsburgh Medical Center, Pittsburgh, PA, [2]UPMC, Pittsburgh, PA*

500 **Association Between Donor-Recipient Genetic Matching and Acute Rejection in Kidney Transplantation**
R. Cao[1], V. Arthur[2], J. Chen[2], B. Keating[2], C. Dorr[3], D. Schladt[3], G. Onyeaghala[3], R. Mannon[4], A. Matas[1], R. Remmel[1], N. Pankratz[1], B. Wu[1], W. Oetting[1], P. Jacobson[1], A. Israni[3], W. Guan[1], *[1]University of Minnesota, Minneapolis, MN, [2]University of Pennsylvania, Philadelphia, PA, [3]Hennepin Healthcare Research Institute, Minneapolis, MN, [4]University of Nebraska, Omaha, NE*

501 **Murine Cytomegalovirus Induces Kidney Allograft Injury via Th17 Cells Recruited by Both Viral Antigen-Specific and Cytokine/chemokine Mediated Pathways**

R. Dhital[1], V. Velazquez[1], Q. Zeng[2], B. Graber[1], K. Flint[1], M. Shimamura[1], *[1]Vaccines and Immunity, Nationwide Children's Hospital, Columbus, OH, [2]Center for Cardiovascular Research, Nationwide Children's Hospital, Columbus, OH*

502 **Belatacept-Resistant T Cells are Activated by IFNα-IRF7 Pathway**

F. Herr, K. Bargiel, A. Vernochet, A. Durrbach, *UMR1186, Villejuif, France*

503 **Successful Prophylaxis of Antibody-Mediated Rejection by Downregulation of C5 Expression via RNA Interference in a Rat Kidney Transplant Model**

H. Ishigooka[1], S. Motoi[2], T. Yamakawa[1], C. Matsui[2], Y. Suzuki[3], R. Ishii[1], K. Saiga[1], D. Tokita[1], T. Imai[2], K. Tanabe[1], *[1]Urology, Tokyo Women's Medical University, Tokyo, Japan, [2]KAN Research Institute, Inc., Kobe, Japan, [3]Tsukuba Research Laboratories, Eisai, Co., Ltd., Ibaraki, Japan*

504 **The Microenvironment of Belatacept-Resistant Rejection**

A. Johnson, J. Zhang, C. Larsen, *Surgery, Emory University, Atlanta, GA*

505 **The Efficacy of Delayed Fc-nonbinding Anti-CD3 Antibody Treatment in Sensitized Allogeneic Mouse Heart Transplantation**

T. Ota[1], R. Goto[1], R. Kanazawa[1], K. Shibuya[1], Y. Ganchiku[1], N. Kawamura[2], M. Watanabe[2], M. Fukai[1], T. Shimamura[3], A. Taketomi[1], *[1]Dept. of Gastroenterological Surgery I, Hokkaido University, Sapporo, Japan, [2]Dept. of Transplant Surgery, Hokkaido University, Sapporo, Japan, [3]Division of Organ Transplantation, Hokkaido University Hospital, Sapporo, Japan*

506 **Pharmacokinetic and Toxicity Studies of an Anti CD40L Antibody, At-1501 in Rhesus Macaques**

S. Perrin[1], A. Gill[2], C. Gill[2], F. Vieira[2], K. Thompson[2], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

507 **Belatacept and Rapamycin Maintenance Immunosuppression in a Sensitized Nonhuman Primate Kidney Allotransplantation Model**

R. Schmitz[1], Z. W. Fitch[1], M. Manook[1], J. Yoon[1], A. B. Farris[2], J. Kwun[1], S. J. Knechtle[1], *[1]Department of Surgery, Duke University Medical Center, Durham, NC, [2]Department of Pathology and Laboratory Medicine, Emory University School of Medicine, Atlanta, GA*

508 **Inhibition of Fatty Acid Beta-Oxidation Prolongs Heart Allograft Survival**

B. W. Wong, Y. Zhu, H. Dun, L. Ye, *Surgery, Washington University School of Medicine, Saint Louis, MO*

509 **Re-Transplantation of Mouse Kidney Grafts to Study Local Immune Responses**

D. Zhao, M. Oberbarnscheidt, F. Lakkis, K. Khodor, *Starzl Transplantation Institution, Pittsburgh, PA*

510 **Invariant Nkt Cells Promote Expansion of Novel $Cxcr3^{+}Ccr4^{+}Cd8^{+}$ T Cells in the Liver Following Allogeneic Hepatocyte Transplant**

J. Zimmerer[1], B. Ringwald[2], S. Chaudhari[1], J. Han[1], C. M. Peterson[1], R. T. Warren[1], M. Hart[1], M. Abdel-Rasoul[3], G. Bumgardner[1], *[1]OSU, Columbus, OH, [2]Medical Student Research Program, OSU, Columbus, OH, [3]Center for Biostatistics, OSU, Columbus, OH*

Antigen Presentation / Allorecognition / Dendritic Cells

511 **Environmental Factors That Shape T-cell Alloimmunity: Role of the Microbiome**

K. Janek[1], J. H. Fechner[1], R. A. Daley[1], K. Krautkamer[1], F. Rey[2], J. D. Mezrich[1], *[1]Surgery, University of Wisconsin School of Medicine & Public Health, Madison, WI, [2]Bacteriology, University of Wisconsin, Madison, WI*

512 **The Development and Characterization of AT1501, an Anti CD40L Antibody Lacking Fc Effector Function**

S. Perrin[1], A. Gill[2], C. Gill[2], F. Vieira[2], K. Thompson[2], J. Lincecum[2], B. Jiang[2], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

513 **DAP12 Promotes Liver DC Tolerogenicity by Negative Regulation of the CGAS-STING-IFN I Pathway**

Y. Zheng[1], J. Long[2], N. Ryosuke[1], L. Peng[3], F. Peng[3], A. Thomson[1], *[1]Thomas E. Starzl Transplantation Institute, University of Pittsburgh, Pittsburgh, PA, [2]Department of Cardiology, The Second Xiangya Hospital of Central South University, Changsha, China, [3]Department of Kidney Transplantation, The Second Xiangya Hospital of Central South University, Changsha, China*

B-cell / Antibody /Autoimmunity

514 **Lung Transplant Recipients Developing Early DSAs are Characterized by a Shift Towards Memory B Cells Directly After Transplantation**

S. Christoph[1], A. Hitz[1], R. Bellmàs Sanz[1], J. Kühne[1], B. Wiegmann[2], F. Ius[2], J. Salman[2], E. Chichelnitskiy[1], T. Siemeni[2], W. Sommer[3], A. Haverich[2], G. Warnecke[3], C. Falk[1], *[1]Institute of Transplant Immunology, MHH, Hannover, Germany, [2]Department of Cardiothoracic, Transplant and Vascular Surgery, MHH, Hannover, Germany, [3]Department of Cardiac Surgery, University Hospital Heidelberg, Heidelberg, Germany*

515 **Autoantibodies Against Ro/SS-A, CENP-B, and La/SS-B are Increased in Patients with Kidney Allograft Antibody-mediated Rejection**

S. Clotet-Freixas[1], M. Kotlyar[2], C. M. McEvoy[1], C. Pastrello[2], S. Rodríguez-Ramírez[1], S. Farkona[1], H. Cardinal[3], M. Dieudé[3], M. Hébert[3], Y. Li[1], O. Famure[1], P. Chen[1], S. Kim[1], E. Chan[4], I. Jurisica[2], R. John[1], A. Chruscinski[1], A. Konvalinka[1], *[1]Toronto General Hospital Research Institute, University Health Network, Toronto, ON, Canada, [2]Krembil Research Institute, University Health Network, Toronto, ON, Canada, [3]Centre de Recherche du Centre Hospitalier de l'Université de Montréal, Montreal, QC, Canada, [4]Department of Medicine, Division of Nephrology, University Health Network, Toronto, ON, Canada*

516 **Properties of Regulatory B Cells Suppressing B Cells**

Q. Fu[1], K. Lee[2], K. Deng[2], G. Huai[2], C. Rickert[2], H. Yang[1], C. LeGuern[2], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA*

517 **Autoimmune Responses to DNA Topoisomerase I Exacerbate Renal Allograft Injury**

V. Gorbacheva, R. Fan, S. Miyairi, W. Baldwin, R. Fairchild, A. Valujskikh, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

518 **Donor-specific Regulatory B Cells Prolong Skin Graft Survival by Preventing the Proliferation of Donor-specific CD4 Helper but Not of CD8 Effector T Cells**

G. Huai[1], K. Lee[2], K. Deng[2], Q. Fu[1], C. G. Rickert[2], S. Deng[1], C. LeGuern[2], J. F. Markmann[2], *[1]Department of Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

519 **In Vitro Generated Regulatory B Cells Induce $Cd4^{+}Cd25^{+}Foxp3^{+}$Tregs from $Cd4^{+}Cd25^{-}$T Cells via TGF-β**

G. Huai[1], K. Lee[2], K. Deng[2], Q. Fu[1], C. G. Rickert[2], S. Deng[1], C. LeGuern[2], J. F. Markmann[2], *[1]Department of Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

520 **Quantifying Hidden Sensitization: HLA-reactive Memory B Cells in the Spleens of Sensitized Women**
J. T. Killian[1], J. A. Houp[1], A. Nellore[2], R. G. King[3], P. M. Porrett[1], F. E. Lund[3], *[1]Department of Surgery, University of Alabama at Birmingham School of Medicine, Birmingham, AL, [2]Department of Medicine, University of Alabama at Birmingham School of Medicine, Birmingham, AL, [3]Department of Microbiology, University of Alabama at Birmingham School of Medicine, Birmingham, AL*

521 **Suppression of T Cell Proliferation by Activated Nonhuman Primate B Cells**
K. Lee, K. Deng, G. Huai, F. Qiang, C. Rickert, J. Lei, C. Leguern, J. Markmann, *Massachusetts General Hospital, Boston, MA*

522 **Targeting Il-21 Receptor Shifts Tfh/tfr Balance and Amelioratеschronic Antibody Mediated Rejection**
Y. Nian, Z. Xiong, J. Zhao, Y. Fu, *Tianjin First Central Hospital, Tianjin, China*

523 **Antibodies to Hla Molecules Lead to Induction and Release of Circulating Exosomes with Lung Self-Antigens**
R. Ravichandran, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

524 **Development of a Rat Model of Antibody-Mediated Rejection After Liver Transplantation**
T. Tajima, K. Hata, J. Kusakabe, H. Miyauchi, S. Uemoto, *Dept. of Surgery, Div. of HBP Surgery & Transplantation, Kyoto University Graduate School of Medicine, Kyoto, Japan*

525 **A Novel Mouse Model of Cardiac Allograft Vasculopathy**
H. Tsuda[1], E. Reed[2], W. Baldwin[1], R. Fairchild[1], *[1]Inflammation and Immunity, Cleveland Clinic, Cleveland, OH, [2]Pathology and Laboratory Medicine, University of California, Los Angeles, CA*

526 **Iguratimod Prevents Antibody-mediated Rejection by Regulating Germinal Center Formation and Antibody Production**
H. Zhang, A. Chandraker, P. Sage, N. Murakami, *Transplantation Research Center, Brigham and Women's Hospital, Boston, MA*

Biomarker Discovery and Immune Modulation

544 **Hypoxia Inducible Factor 1á (HIF-1á) Regulates Carcinoembryonic Antigen-related Cell Adhesion Molecule-1 (CEACAM1) Splice Isoforms to Protect Against Ischemic Injury in Mouse and Human Liver Transplantation**
K. J. Dery, H. Kojima, K. Kadono, H. Hirao, J. W. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

545 **Microbial Signatures Promote Antibiotic-Mediated Alleviation of Peritransplant Liver Damage in Mouse Recipients**
K. J. Dery[1], S. Kageyama[1], H. Hirao[1], H. Kojima[1], K. Kadono[1], T. Dong[2], J. W. Kupiec-Weglinski[1], *[1]The Dumont-UCLA Transplantation Center, Los Angeles, CA, [2]Department of Medicine, Vatche & Tamar Manoukian Division of Digestive Diseases, UCLA, Los Angeles, CA*

546 **Neutrophil CEACAM1 Induces Hepatic Autophagy and Shapes Innate-adaptive Immune Response in Liver Transplantation: From Mouse-to-human**
H. Hirao[1], H. Kojima[1], K. Kadono[1], K. J. Dery[1], K. Nakamura[2], D. G. Farmer[1], F. M. Kaldas[1], J. W. Kupiec-Weglinski[1], *[1]Surgery, Dumont-UCLA Transplant Center, Los Angeles, CA, [2]Surgery, Kyoto University, Kyoto, Japan*

547 **Treg Lymphotoxin Engages Lymphotoxin Receptor on Cancer and Endothelial Cells to Promote Cancer Metastatic Migration: Mechanisms for Treg-Cancer Interactions**
W. Piao, R. Oakes, C. Paluskievicz, J. Christopher, J. Bromberg, *U Maryland, Baltimore, MD*

548 **Development of a Lateral Flow Assay Detecting CXCL9 within Antibody Mediated and Acute T Cell Mediated Rejections After Kidney Transplantation**

L. K. Seiler[1], R. Jonczyk[1], P. Lindner[1], L. Phung[1], C. Falk[2], C. Blume[1], *[1]Faculty of Natural Sciences, Institute of Technical Chemistry, Hannover, Germany, [2]Institute of Transplant Immunology, Medical School Hannover, Hannover, Germany*

550 **Novel Morphologic Biomarkers of Cardiac Allograft Remodeling are Associated with Multiple Peri- and Post-transplant Inflammatory Processes**

C. Yuan[1], S. Arabyarmohammadi[1], H. Li[1], E. Peyster[2], P. Lal[3], M. Feldman[3], K. Margulies[2], A. Madabhushi[1], *[1]Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH, [2]Cardiovascular Research Institute, University of Pennsylvania, Philadelphia, PA, [3]University of Pennsylvania, Philadelphia, PA*

LB 28 **Urinary Exosomal Cystatin C and Lipopolysaccharide Binding Protein as Biomarkers for Monitoring Antibody-mediated Rejection After Kidney Transplantation**

M. Kim, S. Lim, S. Shin, *Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, Republic of*

Biomarkers, Immune Assessment and Clinical Outcomes

624 **Cardiac Outcomes in Isolated Heart and Simultaneous Kidney and Heart Transplants in the US**

K. A. Agarwal[1], H. Patel[1], N. Agrawal[1], F. Cardarelli[1], N. Goyal[2], *[1]Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [2]Nephrology, Tufts Medical Center, Boston, MA*

625 **Nrf2 Assessment in Discarded Liver Allografts: A Role in Allograft Function and Salvage**

O. Ahmed, M. Xu, F. Zhou, A. N. Wein, G. Upadhya, Y. Lin, W. Chapman, *Surgery, Washington University School of Medicine, Saint Louis, MO*

626 **Biomarkers of Kidney Injury and Repair in Expanded-Criteria Deceased Donor Kidney Transplant Recipients: A Prospective Study**

A. Al Jurdi[1], O. Efe[1], B. Aoyama[2], M. Lima[2], H. Silva[2], I. Schmidt[3], S. Waikar[3], V. Sabbisetti[4], L. V. Riella[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Escola Paulista de Medicina, UNIFESP, São Paulo, Brazil, [3]Boston Medical Center, Boston, MA, [4]Brigham and Women's Hospital, Boston, MA*

627 **Remote Monitoring Using Mobile Phlebotomy and Donor-derived Cell-free DNA in Kidney Transplant Recipients During the Covid-19 Pandemic**

N. Ali[1], J. Miles[2], V. Tatapudi[1], R. Montgomery[1], *[1]NYU Langone, New York, NY, [2]Medical Science Liason, CareDx, Brisbane, CA*

628 **Longitudinal Variance of Donor Derived Cell Free DNA (dd-cf DNA) in Stable Kidney Transplant (Tx) Patients are Influenced by Donor/Recipient Variables**

S. Anand, F. Lopez-Verdugo, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*

629 **Longitudinal Surveillance, Relative Change Value (RCV) Improve Diagnostic Test Accuracy (DTA) of Donor-Derived Cell Free DNA (dd-cfDNA)**

S. Anand, F. Lopez-Verdugo, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*

630 **Evaluation of Meningococcal Vaccine Response Among Solid Organ Transplant Recipients Receiving Eculizumab**

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631 **Single Center Experience Comparing Two Clinically Available Donor Derived Cell Free DNA Tests**

S. Bunnapradist[1], S. Lee[2], P. Homkrailas[3], G. Danovitch[3], *[1]UCLA, Los Angeles, CA, [2]Pharmacy, David Geffen School of Medicine at UCLA, Los Angeles, CA, [3]David Geffen School of Medicine at UCLA, Los Angeles, CA*

632 **Comparative Proteomics Analysis Identifies the Biomarker of Ischemia-Reperfusion Injury During Liver Transplantation**

M. Chen[1], L. Xiaohong[2], H. Xitao[1], J. Weiqiang[1], *[1]Transplant Center, Sun Yat-sen University, Guangzhou, China, [2]Sun Yat-sen University, Guangzhou, China*

633 **Association of Immune Cell Markers with Adverse Outcomes in the First 6 Months Post-pediatric Heart Transplantation**

J. Chen[1], D. Salerno[2], H. Corbo[1], S. Shah[3], A. Rothkopf[4], I. D. Lytrivi[4], *[1]Department of Pharmacy, Columbia University Irving Medical Center, New York, NY, [2]Department of Pharmacy, Weill Cornell Medical Center, New York, NY, [3]College of Pharmacy and Health Sciences, St. John's University, Queens, NY, [4]Pediatric Cardiology, Columbia University Irving Medical Center, New York, NY*

634 **Impact of Deceased Donor Mode of Death and Kidney Donor Profile Index on Baseline Donor Derived Cell Free DNA in Kidney Transplant Recipients**

B. Chopra, A. Grazier, K. K. Sureshkumar, *Allegheny Health Network, Pittsburgh, PA*

635 **Gene Expression Profiles Assessed by the Nanostring nCounter® Platform May Differentiate Different Types of Rejection, and Importantly, T-Cell Mediated Rejection from BK Virus Nephropathy**

K. R. Degner[1], K. J. Swanson[1], S. Parajuli[1], D. Mandelbrot[1], N. Garg[1], F. Aziz[1], M. Mohamed[1], W. Zhong[1], L. Ptak[1], N. A. Wilson[1], R. Woodward[2], A. Djamali[1], *[1]University of Wisconsin, Madison, WI, [2]CareDx, Inc., San Francisco, CA*

636 **Combined Donor Derived Cell Free DNA (AlloSure) and Peripheral Immune Cell Gene Expression (AlloMap) Testing for the Diagnosis of Rejection in Kidney Transplant Recipients with De Novo Donor Specific Antibodies**

K. R. Degner, S. Parajuli, F. Aziz, N. Garg, D. Mandelbrot, M. Mohamed, K. Van Hyfte, S. R. Reese, N. A. Wilson, A. Djamali, *University of Wisconsin, Madison, WI*

637 **Renal Tubular-cell-specific Urinary Extracellular Vesicles: A Novel Biomarker for Diabetic Nephropathy After Kidney Transplantation**

N. Eguchi[1], H. Lau[1], F. Zaldivar[2], U. G. Reddy[3], E. Tantisattamo[3], A. Ferrey[3], D. Dafoe[1], H. Ichii[1], *[1]Surgery, University of California Irvine, Orange, CA, [2]Pediatric Execise and Genomics Research Center, University of California Irvine, Irvine, CA, [3]Medicine, University of California Irvine, Orange, CA*

638 **Should We Worry About Covid-19 Infection in Pediatric SOT?**

U. Ekong[1], S. Paul[1], S. Royal[2], J. Chahine[3], N. Yazigi[1], S. Kaufman[1], K. Khan[1], C. Matsumoto[1], A. Kroemer[1], T. Fishbein[1], *[1]Surgery, Medstar Georgetown Transplant Institute, Washington, DC, [2]Pediatrics, Medstar Georgetown University Hospital, Washington, DC, [3]Pathology and Laboratory Medicine, Medstar Georgetown University Hospital, Washington, DC*

639 **Urinary Exosome Mrna Signature for the Diagnosis of Human Kidney Transplant Rejection**

R. El Fekih[1], J. Hurley[2], V. Tadigotla[2], A. Alghamdi[3], A. Srivastava[4], C. Coticchia[2], J. Choi[1], H. Allos[5], k. yatim[5], J. Alhaddad[5], S. Eskandari[5], P. Chu[5], A. Mihali[5], I. Lape[5], M. Lima Filho[5], B. Ayoma[5], A. Chandraker[5], K. Safa[6], J. Markmann[6], L. Riella[6], R. Formica[7], J. Skog[2], J. Azzi[5], *[1]Medecine, Brigham and Women Hospital, Boston, MA, [2]Exosome Diagnostics, Boston, MA, [3]Boston Children Hospital, Boston, MA, [4]Center for Translational Metabolism and Health, Chicago, IL, [5]Transplantation Research Center, Boston, MA, [6]Massachusetts General Hospital, Boston, MA, [7]Yale School of Medicine, New Haven, CT*

640 **Intraoperative Fluid Management and Kidney Transplantation Outcomes: A Retrospective Review**

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641 **Real-time Donor-derived Cell-free Dna Kinetics Indicate Decreased "Molecular Injury" During Treatment of Acute Renal Allograft Rejection**

R. Hinojosa[1], K. M. Hitchman[2], D. J. Ross[3], R. C. Hall[1], J. E. Nelson[1], E. L. Kincaide[1], K. Klein[1], A. M. Bell[3], *[1]Pharmacotherapy Education and Research Center | Long School of Medicine, UT Health San Antonio | University Transplant Center, University Health, San Antonio, TX, [2]Long School of Medicine, UT Health San Antonio | University Transplant Center, University Health, San Antonio, TX, [3]CareDx, Inc., Brisbane, CA*

642 **The Impact of Maintenance Immunosuppression Withdrawal on Sensitization Status After Renal Graft Failure**

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643 **Outcomes of Novel Coronavirus 2019 in Solid Organ Transplant Recipients: Yet Again, Race and Payor Status Matters**

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644 **A Reliable Non Invasive Alternative to Surveillance Renal Allograft Biopsy**

R. Jain, S. Thaduri, V. Kumar, C. Kew, B. Julian, G. Towns, S. Ong, F. Ahmed, S. Mehta, G. Agarwal, *Transplant Nephrology, University of Alabama Birmingham, Birmingham, AL*

645 **Characteristics, Risk Factors, and Outcomes of Neutropenia for the First Year After Liver or Kidney Transplantation in Children**

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646 **Leukopenia in the Renal Transplant Population**

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648 **Incidence of Pancreatic Exocrine Insufficiency in Patients Undergoing Liver Transplantation**

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649 **De Novo Donor Specific Antibodies After Heart Transplantation in Fontan Patients with Protein Losing Enteropathy**

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650 **Brain Natriuretic Peptide and Pedometer Activity are Most Predictive of Poor Kidney Transplant Waitlist Outcomes**

P. Manay[1], P. TenEyck[2], R. Kalil[3], M. Sanders[4], M. Swee[4], G. Binns[5], J. Hornikel[5], D. Katz[1], *[1]Department of Surgery, University of Iowa, Iowa City, IA, [2]Institute for Clinical and Translational Science, University of Iowa, Iowa City, IA, [3]Department of Medicine, University of Maryland Medical Center, Baltimore, MD, [4]Department of Medicine, University of Iowa, Iowa City, IA, [5]Iowa City VAMC, Iowa City, IA*

651 **The Assesment of Pre-transplant Donor-reactive IL-21 Producing T Cells as a Tool to Identify Patients at Risk for Acute Rejection**

A. Mendoza Rojas[1], T. van Gelder[2], R. de Kuiper[1], D. Reijerkerk[1], M. C. Clahsen-van Groningen[3], D. A. Hesselink[1], C. C. Baan[1], N. M. van Besouw[1], *[1]Internal Medicine, Neprology & Transplantation, Erasmus Medical Center, Rotterdam, Netherlands, [2]Department of Clinical Pharmacy & Toxicology, Leiden University Medical Center, Leiden, Netherlands, [3]Internal Medicine, Pathology, Erasmus Medical Center, Rotterdam, Netherlands*

652 **Immunosuppression is Not Associated with High-risk Immunologic Parameters in Transplant Recipients with the Sars-cov2 Virus**

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653 **Endothelial Glycocalyx Shedding is Associated with Graft Quality During Ex Vivo Lung Perfusion**

K. Noda, B. J. Philips, T. Harano, J. D. Luketich, P. G. Sanchez, *Department of Cardiothoracic Surgery, University of Pittsburgh, Pittsburgh, PA*

654 **Hla-dq Epitope Mismatch Predicts De Novo Donor-Specific Antibody Formation and Acute Cellular Rejection After Living Donor Liver Transplantation**

K. Ono, K. Ide, Y. Tanaka, M. Ohira, H. Tahara, N. Tanimine, S. Akimoto, Y. Imaoka, K. Sato, H. Yamane, N. Tsukiyama, R. Ide, T. Mochizuki, H. Ohdan, *Department of Gastroenterological and Transplant Surgery, Graduate School of Biomedical and Health S, Hiroshima University, Hiroshima City, Japan*

655 **Dietary Intake and Mycophenolate Mofetil-related Diarrhea Following Kidney Transplantation**

G. Onyeaghala[1], L. Teigen[2], B. Guo[2], Y. Doronin[1], M. Al-Kofahi[2], B. Wu[2], W. Guan[2], C. Staley[2], S. Riad[2], A. Matas[2], R. Remmel[2], W. Oetting[2], C. Dorr[1], P. Jacobson[2], A. Israni[1], *[1]Nephrology, Hennepin Healthcare Research Institute, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN*

656 **Comparison of Donor-derived Cell Free Dna Between Recipients with First Solitary Allograft and Regrafts**

S. Paluri[1], S. Muthusamy[1], M. Shinbashi[1], G. Gupta[1], B. Dale[2], Z. Kashi[3], P. Halloran[4], D. Kumar[1], *[1]Virginia Commonwealth University, Richmond, VA, [2]CareDx, Brisbane, CA, [3]Kashi Clinical Laboratories, Portland, OR, [4]ATAGC, Edmonton, AB, Canada*

657 **Dysregulation of Immune Cell Glycolysis and Oxidative Phosphorylation Correlates with Development of Pre-liver Transplant Immune Dysfunction and Post-transplant Mortality**

G. Panayotova[1], L. Jin[1], A. Lemenze[1], S. Simonishvili[1], Y. Qin[1], L. Minze[2], G. Dikdan[1], F. Paterno[1], X. C. Li[2], M. Ghobrial[2], J. V. Guarrera[1], K. E. Lunsford[1], *[1]Transplant Surgery, Rutgers NJMS, Newark, NJ, [2]Transplant Surgery, Houston Methodist Hospital, Houston, TX*

658 **Kidney Graft Biopsy for Indication Proteinuria: Finding, and Outcomes**

S. Parajuli, K. Swanson, J. Alstott, F. Aziz, N. Garg, W. Zhong, A. Djamali, D. Mandelbrot, *University of Wisconsin, Madison, WI*

659 **Initial Experience with Trugraf™ Gene Expression Profile and Trac™ Dd-cfdna Testing in Kidney Transplant Recipients Suggests Synergy and Enhanced Management within the First Year Post-transplant and Beyond**

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660 **Blood Gene Expression and Donor-derived Cell Free DNA for Diagnosing Subclinical Acute Rejection in Stable Kidney Transplant Recipients**

S. Park[1], K. Guo[2], H. Raymond[3], E. Poggio[4], D. Taber[5], C. Marsh[6], S. Kurian[7], S. Kleiboeker[8], J. Weems[8], J. Holman[9], L. Zhao[2], R. Sinha[8], S. Brietigam[2], C. Rebello[2], M. Abecassis[10], J. Friedewald[1], *[1]Transplant Nephrology, Northwestern University, Chicago, IL, [2]Feinberg School of Medicine, Northwestern University, Chicago, IL, [3]Mayo Clinic College of Medicine and Science, Phoenix, AZ, [4]Department of Nephrology and Hypertension, Cleveland Clinic, Cleveland, OH, [5]Division of Transplant Surgery, Medical University of South Carolina, Charleston, SC, [6]Department of Medicine and Surgery, Scripps Clinic and Green Hospital, La Jolla, CA, [7]Scripps Health, La Jolla, CA, [8]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [9]Transplant Genomics, Inc, Mansfield, MA, [10]University of Arizona College of Medicine, Tucson, AZ*

661 **Immunosuppression Impacts Panel Reactive Antibody Status in Second Solid Organ Transplant Recipients - A Single Center Experience**

J. Patel[1], S. Ali[2], M. L. Sanders[1], C. P. Thomas[1], D. Axelrod[1], M. Bilal[3], E. H. Field[3], S. Kuppachi[1], *[1]University of Iowa Hospitals & Clinics, Iowa city, IA, [2]Louis A. Johnson VA Medical Center, Clarksburg, WV, [3]Iowa City VA Health Care System, Iowa city, IA*

662 **Continuation of Immunosuppression After the First Renal Allograft Failure Impacts Panel Reactive Antibody Status During Subsequent Renal Transplantation**

J. Patel[1], S. Ali[2], M. L. Sanders[3], C. P. Thomas[3], D. Axelrod[3], M. Bilal[4], E. H. Field[4], S. Kuppachi[3], *[1]University of Iowa Hospitals & Clinics, Iowa CIty, IA, [2]Louis A. Johnson VA Medical Center, Clarksburg, WV, [3]University of Iowa Hospitals & Clinics, Iowa City, IA, [4]Iowa City VA Health Care System, Iowa City, IA*

663 **Donor-Derived Cell-Free DNA Performance Characteristics are Similar for Repeat and Primary Kidney Transplant Recipients**

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664 **The Role of the B2 Microglobulin Trend in Patients with Delayed Graft Function After Kidney Transplant**

A. Perez-Gutierrez, P. J. Bachul, B. Juengel, P. Witkowski, D. DiSabato, R. Barth, J. Fung, Y. Becker, *Surgery, University of Chicago, Chicago, IL*

665 **Does the Timing of Subclinical Acute Rejection After Kidney Transplant Matter?**

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666 **GENiE in a Bottle - Renasight Testing in the Kidney Transplant Setting - A Single Center Experience**

Y. A. Qazi[1], W. Mon[1], N. Ioannou[2], M. Smogorzewski[1], *[1]Keck Medical Center at USC, Los Angeles, CA, [2]Natera, San Carlos, CA*

667 **Role of Trugraf Testing in Kidney Allografts Previously Biopsied for Dysfunction**

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668 **Tru and Sure -A Tale of Two Cities! Can Allosure Predict and Enhance Trugraf Results?**

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669 **Core Signature of Rejection-Specific Cytokines and Chemokines in Heart Biopsies After Transplantation**

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670 **Analysis of Single Cell RNA Sequencing Data to Define Biomarkers of Human Liver Immune Tolerance**

B. Rocque[1], A. Barbetta[1], P. Singh[1], C. Goldbeck[1], D. G. Helou[2], E. Loh[3], N. Ung[4], J. S. Lee[4], O. Akbari[2], J. Emamaullee[1], *[1]Surgery, University of Southern California Keck School of Medicine, Los Angeles, CA, [2]Molecular Microbiology and Immunology, University of Southern California, Los Angeles, CA, [3]Norris Medical Library, University of Southern California Keck School of Medicine, Los Angeles, CA, [4]Ellison Institute, University of Southern California, Los Angeles, CA*

671 **Kidney Injury in Hematopoietic Cell Transplant (HCT) Recipients: Urinary Biomarkers to the Rescue**

T. Salinas[1], C. Snopkowski[1], C. Li[1], K. Chen[1], M. Lubetzky[1], S. Salvatore[1], K. Van Besien[1], E. Jaimes[2], S. Hingorani[3], S. Seshan[1], T. Muthukumar[1], *[1]NY Presbyterian- Weill Cornell Medical College, New York, NY, [2]Memorial Sloan Kettering Cancer Center, New York, NY, [3]University of Washington School of Medicine, Seattle, WA*

672 **Nonadherence Post-kidney Transplant is Associated with Increased Immune Activation Detected by Peripheral Blood Gene Expression Assay**

N. Singh[1], A. Palermini[1], M. S. Naseer[1], T. Le[1], S. Tandukar[1], D. Aultman[2], H. Shokouh-Amiri[2], G. Zibari[2], *[1]Transplant, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [2]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA*

673 **Trugraf Gene Expression Testing Can Discriminate Rejection in the Setting of Acute Kidney Injury**

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675 **Analysis of the Difference of the Monitoring Results of Tcr High Variable Area in Renal Transplant Recipients After Treatment with Different Immune Induction Schemes**

P. Tian, F. Han, M. Dou, B. Zheng, G. Deng, X. Ding, W. Xue, *The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China*

676 **Donor Derived Cell-free-dna (dd-cfdna) as a Surrogate Marker for Kidney Biopsy- Indiana University Transplant Nephrology Experience**

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677 **Evaluation of Serum Klotho Levels at Early Kidney Post-Transplant**

T. Vazquez-Sanchez[1], J. Alonso-Titos[1], M. Sánchez-Niño[2], E. Sola[1], M. Leon[3], V. Lopez[1], P. Ruiz-Esteban[1], E. Porrini[4], A. Ortiz[5], D. Hernández[1], *[1]Nephrology, Instituto de Investigación Biomédica de Málaga (IBIMA). Hospital Universitario Regional de Málaga and University of Málaga. REDinREN (RD16/0009/0006). Málaga. (Spain), Malaga, Spain, [2]Nephrology, Instituto de Investigación-Sanitaria de la FundaciónJiménez Díaz,UniversidadAutónoma de Madrid. REDINREN, Madrid, Spain, [3]Pathology, Instituto de Investigación Biomédica de Málaga (IBIMA). Hospital Universitario Regional de Málaga and University of Málaga. REDinREN (RD16/0009/0006). Málaga. (Spain), Malaga, Spain, [4]Nephrology, Hospital Universitario de Canarias, CIBICAN, Universidadde laLaguna, REDinREN (RD16/0009/0031) Tenerife e Instituto Reina Sofía de Investigación Renal (IRSIN), Malaga, Spain, [5]Nephrology, Instituto de Investigación-Sanitaria de la FundaciónJiménez Díaz,UniversidadAutónoma de Madrid. REDINREN, Malaga, Spain*

678 **Is Subclinical Allograft Rejection by 2019 Banff Criteria Associated with Worse Kidney Allograft Outcomes? Comparison Between 2007 and 2019 Banff Criteria**

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679 **Long-term Outcomes of Early Steroid Withdrawal (SW) After Kidney Transplant**

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680 **Identification and Validation of a Prognostic Index for Renal Allograft Survival Based on the Geo Database**

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681 **Nomogram of Quantity of Peripheral $Cxcr5^{+}Cd8^{+}$ T Cells, Aims to Predict Risk of De Novo Dsa in First-time Kidney Transplant Recipients**

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LB 29 **Torque Teno Virus Load Predicts Allograft Rejection but Not Viral Infection After Kidney Transplantation; A Cohort Joint Modelling Study**

A. L. van Rijn[1], H. F. Wunderink[2], I. A. Sidorov[1], C. S. de Brouwer[1], A. C. Kroes[1], H. Putter[3], A. P. de Vries[4], J. I. Rotmans[4], M. C. Feltkamp[1], *[1]Medical Microbiology, Leiden University Medical Center, Leiden, Netherlands, [2]Medical Microbiology, University Medical Center Utrecht, Utrecht, Netherlands, [3]Medical Statistics, Leiden University Medical Center, Leiden, Netherlands, [4]Internal Medicine, Leiden University Medical Center, Leiden, Netherlands*

LB 30 **Cellular and Genetic Signatures of Operational Tolerance in Kidney Transplant Recipients Through Single Cell R N A Sequencing Analysis**

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LB 31 **Estimated GFR by Serum Myo-inositol, Valine, Creatinine, and Cystatin-c Outperforms Current CKD-epi Equations in Renal Transplant Recipients**

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LB 32 **AlloMap Kidney Gene Expression Profiling Discriminates Rejection from Immuno-Quiescence in Renal Transplant Recipients**

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LB 33 **Precision Medicine in Renal Transplantation: T-cell Repertoire Sequencing to Define Donor-specific Clones for Post-transplant Monitoring**

K. R. Sherwood[1], P. Wong[1], F. Fenninger[1], V. Wu[1], J. Beckrud[2], D. P. Cina[3], L. Allan[2], J. Lan[2], P. A. Keown[2], *[1]University of British Columbia, Vancouver, BC, Canada, [2]Vancouver General Hospital, Vancouver, BC, Canada, [3]Urologic Sciences, Vancouver General Hospital, Vancouver, BC, Canada*

Cellular Therapies, Tissue Engineering/ Regenerative Medicine

527 **Transgenic Beta-cell Cxcl12 Expression and Stem Cell Mobilization Synergize to Suppress Type 1 Diabetes**

D. A. Alagpulinsa, A. Jajoo, M. H. Chapin II, M. C. Poznansky, *Vaccine & Immunotherapy Center, Massachusetts General Hospital and Harvard Medical School, Boston, MA*

528 **Versatile Strategy to Enhance Nanomedicine Delivery to Graft Endothelial Cells**

C. Albert[1], L. G. Bracaglia[1], A. Koide[2], J. DiRito[1], T. Lysyy[1], C. Edwards[1], J. T. Langford[1], D. Haakinson[1], S. A. Hosgood[3], M. L. Nicholson[3], J. S. Pober[1], W. M. Saltzman[1], S. Kiode[2], G. Tietjen[1], *[1]Yale University, new haven, CT, [2]Perlmutter Cancer Center, New York University, Langone Medical Center, New York, NY, [3]University of Cambridge, Cambridge, United Kingdom*

529 **Single Cell RNA Sequencing Reveals a Global Increase in Inflammatory Gene Signature Following Normothermic Ex Vivo Liver Perfusion**

K. Carlson, J. Pavan-Guimaraes, B. Verhoven, J. Verhagen, F. Najmabadi, D. P. Al-Adra, *Surgery, University of Wisconsin, Madison, WI*

530 **Patterns and Inhibition of Cell Death During Static Cold Storage of Human Kidneys**

J. R. DiRito[1], G. Chickering[2], J. T. Langford[1], D. Stern[1], S. Hosgood[3], M. L. Nicholson[3], E. Gavathiotis[4], R. N. Kitsis[5], M. Saltzman[2], J. S. Pober[6], G. T. Tietjen[7], *[1]Surgery, Yale School of Medicine, New Haven, CT, [2]Biomedical Engineering, Yale University, New Haven, CT, [3]Surgery, University of Cambridge, Cambridge, United Kingdom, [4]Biochemistry and Medicine, Wilf Family Cardiovascular Research Institute, Albert Einstein College of Medicine, Bronx, NY, [5]Surgery, Albert Einstein College of Medicine, Bronx, NY, [6]Immunobiology, Yale University, New Haven, CT, [7]Surgery and Biomedical Engineering, Yale School of Medicine, New Haven, CT*

531 **Ectopic Hepatocyte Transplantation Into the Lymph Nodes in a Fully Mismatched Allogeneic Dog Model Using Tacrolimus and Prednisone**

P. A. Fontes, *NA, LyGenesis, Pittsburgh, PA*

533 **The Hepatoprotective Role of Innate Lymphoid Cells in Liver Transplantation**

H. Kojima, H. Hirao, H. Zhang, K. Kadono, K. J. Dery, Y. Zhai, J. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

534 **Pathways and Factors That Confer Therapeutic Properties of Adipose Derived Regenerative Cells in Reducing Ischaemia Reperfusion Injury in Kidney Transplantation**
R. Lathan, P. Mark, M. Clancy, R. Touyz, *Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, United Kingdom*

535 **Lacripep™-like Peptide N-104 Promotes Beta Cell Proliferation in Murine Pancreatic Islets**
M. Ma, P. Chhabra, K. Fread, K. Dias Teixeira, G. Laurie, K. Brayman, *University of Virginia Health System, Charlottesville, VA*

537 **Platelets Stimulate Liver Regeneration After Partial Liver Transplantation**
K. Takahashi, C. Liang, K. Furuya, T. Oda, *GI and HBP Surgery, University of Tsukuba, Tsukuba, Japan*

538 **The Tumor-suppressor Signaling of the α1-na/k-atpase- Cav-1-src Complex at the Caveola in Nash Related Hepatocellular Carcinoma**
U. S. Udoh[1], J. D. Sanabria[1], M. Banerjee[1], P. K. Rajan[1], M. Schade[1], J. A. Sanabria[1], A. Mallick[1], G. Smith[1], G. U. Udoh[2], K. Sodhi[1], S. Pierre[2], Z. Xie[2], J. Shapiro[2], J. Sanabria[1], *[1]Dept. of Surgery/ Marshall Institute for Interdisciplinary Research, Marshall University, Huntington,, WV, [2]Marshall Institute for Interdisciplinary Research, Marshall University, Huntington,, WV*

539 **Human Liver-derived Mesenchymal Stromal Cells (MSC) are Superior Inhibitors of Natural Killer Cells Compared to Bone Marrow or Adipose Tissue-derived MSC**
F. Yigitbilek, M. J. Hansen, W. D. Park, M. D. Stegall, T. Taner, *Mayo Clinic, Rochester, MN*

Endothelial Cell Biology

540 **Src Kinase Inhibitor Pp1 Blunts Tgf-β1 Dependent Endothelial-to-Mesenchymal Transition to Alleviate Allograft Kidney Fibrosis Through Orchestrating β-catenin Signaling**
Z. Gui, Z. Wang, Z. Han, J. Tao, X. Ju, R. Tan, M. Gu, *Urology, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

541 **Extracellular Vesicles from Patients with Diabetic Nephropathy Induce Endothelial Dysfunction Through Icam-1 and Vcam-1 in an In Vitro Model**
E. Montagud-Marrahi[1], S. Torramadé-Moix[2], M. Ramirez-Bajo[3], J. Rovira[3], E. Bañón-Maneus[3], E. Hermida[1], F. Diekmann[1], M. Palomo[4], M. Díaz-Ricart[2], P. Ventura-Aguiar[1], *[1]Nephrology and Kidney Transplantation Department, Hospital Clínic de Barcelona, Barcelona, Spain, [2]Hematopathology Department, Hospital Clínic de Barcelona, Barcelona, Spain, [3]Nephrology and Transplant Experimental Laboratory (LENIT), Hospital Clínic de Barcelona, Barcelona, Spain, [4]Josep Carreras Leukaemia Research Institute, Hospital Clínic de Barcelona, Barcelona, Spain*

542 **HLA I Antibody-Activated Endothelium Polarized M2-Like Macrophages with Increased Efferocytic and Phagocytic Capacity**
J. Nevarez-Mejia[1], X. Wei[1], N. M. Valenzuela[1], M. Rossetti[1], H. Pickering[1], G. A. Fishbein[1], A. Mulder[2], E. F. Reed[1], *[1]Pathology and Laboratory Medicine, UCLA, Los Angeles, CA, [2]Immunohematology and Blood Transfusion, LUMC, Leiden, Netherlands*

543 **IFNγ, and to a Lesser Extent TNFα, Elicits Protracted Endothelial Cell Expression of Costimulatory Molecules and Antigen Presentation Machinery**
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Histocompatibility and Immunogenetics

579 Anti-HLA-DP Antibodies Positive - A Retrospective Review of Outcomes in Renal Transplantation- Single Centre Experience

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580 Disparities in HLA Representation by Single Antigen Reagents in Different Ethnic Populations

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581 HLA Mismatching and Subclinical Inflammation: An Association to be Considered in Kidney Transplant Patients with Low Immunological Risk

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582 The Co-Occurrence of Newly Developed HLA Donor Specific Antibody and Positive C3d/C4d Profiles Along with Immune Therapy Non-Compliance in Pediatric Heart Transplant Recipients is a High Risk Indicator for Patient Mortality

A. Zhang, C. Nasman, J. Allen, Y. Sun, D. Thomas, R. Rodriguez, C. Tan, G. Boyle, *Cleveland Clinic Foundation Transplant Center, Cleveland, OH*

Immunosuppression Preclinical Studies

583 Transforming Growth Factor-Beta Induced Myeloid-Derived Suppressor Cells Promote Transplant Immune Tolerance

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Innate Immunity; Chemokines, Cytokines, Complement

551 Adjuvant Treatment Shapes the Bone Marrow Myeloid Compartment Towards an Immunosuppressive Phenotype That Can Suppress Allograft Rejection

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552 Donor Kidney-Resident Macrophages Promote Allograft Inflammation and CD8 T Cell Response Post-Transplantation

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553 Portal Hypertension Abrogates Trail Expression of Liver Resident Nk Cells via Il-33

Y. Imaoka, M. Ohira, K. Sato, H. Ohdan, *Hiroshima Uni., Hiroshima, Japan*

554 **Taurodeoxycholic Acid and L-valine Ameliorate Macrophage Driven Alloimmunity in Obese Transplant Recipients**
M. Quante[1], J. Iske[1], D. Perkins[2], M. Alegre[3], H. Zhou[1], A. Elkhal[1], S. G. Tullius[1], *[1]Department of Surgery, Brigham and Women's Hospital, Boston, MA, [2]University of Illinois at Chicago, Chicago, IL, [3]Department of Medicine, The University of Chicago, Chicago, IL*

555 **Recipient Neutrophils Producing Myeloperoxidase Provoke Nk Cell and Monocyte/macrophage Activation During Acute Antibody-mediated Rejection of Kidney Allografts**
D. Ueda, S. Miyairi, K. Keslar, W. M. Baldwin, R. L. Fairchild, *Lerner Research Institute, Cleveland Clinic, Cleveland, OH*

LB 34 **CHBP Induces Stronger Immunosuppressive CD127^{+} M-MDSC via Erythropoietin Receptor**
C. Yang, *Urology, Zhongshan Hospital, Fudan University, Shanghai, China*

LB 35 **Influence of Immunosuppressive Drug Trough Levels on Nk Cells in Liver Transplantation**
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LB 36 **Naïve Rhesus Monkey CD4^{+}CD8^{lo}T Cells Comprise High Percentage of Memory T Cells with Strong Effector Function**
M. Kubo, K. Sasaki, A. P. Gutiérrez, L. Lu, V. Vujevich, A. W. Thomson, M. Ezzelarab, *Department of Surgery, University of Pittsburgh, PITTSBURGH, PA*

Ischemia Reperfusion & Organ Rehabilition

595 **MiRNA as Regulator of Cell Death and Inflammatory Response in Hepatic Iri**
E. Bardhi[1], T. Rousselle[1], J. McDaniels[1], S. Bontha[1], J. Eason[2], D. Maluf[1], V. Mas[3], *[1]Surgery, University of Maryland, Baltimore, MD, [2]Surgery, James D Eason Transplant Institute, Memphis, TN, [3]Surgery, University of Maryland - Division of Surgical Science, Baltimore, MD*

596 **Spleen Tyrosine Kinase (syk): A Novel Regulator of Neutrophil Infiltration in Hepatic Iri**
V. Boominathan, A. Kobayashi, S. Duarte, A. Zarrinpar, *Surgery, University of Florida, Gainesville, FL*

597 **Sampling Renal Biopsies in Pre-Clinical Research for Comprehensive Assessment**
C. M. Edwards[1], C. Albert[2], D. Stern[1], J. Langford[1], W. Day[2], J. R. DiRito[1], W. M. Saltzman[2], M. Kashgarian[3], J. S. Pober[4], G. T. Tietjen[1], *[1]Surgery, Yale School of Medicine, New Haven, CT, [2]Biomedical Engineering, Yale School of Medicine, New Haven, CT, [3]Pathology, Yale School of Medicine, New Haven, CT, [4]Immunobiology, Yale School of Medicine, New Haven, CT*

598 **Indocyanine Green Fluorescence Imaging Allows Quantification of Ischemic Injury During Porcine Normothermic Ex Situ Perfusion**
T. Goto, Y. Noguchi, S. Ganesh, L. Mazilescu, T. Reichman, N. Selzner, M. Selzner, *Ajmera Transplant Program, Department of Surgery, Toronto General Hospital, Toronto, ON, Canada*

599 **The Harmful Effect of Retained Peripheral Cells During Flushing and Static Cold Storage in Rat Liver Normothermic Machine Perfusion**
O. Haque[1], C. A. Pendexter[2], J. F. Markmann[2], K. Uygun[2], H. Yeh[2], S. N. Tessier[2], *[1]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

600 **Thrombolytic Therapy During Ex-Vivo Normothermic Machine Perfusion of Human Livers Reduces Peribiliary Vascular Plexus Injury**

O. Haque[1], S. Raigani[2], I. Rosales[2], C. Carroll[2], T. M. Coe[2], S. Baptista[2], H. Yeh[2], K. Uygun[2], J. F. Markmann[2], *[1]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

601 **Sigma-1 Receptor Agonists are Renoprotective in Experimental Kidney Transplantation**

A. Hosszu[1], T. Lakat[1], A. Toth[1], D. Balogh[1], J. Hodrea[1], L. J. Wagner[2], A. J. Szabo[1], A. Fekete[1], *[1]1st Department of Pediatrics, Semmelweis University, Budapest, Hungary, [2]Department of Transplantation and Surgery, Semmelweis University, Budapest, Hungary*

602 **An Immune-modulatory Strategy to Mitigate Hepatic Ischemia/reperfusion Injury in a Murine Model**

A. Kobayashi, A. Wanchoo, S. Farhadi, J. Simonovich, S. Duarte, V. Boominathan, S. Shrestha, G. Hudalla, B. G. Keselowsky, A. Zarrinpar, *University of Florida, Gainesville, FL*

603 **Nanodiamond-doxorubicin Complexes Improve Hepatic Ischemia/reperfusion Injury**

A. Kobayashi, C. Grady, S. Duarte, V. Boominathan, S. Shrestha, A. Zarrinpar, *Surgery, University of Florida, Gainesville, FL*

604 **Hepatic Ferroptosis in Cold Stress and Warm Ischemia-reperfusion: A Novel Therapeutic Target in Liver Transplantation**

H. Kojima[1], H. Hirao[1], K. Kadono[1], T. Ito[1], K. J. Dery[1], S. Kageyama[2], K. Nakamura[3], F. M. Kaldas[1], D. G. Farmer[1], J. W. Kupiec-Weglinski[1], *[1]UCLA Medical Center, Los Angeles, CA, [2]Kyoto University, Kyoto, Japan, [3]Nishi-Kobe Medical Center, Kyoto, Japan*

605 **Augmented Responses of Donor Kidney Tubular Cells to TLR Signaling Correlate with Ameliorated Ischemia/reperfusion Injury and Long-term Allograft Protection**

X. Lai[1], J. Wang[1], L. Qiu[2], S. Han[1], K. Shen[1], Z. Zhang[1], *[1]Comprehensive Transplant Center, Microsurgery core, Northwestern University, Chicago, IL, [2]University of California, San Francisco, San Francisco, CA*

606 **Caspase-3 is a Predominant Regulator of Microvascular Dysfunction and Aki-ckd Transition Post Renal Ischemia-reperfusion Injury**

S. Lan, F. Migneault, J. Turgeon, M. Bourgault, M. Dieudé, N. Patey, H. Cardinal, M. Hébert, *CRCHUM, University of Montreal, Montreal, QC, Canada*

607 **Combining Oxygenated Cold Perfusion with Normothermic Ex-vivo Perfusion Improves the Outcome of DCD Porcine Kidney Transplantation**

L. I. Mazilescu[1], T. Goto[1], R. Rosales[1], Y. Noguchi[1], P. Urbanellis[1], L. A. Robinson[2], M. Selzner[1], *[1]Ajmera Transplant Program, Toronto General Hospital, Toronto, ON, Canada, [2]Department of Nephrology, The Hospital for Sick Children, Toronto, ON, Canada*

608 **Tubastatin-a Mediated Protection from Liver Injury is Preserved in a Lymphocyte Deficient Model**

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609 **Effect of Defibrotide on Kidney Ischemia Reperfusion Injury in a Preclinical Renal Transplant Model**

P. Pine[1], Z. Sun[2], A. Matas[3], J. Shi[1], A. Ebrahimnejad[1], M. Zanette[4], P. Halloran[5], J. S. Bromberg[6], R. Hanvesakul[7], *[1]Jazz Pharmaceuticals, Palo Alto, CA, [2]Johns Hopkins Medicine, Baltimore, MD, [3]Univ of Minnesota, Minneapolis, MN, [4]Jazz Pharmaceuticals, Philadelphia, PA, [5]Univ of Alberta, Edmonton, AB, Canada, [6]Univ of Maryland School of Medicine, Baltimore, MD, [7]Jazz Pharmaceuticals, Oxford, United Kingdom*

610 **Composition of Ex Vivo Lung Perfusion Solutions and Kinetics Define Differential Cytokine and Chemokine Secretion in a Porcine Cardiac Arrest Model of Lung Preservation**

L. M. Radomsky[1], A. Koch[2], C. Olbertz[2], J. F. Kuehne[1], Y. Liu[2], J. Keil[1], K. Beushausen[1], U. Rauen[3], C. S. Falk[1], M. Kamler[2], *[1]Institute of Transplant Immunology, Hannover Medical School, Hannover, Germany, [2]Thoracic Transplantation, Department of Thoracic and Cardiovascular Surgery, University Hospital Essen, Essen, Germany, [3]Institute of Physiological Chemistry, University Hospital Essen, Essen, Germany*

611 **Inhibition of Apoptosis During Ex Situ Liver Normothermic Machine Perfusion Decreases Reperfusion Injury and Improves Viability**

S. Raigani[1], S. Baptista[1], A. Ohman[2], J. Santiago[2], I. Rosales[1], M. Heaney[2], J. Boylan[2], T. Coe[1], K. Uygun[1], J. Sanders[2], H. Yeh[1], *[1]Transplant Surgery, Massachusetts General Hospital, Boston, MA, [2]Pediatric Endocrinology, Brown University, Providence, RI*

612 **The Contribution of Disulfide-hmgb1 Released During Ischemia-reperfusion Injury to Pro-inflammatory Macrophage Polarization Following Liver Transplantation**

A. Q. Terry, R. A. Sosa, M. Rossetti, J. Nevarez-Mejia, B. V. Naini, F. Kaldas, V. Groysberg, S. Younan, R. Busuttil, D. W. Gjertson, J. W. Kupiec-Weglinski, E. Reed, *Pathology and Lab Medicine, UCLA, Los Angeles, CA*

613 **Myeloid YAP-HSF1 Signaling Inhibits NLRP3 Function and RIPK3-mediated Hepatocyte Necroptosis in Liver Ischemia and Reperfusion Injury**

Y. Tian, D. Xu, M. Sheng, Y. Zhan, Y. Lin, C. Li, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, *Surgery, Dumont - UCLA Transplant Ctr, Los Angeles, CA*

614 **Single-cell Rna Sequencing of Latent Murine Cytomegalovirus Infected Lung Transplants**

L. A. VanOsdol[1], S. Han[1], M. Kandpul[2], J. J. Wang[1], L. Qiu[3], Z. J. Zhang[1], *[1]Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]Department of Surgery, Northwestern University, Chicago, IL, [3]School of Medicine, University of California, San Fransisco, San Fransisco, CA*

615 **Galectin-3 Blockade Can Decrease Reperfusion Injury in Response to Ischemia in a Rat Hind Limb Transplant Model**

Z. Wang[1], Y. Wang[1], D. Yoeli[1], B. Li[1], A. Su[1], D. Mathes[1], K. Washington[1], E. Farkash[2], C. A. Huang[1], *[1]University of Colorado, Aurora, CO, [2]University of Michigan, Ann Arbor, Ann Arbor, MI*

616 **Mitochondrial Transplant Minimizes Liver Ischemia Reperfusion Injury in Lean and Obese Mice**

C. Watkins[1], G. Lamanilao[1], C. Kuscu[1], C. Kuscu[1], J. F. Pierre[2], J. Eason[1], A. Bajwa[1], *[1]Transplant Research Institute, James D. Eason Transplant Institute, Department of Surgery, The University of Tennessee Health Science Center, Memphis, TN, [2]Department of Pediatrics - Divisions of Neonatology and Pediatric Obesity, The University of Tennessee Health Science Center, Memphis, TN*

617 **Characterization of Kidney Small Extracellular Vesicles Released During Normothermic Machine Perfusion**

W. W. Woud[1], A. Arykbaeva[2], D. de Vries[2], I. Alwayn[2], K. Boer[1], C. Baan[1], M. Hoogduijn[1], R. Minnee[3], *[1]Internal Medicine, Nephorology and Transplantation, Erasmus MC, Rotterdam, Netherlands, [2]Department of Surgery, LUMC, Leiden, Netherlands, [3]Department of Surgery, Division of Hepato-Pancreato-Biliary and Transplant Surgery, Erasmus MC, Rotterdam, Netherlands*

618 **Myeloid Yap Signaling is Required for Hepatic Cytoprotection in Liver Ischemia-reperfusion Injury**

B. Yang[1], Z. Xue[1], C. Zhang[2], Y. Zhang[2], Y. Liu[2], J. Kupiec-Weglinski[1], H. Ji[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]Dept of Surgery, Zhejiang University, Hangzhou, China*

619 **The Inflammatory Response in the Context of Tissue Injury: Roles of Tyro3, Axl, and Mer (TAM) Receptor Tyrosine Kinases in Liver Ischemia/ reperfusion Injury**
J. Zhang[1], H. Zhang[1], M. Ni[2], R. Busuttil[1], J. Kupiec-Weglinski[1], Y. Zhai[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]Liver Suyrgery, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

620 **Glycogen Synthase Kinase 3 Beta Regulates Distinctive Macrophage Subsets in the Activation and Resolution of Liver Ischemia Reperfusion Injury**
H. Zhang[1], M. Ni[2], J. Zhang[1], H. Wang[2], R. Busuttil[1], J. Kupiec-Weglinski[1], Y. Zhai[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

621 **Normothermic-Hyperthermic Machine Perfusion Could Increase Response to Pharmacological Intervention in Mitigation of Liver Steatosis**
F. Zhou, M. Xu, G. A. Upadhya, Y. Lin, W. C. Chapman, *Surgery, Washington University in St. Louis, St. Louis, MO*

LB 38 **Identification and Comprehensive Validation of Prognostic Genes After Ischemic and Reperfusion Injury Across Different Donor Types in Renal Transplantation**
D. Zhang, Y. Wang, Y. Wang, X. Hu, *Department of Urology, Beijing Chao-Yang Hospital, Capital Medical University, Beijing, China*

Islet Cell and Cell Transplantation

584 **Islet Isograft Transplantation Improves Insulin Sensitivity in a Murine Model of Type 2 Diabetes**
S. Lim, M. Choi, M. Kim, Y. Wee, H. Kwon, C. Jung, Y. Kim, D. Han, S. Shin, *Asan Medical Center, Seoul, Songpa, Korea, Republic of*

585 **Lacripep™-like Peptide N-104 Increases Insulin Secretion and Promotes Islet Transplantation Outcomes**
M. Ma, P. Chhabra, K. Dias Teixeira, G. Laurie, K. Brayman, *University of Virginia Health System, Charlottesville, VA*

586 **A Small Molecule Inhibitor of Toll-like Receptor-4 TAK-242 Attenuates IBMIR Against Human Islets**
J. Mattke[1], S. Vasu[1], K. Kumano[1], Y. Liu[1], C. M. Darden[1], M. C. Lawrence[1], R. R. Kane[2], B. Naziruddin[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Baylor University, Waco, TX*

587 **Bone Marrow-Derived Mesenchymal Stem Cells Improve Rat Islet Graft Revascularization by Upregulating Isl1**
W. Ying, J. Wang, X. Ding, *Kidney Transplantation, The First Affiliated Hospital of Xi'an Jiaotong University, Xi An, China*

Lymphocyte Biology: Signaling, Co-Stimulation, Regulation

556 **Effects of IL-18 on Key Post-Translational Modifications of Human Foxp3 and Innate Immunity**
T. Akimova[1], L. M. Christensen[1], Z. Wang[2], M. H. Levine[2], W. W. Hancock[1], *[1]CHOP & University of Pennsylvania, Philadelphia, PA, [2]University of Pennsylvania, Philadelphia, PA*

557 **The Absence of T Follicular Regulatory Cells Prolongs Germinal Center Reactivity in Transplantation**
E. S. Crichton, S. Zeng, I. Badell, *Emory University, Atlanta, GA*

558 **Tip60 Inhibitors Enhance Regulatory T Cells (Treg) Induction by Promoting Acetylation of Foxp3**
F. Fueyo-Gonzalez[1], G. Vilanova[2], M. Fribourg[1], *[1]Department of Medicine, Translational Transplant Research Center, Icahn School of Medicine at Mount Sinai, New York, NY, [2]LaCàN, Universitat Politècnica de Catalunya-BarcelonaTech, Barcelona, Spain*

559 **IL-10 Signaling in T Cells Modulates Costimulation-independent Activation and is Essential for Transplant Tolerance Induction**
M. Iglesias Lozano[1], D. Bibicheff[1], M. Chicco[2], A. Komin[1], G. Brandacher[1], G. Raimondi[1], *[1]Plastic Surgery, Johns Hopkins University, Baltimore, MD, [2]Frimley Health NHS Foundation Trust, London, United Kingdom*

560 **Evaluation of the Differentiation Program of Endogenous Antigen-specific CD8⁺T Cells Following Transplantation**
S. M. Krummey[1], K. Tong[2], M. L. Ford[2], *[1]Pathology, Johns Hopkins University, Baltimore, MD, [2]Surgery, Emory Transplant Center, Atlanta, GA*

561 **CD40/40L Pathway is Critical in Controlling CMV Transmission Following Kidney Transplantation in Immunocompromised Mice**
X. Lai[1], L. Qiu[2], J. Wang[1], L. VanOsdol[1], S. Yan[3], M. Kandpal[4], M. Abecassis[5], Z. Zhang[1], *[1]Comprehensive Transplant Center, Microsurgery core, Northwestern University, Chicago, IL, [2]University of California,, San Francisco, CA, [3]Northwestern University, Chicago, IL, [4]Comprehensive Transplant Center, Northwestern University, Chicago, IL, [5]University of Arizona, Tucson, AZ*

562 **Laminins Differentially Regulate Tolerogenic T Cell Migration and Homing to Lymph Nodes**
L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[2], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MA*

563 **P2X7 Receptor Activity Mediates Th17-Specific Self- and Alloreactivity in Non-Human Primates**
C. Little, J. Sullivan, W. Burlingham, D. Kaufman, *Department of Surgery, University of Wisconsin, Madison, WI*

564 **Single Cell RNAq-seq Analysis of Paired Peripheral and Intragraft T Cells Reveals Biopsy Specific Fc Receptor Gene Expression in Rejection Only**
A. Malone, A. Leckie-Harre, I. Silverman, A. Chadha, H. Wu, B. Humphreys, *Washington University School of Medicine, St Louis, MO*

565 **Establishing a Linear Program for the Development of Costimulation Resistant T-Cells**
D. P. Moris, A. Lucander, A. Kirk, *Surgery, Duke, Durham, NC*

566 **K562 Cells Expressing HLA-A2 Stimulate Alloreactive CD8+ T Cells**
A. B. Morris, E. Peek, A. Hadley, C. P. Larsen, *Emory Transplant Center, Emory University, Atlanta, GA*

567 **CD80/PD-L1 Uniquely Regulates CD4 Effector T Cell Migration**
W. Piao[1], L. Li[1], Y. Zhang[2], K. Hippen[2], M. WillsonShirkey[1], B. Blazar[2], L. Riella[3], J. Bromberg[1], *[1]U Maryland, baltimore, MD, [2]U Minnesota, Minneapolis, MN, [3]Harvard U, boston, MA*

568 **CRISPR Screens to Map CTLA-4 Regulatory Networks in Primary Human T Cells**
O. Shaked[1], J. Freimer[1], J. Pritchard[2], A. Marson[1], *[1]UCSF, San Francisco, CA, [2]Stanford University, Stanford, CA*

569 **Anti-CD272 Antibody (6B2) Generated Foxp3⁺Regulatory T Cells and Suppressed Donor Specific Antibody in Murine Cardiac Transplant Model**
Y. Yamamoto[1], M. Uchiyama[2], K. Uchida[3], H. Yagita[3], M. Niimi[1], *[1]Department of Surgery, Teikyo University, Tokyo, Japan, [2]Department of Cardiovascular Surgery, Teikyo University, Tokyo, Japan, [3]Juntendo University, Tokyo, Japan*

570 **Alloreactive Memory T Follicular Helper Cells Rapidly Differentiate Into Effectors Independent of B Cell Memory Following Retransplantation**
S. Zeng, E. S. Crichton, I. R. Badell, *Department of Surgery, Emory, Atlanta, GA*

571 **Distinct Phenotype and Function of Antibody-suppressor Cxcr5^{+}Cd8^{+} T Cells**
J. Zimmerer, J. Han, M. Hart, S. Chaudhari, C. Peterson, G. Bumgardner, *OSU, Columbus, OH*

LB 37 **Proteomic Analysis of Extracellular Vesicles Derived From a Potent Donor-specific Regulatory T Cell-enriched Population Demonstrates Multiple Markers of Immune Suppression**
B. Schreiber[1], S. Tripathi[1], M. Blaser[2], T. Pham[2], S. Kuraoka[2], S. A. Singh[2], E. Aikawa[2], A. Chandraker[1], *[1]Transplantation Research Center, Renal Division, Brigham and Women's Hospital, Boston, MA, [2]Center for Interdisciplinary Cardiovascular Sciences, Division of Cardiovascular Medicine, Brigham and Women's Hospital, Boston, MA*

Tolerance / Immune Deviation

572 **Estrogen Receptors Alpha and Beta are Required for Immune Homeostasis and Normal Treg Function**
L. M. Christensen[1], T. Akimova[2], G. Ge[3], R. Han[1], L. Wang[1], P. Hernandez[3], C. O'Brien[3], M. H. Levine[3], W. W. Hancock[1], *[1]Children's Hospital of Philadelphia, Philadelphia, PA, [2]Children's Hospital of Philadelphia and University of Pennsylvania, Philadelphia, PA, [3]University of Pennsylvania, Philadelphia, PA*

574 **Selective Bcl-2 Inhibition to Deplete Hematopoietic Stem Cells in Bone Marrow Niche: A Novel Approach to Promote Mixed Chimerism**
T. Hirose[1], H. Sasaki[1], G. Lassiter[1], D. Ma[1], T. Oura[1], A. Dehnadi[1], A. Cosimi[1], P. Cippa[2], T. Fehr[2], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Institute of Physiology, University of Zurich, Zurich, Switzerland*

575 **Donor Lymphocytes in Peripheral Blood of Patients After Lung Transplantation Comprise High Frequencies of Killer Cell Immunoglobulin-like Receptor-positive T and NK Cell Subsets**
J. F. Kühne[1], A. Hitz[1], K. A. Bläsing[1], B. Wiegmann[2], R. Bellmàs Sanz[1], F. Ius[2], A. Haverich[2], G. Warnecke[2], C. S. Falk[1], *[1]MHH, Institute of Transplant Immunology, Hannover, Germany, [2]MHH, Department for Cardiothoracic, Transplantation and Vascular Surgery, Hannover, Germany*

576 **Selective Bcl-2 Inhibition for Induction of Mixed Chimerism and Renal Allograft Tolerance without Myelosupression**
G. Lassiter[1], T. Hirose[1], H. Sasaki[1], D. Ma[1], T. Oura[1], A. Dehnadi[1], A. Cosimi[1], P. Cippa[2], T. Fehr[3], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Division of Nephrology, Ente Ospedaliero Cantonale, Lugano, Switzerland, [3]Division of Nephrology, University of Zurich, Zurich, Switzerland*

577 **Effects of IL-2 and/ or Anti-IL6R Therapy on Long-term Cardiac Allograft Survival in Non-Human Primates (NHPs)**
C. L. Miller, K. J. Ahrens, J. M. O, P. M. Patel, J. A. Morrissette, D. Becerra, T. Costa, A. Dehnadi, I. M. Hanekamp, G. Benichou, J. C. Madsen, *Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA*

578 **Donor T and NK Cells with a Special Tissue-Resident Memory Phenotype Migrate Into the Periphery of Lung Transplant Recipients - A Potential Feature for Tolerance Development**
L. M. Ruhl[1], R. Bellmàs Sanz[1], A. Hitz[1], B. Wiegmann[2], K. A. Bläsing[1], W. Sommer[2], F. Ius[2], J. F. Kühne[1], A. Knöfel[2], L. M. Horn[1], I. Tudorache[2], A. Haverich[2], D. Jonigk[3], G. Warnecke[2], C. S. Falk[1], *[1]MHH, Institute of Transplant Immunology, Hannover, Germany, [2]MHH, Department for Cardiothoracic, Transplantation and Vascular Surgery, Hannover, Germany, [3]MHH, Institute of Pathology, Hannover, Germany*

LB 39 **Regulatory Macrophage Induced by Il-33 Promoted Immune Tolerance of Kidney Transplantation Through Siglec-10**
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682 **Results of Litmus (nct 02541916): The Liver Immune Tolerance Bio Marker Utilization Study**
A. Chruscinski[1], V. Rojas-Luengas[1], A. Issacher[1], L. Lilly[1], E. Renner[1], M. Epstein[1], O. Adeyi[1], S. Fischer[1], Z. Galvin[1], S. Moshkelgosha[1], E. Jaeckel[2], S. Juvet[1], N. Selzner[1], G. Levy[1], *[1]Multi-Organ Transplantation, University Health Network, Toronto, ON, Canada, [2]Hannover Medical School, Hannover, Germany*

683 **Expansion of Cd45ra-foxp3hi Activated Regulatory T Cells Predict Immune Tolerance in Patients with Combined Kidney and Bone Marrow Transplantation**
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684 **Inducing Transient Mixed Chimerism without Chimeric Transition Syndrome for Tolerance Induction After Kidney Transplantation**
K. Lee, J. Park, *Samsung Medical Center, Seoul, Korea, Republic of*

685 **Long-Term Follow-Up of a Phase 2 Clinical Trial to Induce Tolerance in Living Donor Renal Transplant Recipients**
J. Leventhal[1], J. Galvin[2], J. Mathew[1], L. Gallon[1], D. Belshe[1], M. Gibson[1], K. Ravindra[3], M. Horwitz[3], S. Ildstad[4], *[1]Northwestern University, Comprehensive Transplant Center, Chicago, IL, [2]Northwestern University, Chicago, IL, [3]Duke Medical Center, Durham, NC, [4]University of Louisville, Llouisville, KY*

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588 **Cold Perfusion for Ischemia Minimization Reduces Cardiac Injury in an Ex Vivo Xenoperfusion Model**
M. R. Connolly[1], A. Calhoun[1], F. Pollok[1], L. Burdorf[1], Z. Habibabady[1], M. Ma[1], S. Miura[1], W. Eyestone[2], C. Phelps[2], D. Ayares[2], *[1]Massachusetts General Hospital, Boston, MA, [2]Revivicor, Blacksburg, VA*

589 **Imaging Flow Cytometry Reveals That Platelet-Sized Erythrocyte Fragments are Formed During Pig Organ Perfusion with Human Blood**
Z. A. Habibabady[1], F. Ellett[2], L. Burdorf[1], M. Connolly[1], F. Pollok[1], D. Irimia[2], R. N. Pierson III[1], A. M. Azimzadeh[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital and Harvard School of Medicine, Boston, MA, [2]Center for Engineering in Medicine and Surgery, Massachusetts General Hospital and Harvard School of Medicine, Boston, MA*

590 **Initial Experience with Growth Hormone Receptor Knockout in Pig-to-Baboon Kidney Transplantation: Effect on Ureteric Viability and Kidney Growth**
C. Hansen-Estruch[1], H. Iwase[1], A. Jagdale[1], T. Yamamoto[1], M. H. Bikhet[1], J. Foote[2], H. Hara[1], D. Anderson[1], P. Porrett[1], D. Eckhoff[1], D. Ayares[3], W. Eyestone[3], J. Locke[1], D. K. Cooper[1], *[1]Xenotransplantation Program, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, [2]Department of Microbiology and Animal Resources Program, University of Alabama at Birmingham, Birmingham, AL, [3]Revivicor, Blacksburg, VA*

591 **Anti-pig IgE and IgA Antibodies in Sera of (i) Naïve Primates and (ii) Non-human Primates Sensitized to Pig Xenografts**
H. Hara, Q. Li, H. Iwase, T. Yamamoto, D. Ayares, D. K. Cooper, *University of Alabama at Birmingham, Birmingham, AL*

592 **Transgenic Overexpression of Human Ectonucleoside Triphosphate Diphosphohydrolase 1 (entpd1, Or Hcd39) in Pig to Primate Xenotransplantation Models**
R. Matheson[1], K. Deng[1], K. M. Lee[1], Z. A. Habibabady[1], C. G. Rickert[1], K. J. Ahrens[1], J. M. O[1], D. Becerra[1], P. Patel[1], W. Westlin[2], M. Youd[2], N. Serifis[1], T. M. Coe[1], D. Cloonan[1], A. M. Azimzadeh[1], C. LeGuern[1], J. C. Madsen[1], S. C. Robson[3], J. F. Markmann[1], *[1]Transplantation Surgery Research, Massachusetts General Hospital, Boston, MA, [2]eGenesis, Cambridge, MA, [3]Beth Israel Deaconess Medical Center, Boston, MA*

593 **HTFPI.hCD47 and Adhesion Inhibition in GTKO.hCD46 Pig Lung Xenograft Injury**
S. Miura[1], L. Burdorf[1], Z. Habibabady[1], A. Dandro[2], M. Connolly[1], S. Pratts[1], C. Phelps[2], W. Eyestone[2], D. Ayares[2], A. Azimzadeh[1], R. Pierson III[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Revivicor, Inc, Blacksburg, VA*

594 **Triple-Knockout Pig Red Blood Cells Are a Potential Alternative Source for Clinical Blood Transfusion**
T. Yamamoto[1], M. H. Bikhet[1], H. Q. Nguyen[1], M. Javed[1], D. Ayares[2], H. Iwase[1], H. Hara[1], D. K. Cooper[1], *[1]Xenotransplantation Program, Surgery, The University of Alabama at Birmingham, Birmingham, AL, [2]Revivicor, Blacksburg, VA*

COVID-19

COVID-19

LB 43 **SARS-CoV-2 Infection in Solid Organ Transplant Recipients: A Retrospective Cohort Study**
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LB 44 **Kidney Transplantation in Patients with Prior Coronavirus Disease 2019 (COVID-19)**
A. Santeusanio, A. Bhansali, M. Rana, S. Lerner, D. Von Ahrens, O. Sulimani, S. Farouk, F. Tedla, R. Shapiro, *Mount Sinai Hospital, New York, NY*

LB 45 **Kidney Transplant Biopsy Findings After Covid-19**
E. Daniel[1], S. Kudose[2], D. J. Cohen[1], L. Ratner[3], V. D'Agati[2], I. Batal[2], *[1]Division of Nephrology, Columbia University Medical Center, NY, NY, [2]Department of Pathology, Columbia University Medical Center, NY, NY, [3]Department of Surgery, Columbia University Medical Center, NY, NY*

LB 46 **Liver and Kidney Transplantation During the Covid-19 Pandemic Period: A Single Center Experience**
M. Haberal[1], E. Karakaya[1], A. Akdur[1], E. Ayvazoglu Soy[1], F. Ozcay[2], E. Baskin[3], S. Boyacioglu[4], A. Torgay[5], S. Yildirim[1], G. Moray[1], F. Yarbug Karakayali[1], *[1]Division of Transplantation, Department of General Surgery, Baskent University, Ankara, Turkey, [2]Department of Pediatric Gastroenterology, Baskent University, Ankara, Turkey, [3]Department of Pediatric Nephrology, Baskent University, Ankara, Turkey, [4]Department of Gastroenterology, Baskent University, Ankara, Turkey, [5]Department of Anaesthesiology, Baskent University, Ankara, Turkey*

LB 47 **Feasibility of a Virtual Renal Transplant Simulation Model for Surgical Trainees in the Covid Era**
O. Eletta[1], S. Iacono[1], D. Walls[1], S. Puri[2], B. Perry[1], C. Anderson[1], M. J. Nguyen[3], A. Bongu[2], *[1]General Surgery, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, [2]Transplant, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, [3]Transplant Institute, Loma Linda University Medical Center, Loma Linda, CA*

LB 48 **Living Organ Donor Perspectives on Covid-19 Vaccines**
M. N. Harhay[1], A. Klassen[2], H. Zaidi[1], M. Mittelman[3], R. Bertha[3], R. Mannon[4], K. Lentine[5], *[1]Medicine, Drexel University, Philadelphia, PA, [2]Drexel University, Philadelphia, PA, [3]American Living Organ Donor Fund, Philadelphia, PA, [4]University of Nebraska Medical Center, Omaha, NE, [5]Saint Louis University, Saint Louis, MO*

LB 49 **Sars-cov-2 Stat Testing for Organ Donation; One Laboratory's Experience**
S. Dionne, B. O'Neale, *VRL-Eurofins, Centennial, CO*

LB 50 **Covid-19 Severity within One Year of Liver, Pancreas and Kidney Transplantation**

H. Sarumi, J. Fisher, B. Johnson, T. Pruett, *Solid Organ Transplant Surgery, University of Minnesota, Minneapolis, MN*

LB 51 **Short Term Outcomes in Previously Covid Positive Kidney Transplant Recipients in Pre-vaccine Era**

R. Prashar, N. J. Khoury, M. Ramesh, A. K. Patel, *Henry Ford Transplant Institute, Detroit, MI*

LB 52 **Kidney Transplantation in Times of Covid-19 - Decision Analysis in the Canadian Context**

I. Yanev[1], M. Gagnon[1], M. Cheng[2], S. Paraskevas[2], D. Kumar[3], A. Dragomir[4], R. Sapir-Pichhadze[4], *[1]McGill University, Montreal, QC, Canada, [2]McGill University Health Centre, Montreal, QC, Canada, [3]University Health Network, Toronto, ON, Canada, [4]Research Institute of McGill University Health Centre, Montreal, QC, Canada*

LB 53 **Influence of Vitamin D Status on the Prognosis of Covid 19 in Patients with Kidney Transplant**

J. Ugalde-Altamirano, I. Revuelta, A. Carrillo, M. Xipell, F. Cofan, N. Esforzado, E. Montagud, G. Piñeiro, A. Molina, P. Ventura, D. Cucchiari, F. Oppenheimer, F. Diekmann, J. Campistol, B. Bayes, J. Torregrosa, *Nephrology, Hospital Clinic de Barcelona, Barcelona, Spain*

LB 54 **Short Term Outcomes in Previously Covid Positive Living Kidney Donors and Their Recipients**

R. Prashar, N. J. Khoury, M. Ramesh, A. K. Patel, *Henry Ford Transplant Institute, Detroit, MI*

LB 55 **Elevated Tacrolimus Levels in Hospitalized Organ Transplant Recipients with COVID-19**

K. Mecadon[1], A. Hardesty[2], K. Vieira[3], R. Rogers[3], B. Merhi[4], A. J. Osband[5], G. Bayliss[4], R. Gohh[4], P. Morrissey[5], D. Farmakiotis[3], *[1]Department of Pharmacy, Rhode Island Hospital, Providence, RI, [2]Department of Internal Medicine, Residency, Warren Alpert Medical School of Brown University, Providence, RI, [3]Division of Infectious Diseases, Warren Alpert Medical School of Brown University, Providence, RI, [4]Division of Nephrology, Warren Alpert Medical School of Brown University, Providence, RI, [5]Department of Surgery (Transplantation), Warren Alpert Medical School of Brown University, Providence, RI*

LB 56 **Monoclonal Antibodies for Covid-19 in Patients with Solid Organ Transplant Recipients**

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LB 57 **Covid-19 in Renal Transplant Recipients: Experience of Lithuania**

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LB 58 **Nurse and Nurse Practitioner-lead Monoclonal Antibody Initiative for Solid Organ Transplant (sot) Recipients with Covid-19**

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LB 59 **Impact of Covid-19 Infection on Tacrolimus Levels in Solid Organ Transplant Recipients**

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LB 60 **Bamlanivimab for Covid-19 in Kidney Transplant Patients**

M. Y. Jan, S. El-Sayegh, M. S. Yaqub, D. P. Mishler, O. Adebiyi, M. D. Anderson, T. E. Taber, A. Sharfuddin, *Nephrology, Indiana University School of Medicine, Indianapolis, IN*

LB 61 **Impact of a "COVID-free" Pathway on Living Donor Transplantation During a Pandemic**

S. Koganti, Y. Cheah, C. J. Simon, M. Tobon Lascano, J. Kim, M. E. Akoad, *Lahey Hospital & Medical Center, Burlington, MA*

LB 62 **Quantification of Multiple Isotypes of Anti-SARS-CoV-2 Antibodies in Kidney Transplant Recipients**

J. S. Maltzman[1], L. Wang[1], P. Ahearn[1], T. Yalamarti[1], M. Menon[2], Y. Azzi[3], M. Melcher[1], M. Fernandez-Vina[1], R. Bray[4], H. Gebel[4], E. Woodle[5], E. Akalin[3], A. Girnita[1], P. Cravedi[2], *[1]Stanford University, Palo Alto, CA, [2]Icahn School of Medicine, NYC, NY, [3]Einstein School of Medicine, NYC, NY, [4]Emory University, Atlanta, GA, [5]University of Cincinnati, Cincinnati, OH*

LB 63 **Donor-specific Anti-HLA Alloantibody in Kidney Transplant Recipients with COVID-19 Exhibit a Different Immunoglobulin Class and Subclass Profile When Compared to Anti-SARS-CoV-2 Antibodies**

A. Girnita[1], L. Wang[1], M. Fernandez-Vina[1], E. Woodle[2], P. Ahearn[1], T. Yalamarti[1], M. Menon[3], Y. Azzi[4], M. Melcher[1], R. Bray[5], H. Gebel[5], E. Akalin[4], P. Cravedi[3], J. S. Maltzman[1], *[1]Stanford University, Palo Alto, CA, [2]University of Cincinnati, Cincinnati, OH, [3]Icahn School of Medicine, NYC, NY, [4]Einstein School of Medicine, NYC, NY, [5]Emory University, Atlanta, GA*

LB 64 **High Levels of Sars-cov-2 Detected in Immunosuppressed Covid-19 Patient Environments Weeks Following Initial Positive Test**

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LB 65 **Covid-19 Infections Post-liver and Kidney Transplantation in a Southern Ca Program**

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LB 66 **White, Older Men Are Less Affected by the Changes of the Covid-19 Pandemic**

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714 **Solid Organ Transplant Recipients and Healthcare Burden in Covid19 Era**

A. Basu, N. Sharma, R. Subramanian, L. Sridharan, S. Pastan, T. Pearson, *Emory Healthcare, Atlanta, GA*

715 **Utilization of Living Donor Liver Transplant for Patients Who Travel for Transplant in the United States**
H. J. Braun, D. Amara, A. M. Shui, P. Stock, R. Hirose, F. Delmonico, N. L. Ascher, *University of California, San Francisco, San Francisco, CA*

716 **Medical Costs in the Year Following Kidney Transplantation: Relationships with Renal Function and Graft Failure**
M. Cooper[1], M. A. Schnitzler[2], C. Nilubol[1], W. Wang[3], X. Zhu[3], J. Wu[3], R. J. Nordyke[4], *[1]MedStar Georgetown Transplant Institute, Washington, DC, [2]Saint Louis University, St. Louis, MO, [3]Genesis Research, Hoboken, NJ, [4]Angion Biomedica, San Francisco, CA*

717 **A Payer's Perspective: The Cost of Hemodialysis versus Living Donor Kidney Transplant for Kidney Failure Patients in Nigeria**
J. Lang[1], I. James[2], D. Da Rocha Afodu[1], C. G. Okwuonu[3], O. Ekwenna[1], *[1]University of Toledo College of Medicine and Life Sciences, Toledo, OH, [2]Surgical Specialists of Charlotte, Matthews, NC, [3]Department of Internal Medicine, Nephrology Unit, Federal Medical Centre, Umuahia, Abia State, Nigeria*

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706 **Posttraumatic Stress and Medication Adherence in Pediatric Transplant Recipients**
S. Duncan-Park[1], L. Danziger-Isakov[2], B. Armstrong[3], N. Williams[4], J. Odim[4], E. Shemesh[5], S. Sweet[6], R. Annunziato[1], *[1]Icahn School of Medicine at Mount Sinai and Fordham University, New York, NY, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [3]Rho Inc., Durham, NC, [4]NIAID, Bethesda, MD, [5]Icahn School of Medicine at Mount Sinai, New York, NY, [6]Washington University in St. Louis, St. Louis, MO*

707 **A Psychosocial Clinician Rating Scale is Used Differently Across Solid Organ Teams within a Single Transplant Center**
S. Entenman[1], T. Chaffee[2], M. Pienta[3], B. Young[3], E. Clifton[1], J. Mellinger[4], L. McElroy[5], G. Winder[1], *[1]Psychiatry, University of Michigan, Ann Arbor, MI, [2]Psychiatry, University of Missouri-Kansas City, Kansas City, MO, [3]Surgery, University of Michigan, Ann Arbor, MI, [4]Internal Medicine, University of Michigan, Ann Arbor, MI, [5]Surgery, Duke University, Durham, NC*

708 **Development of a Question Prompt Sheet for Upper Extremity Vascularized Composite Allotransplantation**
J. Gacki-Smith[1], B. Kuramitsu[1], A. Ferzola[2], K. Vanterpool[2], C. Kunkle[3], M. Hewitt[3], A. Schultheis[3], T. Riggleman[3], J. Taylor[3], C. Cooney[2], M. Levan[2], S. Tintle[3], G. Brandacher[2], E. Gordon[1], *[1]Northwestern University, Chicago, IL, [2]Johns Hopkins University, Baltimore, MD, [3]Walter Reed National Military Medical Center, Bethesda, MD*

709 **"A New Lease on Life": Patient Perceptions After Early Liver Transplantation for Alcohol-Related Liver Disease**
R. Greenberg, G. Punchhi, H. Sung, K. Gianaris, M. Krach, K. Herrick-Reynolds, P. Chen, M. Levan, J. Garonzik Wang, A. Cameron, *Johns Hopkins, Baltimore, MD*

710 **Anonymous Live Liver Donor Perspectives on Anonymity in the Donation Process**
S. S. Humar, N. Selzner, J. Jung, S. Krause, S. Abbey, *Multi-Organ Transplant Program, University Health Network, Toronto, ON, Canada*

711 **The Lived Experience of Older Adult Kidney Transplant Recipients: Reflections on Embodied Selfhood in Later Life**
L. Kimberly, *New York University Langone Health, New York, NY*

712 **Two Step Screening for Anxiety Symptoms in Solid Organ Transplant Recipients**
H. Lan, F. Jamil, N. Al Kaabi, R. Aser, K. Gyatso, H. Habbal, S. Macanovic, S. Dano, M. Novak, I. Mucsi, *University Health Network, Toronto, ON, Canada*

713 **Impact of Rejection in Pediatric and Young Adult Kidney Transplant Recipients on the Use of Mental Health Resources**
E. Ruzicka[1], E. Lyons[2], C. Naclerio[2], A. Sikora[2], K. McKinnon[2], E. Blanchette[2], M. Chandran[2], M. Bock[2], E. Christofferson[2], *[1]Children's Hospital Colorado, Aurora, CO, [2]University of Colorado, Aurora, CO*

LB 72 **Death and Loss to Follow-up in Pediatric Liver Transplant Recipients Transferred to Adult Care: Who is at Risk?**
J. P. Stevens[1], S. Gillespie[1], M. Katz[1], L. Hall[2], V. Kolachala[1], R. Ford[3], N. A. Gupta[1], *[1]Pediatrics, Emory University School of Medicine, Atlanta, GA, [2]Transplant Services, Children's Healthcare of Atlanta, Atlanta, GA, [3]Internal Medicine, Emory University School of Medicine, Atlanta, GA*

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1183 **Association Between Cumulative Antithymocyte Globulin Dosing and Adverse Outcomes in Pediatric Heart Transplant Recipients**
J. Chen[1], D. Salerno[1], H. Corbo[1], S. Shah[2], A. Rothkopf[3], I. D. Lytrivi[3], *[1]Department of Pharmacy, NewYork-Presbyterian Hospital, New York, NY, [2]College of Pharmacy and Health Sciences, St. John's University, Queens, NY, [3]Pediatric Cardiology, Columbia University Irving Medical Center, New York, NY*

1184 **The Perfect Candidate? The Stanford Integrated Psychosocial Assessment for Transplant**
E. J. Henricksen[1], K. Stott[2], S. Ilango[2], Y. Moayedi[3], K. Waddell[4], H. I. Luikart[4], J. Twiggs[4], R. Lee[1], B. M. Zhang[5], W. Hiesinger[6], K. K. Khush[4], J. J. Teuteberg[4], *[1]Transplant, Stanford Healthcare, Stanford, CA, [2]Social Work, Stanford Healthcare, Stanford, CA, [3]Cardiology, University Health Network, Toronto, ON, Canada, [4]Cardiology, Stanford University, Stanford, CA, [5]Pathology, Stanford University, Stanford, CA, [6]Cardiothoracic Surgery, Stanford University, Stanford, CA*

1185 **Intravenous Immunoglobulin in Heart Transplant Recipients with Hypogammaglobulinemia and Infection**
J. Hoang, D. Nguyen, E. Graviss, M. Moaddab, A. Guha, J. Krisl, *Houston Methodist Hospital, Houston, TX*

1187 **Right Ventricular Dysfunction After Heart Transplantation: When to Worry?**
S. Kim, J. Patel, M. Kittleson, T. Singer-Englar, N. Patel, R. Skorka, D. Chang, E. Kransdorf, M. Hamilton, B. Azarbal, L. Czer, D. Ramzy, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

1188 **Impact of Donor and Recipient Age Difference: Outcomes within the First Year of Orthotopic Heart Transplant**
M. Mascetti, M. Manson, Z. Truman, *Baylor St. Luke's Medical Center, Houston, TX*

1189 **Outcomes of HLA Antibody Surveillance Protocol in Heart Transplant Patients - A Single-Center Retrospective Analysis**
S. S. Patlolla, V. Bhattad, S. McKean, M. Askar, S. Hall, *Baylor University Medical Center, Dallas, TX*

1190 **Impact of a Pharmacist in an Outpatient Heart Transplant Clinic**
A. Prom[1], D. Ricciuti[1], J. Newman[2], C. Doligalski[1], *[1]UNC Health Care, Chapel Hill, NC, [2]Eshelman School of Pharmacy, Chapel Hill, NC*

1191 **Geographic Variation in Candidate Listing Behavior Under the New Heart Allocation Policy**
G. Ran[1], K. Chung[1], A. S. Anderson[2], R. Gibbons[3], N. Narang[4], M. Churpek[5], W. F. Parker[1], *[1]Pritzker School of Medicine, University of Chicago, Chicago, IL, [2]Department of Medicine, University of Texas San Antonio, San Antoion, TX, [3]Department of Medicine, University of Chicago, Chicago, IL, [4]Department of Medicine, University of Illinois-Chicago, Chicago, IL, [5]Department of Medicine, University of Wisconsin, Madison, WI*

1192 **Combined Heart-liver Transplantation in Patients with Familial Amyloidosis - Analysis of Optn/Unos Database**
A. Sharma, A. Sickels, B. Ruch, M. Carli, M. Levy, *Virginia Commonwealth University, Richmond, VA*

1193 **Simultaneous Heart-Liver-Kidney Transplantation Survival: National and Single-Center Outcomes**
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1194 **Primary Graft Dysfunction in a Risk-Stratified vs. Routine Induction Protocol in Heart Transplant Recipients**
J. S. van Zyl[1], H. Zafar[1], P. M. Nguyen[2], J. Felius[1], T. Sam[3], S. A. Hall[3], *[1]Baylor Scott & White Research Institute, Dallas, TX, [2]Texas A&M University College of Medicine Health Science Center, Dallas, TX, [3]Baylor Scott & White Health, Dallas, TX*

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All Infections (Excluding Kidney & Viral Hepatitis)

718 **Risk Factors Associated with Severe COVID19 Illness in Kidney Transplant Recipients**
E. Abuhelaiqa, M. Alkadi, H. Tohid, R. Elidrisi, R. Abdul Rahiman, M. F. Elshirbeny, T. A. Ghonaimi, A. I. Hamad, A. Nauman, A. A Aziz, O. Fituri, M. Asim, M. A. Othman, H. Al-Malki, *Hamad Medical Corporation, Doha, Qatar*

719 **Clinical Outcomes of Solid Organ Transplant Recipients with Severe Acute Respiratory Syndrome Coronavirus 2**
R. Adekunle, D. Jandhyala, J. Lewis, *Medicine, Division of Infectious Diseases, Medical University of South Carolina, Charleston, SC*

720 **Outcomes of Lung Transplantation with Multi Drug Resistant Colonized Grafts, Retrospective Cohort Study in a Tertiary Care Hospital**
N. Al-Ashi, *Pharmacy, King Fahad Specialist Hospital -Dammam, Khobar, Saudi Arabia*

722 **Risk Factors and Outcomes of Neutropenia in Kidney Transplant Recipients**
R. Avery[1], J. Motter[1], S. Sae-Tia[2], N. Lu[1], W. Cochran[1], A. Massie[1], D. Brennan[1], F. Akinwande[1], S. Shoham[1], E. Kraus[1], N. Alachkar[1], S. Alasfar[1], F. Naqvi[1], F. Al Ammary[1], K. Marr[1], S. Mehta Steinke[1], N. Desai[1], O. Ezennia[1], P. Plummer[1], C. Durand[1], W. Werbel[1], M. Y. Kim[1], D. Segev[1], J. Garonzik Wang[1], B. Trollinger[1], L. Lees[1], L. Toman[1], S. Shulder[3], K. Dzintars[1], D. Ostrander[1], *[1]Johns Hopkins, Baltimore, MD, [2]Stony Brook University, Stony Brook, NY, [3]University of Rochester, Rochester, NY*

723 **Practice Patterns in Pneumocystis Jirovecii Pneumonia Prophylaxis in Solid Organ and Bone Marrow Transplant Recipients**
S. Cao, K. Khalil, F. Cirrone, S. Mehta, *NYU Langone Transplant Institute, New York, NY*

724 **Cryptococcosis in Renal Transplant Recipients —An Analysis of United States Renal Data System Data**
M. E. Cervera-Hernandez, H. A. Yoon, L. Pirofski, V. Hemmige, *Montefiore Medical Center, Bronx, NY*

725 **Use of Microbial Cell Free DNA Sequencing in Solid Organ Transplant Patients**
S. Chang, P. Gaynor, A. Multani, O. E. Beaird, M. Carlson, S. Yang, O. Garner, J. Schaenman, *University of California, Los Angeles, Los Angeles, CA*

726 **Comparison of Outcomes in Sot Recipients During Two Eras of Covid-19 Therapeutics**
T. Chiang, A. Sait, A. Massie, K. Marr, D. Brennan, W. Cochran, P. Shah, T. Jain, S. Mehta Steinke, N. Desai, N. Permpalung, S. Shoham, C. Merlo, C. Durand, W. Werbel, M. Dioverti, D. Ostrander, A. Gurakar, M. Y. Kim, J. Garonzik-Wang, D. Segev, R. Avery, *Johns Hopkins University, Baltimore, MD*

727 **Clinical Consequences in Patients Experiencing Leukopenia and Neutropenia After Solid Organ Transplant**
A. Diamond[1], N. Diehl[2], K. Hiryak[3], K. Mortia[1], J. Au[1], C. Ruggia-Check[1], H. Clauss[4], *[1]Pharmacy, Temple University Hospital, Philadelphia, PA, [2]Pharmacy, UPMC Pinnacle Health, Harrisburg, PA, [3]Pharmacy, Temple University School of Pharmacy, Philadelphia, PA, [4]Infectious Diseases, Temple University Hospital, Philadelphia, PA*

728 **Influence of Immunosuppressant Management on Mortality in Kidney Transplant Recipients Hospitalized with COVID-19**
Y. Fenig, A. Santeusanio, M. Menon, C. Liu, M. Rana, R. Shapiro, *Mount Sinai Hospital, New York, NY*

729 **Pulmonary Infections in Patients with Kidney Transplant: Epidemiology, Risk Factors and Impact of a Dedicated Pre-Transplant Infectious Disease Consultation**
E. Feredj, *Infectious Disease, APHP Henri Mondor, Créteil, France*

730 **Clinical Characteristics and Outcomes of Aspergillus Infections in Intestinal Transplant Patients: Retrospective Cohort Study**
A. Fernandez, M. Romero, Y. Natori, J. Camargo, S. Anjan, R. Vianna, J. Simkins, *Miami Transplant Institute, Jackson Health System, Miami, FL*

731 **Utilizing Risk Factors to Guide Prevention of Invasive Fungal Infections in Liver Transplant Recipients**
K. Fitton, A. Chan, C. Truax, B. Sirandas, T. Larson, L. Smith, A. Carlson, *University of Utah Health, Salt Lake City, UT*

732 **Outcomes in High Risk CMV Liver Transplants with Elevated MELD Scores**
S. Freedman[1], K. Saunders[2], T. Sparkes[1], B. Masters[1], M. Plazak[1], K. Saharia[3], D. Maluf[3], B. Ravichandran[2], *[1]University of Maryland Medical Center, Baltimore, MD, [2]University of Maryland School of Pharmacy, Baltimore, MD, [3]University of Maryland School of Medicine, Baltimore, MD*

733 **Covid Studies in 208 Patients with Consent for Donation**
A. L. Friedman, C. Ezzell, K. Delli Carpini, *LiveOnNY, New York, NY*

734 **Impact of Valganciclovir Prophylaxis Dosing in High Risk Cytomegalovirus Kidney and Pancreas Transplant Recipients with Delayed Graft Function**
A. Gharabagi[1], J. Geyston[1], A. Agarwal[2], S. Rao[3], A. Doyle[3], J. Dann[1], *[1]Pharmacy, University of Virginia Health System, Charlottesville, VA, [2]Transplant Surgery, University of Virginia Health System, Charlottesville, VA, [3]Transplant Nephrology, University of Virginia Health System, Charlottesville, VA*

735 **Clinical Signs Predictive of Covid-19 Mortality Among Transplant Recipients**
D. Ginzberg[1], K. Pierce[2], E. Kreiger-Benson[2], M. Graves[2], H. Neumann[3], N. Ali[3], C. Gidea[3], J. Park[3], S. Mehta[3], *[1]Hackensack University Medical Center, Hackensack, NJ, [2]New York University Grossman School of Medicine, New York, NY, [3]New York University Langone Transplant Institute, New York, NY*

736 **Observational Study of the Clinical Characteristics and Short-term Outcomes of Kidney Transplant Recipients Diagnosed with Coronavirus-19 Infection (sars-cov2) Requiring Hospitalization in New Orleans**

S. Giusti[1], S. Chazin[2], P. Vaitla[3], K. Atiemo[4], M. Atari[1], A. Paramesh[4], H. Jeon[4], A. Vijay[4], A. Torres[5], M. Killackey[4], R. Thimmisetty[6], J. Garces[6], *[1]Tulane University Section of Nephrology & Hypertension, New Orleans, LA, [2]Tulane University School of Medicine, New Orleans, LA, [3]University of Mississippi Medical Center, Jackson, MS, [4]Tulane Transplant Institute, New Orleans, LA, [5]Ochsner Medical Center, New Orleans, LA, [6]Ochsner Multi-Organ Transplant Institute, New Orleans, LA*

737 **Infection Rates in Heart Transplant Recipients With Combined Tacrolimus and Sirolimus at High versus Low Concentrations**

S. Goyal, J. Lyons, J. Negrelli, M. Liebo, A. Heroux, *Loyola University Medical Center, Maywood, IL*

738 **An Evaluation of Pjp Prophylaxis and Anemia Among Renal Transplant Recipients**

J. Hedvat, N. Poladi, D. Salerno, G. Dube, N. Lange, *NewYork-Presbyterian Hospital, New York, NY*

739 **Covid-19 in a Kidney Transplant Patient Associated with Collapsing Glomerulopathy**

W. Hninn, M. Merzkani, H. Murad, A. Malone, A. Java, G. Rajashekar, R. Delos Santos, T. Alhamad, *Washington University School of Medicine, St. Louis, MO*

740 **Breakthrough Cytomegalovirus DNAemia in High vs Intermediate Risk Heart Transplant Recipients**

G. Huang[1], O. E. Beaird[1], M. Davis[2], M. Carlson[1], S. Chang[1], P. Gaynor[1], A. Fan[2], M. Deng[3], A. Multani[1], A. Nsair[3], J. Schaenman[1], *[1]Infectious Diseases, UCLA, Los Angeles, CA, [2]Pharmacy, UCLA, Los Angeles, CA, [3]Cardiology, UCLA, Los Angeles, CA*

741 **Relationship Between Tacrolimus Blood Levels and Covid-19 Pandemic in Kidney Transplant Recipients**

T. Inoue[1], K. Unagami,[2], A. Ishiwatari[3], T. Kanzawa[3], T. Shimizu[3], K. Omoto[3], M. Inui[3], T. Suzuki[1], H. Ishida[4], K. Tanabe[3], *[1]Department of Nephrology, Kameda Medical Center, Chiba Kamogawa, Japan, [2]Department of Organ Transplant Medicine, Tokyo Women's Medical University, Tokyo, Japan, [3]Department of Urology, Tokyo Women's Medical University, Tokyo, Japan, [4]Department of Organ transplant medicine, Tokyo Women's Medical University, Tokyo, Japan*

742 **Clinical Course and Outcomes in Solid Organ Transplant Recipients with Covid-19**

R. C. Jackson[1], S. Challa[2], A. Halim[1], N. Kelly[3], D. Maluf[4], K. Shetty[3], Z. Lominadze[3], *[1]Department of Medicine, University of Maryland School of Medicine, Baltimore, MD, [2]Internal Medicine, University of Maryland Medical Center Midtown, Baltimore, MD, [3]Program in Transplantation, Department of Medicine, University of Maryland Medical System, Baltimore, MD, [4]Program in Transplantation, University of Maryland Medical System, Baltimore, MD*

743 **Immune Response to Covid-19 in Kidney Transplant Waitlist Patients**

P. T. Jindra[1], C. M. Foye[1], I. Sharf[2], A. Rana[1], T. N. Galvan[1], A. Awan[1], C. A. O'Mahony[1], B. V. Murthy[1], *[1]Baylor College of Medicine, Houston, TX, [2]Baylor St. Luke's Medical Center, Houston, TX*

744 **Probiotic Protocol to Reduce Perioperative Infection After Liver Transplantation**

M. Jorgenson[1], Q. Yang[2], D. Yang[2], G. Leverson[2], C. Saddler[2], J. Smith[2], N. Safdar[2], L. Fernandez[2], D. Al-Adra[2], *[1]UW Health, Madison, WI, [2]UW School of Medicine and Public Health, Madison, WI*

745 **Analyzing the Impact of Covid-19 in the Hospitalized Cohort of Liver Transplant Recipients: An Early Systematic Review and Meta-Analysis**

J. Kumar[1], I. Reccia[2], P. Bachul[1], D. DiSabato,[1], R. Barth[1], J. Fung[1], T. Baker[1], P. Witkowski[1], *[1]University of Chicago, Chicago, IL, [2]Imperial College, London, United Kingdom*

746 **COVID-19 in Kidney Transplant Recipients in the Southeastern United States: A Single Center Experience**
K. R. Kumm, S. H. Shawar, R. C. Forbes, B. P. Concepcion, *Vanderbilt University Medical Center, Nashville, TN*

747 **The Gut Microbiota Diversity and Metabolite Production is Reduced in Liver Transplant Recipients and Associated with Post-Operative Infection**
C. J. Lehmann, R. Keskey, R. Nayak, E. Littmann, E. Pamer, T. Baker, *University of Chicago, Chicago, IL*

748 **COVID-19 in Hospitalized Kidney Transplant Recipients: Clinical Course, Prognostic Factors and Differences Between First and Second Waves**
N. Macías, M. Rodríguez Ferrero, A. Acosta, J. Carbayo, Á. González Rojas, A. Muñoz de Morales, A. García Prieto, M. Goicoechea, *Nephrology, Hospital Gregorio Marañón, Madrid, Spain*

749 **Weathering the Cytokine Storm: Therapeutic Plasma Exchange for the Management of Severe Covid19 in Solid Organ Transplant Recipients**
A. Mattiazzi[1], J. Pagan[1], L. A. Mendez Castaner[2], A. Fernandez[1], R. Zamora Gonzalez[1], J. Simkins[1], L. Preczewski[1], Y. Natori[1], S. Anjan[1], G. Guerra[1], *[1]Miami Transplant Institute, Miami, FL, [2]Miami Trasnplant Institute, Miami, FL*

750 **Sars-cov-2 versus Non-sars-cov-2 Infection Among Solid Organ Transplant Recipients: Case Control Study**
M. A. Mendoza[1], M. Raja[1], S. Anjan[1], S. C. Curel[2], G. Rosello[3], A. Fernandez[1], A. Chandorkar[4], C. O'Brien[5], A. Phancao[5], N. Sinha[1], R. Vianna[1], M. Loebe[1], C. Gaetano[1], J. Simkins[1], M. Morris[1], L. Abbo[1], J. Camargo[1], G. Guerra[1], Y. Natori[1], *[1]Department of Medicine, University of Miami, Miami, FL, [2]Miller School of Medicine, University of Miami, Miami, FL, [3]University of Miami, Miami, FL, [4]University of Minnesota, Minneapolis, MN, [5]Miami Transplant Institute, University of Miami, Miami, FL*

751 **Multi-drug Resistant Infections in Solid Organ Transplant Recipients, a New Era of Risk**
L. A. Morais, D. Reynoso, A. Lea, M. Mujtaba, S. Merwat, R. Kulkarni, J. Fair, M. Kueht, *University of Texas Medical Branch, Galveston, TX*

752 **Seroprevalence of SARS-CoV-2 Antibodies in Transplant Recipients in a Croatian Transplant Center**
A. Mrzljak[1], Z. Jurekovic[1], J. Pavicic Saric[2], L. Antolasic[3], L. Milasincic[3], I. Tabain[3], T. Vilibic Cavlek[3], *[1]Department of Internal Medicine, Merkur University Hospital, Zagreb, Croatia, [2]Department of Anesthesiology, Merkur University Hospital, Zagreb, Croatia, [3]Department of Microbiology, Croatian Institute of Public Health, Zagreb, Croatia*

753 **Current Practices for Management and Treatment of COVID-19 in Immunocompromised Adults: A Survey of Institutions**
H. H. Nam[1], S. Aslam[2], O. Beaird[3], G. Forrest[4], M. Fung[5], A. Limaye[6], A. Multani[3], J. Nelson[7], R. Rakita[6], L. Strasfeld[8], J. Schaenman[3], *[1]Medicine, University of California - Irvine, Orange, CA, [2]Division of Infectious Diseases and Global Public Health, University of California - San Diego, San Diego, CA, [3]Medicine, University of California - Los Angeles, Los Angeles, CA, [4]Medicine, Rush University, Chicago, IL, [5]Medicine, University of California - San Francisco, San Francisco, CA, [6]Medicine, University of Washington, Seattle, WA, [7]Medicine, Stanford University, Palo Alto, CA, [8]Medicine, Oregon Health and Science University, Portland, OR*

754 **Evaluation of High-versus Low-Dose Valganciclovir for Cytomegalovirus Prevention in Adult Liver Transplant Recipients: A Single Center Experience**
P. Parikh[1], M. Siddiqui[2], O. De La Cruz[2], G. Gupta[2], D. Kumar[2], I. Yakubu[2], *[1]Our Lady of the Lake Regional Medical Center, Baton Rouge, LA, [2]Virginia Commonwealth University Health System, Richmond, VA*

755 **Beta-lactam Allergies Among Solid Organ Transplant Recipients: Prevalence and Association with Transplant Admission Length of Stay**
N. N. Pettit[1], V. Nguyen[2], C. T. Nguyen[1], A. Lew[1], J. Pisano[1], L. M. Potter[1], *[1]University of Chicago Medicine, Chicago, IL, [2]University of Michigan College of Pharmacy, Ann Arbor, MI*

756 **Covid vs Non Covid Pneumonia in Kidney Transplant Recipients**
R. Prashar, N. Khoury, P. Shrivastava, S. Yeddula, T. Kitajima, E. Ulrich, M. Ramesh, A. Patel, S. Nagai, M. Samaniego-Picota, *Henry Ford Hospital, Detroit, MI*

757 **PDSA Model to Improve Pneumococcal Vaccine Adherence Among Kidney Transplant Candidates**
J. M. Ramakrishna, L. Brumble, C. R. Libertin, *Division of Infectious Diseases, Mayo Clinic, Florida, Jacksonville, FL*

758 **Covid-19 in Hiv-infected Solid Organ Transplant Recipients: A Case Series**
M. Ramanathan, A. Fernandez, Y. Natori, J. Simkins, J. Camargo, M. Morris, N. Rivera, M. Loebe, G. Ciancio, L. Abbo, A. Mattiazzi, G. Guerra, S. Anjan, *University of Miami, Miami, FL*

759 **Clinical Outcomes of Culture-Positive Pneumonia in Solid Organ Transplant Recipients**
L. Rice[1], A. C. Kalil[2], D. Hixson[2], M. Leick[3], *[1]Monument Health, Rapid City, SD, [2]University of Nebraska Medical Center, Omaha, NE, [3]Nebraska Medicine, Omaha, NE*

760 **Donor-Derived Tuberculosis in Lung Transplant Recipients, a Single Center Experience**
M. Robbins, D. Kabbani, C. Cervera, C. O'Neil, R. Cooper, K. Halloran, S. Grocholski, K. Doucette, *University of Alberta, Edmonton, AB, Canada*

761 **Pregnancy After CMV Infection Following Uterus Transplantation: A Case Report**
M. Rosenzweig, A. Wall, G. Testa, L. Johannesson, *Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX*

762 **Covid-19 Reinfection in a Kidney Transplant Patient**
Z. Saeed Zafar, D. Malhotra, *Nephrology, Yale School of Medicine, New Haven, CT*

763 **Kidney Transplant Outcomes in HIV+ Recipients: A Single-Center Study**
M. Samra[1], A. Hall[2], I. Tang[2], *[1]Medicine, Edward Hines VA, Hines, IL, [2]Medicine, University of Illinois, Chicago, IL*

764 **Covid-19 Caseload and Management Practices Vary by Program-Level Factors: A Multinational Survey Study**
S. Sandal[1], B. Boyarsky[2], P. Chiang[2], A. Massie[2], D. Segev[2], M. Cantarovich[1], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

765 **Perioperative Anidulafungin Combined with Triazole Prophylaxis for the Prevention of Early Invasive Candidiasis in Lung Transplant Recipients**
E. Sartain[1], K. Schoeppler[1], B. Crowther[1], J. B. Smith[2], M. Abidi[3], T. J. Grazia[4], M. Steele[2], T. Gleason[2], K. Porter[2], A. Gray[2], *[1]University of Colorado Skaggs School of Pharmacy, Aurora, CO, [2]Division of Pulmonary Sciences and Critical Care, University of Colorado, Denver, CO, [3]Division of Infectious Disease, University of Colorado, Denver, CO, [4]Baylor University Medical Center, Dallas, TX*

766 **COVID-19 Infection in Kidney versus Non-kidney Solid Organ Transplant Recipients: A Single Center Study**
J. Schaenman[1], H. Byford[2], T. R. Grogan[3], S. Fraschilla[2], K. Meneses[4], J. C. Alejos[5], M. Rivera[6], S. Saab[7], *[1]Infectious Diseases, UCLA, Los Angeles, CA, [2]Transplant Administration, UCLA, Los Angeles, CA, [3]Division of General Internal Medicine and Health Services Research, UCLA, Los Angeles, CA, [4]Liver Transplantation, UCLA, Los Angeles, CA, [5]Pediatric Heart Transplantation, UCLA, Los Angeles, CA, [6]Pediatric Kidney Transplantation, UCLA, Los Angeles, CA, [7]Liver Transplantation, David Geffen School of Medicine at UCLA, Los Angeles, CA*

767 **Impact of Sars-cov-2 Infection in Waiting List for Liver Transplantation: A Cohort Study on Clinical Outcomes**
A. Sessa, A. Mazzola, B. Granger, D. Wakselman, M. Atif, V. Martinez, M. Mallet Maxime, D. Thabut, O. Scatton, F. Conti, *Hopital Pitie Salpetriere, Paris, France*

768 **Delayed Valganciclovir Initiation and the Incidence of Cytomegalovirus Infection in Liver Transplant Recipients**
S. Shaikh, P. Kawewat-Ho, Y. Genyk, L. Sher, J. Kahn, L. Rivera, *Keck Medical Center of USC, Los Angeles, CA*

769 **Quantiferon-tb Gold Plus in Liver Transplant Candidates: Single-center Experience**
J. Simkins[1], M. A. Mendoza[1], A. Chandorkar[1], Y. Natori[1], S. Anjan[1], L. R. Arosemena[1], R. Vianna[2], *[1]Medicine, University of Miami, Miami, FL, [2]Surgery, University of Miami, Miami, FL*

770 **Nosocomial COVID-19 Among Hospitalized Solid Organ Transplant Recipients**
J. T. Swan[1], A. Tran[1], E. Rizk[2], E. A. Graviss[1], A. Drews[2], K. A. Grimes[2], D. T. Nguyen[1], S. G. Yi[2], R. R. McMillan[2], F. Yuan[1], I. Carrillo[3], G. Book[3], F. R. Zabaneh[3], L. W. Moore[1], A. O. Gaber[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX, [3]Houston Methodist, Houston, TX*

771 **Cytomegalovirus Nephritis: Epidemiology and Outcomes of an Uncommon Diagnosis**
K. J. Swanson, A. Djamali, A. Ghaffar, F. Aziz, N. Garg, M. Mohamed, D. A. Mandelbrot, M. Jorgensen, S. Parajuli, *Division of Nephrology, University of Wisconsin-Madison, Madison, WI*

772 **Changes in Cytomegalovirus Specific T Cell Immunity With Immunomodulation in Serodiscordant High Risk Transplant Recipients**
T. Tinkham, C. Song, R. Winstead, I. Yakubu, A. Brown, S. Sterling, G. Gupta, D. Kumar, *Virginia Commonwealth University Health, Richmond, VA*

773 **Ganciclovir Therapeutic Drug Monitoring in Obese Adults Patients - Opportunity for Clinical Utility**
Y. Tran[1], S. Bernard[1], R. W. Stevens[1], L. Myhre[1], R. Razonable[2], *[1]Department of Pharmacy, Mayo Clinic, Rochester, MN, [2]Division of Infectious Diseases, Department of Internal Medicine, Mayo Clinic, Rochester, MN*

Kidney Infectious Non-Polyoma & Non-Viral Hepatitis

774 **Variation of Mortality from SARS-CoV-2 Infection in Kidney Transplant Recipients Over the Course of the Pandemic**
Y. Al Azzi, C. Pynadath, P. Loarte, O. Alani, L. Liriano-Ward, M. Ajaimy, R. Bartash, J. Graham, M. Le, H. Yaffe, S. Greenstein, J. Rocca, M. Kinkhabwala, E. Akalin, *Montefiore Medical Center, New York, NY*

775 **Risk Factors of COVID-19 in Kidney Transplant Recipients**
M. M. Alkadi, E. Abuhelaiqa, M. Asim, O. Fituri, R. Elidrisi, R. Abdul Rahiman, M. Elshirbeny, M. Othman, A. Hamad, A. Ashour, A. Hamdi, A. Nauman, H. Tohid, M. Jarman, H. Al-Malki, *Nephrology-Medicine, Hamad Medical Corporation, Doha, Qatar*

776 **Impact of Early versus Late Ureteric Stent Removal and Antibiotic Prophylaxis on Urinary Tract Infection Incidence in Kidney Transplant Adult Recipients**
K. Althiab[1], B. Alqahtani[2], R. Alotaibi[3], R. Alhussein[3], R. Almuhiteb[2], L. Alnajjar[2], M. Alqahtani[2], K. Bin Saad[4], W. Ohali[4], A. Tamimi[4], M. N. Almarastani[4], S. Kashkoush[4], G. Aboalsameh[4], M. Shaheen[4], M. Tawhari[4], A. Altheaby[4], Z. Arabi[5], *[1]Pharmaceutical Care Services, King Abdulaziz Medical Center, Riyadh, Saudi Arabia, [2]College of Pharmacy, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia, [3]bCollege of Pharmacy, Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia, [4]Organ Transplant Center, King Abdulaziz Medical Center, Riyadh, Saudi Arabia, [5]King Abdulaziz Medical Center, Riyadh, Saudi Arabia*

777 **Methenamine for the Prevention of Recurrent UTIs Post-Renal Transplant**

A. Bigness[1], S. Mohamed[2], S. Mandala[1], N. Khodieva[2], K. Robichaux[3], H. Mohammed[1], J. Buggs[4], A. Kumar[1], A. Brueckner[5], L. Bowman[5], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]College of Public Health, University of South Florida, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Surgery, Tampa General Hospital, Tampa, FL, [5]Department of Pharmacology, Tampa General Hospital, Tampa, FL*

778 **Outcomes Among CMV Mismatched and Highly Sensitized Kidney Transplant Recipients Who Develop Leukopenia or Neutropenia**

S. Brar[1], R. Berry[2], A. Raval[3], Y. Tang[3], F. Vincenti[2], N. Skartsis[2], *[1]University of British Columbia, Vancouver, BC, Canada, [2]University of California, San Francisco, San Francisco, CA, [3]Merck and Co., Inc., Kenilworth, NJ*

779 **Clinical Characteristics, Risk Factors and Outcomes of Norovirus Infection in Renal Transplant Patients: A Retrospective Single Center Study**

T. Brooks[1], T. Crilley[1], B. Gaglani[2], N. Jakharia[2], *[1]Department of Internal Medicine, Wake Forest University Baptist Medical Center, Winston Salem, NC, [2]Division of Infectious Diseases, Wake Forest University Baptist Medical Center, Winston Salem, NC*

780 **Evaluation of Low Dose Famciclovir as Herpes Simplex Virus and Varicella Zoster Virus Prophylaxis in Cytomegalovirus Low Risk Solid Organ Transplant Recipients**

M. Cote, A. Cubley, C. Rogers, S. Shao, C. N. Kotton, *Massachusetts General Hospital, Boston, MA*

781 **Relationship Between Diabetes Mellitus and Covid-19 Prognosis in Kidney Transplant Patients**

D. D. de Lucena, I. A. de Brito, M. P. Cristelli, J. O. Medina-Pestana, H. Tedesco-Silva, É. B. Rangel, *Department of Medicine, Division of Nephrology, Federal University of São Paulo, São Paulo, Brazil*

782 **Management of Asymptomatic Bacteriuria in Kidney Transplant Recipients**

A. Diamond, *Pharmacy, Temple University Hospital, Philadelphia, PA*

783 **Survival Outcomes in Kidney Transplant Recipients Aged 18-60 Years by CMV Discordance Status: A Multivariable Analysis**

A. Dinesh[1], T. Shaker[1], S. Jackson[2], S. Riad[3], T. L. Pruett[1], *[1]Division of Transplantation, Department of Surgery, University of Minnesota, Minneapolis, MN, [2]Biostatistics, Analytics Consulting Services- Solid Organ Transplant, M Health Fairview, Minneapolis, MN, [3]Department of Medicine, University of Minnesota, Minneapolis, MN*

784 **Does High-Risk CMV Discordance Affect Elderly Kidney Transplant Recipient Survival? A Multivariable Analysis**

A. Dinesh[1], S. Jackson[2], S. Riad[3], T. L. Pruett[1], *[1]Division of Transplantation, Department of Surgery, University of Minnesota, Minneapolis, MN, [2]Biostatistics, Analytics Consulting Services- Solid Organ Transplant, M Health Fairview, Minneapolis, MN, [3]Department of Medicine, University of Minnesota, Minneapolis, MN*

785 **Outcomes of Kidney Transplantation at the Epicenter of the Covid-19 Pandemic: The Experience of the Ospedale Maggiore Policlinico**

E. Favi[1], C. Alfieri[2], M. Gandolfo[2], A. Brescacin[1], M. Bilato[3], R. Cacciola[4], P. Messa[2], M. Ferraresso[5], *[1]Renal Transplantation, Ospedale Maggiore Policlinico, Milan, Italy, [2]Nephrology, Ospedale Maggiore Policlinico, Milan, Italy, [3]Urology, Ospedale Maggiore Policlinico, Milan, Italy, [4]HBP Surgery, Policlinico Tor Vergata, Rome, Italy, [5]Department of Clinical Sciences and Community Health, University of Milan, Milan, Italy*

786 **Delay in Pediatric Kidney Transplantation Due to Infection: A Single Center Study**

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787 **Clinical Outcomes and Management of Covid-19 Patients Among Kidney Transplant Recipients: A Systematic Review**

S. Ismail[1], A. Babonj[2], S. Al Harbi[3], A. Babonj[2], A. Almalki[1], E. J. Murray[4], *[1]King Khalid hospital, MNGHA, Jeddah, Saudi Arabia, [2]King Abdulaziz University, Jeddah, Saudi Arabia, [3]King Faisal Specialist Hospital, Jeddah, Saudi Arabia, [4]Boston University School of Public Health, Boston, MA*

788 **Efficacy and Safety of a High Dose Ganciclovir Dosing Strategy in Kidney and Pancreas Transplant Recipients**

M. Jorgenson[1], J. Descourouez[1], G. Leverson[2], C. Saddler[2], J. Smith[2], D. Mandelbrot[2], J. Odorico[2], *[1]UW Health, Madison, WI, [2]UW School of Medicine and Public Health, Madison, WI*

789 **Covid 19 Re-infection versus Reactivation in Two Renal Transplant Patients**

L. Liriano-Ward, Y. Al Azzi, R. Bartash, C. Pynadath, M. Ajaimy, P. Loarte, J. Graham, S. Greenstein, M. Kinkhabwala, J. Rocca, E. Akalin, *Montefiore Medical Center, New York, NY*

790 **Infectious Complications and Malignancy After Kidney Transplantation in the Elderly Population**

L. Liriano-Ward, M. Parides, Y. Al Azzi, C. Pynadath, M. Ajaimy, P. Loarte, J. Graham, S. Greenstein, M. Le, H. Yaffe, M. Kinkhabwala, J. Rocca, E. Akalin, *Montefiore Medical Center, New York, NY*

791 **Impact of Belatacept and Tacrolimus on Cmv Viral Load Control and Relapse in Moderate and High-risk Cmv Serostatus Kidney Transplant Recipients**

W. Magua[1], A. C. Johnson[1], G. M. Karadkhele[1], I. R. Badell[1], P. Vasanth[1], M. G. Lyon III[2], A. K. Mehta[2], K. A. Easley[3], J. Rickert[4], C. P. Larsen[1], *[1]Department of Surgery, Emory University, Atlanta, GA, [2]Department of Medicine, Emory University, Atlanta, GA, [3]Biostatistics and Bioinformatics, Emory University, Atlanta, GA, [4]RStudio and R Consortium, San Jose, CA*

792 **Impact of Non-active Hepatitis B on Patient Survival After Renal Transplantation**

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793 **Intensive Monitoring and Early Treatment for Urinary Infection in Renal Transplant Recipients Reduces Readmission and Sepsis**

A. Patel, S. Desai, B. R. Schleich, M. Wynd, T. Carrea, Y. Yushkov, S. Geatrakas, N. White, R. Luongo, R. Sosnicki, V. Wadhera, D. Serur, M. J. Goldstein, *Organ Transplant, Hackensack University Medical Center, Hackensack, NJ*

794 **Unquantified Blips Lead to CMV Slips - Post Transplant CMV Monitoring in High Risk Kidney Transplant Recipients**

A. T. Payne[1], J. G. Timpone[2], A. Gilbert[2], B. Thomas[2], B. K. Lindner[2], *[1]Georgetown University School of Medicine, Washington, DC, [2]Medstar Georgetown University Hospital, Washington, DC*

795 **Discontinuation of Trimethoprim/sulfamethoxazole Prophylaxis Due to Hyperkalemia in Kidney Transplant Recipients**
D. Pett[1], G. Malat[2], C. Domenico[1], R. Samudralwar[1], A. Forte[1], D. Sawinski[2], J. Hu[1], B. Steiner[1], J. Rashid[1], J. Trofe-Clark[2], *[1]Pharmacy, Hospital of Univ of Pennsylvania, Philadelphia, PA, [2]Penn Transplant Institute, Hospital of Univ of Pennsylvania, Philadelphia, PA*

796 **Covid Infection Among Kidney Transplant Recipients: Management and Outcomes**
A. Price, K. Soliman, C. Zayas, V. Rao, M. Casey, D. Taber, M. Posadas Salas, *Medical University of South Carolina, Charleston, SC*

797 **SARS-CoV-2 Infection Among Kidney Transplant Recipients: A Multicenter Brazilian Cohort Study**
T. Sandes-Freitas[1], J. Medina-Pestana[2], o. COVID-19 Brazil Study Group[3], *[1]Universidade Federal do Ceará, Fortaleza, Brazil, [2]Hospital do Rim, São Paulo, Brazil, [3]Brazil, Brazil, Brazil*

798 **Risk Factors Associated with Multidrug Resistant Organism (MDRO) Infections in Kidney Transplant Recipients: A Single Center Experience**
S. Schrank[1], J. Timpone[2], B. Javaid[3], P. Kumar[2], M. Cooper[3], *[1]Internal Medicine, MedStar Georgetown University Hospital, Washington, DC, [2]Infectious Diseases and Travel Medicine, MedStar Georgetown University Hospital, Washington, DC, [3]Transplant Institute, MedStar Georgetown University Hospital, Washington, DC*

799 **Predictive Factors and Management of Urinary Tract Infections After Kidney Transplantation: A Retrospective Cohort Study**
T. Shimizu, Y. Kinoshita, T. Shinzato, D. Iwami, *Jichi Medical University, Shimotsuke City, Japan*

800 **An Unusual Viral Tropism in a Solid Organ Transplant Recipient**
P. Singh, A. Bentall, C. Langstraat, A. Swanson, P. Deziel, Y. Huang, R. Razonable, *Mayo Clinic, Rochester, MN*

801 **Incidence of Oral Candidiasis in Renal and/or Pancreas Transplant Recipients When Administering Prophylaxis versus No Prophylaxis**
L. Von Stein[1], S. Patel[1], L. Wardlow[2], *[1]Transplant, The Ohio State Wexner Medical Center, Columbus, OH, [2]Pharmacy, The Ohio State Wexner Medical Center, Columbus, OH*

802 **Clinical and Pathological Features of Lobar Nephronia in Renal Allograft**
Y. Wang[1], Z. Yan[1], Y. Liu[1], Y. Zhou[1], Y. He[1], W. Zeng[1], R. Xia[1], W. Deng[1], J. Xu[1], C. Wu[2], Y. Miao[1], *[1]Department of Organ Transplantation, Nanfang Hospital, Southern Medical University, Guangzhou, China, [2]Department of Urology and Pathology, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

LB 67 **Real-world Treatment Patterns of Antiviral Agents for Cytomegalovirus Among Adult Kidney Transplant Recipients: A USRDS-Medicare Linked Database Study**
A. D. Raval[1], M. Ganz[2], P. Saravanan[2], Y. Tang[1], C. A. Santos[3], *[1]Merck & Co., Inc., Kenilworth, NJ, [2]Evidera, Inc., Waltham, MA, [3]Rush University Medical Center, Chicago, IL*

LB 68 **Cytomegalovirus Infection Among Adult Kidney Transplant Recipients: Findings From the USRDS-medicare Linked Database Study**
A. Raval[1], M. Ganz[2], S. Alam[2], Y. Tang[1], C. Santos[3], *[1]Merck & Co., Inc., Rahway, NJ, [2]Evidera-PPD, Waltham, MA, [3]Rush University Medical Center, Chicago, IL*

LB 69 **Impact of Cytomegalovirus Prophylaxis on Herpes Simplex and Varicella Zoster Virus Infections in Kidney Transplant Recipients**
K. Ridgely[1], B. Crowther[2], P. Klem[2], K. Schoeppler[1], K. Schwarz[1], A. Nadrash[2], V. Lewis[1], E. Benamu[3], *[1]Department of Pharmacy Services, UCHealth University of Colorado Hospital, Aurora, CO, [2]Ambulatory Care Pharmacy Services, UCHealth University of Colorado Hospital, Aurora, CO, [3]Department of Medicine, UCHealth University of Colorado Hospital, Aurora, CO*

Kidney: Polyoma

803 **Belatacept Pharmacokinetics in Patients with and without Infection**
A. Bickenbach[1], M. McGowan[1], B. Miyagawa[2], T. Mizuno[2], A. Shields[3], A. Christianson[1], P. West-Thielke[4], J. Leone[5], E. Woodle[1], D. Kaufman[6], A. Wiseman[7], A. Vinks[2], R. Alloway[1], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Children's Med Center, Cincinnati, OH, [3]Christ Hospital, Cincinnati, OH, [4]UIC, Chicago, IL, [5]Tampa Gen, Tampa, FL, [6]U Wisconsin, Madison, WI, [7]Centura Transplant, Denver, CO*

804 **Significance of Detectable but Unquantifiable Viremias Post Renal Transplantation**
M. Chaung, S. Puri, S. Bunin, Z. Mondal, O. Eletta, R. Pelletier, A. Bongu, *Robert Wood Johnson University Hospital, New Brunswick, NJ*

805 **Influence of HLA Compatibility on Bk Virus Associated Nephropathy Among Japanese Living Donor Kidney Transplant Recipients**
N. Fujiyama[1], M. Saito[2], R. Yamamoto[2], R. Sagehashi[2], T. Saito[2], S. Kashima[2], K. Numakura[2], S. Narita[2], T. Habuchi[2], S. Satoh[1], *[1]Center for Kidney Disease and Transplantaion, Akita University Hospital, Akita, Japan, [2]Department of Urology, Akita University Graduate School of Medicine, Akita, Japan*

806 **Dissecting the Intrarenal Immune Response to Viral Infected Cells in Pediatric BK Virus-associated Nephropathy (BKVAN)**
D. M. Okamura[1], S. W. Jackson[1], V. R. Dharnidharka[2], J. M. Smith[1], *[1]Pediatric Nephrology, Seattle Children's Hospital & Research Institute, Seattle, WA, [2]Pediatric Nephrology, 2St. Louis Children's Hospital, Washington University School of Medicine, St. Louis, MO*

807 **BKV-Associated Urothelial Carcinoma in Patients After Renal and Extrarenal Carcinoma**
A. Schwarz[1], J. Schmitz[2], J. Gottlieb[3], C. Bara[4], H. Haller[1], J. Braesen[2], *[1]Nephrology Department, Hannover Medical School, Hannover, Germany, [2]Institute of Pathology, Hannover Medical School, Hannover, Germany, [3]Department of Pneumology, Hannover Medical School, Hannover, Germany, [4]Department of Thoracic Surgery, Hannover Medical School, Hannover, Germany*

808 **Polyomavirus BK-Associated Nephropathy in Patients After Renal and Extrarenal Transplantation**
A. Schwarz[1], J. Schmitz[2], J. Braesen[2], C. Bara[3], M. Sauer[4], H. Haller[1], J. Gottlieb[5], *[1]Nephrology Department, Hannover Medical School, Hannover, Germany, [2]Institute of Pathology, Hannover Medical School, Hannover, Germany, [3]Department of Thoracic Surgery, Hannover Medical School, Hannover, Germany, [4]Department of Pediatric Hematology, Hannover Medical School, Hannover, Germany, [5]Department of Pneumology, Hannover Medical School, Hannover, Germany*

809 **Conversion from Tacrolimus to Envarsus in Rapid Metabolizers for Prevention of BK Infection**
G. Towns, G. Agarwal, C. Kew, *Transplant Nephrology, UAB, Birmingham, AL*

Non-Organ Specific: Viral Hepatitis

810 **Successful Single-Center Experience Using HCV+ Organs for Single and Dual-Organ Transplantation**
S. Aslam, C. Logan, N. Law, J. Kerr, J. Kozuch, V. Ajmera, K. Afshar, A. Khan, E. Adler, K. Mekeel, E. Golts, V. Pretorius, *UCSD, San Diego, CA*

811 **Hepatitis E Diagnosis and Management After Liver, Kidney, or Heart Transplant: A Single Center Experience**
M. Carter[1], M. Fitzmaurice[2], S. Yeddula[2], A. Singh[2], S. Nagai[2], S. Jafri[2], *[1]Wayne State University School of Medicine, Detroit, MI, [2]Henry Ford Health System, Detroit, MI*

812 **Processes to Successfully Utilize Hepatitis C (HCV) Infected Donor Kidneys as Standard of Care**
A. Dao[1], A. Reyad[1], J. Guiteau[1], M. Madhrira[2], S. Allam[2], *[1]Transplant, Medical City Fort Worth, Fort Worth, TX, [2]Tarrant Nephrology Associates, Premier Physicians Group Health, Fort Worth, TX*

813 **Not Always as it Seems: Lack of Hepatitis C Virus Transmission from Nucleic Acid Testing Positive Deceased Donors**
A. Nishio Lucar[1], A. Kumar[1], S. Rao[1], V. L. Kelly[1], K. Coles[2], J. Kamal[1], C. W. Green[1], A. M. Doyle[1], *[1]Medicine, University of Virginia, Charlottesville, VA, [2]University of Virginia, Charlottesville, VA*

814 **Transplantation of Hepatitis C Positive Kidney and Pancreas Allografts Into Hepatitis C Naïve Recipients - A Single Center Experience as a Standard of Care**
K. Yadav[1], A. Padiyar[2], K. Zhao[3], J. Rabets[3], A. Jittirat[2], S. Sclair[4], *[1]Transplant Surgery, University of Toledo Medical Center, Toledo, OH, [2]Nephrology, University Hospitals Cleveland, Cleveland, OH, [3]Transplant Surgery, University Hospitals Cleveland, Cleveland, OH, [4]Gastroenterology and Hepatology, University Hospitals Cleveland, Cleveland, OH*

LB 70 **Exploring the Correlation with Donor Hepatitis C Viral Load and Viral Kinetics in Naïve Kidney Transplantation Recipients**
A. Brooks[1], A. Rechnitzer[1], R. Teo[1], D. Y. Goldstein[2], M. Narlieva[2], J. P. Rocca[1], M. Ajaimy[1], L. Liriano-Ward[1], Y. Azzi[1], C. Pynadath[1], P. Loarte-Campos[1], E. Akalin[1], M. E. Le[1], H. Yaffe[1], S. Greenstein[1], J. Torabi[1], M. M. Kinkhabwala[1], J. A. Graham[1], *[1]Montefiore-Einstein Center for Transplantation, Montefiore Medical Center, Bronx, NY, [2]Pathology, Montefiore Medical Center, Bronx, NY*

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PTLD: All Topics

815 **Post-Transplant Lymphoproliferative Disorder as a Trigger for Hemophagocytic Lymphohistiocytosis in Solid Organ Transplant - Case Series**
M. Doraiswamy, P. Singh, T. Pesavento, *Comprehensive Transplant Center, The Ohio State University Wexner Medical Center, Columbus, OH*

Kidney

Kidney Acute Antibody Mediated Rejection

1025 **Outcomes of Kidney Transplant Recipients with Antibody-mediated Allograft Rejection: A Retrospective Study**
A. Al Jurdi[1], L. Goldfarb[1], M. Lafargue[2], J. Azzi[3], L. V. Riella[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Université de Paris, Paris, France, [3]Transplantation Research Center, Brigham and Women's Hospital, Boston, MA*

1026 **Clinical Validation and Performance of Donor-Derived Cell-Free DNA in Allograft Rejection**
S. Anand[1], A. Pai[2], J. S. Bromberg[3], G. Gupta[4], I. Moinuddin[4], T. Alhamad[5], V. Bowers[6], S. Ghosh[7], W. Tian[7], L. Bu[8], E. Stites[9], *[1]Intermountain Medical Center, Murray, UT, [2]University of Texas McGovern Medical School, Houston, TX, [3]University of Maryland School of Medicine, Baltimore, MD, [4]Virginia Commonwealth University, Richmond, VA, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]CareDx, Brisbane, CA, [8]University of Minnesota, Minneapolis, MN, [9]University of Colorado, Aurora, CO*

1027 **A2 to B Deceased Donor Renal Transplantation Outcome Analysis: Single Center Experience**
S. Bindroo, M. Doshi, *Nephrology, University of Michigan, Ann Arbor, MI*

1028 **Plasma Donor-Derived Cell-Free DNA Levels Risk-Stratify Kidney Allograft Injury with Isolated Transplant Glomerulitis**

L. Bu[1], S. Anand[2], A. Pai[3], J. S. Bromberg[4], G. Gupta[5], I. Moinuddin[5], T. Alhamad[6], V. Bowers[7], S. Ghosh[8], W. Tian[8], E. Stites[9], *[1]University of Minnesota, Minneapolis, MN, [2]Intermountain Medical Center, Murray, UT, [3]University of Texas McGovern Medical School, Houston, TX, [4]University of Maryland School of Medicine, Baltimore, MD, [5]Virginia Commonwealth University, Richmond, VA, [6]Washington University in St. Louis, St. Louis, MO, [7]Tampa General Hospital, Tampa, FL, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*

1029 **The Role of Donor-derived Cell-free DNA Testing in Detecting Subclinical Kidney Allograft Rejection**

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1030 **Donor Derived Cell-free DNA Kinetics Early After Kidney Transplant in Patients with Delayed Graft Function Who Received Kidneys from Donation After Cardiac Death Donors**

R. Gumber, M. Abuzeineh, C. Mejia, D. Brennan, F. Naqvi, *Division of Nephrology, Johns Hopkins University School of Medicine, Baltimore, MD*

1031 **Utility of Donor-Derived Cell Free DNA for Detecting ABMR in Patients With AT1R Antibodies**

S. Kant[1], D. Kumar[2], I. Moinuddin[2], T. Alhamad[3], M. Haris[3], J. Gray[4], B. Dale[4], M. Bettinotti[1], D. C. Brennan[1], *[1]Johns Hopkins University School of Medicine, Baltimore, MD, [2]VCU, Richmond, VA, [3]Wash Univ, St. Louis, MO, [4]CareDx, Brisbane, CA*

1032 **Graft Outcomes of Antibody Mediated Rejection without Donor Specific Anti - HLA Antibodies After Kidney Transplantation**

H. Ko, S. Min, A. Han, S. Ahn, C. T. Chung, H. Kim, K. Choi, S. Min, H. Kang, J. Ha, *Seoul National University Hospital, Seoul, Korea, Republic of*

1033 **Combined Impact of Pre-sensitization and Delayed Graft Function on Allograft Rejection in Deceased Donor Kidney Transplantation: A Nationwide Cohort Study**

H. Lee[1], Y. Park[1], T. Ban[2], S. Song[3], S. Song[4], J. Yang[5], C. Ahn[5], C. Yang[1], B. Chung[1], *[1]Division of Nephrology, Department of Internal Medicine, Seoul St. Mary's hospital, Seoul, Korea, Republic of, [2]Division of Nephrology, Department of Internal Medicine, Eunpyeong St. Mary's hospital, Seoul, Korea, Republic of, [3]Organ Transplantation Center and Department of Internal Medicine, Pusan National University Hospital, Pusan, Korea, Republic of, [4]Department of Surgery, Ewha Womans University Medical Center, Seoul, Korea, Republic of, [5]Department of Nephrology, Seoul National University Hospital, Seoul, Korea, Republic of*

1034 **The Clinical Significance of Preformed Anti-HLA-DQ Donor-specific Antibodies on Allograft Outcomes in Kidney Transplantation**

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1035 **The Clinical Significance of Preformed C1q-binding Donor-specific HLA Antibodies in Kidney Transplantation**

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1036 **Comparing Bortezomib Protocol versus IVIG/Rituximab in the Treatment of Antibody Mediated Rejection (AMR) in Kidney Transplantation**

V. M. Lowery[1], A. Centeno[1], T. Harrison[1], P. Cabrera[1], A. Mattiazzi[2], *[1]Pharmacy, Jackson Memorial Hospital/Miami Transplant Institute, Miami, FL, [2]Nephrology & Hypertension, Miami Transplant Institute, Jackson Memorial Hospital/Miami Transplant Institute, Miami, FL*

1037 **Membrane versus CentrifugeBased Therapeutic Plasma Exchange to Treat Antibody-Mediated Rejection in Kidney Transplantation**

P. Maggiani[1], J. C. Ramirez Valdestino[1], J. H. Cano Cervantes[1], O. D. Díaz Avedaño[1], G. García Castillo[1], M. C. Oseguera Vizcaíno[2], M. A. Covarrubias[2], M. Matías Carmona[1], D. F. Ovando Morga[1], G. Ramirez Ramirez[1], V. D. Lebrija Córdoba[1], S. Hernandez Estrada[1], *[1]Transplantation, Centro Medico Nacional 20 de Noviembre, Mexico City, Mexico, [2]Transplantation, Hospital Civil Fray Antonio Alcalde, Guadalajara, Mexico*

1038 **Donor Derived Cell Free Dna: Teasing Out the Optimal Threshold for Antibody Mediated Rejection**

M. Mattu[1], H. Murad[1], M. Merzkani[1], A. Malone[1], R. Delos Santos[1], M. Wang[2], B. Wang[2], S. Chang[2], T. Alhamad[1], *[1]Department of Medicine, Washington University in St Louis, St Louis, MO, [2]Washington University in St Louis, St Louis, MO*

1039 **De Novo Membranous Nephropathy Associated with Antibody-mediated Rejection in Renal Transplant Recipients**

M. V. Sousa[1], L. G. Fernandes[2], L. L. de Freitas[3], R. L. Zollner[2], M. Mazzali[1], *[1]Internal Medicine - Division of Nephrology, University of Campinas, Campinas, Brazil, [2]Internal Medicine, University of Campinas, Campinas, Brazil, [3]Pathology, University of Campinas, Campinas, Brazil*

1040 **Treatment and Outcomes of Kidney Transplant Recipients with C4d Negative Antibody Mediated Rejection**

M. Walsh, L. Lineberger, M. Brokhof, N. Kenyon, N. Alvey, *Rush University Medical Center, Chicago, IL*

1041 **Use of Donor-Derived Cell-Free DNA for Assessment of Allograft Rejection After Change in Maintenance Immunosuppression Regimens in the First Year Post Kidney Transplant**

M. Walsh, V. Peev, L. Lineberger, M. Brokhof, N. Kenyon, N. Alvey, *Rush University Medical Center, Chicago, IL*

LB 76 **Detection of Rejection in Kidney Transplant Patients Using an Algorithm That Combines Donor Fraction and Absolute Donor-derived Cell-free DNA**

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Kidney Chronic Antibody Mediated Rejection

1042 **The Summarized Assessment of Endothelin a Receptors Expression in Renal Transplant Compartments is Associated with Antibody Mediated Rejection**

M. Banasik[1], K. Nowanska[1], P. Donizy[2], K. Koscielska-Kasprzak[3], S. Zmonarski[1], M. Kuriata-Kordek[1], A. Tukiendorf[4], A. Hałoń[2], D. Janczak[5], M. Krajewska[1], *[1]Department of Nephrology and Transplantation Medicine, Wroclaw Medical University, Wroclaw, Poland, [2]Department of Pathomorphology and Oncological Cytology, Wroclaw Medical University, Wroclaw, Poland, [3]Research laboratory, Wroclaw Medical University, Wroclaw Medical University, Wroclaw, Poland, [4]Department of Public Health, Wroclaw Medical University, Wroclaw, Poland, [5]Department of General, Vascular and Transplant Surgery, Wroclaw Medical University, Wroclaw, Poland*

1043 **Higher Calcineurin Inhibitor Levels Associate with Graft Outcomes in Kidney Recipients with De Novo Donor-specific Antibodies of Either Hla Class I or II**

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1044 **Non-HLA Antibodies and Eplet Mismatches in Cases with Histological Picture of Antibody-Mediated Rejection with and without HLA Donor-Specific Antibodies**

M. Crespo[1], L. Llinás[2], D. Redondo[2], C. Butler[3], J. Gimeno[4], M. Pérez-Sáez[2], A. Buxeda[2], C. Arias[2], M. Folgueiras[2], S. Sanz[2], N. Valenzuela[3], E. E. Reed[3], J. Pascual[2], *[1]Nephrology and Kidney Transplantation, Hospital del Mar, Barcelona, Spain, [2]Nephrology, Hospital del Mar, Barcelona, Spain, [3]UCLA Immunogenetics Center, UCLA, Los Angeles, CA, [4]Pathology, Hospital del Mar, Barcelona, Spain*

1045 **Treatment of Refractory Chronic Active Antibody-Mediated Rejection: Improvement in Histopathology are Delayed Compared to the Reduction in Donor Specific Antibodies**

K. R. Degner[1], S. Parajuli[1], F. Aziz[1], N. Garg[1], M. Mohamed[1], D. A. Mandelbrot[1], S. E. Panzer[1], L. Hidalgo[1], N. A. Wilson[1], S. R. Reese[1], K. Van Hyfte[1], W. Zhong[1], P. Nickerson[2], A. Djamali[1], *[1]University of Wisconsin, Madison, WI, [2]University of Manitoba, Winnipeg, MB, Canada*

1046 **Psmp is Discriminative for Chronic Active Antibody-Mediated Rejection and Predicts Graft Risk After Kidney Transplantation**

Y. Fu, P. Zhan, *Tianjin First Central Hospital, Tianjin, China*

1047 **Clazakizumab for the Treatment of Chronic Active Antibody-Mediated Rejection in Kidney Transplant Recipients: Phase 3 IMAGINE Study Design**

P. Nickerson[1], G. Böhmig[2], S. Chadban[3], D. Kumar[4], R. B. Mannon[5], T. van Gelder[6], S. Adler[7], E. Chong[7], A. Djamali[8], *[1]University of Manitoba, Winnipeg, MB, Canada, [2]Medical University of Vienna, Vienna, Austria, [3]University of Sydney, Sydney, Australia, [4]University of Toronto, Toronto, ON, Canada, [5]University of Nebraska Medical Center, Omaha, NE, [6]Leiden University Medical Center, Leiden, Netherlands, [7]CSL Behring, King of Prussia, PA, [8]University of Wisconsin, Madison, WI*

1048 **Clazakizumab (clz, Anti-il-6 Antibody) Treatment Affects Il-6/il-6r Signaling by Increasing Soluble Gp130 (sgp130) in Hla-sensitized Kidney Transplant Patients (hs Ktx Pts) Treated for Chronic Antibody-mediated Rejection (cabmr)**

B. Shin, S. Ge, A. Jimenez, N. Ammerman, A. Vo, R. Zhang, S. C. Jordan, M. Toyoda, *Cedars-Sinai Medical Center, Cerritos, CA*

Kidney Complications: Immune Mediated Late Graft Failure

1061 **Donor-Derived Cell-Free DNA as a Surrogate Marker for "Allograft Quiescence" After Kidney Transplantation**

J. S. Bromberg[1], L. Bu[2], G. Gupta[3], I. Moinuddin[3], S. Anand[4], A. Pai[5], T. Alhamad[6], V. Bowers[7], S. Ghosh[8], W. Tian[8], E. Stites[9], *[1]University of Maryland School of Medicine, Baltimore, MD, [2]University of Minnesota, Minneapolis, MN, [3]Virginia Commonwealth University, Richmond, VA, [4]Intermountain Medical Center, Murray, UT, [5]University of Texas McGovern Medical School, Houston, TX, [6]Washington University in St. Louis, St. Louis, MO, [7]Tampa General Hospital, Tampa, FL, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*

1062 **Association of Donor-Derived Cell-Free DNA with Severity of Interstitial Fibrosis and Cortical Atrophy Lesions Following Kidney Transplantation**

L. Bu[1], E. Stites[2], V. Bowers[3], T. Alhamad[4], J. S. Bromberg[5], G. Gupta[6], I. Moinuddin[6], S. Ghosh[7], W. Tian[7], A. Pai[8], S. Anand[9], *[1]University of Minnesota, Minneapolis, MN, [2]University of Colorado, Aurora, CO, [3]Tampa General Hospital, Tampa, FL, [4]Washington University in St. Louis, St. Louis, MO, [5]University of Maryland School of Medicine, Baltimore, MD, [6]Virginia Commonwealth University, Richmond, VA, [7]CareDx, Brisbane, CA, [8]University of Texas McGovern Medical School, Houston, TX, [9]Intermountain Medical Center, Murray, UT*

1063 **Recurrence and Outcome of Anti-GBM Glomerulonephritis After Kidney Transplantation: A Belgian Multicenter Study**

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1064 **PLA2R Status and Antibody Mediated Rejection in Kidney Transplant with Membranous Nephropathy**

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1065 **Characterization of Chronic Renal Allograft Dysfunction at Single Cell Resolution**

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1066 **Risk Factors for Mortality in Kidney Transplant Patients Infected by Sars-cov-2 in South of Spain**

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1067 **Intermediate Outcomes Following Early Inflammatory Changes on Surveillance Biopsies**

I. Melgarejo[1], V. Viswanathan[2], A. Sharma[1], P. Sood[1], C. Puttarajappa[1], N. Shah[1], M. Molinari[1], A. Tevar[1], C. Wu[1], S. Hariharan[1], R. Mehta[1], *[1]Starzl Transplant Institute, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Renal-electrolyte, University of Pittsburgh Medical Center, Pittsburgh, PA*

1068 **A Case of Graft-versus-Host Disease Following Pancreas-Kidney Transplant**

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LB 77 **The Importance of Persistent and Recurrent T Cell Mediated Rejection in Tacrolimus Treated Renal Transplant Recipients**

C. Rampersad[1], I. W. Gibson[2], D. N. Rush[1], D. Pochinco[3], P. E. Birk[4], A. Goldberg[4], T. Blydt-Hansen[5], M. Karpinski[1], J. Shaw[1], J. Ho[1], P. W. Nickerson[1], C. Wiebe[1], *[1]Department of Medicine, University of Manitoba, Winnipeg, MB, Canada, [2]Department of Pathology, University of Manitoba, Winnipeg, MB, Canada, [3]Shared Health Services Manitoba, Winnipeg, MB, Canada, [4]Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, MB, Canada, [5]Department of Pediatrics, University of British Columbia, Winnipeg, MB, Canada*

Kidney Complications: Non-Immune Mediated Late Graft Failure

1049 **HLA Allele Association with Recurrent Iga Nephropathy After Kidney Transplantation**

O. Alzahabi, M. Merzkani, H. Murad, A. Java, R. Delos Santos, T. Alhamad, A. Malone, *Transplant, Washington University, Saint Louis, MO*

1050 **Risk Factors and Outcome of Transplant Renal Artery Stenosis in Kidney Transplant Recipients - A Nested Case-control Study**

D. Choudhary[1], A. Sharma[1], R. Vijayvergiya[2], G. Kasinadhuni[2], D. Kenwar[1], S. Singh[1], *[1]Renal & Pancreas Transplant Surgery, Pgimer Chandigarh, Chandigarh, India, [2]Cardiology, Pgimer Chandigarh, Chandigarh, India*

1051 **De Novo Atypical Hemolytic Uremic Syndrome (aHUS) in Kidney Transplant Recipients from the Same Donor: Possible Role of Two Genetic Hits**

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1052 **Kidney Transplantation Outcomes Over Last Six Decades- A Single-center Experience**

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1053 **Belatacept Conversion in Proteinuric Renal Transplant Recipients: An Interventional Multi-Center Trial**

O. Efe[1], A. Al Jurdi[1], D. Wojciechowski[2], K. Safa[1], H. Gilligan[1], A. Chandraker[3], J. Azzi[3], A. Weins[3], L. V. Riella[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]UT Southwestern Medical Center, Dallas, TX, [3]Brigham and Women's Hospital, Boston, MA*

1054 **Defining the Characteristics and Graft Outcomes of Kidney Transplant Recipients with Elevated Plasma Oxalate Level Not Due to Primary Hyperoxaluria**

D. Khan, N. Zhang, M. Keddis, *Mayo Clinic, Phoenix, AZ*

1055 **Transplant Center Volume in High-risk Recipient Association with Graft and Patient Survival**

M. A. Merzkani, H. Murad, M. Mattu, S. Husami, M. Wang, V. Hu, S. Chang, T. Alhamad, *Transplant, Washington University, Saint Louis, MO*

1056 **Outcomes of Kidney Transplantation in Patients with Congenital Anomalies of the Kidney and Urinary Tract**

O. A. Oto[1], Y. Caliskan[2], H. Yazici[1], S. Mirioglu[3], A. Dirim[1], N. Garayeva[1], S. Safak[1], E. Demir[1], Y. Ozluk[4], A. Artan[1], A. Turkmen[1], K. Lentine[2], *[1]Nephrology, Istanbul University, Istanbul, Turkey, [2]Nephrology, Saint Louis University School of Medicine, Saint Louis, WA, [3]Nephrology, Bezmialem Vakif University School of Medicine, Istanbul, Turkey, [4]Pathology, Istanbul University, Istanbul, Turkey*

1057 **Hypercholesterolemia and Donor Age Impaired Capillary Vegf and Nitric Oxide (no) Expression and in Turn Decrease Both Microvascular Density and Tubule Villin Expression in Renal Allografts, Resulting in Poor Graft Survival**

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1058 **Impact of Donated Kidney Volume and Recipient Body Surface Area Incompatibility on the Allograft Outcomes with Pre-transplant Diabetes Mellitus**

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1059 **Cancer Among Kidney Transplant Recipients More Than 20 Years After Transplantation: PTLD Remains the Most Common Cancer Type Even in the Very Long-Term**

T. Schachtner, J. Fuhrmann, T. Mueller, *Nephrology, University Hospital Zurich, Zurich, Switzerland*

1060 **Changes in Glomerular Filtration Rate (delta Egfr) within the First Year Predict Long-Term Outcomes of Renal Grafts**

A. M. Thompson, M. Zenati, S. Hariharan, M. Molinari, *Starzl Transplant Institute, UPMC, Pittsburgh, PA*

Kidney Deceased Donor Allocation

823 **Black Patients Do Not Have Worse Short-Term Outcomes After Receiving High KDPI (>85%) Kidneys**

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824 **Low Immunogenic Donors Improved Survival of Kidney Transplants in African American Recipients**

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825 **VO_{2peak} Differentiates Survival Post Kidney Transplant**

H. Chakkera[1], B. Kaplan[2], P. Budhiraja[1], R. Butterfield[1], *[1]Mayo Clinic Hospital, Phoenix, AZ, [2]Baylor Scott and White Health, Temple, TX*

826 **Outcomes of Deceased Donor Transplants with Donor Specific Antibodies Before and After the New Kidney Allocation System**

R. Crew, P. Khairallah, S. S. Patel, *Columbia University, New York, NY*

827 **Titer Stability vs. Terminal Pre-transplant Titer: Titer History is Irrelevant for A_2 to B Transplantation**

A. Gilbert[1], S. Radomski[2], J. Vucci[1], B. Thomas[1], M. Cooper[1], *[1]Medstar Georgetown Transplant Institute, Washington, DC, [2]Johns Hopkins Medical Center, Baltimore, MD*

828 **HLA Haplotype Frequency and Racial Disparities in Access to Transplant Among Highly Sensitized Kidney Transplant Candidates**

L. Gragert[1], M. Kadatz[2], D. Chang[2], H. Gebel[3], D. Stewart[4], E. Kransdorf[5], S. Brar[2], S. Vaishnav[2], J. Gill[2], J. Lan[2], *[1]Tulane University, New Orleans, LA, [2]University of British Columbia, Vancouver, BC, Canada, [3]Emory University, Atlanta, GA, [4]UNOS, Richmond, VA, [5]Cedars-Sinai, Beverly Hills, CA, Canada*

829 **The Incremental Cost of Transplanting Patients with 100% cPRA Under the Kidney Allocation System: A Single Center Analysis**

R. Gumber, E. Kraus, K. Jackson, N. Alachkar, *Nephrology, Johns Hopkins University School of Medicine, Baltimore, MD*

830 **Effect of HLA-DR Mismatches on Graft Outcomes of Kidney Transplant from Elderly Donors**

P. Homkrailas, S. Bunnapradist, *David Geffen School of Medicine at UCLA, Los Angeles, CA*

831 **Organ Decline Rate and Outcomes of Shared Kidneys from OneLegacy OPO Donation Service Area in Los Angeles**

M. Hussain[1], P. Homkalrias[1], K. Wheeler[2], G. Danovitch[1], S. Bunnapradist[1], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]OneLegacy, Los Angeles, CA*

832 **Sharing Under KAS - What is the Impact According to KDPI?**

M. Jacobs, R. Stratta, C. Jay, *Wake Forest Baptist Health, Winston Salem, NC*

833 **Impact of the Kidney Allocation System on Kidney Transplant Outcomes in Patients with Long Dialysis Treatment (> 10 Years)**

M. Kadatz, S. Vaishnav, S. Brar, D. Chang, J. Lan, J. Gill, *Medicine, Division of Nephrology, University of British Columbia, Vancouver, BC, Canada*

834 **Transplant Center Provisional Yes Practices for Deceased Donor Kidneys**

A. M. Placona[1], C. Martinez[1], H. McGehee[1], C. Van De Walker[2], J. Rosendale[1], *[1]United Network for Organ Sharing, Richmond, VA, [2]Pacific Northwest Transplant Bank, Portland, OR*

835 **Changes to Allocation of En Bloc Deceased Donor Kidneys to Low Epts Patients**

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836 **Patient and Physician Perspectives on Kdpi>85 Consent and Kidney Acceptance Decision Making**

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LB 73 **Trends and Outcomes Analysis of U.S. Transplant Centers Performing High Volumes of Hard to Place Kidneys**

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LB 74 **Is Equitable Access to Transplantation Possible in the Era of HLA Epitope Compatibility?**

S. Parto[1], J. Lamsatfi[2], B. Liu[2], A. Bourdiec[2], B. Foster[2], K. Oualkacha[2], F. Claas[3], P. Keown[4], R. Sapir-Pichhadze[5], *[1]Medicine, McGill University, Montreal, QC, Canada, [2]McGill University, Montreal, QC, Canada, [3]Leiden University Medical Centre, Albinusdreef, Netherlands, [4]University of British Columbia, Vancouver, BC, Canada, [5]Medicine, McGill University Health Centre, Montreal, QC, Canada*

Kidney Deceased Donor Selection

837 **Days of Delayed Graft Function and Its Impact on Graft Outcomes in Deceased Donor Kidney Transplant**

P. Budhiraja[1], R. J. Butterfield[2], S. S. Misra[1], K. S. Reddy[3], L. Kodali[1], H. A. Khamash[1], S. Nair[1], G. K. Mour[1], H. A. Chakkera[1], C. C. Jadlowiec[3], H. Janna[1], R. L. Heilman[1], *[1]Department of Medicine, Mayo Clinic Arizona, Phoenix, AZ, [2]Department of Statistics, Mayo Clinic Arizona, Phoenix, AZ, [3]Department of Surgery, Mayo Clinic Arizona, Phoenix, AZ*

838 **Long-Term Outcomes in Older Kidney Transplant Recipients from Older Donors**

E. Cuadrado-Payán, E. Montagud-Marrahi, J. Casals-Urquiza, J. del Risco-Zevallos, D. Cucchiari, P. Ventura-Aguiar, I. Revuelta, G. Piñeiro, N. Esforzado, F. Cofan, J. Ugalde, J. Campistol, F. Oppenheimer, J. Torregrosa, F. Diekmann, *Nephrology and Kidney Transplantation, Hospital Clínic de Barcelona, Barcelona, Spain*

839 **Outcomes in Highly Sensitized Kidney Transplant Recipients Receiving DCD Organs**

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840 **Findings from the BARETO Study: A New, Composite Renal Vascular Plaque Score is Highly Associated with Kidney Graft Survival**

J. Foutz[1], D. Stewart[1], L. Kamal[2], H. McGehee[1], P. Saravanane[2], S. Yu[2], R. Yousfi[2], G. Gupta[2], *[1]United Network for Organ Sharing, Richmond, VA, [2]Virginia Commonwealth University School of Medicine, Richmond, VA*

841 **Not Quite Right: The Irony of Longer Cold Times for Higher KDPI Kidneys**

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842 **The Extremes of KDPI: Even KDPI 95%+ Kidneys Can Be Used Successfully**

A. Gilbert, J. Verbesey, B. Thomas, J. Moore, M. Cooper, *Medstar Georgetown Transplant Institute, Washington, DC*

843 **Effect of Donor Glomerulosclerosis and Interstitial Fibrosis/Tubular Atrophy (IFTA) on Kidney Graft Survival: A Single Organ Procurement Organization (OPO) Data**

P. Homkrailas[1], M. Hussain[1], G. M. Danovitch[1], K. Wheeler[2], S. Bunnapradist[1], *[1]Medicine, David Geffen School of Medicine at UCLA, Los Angeles, CA, [2]OneLegacy, Los Angeles, CA*

844 **Comparison of Kidney Transplantation Outcomes Between Donors After Controlled Circulatory Death and Brain Death Donors in Catalonia, Spain**

J. Juega[1], M. Pérez-Sáez[2], J. Comas[3], A. Zapatero[4], M. Crespo[2], J. Tort[3], R. Lauzurica[1], J. Pascual[2], *[1]Nephrology, Germans Trias i Pujol Hospital, Badalona, Barcelona, Spain, [2]Nephrology, Hospital del Mar, Barcelona, Spain, [3]Departament de Salut, Organització Catalana de Trasplantaments (OCATT), Barcelona, Spain, [4]Intensive care unit, Hospital del Mar, Barcelona, Spain*

845 **Donation After Cardiac Death (DCD) Agonal Phase Physiology is Associated with Post-transplant Kidney Graft Outcomes**

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846 **Impact of Elevated Initial Donor Creatinine on Outcomes After Transplanting Kidney from Deceased Donor with Severe AKI**

L. Kodali, K. Reddy, P. Budhiraja, S. Nair, G. Mour, J. Huskey, C. Jadloweic, H. Khamash, H. Chakkera, R. Heilman, *Medicine, Mayo Clinic, Arizona, Phoenix, AZ*

847 **Hypoperfusion Warm Ischaemia Time in Renal Transplants from Donors After Circulatory Death**

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848 **The Implications of Donor-Recipient Size Mismatch in Renal Transplantation**

I. D. Kostakis, N. Karydis, T. Kassimatis, N. Kessaris, I. Loukopoulos, *Department of Transplantation, Guy's Hospital, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom*

849 **Trends in the Recovery and Discard of Kidneys from Deceased Donors with Acute Kidney Injury from 2010-2018**

C. Liu[1], S. Alasfar[2], P. P. Reese[3], S. Mohan[4], M. D. Doshi[5], I. E. Hall[6], H. R. Thiessen-Philbrook[2], Y. Jia[2], D. E. Stewart[7], C. Parikh[2], *[1]Icahn School of Medicine at Mount Sinai, New York, NY, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]Perelman School of Medicine, Philadelphia, PA, [4]New York-Presbyterian/Columbia University Irving Medical Center, New York, NY, [5]University of Michigan, Ann Arbor, MI, [6]University of Utah School of Medicine, Salt Lake City, UT, [7]United Network for Organ Sharing, Richmond, VA*

850 **Two-for-One Kidney Transplant Outcomes**

C. Malanga[1], H. Madeem[2], K. Robichaux[2], J. Buggs[3], A. Kumar[1], V. Bowers[3], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL*

851 **Transplant Center Volume in High-risk Donors are Associated with Graft and Patient Survival**

M. A. Merzkani, H. Murad, M. Mattu, M. Wang, V. Hu, S. Chang, T. Alhamad, *Transplant, Washington University, Saint Louis, MO*

852 **Improving Eligibility of Renal Transplants in the Elderly**

L. B. Moraitis, J. Rogers, A. Farney, A. Reeves-Daniel, G. Orlando, W. Doares, S. Kaczmorski, A. Mena-Gutierrez, C. Jay, R. Stratta, *Abdominal Organ Transplant, Wake Forest Baptist Health, Winston-Salem, NC*

853 **Outcomes in Older Recipients Receiving Kidneys from Donors with Acute Kidney Injury (AKI)**

S. Nair, K. Reddy, L. Kodali, P. Budhiraja, J. Ninan, C. Jadlowiec, A. Mathur, J. Harbell, H. Khamash, M. Smith, R. Heilman, *Mayo Clinic, Phoenix, AZ*

855 **Efficacy of Hope: Analysis of Quality HIV+ Deceased Donor Organ Availability**

G. E. Owens[1], B. Shelton[1], P. MacLennan[1], D. Sawinski[2], J. E. Locke[1], *[1]Transplant, University of Alabama at Birmingham, Birmingham, AL, [2]Transplant, University of Pennsylvania, Philadeplphia, PA*

857 **Excellent Outcomes of Kidney Transplantation from Hepatitis C Infected Donors**

B. Rawashdeh, J. Dann, K. M. Marsh, A. Doddi, S. Rao, A. Agarwal, *UVA Health System, University of Virginia, Charlottesville, VA*

858 **Donation After Circulatory Death Kidney Transplantation Has Equal Long-Term Graft and Patient Survival as Donation After Brain Death: A Systematic Review and Meta-Analysis**

E. Rijkse[1], S. Ceuppens[1], H. Qi[2], J. N. IJzermans[1], D. A. Hesselink[3], R. C. Minnee[1], *[1]HPB/Transplant surgery, Erasmus Medical Center, Rotterdam, Netherlands, [2]Biostatistics, Erasmus Medical Center, Rotterdam, Netherlands, [3]Nephrology and Transplantation, Erasmus Medical Center, Rotterdam, Netherlands*

859 **Prolonged Cold Ischemic Time Demonstrating Minor Effect on Outcomes Following Renal Transplantation - A Paired Kidney Analysis**

N. Sanichar[1], V. Sandra[2], K. L. King[2], S. A. Husain[2], S. Mohan[2], *[1]Columbia University Irving Medical Center, New York, NY, [2]Columbia University, New York, NY*

860 **A Kidney Waitlist Outcomes Timeline to Visualize Candidate Offers and Outcomes**

C. Schaffhausen[1], J. Miller[2], A. Matas[3], A. Israni[4], A. Wey[5], A. Hart[4], *[1]Hennepin Healthcare Research Institute / University of Minnesota (UMN), Minneapolis, MN, [2]Chronic Disease Research Group, Minneapolis, MN, [3]Department of Surgery, UMN, Minneapolis, MN, [4]Hennepin Healthcare / UMN, Minneapolis, MN, [5]Scientific Registry of Transplant Recipients, Minneapolis, MN*

861 **Outcomes After Usage of Organs from Deceased Organ Donors with Sepsis - A Single-center Experience**

A. Sharma[1], D. Choudhary[1], D. Kenwar[1], S. Singh[1], S. kumar[1], K. jain[2], N. Bansal[3], A. Ravi[1], *[1]Renal & Pancreas Transplant Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, Chandigarh, India, [2]Anesthesiology, Postgraduate Institute of Medical Education and Research, Chandigarh, Chandigarh, India, [3]Transplant Coordinator, Postgraduate Institute of Medical Education and Research, Chandigarh, Chandigarh, India*

862 **Poor Reliability of Karnofsky Performance Score in Kidney Transplant Candidates**

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863 **Use of Hepatitis B N.A.T. Positive Kidneys in Hepatitis B Immune Recipients**

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864 **Can Procurement Biopsy Data Tell Us Anything? The Influence of Interstitial Fibrosis on Long-term Kidney Graft Survival**

D. Stewart[1], J. Foutz[1], L. Kamal[2], H. McGehee[1], P. Saravanane[2], S. Yu[3], R. Yousfi[2], G. Gupta[2], *[1]Research, United Network for Organ Sharing, Richmond, VA, [2]Virginia Commonwealth University Health, Richmond, VA, [3]Research, Virginia Commonwealth University Health, Richmond, VA*

865 **The Impact of High Kdpi on 1-year Post-transplant Graft Function and Survival in a Brazilian Cohort**

H. Tedesco Silva Junior, R. Demarchi Foresto, M. Hazin, B. Cassão, A. Aquino, J. Taddeo, C. Rosso Felipe, L. Requião Moura, J. Medina, *Núcleo de Ensino e Pesquisa, Hospital do Rim, Universidade Federal de São Paulo, São Paulo, Brazil*

866 **The Edge of Glory: Determinants of Success and Failure for Prolonged Cold Ischemia in Kidney Transplantation**
A. Turner[1], M. Hamidi[1], V. Ariyamuthu[2], R. Harland[1], B. Tanriover[2], *[1]Surgery, Banner University of Arizona Medical Center, Tucson, AZ, [2]Medicine, Banner University of Arizona Medical Center, Tucson, AZ*

867 **Long Term Outcomes of Kidney Transplantation from Deceased Donors with Terminal Acute Kidney Injury**
J. Rogers[1], R. Stratta[2], A. Farney[2], G. Orlando[2], C. Jay[2], A. Reeves-Daniel[3], A. Mena-Gutierrez[3], N. Sakhovskaya[3], K. Gurung[2], B. Sharda[2], J. Rogers[2], *[1]Surgery, Wake Forest School of Medicine, Winston Salem, NC, [2]Surgery, Wake Forest Baptist Medical Center, Winston Salem, NC, [3]Internal Medicine, Wake Forest Baptist Medical Center, Winston Salem, NC*

Kidney Immunosuppression: Desensitization

913 **Deceased Donor Transplantation Across Positive Flow Crossmatch - A Single Center Experience**
M. Campara, A. Lichvar, J. Benken, S. Patel, C. Muran, D. Pierce, I. Tang, P. Di Cocco, J. Almario Alvarez, M. Spaggiari, E. Benedetti, I. Tzvetanov, *University of Illinois at Chicago, Chicago, IL*

914 **Iguratimod Reduce Panel Reactive Antibody in High Mismatched Renal Transplant Recipients: A Retrospective Propensity Score-Matched Study**
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916 **Immunosuppression Regimen and Risk of Posttransplant Diabetes Among Older Kidney Transplant Recipients**
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917 **Desensitization with Plasmapheresis and IV Immunoglobulin is Safe and Effective in Pra Positive Kidney Transplant Recipient Candidates in Covid-19 Pandemic Period**
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918 **Safety and Tolerability of Tacrolimus Extended-Release (astagraf Xl) in Hla Sensitized Kidney Transplant Recipients: A Single Center Experience**
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919 **A Question with Multiple Answers: Do Renal Transplant Recipients Require Steroid Maintenance Following Thymoglobulin Induction?**
A. Aala, H. Patel, F. Cardarelli, *Beth Israel Deaconess Medical Center, Boston, MA*

920 **A Comparative Analysis of Kidney Allograft Outcomes in Steroid Use versus Steroid Discontinuation After Basiliximab Induction: Unos Data Base Study**
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921 **Cost Savings Initiative with Idea Body Weight Dosing of Rabbit Antithymocyte Globulin (rATG) Induction in an Older Kidney Transplant Population: A Single Center Analysis**
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922 **The Impact of Fixed-Dose Alemtuzumab in Renal Transplant Recipients According to Weight**
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923 **Rabbit Anti-thymocyte Globulin Induction Dosing Strategies in a High-risk Kidney Transplant Population**
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924 **Preemptive Second Kidney Transplant Outcomes by Induction Type in the United States**
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925 **Outcomes of Second Kidney Transplant After Return to Dialysis by Induction Type in the United States**
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926 **Outcomes in Standard vs. Extended Use of Thymoglobulin as Induction Therapy in Kidney Transplant Recipients**
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927 **Sirolimus (srl) versus Everolimus (evr) versus Mycophenolate (mpa) in Kidney Transplant Recipients Receiving Anti-thymocyte Globulin Induction (r-atg), Tacrolimus (tac), and Prednisone**
H. Tedesco Silva Junior, C. Felipe, L. Viana, M. Cristelli, N. Tenorio, V. Lima, V. Azevedo, K. Ficher, J. Rezende, R. Foresto, M. Nakamura, Y. Dreige, J. Taddeo, C. Zito, J. Medina, *Hospital do Rim, Universidade Federal de São Paulo, São Paulo, Brazil*

LB 78 **Alemtuzumab vs Antithymocyte Globulin Induction in Hepatitis C Viremic Donors to Hepatitis C Negative Kidney Transplant Recipients**
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928 **Effect of Early Steroid Withdrawal on Posttransplant Diabetes Mellitus Among Kidney Transplant Recipients Differs by Recipient Age**
J. Ahn[1], S. Bae[1], M. Schnitzler[2], G. Hess[3], K. Lentine[2], D. Segev[1], M. McAdams-DeMarco[1], *[1]Johns Hopkins University, Baltimore, MD, [2]Saint Louis University, St. Louis, MO, [3]Drexel University, Philadelphia, PA*

929 **Evaluation of Rituximab-abbs in Renal Transplant: A Case Series**
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930 **Evaluation of Conversion to Extended-Release Tacrolimus in Abdominal Organ and Thoracic Transplant Recipients**
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931 **Belatacept Conversion in Elderly Renal Transplant Recipients**

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932 **Avoiding Tacrolimus Under- and Overexposure with a Dosing Algorithm for Renal Transplant Recipients: A Single Arm Prospective Intervention Trial**

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933 **Calcineurin Inhibitor Dose and Selection, Not Antiproliferatives or Steroids, Influence Development of DSA One Year Post-kidney Transplant**

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935 **Early Conversion to Belatacept-based Therapy Improves Graft Function in Renal Transplant Patients**

N. Huang[1], C. J. Yang[2], I. Movileanu[1], R. H. Dvorai[3], K. M. Ecal[1], R. F. Saidi[1], A. N. Ayla Senay[1], B. Gallay[4], M. J. Hanlon[1], S. Narsipur[4], M. R. Laftavi[1], R. Shahbazov[1], *[1]Surgery, SUNY Upstate Medical University, Syracuse, NY, [2]Pharmacy, SUNY Upstate Medical University, Syracuse, NY, [3]Pathology, SUNY Upstate Medical University, Syracuse, NY, [4]Medicine, SUNY Upstate Medical University, Syracuse, NY*

936 **Tolerability of De Novo and Conversion Belatacept Regimens in Kidney Transplantation**

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937 **Belatacept Utilization During the Covid-19 Pandemic in the United States**

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938 **Association of Belatacept Conversion on Patient and Allograft Survival in Kidney Transplant Recipients with Congestive Heart Failure**

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939 **Modeling of Alternative Weight-Based Dosing Strategies of LCP-Tacrolimus in De Novo Kidney Transplant Patients**

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940 **Evaluation of Empiric Extended-Release Tacrolimus Dosing in Adult Kidney Transplant Recipients**
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941 **Obesity Impacts Acute Rejection but Not Allograft Function Improvement in the Setting of Belatacept Conversion**
D. Pierce, J. Benken, P. West-Thielke, I. Tzvetanov, E. Benedetti, A. Lichvar, *University of Illinois at Chicago, Chicago, IL*

942 **Kidney Transplant Outcomes Stratified by Race with a Calcineurin and Steroid Free Regimen**
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943 **Kidney Transplant Outcomes Stratified by Age with a Calcineurin and Steroid Free Regimen**
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944 **Sharp Anti-HLA Antibody Development Due to Concomitant Graft Nephrectomy and Immunosuppression Withdrawal After Early Graft Loss**
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945 **Tolerability of Mycophenolate Mofetil in Elderly Kidney Transplant Recipients: A Retrospective Cohort Study**
S. Witek[1], G. Malat[2], D. Sawinski[2], C. Sammons[2], C. LaFratte[1], A. Forte[1], R. Samudralwar[1], S. Lyle[1], J. Rashid[1], J. Trofe-Clark[2], *[1]Dept of Pharmacy, Hospital of the Univ of Pennsylvania, Philadelphia, PA, [2]Penn Transplant Institute, Hospital of the Univ of Pennsylvania, Philadelphia, PA*

946 **Tacrolimus Variability Score Outperforms Coefficient of Variation in Predicting Clinical Outcomes of Living Kidney Transplantation**
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947 **Frailty Component Trajectories Among Kidney Transplant Recipients**
N. Chu, X. Chen, D. Segev, M. McAdams-DeMarco, *Johns Hopkins, Baltimore, MD*

948 **Different Levels of GFR of Retained Kidney on the Long-term Safety of the Donors in Living-related Renal Transplantation**
M. Dou, P. Tian, B. Zheng, G. Deng, Y. Shi, C. Ding, *The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China*

949 **Factors Affecting Sensitization Following Kidney Allograft Failure**
N. Garg, L. Hidalgo, S. Parajuli, F. Aziz, M. Mohamed, A. Djamali, D. Mandelbrot, *UW Madison, Madison, WI*

950 **Pill Burden in Belatacept versus Tacrolimus-Based Immunosuppression**
S. Gattis, L. Lakhani, A. Basu, *Emory Healthcare, Atlanta, GA*

951 **Creatinine Reduction Ratio at 2 Postoperative Day as a Predicting Factor of Long-Term Outcomes After Living Donor Kidney Transplantation**
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952 **The Impact of Diabetes on Young Transplant Recipients: An American Perspective**
J. M. Loera, S. C. Barrett, T. S. Zhang, A. A. Awan, B. V. Murthy, R. T. Cotton, C. A. O'Mahany, N. T. Galvan, J. A. Goss, A. A. Rana, *Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

953 **Patient Survival After Living Donor Kidney Donation**
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954 **Awareness of Teratogenic Potential of Mycophenolic Acid Products and Pregnancy Outcomes in Kidney Transplant Recipients**
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955 **Very Long-Term Patient and Kidney Allograft Outcomes in Kidney Transplant Recipients More Than 20 Years After Transplantation:**
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956 **Impact of Rituximab Induction Therapy on Donor-specific Anti-HLA Antibodies in Abo-compatible Kidney Transplant Recipients**
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957 **Graft Volume Changed in the First Year After Living Donor Kidney Transplantation**
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958 **Modifiable Barriers in Decision Making Around Living Donor Kidney Transplantation - A Rapid Scoping Review to Guide (DEAL-KD) Study**
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959 **Seasonal and Income-related Factors in Live Kidney Donation in the United States from 1995 to 2019**
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960 **Decreased Pca and Regional Anesthesia Requirements Following Robotic Donor Nephrectomy**
J. C. Alonso-Escalante, L. Machado, K. R. Tabar, R. P. Tindall, N. Thai, T. Uemura, *Surgery, Allegheny General Hospital, Pittsburgh, PA*

961 **Kidney Transplantation in Patients with Hereditary Kidney Diseases**
Y. Caliskan[1], N. Garayeva[2], A. B. Dirim[2], S. Safak[2], S. Mirioglu[2], H. Yazici[2], A. Yildiz[3], O. A. Oto[2], E. Demir[2], Y. Ozluk[4], A. Turkmen[2], K. Lentine[1], *[1]Saint Louis University, Saint Louis, MO, [2]Division of Nephrology, Istanbul University, Istanbul, Turkey, [3]Division of Nephrology, Uludag University, Bursa, Turkey, [4]Department of Pathology, Istanbul University, Istanbul, Turkey*

962 **Effects of Transverse Abdominis Plane Blocks on Opioid Requirements Post Kidney Donation**
R. Caputo, O. Witkowsky, A. Rajab, *The Ohio State University Wexner Medical Center, Columbus, OH*

963 **The Impact of Donor Age and Donor-Recipient Age Difference on Living Donor Kidney Transplantation**

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964 **The Impact of Living Donors Aged 70 and Older on Living Donor Kidney Transplantation**

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965 **Identifying Health-System Level Barriers and Facilitators to Living Donor Kidney Transplantation: A Comparative Case Study**

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966 **The Evaluation of Living-Related Kidney Transplantation Donors in Autosomal-Dominant Polycystic Kidney Disease**

T. Kikuchi[1], K. Unagami[2], Y. Kobari[3], T. Yagisawa[3], T. Kanzawa[3], K. Omoto[3], A. Uemura[1], H. Ishida[2], K. Tanabe[3], *[1]Urology, Kindai University Hospital, Osaka, Japan, [2]Organ transplant medicine, Tokyo Women's Medical University Hospital, Tokyo, Japan, [3]Urology, Tokyo Women's Medical University Hospital, Tokyo, Japan*

967 **Developing a Robot-assisted Donor Nephrectomy Program in a High Volume Laparoscopic Living Donor Nephrectomy Program**

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968 **Alterations in Mineral Metabolism of Living Kidney Donors: Prospective Observational Study**

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969 **Kidney Transplant Associated Allergy Transfer After Living Donation**

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970 **Which Living Kidney Donors Arrive to the Donation Process Informed About Surgery?**

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971 **Multimodal Analgesia Reduces Length of Stay in Living Kidney Donors**

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972 **Preempting Misconceptions: An Educational Initiative for Preemptive Kidney Transplant Candidates**

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973 **Clinical Outcomes of Living Kidney Transplantation from Elderly Spousal Donors**

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974 **A Dynamic Markov Model to Assess the Cost-Effectiveness of the Kidney Team at Home Intervention in the Netherlands**

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975 **Implementation of the Kidney Team at Home Intervention: Evaluating Generalizability, Implementation Process, and Effects**

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976 **Living Donor Total Robotic Renal Transplantation: Early Single Center Experience**

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Kidney Living Donor: Selection

1000 **The Differential Impact of Size Mismatch in Live versus Deceased Donor Kidney Transplant**

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1001 **Pediatric Kidney Transplant Strategy: The Sequence Effect**

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994 **Barriers to Living Kidney Donation: A Closer Look at Declined Donors**

M. Anand, S. Barhorst, S. Bumb, B. Abu Jawdeh, T. Kaur, A. Govil, *University of Cincinnati, Cincinnati, OH*

995 **Development and Validation of a Nomogram for Remnant Kidney Function After Living-donor Donation**

M. Dou, P. Tian, B. Zheng, G. Deng, Y. Shi, C. Ding, *The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China*

996 **Body Surface Adjusted vs Raw GFR in Predicting Long Term Outcomes of Kidney Donors. Who is Disadvantaged?**

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997 **Criteria and Practice Patterns for Accepting Living Donors with Prior Covid-19: A National Survey**

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999 **Early Experience with Broad Renal Genetic Testing in an Academic Transplant Center**

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Kidney Paired Exchange

1069 **An Early Look at the OPTN Kidney Paired Donation Pilot Program's New Priority Points Policy**

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1070 **Impact of Pre-Screening on OPTN Kidney Paired Donation Pilot Program Transplant and Refusal Rates**

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1071 **First Promising Results of CIAT: A New Kidney Exchange Program for Difficult-to-match Patients**

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1072 **"I Would Do Whatever It Took": Understanding the Motivation, Education and Experiences of Kidney Paired Donation Participants**

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1073 **In Search of a Better Outcome: Opting Into the Live Donor Paired Kidney Exchange Program**

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LB 79 **Who Can be Matched via Kidney Exchange?**

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868 **Identifying Barriers to Transition Readiness in Pediatric Kidney Transplant Patients**

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869 **Greater Social Vulnerability is Associated with Self-advocacy in the Living Donor Navigator Program**

A. Carter, A. C. Kale, R. D. Reed, B. A. Shelton, H. Qu, M. C. McLeod, B. J. Orandi, R. M. Cannon, D. Anderson, P. MacLennan, V. Kumar, M. Hanaway, J. E. Locke, *University of Alabama at Birmingham Hospital, Birmingham, AL*

870 **Health-related Quality of Life (HRQoL) in Patients on Dialysis and Kidney Transplant Recipients - Experience with the PROMIS Global-10 Survey**

G. Chawla, W. Hajjar, M. Dastgheib, N. Yanga, G. Ahmadzadeh, N. El-Dassouki, A. Shahreza, N. Al Kaabi, N. Edwards, I. Mucsi, *University Health Network, Division of Nephrology and Multi-Organ Transplant Program, Toronto, ON, Canada*

871 **The Impact of Health Literacy on Kidney Transplant Listing**

G. Chen[1], J. Siahaan[2], L. Leon Novelo[2], I. Rizvi[3], A. M. De Golovine[4], A. R. Edwards[4], A. Pai[4], W. A. Dar[3], *[1]Abdominal Transplant, Memorial Hermann Hospital, Houston, TX, [2]Department of Biostatistics and Data Science, School of Public Health The University of Texas Health Science Center at Houston, Houston, TX, [3]Department of Surgery, McGovern Medical School The University of Texas Health Science Center at Houston, Houston, TX, [4]Department of Internal Medicine, Renal Diseases and Hypertension, McGovern Medical School The University of Texas Health Science Center at Houston, Houston, TX*

872 **Experiential Expertise: What Can Patients and Donors Teach Us About Living Donation?**

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873 **Ambient Air Pollution and Changes in Cognitive Function Among Kidney Transplant Recipients**

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874 **True Living Donation Experiences: A Thematic Analysis of Storytelling from Kidney Living Donors**

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875 **Association of Kidney Function with Patient Reported Outcomes After Kidney Transplantation**

G. S. Kochar, S. A. Rega, I. D. Feurer, A. Dreher, H. Schaefer, D. Shaffer, R. C. Forbes, C. W. Pinson, B. P. Concepcion, *Nephrology, Vanderbilt University Medical Center, Nashville, TN*

876 **Attitudes of Obese Kidney Transplant Candidates Towards Bariatric Surgery**

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877 **Current Opioid Utilization Practices of Kidney Transplant Centers in the United States: A National Survey of Institutional Practices**

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878 **Covid-19-related Knowledge, Health Behaviors and Attitudes Towards Telemedicine and Emergency Visits in a Population of Kidney Transplant (KTx) Recipients**

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879 **Identifying the Needs of Kidney Transplant Recipients That Can be Addressed by a Web-based Self-management Program**

D. Massierer[1], R. Sapir-Pichhadze[2], V. Bouchard[3], K. Dasgupta[2], N. Fernandez[4], D. da Costa[2], S. Ahmed[1], M. Fortin[5], R. Langevin[6], N. Mayo[1], T. Janaudis-Ferreira[1], *[1]Faculty of Medicine- School of Physical and Occupational Therapy, McGill University, Montreal, QC, Canada, [2]Centre for Outcomes Research and Evaluation (CORE), Research Institute of the McGill University Health Centre (RI-MUHC), Montreal, QC, Canada, [3]CIUSSS du Saguenay-Lac-Saint-Jean, Chicoutimi, QC, Canada, [4]Department of Family Medicine/Emergency Medicine, Université de Montreal, Montreal, QC, Canada, [5]Department of Medicine, Université de Montreal, Montreal, QC, Canada, [6]Canadian Donation and Transplantation Research Program (CDTRP), Edmonton, AB, Canada*

880 **Intersecting Disparities in Health Literacy Among Renal Patients Experiencing Transplant Barriers**

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881 **Understanding Early Transplant Preparation: CKD 3-5 Patients' Transplant Knowledge and Actions at Kaiser Permanente Southern California**

R. Pines[1], S. H. Kawakita[2], G. H. Kim[3], O. Ranasinghe[4], B. Mittman[5], B. Dub[5], H. Wilhalme[3], A. D. Waterman[3], *[1]Santa Barbara Cottage Hospital, Santa Barbara, CA, [2]Terasaki Institute, Los Angeles, CA, [3]UCLA David Geffen School of Medicine, Los Angeles, CA, [4]Outbreak Management Branch, Los Angeles County Department of Public Health, Los Angeles, CA, [5]Research and Evaluation, Kaiser Permanente, Pasadena, CA*

882 **Patients' Perceptions of Kidney Transplant Failure and Transitioning to Dialysis**

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883 **Impact of Pre- and Post-transplant Outcomes on Patient-reported Outcomes in a Prospective Multicenter Trial in Kidney Transplantation**

J. M. Rohan[1], J. P. Leone[2], E. Woodle[3], D. Kaufman[4], A. R. Shields[3], A. Wiseman[5], A. J. Matas[6], P. West-Thielke[7], E. King[3], R. R. Alloway[3], *[1]Children's Hospital Richmond VCU, Richmond, VA, [2]Tampa General, Tampa, FL, [3]U Cincinnati, Cincinnati, OH, [4]U Wisconsin, Madison, WI, [5]Centura Transplant, Denver, CO, [6]U Minnesota, Minneapolis, MN, [7]UIC, Chicago, IL*

884 **Validation of PROMIS Anxiety Computer Adaptive Test in Solid Organ Transplant Recipients**

M. Saqib, M. Yang, F. Jamal, S. Aghamohammadi, G. Ahmadzadeh, M. Hamid, V. Shah, N. Jayakumar, M. Novak, I. Mucsi, *University Health Network, Toronto, ON, Canada*

885 **Transplant Decision Making Concerns for Asian Patients with End-Stage Kidney Disease**

N. Singh[1], A. Wasim[1], G. Chawla[1], F. Jamil[1], M. Hamid[1], R. Siddiqui[1], E. Lui[1], N. El-Dassouki[1], M. Novak[1], A. D. Waterman[2], I. Mucsi[1], *[1]University Health Network, Toronto, ON, Canada, [2]David Geffen School of Medicine, UCLA, Los Angeles, CA*

886 **Information-Seeking Behavior During Covid-19: Opportunities for Communication and Care Transition Improvements**

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977 **Detrusor Reinforced Lich-Gregoir Ureteroneocystostomy for Kidney Transplants Recipients: Comparative Analysis of the First 100 Cases**

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978 **Single Center Experience in Ex Vivo Hilar Renal Artery Aneurysm Repair and Autotransplantation**

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979 **Initial Experience with Single-port Robotic-assisted Kidney Transplantation**

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980 **Anterior Rectus Sheath versus Gibson Incision for Kidney Transplantation - University of Chicago Experience**

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981 **The Experience of 1000 Hand Assisted Laparoscopic Donor Nephrectomy for Living Donor Kidney Transplantation**

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982 **Urine Donor-derived Cell-free is Valuable for Predicting BK Polyomavirus-associated Nephropathy in Kidney Transplant Recipients**

G. Huang[1], X. Chen[1], Y. Huang[1], J. Li[1], R. Deng[1], W. Chen[2], J. Qiu[1], S. Deng[1], G. Chen[1], Q. Fu[1], C. Wu[1], J. Fei[1], L. Liu[1], L. Chen[1], C. Wang[1], *[1]Organ Transplant Center, The First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China, [2]Department of Pathology, The First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China*

983 **Single Incision Simultaneous Liver Kidney Transplantation: Outcomes and Feasibility**

D. Imai, Y. Sambommatsu, A. Khan, S. Lee, A. Sharma, V. Kumaran, D. Bruno, A. Cotterell, C. Bhati, M. F. Levy, *Virginia Commonwealth University, Richmond, VA*

984 **Is There a Role for Pre-Operative Angiographic Kidney Embolization Prior to Allograft Nephrectomy?**

M. Jacobs[1], R. Stratta[1], D. Harriman[2], A. Farney[1], J. Rogers[1], G. Orlando[1], A. Reeves-Daniel[1], C. Jay[1], *[1]Wake Forest Baptist Health, Winston Salem, NC, [2]University of British Columbia, Vancouver, BC, Canada*

985 **Robotic Assisted Donor Nephrectomy: A Single Center Experience**

A. Khan, A. Sharma, S. Lee, A. Cotterell, D. Kumar, L. Kamal, I. Moinuddin, D. Bruno, V. Kumaran, M. Levy, C. Bhati, *Transplant Surgery, Virginia Commonwealth University, Richmond, VA*

986 **Robotic versus Open Mini-incision Living Donor Nephrectomy: Single Center Experience**

S. Lee[1], S. Z. Wang[2], A. Khan[1], A. Sharma[1], D. Kumar[3], L. Kamal[3], A. Cotterell[1], V. Kumaran[1], D. Bruno[1], M. Levy[1], C. Bhati[1], *[1]Transplant Surgery, Virginia Commonwealth University hospital, Richmond, VA, [2]Medical School, Virginia Commonwealth University, Richmond, VA, [3]Transplant Nephrology, Virginia Commonwealth University hospital, Richmond, VA*

987 **Evaluation of the Impact of Delayed Graft Function (dgf) on Kidney Allograft Outcomes**
J. Leeds, B. Rawashdeh, M. Sestito, B. Sharma, J. Kamal, A. Kumar, A. AgarwalAA4VB, A. Doyle, S. Rao, *University of Virginia, Charlottesville, VA*

988 **Early Recovery After Surgery Protocol in Kidney Transplantation is Associated with Decreased Hospital Stay and Improved Clinical Outcomes**
Y. Lin, M. Eltemamy, K. Sasaki, V. Krishnamurthi, D. Goldfarb, A. Wee, *Cleveland Clinic, Cleveland, OH*

990 **Anterior Rectus Sheath versus Standard Gibson Approach to Kidney Transplantation: A Randomized Double-blinded Controlled Trial**
P. Murthy, M. Lyon, M. Fascelli, M. Spinner, E. Miller, Y. Lin, D. Goldfarb, V. Krishnamurthi, A. Wee, M. Eltemamy, *Glickman Urological and Kidney Institute, Cleveland Clinic, Cleveland, OH*

991 **Application of Incisional Wound Vac to Decrease Wound Complications and Surgical Site Infections: A Single Center Pilot Project**
E. K. Venniro, M. Dokus, J. Taylor, R. Kashyap, *University of Rochester Medical Center, Rochester, NY*

992 **Early Experience with Machine Retrograde Perfusion of Deceased Donor Kidneys: Short-term Outcomes of a Prospective Study**
J. Zeng, Q. Zhong, S. Yin, Z. Jia, Z. Huang, Y. Fan, X. Wang, T. Lin, T. Song, *Urology Institute and Organ Transplantation Center, West China Hospital, Chengdu, China*

993 **Initial Experiment of Self-expanding Metal Ureteral Stent in Recurrent Ureteral Stenosis After Kidney Transplantation**
Q. Zhong, T. Song, J. Zeng, Y. Fan, X. Wei, T. Lin, *Urology Institute and Organ Transplantation Center, West China Hospital, Chengdu, China*

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887 **How Should Acute T-Cell Mediated Rejection of Kidney Transplants be Treated?**
F. Aziz[1], S. Parajuli[2], N. Garg[2], M. Mohamed[2], A. Djamali[2], D. Mandelbrot[2], *[1]University of Wisconsin, Madison, WI, [2]University of Wisconsin, Verona, WI*

888 **Kidney Transplant Survival After Borderline Rejection in the Setting of Denovo Dsa Formation**
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889 **Impact of Induction Immunosuppression Selection on Clinical Outcomes in Kidney Transplant Recipients During the COVID-19 Pandemic in New York City**
K. Khalil, S. Jonchhe, J. Stern, T. C. Lewis, N. Alnazari, B. Lonze, Z. Stewart Lewis, N. Ali, *Transplant Institute, NYU Langone Health, New York, NY*

890 **Impact of Treatment of Subclinical Rejection at 2 Weeks After Kidney Transplantation, Compared by 1 Year Histologic Outcomes**
O. Lee[1], K. Lee[1], J. Park[1], J. Lee[2], G. Kwon[3], K. Kim[4], *[1]Surgery, Samsung Medical Center, Seoul, Korea, Republic of, [2]Medicine, Samsung Medical Center, Seoul, Korea, Republic of, [3]Pathology, Samsung Medical Center, Seoul, Korea, Republic of, [4]Biostatistics, Samsung Medical Center, Seoul, Korea, Republic of*

891 **Continuous 24-Hour Antithymocyte Globulin (ATG) for Renal Allograft Rejection: Results of a Randomized Controlled Trial**
S. J. Patel, A. Rogers, S. Kuten, R. Knight, E. Graviss, D. Nguyen, T. Ellimuttil, I. Agboli, L. Gaber, A. Gaber, *Houston Methodist Hospital, Houston, TX*

892 **Dosing Weight of Rabbit Antithymocyte Globulin and Outcomes Among Kidney Transplant Patients Treated for Rejection**
C. Patton, K. Cunningham, C. D'Agostino, A. Novak, M. Kapugi, K. Lang, C. Kane, *Pharmacy, Northwestern Memorial Hospital, Chicago, IL*

893 **Role of Serial Donor Derived Cell-Free DNA Monitoring in Kidney Transplant Recipients**
A. X. Wang, C. R. Lenihan, *Nephrology, Stanford University School of Medicine, Palo Alto, CA*

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894 **Risk of Statin-Related Side Effects in Kidney Transplant Recipients**
S. Bae[1], J. Ahn[1], K. Lentine[2], M. A. Schnitzler[2], G. Hess[3], H. Xiao[2], D. Segev[1], M. McAdams DeMarco[1], *[1]Johns Hopkins University, Baltimore, MD, [2]Saint Louis University, Saint Louis, MO, [3]Drexel University, Philadelphia, PA*

895 **Association of Delayed Graft Function with Mortality Post-kidney Transplantation**
N. Eguchi[1], H. Ichii[2], F. J. Ferrey[1], U. G. Reddy[1], D. C. Dafoe[2], H. Seo[3], K. Kalantar-Zadeh[1], E. Tantisattamo[1], *[1]Division of Nephrology, Hypertension and Kidney Transplantation, Department of Medicine, University of California Irvine, Orange, CA, [2]Division of Kidney and Pancreas Transplantation, Department of Surgery, University of California Irvine, Orange, CA, [3]School of Pharmacy and Pharmaceutical Sciences, University of California Irvine, Irvine, CA*

896 **Superior Metabolic Function of Type 2 Diabetes Mellitus Patients After Simultaneous Kidney/pancreas Transplantation Compared with Kidney Transplantation Alone**
X. Y. Fu, C. Yu, H. Wang, J. Zhao, Z. Wang, C. Mo, X. Shi, G. Feng, W. Song, Z. Shen, *Tianjin First Centeral Hospital, Tianjin, China*

897 **Early Parathyroidectomy for Management of Post-transplant Hyperparathyroidism: A Case Series**
A. Gokhale, J. Chancay, S. Johnson, R. P. Owen, F. Tedla, A. Bhansali, V. Sehgal, R. Shapiro, G. De Boccardo, *Recanati Miller Transplant Institute, Mount Sinai Hospital, New York, NY*

898 **Renal Transplant Recipients with Low Skeletal Muscle Attenuation Have a Greater Risk of Developing New-onset Diabetes After Transplantation**
A. Han, H. Kim, C. Chung, H. Ko, K. Choi, S. Min, S. Min, J. Ha, *Department of Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of*

899 **An Unexpected Case of Transthyretin Amyloid Cardiomyopathy (ATTR-CM) Overlooked Pretransplant, but Then Diagnosed Early After Kidney Transplant with a Negative Patient Outcome: A Case Report**
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900 **Changes in Body Mass Index Before and After Kidney Transplant**
M. Laub[1], S. Finder[2], P. Harikrishnan[1], M. Simon[3], I. Gani[1], M. Saeed[1], R. Kapoor[1], *[1]Augusta University Medical Center, Augusta, GA, [2]Vanderbilt University Medical Center, Nashville, TN, [3]Brandon Wilde, Augusta, GA*

901 **Predictors of Postoperative Atrial Fibrillation in an Urban, Obese Adult Renal Transplant Population**
A. Lichvar, Z. Ress, M. Tabriz, H. Jenkins, T. Walsh, I. Tzvetanov, E. Benedetti, M. Campara, *University of Illinois at Chicago, Chicago, IL*

902 **The Seattle Heart Failure Model is a Predictor of Mortality After Kidney Transplant in Patients with End Stage Renal Disease and Heart Impairment**
A. Perez-Gutierrez[1], P. J. Bachul[2], D. N. Danz[3], B. Juengel[2], M. Josephson[2], J. Fung[2], P. Witkowski[2], B. Chung[4], Y. Becker[2], *[1]Surgery, University of Chicago, Chicago, IL, IL, [2]Surgery, University of Chicago, Chicago, IL, [3]Economics, University of Pittsburgh, Pittsburgh, IL, [4]Cardiology, University of Chicago, Chicago, IL*

903 **Effect of Insulin versus Oral Agents on Early Glycemic Control Following Kidney Transplant**
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904 **Kidney Transplantation in Patients with Severe Pulmonary Hypertension: Not an Absolute Contraindication?**
B. Prajapati[1], D. Gumber[2], I. Moinuddin[1], C. Bhati[1], G. Gupta[1], D. Grinnan[3], D. Kumar[1], *[1]Nephrology, Virginia Commonwealth University, Richmond, VA, [2]Cardiology, Virginia Commonwealth University, Richmond, VA, [3]Pulmonology, Virginia Commonwealth University, Richmond, VA*

906 **Renal Transplant is Safe in Septuagenarians**
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907 **Early Hypertransaminasemia in Kidney Transplant Recipient: Influence of Donor Type and Clinical Significance**
E. Solà-Porta, M. Redondo-Pachón, S. Núñez-Delgado, C. Arias-Cabrales, M. Mir, A. Buxeda, C. Burballa, M. Crespo, J. Pascual, M. Pérez-Sáez, *Nephrology, Hospital del Mar, Barcelona, Spain*

908 **Sodium Zirconium Cyclosilicate Use in Kidney Transplant Recipients**
K. J. Swanson, F. Aziz, S. Parajuli, M. Mohamed, D. A. Mandelbrot, A. Djamali, N. Garg, *University of Wisconsin-Madison, Madison, WI*

909 **Dietary Intake of Calories and Protein in the Acute Phase Following Kidney Transplant: Opportunities for Improvement**
L. Teigen[1], G. Onyeaghala[1], Y. Doronin[2], B. Guo[1], B. Wu[1], J. Abrahante[1], D. Schladt[1], W. Guan[1], C. Staley[1], M. Al-Kofahi[1], S. Riad[1], A. Matas[1], R. Remmel[1], W. Oetting[1], C. Dorr[1], P. Jacobson[1], A. Israni[1], *[1]University of Minnesota, Minneapolis, MN, [2]Hennepin Healthcare Research Institute, Minneapolis, MN*

910 **Clinical Effect of Post-transplant Av-fistula Ligation on Hemodynamic Status and Kidney Allograft Function**
S. Valavoor, J. Powelson, A. Sharfuddin, O. Adebiyi, *Nephrology, Indiana University, Indianapolis, IN*

911 **Risk Factors for Low Bone Density and Vertebral Fracture in Kidney Transplant Recipients: A Cross-sectional Cohort Study**
A. Velioglu[1], B. Kaya[1], B. Aykent[1], B. Ozkan[2], M. S. Karapinar[1], H. Arikan[1], E. Asicioglu[1], O. Bugdayci[3], D. Gogas Yavuz[4], S. Tuglular[1], *[1]Nephrology, Marmara University School of Medicine, Istanbul, Turkey, [2]Marmara University School of Medicine, Istanbul, Turkey, [3]Radiology, Marmara University School of Medicine, Istanbul, Turkey, [4]Endocrinology, Marmara University School of Medicine, Istanbul, Turkey*

912 **The Association of Pre-Kidney Transplant C-Peptide Level with Post Transplant Outcomes**
A. J. Vinson, K. Tennankore, *Nova Scotia Health Authority Division of Nephrology, Departm, Halifax, NS, Canada*

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1002 **The Use of Donor Derived Cell Free DNA in Children to Monitor Therapy of Kidney Rejection**
A. Al-Uzri, M. Wright, K. Clark, R. Jenkins, *Oregon Health & Science Univ, Portland, OR*

1003 **Graft Loss in Adolescent and Young Adult Generation After Pediatric Kidney Transplantation: A Single Center Experience in Japan**
Y. Aoki, Y. Hamasaki, M. Muramatsu, J. Hashimoto, M. Kubota, S. Shishido, K. Sakai, *Nephrology, Toho University Faculty of Medicine, Tokyo, Japan*

1004 **Growing Up During the Pandemic: A New Look for Transitioning to Adult Transplant Care**
M. M. Chandran, E. Blanchette, A. Sikora, M. Bisek, E. S. Christofferson, M. Bock, *Children's Hospital Colorado, Aurora, CO*

1005 **Impact of Once-Daily Extended-Release Tacrolimus Intrapatient Variability in Stable Adolescent and Young Adult Renal Transplant Recipients - 3 Year Results**
M. M. Chandran[1], E. Blanchette[1], J. Goebel[2], M. Bock[1], *[1]Children's Hospital Colorado, Denver, CO, [2]Helen DeVos Children's Hospital, Grand Rapids, MI*

1006 **Longitudinal Studies of Blood Donor-derived Cell Free DNA (dd-cfDNA) Show Predictable Rise at Time of BK Viremia or Viruria in Pediatric Kidney Transplant Recipients (PKTx)**
R. Dandamudi[1], H. Gu[1], C. Goss[1], S. Federman[2], R. Woodward[2], S. Dholakia[2], L. Walther[1], V. Dharnidharka[1], *[1]Washington University in St Louis, St. Louis, MO, [2]CareDx, Brisbane, CA*

1007 **Longitudinal Studies of Blood Anellovirus DNA Prior to Acute Rejection or Major Infection Events in Pediatric Kidney Transplant Recipients (PKTx)**
R. Dandamudi, H. Gu, C. Goss, H. Gula, K. Wylie, V. Dharnidharka, *Washington University in St Louis, St. Louis, MO*

1008 **The Impact of the Kidney Transplant Journey on Patient's and Parent's Identities and Self-Management**
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1009 **Outcomes of Granulocyte-Colony Stimulating Factor Use in Pediatric Renal Transplant Recipients: A Pediatric Nephrology Research Consortium Study**
R. M. Engen[1], P. L. Weng[2], W. Shih[3], H. Patel[4], K. Richardson[5], S. Dowdrick[6], I. Ashoor[7], J. Misurac[8], A. Z. Traum[9], M. Semanik[10], N. G. Jain[11], R. Sreedharan[12], *[1]Northwestern University, Chicago, IL, [2]University of California Los Angeles, Los Angeles, CA, [3]University of Michigan, Ann Arbor, MI, [4]Nationwide Children's Hospital, Columbus, OH, [5]Oregon Health & Science University, Portland, OR, [6]Penn State Health, Hershey, PA, [7]Louisiana State University, New Orleans, LA, [8]University of Iowa, Iowa City, IA, [9]Harvard University, Boston, MA, [10]University of Wisconsin-Madison, Madison, WI, [11]Columbia University, New York, NY, [12]Medical College of Wisconsin, Milwaukee, WI*

1010 **Understanding Delays to Pediatric Kidney Transplant Wait-List Activation: Providers and Families Weigh in**
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1011 **Maternal Perinatal Condition and Neonatal Growth and Development After Renal Transplantation**
X. Feng, T. Song, Q. Zhong, J. Zeng, X. Wang, Y. Fan, Z. Huang, T. Lin, *Department of Urology, Institute of Urology, Organ Transplantation Center, West China Hospital, Sichuan University, Chengdu, China*

1012 **Bortezomib for Antibody-Mediated Rejection of Renal Transplant in Youth**
L. Galea, J. Hewlett, J. Savant, S. Lopez, S. Amaral, B. Viteri, *The Children's Hospital of Philadelphia, Philadelphia, PA*

1013 **Predictors of Prolonged Length of Stay in Pediatric Kidney Transplantation: Changes Over the Last Three Decades**
K. Goli, N. T. Galvan, R. T. Cotton, J. A. Goss, C. A. O'Mahony, A. Rana, *Department of Abdominal Transplantation, Baylor College of Medicine, Houston, TX*

1014 **Improving Allograft Survival by Informing Donor Selection in Kidney Transplant Recipients Under 5 Years Old**
F. Manca Barayre, L. Greenbaum, R. Garro, P. Winterberg, R. Patzer, J. Hogan, *Emory University, Atlanta, GA*

1015 **Treatment of Bk Virus With Intravenous Immunoglobulin in Pediatric Kidney Transplant**
D. Mohammad, D. Kim, R. Baracco, G. Kapur, A. Jain, *Pediatric Nephrology and Transplant Services, Children's Hospital of Michigan, Detroit, MI*

1017 **Single Center Experience on SARS-CoV-2 Testing of Symptomatic and Asymptomatic Pediatric Kidney Transplant Recipients**
H. Pizzo[1], P. R. Soni[2], S. Nadipuram[2], J. Garrison[1], D. Puliyanda[1], *[1]Pediatric Nephrology, Cedars-Sinai Medical Center, Los Angeles, CA, [2]Pediatric Infectious Disease, Cedars-Sinai Medical Center, Los Angeles, CA*

1018 **To Whom do Pediatric Donor Organs Go?**
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1019 **Pediatric Kidney Transplant Recipients Frequently Experience Utis Regardless of Esrd Etiology**
E. Spiwak, C. Nailescu, A. Schwaderer, *Indiana University Department of Pediatrics Division of Nephrology, Indianapolis, IN*

1020 **Kidney Allograft Outcomes in Pediatric Patients Transitioned to Adult Care - A Single Center Study**
S. Subramanyam, G. Agarwal, M. Seifert, V. Kumar, G. Towns, K. Wille, S. Ong, *University of Alabama at Birmingham, Birmingham, AL*

1021 **En Bloc Kidney Transplantation from Pediatrics Weighing Less Than 5 Kg: Single Center Analysis of 31 Cases**
Z. Wang[1], X. Zeng[2], Q. Xia[2], J. Peng[2], H. Xiao[2], J. Liu[2], H. Li[2], *[1]Urology, Huazhong University of Science and Technology, Union Hospital, Wuhan, China, [2]Urology, Union Hospital, Wuhan, China*

1022 **Nutrition, Body Habitus, and Food Insecurity, in Pediatric Kidney Transplant Recipients**
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1023 **Use of Donor-Derived Cell-Free DNA in Children with Kidney Transplantation: A Pilot Study**
E. Winnicki, J. Brennan, M. McEnhill, P. Brakeman, E. Ku, *UCSF, San Francisco, CA*

LB 80 **Food Insecurity and Impact on Transplant Outcomes in Pediatric Kidney Transplant Recipients**
A. Moin, P. Verghese, R. Engen, D. Matossian, *Pediatric Nephrology, Lurie Children's Hospital, chicago, IL*

Liver

Liver: Cirrhosis - Portal Hypertension and Other Complications?

1088 **Transplant-free Survival in Alcohol-related Liver Disease (ALD) Patients Presenting with First Evidence of Ascites**
K. Fahoum[1], N. T. Shen[2], E. Basu[1], J. Lee[3], A. Kaplan[2], A. Salajegheh[4], R. Rosenblatt[2], A. Jesudian[2], C. Lucero[2], B. Fortune[2], M. M. Safford[5], R. S. Brown[2], *[1]Medical College, Weill Cornell Medicine, New York, NY, [2]Gastroenterology and Hepatology, Weill Cornell Medicine, New York, NY, [3]Population Health Sciences, Weill Cornell Medicine, New York, NY, [4]Psychiatry, Weill Cornell Medicine, New York, NY, [5]General Internal Medicine, Weill Cornell Medicine, New York, NY*

1089 **Identification of Molecular Markers for Liver Cirrhosis by Single-nucleus Rna Sequencing**

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1090 **Algorithms to Identify Alcoholic Hepatitis Hospitalizations in Patients with Cirrhosis**

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1091 **Longitudinal Quality of Life Assessment in Liver Transplant - Feasibility Study and Early Results**

O. M. Siddiqui, P. Polineni, A. J. Thuluvath, C. Loftus, *Northwestern University, Chicago, IL*

1092 **Blood Pressure Variability Immediately After Liver Transplant Predicts the Likelihood of Long-Term Cardiovascular Events**

K. N. Truitt[1], K. Chen[2], Y. Yano[3], D. Gregory[4], L. B. VanWagner[5], *[1]Northwestern Memorial Hospital, Chicago, IL, [2]Harvard University, Cambridge, MA, [3]Duke University School of Medicine, Durham, NC, [4]Northwestern University Feinberg School of Medicine, Chicago, IL, [5]Northwestern University Feinberg School of Medicine, Northwestern University Feinberg School of Medicine, Chicago, IL*

LB 83 **Loneliness in Adults Awaiting Liver Transplantation at 7 U.S. Transplant Centers During the Covid-19 Pandemic**

K. Berry[1], D. Kent[1], S. Seetharaman[1], R. Wong[1], Y. Mohamad[1], F. Yao[1], M. Duarte[2], B. Boyarsky[3], R. Rahimi[4], A. Duarte-Rojo[5], M. Kappus[6], M. Volk[7], D. Ladner[8], D. Segev[3], M. McAdams-DeMarco[3], E. Verna[9], D. Ganger[8], J. C. Lai[1], *[1]UCSF, San Francisco, CA, [2]Johns Hopkins, Baltimore, CA, [3]Johns Hopkins, Baltimore, MD, [4]Baylor, Dallas, TX, [5]Pittsburgh, Pittsburgh, PA, [6]Duke, Durham, NC, [7]Loma Linda, Loma Linda, CA, [8]Northwestern, Chicago, IL, [9]Columbia, New York, NY*

Liver: Hepatobiliary Surgery

1124 **The Surgical Experience and Treatment Options for Hepatic Cystic Disease**

M. Crowley[1], K. Robichaux[2], A. Kumar[1], J. Buggs[3], J. Sokolich[4], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL, [4]Hepatobiliary Surgery, Valley Presbyterian Hospital, San Fernando Valley, CA*

1125 **Admission to the Intensive Care Unit Post-liver Transplantation: One Academic Center's Experience**

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Liver: Hepatocellular Carcinoma and Other Malignancies

1111 **Given the Potential Impact on Liver Transplant Selection, Revisiting the Current Standard of Diagnosis of Hepatocellular Carcinoma**

K. Amarell, B. Fisher, B. Park, K. Ko, B. Kallakury, *Department of Pathology & Laboratory Medicine, Georgetown University School of Medicine, Washington, DC*

1112 **Pilot Evaluation of Prognosis After Liver Transplantation in Patients with a History of Hepatocellular Carcinoma and Pd-1 Inhibition**

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1113 **Effects of TIPS on Transplant Outcomes for HCC**

C. L. Hanlon[1], D. Toy[1], Y. Liu[1], S. Zhou[1], K. Zhou[2], J. Kahn[2], L. Yuan[2], *[1]Internal Medicine, University of Southern California, Los Angeles, CA, [2]Internal Medicine - Department of Gastroenterology and Hepatology, University of Southern California, Los Angeles, CA*

1114 **Immunotherapy of Dc-cik Cells in Patient with Hepatocellular Carcinoma Recurrence Following Liver Transplantation**

S. Hsu, L. Jeng, H. Yang, A. Thorat, *China Medical University Hospital, Taichung, Taiwan*

1115 **Impact of Donation After Circulatory Death Donor Allografts on Outcomes Following Liver Transplantation for Cholangiocarcinoma**

S. Kumar[1], S. Lin[2], J. D. Schold[2], *[1]Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates, [2]Department of Quantitative Health Sciences, Cleveland Clinic Foundation, Cleveland, OH*

1116 **Review of 10-Year Liver Explant Pathology Impact on Outcomes in a Single Center**

Y. K. Kwon[1], L. Sher[1], S. Khemichian[2], J. Kahn[2], Y. Genyk[1], *[1]Hepatobiliary and Abdominal Transplant Surgery, University of Southern California, Los Angeles, CA, [2]Gastrointestinal and Liver Diseases, University of Southern California, Los Angeles, CA*

1117 **Intrahepatic Spatial Location of HCC Recurrence Following Loco-regional Therapy for Solitary Tumors Predicts a Higher Oncologic Risk & Increased Recurrence Post-transplant**

A. Mathur, E. Baughan, S. Haider, A. Griesemer, T. Kato, J. Emond, *Columbia University, New York, NY*

1118 **Improving Liver Transplantation Outcomes for Hepatitis C Associated Hepatocellular Carcinoma in Direct-Acting Antiviral Therapy Era**

K. Okumura, H. Sogawa, G. Veillette, D. John, T. Diflo, R. Bodin, D. C. Wolf, S. Nishida, *Surgery, Westchester Medical Center/New York Medical College, Valhalla, NY*

1119 **The Role of Histone Acetylation/methylation Mediated Epigenetic Modifications in the Pathogenesis of Non-alcoholic Steatohepatitis-associated Liver Carcinogenesis**

P. K. Rajan[1], U. Utibe-Abasi[1], J. D. Sanabria[1], M. Banerjee[2], G. Smith[1], M. S. Schade[1], J. Sanabria[1], K. Sodhi[1], S. Pierre[2], Z. Xie[2], J. I. Shapiro[2], J. Sanabria[1], *[1]Department of Surgery, Marshall University, Huntington, WV, [2]Marshall Institute for Interdisciplinary Research (MIIR), Marshall University, Huntington, WV*

1120 **Excellent Pathological Response with Gemcitabine-based Protocol in Patient with Hilar Cholangiocarcinoma**

A. Saharia[1], R. McMillan[1], S. Kodali[1], M. Javley[2], C. M. Mobley[1], M. J. Hobeika[1], A. Shetty[1], D. W. Victor[1], R. McFadden[1], M. Abdelrahim[1], K. Heyne[1], A. O. Gaber[1], R. M. Ghobrial[1], *[1]Houston Methodist Hospital, Houston, TX, [2]MD Anderson Cancer Center, Houston, TX*

1121 **Liver Transplantation Following Checkpoint Inhibitor Therapy - Timing is Everything**

G. T. Schnickel[1], J. Parekh[1], Y. Kono[2], J. Berumen[1], V. Ajmeera[2], K. Mekeel[1], *[1]Division of Transplant and Hepatobiliary Surgery, Department of Surgery, University of California San Diego, San Diego, CA, [2]Division of Gastroenterology, Department of Medicine, University of California San Diego, San Diego, CA*

1122 **Albumin Level Prior to Liver-Directed Therapy is a Risk Factor of Waitlist Tumor Progression Independent of HCC Burden**

P. Thevenot, K. Nunez, T. Sandow, M. Hibino, P. Wright, J. Patel, D. Fort, A. Cohen, *Ochsner Health, New Orleans, LA*

1123 **Outcomes of Surgical Resection versus Liver Transplantation in Hilar Cholangiocarcinoma**
M. K. White[1], F. Aucejo[2], A. Moro[2], K. Sasaki[2], K. Stephans[3], B. Estfan[4], C. Quintini[2], B. Eghtesad[2], K. Hashimoto[2], F. Masato[2], C. Miller[2], K. Menon[5], *[1]Cleveland Clinic, Cleveland, OH, [2]General Surgery, Cleveland Clinic, Cleveland, OH, [3]Radiation Oncology, Cleveland Clinic, Cleveland, OH, [4]Oncology, Cleveland Clinic, Cleveland, OH, [5]Gastroenterology & Hepatology, Cleveland Clinic, Cleveland, OH*

Liver: Immunosuppression and Rejection

1093 **Changes in Liver Transplant Volume and Induction During the Covid-19 Era**
T. Alhamad, J. Wellen, K. Lentine, M. Doyke, W. Chapman, Y. Al-Hosni, D. Axelrod, S. Chang, *Washington University School of Medicine in St. Louis, Saint Louis, MO*

1094 **Evaluation of the Conversion from Tacrolimus to Sirolimus in Liver Transplant Recipients**
H. Bakhtiari[1], S. Todd[2], H. Snyder[2], D. Lo[2], M. Flynn[2], *[1]Mercer University College of Pharmacy, Atlanta, GA, [2]Emory University Hospital, Atlanta, GA*

1095 **Early Reduction of Tacrolimus Trough Levels Improves Long-term Kidney Function without Increase in Incidence of Acr**
M. Chen[1], B. Loza[1], A. Chang[1], R. Byfield[2], K. Olthoff[1], A. Shaked[1], *[1]Department of Surgery, University of Pennsylvania, Philadelphia, PA, [2]Data Analytics Center, Penn Medicine Information Systems, University of Pennsylvania Health System, Philadelphia, PA*

1096 **Dynamics of IgG Subclass as a Mechanism of Desensitization Using Rituximab for Presensitized Patients Undergoing Living Related Liver Transplantation**
H. Egawa[1], K. Ide[2], T. Ishizuka[3], H. Ohdan[4], Y. Kotera[1], T. Kato[1], A. Ohmori[1], Y. Hirata[1], G. Shibuya[1], S. Yamashita[1], S. Ariizumi[1], *[1]Tokyo Women's Medical University, Tokyo, Japan, [2]Surgery, Hiroshima University, Hiroshima, Japan, [3]Clinical Laboratory, Tokyo Women's Medical University, Tokyo, Japan, [4]Hiroshima University, Hiroshima, Japan*

1097 **Quantifying the Interaction Between Posaconazole and Tacrolimus in Liver Transplant Recipients: A Practical Approach**
B. Lane[1], U. Kaszubski[1], A. Freeman[1], B. Wise[1], L. Hutchinson[1], M. Janusek[1], G. Therapondos[2], H. Bohorquez[3], S. Anders[1], *[1]Pharmacy, Ochsner Medical Center, New Orleans, LA, [2]Hepatology, Ochsner Medical Center, New Orleans, LA, [3]Transplant Surgery, Ochsner Medical Center, New Orleans, LA*

1098 **Highly Sensitized Simultaneous Liver-kidney Transplant Recipients Show a Reduction in Panel Reactive Antibodies and No Kidney Rejection 1-year Post-transplant**
M. Moaddab, J. V. Nolte Fong, C. M. Mobley, A. Saharia, M. J. Hobeika, R. McMillan, S. G. Yi, R. J. Knight, A. Gaber, R. Ghobrial, *Houston Methodist Hospital, Houston, TX*

1099 **Varicella Hepatitis Mimicking Immune Checkpoint Inhibitor-induced Liver Toxicity**
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Liver: Kidney Issues in Liver Transplantation

1080 **Development of Novel Multivariable Logistic Regression Model for Predicting Acute Kidney Injury After Liver Transplantation**
H. Chen, Y. Nie, Q. Zhao, X. He, *Organ Transplant Center,, The First Affiliated Hospital, Sun Yat-sen University, Guangzhou, China*

1081 **Non-Alcoholic Fatty Liver Disease in Non-Liver Transplant Patients**

R. Claudio[1], C. Conceicao[2], K. Robichaux[2], A. Kumar[1], J. Buggs[3], N. Kemmer[4], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL, [4]Transplant Hepatology, Tampa General Hospital, Tampa, FL*

1082 **A Significantly Shorter Waiting Time to Subsequent Kidney Transplant After Liver Transplant by Using Safety Net Policy**

P. Homkrailas, S. Bunnapradist, *Medicine, David Geffen School of Medicine at UCLA, Los Angeles, CA*

1083 **Perioperative Terlipressin Therapy Reduces the Risk of Acute Kidney Injury Post-Living Donor Liver Transplantation - A Systematic Review and Meta-analysis**

A. V. Kulkarni, H. V. Tevethia, M. Sharma, P. Kumar, N. P. Rao, N. D. Reddy, *Hepatology and Liver Transplantation, Asian Institute of Gastroenterology, Hyderabad, India*

1084 **Comparison of Allograft Outcomes in SLK Transplant Patients with and without ESLD: A UNOS Database Analysis**

P. Kyriazis, H. Patel, P. Nissaisorakarn, F. Cardarelli, N. Agrawal, *Transplant Division, Beth Israel Deaconess Medical Center, Boston, MA*

1085 **The Combined Effects of Simultaneous Portal Vein Thrombosis and Renal Dysfunction in Liver Transplant Recipients**

M. Molinari[1], C. F. Carillo[2], D. Dongling[1], D. Jorgensen[1], S. Dharmayan[1], C. Kaltenmeier[1], H. Liu[1], J. Behari[1], V. Rachakonda[1], S. Ganesh[1], C. Hughes[1], A. Tevar[1], H. Al Harakeh[1], B. Emmanuel[1], A. Humar[1], R. Bataller[1], *[1]University of Pittsburgh Medical Centre, Pittsburgh, PA, [2]Medicine, University of Pittsburgh Medical Centre, Pittsburgh, PA*

1086 **Combined Liver-Kidney Transplantation in Adults With End-Stage Liver Disease: Risk Factors in Patients with Chronic Kidney Disease Stages 3-5, Not on Maintenance Dialysis**

A. Santos, E. Bueno, M. Leghrouz, *University of Florida, Gainesville, FL*

1087 **Obesity is a Risk Factor for Progression to Kidney Transplant Waitlisting After Liver Transplantation**

B. Shelton[1], B. Orandi[1], K. Olthoff[2], E. Pomfret[3], K. Forde[2], D. Sawinski[2], M. Gray[1], N. Ascher[4], J. Locke[1], *[1]University of Alabama at Birmingham, Birmingham, AL, [2]University of Pennsylvania, Philadelphia, PA, [3]University of Colorado School of Medicine, Aurora, CO, [4]University of California San Francisco, San Francisco, CA*

LB 82 **Chances of Renal Recovery in Liver Only Transplant Recipients Who Were Eligible for Simultaneous Liver-Kidney Transplant**

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Liver: Large Data and Artificial Intelligence

1181 **Application of Linear Discriminant Analysis (lda) to Differentiate Acute Rejection (ar) and Acute Dysfunction Non-Rejection (adnr) in Liver Transplant Recipients**

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1182 **Artificial Neural Network Application for MELDNa Prediction**
L. Pruinelli[1], M. Nguyen[1], S. Olson[1], J. Zhou[1], J. Schold[2], T. Pruett[1], S. Ma[1], G. Simon[1], *[1]University of Minnesota, Minneapolis, MN, [2]Cleveland Clinic Foundation, Cleveland, OH*

LB 84 **Deep Learning Based Automatic Liver Volume Estimation and Segmentation via U-net Convolutional Neural Network**
B. Marlatt[1], R. Pettit[2], J. Havelka[1], S. J. Corr[3], A. Rana[2], *[1]InformAI, Houston, TX, [2]Baylor College of Medicine, Houston, TX, [3]Houston Methodist, Houston, TX*

Liver: Living Donor Liver Transplant and Partial Grafts

1126 **Machine Learning Informs Utility-Based Non-Directed Living Liver Donor Allocation**
K. Bambha[1], J. Perkins[1], M. Sturdevant[1], S. W. Biggins[1], R. Bakthavatsalam[1], P. Healey[2], A. Dick[2], J. Reyes[1], *[1]University of Washington, Seattle, WA, [2]Seattle Children's, Seattle, WA*

1127 **Elevated BMI (>28) and High Titer ANA are the Most Common Causes of Abnormal Selective Pre-donation Liver Biopsies in Living Liver Donors**
J. Cisek, *Transplant, University of Colorado Hospital, Aurora, CO*

1128 **Update on Domino Liver Transplants - A Registry Report**
R. Gruessner, J. Renz, A. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

1129 **The Landscape of Non-Directed Living Liver Donation in the United States**
L. R. Herbst, L. Zeiser, A. Massie, K. Herrick Reynolds, E. King, A. Gurakar, D. L. Segev, J. Garonzik Wang, A. M. Cameron, *Johns Hopkins University, Baltimore, MD*

1130 **Outcomes of Robotic Living Donor Right Hepatectomy in Liver Transplant Recipients: A Systematic Review and Meta-analysis**
E. Lincango-Naranjo[1], E. Garces-Delgado[2], P. Solis-Pazmino[3], H. Alexander-Leon[4], G. Restrepo-Rodas[2], R. Mancero-Montalvo[2], C. J. Ponce[2], R. Cadena-Semanate[2], R. Vargas-Cordova[5], G. Herrera-Cevallos[6], A. Villarreal-Juris[7], S. Vallejo[1], C. Liu-Sanchez[8], L. P. Prokop[9], A. D. Guerron[10], O. J. Ponce[1], D. Moris[11], *[1]Knowledge and Evaluation Research Unit, Mayo Clinic, Rochester, MN, [2]Universidad Internacional del Ecuador, Quito, Ecuador, [3]Department of Otolaryngology-Head and Neck Surgery, Stanford University, Stanford, CA, [4]Universidad de las Americas, Quito, Ecuador, [5]Hospital General San Francisco IESS, Quito, Ecuador, [6]Hospital Metropolitano, Quito, Ecuador, [7]Universidad Central del Ecuador, Quito, Ecuador, [8]Universidad Peruana Cayetano Heredia, Lima, Peru, [9]Mayo Clinic Libraries, Mayo Clinic, Rochester, MN, [10]Department of Surgery, Duke University, Durham, NC, [11]Department of surgery, Duke University, Durham, NC*

1131 **Is Low Systemic Fibrinolytic Activity During the Anhepatic Phase Liver Transplant Surgery Associate with the Dreaded Post-Operative Complication of Hepatic Artery Thrombosis?**
H. B. Moore[1], Y. Bababekov[1], J. Pomposelli[1], T. Ferrell[1], F. Azam[1], M. Adams[2], D. Yoeli[1], R. Choudhury[1], M. Wachs[2], E. Pomfret[1], T. Nydam[1], *[1]University of Colorado, Aurora, CO, [2]Childrens Hospital Colorado, Aurora, CO*

1132 **Adult Deceased Donor Liver Transplantation with Split Liver Grafts vs Whole Liver Grafts. A Single-Center Experience**
P. Vargas[1], C. Argo[2], H. Zachary[2], M. Stotts[2], N. Intagliata[2], P. Northup[2], S. Pelletier[1], J. Oberholzer[1], N. Goldaracena[1], *[1]Transplant Surgery, University of Virginia Health System, Charlottesville, VA, [2]Gastroenterology and Hepatology, University of Virginia Health System, Charlottesville, VA*

1133 **No Benefit of Antithymocyte Globulin in Living Donor Liver Transplant Recipients**
N. Wilson, P. Nguyen, G. Saracino, R. Patel, G. Testa, T. Sam, *Baylor University Medical Center, Dallas, TX*

LB 85 **Comprehensive Intrahepatic Biliary Anatomy Underscores the Split-ability and the Origin of Biliary Leakage in Hemiliver Split Liver Transplant**
J. Nguyen[1], K. Musto[1], M. Dougherty[1], R. Paz-Fugamalli[2], D. Harnois[1], *[1]Transplantation, Mayo Clinic Florida, Jacksonville, FL, [2]Radiology, Mayo Clinic Florida, Jacksonville, FL*

Liver: MELD, Allocation and Donor Issues (DCD/ECD)

1134 **Influence of Controlled Donation After Circulatory Death (cdcd) on Waiting List Mortalityfor Liver Transplantation in the Last 10 Years: The Spanish Experience**
F. Alconchel, M. Royo-Villanova, J. Moya, L. Martínez-Alarcón, J. Zambudio, P. Cascales-Campos, T. Nicolás, R. Robles, F. Sánchez-Bueno, J. Pons, J. Rodríguez, A. Ríos, J. Fernández, P. Ramírez, *University Hospital Virgen Arrixaca (IMIB-Arrixaca), Murcia, Spain*

1135 **Liver Simulated Allocation Model (LSAM) of a Height-Based Policy Change to Improve Sex Disparity in Liver Transplantation (LT)**
S. Bernards[1], E. Lee[1], N. Leung[2], H. Zhao[2], M. Akan[3], M. Sarkar[1], S. Tayur[3], N. Mehta[1], *[1]UCSF, SF, CA, [2]City U, HK, Hong Kong, [3]CMU, Pittsburgh, PA*

1136 **Utilization of Pre-Procurement Donor Liver Biopsy in Donation-after-circulatory-Death Liver Transplantation**
A. C. Bolognese[1], N. Neidlinger[1], C. Sparks[2], A. Schneider[2], A. M. D'Alessandro[1], D. P. Foley[1], *[1]Department of Surgery, Division of Transplantation, University of Wisconsin School of Medicine and Public Health, Madison, WI, [2]UW Organ and Tissue Donation, Madison, WI*

1137 **A Comparison Between Combined Liver Kidney Transplants to Liver Transplants Alone: A Systematic Review and Meta-analysis**
S. Bouari[1], E. A. Rijkse[1], H. J. Metselaar[2], M. W. van den Hoogen[3], J. N. Ijzermans[1], J. de Jonge[1], W. G. Polak[1], R. C. Minnee[1], *[1]Surgery, Division of HPB & Transplant Surgery, Erasmus MC, Rotterdam, Netherlands, [2]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, Netherlands, [3]Internal Medicine, Section of Nephrology and Transplantation, Erasmus MC, Rotterdam, Netherlands*

1138 **Center Cost is Not a Barrier to Aggressive Utilization of DCD Livers**
L. M. Brewer, D. M. Faulkner, A. J. Logan, J. M. Sneddon, G. N. Brock, N. Singh, W. K. Washburn, A. D. Schenk, *The Ohio State University Wexner Medical Center, Columbus, OH*

1139 **Post-Transplant Outcomes Comparing A2 Incompatible to Compatible Deceased Donor Liver Transplant Recipients**
T. Chiang, M. A. Eagleson, S. Bae, J. Garonzik-Wang, D. Segev, A. B. Massie, *Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD*

1140 **Clinical Analysis of the Prognosis After Receiving a Liver Graft That Abandoned Transplantation Due to Poor Graft Conditions in the Centers Allocated as a Priority**
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1141 **Allocation Changes and Covid Effect on Waiting Time for Liver Transplantation**
L. Dageforde[1], Q. Yuan[2], N. Elias[1], *[1]Division of Transplantation, Massachusetts General Hospital, Boston, MA, [2]Organ Transplant Institute, 8th Medical Center, Chinese PLA General Hospital, Beijing, China*

1142 **Short Waiting Time is Not Associated with Decrease in Disease-free Survival in Liver Transplant Recipients with HCC**

J. Daum[1], N. Gupta[1], B. Aqel[2], L. Mi[3], J. Harbell[4], *[1]School of Medicine, Mayo Clinic Arizona, Phoenix, AZ, [2]Hepatology, Mayo Clinic Arizona, Phoenix, AZ, [3]Biostatistics, Mayo Clinic Arizona, Phoenix, AZ, [4]Transplant Surgery, Mayo Clinic Arizona, Phoenix, AZ*

1143 **Time-averaged Oxygen Saturation During Donor Agonal Phase is Associated with Post-transplant Hepatic Graft Survival**

K. C. Eddinger[1], E. M. Sonnenberg[1], A. Kayastha[2], N. Mahmud[3], D. E. Schaubel[2], P. L. Abt[1], *[1]Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, [2]Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, [3]Gastroenterology, Hospital of the University of Pennsylvania, Philadelphia, PA*

1144 **Marginal Allografts in Liver Transplantation Have Very Limited Impact on Length of Stay**

C. Goff[1], T. Zhang[1], M. McDonald[1], A. Anand[1], N. Galvan[2], F. Kanwal[3], G. Cholankeril[2], R. Hernaez[3], J. A. Goss[4], A. Rana[2], *[1]Department of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Division of Abdominal Transplantation, Michael E DeBakey Department of General Surgery, Baylor College of Medicine, Houston, TX, [3]Division of Gastroenterology and Hepatology, Department of Medicine, Baylor College of Medicine, Houston, TX, [4]Liver Center, Division of Abdominal Transplantation, Department of General Surgery, Baylor College of Medicine, Houston, TX*

1145 **Outcomes of DCD Allografts in Liver Transplant Recipients with HCC**

N. Gupta[1], J. Daum[1], B. Aqel[2], L. Mi[3], J. Harbell[4], *[1]School of Medicine, Mayo Clinic Arizona, Phoenix, AZ, [2]Hepatology, Mayo Clinic Arizona, Phoenix, AZ, [3]Biostatistics, Mayo Clinic Arizona, Phoenix, AZ, [4]Transplant Surgery, Mayo Clinic Arizona, Phoenix, AZ*

1146 **Geographic Divergence in Waitlist Registration and Trends in Waitlist Removal for Liver Transplantation in Patients with Nonalcoholic Steatohepatitis (NASH)**

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1147 **Waitlist Outcomes for Exception Candidates Following the Implementation of MMaT/250 Score**

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1148 **Extreme Hyponatremia as a Risk Factor for Early Mortality After Liver Transplantation in the MELD-Sodium Era**

T. Ivanics[1], S. Leonard-Murali[1], H. Mouzaihem[1], D. Moonka[2], T. Kitajima[1], S. Yeddula[1], T. Shamaa[1], M. Rizzari[1], K. Collins[1], A. Yoshida[1], M. Abouljoud[1], S. Nagai[1], *[1]Division of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI, [2]Division of Gastroenterology and Hepatology, Henry Ford Hospital, Detroit, MI*

1149 **Long-term Outcomes of Donation After Cardiac Death and Living Donor Liver Transplant for Primary Sclerosing Cholangitis: An Analysis of UNOS Registry from 2002-2020**

T. Kitajima, S. Nagai, T. Ivanics, T. Shamaa, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, D. Moonka, *Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

1150 **Pre-transplant Prognostic Nutritional Index Predicts Short-term Outcomes After Liver Transplantation**

E. Lisznyai, T. Kitajima, K. Delvecchio, A. Mohamed, S. Yeddula, T. Shamaa, T. Ivanics, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Transplant Institute, Henry Ford Hospital, Detroit, MI*

1151 **Role of Recovering Surgeon in DCD Liver Transplant Outcomes**
E. Macdonough, K. Pont, B. Aqel, K. Valenti, W. Hewitt, A. Moss, K. S. Reddy, C. Jadlowiec, *Mayo Clinic, Phoenix, AZ*

1152 **The Survival Benefits of Using Marginal Allografts in Liver Transplantation**
T. H. Malik[1], E. L. Godfrey[1], A. Rana[2], *[1]Baylor College of Medicine, Houston, TX, [2]Department of Abdominal Transplantation, Baylor College of Medicine, Houston, TX*

1153 **When One Size Does Not Fit All: Geographically Heterogeneous Liver Distribution**
M. A. Mankowski[1], S. Gentry[2], D. Segev[3], N. Trichakis[4], *[1]KAUST, Thuwal, Saudi Arabia, [2]US Naval Academy, Annapolis, MD, [3]JHU, Baltimore, MD, [4]MIT, Boston, MA*

1154 **Evaluation of Increasing Liver Discard Rate and Waiting List Drop-Off in Post-MELD Era**
R. Matsumoto[1], K. Halazun[2], J. Emond[1], B. Samstein[2], R. S. Brown Jr.[2], L. Dove[1], T. Kato[1], *[1]Center for Liver Disease and Transplantation, Columbia University Irving Medical Center, New York, NY, [2]Center for Liver Disease and Transplantation, Weill Cornell Medical Center, New York, NY*

1155 **Survival Adult Liver Transplantation: Experience in a Latinoamerican High Complexity Center. 15 Years with More Than 500 Transplants**
C. A. Murcia, N. Ramirez, M. E. Ramos, C. Benavides, J. Rivera, G. Mejia, *Transplant Unit, Fundación Cardioinfantil, Bogotá, Colombia*

1156 **Early Effects of Acuity Circle-Based Liver Allocation During Covid-19 Pandemic in the United States**
S. Nagai, T. Ivanics, T. Kitajima, M. Shamaa, M. Lu, S. Yeddula, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, *Henry Ford Hospital, Detroit, MI*

1157 **Liver Transplant Outcomes Using Nationally Allocated Grafts**
S. Ohara[1], B. Lizaola-Mayo[2], P. Morgan[2], D. Das[3], J. Wagler[4], K. S. Reddy[2], B. Aqel[2], A. Moss[2], C. Jadlowiec[2], *[1]Valleywise Health General Surgery Residency Program, Phoenix, AZ, [2]Mayo Clinic, Phoenix, AZ, [3]Mayo Clinic Alix School of Medicine, Scottsdale, AZ, [4]John C Lincoln, Phoenix, AZ*

1158 **Assessing Liver Transplant Outcomes Utilizing Post-Cross Clamp Offers**
K. Pont[1], E. Macdonough[1], D. Das[2], K. Valenti[1], P. Morgan[1], B. Aqel[1], A. Mathur[1], A. Moss[1], K. S. Reddy[1], C. Jadlowiec[1], *[1]Mayo Clinic, Phoenix, AZ, [2]Mayo Clinic Alix School of Medicine, Scottsdale, AZ*

1159 **Impact of Liver Acuity Circles on Timing of Donor Procurements**
R. Radhakrishnan, D. Goldberg, *University of Miami, Miami, FL*

1160 **Patient Feedback of a Patient and Family Decision Support Tool for Liver Organ Offer Decisions**
C. Schaffhausen[1], S. Chu[2], M. Bruin[3], S. Chinnakotla[3], J. Lake[3], A. Israni[4], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]University of Minnesota (UMN), Minneapolis, MN, [3]UMN, Minneapolis, MN, [4]Hennepin Healthcare, UMN, Minneapolis, MN*

1161 **Liver Transplantation with Super Obese Donors (BMI ≥ 50) Grafts: An Acceptable Pathway to Expand the Donor Pool. Analysis of the OPTN/UNOS Liver Transplant Registry**
P. Vargas[1], C. Argo[2], H. Zachary[2], M. Stotts[2], N. Intagliata[2], P. Northup[2], J. Oberholzer[1], S. Pelletier[1], N. Goldaracena[1], *[1]Transplant Surgery, University of Virginia Health System, Charlottesville, VA, [2]Gastroenterology and Hepatology, University of Virginia Health System, Charlottesville, VA*

LB 86 **Assessing the Impact of the New Liver Allocation Policy on Transplant Center and Organ Procurement Organization Logistics**
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LB 87 **Improved Patient Survival in DCD Liver Transplantation**

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Liver: Pediatrics

1162 **Living Donor versus Deceased Donor Pediatric Liver Transplantation: A Systematic Review and Meta-Analysis of Outcomes**

A. Barbetta[1], C. Butler[2], S. Barhouma[2], R. Hogen[1], B. Roque[1], H. Schillperoort[3], G. Meeberg[4], J. Shapiro[5], Y. Kwon[1], R. Kohli[6], J. Emamaullee[1], *[1]Surgery, abdominal transplat, University of Southern California, Los Angeles, CA, [2]University of Southern California, Los Angeles, CA, [3]Norris Medical Library, University of Southern California, Los Angeles, CA, [4]Department of Surgery, University of Alberta, Edmonton, AB, Canada, [5]Department of Surgery,, University of Alberta, Edmonton, AB, Canada, [6]Department of Pediatrics, University of Southern California, Los Angeles, CA*

1163 **Immunologic Benefits of Maternal Living Donor Allografts in Pediatric Liver Transplantation: Less Rejection Episodes and No Evidence of De Novo Allosensitization**

A. Barbetta[1], G. Meeberg[2], B. Rocque[1], S. Barhouma[3], S. Gilmour[4], F. Faytrouni[5], O. Guttman[5], P. Campbell[4], J. Shapiro[2], J. Emamaullee[1], *[1]Surgery, Abdominal Transplant, University of Southern California, Los Angeles, CA, [2]Surgery, University of Alberta, Edmonton, AB, Canada, [3]University of Southern California, Los Angeles, CA, [4]University of Alberta, Edmonton, AB, Canada, [5]University of British Columbia, Vancouver, BC, Canada*

1164 **Post Pediatric Liver Transplant Immunosuppression: What's the Caregivers' Perspective?**

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1165 **Developmental Characteristics and Haemodynamics After Pediatric Donor to Adult Recipients in Liver Transplantation**

M. Chen, L. Xiaohong, H. Xitao, C. Zhitao, J. W., *Transplant Center, Sun Yat-sen University, Guangzhou, China*

1166 **Portal Vein Challenges in Pediatric Liver Transplantation: The Utility of Interposition Grafts as an Acceptable Management Strategy**

R. Hogen, K. Etesami, J. Cervantes, Y. Kwon, S. Zielsdorf, J. Emamaullee, Y. Genyk, *Division of Hepatobiliary and Abdominal Organ Transplantation, Keck School of Medicine of USC, University of Southern California, Los Angeles, CA*

1167 **Adults Undergoing First Time Liver Transplantation with Biliary Atresia: An Analysis of the United Network for Organ Sharing Database**

E. Hsu[1], J. Perkins[2], S. P. Horslen[1], A. A. Dick[1], N. M. Blondet[1], J. D. Reyes[2], *[1]Seattle Children's Hospital, Seattle, WA, [2]Surgery, University of Washington School of Medicine, Seattle, WA*

1169 **Clearance of Viral RNA and DNA and Antibody Response Following Administration of Live Attenuated Measles and Varicella Vaccines in Children with Chronic Liver Disease**

S. Kemme[1], A. Weinberg[2], A. G. Feldman[1], *[1]Children's Hospital Colorado, Denver, CO, [2]University of Colorado Denver, Denver, CO*

1170 **Outcomes After Abo Incompatible Pediatric Liver Transplantation are Comparable to Abo Identical/ compatible Transplant**

C. Lemoine, K. Brandt, R. Superina, *Division of Transplant and Advanced Hepatobiliary Surgery, Ann & Robert H. Lurie Children's Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL*

1171 **Thrombotic and Hemorrhagic Complications Associated with Postoperative Anticoagulation After Pediatric Liver Transplantation**

C. Lemoine, K. Brandt, R. Superina, *Division of Transplant and Advanced Hepatobiliary Surgery, Ann & Robert H. Lurie Children's Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL*

1172 **Perivenular Fibrosis After Pediatric Liver Transplant**

J. Lew, S. Cho, S. Feng, E. R. Perito, *UCSF, San Francisco, CA*

1173 **Peripheral Lymphocyte Profiling and Increased Risk of EBV Infection in Pediatric Liver Transplant Recipients**

V. M. Novara Gennuso[1], T. Miloh[2], *[1]Pediatrics, Miller School of Medicine- University of Miami, Miami, FL, [2]Pediatrics, Miami Transplant Institute, Miami, FL*

1174 **Paired Surveillance Biopsies Over >4 Years from a Multi-Center Cohort of 78 Long-Term Pediatric Liver Transplant Recipients**

E. R. Perito[1], E. Persyn[2], J. Bucuvalas[3], J. E. Squires[4], M. Martinez[5], S. Mohammad[6], A. J. Demetris[4], S. Feng[1], *[1]UCSF, San Francisco, CA, [2]King's College, London, United Kingdom, [3]Mt. Sinai School of Medicine, NY, NY, [4]U of Pittsburgh, Pittsburgh, PA, [5]Columbia U, NY, NY, [6]Northwestern U, Chicago, IL*

1175 **A Pediatric Liver Allograft with an Occult Urea Cycle Defect Carrier Mutation Causing Delayed Graft Function and Metabolic Crisis After Liver Transplantation**

A. Peters, M. Rezvani, C. Prada, K. Campbell, *Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

1176 **Macrosteatosis in the US Pediatric Deceased Liver Donor Population, 2005-2018**

J. Purvis, D. Dhall, C. McLeod, S. Sheikh, R. Cannon, K. Frey, J. Locke, B. Orandi, *University of Alabama School of Medicine, Birmingham, AL*

1177 **Temporal Changes in Renal Function Predict Waitlist Death or Deterioration in Pediatric Liver Transplantation**

N. Thalji, L. Thalji, S. Ibrahim, T. Diwan, P. Kamath, J. Heimbach, *Mayo Clinic Rochester, Minnesota, Rochester, MN*

1178 **Clinically Evident Portal Hypertension (CEPH) is Associated with Low IGF-1 in Children with Chronic Liver Disease**

B. Whitehead[1], S. Mohammad[1], S. Kelly[1], J. Josefson[2], L. Mithal[3], E. M. Alonso[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [2]Division of Endocrinology, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [3]Division of Infectious Disease, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL*

1179 **Hepatoportoenterostomy versus Primary Liver Transplantation for Biliary Atresia: A Review of the National Experience**

D. Yoeli[1], R. A. Choudhury[1], S. S. Sundaram[2], C. L. Mack[2], J. P. Roach[3], F. M. Karrer[4], M. E. Wachs[1], M. A. Adams[1], *[1]Transplant Surgery, University of Colorado and Children's Hospital Colorado, Aurora, CO, [2]Pediatric Gastroenterology, Hepatology and Nutrition, University of Colorado and Children's Hospital Colorado, Aurora, CO, [3]Pediatric Surgery, University of Colorado, Aurora, CO, [4]Pediatric Surgery, University of Colorado and Children's Hospital Colorado, Aurora, CO*

1180 **Impact of Pediatric Living Donor Liver Transplant Center Volume on Waiting List and Post-Transplant Outcomes**

D. Yoeli, R. A. Choudhury, H. B. Moore, T. L. Nydam, M. E. Wachs, E. A. Pomfret, M. A. Adams, *Transplant Surgery, University of Colorado School of Medicine and Children's Hospital Colorado, Aurora, CO*

LB 88 **Intestinal Insufficiency May Affect Outcomes After Pediatric Liver Transplantation**
A. K. Batra, M. Desai, J. Yang, K. Cummins, H. Oden-Brunson, H. Ling, S. Beer, J. Goss, N. Galvan, *Surgery, Baylor College of Medicine, Houston, TX*

Liver: Recipient Selection

1100 **Early Portal Vein Ligation in the Setting of Shorter Hepatectomy May Contribute to Better Surgical Outcomes in Deceased Donor Liver Transplantation**
K. Delvecchio, T. Kitajima, A. Mohamed, S. Yeddula, M. Tayseer, T. Ivanics, K. Collins, M. Rizzari, A. Yoshida, M. Aboul-joud, S. Nagai, *Henry Ford Hosptial, Detroit, MI*

1101 **Liver Transplantation in Septuagenarians**
L. Egbert[1], D. Das[1], S. Ohara[2], J. Wagler[3], G. Mahdi[4], B. Aqel[5], A. Moss[5], K. S. Reddy[5], C. Jadlowiec[5], *[1]Mayo Clinic Alix School of Medicine, Scottsdale, AZ, [2]Valleywise Health General Surgery Residency Program, Phoenix, AZ, [3]HonorHealth John C. Lincoln, Phoenix, AZ, [4]Mayo Clinic Alix School of Medicine, Phoenix, AZ, [5]Mayo Clinic, Phoenix, AZ*

1102 **Implementation of a High-risk Medication Report for Waitlisted Liver Transplant Candidates**
M. M. Eiting[1], H. Yeh[2], M. Cote[1], S. Shao[1], A. B. Scherrer[2], L. Dageforde[2], N. Elias[2], C. Rogers Marks[1], *[1]Pharmacy, Massachusetts General Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

1103 **Can an Organ Survive for More Than 100 Years Between Donor and Recipient**
R. Gruessner, J. Renz, A. C. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

1104 **Regional Trends in Liver Transplantation for Nonalcoholic Steatohepatitis**
C. L. Hanlon[1], B. Saberi[2], L. Yuan[1], *[1]Internal Medicine, University of Southern California, Los Angeles, CA, [2]Division of Gastroenterology and Hepatology, Beth Israel Deaconess Medical Center, Boston, MA*

1105 **Implementation of an Alcohol Screening Program Identifies Active Pre-transplant Drinking and Allows Engagement in Chemical Dependency Treatment**
N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[2], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Division of Transplantation, University of Minnesota, Minneapolis, MN*

1106 **Serum Phosphatidylethanol is Superior to Urine Ethyl Glucuronide for Detection of Alcohol Use in Pre-transplant Patients**
N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[2], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Division of Transplantation, University of Minnesota, Minneapolis, MN*

1107 **A Shift in Paradigm: Phosphatidylethanol Testing to Monitor for and Address Alcohol Recidivism Following Liver Transplantation**
F. M. Nimri[1], S. Naffouj[1], F. Askar[1], A. Singh[2], H. Gonzalez[2], S. Jafri[2], *[1]Internal Medicine, Henry Ford Hospital, Detroit, MI, [2]Gastroenterology, Henry Ford Hospital, Detroit, MI*

1108 **Recent Trends and Outcomes of Liver Transplantation for Non-alcoholic Steatohepatitis versus Alcohol Liver Disease in the United States: Obesity Might be Protective**

K. Okumura, I. Lee, H. Sogawa, G. Veillette, D. John, T. Diflo, R. Bodin, D. Wolf, S. Nishida, *Surgery, Westchester Medical Center/New York Medical College, Valhalla, NY*

1109 **Variation of Liver and Kidney Transplant Practice and Outcomes During Public Holidays in the United States**

M. Shamaa, T. Kitajima, T. Ivanics, A. Elsabbagh, M. Lu, K. Delvecchio, A. Mohamed, S. Yeddula, M. Rizzari, K. Collins, A. Yoshida, M. Abouljoud, S. Nagai, *Transplant surgery, Henry Ford Hospital, Detroit, MI*

1110 **Liver Transplant in Adult Recipients Using Pediatric Deceased Donor Liver Grafts**

P. Vargas[1], C. Argo[2], H. Zachary[2], M. Stotts[2], N. Intagliata[2], P. Northup[2], S. Pelletier[1], J. Oberholzer[1], N. Goldaracena[1], *[1]Transplant surgery, University of Virginia, Charlottesville, VA, [2]Gastroenterology and Hepatology, University of Virginia, Charlottesville, VA*

Liver: Retransplantation and Other Complications

1074 **Comparative Outcomes of Endovascular Interventions for Hepatic Artery Stenosis Following Adult Liver Transplantation**

S. Desai[1], D. Crabtree[2], A. Parsikia[2], R. Ahuja[1], A. Desai[1], B. Natarajan[1], P. Brady[1], H. Kaul[3], K. Khanmoradi[3], R. Zaki[3], N. Chandolias[3], *[1]Interventional Radiology, Albert Einstein Medical Center - Philadelphia, Philadelphia, PA, [2]General Surgery, Albert Einstein Medical Center - Philadelphia, Philadelphia, PA, [3]Transplant Surgery, Albert Einstein Medical Center - Philadelphia, Philadelphia, PA*

1075 **Impact of Social Support, Social Circumstances and Distance from Transplant Center on Post Liver Transplant Outcomes: An Analysis from a Predominantly Rural U.S. Cohort**

R. Kaur[1], C. Lavender[1], E. Askew[1], S. Jafri[2], R. Thandassery[1], M. Deneke[1], *[1]University of Arkansas for Medical Sciences, Little Rock, AR, [2]Henry Ford Hospital, Detroit, MI*

1076 **Subjective Cognition Among Liver Transplant Recipients**

D. Ko[1], M. S. Dietrich[2], K. A. Gifford[3], S. H. Ridner[2], *[1]School of Nursing, Northeastern University, Boston, MA, [2]School of Nursing, Vanderbilt University, Nashville, TN, [3]Department of Neurology, Vanderbilt University Medical Center, Nashville, TN*

1077 **Serum Phosphatidylethanol is Superior to Urine Ethyl Glucuronide for Diagnosis of Alcohol Relapse in Liver Transplant Recipients**

N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[2], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Divison of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Divison of Transplantation, University of Minnesota, Minneapolis, MN*

1078 **Biliary Complications Following Adult Deceased Donor Liver Transplantation: Risk Factors and Implications at a High-Volume US Center**

A. Matar, K. Ross-Driscoll, L. Kenney, H. Wichmann, J. F. Magliocca, W. H. Kitchens, *Emory Transplant Center, Atlanta, GA*

1079 **Predictive Factors of the Hepatic Artery Thrombosis in Liver Transplantation Through the Analysis of Donor Characteristics**

M. M. Pascale[1], G. Moschetta[2], G. Bianco[2], F. Frongillo[2], E. Nure[2], F. Giovinazzo[2], S. Agnes[2], *[1]General Surgery and Liver Transplant Unit, Fondazione, Roma, Italy, [2]General Surgery and Liver Transplant Unit, Fondazione "Policlinico A. Gemelli" UCSC - Rome, Roma, Italy*

LB 81 **Hepatic Artery Thrombosis and Liver Transplantation: Patient Management and Candidate Selection for Re-transplantation**
H. Fernandez, A. Wall, A. Gupta, E. Martinez, J. Bayer, G. McKenna, N. Onaca, R. Ruiz, C. Spak, G. Testa, *Baylor University Medical Center, Dallas, TX*

Lung

Lung: All Topics

1195 **BK Virus-associated Nephropathy as a Cause of Renal Failure Post-lung Transplantation**
A. Arjuna, M. T. Olson, B. Buddhdev, R. Tenorio, A. Omar, S. Tokman, *Norton Thoracic Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ*

1196 **Antibody-mediated Rejection and Sponge Effect in a Redo Lung Transplant Recipient: A Case Report**
A. Arjuna, M. T. Olson, S. Tokman, R. Walia, T. Mohanakumar, A. S. Hashimi, M. A. Smith, R. M. Bremner, A. Omar, *Norton Thoracic Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ*

1197 **Impact of Positive Donor Cultures on Postoperative Lung Transplantation Infectious Outcomes**
A. Curtis, C. Pham, B. P. Pierce, *Houston Methodist Hospital, Houston, TX*

1198 **Long-Term Renal Outcomes in Lung Transplant Recipients- A Single-Center Five-Year Experience**
M. Doraiswamy, E. Obole, P. Singh, T. Pesavento, *Comprehensive Transplant Center, The Ohio State University Wexner Medical Center, Columbus, OH*

1199 **A Case-Match Cohort Comparison of the Safety and Efficacy of Basiliximab for Immunosuppression Holiday in Lung Transplant Patients**
M. M. Eiting[1], J. E. Clark[1], T. L. Astor[2], J. Palafox[2], C. Rogers Marks[1], G. Waldman[1], *[1]Pharmacy, Massachusetts General Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

1200 **Therapeutic Enoxaparin Dosing in Lung Transplant Recipients**
S. Finder, M. Morrison, K. B. Harrison, S. A. Heeney, *Vanderbilt University Medical Center, Nashville, TN*

1201 **Lung Transplant Outcomes Based on Immunosuppressive Regimen at Discharge: Data from the US Scientific Registry of Transplant Recipients (SRTR)**
W. Fitzsimmons[1], J. Erdman[2], J. Wolfram[3], D. Nimke[2], R. Croy[2], X. Wang[2], T. Weaver[4], D. Schladt[4], *[1]University of Illinois at Chicago, College of Pharmacy, Vernon Hills, IL, [2]Astellas Pharma, Inc, Northbrook, IL, [3]Astellas Pharma Europe BV, Leiden, Netherlands, [4]Chronic Disease Research Group, Minneapolis, MN*

1202 **Textbook Outcome: A Novel Metric in Lung Transplantation Outcomes**
A. M. Ganapathi[1], B. A. Whitson[1], N. A. Mokadam[1], B. C. Keller[2], A. Logan[1], G. Brock[1], K. Washburn[1], A. D. Schenk[1], *[1]Surgery, Ohio State University Wexner Medical Center, Columbus, OH, [2]Medicine, Ohio State University Wexner Medical Center, Columbus, OH*

1204 **Lung Transplantation After Ex-Vivo Lung Perfusion versus Static Cold Storage: A Single Institution Cost Analysis**
S. E. Halpern[1], S. J. Kesseli[2], S. Au[1], M. K. Krischak[1], D. G. Olaso[1], H. Smith[3], G. Tipton[2], I. Jamieson[3], J. C. Haney[2], J. A. Klapper[2], M. G. Hartwig[2], *[1]Duke University School of Medicine, Durham, NC, [2]Surgery, Duke University Medical Center, Durham, NC, [3]Office of Finance, Duke Transplant Center, Durham, NC*

1205 **Pre-Procurement Cardiac Arrest in Lung Allograft Donors and Effects on Recipient Outcomes**
T. J. Hathaway, E. C. Klipsch, D. Roe, C. Hage, M. Duncan, R. S. Mangus, *Indiana University School of Medicine, Indianapolis, IN*

1206 **Incidence and Risk Factors for Nonmelanoma Skin Cancer in Lung Transplant Recipients**
G. Holdren[1], E. Lushin[1], M. Duncan[2], C. Hage[2], *[1]Pharmacy, Indiana University Health, Indianapolis, IN, [2]Pulmonary Critical Care, Indiana University Health, Indianapolis, IN*

1207 **Postoperative Tracheostomy as a Predictor of Poor Clinical Outcomes in Lung Transplantation**
E. C. Klipsch, T. J. Hathaway, D. Roe, C. Hage, M. Duncan, R. S. Mangus, *Indiana University School of Medicine, Indianapolis, IN*

1208 **Mortality from Fulminant Myocarditis in Multi-organ Transplant Recipient with Covid-19**
K. Mahendraraj, I. Kim, T. Todo, T. Brennan, N. Nissen, K. Kosari, G. Voidonikolas, D. Ramzy, *Transplant Surgery, Cedars-Sinai Medical Center, Los Angeles, CA*

1209 **Creating a Lung Transplant Program Search Tool Tailored to Patient Characteristics**
W. T. McKinney[1], C. R. Schaffhausen[1], M. Bruin[2], S. Chu[2], J. Snyder[3], M. Hertz[4], M. Valapour[5], B. Kasiske[6], A. Israni[1], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]College of Design, University of Minnesota, Minneapolis, MN, [3]Scientific Registry of Transplant Recipients, Minneapolis, MN, [4]Medical School, University of Minnesota, Minneapolis, MN, [5]Pulmonary Medicine, Cleveland Clinic, Cleveland, OH, [6]Nephrology, Hennepin Healthcare, Minneapolis, MN*

1210 **Evaluation of Pepsin in Bronchoalveolar Lavage Fluid Post-lung Transplantation: Implications of Detection**
M. T. Olson, C. Rogers, K. McAnally, A. Arjuna, *Norton Thoracic Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ*

1211 **A Retrospective Analysis of the Safety and Efficacy of Apixaban After Lung Transplant**
T. Sam[1], K. Reininger[2], R. Patel[1], C. Naik[1], K. Ausloos[1], R. Rosenblatt[1], T. Grazia[1], I. Lam[3], *[1]Transplant, Baylor University Medical Center, Dallas, TX, [2]Transplant, Hennepin County Medical Center, Minneapolis, MN, [3]Transplant, Sharp Memorial Hospital, San Diego, CA*

1212 **Pathology of the Explanted Lungs and Surveillance Allograft Biopsy in 202 Lung Transplant Cases: Single Institution Experience**
S. Sathirareuangchai[1], S. Moore[1], Q. Cai[1], L. De Las Casas[1], J. Joerns[2], J. Torrealba[1], *[1]Pathology, University of Texas Southwestern Medical Center, Dallas, TX, [2]Internal Medicine, University of Texas Southwestern Medical Center, Dallas, TX*

1213 **Evaluation of Fungal Prophylaxis Post-Lung Transplantation**
I. Shah[1], K. Mohrien[1], C. Rose[2], J. Au[1], *[1]Temple University Hospital, Philadelphia, PA, [2]Temple School of Pharmacy, Philadelphia, PA*

1214 **Tacrolimus Dose Requirements in Lung Transplant Recipients on Systemic Azole Antifungals: The Influence of Race and Transplant Indication**
K. S. Walter[1], T. Wert[1], R. Coakley[2], L. J. Lobo[2], R. A. Evans[1], *[1]Department of Pharmacy, University of North Carolina, Chapel Hill, NC, [2]Department of Medicine, University of North Carolina, Chapel Hill, NC*

1215 **Bilateral Lung Transplantation for Destroyed Lungs with Asymmetric Thorax**
B. Yue, J. Chen, *Wuxi People's Hospital Affiliated to Nanjing Medical University, Wuxi, China*

LB 89 **Incidentally Detected Malignancies in Lung Explants: Single Center Case Series**
D. Razia, A. Arjuna, L. Schaheen, J. Huang, M. Smith, R. Bremner, R. Walia, *Thoracic Surgery and Lung Transplantation, Norton Thoracic Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Pancreas

Pancreas and Islet: All Topics

1216 **Donor-Derived Cell-Free DNA Can Differentiate Rejection versus Other Causes of Pancreas Transplant Dysfunction**
N. Ali[1], J. Miles[2], Z. Stewart Lewis[1], *[1]Transplant Institute, NYU Langone Health, New York, NY, [2]CareDx, Brisbane, CA*

1217 **Induction in Pancreas Transplantation: T-Cell Depletion vs. Il-2 Receptor Blockade**
F. Aziz, S. Parajuli, D. Kaufman, J. Odorico, D. Mandelbrot, *University of Wisconsin, Madison, WI*

1218 **Endocrine Cell Identity and HOMA-B In Patients with Chronic Pancreatitis Undergoing Islet Auto-transplantation**
C. A. Beamish[1], O. Gaber[2], O. M. Sabek[2], *[1]Surgery, Houston Mehodist Hospital, Houston, TX, [2]Surgery, Houston Mehodist, Houston, TX*

1219 **Outcomes of Covid 19 in Candidates Waitlisted for Kidney and Pancreas Transplantation**
R. El-Rifai[1], S. Riad[1], R. Belina[2], A. Matas[2], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Surgery, University of Minnesota, Minneapolis, MN*

1220 **One-Year Monitoring of Changes to Kidney-Pancreas Waiting Time Criteria: An OPTN Analysis**
R. C. Forbes[1], B. Plucinski[2], J. White[2], N. T. Kyaw[2], R. Kandaswamy[3], S. V. Niederhaus[4], *[1]Surgery, Vanderbilt University, Nashville, TN, [2]UNOS, Richmond, VA, [3]Surgery, University of Minnesota, Minneapolis, MN, [4]Surgery, University of Maryland, Baltimore, MD*

1221 **Update on Pancreas Retransplantation-A Registry Analysis**
A. Gruessner, J. Renz, S. Saggi, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

1222 **Development of De-novo Malignancies After Kidney and/or Pancreas Transplantation in Diabetic Patients**
A. Gruessner, S. Saggi, J. Renz, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

1223 **TPIAT Outcomes in Diabetic and Non-diabetic Patients**
M. A. Kanak, J. B. Spriggs, P. Coughenour, J. Kalivarathan, P. Saravanan, M. Levy, *Virginia Commonwealth University, Richmond, VA*

1224 **Comparative Outcomes of TPIAT in African American and Caucasian Patients with Chronic Pancreatitis**
M. A. Kanak, J. B. Spriggs, P. Coughenour, J. Kalivarathan, P. Saravanan, M. F. Levy, *Virginia Commonwealth University, Richmond, VA*

1225 **Symptoms on MTSOSD Questionnaire in Pancreas Transplantation Recipients**
R. Kaur, S. R. Rizvi, B. H. Smith, C. Reid, S. K. McCrady-Spitzer, W. K. Kremers, P. G. Dean, A. Kukla, M. D. Stegall, Y. C. Kudva, *Mayo Clinic, Rochester, MN*

1226 **Diffuse Calcification Pattern in Chronic Pancreatitis Has Two Aspects in Total Pancreatectomy with Islet Autotransplantation: Bad Sign for Islet Graft Function and Good Sign for Pain Relief**
Y. Liu, K. Kumano, J. Mattke, C. Darden, S. Vasu, M. Lawrence, G. Testa, A. Gupta, E. Beecherl, N. Onaca, B. Naziruddin, *Baylor University Medical Ctr, Dallas, TX*

1227 **Dual-Agent Induction Therapy for Pancreas Transplantation: A Single-center Experience**
E. C. Liu[1], J. H. Lee[1], R. Craig-Schapiro[2], M. Aull[2], S. Sultan[2], *[1]Pharmacy, NewYork-Presbyterian Weill Cornell Medical Center, New York, NY, [2]Kidney/Pancreas Transplant Surgery, NewYork-Presbyterian Weill Cornell Medical Center, New York, NY*

1228 **Impact of Insulin Therapy in Pancreas Transplantation Donors on Graft Outcomes: An Analysis of the Optn/unos Database**

E. Montagud-Marrahi[1], F. Ausania[2], Y. Fundora[2], A. Amor[3], E. Esmatjes[3], J. Ferrer[2], I. Revuelta[1], D. Cucchiari[1], J. Rovira[4], M. Musquera[5], C. Fondevila[2], F. Diekmann[1], P. Ventura-Aguiar[1], *[1]Nephrology and Kidney Transplantation Department, Hospital Clinic de Barcelona, Barcelona, Spain, [2]Hepatobiliopancreatic and Liver Transplant Department, Hospital Clinic de Barcelona, Barcelona, Spain, [3]Endocrinology Department, Hospital Clinic de Barcelona, Barcelona, Spain, [4]Laboratori Experimental de Nefrologia I Trasplantament (LENIT), CRB CELLEX, Fundació Clínic, IDIBAPS, Hospital Clinic de Barcelona, Barcelona, Spain, [5]Urology Department, Hospital Clinic de Barcelona, Barcelona, Spain*

1229 **Human Leukocyte Antigen Mismatches Between Donor-Recipient or Donor-Donor are Not Associated with Adverse Pancreas Outcomes in Pancreas After Kidney Transplant Recipients**

S. Parajuli, D. Kaufman, B. Welch, H. Sollinger, D. Mandelbrot, J. Odorico, *University of Wisconsin, MADISON, WI*

1230 **Early Increases in Post-Transplant Pancreatic Enzymes are Not Associated with Inferior Patient or Graft Outcomes Among Pancreas Transplant Recipients**

S. Parajuli, G. E. Leverson, B. Welch, H. Sollinger, D. Kaufman, D. Mandelbrot, J. Odorico, *University of Wisconsin, Madison, WI*

1231 **Early Increases in Post-Transplant Pancreatic Enzymes Are Associated with Surgical Complications Among Pancreas Transplant Recipients**

S. Parajuli, G. Leverson, B. Welch, H. Sollinger, D. Kaufman, D. Mandelbrot, J. Odorico, *University of Wisconsin, Madison, WI*

1232 **Corticosteroid Reintroduction in Urban Simultaneous Kidney-pancreas Transplant Recipients Following an Early Corticosteroid Withdrawal Protocol**

D. Pierce, P. West-Thielke, M. Campara, I. Tang, M. Spaggiari, I. Tzvetanov, E. Benedetti, A. Lichvar, *University of Illinois at Chicago, Chicago, IL*

1233 **SPK Transplantation in HIV-positive Recipients**

H. Resweber, k. nguyen, H. Curtis, J. Panichella, A. DI Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

1234 **Donor Derived Cell-Free DNA (dd-cfDNA) in Pancreas Transplant Recipients**

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1235 **Induction Immunosuppression Efficacy in Pancreas and Kidney Transplantation in the SARS-CoV-2 Era**

H. Sarumi, K. Vassar, S. Jackson, T. Pruett, R. Kandaswamy, *University of Minnesota, Minneapolis, MN*

1236 **COVID-19 Presentation and Severity Within One Year of Pancreas and Kidney Transplantation**

H. Sarumi, J. Fisher, B. Johnson, T. Pruett, *University of Minnesota, Minneapolis, MN*

1237 **COVID-19 Transmission within One Year from Pancreas and Kidney Recipients**

H. Sarumi, J. Fisher, B. Johnson, T. Pruett, *University of Minnesota, Minneapolis, MN*

1238 **Systemic Venous versus Portal Venous Drainage in Simultaneous Pancreas-kidney Transplantation: A Matched-pair Analysis**

B. Sharda, *Wake Forest Baptist Medical Center, Winston Salem, NC*

1239 **Achilles Heel No Longer: Marked Decline in Early Relaparotomy and Allograft Pancreatectomy Rates Following Simultaneous Kidney-Pancreas Transplantation in the Contemporary Era**

B. Sharda[1], K. Gurung[2], R. Stratta[2], A. Farney[2], G. Orlando[2], C. Jay[2], A. Reeves-Daniel[3], A. Mena-Gutierrez[3], N. Sakhovskaya[3], W. Doares[4], S. Kaczmorski[4], M. Magid[4], J. Rogers[2], *[1]Wake Forest Baptist Medical Center, Winston Salem, NC, [2]Department of Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC, [3]Internal Medicine, Wake Forest Baptist Medical Center, Winston-Salem, NC, [4]Department of Pharmacy, Wake Forest Baptist Medical Center, Winston-Salem, NC*

1240 **Outcomes of Simultaneous Kidney-Pancreas Transplantation in Patients with Type-I and Type-II Diabetes Mellitus**

H. Shokouh-Amiri[1], M. S. Naseer[1], A. Palermini[1], D. Aultman[1], R. McMillan[1], S. Tandukar[2], N. Singh[2], G. Zibari[1], *[1]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [2]Transplant Nephrology, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA*

1241 **Enteric Conversion After Bladder-drained Kidney-pancreas Transplantation**

S. Sivan, M. Ortigosa-Goggins, M. Patel, M. Morsi, L. Chen, J. Figueiro, G. Ciancio, G. Burke, *Miami Transplant Institute, University of Miami Miller School of Medicine, Jackson Memorial Hospital, Miami, FL*

1242 **Distal Allograft Pancreatectomy for Graft Salvage After Pancreas Transplantation**

D. Soma, T. Nikumbh, A. J. Lutz, J. A. Powelson, J. A. Fridell, *Transplant Division, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN*

1243 **Psychosocial Outcomes 1-year Post Total Pancreatectomy and Autologous Islet Cell Transplant**

J. Steel[1], A. Amin[1], M. Wijkstrom[1], A. Zureikat[1], E. Tillman[1], R. Jones[1], D. Yadav[1], A. Slivka[1], A. Phillips[1], M. Bellin[2], A. Carroll[3], A. Humar[1], *[1]University of Pittsburgh, Pittsburgh, PA, [2]University of Minnesota, Minneapolis, MN, [3]University of Pittsburgh Medical Center, Pittsburgh, PA*

1244 **Baseline Levels of Dd-cf Dna After Pancreas Transplantation: Using Dd-cfdna as an Indicator for Pancreas Rejection and Biopsy Avoidance**

A. Yoo, I. Qian, A. Riedel, C. Cazac, A. Bartosic, J. S. Bromberg, J. Scalea, *Department of Surgery, Division of Transplant, University of Maryland School of Medicine, Baltimore, MD*

LB 90 **Donor Derived Cell Free DNA Identifies Rejection in Simultaneous Pancreas Kidney Transplant Recipients**

M. Williams[1], S. Ghosh[2], L. L. Jenkins[2], M. Hertl[1], S. Saltzberg[3], V. Peev[3], E. Chan[1], E. Hollinger[1], E. Schadde[1], O. Olaitan[1], *[1]Department of Surgery, Rush University Medical Center, Chicago, IL, [2]CareDx, Inc., Brisbane, CA, [3]Department of Internal Medicine, Rush University Medical Center, Chicago, IL*

LB 91 **Controlled Donation After Circulatory Death Pancreas Transplantation in Spain. Initial Experience**

J. Ferrer-Fàbrega[1], R. Muñoz[2], J. Ruiz[3], D. Casanova[4], F. Sánchez-Bueno[5], J. Pérez-Daga[6], C. Fernández-Rivera[7], M. Gómez[8], F. Castillo[9], R. López-Andújar[10], J. Maupoey[10], J. Briceño[11], J. Sánchez-Hidalgo[11], Á. Arjona[11], A. Álvarez[12], A. Alarcó[13], A. Bravo[13], R. García[1], R. Rull[1], M. López-Boado[1], P. Ventura-Aguiar[14], F. Diekmann[14], D. Paredes[15], J. García-Valdecasas[1], J. Fuster[1], C. Fondevila[1], B. Domínguez-Gil[2], *[1]Hepatobiliopancreatic Surgery and Transplantation Department, Hospital Clínic Barcelona, Barcelona, Spain, [2]Organización Nacional de Trasplantes (ONT), Madrid, Spain, [3]Department of Nephrology., University Hospital Marques de Valdecilla. University Cantabria, Santander., Santander, Spain, [4]Department of Surgery, University Hospital Marques de Valdecilla, University Cantabria, Santander., Santander, Spain, [5]Department of General, Visceral and Transplantation Surgery., Clinic and University Hospital Virgen de la Arrixaca. IMIB-ARRIXACA. Murcia., Murcia, Spain, [6]Department of Surgery, Hospital Regional de Málaga. Málaga., Málaga, Spain, [7]Department of Nephrology., Complexo Hospitalario Universitario de A Coruña. A Coruña, A Coruña, Spain, [8]Department of Surgery, Complexo Hospitalario Universitario de A Coruña. A Coruña, A Coruña, Spain, [9]Department of Surgery, University Hospital Marques de Valdecilla. University Cantabria, Santander., Santander, Spain, [10]Hepato-Pancreatico-Biliary Surgery and Transplant Unit, La Fe University Hospital. Valencia, Valencia, Spain, [11]Department of Surgery, Hospital Universitario Reina Sofía. Córdoba, Córdoba, Spain, [12]Department of Nephrology., Hospital Universitario de Canarias. Tenerife., Tenerife, Spain, [13]Department of Surgery, Hospital Universitario de Canarias. Tenerife., Tenerife, Spain, [14]Renal Transplant Unit, Hospital Clínic Barcelona, Barcelona, Spain, [15]Coordination Department, Hospital Clínic Barcelona, Barcelona, Spain*

Pharmacy

Non-Organ Specific: Pharmacogenomics / Pharmacokinetics

816 **Characterization of SGLT2 Inhibitor Use After Abdominal Transplant**

F. Hailemariam[1], S. Yeager[2], J. Schulte[3], P. Singh[1], A. Yadav[1], *[1]Transplant Nephrology, Thomas Jefferson University Hospital, Philadelphia, PA, [2]Abdominal Transplant Pharmacist, Thomas Jefferson University Hospital, Philadelphia, PA, [3]Abdominal Transplant, Clinical Pharmacist, Thomas Jefferson University Hospital, Philadelphia, PA*

817 **Systematic Evaluation of Immunosuppressant Drug Tolerability in Lung Transplant Recipients with Short Telomere Syndrome**

R. Patolia[1], R. Guzy[2], L. Potter[1], *[1]Department of Pharmacy, University of Chicago Medicine, Chicago, IL, [2]Department of Medicine, Division of Pulmonology, University of Chicago Medicine, Chicago, IL*

818 **Unclear Implications of Tacrolimus Time in Therapeutic Range as a Predictor of Acute Rejection in Renal Transplant Recipients Undergoing Early Corticosteroid Withdrawal**

D. Pierce, P. West-Thielke, Z. Hajjiri, S. Gaitonde, I. Tzvetanov, E. Benedetti, A. Lichvar, *University of Illinois at Chicago, Chicago, IL*

819 **Impact of the Transplant Clinical Pharmacist in an Outpatient Transplant Clinic**

O. Roe[1], S. Gattis[1], R. Parsons[2], D. Lo[2], S. Todd[1], *[1]Emory University Hospital, Atlanta, GA, [2]Emory Transplant Center, Atlanta, GA*

820 **Evaluation of Safety and Efficacy of PCSK9 Inhibitors in Solid Organ Transplant Recipients: Experience at a Large Multi-organ Transplant Center**

A. Ucci[1], M. Norris[2], J. Trofe-Clark[2], T. Fallah[2], M. Meck[1], R. Samudralwar[1], M. V. Genuardi[3], *[1]Hospital of Univ of Pennsylvania, Philadelphia, PA, [2]Penn Transplant Institute, Hospital of Univ of Pennsylvania, Philadelphia, PA, [3]Cardiovascular Medicine Div, Hospital of Univ of Pennsylvania, Philadelphia, PA*

821 **Letermovir Prophylaxis in Solid Organ Transplant - CMV Breakthrough and Tacrolimus Drug Interaction**
R. Winstead[1], D. Kumar[1], A. Brown[1], I. Yakubu[1], C. Song[1], L. Thacker[2], G. Gupta[1], *[1]Virginia Commonwealth University Health, Richmond, VA, [2]Virginia Commonwealth University, Richmond, VA*

822 **The Impact of Tacrolimus IPV and TTR on the Development of De Novo Donor-specific Antibodies in Kidney Transplant Recipients**
D. Xu[1], K. Richards[1], K. Zheng[1], H. Patel[2], F. Cardarelli[2], J. A. Pena[3], A. Aala[2], *[1]Pharmacy, Beth Israel Deaconess Medical Center, Boston, MA, [2]Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [3]Pathology, Beth Israel Deaconess Medical Center, Boston, MA*

Public Policy

Non-Organ Specific: Public Policy & Allocation

686 **Better Dialysis Facility Five-Star Rating is Associated with Increased Listing for Kidney Transplantation**
J. T. Adler[1], L. Xiang[1], J. S. Weissman[1], J. R. Rodrigue[2], R. E. Patzer[3], S. S. Waikar[4], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [3]Surgery, Emory University, Atlanta, GA, [4]Medicine, Boston Medical Center, Boston, MA*

687 **The Quality Incentive Program (QIP) is Associated with Increased Waitlisting for Transplantation**
J. T. Adler[1], L. Xiang[1], J. S. Weissman[1], J. R. Rodrigue[2], R. E. Patzer[3], S. S. Waikar[4], T. C. Tsai[1], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [3]Surgery, Emory University, Atlanta, GA, [4]Surgery, Boston Medical Center, Boston, MA*

688 **Dual Liver and Kidney Donors, What Makes Them Decide to Do It?**
H. Al Harakeh, B. Emmanuel, C. Hughes, A. Tevar, J. Steel, A. F. DiMartini, S. Ganesh, A. Humar, *Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA*

689 **Impact of Electronic Donor Referral Technology on Deceased Donor Referrals**
B. Boyarsky[1], J. R. DiRito[2], K. Vanterpool[1], J. Piano[3], W. Liu[3], J. Hewlett[4], C. Trahan[4], D. Segev[1], M. Levan[1], A. Massie[1], P. Niles[4], *[1]Johns Hopkins, Baltimore, MD, [2]Yale, New Haven, CT, [3]Transplant Connect, Santa Monica, CA, [4]Southwest Transplant Alliance, Dallas, TX*

690 **Realistic Targets for Transplantation Among Incident Kidney Failure Patients in the United States**
S. Brar, M. Kadatz, J. Lan, D. Chang, J. Gill, S. Vaishnav, J. Gill, *University of British Columbia, Vancouver, BC, Canada*

691 **Racial/ethnic Disparities Among Renal Transplant Recipients with Diabetes, Hypertension, and/or Dyslipidemia Due to Medicare Part D Star Ratings Criteria**
M. Chisholm-Burns[1], C. Spivey[1], C. Tsang[1], L. E. Hines[2], J. Wang[1], *[1]University of Tennessee Health Science Center College of Pharmacy, Memphis, TN, [2]Pharmacy Quality Alliance, Alexandria, VA*

692 **The Use of Organs from Donors That Do Not Meet Eligibility Criteria in the United States**
L. Deroos, M. Lavieri, D. Hutton, W. Marrero, N. Parikh, *University of Michigan, Ann Arbor, MI*

693 **Trends in Living Donor Transplantation in USA**
N. Kemmer, C. Albers, S. Agrawal, R. Syed, M. Malespin, J. Buggs, *Tampa General Hospital, Tampa, FL*

694 **Attitudes Regarding Transplantation During the Pandemic: Give Me My Kidney Now!**
T. Menser[1], M. Hobeika[2], A. Gaber[2], H. Ibrahim[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX*

695 **Seasonality of Mortality for Solid Organ Waitlist Candidates**
J. Miller, D. Musgrove, *SRTR, Minneapolis, MN*

696 **Early Review of Liver Acuity Circles Allocation**
S. Noreen[1], J. Heimbach[2], J. Pomposelli[3], M. Cafarella[1], J. Trotter[4], *[1]UNOS, Richmond, VA, [2]Mayo Clinic, Rochester, MN, [3]UCHealth, Aurora, CO, [4]BSWHealth, Dallas, TX*

697 **Black Disparity in Access to Kidney Transplant Waitlist Worsens in Illinois After New Kidney Allocation System (kas)**
S. Park[1], D. Simpson[1], N. Katariya[2], J. Friedewald[3], B. Ho[3], D. P. Ladner[1], *[1]Transplant Outcomes Research Collaborative, Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]Division of Transplant Surgery, Northwestern University, Chicago, IL, [3]Transplant Nephrology, Northwestern University, Chicago, IL*

698 **The Impact of Lack of Access to Simultaneous Kidney and Pancreas Transplantation Due to Insurance Ineligibility - A Single Center Analysis**
Y. A. Qazi, E. Villalon, D. Samson, W. Mon, M. Smogorzewski, *Keck Medical Center at USC, Los Angeles, CA*

699 **Trends of Kidney Transplant Volume During Covid-19 Era**
G. Rajashekar[1], S. Chang[1], K. Lentine[2], J. Wellen[1], T. Alhamad[1], M. Merzkani[1], H. Murad[1], *[1]Nephrology, Washington University in St. Louis, Saint louis, MO, [2]Nephrology, SSM Saint Louis University, Saint louis, MO*

700 **Investigating Physician Outlook Regarding Living Donation Prior to Planned Withdrawal of Care**
S. Rath[1], L. Washburn[2], S. Creden[1], M. Goss[3], A. Rana[1], J. Goss[1], N. T. Galvan[1], *[1]Baylor College of Medicine, Houston, TX, [2]University of Pittsburgh Medical Center, Pittsburgh, PA, [3]McGovern Medical School, Houston, TX*

701 **Impact of Traveling for Transplant on Access to and Outcomes from Kidney and Liver Transplantation**
K. Ross-Driscoll[1], R. Lynch[1], D. Axelrod[2], R. Patzer[1], *[1]Emory University, Atlanta, GA, [2]University of Iowa, Ames, IA*

702 **Accounting for Survivor Bias in Transplant Benefit Models**
E. M. Schnellinger[1], E. Cantu[2], M. O. Harhay[1], D. E. Schaubel[1], S. E. Kimmel[1], A. J. Stephens-Shields[1], *[1]Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania Perelman School of Medicine, Philadelphia, PA, [2]Department of Surgery, Division of Cardiovascular Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA*

703 **Has the Proportional Rise in Deceased Organ Donation Rate Over Last 5 Years Been Optimal? Data-based, Forecasting Model Analysis of UNOS/ NHSBT UK Donor Data**
H. Sharma[1], A. Sharma[2], *[1]Transplant and Vascular Access Surgery, Royal Liverpool University Hospital, Liverpool, United Kingdom, [2]Data Analytics, Loyola University, Chicago, IL*

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A. J. Vinson[1], B. Kiberd[2], K. Tennankore[1], *[1]Nova Scotia Health Authority Division of Nephrology, Departm, Halifax, NS, Canada, [2]Dalhousie University, Halifax, NS, Canada*

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VCA

VCA

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623 **General Public Attitude Toward Vascularized Composite Allografts (VCA) Donation?**
M. S. S Gharibdousti[1], M. T Khasawneh[1], A. L Friedman[2], *[1]System Science and Industrial Engineering, Binghamton University, Vestal, NY, [2]LiveOnNY, New York City, NY*

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S. K. Pandey[1], A. Meyers[1], P. Sadeghi[1], V. Kopparthy[1], T. Xia[1], H. Brunengraber[2], S. Dasarathy[3], A. Rampazzo[1], B. Bassiri Gharb[1], *[1]Plastic Surgery, Cleveland Clinic, Cleveland, OH, [2]Department of Nutrition, School of Medicine, Case Western Reserve University, Cleveland, OH, [3]Department of Gastroenterology, Cleveland Clinic, Cleveland, OH*

LB 41 **Efficacy of Ex Vivo Normothermic Limb Perfusion in Maintaining Cellular Viability and Muscle Function**
T. Xia[1], P. Sadeghi[2], V. Kopparthy[2], S. Pandey[2], A. Rampazzo[2], B. Bassiri Gharb[2], *[1]School of Medicine, Case Western Reserve University, Cleveland, OH, [2]Department of Plastic Surgery, Cleveland Clinic, Cleveland, OH*

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B. Kern[1], J. Mengwasser[1], A. Reutzel-Selke[1], M. I. Ashraf[1], D. Polenz[1], K. Fuehrer[1], S. Lippert[1], P. Tang[1], F. Martin[1], C. Witzel[1], I. M. Sauer[1], J. Pratschke[1], S. G. Tullius[2], *[1]Dept. of Surgery, Charité Campus CCM|CVK, Universitaetsmedizin Berlin, Germany, Berlin, Germany, [2]Division of Transplant Surgery and Transplant Surgery Research Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA*

AMERICAN TRANSPLANT CONGRESS 2021 ABSTRACTS

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All Topics

Plenary 1

Abstract# 1

Donor Derived Transmissions 2019: Analysis of the OPTN Ad Hoc Disease Transmission Advisory Committee (DTAC)

L. Danziger-Isakov[1], M. G. Michaels[1], A. Agarwal[1], S. Aslam[1], K. Dunn[1], J. Goldman[1], D. Levine[1], C. Marboe[1], G. Marklin[1], S. Pouch[1], M. Rana[1], R. Razonable[1], H. L. Stevenson[1], H. S. Te[1], A. Woolley[1], E. Ward[2], C. Jett[2], L. Cartwright[2], R. La Hoz[1], *[1]OPTN DTAC, Richmond, VA, [2]UNOS, Richmond, VA*

Purpose: The OPTN DTAC, a multidisciplinary group, evaluates potential donor derived transmission events (PDDTE), mostly infections (I) & malignancies (M), to assess the likelihood of disease transmission.

Methods: This is a retrospective study of PDDTE cases reported to the OPTN between 01/19 and 12/19. DTAC reviewed cases using a standardized classification algorithm.

Results: During 2019, there were 19,258 donors and 38,425 recipients. DTAC reviewed 311/470 cases reported from donor (160) or recipient (151). 47/311 (15%) donors had proven/probable transmission(P/P Tr) of I, M or other to 73/153 (48%) exposed recipients [figure]. 22 involved living donors. Infection occurred with 35/47 P/P cases affecting 53 recipients. Viruses were most frequent P/P infections with 28 recipients having P/P Tr from 17 donors. HBV & HCV accounted for 40/72 viruses, increased from 28/48 in 2018. For bacteria, 13 recipients had P/P Tr from 10 donors. Parasites (66 reports) resulted in 1 P/P Tr in 2019 compared to 8 donors transmitting to 8 recipients with 2 attributable deaths (AD) in 2018. AD was highest for fungal infections (5/11, 45%). 7 donors with malignancies were classified as P/P impacting 14 recipients with 2 AD. 29 non-I, non-M PDDTE were reported; 5 resulted in P/P Tr to 6 recipients. Deaths from infection (N=6) occurred a median of 47 days (30-113 days), and malignancy deaths (N=2) occurred at 9-368 days.

Conclusions: Although P/P events remain rare, 1/6 reviewed cases resulted in unanticipated P/P Tr, with parasitic decreasing and HCV/HBV increasing in 2019. This is a conservative estimate due to passive reporting and empiric interventions. Infections were most common, led by viruses. Lung recipients continue to be disproportionately represented in 2019. The DTAC continues to evaluate PDDTE to maximize organ use and assess prevention strategies to minimize transmission risk.

	Total Reports	P/P Donor	Total Recipients From P/P Donors	Recipients with Transmission/ Total Recipients From P/P Donors*							Total Recipients with Transmission	Attributable Deaths (%)
				KI	KP	PA	LI	IN	HR	LU		
Malignancy	85	7	24	6/10	1/1	0/0	3/6	0/0	1/4	3/3	14	2 (14%)
Bacteria	32	10	30	4/16	1/1	0/0	3/6	0/0	2/4	4/5	13	1 (8%)
Fungus	56	7	25	5/13	0/1	0/0	0/4	0/0	2/2	4/5	11	5 (45%)
Virus	72	17	52	14/28	0/1	0/0	13/16	0/0	1/5	2/4	28	0
Parasite	37	1	5	0/2	0/0	0/0	0/1	0/0	1/1	0/1	1	0
Other	29	5	17	3/8	0/0	0/0	0/4	0/0	0/2	¾	6	0
Total	311	47	153	32/77	2/4	0/0	19/37	0/0	7/18	16/22	73	8 (11%)

CITATION INFORMATION: Danziger-Isakov L., Michaels M., Agarwal A., Aslam S., Dunn K., Goldman J., Levine D., Marboe C., Marklin G., Pouch S., Rana M., Razonable R., Stevenson H., Te H., Woolley A., Ward E., Jett C., Cartwright L., La Hoz R. Donor Derived Transmissions 2019: Analysis of the OPTN Ad Hoc Disease Transmission Advisory Committee (DTAC) *AJT, Volume 21 Supplement 3*

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Abstract# 2

Combined CD11b/CD40 Blockade is Superior to CD40 Blockade Alone in Prolonging Survival in Pig-to-Nonhuman Primate Renal Xenotransplantation

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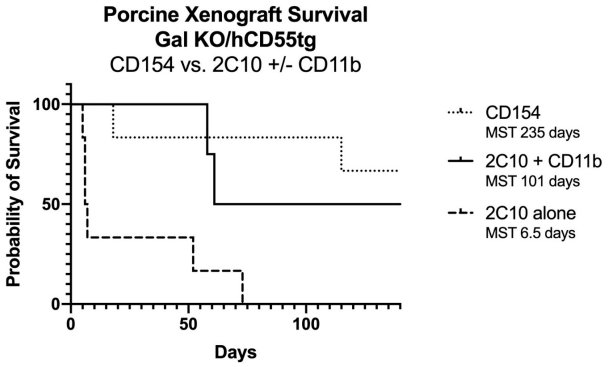
Purpose: Blockade of the CD40/CD154 pathway is highly effective in preventing rejection in pig-to-nonhuman primate (NHP) xenotransplantation models. Clinical translation of anti-CD154 mAbs, however, has been plagued by elevated rates of thromboembolic events, and blockade of CD40 alone has not replicated the prolonged xenograft survival of anti-CD154 containing regimens. Recent reports demonstrated that CD11b, a second ligand for CD154, may provide an additional pathway by which rejection signals can bypass CD40 selective blockade, but not CD154 directed therapies. The aim of this study was to assess the efficacy of CD11b blockade in combination with CD40 blockade in preventing rejection in a pig-to-NHP model of renal xenotransplantation.

Methods: Rhesus macaques (n=16) with low pre-transplant xenoreactive antibody titers underwent bilateral nephrectomy and life-sustaining porcine renal xenotransplantation using GGTA1 KO/CD55 transgenic donor pigs. Animals underwent T cell depletion and were assigned to one of three maintenance treatment regimens: anti-CD154 (clone 5C8), anti-CD40 (clone 2C10R4) alone, or combined anti-CD40 plus anti-CD11b (clone M1/70); plus mycophenolic acid and steroids.

Results: Recipients treated with anti-CD154 therapy (n=6) experienced the longest survival (MST=235 days), including three rhesus macaques with extended survival over 300 days (406, 400, 310 days). Recipients treated with combined anti-CD40/CD11b therapy (n=4) showed prolonged survival (MST=101 days) compared with recipients treated with anti-CD40 therapy alone (n=6, MST=6.5 days).

Conclusions: Here we demonstrate that treatment with anti-CD11b mitigates early xenograft rejection seen with anti-CD40 therapy in a porcine-to-NHP model of renal xenotransplantation. Additionally, treatment with anti-CD40/CD11b is statistically similar to treatment with anti-CD154. Together, these data support the hypothesis that CD11b acts as an additional ligand of CD154 through which rejection signals can bypass CD40 selective blockade. These provide further rationale for the continued development and eventual clinical translation of therapeutics to block this pathway.



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DISCLOSURES: D.A. Faber: None. **B. Lovasik:** None. **A. Matar:** None. **C. Breeden:** None. **S. Kim:** None. **A. Adams:** None.

Abstract# 3

Engineered Human Glomerular Endothelial Cells to Identify Non-hla Antibodies and Decipher Their Pathogenicity After Kidney Transplantation

B. Lamarthée[1], C. Burger[1], C. Leclaire[1], L. Morin[1], F. Terzi[1], C. Tinel[1], D. Anglicheau[2], *[1]Inserm U1151, Necker-Enfants Malades Institute, PARIS, France, [2]Necker Hospital, AP-HP, Department of Nephrology and Kidney Transplantation, PARIS, France*

Purpose: In kidney transplantation recipients (KTRs), donor-specific antibodies directed against Human Leucocyte Antigens (HLA-DSA) are thought to drive antibody-mediated rejection (AMR) and poor transplant outcome. However, evidence of microvascular inflammation, the histological hallmark of AMR, is increasingly reported in patients without HLA-DSA, strongly supporting the implication of non-HLA antibodies (Abs). In KTRs displaying a severe vascular rejection in the absence of HLA-DSA, we previously showed that their pretransplant sera (D0) contain IgG Abs specifically targeting conditionally immortalized human glomerular endothelial cells (CiGEnC).

Methods: As a human cell, the CiGEnC cells constitutively express HLA class I molecules and class II after activation. In order to develop a cell-based assay allowing the detection of non-HLA Abs reactivity to human glomerular endothelial cells even in patients with circulating HLA-DSA, we used the CRISPR-Cas9 technology to delete *B2M* and *CIITA* genes in CiGEnC cells to suppress the expression of class I and II HLA antigens, respectively. Phenotyping of the produced cells was assessed

by flow cytometry, qPCR and confocal microscopy. The produced CiGEnCΔHLA clone was then used as target cell in a new cell-based assay to assess the presence of preformed non-HLA Abs in the sera of a large cohort of 389 consecutive KTRs. **Results:** A two-step process of gene-editing and selection of a CiGEnCΔHLA clone was performed. The engineered CiGEnCΔHLA clone remained undistinguishable from the parent cell line in terms of morphology and expression of various endothelial markers. The CiGEnCΔHLA clone was then used to assess the presence of preformed non-HLA Abs in pretransplant serum samples of 389 consecutive KTRs. Multivariate regression analysis revealed that pretransplant serum reactivity associated to retransplantation status (P<0.001). Addressing the prognosis significance of our cell-based assay, we demonstrated that the pretransplant serum reactivity associated with microvascular inflammation at 3 months and 12 months post-transplantation, independently of HLA-DSAs. In a time-to-event analysis, the pretransplant serum reactivity to CiGEnCΔHLA cells also associated with occurrence of histological lesions suggestive of AMR (i.e. microvascular inflammation >2 or C4d positivity). **Conclusions:** We have developed an engineered human glomerular endothelial cell line lacking HLA antigen that allowed us to identify preformed non-HLA Abs with significant consequences on allograft outcome. These results support the link between the presence of non-HLA Abs and endothelial allograft injury.

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Abstract# 4

Myeloid Foxo1-β-catenin Axis Regulates Hedgehog/Gli1 Signaling and Controls NLRP3-Mediated Innate Immune Responses in Sterile Inflammatory Liver Injury

D. Xu, C. Li, M. Sheng, Y. Lin, Y. Tian, Y. Zhan, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, *Surgery, Dumont - UCLA Transplant Center, Los Angeles, CA*

Purpose: Foxo1 plays important roles in cell metabolism, oxidative stress, inflammation, and apoptosis. Activation of Hedgehog/Gli1 signaling regulates cell growth, differentiation, and immune function. However, it remains unknown whether and how myeloid Foxo1 signaling may modulate the Hedgehog/Gli1 pathway in sterile inflammatory liver injury. This study investigated the functional roles and molecular mechanisms of myeloid Foxo1 signaling in the modulation of NLRP3-mediated innate immune responses during ischemia/reperfusion (IR)-triggered liver inflammation.

Methods: Myeloid-specific Foxo1 knockout ($Foxo1^{M\text{-}KO}$) and floxed Foxo1 ($Foxo1^{FL/FL}$) mice (n=6/group) were subjected to 90 min partial liver warm ischemia followed by 6 h of reperfusion. In parallel *in vitro* study, bone marrow-derived macrophages (BMMs) were isolated from these conditional knockout mice and transfected with CRISPR/Cas9-mediated Gli1 or Snail knockout vector followed by LPS (100 ng/ml) stimulation.

Results: $Foxo1^{M\text{-}KO}$ mice were resistant to IR-induced hepatocellular damage, with reduced serum ALT levels, macrophage/neutrophil infiltration, and pro-inflammatory mediators compared to the $Foxo1^{FL/FL}$ controls. Unlike in the $Foxo1^{FL/FL}$ controls, $Foxo1^{M\text{-}KO}$ enhanced β-catenin, Hedgehog signaling effector Gli1, and Snail but reduced RIPK3, NEK7/NLRP3 activation in ischemic livers. Disruption of Gli1 in $Foxo1^{M\text{-}KO}$ livers deteriorated liver function with diminished Snail while enhancing RIPK3 and NEK7/NLRP3 activation. For the *in vitro* studies, we found that macrophage Foxo1 and β-catenin co-localized in the nucleus whereby Foxo1 interacts with β-catenin in response to inflammatory stimulation. Importantly, nuclear Foxo1 competed with TCF for interaction with β-catenin. Disruption of the Foxo1-β-catenin axis by Foxo1 deletion enhanced β-catenin/TCF binding, activated Gli1/Snail signaling, leading to inhibited RIPK3 and NEK7/NLRP3. Moreover, macrophage Gli1 or Snail knockout activated RIPK3, which augmented hepatocyte necroptosis after macrophage/hepatocyte co-culture while macrophage RIPK3 knockout diminished NEK7/NLRP3-mediated immune and inflammatory responses.

Conclusions: Myeloid-specific Foxo1 deficiency promotes the Hedgehog/Gli1 signaling and mitigates IR-induced hepatocellular injury through disruption of nuclear Foxo1-β-catenin interaction, which in turn enhances β-catenin/TCF binding and activates the Hedgehog/Gli1/Snail signaling, resulting in reduced NEK7/NLRP3-driven liver inflammation and RIPK3-mediated hepatocyte necroptosis. Our findings underscore the crucial role of myeloid Foxo1 signaling in the modulation of NLRP3-mediated innate immunity and inflammatory responses during sterile inflammatory liver injury, and imply the therapeutic potential in organ IRI and transplant recipients.

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VCA: Basic and Clinical

Abstract# 5

Twelve Live Births After Uterus Transplantation in the Dallas Uterus Transplant Study

L. Johannesson, G. J. McKenna, A. Wall, J. Bayer, G. Testa, *Baylor University Medical Center, Dallas, TX*

Purpose: To describe aggregated pregnancy outcomes after uterus transplantation from a single, experienced center.

Methods: This prospective study reports on live births among 20 women who received a uterus transplant from 2016 to 2019 at Baylor University Medical Center at Dallas. These live births occurred between November 2017 and September 2020. This study is ongoing. The main measures were live birth, maternal complications, and fetal and newborn outcomes.

Results: There were 6 graft failures (4 surgical complications and 2 with poor perfusion postoperatively). Of the 14 technically successful transplants, at least one live birth occurred in 11 patients. Thus far, the success rate per patient per transplant is 55%, and the live birth rate per patient per technically successful transplant is 79%. Ten uteri were from nondirected living donors and one uterus was from a deceased donor. In vitro fertilization was performed to achieve pregnancy. Ten recipients delivered one neonate and one recipient delivered two neonates. One organ rejection episode was detected during pregnancy and resolved with steroids. The median birthweight was 2890 g (range 1770-3140 g [median 68th percentile]). Maternal weight gain was higher than Institute of Medicine recommendations. Maternal medical complications were observed in five recipients (elevated creatinine, gestational diabetes, gestational hypertension [n=2], and preeclampsia). In five recipients, maternal medical or obstetric complications led to an unplanned preterm delivery (elevated creatinine, preeclampsia; preterm labor [n=3]). The median gestational age at delivery was 36w6d (range 30w6d-38w). All neonates were liveborn, with Apgar scores ≥8 at 5 min.

Conclusions: Thus far, our program experienced a success rate per patient per transplant of 55% and live birth rate per patient per technically successful transplant of 79%. In our experience, uterus transplantation resulted in a third-trimester live birth in all cases where pregnancies reached 20 weeks' gestation. Maternal medical and obstetrical complications can occur; however, these were manageable by applying principles of generally accepted obstetric practice.

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DISCLOSURES: L. Johannesson: None. **G.J. McKenna:** None. **A. Wall:** None. **J. Bayer:** None. **G. Testa:** None.

Abstract# 6

Immunosuppression in Uterine Transplant Recipients: Experience from the Largest Uterine Transplant Program

N. Wilson, R. Patel, L. Johannesson, G. Testa, T. Sam, *Baylor University Medical Center at Dallas, Dallas, TX*

Purpose: Uterus transplantation (UT) is an emerging treatment in the field of total uterine infertility. There is no consensus on the optimal immunosuppression regimen in UT recipients.

Methods: Of the 20 UT recipients at this center, 6 were excluded due to graft removal prior to 30 days. Ectocervial biopsies (ECB) were collected at pre-determined timepoints to assess for rejection. ECB were scored as: negative, borderline, grade 1, grade 2, or grade 3 for ACR. Rejection was defined as grade 2 or higher. First line treatment for rejection was pulse corticosteroids over 3 days with a total methylprednisolone dose of 2.5g IV.

Results: Duration of immunosuppression at the time of last follow up is 1.5 years (median, IQR 1.2 - 2.1). Nine of the 14 included UT recipients have undergone graft explant post-delivery. Demographics, immunosuppression, and other outcomes are detailed in Table 1. All received induction with rabbit antithymocyte globulin (rATG) 4.5 mg/kg based on ideal body weight (IBW), with the exception of one patient induced with rATG 3 mg/kg who later developed rejection. LCPT-tacrolimus (Envarsus XR) was used in 93% of patients. Four patients discharged on mycophenolate and were converted to azathioprine (AZA, dosed at 1mg/kg daily) prior to pregnancy. One patient received a combination of tacrolimus and everolimus, which was switched to AZA 10 months post-UT. All rejections were subclinical and discovered on protocol ECB. All rejections responded to pulse corticosteroids except one, which required rATG. Only one rejection occurred during pregnancy. No rejections were noted to cause miscarriage or graft failure. Donor specific antibody (DSA) incidence was low and only seen in the rejection group.

Conclusions: In UT recipients, an immunosuppression regimen of rATG 4.5 mg/kg (IBW) paired with dual maintenance therapy TAC (troughs of approx. 5-8 ng/mL) and AZA 1 mg/kg resulted in excellent live birth rates. All rejections were asymptomatic and did not affect patient or graft survival, or live birth rate. Despite

pregnancy being an immunologically sensitizing event, DSA occurrence was infrequent. This study represents a description of IS and rejection treatment of the largest cohort of UT recipients.

Table 1. Uterine Transplant Recipient Demographics

	Rejection (n = 8)	No Rejection (n = 6)
Demographics		
Age, years, median (range)	31 (21, 35)	31 (24, 35)
Race, n (%)		
African American	0 (0)	1 (17)
Asian	0 (0)	1 (17)
Caucasian	8 (100)	4 (67)
PRA, %, median (range)	1 (0, 30)	37 (0, 61)
Donor type, living, n (%)	7 (88)	6 (100)
Length of stay, days, median (range)	5 (4, 6)	6 (4, 9)

Table 2. Immunosuppression Summary and Other Outcomes

	Rejection (n = 8)	No Rejection (n = 6)
Immunosuppression		
Antithymocyte globulin induction, n (%)	8 (100)	6 (100)
Discharge regimen, n (%)		
Tacrolimus	8 (100)	6 (100)
Everolimus	0 (0)	1 (17)
Mycophenolate	2 (25)	2 (33)
Azathioprine	6 (75)	3 (50)
Prednisone	2 (25)	2 (33)
Tacrolimus troughs, ng/mL, median (range)		
Pre-pregnancy	8.65 (6.6,12.2)	8.7 (6.9, 11.5)
During pregnancy	6.1 (4.6, 8)	6.55 (5.3, 7.9)
Post live birth or miscarriage	6.7 (5.4, 8.3)	8.3 (5.8, 10)
Other Outcomes*		
Number of live births, n (%)		
0	1 (13)	1 (17)
1	5 (63)	5 (83)
2	2 (25)	0 (0)
Miscarriages, n (%)		
0	5 (63)	5 (83)
1	3 (38)	0 (0)
2	0 (0)	1 (17)
Current pregnancy, n (%)	1 (13)	0 (0)
Uterine explanted, n (%)	5 (63)	4 (67)
Duration of immunosuppression**, days, median (range)	406 (363, 1169), [n = 5]	493 (421, 836), [n = 4]
DSA development while on immunosuppression, n (%)	2 (25)	0 (0)
Recipient Death, n (%)	0 (0)	0 (0)

*Reported events at time of abstract submission
**UT recipients who have not undergone explants excluded from variable

CITATION INFORMATION: Wilson N., Patel R., Johannesson L., Testa G., Sam T. Immunosuppression in Uterine Transplant Recipients: Experience from the Largest Uterine Transplant Program *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Wilson: None. **R. Patel:** None. **L. Johannesson:** None. **G. Testa:** None. **T. Sam:** None.

Abstract# 7

A Multi-institutional Study of Renal Outcomes in Uterus Transplantation

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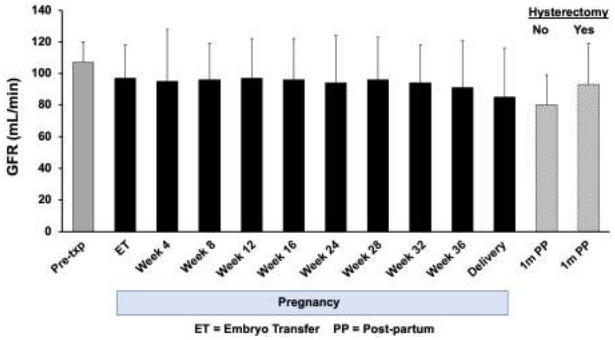
Purpose: Pregnancy and calcineurin inhibitor-based immunosuppression represent potential renal stressors for uterus transplant (UTx) recipients, many of whom have Mayer-Rokitanksy-Kuster-Hauser (MRKH) syndrome and associated renal abnormalities. Renal dysfunction during pregnancy can contribute significantly to pregnancy complications such as pre-eclampsia (PE) and gestational HTN (gHTN). Nevertheless, studies of renal function in UTx patients are lacking.
Methods: We collected demographic and clinical outcome data on UTx recipients transplanted from 2016-2020 at Prague (n=3), Baylor (n=12) and UPenn (n=2). Only UTx patients who achieved live birth during the study period were analyzed (16/17 patients). Acute kidney injury (AKI) was defined using AKIN criteria. Serum creatinine measurements and glomerular filtration rate (GFR), estimated using the CKD-EPI equation, were compared at different time points using a paired t test; a p value <0.05 was considered significant.
Results: The average age at UTx was 28.9 ±4.3 yrs and the most common reason for transplantation was MRKH in 93.4%; only one patient had a solitary kidney. A second pregnancy occurred in 2 women but these data were not included in this analysis. Pretransplant renal function was normal for all UTx recipients (mean serum creatinine 0.75mg/dL± 0.1; mean eGFR 107ml/min±13). An increase in serum creatinine >=0.3mg/dL was noted in 37.5% after UTx; likewise, mean serum creatinine at embryo transfer was significantly higher than pretransplant (0.84mg/dL±0.2, p=0.035). Four patients (25%) developed AKI Stage I in the third trimester. 50% developed a hypertensive disease of pregnancy and 4 (25%) developed PE. GFR at embryo transfer was numerically lower in women who developed PE (82ml/m±27 vs. 102ml/m±17; p=0.11) and this difference was significant at 16 weeks' gestation (72ml/m±25 vs. 106m/m±21, p=0.02). Complicated pregnancies were associated with a shorter gestational duration. GFR improved for all patients after hysterectomy and cessation of immunosuppression but did not always return to pretransplant levels postpartum (Figure1).
Conclusions: AKI is common among UTx recipients and is associated with pregnancy complications. Studies of kidney function in this population are needed to both improve risk counseling for UTx candidates and guide patient selection.



CITATION INFORMATION: Sawinski D., Johannesson L., Kristen J., Fronek J., Porrett P. A Multi-institutional Study of Renal Outcomes in Uterus Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Sawinski: Other; Name of Commercial Interest; Veloxis, CareDx, Natera. Other; Nature of Relationship; advisory board, advisory board, advisory board. **L. Johannesson:** None. **J. Kristen:** None. **J. Fronek:** None. **P. Porrett:** Consulting Fee; Name of Commercial Interest; Janssen Research and Development.

Abstract# 8

Stem Cell and Novel Neurotrophic Factors to Promote Functional Outcomes in Limb Transplantation

S. K. Salgar[1], J. Weiss[2], C. Phillips[2], E. Malin[2], V. Gorantla[3], J. Harding[4], *[1]Clinical Investigation, United States Army, Tacoma, WA, [2]Clinical Investigation, Madigan Army Medical Center, Tacoma, WA, [3]Surgery, Wake Forest University, Winston-Salem, NC, [4]Neuroscience, Washington State Universisty, Pullman, WA*

Purpose: Recently, transplantation of hand and face has become a new clinical specialty. The objective of this study was to determine whether adult Mesenchymal Stem Cells (MSCs), Granulocyte-Colony Stimulating Factor (G-CSF) and/or Dihexa can promote limb transplant function.
Methods: We used rat sciatic nerve transection-repair model. There were 10 experimental groups (n=6/group). Bone marrow derived syngeneic MSCs (2 million), G-CSF (50-100µg/kg), (Dihexa 2-4mg/kg) and/or Vehicle were administered locally via hydrogel at the site of nerve repair, i.v./i.p., and to gastrocnemius muscle.
Results: Total sensory function was ~1.4, 1.7, 2.7 and 2.9 at 2, 4, 8 and 16 weeks post-nerve repair, respectively, on a scale of Grade 0-3 (0=No function; 3= Normal function) in all groups combined; peroneal nerve function recovered quickly by one week (~2.0) and sural nerve function recovered slowly by four weeks (~1.0). Motor function at 16 weeks post-nerve repair as determined by walking foot print grades 0-4 (0=no print; 4=heel plus 4-5 toe prints) was 3.0±0.9, 3.0±0.8, and 2.0±0.6 in MSC+G-CSF, MSC+Dihexa and MSC+vehicle groups with gastrocnemius injections, respectively; however, without gastrocnemius injection it was ~1.6. G-CSF or Dihexa injections to gastrocnemius significantly ($P<0.05$) improved motor function, mitigated muscle atrophy and reduced flexion contractures. MSCs expanded ex vivo were CD29+, CD90+, CD34-, CD31-, MHC Class I+, Class II- and multipotent. In a parallel study with tibial nerve repair we observed significant nerve regeneration/myelination with MSC therapy (n≥6).
Conclusions: It appears, MSC, G-CSF and Dihexa are promising candidates for adjunct therapies to promote limb transplant function.
CITATION INFORMATION: Salgar S., Weiss J., Phillips C., Malin E., Gorantla V., Harding J. Stem Cell and Novel Neurotrophic Factors to Promote Functional Outcomes in Limb Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.K. Salgar: None. **J. Weiss:** None. **C. Phillips:** None. **E. Malin:** None. **V. Gorantla:** None. **J. Harding:** None.

Abstract# 9

Recovery After Extended Static Cold Storage Preservation Using Subnormothermic Machine Perfusion in VCA

M. Goutard[1], R. J. de Vries[1], A. G. Lellouch[1], E. Lupon[1], C. Pendexter[1], S. N. Tessier[1], M. A. Randolph[1], L. Lantieri[2], C. L. Cetrulo[1], K. Uygun[1], *[1]Massachusetts General Hospital, Harvard Medical School, Shriners Hospitals for Children, Boston, MA, [2]Hôpital Européen Georges Pompidou, Paris, France*

Purpose: Vascularized composite allografts (VCA) are more sensitive to cold ischemia than solid organ transplants due to the remaining metabolism in skeletal

muscle cells. In our VCA preservation studies, we observed a higher risk of epidermolysis and muscle fibrosis after extended periods of cold ischemia in a rodent transplantation model. We hypothesized that our perfusion protocol would recover the limbs before transplant and improve the clinical outcomes.

Methods: Partial hind limbs in Lewis rats were procured and flushed with 2ml of heparin saline (100UI/ml) at room temperature then perfused with 150ml of modified Steen solution (Steen+) for 3hours (control group, n=5). In the study groups, grafts were also flushed with 5ml of ice cold HTK solution, then immersed in HTK in a sterile bag and stored in static cold storage (SCS) at 4°C for a period of 6, 12 or 18hours before the 3hrs recovery SNMP (n=4 in each group). Perfusion parameters (vascular resistances, glucose and oxygen consumption, lactates and potassium release) were assessed q30min. Biopsies were taken for histological and ATP analysis and weight gain was measured at the end of perfusion.

Results: In all SCS groups, we were able to restore a flowrate of 0.8ml/min at the end of perfusion. Arterial resistances spiked at 30min in the 6 and 12hrs SCS groups and at 60min in the 18hrs SCS group. In each group, a constant decrease in resistance was seen after the spike and final resistances were similar to the control. After 3hrs SNMP, potassium release was significantly higher in the 12 (p=0.003) and 18hrs SCS group(p=0.0002); however, it remained in an acceptable range (<6.5mmol/L). Lactate production was not statistically different at the end of perfusion in all groups. Nonetheless, weight gain was significantly higher in the 18hrs SCS group compared to the other SCS groups. **(Fig. 1)**

Conclusions: We describe a successful perfusion recovery protocol for cold ischemic VCA in a rodent model. In all groups, perfusion parameters improved throughout the experiment to reach the same level as in our control group. Our SNMP protocol with Steen+ is encouraging for VCA perfusion recovery after extended cold ischemia damage. Our results will be confirmed in vivo by transplantation in rodents.

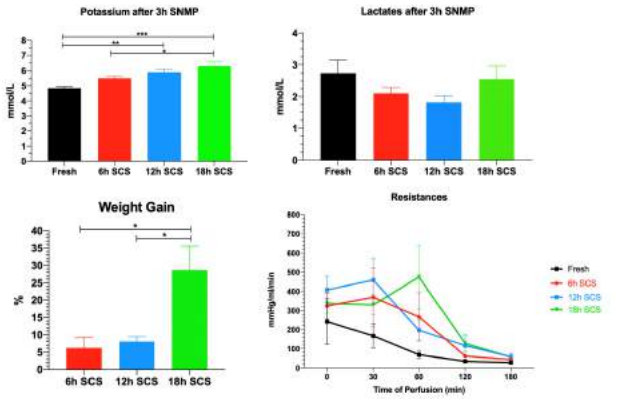


Figure 1. Perfusion parameters

CITATION INFORMATION: Goutard M., de Vries R., Lellouch A., Lupon E., Pendexter C., Tessier S., Randolph M., Lantieri L., Cetrulo C., Uygun K. Recovery After Extended Static Cold Storage Preservation Using Subnormothermic Machine Perfusion in VCA *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Goutard: None. **R.J. de Vries:** None. **A.G. Lellouch:** None. **E. Lupon:** None. **C. Pendexter:** None. **S.N. Tessier:** None. **M.A. Randolph:** None. **L. Lantieri:** None. **C.L. Cetrulo:** None. **K. Uygun:** None.

Abstract# 10

A Noninvasive Diagnostic Approach for Molecular Monitoring of Face Transplant Recipients

C. Snopkowski[1], P. Rabbani[2], H. Yang[1], Z. Berman[2], G. Diep[2], C. Li[1], T. Muthukumar[1], R. Ding[1], D. Ceradini[2], M. Suthanthiran[1], *[1]Weill Cornell Medical Institute, Department of Medicine, Division of Nephrology, NY, NY, [2]NYU Langone Health, Hansjörg Wyss Department of Plastic Surgery, NY, NY*

Purpose: Skin biopsies are currently the gold standard for evaluating the inflammatory status of face allografts. However, "tape stripping" is emerging as a noninvasive technique to monitor autoimmune/auto inflammatory skin diseases. This technique, highly suitable for serial sampling and combined with high sensitive PCR assays, could revolutionize molecular monitoring the face allograft status. Herein, we tested the hypothesis that isolation of total RNA and gene expression profiling are feasible using skin samples collected using tape strips.

Methods: Tape strips (CuDerm Corporation, Texas) were used to obtain RNA from two face transplant recipients. Each tape strip is comprised of 10 discs. Allograft skin area was marked, cleaned with alcohol, and 8 samples (8 tape strips) were obtained. Each disc (10 discs from one sample) was immersed in 1ml RLT buffer with 100ul β-mercaptoethanol. RNA was isolated from the tape strip skin samples using the RNeasy mini kit. We quantified total RNA using A260/A280 ratio, reverse transcribed RNA into cDNA and pre-amplified cDNA using oligonucleotide primer pairs for a custom panel of mRNAs. We measured absolute levels of mRNA for Keratin 15, MIP1α, and MIP1β, as well as 18S rRNA by preamplification enhanced real time quantitative PCR assays (RT-qPCR assays) using Quant Studio 6. We designed gene specific Taqman primers and probes to amplify and detect gene of interest and a customized BAK amplicon to develop a standard curve for absolute quantification of transcript copies per microgram of total RNA.

Results: Median quantity of total RNA from the tape strips was 64.48ng. Individual and the median number of total RNA, individual and the median number of the reference gene 18S rRNA, and individual and median number of mRNA copies of Keratin 15, MIP1α, and MIP1β are shown in Figure 1.

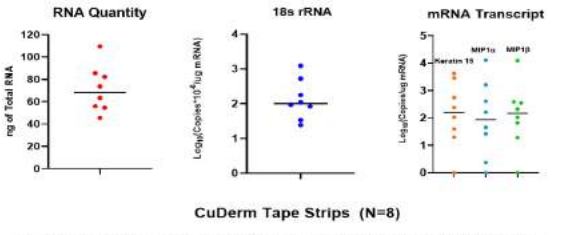


Figure 1. Each colored dot represents a tape strip from an allograft skin. Each tape strip consists of 10 discs. For a given sample, each of the 10 discs were immediately immersed in 1ml of buffer RLT with β-mercaptoethanol (10mL per sample). Total of 8 tape strips obtained from two face transplant recipients were used for RNA isolation.

Conclusions: We have demonstrated the feasibility of isolating total RNA from tape strips and quantifying transcript abundance. Further refinement of this technology is ongoing in our laboratory. Tape strip based molecular monitoring of face transplant recipients may offer a noninvasive substitute for allograft biopsies.

CITATION INFORMATION: Snopkowski C., Rabbani P., Yang H., Berman Z., Diep G., Li C., Muthukumar T., Ding R., Ceradini D., Suthanthiran M. A Noninvasive Diagnostic Approach for Molecular Monitoring of Face Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Snopkowski: None. **P. Rabbani:** None. **H. Yang:** None. **Z. Berman:** None. **G. Diep:** None. **C. Li:** None. **T. Muthukumar:** None. **R. Ding:** None. **D. Ceradini:** None. **M. Suthanthiran:** None.

Basic

Biomarkers, Immune Assessment and Clinical Outcomes - I

Abstract# 11

A Single Nucleotide Polymorphism within the FCGR3A 158 F/V Gene is Associated with Decreased Survival of Renal Allografts with Chronic Active Antibody-Mediated Rejection

N. H. Litjens, A. M. Peeters, J. A. Kal-van Gestel, M. Klepper, M. G. Betjes, *Internal Medicine, Nephrology and Transplantation, Erasmus MC, University Medical Center, Rotterdam, Netherlands*

Purpose: Long-term allograft survival has shown little improvement over the last decades. An important factor compromising long-term allograft survival in kidney transplantation is chronic active antibody mediated rejection (c-aABMR). Histomorphologic lesions of c-aABMR develop over time and are associated with recurrent and episodic endothelial cell activation by immunoglobulin G (IgG)-antibodies recognizing donor-specific leukocyte antigens (HLA) (DSA) or non-HLA antigens. Immune cells expressing Fc-receptors (FCGRs) interact with IgG antibodies bound to endothelial cells and genetic variation in *FCGR* genes may affect susceptibility for antibody-mediated rejection. Natural killer (NK) cells express the Fc-receptor CD16 (*FCGR3A*) and could therefore mediate renal endothelial cell damage in cases of c-aABMR. The V/V-genotype of the *FCGR3A* 158 F/V single nucleotide polymorphism is associated with increased CD16 expression and cytotoxicity by NK cells. This study evaluated whether this genotype is associated with the diagnosis of c-aABMR and renal allograft loss.

Methods: Cases of c-aABMR (N=133) and control kidney transplant recipients without c-aABMR (N=116) were genotyped for *FCGR3A* 158 F/V. In addition, CD16 expression by NK cells and CD16-dependent NK-cell function were evaluated. Follow-up of cases of c-aABMR was until 1st of January 2020 and graft loss/failure was defined as the need for dialysis or a retransplantation. The date of diagnosis of c-aABMR and date of graft failure were used to calculate graft survival upon diagnosis.

Results: The distribution of the *FGCR3A* 158 F/V-genotypes was not different for c-aABMR cases compared to control kidney transplant recipients (P-value =0.65). The V-allele was associated with increased median fluorescence intensity (MFI) of CD16 by NK cells (MFI $3.5x10^4$ versus $1.3x10^4$ for V/V and F/F-genotype, P<0.001). Increased expression of CD16 correlated with CD16-dependent degranulation of NK cells (R=0.4; P=0.02). Moreover, the V/V-genotype was significantly associated with a higher glomerulitis score and an independent risk factor (HR 1.98; P=0.04)

for decreased allograft survival. Death-censored graft survival in c-aABMR cases at 3 years follow-up was 33% for the *FCGR3A* 158 V/V-genotype versus 62% for the F/F-genotype.
Conclusions: In conclusion, the *FCGR3A* V/V-genotype increases CD16-mediated NK cell cytotoxicity and is associated with a higher glomerulitis score and decreased renal allograft survival in cases with c-aABMR.
CITATION INFORMATION: Litjens N., Peeters A., Kal-van Gestel J., Klepper M., Betjes M. A Single Nucleotide Polymorphism within the FCGR3A 158 F/V Gene is Associated with Decreased Survival of Renal Allografts with Chronic Active Antibody-Mediated Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: N.H. Litjens: None. **A.M. Peeters:** None. **J.A. Kal-van Gestel:** None. **M. Klepper:** None. **M.G. Betjes:** None.

Abstract# 12

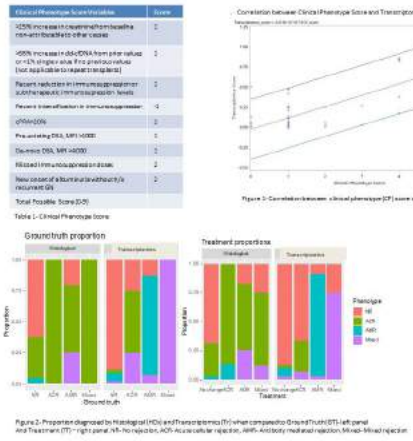
T-cell-Mediated Immunity to Sars-cov-2 Defines Covid-19 Risk and Severity in Transplanted and Non-Transplanted Individuals and Associates with Myeloid-Derived Suppressor Cells

C. Ashokkumar[1], V. Rohan[2], A. H. Kroemer[3], S. Rao[4], G. Mazariegos[5], B. W. Higgs[5], S. Nadig[2], M. Ningappa[5], T. Fishbein[3], S. Subramaniam[6], R. Sindhi[7], *[1]Plexision, Pittsburgh, PA, [2]Medical University of South Carolina, Charleston, SC, [3]MedStar Georgetown Transplant Institute, Georgetown, DC, [4]DHR Health Institute for Research and Development, Texas, TX, [5]University of Pittsburgh, Pittsburgh, PA, [6]University of California, San Diego, CA, [7]University of Pittsburgh, pittsburgh, PA*
Purpose: We assessed whether COVID-19-risk is enhanced by chronic immunosuppression, and is associated with suppressor cells.
Methods: We tested 66 COVID-19 patients, including 26 with solid organ transplants at median 11 days after diagnosis, and 64 unexposed healthy subjects including 21 with transplants, who were sampled pre-pandemic. T- and B-cells, which express CD154 were measured after stimulation with peptide mixtures representing the spike protein S, its conserved C-terminal S2, and less conserved N-terminal S1 components. Monocytic myeloid-derived suppressor cells (M-MDSC) were measured in an independent cohort of 47 COVID-19 patients
Results: Frequencies (%) of S-reactive T-cells (Mean±SEM 2.0±0.3 vs 3.8±0.3, p=5.6E-05) and B-cells (3.0±0.4 vs 5.1±0.4, p=0.0003) were significantly lower in COVID-19 compared with healthy subjects, but were measurable in all samples. Transplanted and non-transplanted subjects demonstrated similar within group frequencies of S-reactive T-cells (4.1±0.3 vs 3.7±0.5, p=NS in healthy and 1.5±0.4 vs 2.4±0.3, p=NS in the COVID-19 group) and other S-reactive cells. Among COVID-19 patients, intubated patients showed lower S-reactive CD8 frequencies compared with non-intubated patients. (1.4±0.5 vs 3.5±0.5, p=0.003). In logistic regression analysis using training and test sets, S-reactive CD3 and CD8 cells, age, race, and transplantation status distinguished COVID-19 from healthy subjects (test set negative and positive predictive values 75% and 85% respectively, AUC 0.9). Among 66 COVID-19 patients, S-reactive CD8 cells and age predicted respiratory failure with NPV 62%, PPV 86%, AUC 0.73. S2-reactive T-cells demonstrated similar predictive performance. S1 antigen elicited minimal cellular responses. Transplanted COVID-19 patients show lower cytomegalovirus-specific CD154+CD3 frequencies compared with non-transplanted patients (0.5±0.1 vs 1.3±0.2, p=0.006). Frequencies of CD14+CD33+CD11b+HLADR-ve M-MDSC (14.5±2.9 vs 3.3±1.5, p=0.002) were higher in 47 independent COVID-19 patients compared with 6 healthy subjects.
Conclusions: Conserved SARS-CoV-2-spike antigen drives T-cell immunity to COVID-19 in unexposed transplanted and non-transplanted subjects. This immunity declines with COVID-19 infection, is accompanied by increased myeloid derived suppressor cells, and can predict infection-risk and disease severity. Transplant patients demonstrate increased COVID-19-risk and co-infection-risk.
CITATION INFORMATION: Ashokkumar C., Rohan V., Kroemer A., Rao S., Mazariegos G., Higgs B., Nadig S., Ningappa M., Fishbein T., Subramaniam S., Sindhi R. T-cell-Mediated Immunity to Sars-cov-2 Defines Covid-19 Risk and Severity in Transplanted and Non-Transplanted Individuals and Associates with Myeloid-Derived Suppressor Cells *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Ashokkumar: Intellectual Property Rights; Name of Commercial Interest; Plexision. Salary; Name of Commercial Interest; Plexision. **V. Rohan:** None. **A.H. Kroemer:** None. **S. Rao:** None. **G. Mazariegos:** None. **B.W. Higgs:** None. **S. Nadig:** None. **M. Ningappa:** None. **T. Fishbein:** None. **S. Subramaniam:** None. **R. Sindhi:** Intellectual Property Rights; Name of Commercial Interest; Plexision. Ownership Interest; Name of Commercial Interest; Plexision.

Abstract# 13

Precision Medicine Tools in Kidney Transplant (KTx): Implications for Individualized Immunosupression Therapy and Downstream Cost-savings

S. Anand, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*
Purpose: Kidney Tissue Transcriptomics (Tr) is an emerging adjunct to traditional histology for diagnosis of kidney rejection in KTx. The objective assessment and reliance on Tr offers a vital, reliable tool for diagnosing early antibody mediated rejection (AMR) and confirming or refuting a borderline T- cell mediated rejection (TCMR) where subjectivity might alter decision making. We devised a clinical phenotype (CP) score and tested its correlation with Tr. We hypothesized 1) Tr results would match clinical phenotyping (CP) and be closer to the "ground truth" (GT) than traditional histological diagnosis (HDx); 2) treatment decision based on Tr would generate personalized targeted immunosuppression and potential cost-savings.
Methods: Patients who underwent kidney biopsy for cause from July 2016 to Nov 2020 were included in the study. We incorporated Tr in the routine workflow for cause biopsies for KTx. CP scores utilized a scoring system for development of rejection clinical phenotype (Table 1). CP scores were assigned on retrospective chart review, with the observer blinded to pathology results. GT was the diagnosis that the clinician used to treat the patient which was considered gold standard. Treatment (TT) was treatment given to the patient. These were retrieved from retrospective chart review.
Results: Of the 69 patients, the median score for CP was 1 (IQR 1-3). CP scores showed a significant, linear and positive correlation with Tr rejection scores (Fig 1). Tr and HDx both showed discordance with comparative standards- GT and TT(Fig 2). Overall, discordance of HDx was higher than Tr for both comparative standards- GT and TT. HDx disproportionately misdiagnosed more borderline acute cellular rejection (ACR) where no rejection (NR) based on GT and TT. Tr successfully diagnosed more acute antibody mediated rejection (AMR) consistent with GT and TT, while HDx missed AMR when compared to the standard GT and TT.



Conclusions: Incorporating Tr pathophysiological based transcripts led to personalization and optimization of immunosuppression (IS) dose and type. Tr resulted in avoidance of overtreatment for ACR, while led to early therapeutic interventions for AMR to dampen early antibody response. Both treatment decisions have potential for cost savings and better patient outcomes, and improved allograft survival. CP scores at bedside are correlated with Tr scores, which can help triage, personalize IS dose and type while awaiting Tr results. Further studies need to validate the utility of CP score.
CITATION INFORMATION: Anand S., Sanchez-Garcia J., Dong L., Fife M., Krong J., Morris D., Srinivas T. Precision Medicine Tools in Kidney Transplant (KTx): Implications for Individualized Immunosupression Therapy and Downstream Cost-savings *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Anand: None. **J. Sanchez-Garcia:** None. **L. Dong:** None. **M. Fife:** None. **J. Krong:** None. **D. Morris:** None. **T. Srinivas:** None.

Abstract# 14

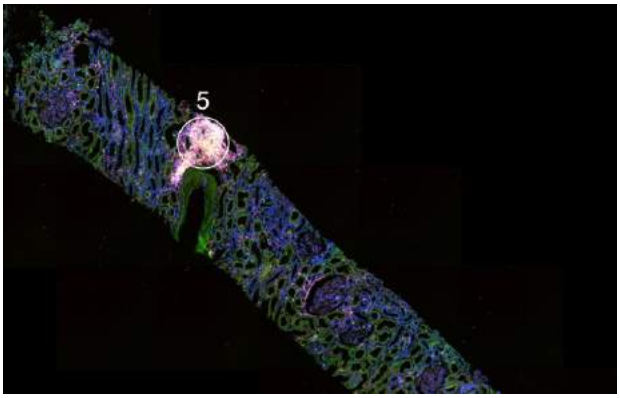
Characterisation of Distinct Graft Infiltrates Following Cellular Therapy in Kidney Transplant Recipients

M. O. Brook[1], P. N. Harden[2], I. Roberts[2], W. R. Mulley[3], J. Hester[1], M. E. Reinders[4], F. Issa[1], *[1]Nuffield Department of Surgical Sciences, University of Oxford, Oxford, United Kingdom, [2]Oxford University Hospitals NHS Foundation Trust, Oxford, United Kingdom, [3]Department of Nephrology, Monash Medical Centre, Melbourne, Australia, [4]Division of Nephrology and Transplant Center, Leiden University Medical Center, Leiden, Netherlands*
Purpose: Cellular therapy is an emerging treatment in the field of clinical transplantation with the potential to improve both short and long-term transplant outcomes. We are taking the first steps towards assessing the potential of cell therapies in the clinical setting of living donor kidney transplantation. A critical aspect of these studies is generating an understanding of how infused cell therapies might impact on the recipient immune response to alloantigen and mediate any beneficial effect.
Methods: Patients receiving regulatory T cell infusion as part of a phase 1 clinical trial underwent a protocol biopsy at 8 months post-transplant. Biopsies are compared with those from patients with an acute T cell mediated rejection episode and surveillance biopsies from patients with clinically stable graft function. Initial

analysis was performed using routine immunohistochemistry. Subsequently, a NanoString GeoMX digital spatial profiler was used to interrogate the composition of biopsy infiltrates through protein and mRNA expression in a tissue location specific manner (Figure 1).

Results: Routine histology demonstrated the presence of unique cellular infiltrates that were dense and remarkably focal in nature in all patients treated with cell therapy. Immunohistochemistry revealed between 5 and 10% of such infiltrates are positive for FOXP3, a marker of regulatory T cells, but one that is also expressed on activated human effector T cells. Digital spacial profiling revealed that infiltrates in all three clinical scenarios demonstrate unique properties based on protein and mRNA expression data and represent distinct cell populations. Infiltrates in the setting of cellular therapy have an expression profile suggestive of regulatory activity.

Conclusions: We demonstrate the prescence of dense focal cellular infiltrates in renal transplant biopsies from patients treated with cell therapy. Such infiltrates are interogated using novel spatial profiling techniques and found to be distinct from those seen during a rejection episode and from infiltrates noted on surveillance biopsies.



CITATION INFORMATION: Brook M., Harden P., Roberts I., Mulley W., Hester J., Reinders M., Issa F. Characterisation of Distinct Graft Infiltrates Following Cellular Therapy in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.O. Brook: None. **P.N. Harden:** None. **I. Roberts:** None. **W.R. Mulley:** None. **J. Hester:** None. **M.E. Reinders:** None. **F. Issa:** None.

Abstract# 15

Integrative Analyses of Circulating Small Rnas and Paired Kidney Graft Transcriptome in Transplant Glomerulopathy

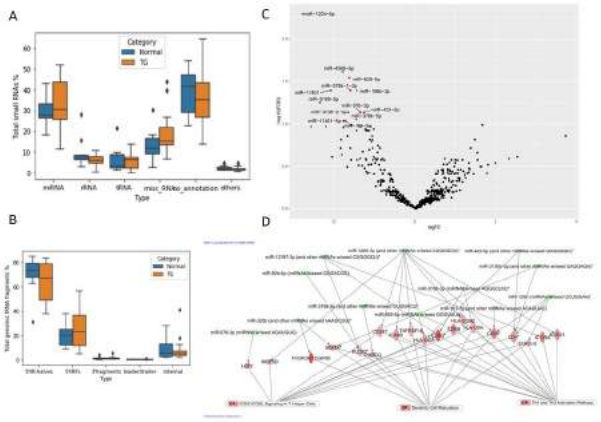
C. Kuscu[1], K. Manjari[2], M. Akram[3], C. Kuscu[4], A. Wolen,[4], A. Bajwa[4], J. Eason[4], D. G. Maluf[5], V. Mas[6], E. Akalin[7], *[1]Surgery, James D Eason Transplant Institute, UTHSC, Memphis, TN, [2]Department of Systems and Computational Biology, School of Life Sciences, University of Hyderabad,, Hyderabad,, India, [3]Center for Biomedical Informatics, University of Tennessee Health Science Center, Memphis, TN, [4]Surgery, James D Eason Transplant Institute, Memphis, TN, [5]Surgery, Program in Transplantation, University of Maryland, Baltimore, MD, [6]Surgery, Division Surgical Science, University of Maryland, Baltimore, MD, [7]Medicine, Montefiore Medical Center, Abdominal Transplant Program, Albert Einstein College of Medicine,, NYC, NY*

Purpose: Transplant glomerulopathy (TG) develops through multiple mechanisms including donor-specific antibodies, T cells and innate immunity. We investigate the role of circulating small RNAs (sRNAs) in TG comparing intragraft gene expression profiles.

Methods: sRNAs profiles were evaluated in serum of kidney transplant recipients with biopsy-proven TG and normal allograft function using RNA sequencing. An integrative approach was applied to link miRNA changes in serum with gene expression profiles from the paired allograft samples.

Results: Among total sRNA population, miRNAs were the most abundant species, compromising approximately 30% of total sRNAs in the serum of kidney transplant patients (Fig. A). Fragments arising from mature tRNA and rRNA were also detected. Most of tRNA fragments (tRFs) were generated from 5' ends of mature tRNA and mainly from two parental tRNAs: tRNA-Gly and tRNA-Glu (Fig. B). Paired gene expression analysis from allograft tissues showed changes in canonical pathways related to immune activation such as iCos-iCosL signaling pathway in T helper cells, Th1 and Th2 activation pathway, and dendritic cell maturation (Fig. C, D). mRNA targets of down regulated miRNAs such as miR-1224-5p, miR-4508, miR-320, miR-378a from serum were globally upregulated in tissue.

Conclusions: This is the first study to report the circulating sRNA profiles in transplant patients with TG using next generation sequencing. A novel circulating tRNA fragment TG signature is reported. Integration of sRNA profiles from serum with gene expression from tissues showed that changes in serum miRNAs support the role of T-cell mediated mechanisms in ongoing allograft injury.



CITATION INFORMATION: Kuscu C., Manjari K., Akram M., Kuscu C., Wolen, A., Bajwa A., Eason J., Maluf D., Mas V., Akalin E. Integrative Analyses of Circulating Small Rnas and Paired Kidney Graft Transcriptome in Transplant Glomerulopathy *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Kuscu: None. **K. Manjari:** None. **M. Akram:** None. **C. Kuscu:** None. **A. Wolen,:** None. **A. Bajwa:** None. **J. Eason:** None. **D.G. Maluf:** None. **V. Mas:** None. **E. Akalin:** None.

Abstract# 16

Utility of Follow-up Biopsies After Acute Rejection in Pediatric Kidney Transplantation

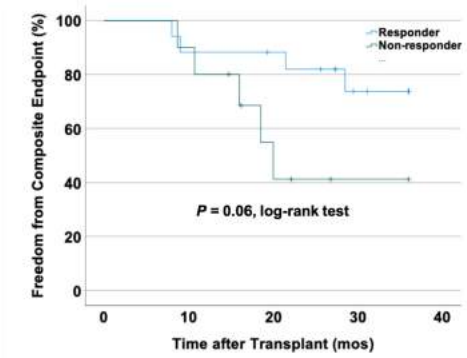
S. S. Raza[1], V. Hauptfeld-Dolejsek[1], F. Rosenblum[1], E. C. Mroczek-Musulman[2], D. R. Kelly[2], M. Seifert[1], *[1]Department of Nephrology, UAB School of Medicine, Birmingham, AL, [2]Children's of Alabama, Birmingham, AL*

Purpose: Treatment of acute kidney transplant rejection in children is often guided by creatinine-based estimates of GFR (eGFR) that may lack sensitivity to determine the adequacy of therapy. The purpose of this study was to analyze our center's practice of performing follow-up biopsies to assess for resolution of acute rejection.

Methods: We performed a retrospective cohort study of all biopsy-proven subclinical and clinical T cell-mediated acute rejection (TCMR) episodes at our center between January 2009 and December 2014. We analyzed the first subclinical or clinical TCMR episode in each patient that had at least one follow-up biopsy performed within three months of diagnosis. Treatment of rejection included standard courses of intravenous pulse steroids with a 4-6-week oral taper with the addition of anti-thymocyte globulin in severe or steroid-resistant rejection. The primary endpoint was biopsy-proven resolution of TCMR, defined by follow-up Banff injury scores of < i1t1 and v=0. The secondary endpoint was a composite outcome of acute rejection, graft loss, or death by five years. We compared continuous and categorical variables between subgroups with resolved versus persistent TCMR using standard approaches. We used Kaplan-Meier methods to compare time-to-event data between those with resolved versus persistent TCMR.

Results: We identified 27 pediatric kidney transplant recipients with at least one follow-up biopsy within three months of diagnosis of subclinical (n=9) or clinical (n=18) TCMR. The cohort was 44% black race, 48% female sex, and 85% deceased donor recipients. Overall, 17/27 (63%) of children had eventual resolution of TCMR on serial follow-up biopsies. However, only 10/27 (37%) had resolution of TCMR on the initial follow-up biopsy within 4-6 weeks of standard treatment. We found no clinical or demographic characteristics that were associated with the response to treatment, including the type of rejection (subclinical/clinical) or improvement in eGFR. The persistent TCMR group had a trend for a higher incidence of the composite endpoint (50% versus 24%; P=0.06, Figure).

Conclusions: Serial follow-up biopsies frequently detected unresolved subclinical and clinical TCMR that may be associated with inferior long-term outcomes in pediatric kidney recipients. Larger studies are warranted to compare biopsy-guided to eGFR-guided treatment regimens for TCMR in children.



CITATION INFORMATION: Raza S., Hauptfeld-Dolejsek V., Rosenblum F., Mroczek-Musulman E., Kelly D., Seifert M. Utility of Follow-up Biopsies After Acute Rejection in Pediatric Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.S. Raza: None. **V. Hauptfeld-Dolejsek:** None. **F. Rosenblum:** None. **E.C. Mroczek-Musulman:** None. **D.R. Kelly:** None. **M. Seifert:** None.

Abstract# 17

The Gut Microbiome in Heart Transplantation: A Prospective Pilot Study

M. Dela Cruz[1], E. Littmann[2], R. Nayak[2], C. Lehmann[2], R. Keskey[3], T. Baker[3], H. Lin[2], A. Bennett[1], G. Kim[1], S. Pinney[1], E. Pamer[2], A. B. Nguyen[1], *[1]Cardiology, University of Chicago, Chicago, IL, [2]Medicine, University of Chicago, Chicago, IL, [3]Surgery, University of Chicago, Chicago, IL*

Purpose: The contribution of the intestinal microbiome to alloimmunity in heart transplantation (HT) is unknown. We examined the fecal microbiota of HT recipients at the time of transplantation and characterized microbiota composition, diversity, and metabolite production.

Methods: In a prospective, observational, pilot study, pre and post-HT stool samples were collected and microbiota composition determined by 16S ribosomal RNA gene sequencing. Fecal short chain fatty acid (SCFA) concentrations were determined using targeted metabolomics. HT samples were compared to those from healthy controls (HC), liver transplant (LT), and ICU patients.

Results: Fecal samples were analyzed from 15 HT recipients (including 2 heart-kidney, 1 heart-liver, 1 heart-liver-kidney) and compared to 15 HC, 16 LT, and 61 ICU patients. Within sample microbial diversity, quantified by inverse Simpson index, was lower in HT subjects compared to HC ($p<0.002$), but higher than that of ICU ($p<0.003$) and LT ($p<0.001$) (Fig.1A). HT microbiota had lower frequencies of Ruminococcaceae than HC (11.3% vs 24%, $p<0.001$), while ICU and LT had marked losses of obligate anaerobes and higher predominance of *Enterococcus*, *Lactobacillus*, and *Proteobacteria*. Compared to ICU and LT, HT microbiota had significantly higher abundances of the commensal anaerobic bacterial families *Lachnospiraceae* (HT 26.9% vs ICU 12.2% vs LT 4.8%, $p<0.001$) and *Ruminococcaceae* (HT 11.3% vs ICU 6.9% vs LT 1.2%, $p<0.001$), and higher butyrate concentrations (HT 7.06mM vs ICU 3.34mM vs LT 1.15mM, $p<0.001$) (Fig.1B). Among HT and ICU subjects, the presence of *Lachnospiraceae* strongly correlated with concentrations of the SCFAs acetate ($r = 0.62$, $p<0.001$), butyrate ($r = 0.50$, $p<0.003$), and propionate ($r = 0.59$, $p<0.001$). Similar correlations were seen with *Ruminococcaceae.* Analysis of beta diversity with Bray-Curtis and Unifrac PCoA demonstrated a trend towards clustering by cohort.

Conclusions: The microbiota of HT recipients is less diverse than that of HC but is remarkably more diverse and contains a greater representation of commensal bacteria than that of LT or ICU subjects. SCFA concentrations differed significantly between cohorts and correlated with the presence of specific bacterial groups. Intriguing differences in microbiota composition and SCFA production are measurably identifiable between and within groups. Further recruitment, collection, and correlation to clinical outcomes is in progress.

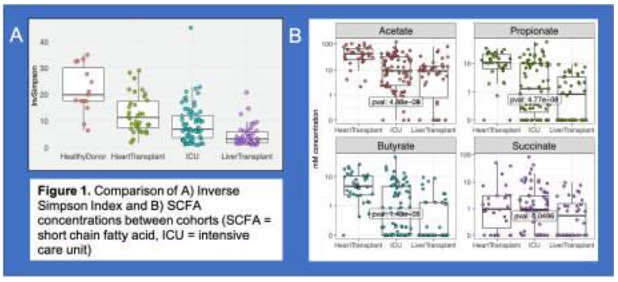


Figure 1. Comparison of A) Inverse Simpson Index and B) SCFA concentrations between cohorts (SCFA = short chain fatty acid, ICU = intensive care unit)

CITATION INFORMATION: Dela Cruz M., Littmann E., Nayak R., Lehmann C., Keskey R., Baker T., Lin H., Bennett A., Kim G., Pinney S., Pamer E., Nguyen A. The Gut Microbiome in Heart Transplantation: A Prospective Pilot Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Dela Cruz: None. **E. Littmann:** None. **R. Nayak:** None. **C. Lehmann:** None. **R. Keskey:** None. **T. Baker:** None. **H. Lin:** None. **A. Bennett:** None. **G. Kim:** None. **S. Pinney:** None. **E. Pamer:** None. **A.B. Nguyen:** None.

Abstract# 18

Peripheral Blood Hematopoietic Chimerism: A Robust Biomarker for Transplantation Tolerance

D. Tollerud[1], E. Gornstein[1], J. Leventhal[2], K. V. Ravindra[3], S. Ildstad[1], *[1]Talaris Therapeutics, Louisville, KY, [2]Division of Organ Transplantation, Northwestern Medical Group, Chicago, IL, [3]Department of Surgery, Duke University Medical Center, Durham, NC*

Purpose: Despite the development of highly effective immunosuppressive medications, organ rejection and the toxicity of the drugs themselves remain significant obstacles to long-term graft and patient survival. It has been known for over 5 decades that peripheral blood chimerism was associated with immunological tolerance to a transplanted organ, beginning with the observations by Owen followed by the seminal investigations by Billingham, Brent and Medawar that ultimately earned them a Nobel Prize. A major limitation to tolerance induction approaches has been the lack of a robust and reliable biomarker that would allow the safe withdrawal of immunosuppression without a high risk of organ rejection.

Methods: Work by Ildstad and colleagues led to the discovery of the Facilitating Cell (FC), a novel $CD8^{+}TCR^{-}$ bone marrow-derived cell, and the development of FCR001, an investigational allogeneic cell therapy product that could achieve chimerism and tolerance in highly HLA mismatched donor-recipient pairs, allowing for complete withdrawal of all immunosuppression without rejection.

Results: A Phase 2 living donor kidney tolerance protocol at Northwestern and Duke Universities has achieved a 70% success rate in the ability to remove all immunosuppression therapy 12 months post-transplant in living donor transplant recipients receiving FCR001 and non-myeloablative conditioning. The therapy is successful in highly HLA mismatched related and unrelated donor-recipient pairs. Durable donor chimerism, as defined by T-cell or whole blood chimerism greater than 20% donor at 6 months post-transplant, was established in 27 subjects, 26 of whom were successfully weaned off of all immunosuppression at 1 year post-transplant.

Conclusions: None of the 26 subjects have had kidney allograft rejection episodes or development of DSA, and all have maintained normal renal function with normal protocol biopsies over a follow-up period of 3 to 11 years post-transplant. Importantly, 1, 3, 6, and 12-month chimerism levels are highly correlated with each other and increasingly predictive over time of ability to withdraw IS at 1 year, suggesting that peripheral blood chimerism could be a valuable surrogate marker of efficacy. The present analysis explores factors influencing the time course and durability of hematopoietic chimerism in the setting of tolerance induction in living donor kidney transplantation.

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DISCLOSURES: D. Tollerud: None. **E. Gornstein:** None. **J. Leventhal:** Grant/Research Support; Name of Commercial Interest; Talaris Therapeutics, Inc.. Ownership Interest; Name of Commercial Interest; TRACT Therapeutics. Ownership Interest; Nature of Relationship; Co-Founder. **K.V. Ravindra:** None. **S. Ildstad:** Ownership Interest; Name of Commercial Interest; Talaris Therapeutics, Inc.. Ownership Interest; Nature of Relationship; CSO.

ID

COVID-19 Session 1

Abstract# 19

Solid Organ Transplant Recipient Attitudes Towards a SARS-CoV-2 Vaccine

M. Ou[1], B. Boyarsky[1], L. Zeiser[1], T. Chiang[1], J. Ruddy[1], S. Rasmussen[1], J. Martin[2], J. Russell[2], C. Durand[1], R. Avery[1], W. Werbel[1], M. Cooper[3], A. Massie[1], D. Segev[1], J. Garonzik-Wang[1], *[1]Johns Hopkins, Baltimore, MD, [2]National Kidney Foundation, New York, NY, [3]Medstar Georgetown Transplant Institute, Washington, DC*

Purpose: An effective and widely-accepted SARS-CoV-2 vaccine could protect the community and vulnerable populations. We investigated the attitudes of solid organ transplant recipients (SOTRs) towards a SARS-CoV-2 vaccine and identified potential barriers to vaccination.

Methods: We conducted a national survey of SOTRs between November 11 - December 2, 2020 through the network and social media platforms of the National Kidney Foundation. We studied 3 major domains: a) attitudes towards a vaccine, b) impact of the pandemic on daily life, and c) impact on mental health.

Results: Among 1308 SOTRs, 783 (59.9%) were female and 1035 (79.1%) were White. Respondents were evenly distributed throughout the US and were largely college graduates (829, 63.4%) and married (830, 63.5%). Half (647, 49.5%) of SOTRs would be either unsure or unwilling to receive a SARS-CoV-2 vaccine once available (Table 1). Major concerns included side effects (537, 85.2%), lack of rigor in vaccine development (439, 69.7%), and incompatibility with organ transplant (482, 75.4%). However, 1135 (86.8%) SOTRs would be willing to receive a vaccine if recommended by a transplant provider. A small fraction (161, 12.3%) were in self-isolation and severe anxiety related to the COVID-19 pandemic remained low (25, 1.9%). There were no significant differences in vaccine attitudes after the announcement of 94.5% efficacy in the mRNA-1273 vaccine (Moderna, Inc.).
Conclusions: Transplant recipients expressed large amounts of skepticism in a potential SARS-CoV-2 vaccine, even after announcements of high vaccine efficacy. However, transplant providers may be the defining influence in vaccine acceptance due to the trust vested in them.

Table 1. Barriers to vaccine acceptance

	Transplant recipients, n (%)
Participants unsure/unlikely to vaccinate	647 (49.5%)
Specific concerns about vaccine (n = 630)	
Side effects	537 (85.2%)
Lack of rigor in testing	439 (69.7%)
Newness	378 (60.0%)
Vaccine contents	364 (57.8%)
Efficacy	345 (54.8%)
Need more information (n = 639)	
Recommendation from doctor	511 (80.0%)
Personal health compatibility	482 (75.4%)
Personal immunity	188 (29.4%)
Timing regarding state of pandemic	174 (27.2%)
Cost	151 (23.6%)
Antivaccine beliefs, attitudes, emotions (n = 628)	
Others should get it first	204 (32.5%)
Uncomfortable with vaccines	90 (14.3%)
Fear of vaccines	33 (5.3%)
Don't need any vaccine	28 (4.5%)
Don't believe vaccine will work due to bad vaccine experiences	27 (4.3%)
Religious beliefs	11(1.8%)
Vaccines don't work in general	10 (1.6%)
Don't need because already infected	8 (1.3%)
Doubts or mistrust (n = 622)	
Vaccine development process	298 (47.9%)
The government	221 (35.5%)
Pharmaceutical companies	183 (29.4%)
CDC	105 (16.9%)
Vaccines in general	48 (7.7%)

*n refers to the number of survey participants who provided a response.

CITATION INFORMATION: Ou M., Boyarsky B., Zeiser L., Chiang T., Ruddy J., Rasmussen S., Martin J., Russell J., Durand C., Avery R., Werbel W., Cooper M., Massie A., Segev D., Garonzik-Wang J. Solid Organ Transplant Recipient Attitudes Towards a SARS-CoV-2 Vaccine *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Ou: None. **B. Boyarsky:** None. **L. Zeiser:** None. **T. Chiang:** None. **J. Ruddy:** None. **S. Rasmussen:** None. **J. Martin:** None. **J. Russell:** None. **C. Durand:** None. **R. Avery:** None. **W. Werbel:** None. **M. Cooper:** None. **A. Massie:** None. **D. Segev:** None. **J. Garonzik-Wang:** None.

Abstract# 20

Systematic Screening of Kidney Transplant Patients Points Towards Deficits in Neutralizing Antibody Capacity Against Sars-cov-2

V. Wijtvliet[1], K. K. Ariën[2], J. Mariën[2], B. Peeters[3], R. Hellemans[4], A. Massart[4], S. Van Hees[1], P. Moons[5], H. Theeten[6], P. Van Damme[6], H. Goossens[7], B. Y. De Winter[1], K. J. Ledeganck[1], D. Abramowicz[4], *[1]Laboratory of Experimental Medicine and Pediatrics, University of Antwerp, Antwerp, Belgium, [2]Department of Biomedical Sciences, Institute of Tropical Medicine and University of Antwerp, Antwerp, Belgium, [3]Department of Laboratory Medicine, Antwerp University Hospital, Antwerp, Belgium, [4]Department of Nephrology and Hypertension, Antwerp University Hospital, Antwerp, Belgium, [5]Biobank, Antwerp University Hospital, Antwerp, Belgium, [6]Centre for the Evaluation of Vaccination, Vaccine and Infectious Disease Institute, University of Antwerp, Antwerp, Belgium, [7]Department of Medical Microbiology, Vaccine & Infectious Disease Institute, University of Antwerp, Antwerp, Belgium*

Purpose: The majority of kidney transplant recipients (KTR) is able to develop SARS-CoV-2 antibodies (Abs). Little is known about the virus neutralizing capacity of these Abs.
Methods: KTR were systematically screened for SARS-CoV-2 at the Antwerp University Hospital by nasopharyngeal swab and serum sampling for the detection of respectively SARS-CoV-2 RNA and SARS-CoV-2 IgG Abs using an in-house Luminex assay. Results of Abs against the nucleocapsid protein (NP) and Receptor-Binding Domain (RBD) of the spike protein were expressed as Median Fluorescence Intensities (MFI). Virus neutralisation assays were performed on serum samples of patients with SARS-CoV-2 Abs or a positive RT-PCR test and on samples of an age and sex matched control group of 23 COVID-19 positive immunocompetent patients.
Results: 135 KTR were included; 13 were known to be RT-PCR positive. Of these 13, 10 (77%) tested positive for SARS-CoV-2 Abs. Antibody screening revealed two (2%) additional KTR with detectable Abs. Virus neutralizing capacity was observed in 11/12 (92%) antibody positive KTR vs. 22/23 (96%) immunocompetent antibody positive controls (p = 0.63). In patients who showed virus neutralizing capacity (expressed as sample dilution reducing the number of infected wells by 50% (NT50)), significantly higher neutralizing antibody capacity was observed in immunocompetent controls vs. KTR (median NT50 1027 (IQR 395-1601) vs. 217 (IQR 108-534); p=0.01). There was no difference in IgG-NP MFI and IgG-RBD MFI values between both groups (median IgG NP MFI 24554 (IQR 11218-27017) vs. 11387 (IQR 3062-24825); p = 0.13); median IgG RBD MFI 20302 (IQR 13464-24251) vs. 21736 (6288-24993); p = 0.85).
Conclusions: Our results suggest that KTR have lower neutralizing antibody capacity compared to immunocompetent subjects. The latter might be of high importance for future COVID-19 vaccine trials.
CITATION INFORMATION: Wijtvliet V., Ariën K., Mariën J., Peeters B., Hellemans R., Massart A., Van Hees S., Moons P., Theeten H., Van Damme P., Goossens H., De Winter B., Ledeganck K., Abramowicz D. Systematic Screening of Kidney Transplant Patients Points Towards Deficits in Neutralizing Antibody Capacity Against Sars-cov-2 *AJT, Volume 21 Supplement 3*
DISCLOSURES: V. Wijtvliet: None. **K.K. Ariën:** None. **J. Mariën:** None. **B. Peeters:** None. **R. Hellemans:** None. **A. Massart:** None. **S. Van Hees:** None. **P. Moons:** None. **H. Theeten:** None. **P. Van Damme:** None. **H. Goossens:** None. **B.Y. De Winter:** None. **K.J. Ledeganck:** None. **D. Abramowicz:** None.

Abstract# 21

Clinical Outcomes of Solid Organ Transplant Recipients Treated with Remdesivir and Convalescent Plasma for Covid-19 at the Largest Transplant Center in the United States

A. Fernandez, S. Anjan, A. Chandorkar, D. de Lima, R. Zamora, L. A. Mendez-Castaner, J. Simkins, J. Camargo, M. Morris, M. Loebe, J. Bauerlein, C. O'Brien, N. Sinha, G. Burke, G. Ciancio, A. Mattiazzi, R. Vianna, L. Abbo, G. Guerra, Y. Natori, *Miami Transplant Institute, Jackson Health System, Miami, FL*

Purpose: Solid organ transplant recipients (SOTr) are at high risk for severe disease with SARS-CoV-2. Data on efficacy of potential treatment options and long-term outcomes are lacking. We describe our experience with use of remdesivir and convalescent plasma in SOTr with COVID-19.
Methods: Single-center, retrospective cohort study of SOTr diagnosed with SARS-CoV-2 infection by PCR from March 1st to September 30th, 2020. Multivariate logistic regression analysis was performed based on univariate analysis to identify the risk factors for higher mortality.
Results: 129 SOTr were identified (Table. 1). Median time from transplant to diagnosis of infection was 27 (IQR, 8-73) months. 48 (37.2%) and 27 (21%) patients received remdesivir and convalescent plasma, respectively (Table 2). 5/48 (10.4%) patients developed mild transaminitis that did not warrant discontinuation of therapy. No adverse effects were seen with convalescent plasma. Anti-metabolite agents were decreased or stopped in majority of the patients (81%). During follow-up, 12 (9%) patients developed clinically suspected acute rejection. Death, graft loss, and secondary infection occurred in 15 (12%), 20 (16%), and 20 (16%) recipients,

respectively. RT-PCR negativity was achieved at a median of 37 (IQR, 25-41) days. Risk factors identified for high mortality were elevated creatinine (p=0.029, Odds ratio[OR] 1.5, 95% Confidence Interval[CI] 1.0- 2.1) and older age (p=0.003, OR 1.1, 95% CI 1.0 - 1.2) at the time of diagnosis.

Conclusions: SARS-CoV-2 RT-PCR positive SOT recipients in our cohort had favorable outcomes. Use of remdesivir and convalescent plasma was found to be safe. Older age and elevated creatinine at the time of diagnosis were found to be risk factors for higher mortality.

Table.1 Characteristics of SOT recipients with COVID-19

Variable	All Patients N = 129 (%)*
Demographics	
Age, median (IQR)	53 (45-62)
Gender, male	75 (58.1%)
Race, White	69 (53.5%)
Ethnicity, Hispanic	62 (48.1 %)
COVID stage base on IDSA guidelines	
Mild	29 (22.5%)
Moderate	73 (56.6%)
Severe	11 (8.5%)
Critical	16 (12.4%)
Maintenance Immunosuppression	
Tacrolimus	107 (82.9%)
Sirolimus	6 (4.7%)
Belatacept	11 (8.5%)
Mycophenolate mofetil	108 (83.7%)
Prednisone	79 (61.2%)

Table 2. Management and outcomes

Variable	All Patients N = 129 (%)*
Management	
Immunosuppression	
Reduction in immunosuppression	91 (70.5%)
Mycophenolate mofetil held	81/108 (75.0%)
Mycophenolate mofetil dose reduction	6/108 (5.6%)
Belatacept held	3/11 (27.3%)
Empiric Antibiotics	**74 (57.4%)**
Treatment	
Hydroxychloroquine	16 (12.4%)
Tocilizumab	11 (8.5%)
Remdesivir	48 (37.2%)
Dexamethasone	58 (45.0%)
Convalescent Plasma	27 (20.9%)
Total plasma exchange	28 (21.7%)
Anticoagulation	46 (35.7%)
Outcomes	
Hospitalization	101 (78.3%)
ICU admission	34/101 (33.7%)
Acute kidney injury	47 (36.4%)
Mechanical ventilation	18 (14.0%)
Length of stay (days), median (IQR)	10 (5-22)
Graft loss	20 (15.5%)
Co-infections	13 (10.1%)
Secondary infections	20 (15.5%)
Overall mortality	15 (11.6%)

CITATION INFORMATION: Fernandez A., Anjan S., Chandorkar A., de Lima D., Zamora R., Mendez-Castaner L., Simkins J., Camargo J., Morris M., Loebe M., Bauerlein J., O'Brien C., Sinha N., Burke G., Ciancio G., Mattiazzi A., Vianna R., Abbo L., Guerra G., Natori Y. Clinical Outcomes of Solid Organ Transplant Recipients Treated with Remdesivir and Convalescent Plasma for Covid-19 at the Largest Transplant Center in the United States *AJT, Volume 21 Supplement 3*

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Abstract# 22

Development and Durability of Sars-cov-2 Antibodies Among Solid Organ Transplant Recipients

B. Boyarsky, M. Ou, R. Greenberg, M. Krach, R. Wang, T. P. Chiang, W. Werbel, R. Avery, W. Clarke, A. Tobian, A. Massie, D. Segev, J. Garonzik-Wang, *Johns Hopkins, Baltimore, MD*

Purpose: The response to SARS-CoV-2 may be blunted in transplant recipients, impacting reinfection risk, treatment selection, and vaccine protocols. We quantified antibody response and durability after COVID-19 in solid organ transplant recipients (SOTRs).

Methods: SOTRs with PCR-confirmed COVID-19 were recruited through the EMR August 21-October 15, 2020. Participants underwent at-home blood sampling with the TAP™ Blood Collection Device, Second Edition (7SBio, Medford, MA). Serum samples were screened using Elecsys® anti-SARS-CoV-2 immunoassay (Roche), which uses a recombinant protein representing the nucleocapsid antigen. Confirmatory testing was performed using EUROIMMUN anti-SARS-CoV-2 enzyme-linked immuosorbent assay (ELISA) for semi-quantitative detection of IgG antibodies to spike protein (anti-S1-IgG), a likely correlate of neutralizing immunity.

Results: Eighteen SOTRs were studied, for whom COVID-19 occurred at a median of 6 years (IQR 2-9) post-transplant. Median age was 56 years (IQR 42-63); 56% were female; 33% were Black and 11% were Hispanic. Most participants (89%) had experienced COVID-19 symptoms; 72% were hospitalized. Among those hospitalized, 15% were admitted to the ICU and 8% were mechanically ventilated. COVID-19 convalescent plasma (CCP) was administered to 3 kidney and 2 lung recipients. At median 98 days (IQR 55-147) after COVID-19 diagnosis, 78% had

reactive screening immunoassays (Table 1). Of the four patients with non-reactive immunoassays, 2 were the lung recipients treated with CCP and 1 was the kidney recipient receiving IVIg. Of those who screened positive, anti-S1-IgG was detectable in 83%. SOTRs who received CCP and/or IVIg were less likely to develop anti-S1-IgG and had lower antibody levels.

Conclusions: We found antibody levels suggestive of neutralizing immunity in the majority of participants. However, those who were administered CCP and/or IVIg were less likely to mount a durable immune response. This raises the possibility that exogenous antibody preparations may blunt durable antibody formation. We observed a significant association between more severe disease and higher antibody levels. Seropositivity might decline over time; however, we were unable to distinguish between impaired production or rapid decrement. Our findings are important for individuals with compromised immune systems, whether deliberately for conditions like organ transplantation and cancer, or naturally in the elderly, frail, and autoimmune populations.

Table 1. Seropositivity, Hospitalization, and Mean Signal-to-Threshold Values of Anti-SARS-CoV-2 Antibodies Among Solid Organ Transplant Recipients with Prior COVID-19.

	Overall (n=18)	Outpatient (n=5)	Hospitalized (n=13)	
			No CCP or IVIg (n=7)	*CCP or IVIg (n=6)*
Total reactive anti-SARS-CoV-2 antibody by screening Immunoassay, n (%)	14/18 (78)	5/5 (100)	6/7 (86)	3/6 (50)
Total reactive anti-S1-IgG by ELISA, n (%)	10/12 (83)	3/4 (75)	5/6 (83)	2/2 (100)
Signal-to-threshold value, mean (median) (Arbitrary Unit ratio)*	5.9 (5.2)	4.4 (5.0)	7.5 (7.7)	3.9 (3.9)
Days since COVID-19 diagnosis, median (IQR)	98 (55-147)	141 (106-147)	129 (67-166)	51 (3-65)

Abbreviations: ELISA, enzyme-linked immunosorbent assay; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; SOTR, solid organ transplant recipient

*Optical density of the sample about the threshold at serum dilution of 1:101 divided by calibrator provided arbitrary unit ratio (A.U.) for which ≥1.1 was considered positive and ≥0.8 were considered indeterminate.

CITATION INFORMATION: Boyarsky B., Ou M., Greenberg R., Krach M., Wang R., Chiang T., Werbel W., Avery R., Clarke W., Tobian A., Massie A., Segev D., Garonzik-Wang J. Development and Durability of Sars-cov-2 Antibodies Among Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Boyarsky: None. **M. Ou:** None. **R. Greenberg:** None. **M. Krach:** None. **R. Wang:** None. **T.P. Chiang:** None. **W. Werbel:** None. **R. Avery:** None. **W. Clarke:** None. **A. Tobian:** None. **A. Massie:** None. **D. Segev:** None. **J. Garonzik-Wang:** None.

Abstract# 23

Polyfunctional T-cell Impairment to Sars-cov-2 Coronavirus in Solid Organ Transplant Recipients with Acute Covid-19 Infection

A. Favà[1], L. Donadeu[2], V. Pernin[3], M. Meneghini[1], E. Crespo[2], N. Sabé[4], L. Lladó[5], J. Gonzalez-Costello[6], O. Thaunat[7], O. Bestard[1], *[1]Kidney Transplantation Unit, Bellvitge University Hospital- IDIBELL, L'Hospitalet de Llobregat. Barcelona, Spain, [2]Experimental Nephrology Laboratory, IDIBELL, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [3]Kidney Transplant Unit, Hospital de Montpellier, Montpellier, France, [4]Infectious Disease Department, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [5]Liver Transplant Unit, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [6]Heart Transplantation Unit, Bellvitge University Hospital, L'Hospitalet de Llobregat. Barcelona, Spain, [7]Department of Transplantation, Edouard Herriot Hospital Lyon, Lyon, France*

Purpose: The emerged COVID-19 pandemic caused by SARS-CoV-2 has paralyzed the world, due to its high infectivity and fatal outcomes, especially among more vulnerable individuals. While description of protective humoral and T-cell immune responses has been reported among immunocompetent (IC) individuals, its characterization and determinants of poorer outcomes among the at-risk Solid Organ Transplant (SOT) patient population has not been thoroughly investigated.

Methods: SARS-CoV-2-specific serological and functional T-cell immune responses against main immunogenic antigens were tracked in 28 SOT recipients during acute infection and over the following 40 days of convalescence and were compared to 16 IC patients admitted with similar moderate/severe COVID-19.

Results: We show a more severe polyfunctional T-cell and serological impairment in SOT at the infection onset as compared to IC individuals, especially against membrane antigen.

Worse clinical outcomes (need of mechanical ventilation or death) more frequently occurred within SOT and were associated with a significantly impaired Th1 polarized immune response to antigens spike and membrane. Nonetheless, SOT achieved robust serological and functional Th1 and Th2 immune responses at convalescence, similarly to those of IC patients.

Conclusions: Our data show a delay of serological and functional T-cell immune activation to SARS-CoV-2 in SOT, which may entail poorer clinical outcomes.

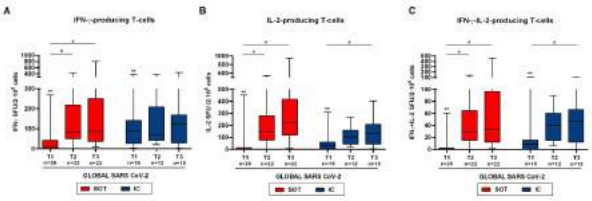


Figure 1: Global T-cell responses specific to SARS-CoV-2 at different time-points
T1 = 16, IQR 12-19 days after symptoms onset; T2 = 32, IQR 25-37 days, and T3 = 49, IQR 43-53 days; respectively.

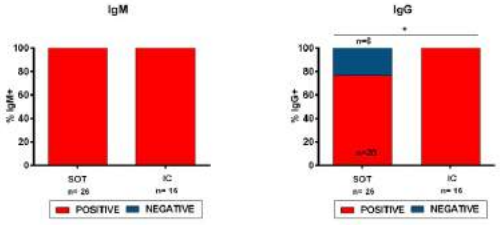


Figure 2. IgM and IgG antibody responses to SARS-CoV-2 at baseline. (16, IQR 12-19 days after symptoms onset)

CITATION INFORMATION: Favà A., Donadeu L., Pernin V., Meneghini M., Crespo E., Sabé N., Lladó L., Gonzalez-Costello J., Thaunat O., Bestard O. Polyfunctional T-cell Impairment to Sars-cov-2 Coronavirus in Solid Organ Transplant Recipients with Acute Covid-19 Infection *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Favà: None. **L. Donadeu:** None. **V. Pernin:** None. **M. Meneghini:** None. **E. Crespo:** None. **N. Sabé:** None. **L. Lladó:** None. **J. Gonzalez-Costello:** None. **O. Thaunat:** None. **O. Bestard:** None.

Abstract# 24

Longitudinal Antibody Response and Viral Loads in Covid-infected Organ Transplant Recipients

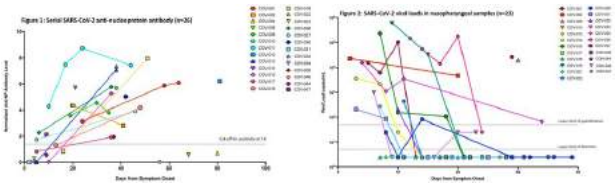
T. M. Marinelli, V. H. Ferreira, M. Ierullo, V. Kulasingham, B. Majchrzak-Kita, C. Rotstein, S. Husain, S. Hosseini, A. Humar, D. Kumar, *UHN, Toronto, ON, Canada*

Purpose: The full spectrum of COVID-19 disease and the impact of disease severity on antibody response and viral shedding dynamics in transplant patients is unclear. The aims of this study were to determine the outcomes COVID-19 in SOT recipients, and correlate disease severity with antibody response and viral dynamics following SARS-CoV-2 infection.

Methods: We performed a single-centre, prospective, observational study of adult SOT patients infected with COVID-19 and followed patients for 4 weeks. Severe disease was defined as either hospitalization attributable to COVID-19 or death. SARS-CoV-2 serology using available sera was assessed by a commercial anti-nucleoprotein (NP) assay (Abbott). Viral loads on serial nasopharyngeal swabs were assessed using real time RT-qPCR (Norgen Biotek).

Results: Between March and November 2020, 55 SOT recipients had PCR-confirmed SARS-CoV-2 infection. 78.2% were male with a median age 55 years (IQR 43-65), median time post-transplantation of 6 years (IQR 1.6-11.5). Transplant types were kidney (53.7%), liver (20.4%), lung (13.0%), kidney-pancreas (9.3%) and heart (3.7%). The majority of patients (65.5%) had >=2 comorbidities other than transplantation. Hospitalization occurred in 55.6% and 33.6% required supplemental oxygen. Other outcomes were ICU admission (16.7%), mechanical ventilation (13.0%), ECMO (1.9%), and all-cause mortality (5.6%). All deaths were lung transplant recipients. On univariate analysis, factors significantly associated with severe disease were >=2 comorbidities (p=0.034), and African-American race (p=0.015). Immunosuppression was reduced in 66.7% of cases, most commonly the antiproliferative agent. A subgroup of patients (n=26) underwent SARS-CoV-2 antibody testing and 23/26 (88%) had antibodies by day 14 post-symptom onset. The three negative patients had mild disease. A subgroup of patients (n=23) had serial nasopharyngeal swabs for viral load. The median duration of positivity was 15 days (IQR 10-24) (Fig 1,2). The median peak VL measured was 4,669 copies/mL (IQR 274 to 103,038 copies/mL). Peak viral load and duration of shedding were not significantly different between hospitalized and non-hospitalized groups (p=0.59 and p=0.52 respectively).

Conclusions: SOT patients experience a spectrum of COVID-19 although mortality was low in our cohort likely due to greater capture of mild cases in the outpatient population. Virus is shed for long durations despite most transplant recipients generating SARS-CoV-2 directed antibody responses.



CITATION INFORMATION: Marinelli T., Ferreira V., Ierullo M., Kulasingham V., Majchrzak-Kita B., Rotstein C., Husain S., Hosseini S., Humar A., Kumar D. Longitudinal Antibody Response and Viral Loads in Covid-infected Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: T.M. Marinelli: None. **V.H. Ferreira:** None. **M. Ierullo:** None. **V. Kulasingham:** None. **B. Majchrzak-Kita:** None. **C. Rotstein:** None. **S. Husain:** None. **S. Hosseini:** None. **A. Humar:** None. **D. Kumar:** Consulting Fee; Name of Commercial Interest; Roche. Consulting Fee; Nature of Relationship; Advisory Board.

Abstract# 25

Attitudes Towards Covid-19 Vaccination in an Inner-city Population of Kidney Transplant Patients (Ktx)

P. Kerner, A. Imas, G. Udod, L. Gruffi, M. Goldberg, A. Saleh, K. Cruickshank, M. Markell, *SUNY Downstate Health Sciences University, Brooklyn, NY*

Purpose: Kidney transplant recipients are at high risk for complications from COVID-19 infection and prevention is important. We studied attitudes toward vaccines including willingness to take a COVID-19 vaccine in a population of inner-city KTx.

Methods: A telephone survey was conducted in summer 2020 in a random sample of 34 KTx patients regarding attitudes and knowledge about vaccines and compared with data that were collected from 28 pts in 2019. Statistics were by t-test or Pearson r as appropriate.

Results: In 2020 mean age was 57.5 ± 10.8 yrs, 18 (55%) males and 15 (46%) females, 21 (66%) black, 5 (16%) Hispanic, 3 (9%) white, 3 (9%) other. 4 (12%) did not finish high school, 14 (43%) completed high school, 15 (35%) finished some college or more. Time since transplant was 8.3 ± 6.5 yrs. 14 (41%) had diabetes. There were no differences between 2019 and 2020 for age, gender, race, time since txp or education. Compared to 2019, KTx in 2020 were more likely to agree that vaccines prevent severe illness (p=0.001) but were more concerned that vaccines could have serious side effects (p=0.023) and reported feeling more comfortable discussing concerns with doctors (p=0.016). For 2020 education level inversely correlated with belief that vaccines prevent severe illness (r = -0.41, p = 0.019). Patients with diabetes expressed less concern about vaccines than those without (p = 0.013). There were no differences in vaccine attitudes with respect to age, gender, or race. When asked if they would take a COVID-19 vaccine 12 (36%) responded "yes" and 21 (64%) responded "no". Education level inversely correlated with agreement (r = -0.45, p = 0.010). There were no differences with respect to age, gender, or race. When asked about primary sources of information on vaccines 21 (66%) said health professionals, 9 (28%) said their own research, 1 (3%) said news, and 1 (3%) said religion. Compared to patients who said health professionals, pts who reported own research had a higher level of education (p = 0.039), believed themselves to be more knowledgeable about vaccines (p = 0.031), and expressed more concern that vaccines can lead to serious side effects (p = 0.030).

Conclusions: In our population: 1) Compared to 2019, KTx in 2020 were more likely to believe that vaccines prevent illness, were more concerned with vaccine safety but felt more comfortable expressing their concern to their doctor. 2) Pts with diabetes had fewer concerns about vaccines. 3) Pts with higher education were more likely to question and express concern about vaccines. 4) The majority of pts would not accept a COVID-19 vaccine at this time, especially those with higher education who report doing their own research to find information. 5) Once the vaccine becomes available, an intensive education program will have to be created so that vaccine acceptance rises in this vulnerable, inner-city population.

CITATION INFORMATION: Kerner P., Imas A., Udod G., Gruffi L., Goldberg M., Saleh A., Cruickshank K., Markell M. Attitudes Towards Covid-19 Vaccination in an Inner-city Population of Kidney Transplant Patients (Ktx) *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Kerner: None. **A. Imas:** None. **G. Udod:** None. **L. Gruffi:** None. **M. Goldberg:** None. **A. Saleh:** None. **K. Cruickshank:** None. **M. Markell:** Consulting Fee; Name of Commercial Interest; CareDx. Grant/Research Support; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx.

Abstract# 26

Early Detection of SARS-CoV-2 and Other Infections in Solid Organ Transplant Recipients and Household Members Using Wearable Devices

E. H. Li[1], E. Mukhtar[1], E. D. Elftmann[1], F. R. Eweje[1], H. Gao[1], L. I. Ibrahim[1], R. G. Kathawate[1], A. C. Lee[1], K. A. Moore[1], N. Nair[1], S. Amaral[2], M. Snyder[3], B. J. Keating[1], *[1]Department of Surgery, Penn Transplant Institute, Division of Transplantation, Philadelphia, PA, [2]Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA, [3]Department of Genetics, Stanford University, Palo Alto, CA*

Purpose: Wearable devices that measure physiological parameters have shown utility for detecting infections such as influenza and recently COVID-19 up to 10 days before clinical symptoms appear. Combining symptom data with wearable biosensor data has proven to increase discrimination between COVID-19 and non-COVID-19 infection compared to using symptom data alone (AUC 0.80 vs. 0.71, p<0.01). Here we study the utility of wearable devices in early detection of SARS-Cov2 and related infections in pediatric solid organ transplant recipients. Early remote detection of infections may guide treatment responses to improve clinical outcomes such as rates of hospitalization.

Methods: This is an ongoing prospective cohort study of pediatric solid organ transplant recipients and their non-transplanted household members. We are currently remotely recruiting all participants from multicenter sites and heart, liver and lung transplant patients from a single transplant center. We continuously monitor heart rate (HR), body temperature, oxygen saturation, blood pressure, sleep and respiratory patterns, and electro-dermal activity. We use MyPHD, a HIPAA compliant information architecture that supports EHR integration, for remote patient recruitment, secure data collection, and analyses. We apply two real-time algorithms to the data to identify changes that are associated with COVID-19. The algorithms are based on Resting Heart-Rate-Difference (RHR-Diff) and identify periods of elevated HR based on outlier interval detection, calculating standardized residuals for each HR observation compared to a baseline of clinically validated "healthy days" for each patient.

Results: Continuous real-time physiological monitoring of transplant patients may provide syndromic surveillance and inform healthcare management. The primary outcome is time to infection diagnoses, with a particular emphasis on SARS-CoV2 and common post-transplant infections (Influenza, EBV, CMV, and BK virus). The secondary outcomes are to optimize our algorithms for the pediatric transplant setting and to monitor for other complications including cardiometabolic complications and eGFR decline.

Conclusions: The potential impact of this study include algorithm-guided early detection of infection signatures coupled with provider clinical-decision-support and return-of-results to manage transplant patient care.

CITATION INFORMATION: Li E., Mukhtar E., Elftmann E., Eweje F., Gao H., Ibrahim L., Kathawate R., Lee A., Moore K., Nair N., Amaral S., Snyder M., Keating B. Early Detection of SARS-CoV-2 and Other Infections in Solid Organ Transplant Recipients and Household Members Using Wearable Devices *AJT, Volume 21 Supplement 3*

DISCLOSURES: E.H. Li: None. **E. Mukhtar:** None. **E.D. Elftmann:** None. **F.R. Eweje:** None. **H. Gao:** None. **L.I. Ibrahim:** None. **R.G. Kathawate:** None. **A.C. Lee:** None. **K.A. Moore:** None. **N. Nair:** None. **S. Amaral:** None. **M. Snyder:** None. **B.J. Keating:** None.

Kidney

Kidney Deceased Donor Allocation

Abstract# 27

Clinical Outcomes and Racial Impact of HLA Matching in the Australian Deceased Donor Kidney Transplantation Program, 2000-2018

M. Gramlick, M. Heer, *Department of Surgery, John Hunter Hospital, Newcastle, Australia*

Purpose: The Australian deceased donor (DD) kidney transplant program places a large emphasis on HLA matching despite a known disadvantage to ethnic minority groups. We assessed the clinical outcomes of deceased donor kidney transplants in Australia, and the impact of the current allocation policy on racial minority groups.

Methods: A retrospective cohort analysis of adult DD kidney transplants from 2000-2018 was conducted using prospectively collected ANZDATA records. Transplants were divided into "Matched" or "Waitlist" allocation groups based on the OrganMatch score, the transplant state, and the current national and state-based allocation algorithms in use in Australia.

Results: Of the 7440 transplant events, 40% were Matched transplants. Matched transplants had a small benefit in renal function (67 vs 64mL/min/1.73m2 at 1 year; 66 vs 62 at 10 years), lower incidence of rejection (23% vs 30%, p<0.001), longer graft survival (median 5.5 vs 4.5 years, p<0.001), and longer patient survival (HR 0.89 (0.78, 1.01), p=0.07) compared to waitlist transplants. A higher proportion of Caucasian (2566/5631, 45%) compared to Aboriginal and Torres Strait Islander

(56/309, 18%) recipients received a Matched transplant. Dialysis time was significantly shorter for Matched transplants (28.1 vs 44.8 months, p<0.0001), and contributed significantly to the benefit seen in graft and patient survival in Matched transplants.

Conclusions: Deceased donor kidney transplants which are well-matched continue to out-perform transplants which are poorly matched, however a significant component of this benefit is via decreased time on dialysis. Ethnic minority groups are less likely to receive a well-matched kidney, spend longer on dialysis, and are disadvantaged by the current allocation model.

CITATION INFORMATION: Gramlick M., Heer M. Clinical Outcomes and Racial Impact of HLA Matching in the Australian Deceased Donor Kidney Transplantation Program, 2000-2018 *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Gramlick: None. **M. Heer:** None.

Abstract# 28

Allocating Kidneys in Optimized Circles: Logistics are More Important Than Distance

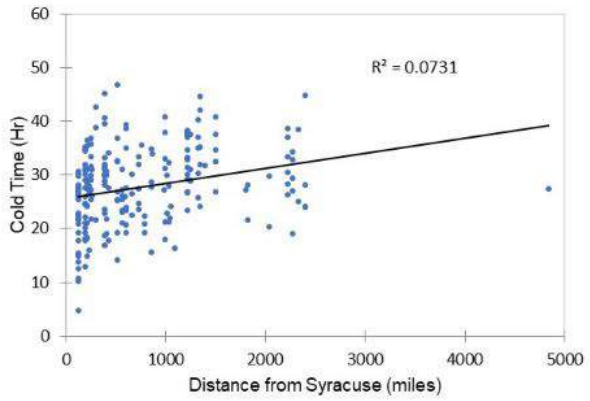
R. Saidi, R. Shahbazov, M. Hanlon, M. laftavi, *SUNY Upstate, Syracuse, NY*

Purpose: The OPTN recently proposed removing Donation Service Area (DSA) and regional boundaries used in the current kidney allocation system (KAS) and allocate organs within a 250 nautical mile (NM) radius centered on the donor hospital. The goal of this proposal is to increase equity in access for U.S. kidney transplant (KT) candidates.

Methods: In our program, the majority of renal allografts are imported from distances ranging from 150-4800 miles. In order to study the impact of distance on cold ischemia time (CIT), delayed graft function (DGF), patient and allograft outcomes, we studied 263 import KT performed from 2014 to 2020 and compared outcomes to locally procured KT (n=178). Zero miss-matched KT were excluded from the study. Donor and recipient demographics were similar in both groups. Induction and maintenance immunosuppression were also similar in both groups.

Results: CIT was significantly higher in the imported group compared to local KT (27.6 vs. 15.9 hrs. p< 0.0001). Notably, the distance traveled by imported KT did not impact CIT (R2= 0.07, Fig 1). Distance did not impact the rate of DGF in both groups (imported 21% vs. local 22%, p=0.74). Furthermore, in the imported group, distance had no correlation with the DGF. Patient and allograft survival rates were similar in the imported vs. local KT group. In a multivariate analysis distance did not affect allograft or patient survival.

Conclusions: We conclude that distance alone does not correlate with CIT and DGF as well as allograft and patient survival. There are many logistical factors and OPO factors that impact significantly on CIT. We postulate that the impact of distance is affected by many issues and cannot be predicted by travel mileage alone. Improvements in transportation options and logistics can improve utilization of organs and decrease the discard rate especially for high KDPI renal allografts.



CITATION INFORMATION: Saidi R., Shahbazov R., Hanlon M., laftavi M. Allocating Kidneys in Optimized Circles: Logistics are More Important Than Distance *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Saidi: None. **R. Shahbazov:** None. **M. Hanlon:** None. **M. laftavi:** None.

Abstract# 29

Status of Kidney Allocation in Liver-kidney Transplants Before and After the UNOS/OPTN Policy

J. Oveyssi, M. Hussain, P. Homkrailas, S. Bunnapradist, *Department of Internal Medicine: Division of Transplant Nephrology, UCLA, Los Angeles, CA*

Purpose: On August 10, 2017 the United Network for Organ Sharing (UNOS) enacted policies 9.7 and 8.5G to establish medical criteria for simultaneous liver-kidney (SLK) and the "safety net". One of the goals of these policies was to preserve higher quality kidneys for at risk kidney transplant candidates. Prior to these policies nearly half of the kidney grafts transplanted for SLK purposes had a kidney donor profile index of < 35%. We aim to understanding the impact of the policy on kidney grafts for liver transplant candidates.

Methods: Kidney transplant recipients who had previously undergone liver transplantation listed between October 1 1987 to April 1, 2020 were identified from the UNOS master datafile. Groups were divided based on transplant date of January 1, 2018. Recipients of a SLK or previous kidney transplant were excluded. We examined the mean and median KDPI of the kidneys transplanted and the average time to kidney transplant.

Results: A total of 12,216 kidney transplants were performed following liver transplant during the study period. A total of 2033 kidney transplants were performed after January 1 2019. The mean (standard deviation) and median KDPI values before January 2018 were 37.5 % (±26.1%) and 33.0% respectively. After January 2018, they were 39.1% (± 24.6%) and 37.0% respectively (p-value 0.008). 1,575 age matched kidney after liver transplants were performed before 2018 and 260 procedures after 2018. The mean (±SD) and median KDPI values before and after January 2018 were 55.0% (±25.2%), 58.0% and 56.0%(±25%) and 59.0%, respectively (p-value 0.6). The average time to transplant was reduced by 27 days after 2018 (p-value 0.0001).

Conclusions: The intended goals of policies 8.5G and 9.7 have been achieved, albeit modestly, since their inception. Additional follow up is needed to ensure that these policies continue to provide a safety net for liver transplant recipients without disadvantaging at risk kidney transplant candidates.

CITATION INFORMATION: Oveyssi J., Hussain M., Homkrailas P., Bunnapradist S. Status of Kidney Allocation in Liver-kidney Transplants Before and After the UNOS/OPTN Policy *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Oveyssi: None. **M. Hussain:** None. **P. Homkrailas:** None. **S. Bunnapradist:** None.

Abstract# 30

The Association Between Environmental Determinants and High KDRI Organ Offer Acceptance Ratios

A. M. Placona, C. Martinez, M. Stuart, *United Network for Organ Sharing, Henrico, VA*

Purpose: Increasing the number of transplants could be realized by increasing high KDRI organ utilization. While the impact of transplant center (TXC) aggressiveness and competition on kidney offer acceptance is known, little is known about how changes in the donor pool affects acceptance rates (O to E ratio). Resource Dependence Theory posits that increased munificence (donor pool) could induce deceases in high KDRI acceptance ratios. Our questions are how stable are acceptance ratios for high KDRI kidneys over time, and do changes in donor volume affect acceptance patterns of high KDRI organs?

Methods: We collected kidney PTR data from 2015 to 2019. Replicating SRTR risk-adjusted offer acceptance models, we calculated O to E ratios for each KDRI strata each year. We calculated TXC volumes, number of kidneys recovered per DSA, and the HHI Index per DSA (a measure of competition) for each year from the OPTN STAR file. Examining the high KDRI strata, we examined the Spearman correlation between 2015 O to E ratios and 2019 O to E ratios; in addition, we leveraged the panel analysis methods of first difference estimators and robust clustered errors to control for omitted variables and autocorrelation. The dependent variable was the logarithmic transformation of acceptance ratio. Independent variables were the log of the number of donors, log of transplant volume, log of prior year's acceptance ratio, and HHI.

Results: The Spearman correlation between 2015 acceptance ratios and 2019 acceptance ratios was **.46.** Regression analysis indicates that increases in donor volume was negatively (-.54) and near significant (p=.0975). Increases in transplant volume were positive (.77) and statistically significant (p<.0001). Previous year's O to E ratio was negative (-.301) and statistically significant (p <.0001). Adjusted R squared was **.1867**.

Conclusions: Results indicate the previous year's performance, in terms to O to E ratios, may reflect either a regression to the mean effect or strategic decisions by TXCs. Since the dependent variable was log transformed and centered around zero, it could also reflect general changes in the national benchmark. That said, the Spearman correlation indicates that rank ordering does change over time as exhibited in Table 1. While our hypothesis about the number of recovered kidneys was near *significant,* directionally a 1% increase in donor volume is associated with **.53%** decrease in high KDRI offer acceptance. Future research should examine whether increases or decreases in the donor pool interact with PSR ratings from the prior year.

	Percentage of Total TXCs drift between 2015 and 2019 OE quartiles*			
Quartiles	>75th	>50th up to 75th	>25th up to 50th	<=25th
> 75th	10.63%	6.38%	5.67%	2.84%
>50th up to 75th	6.38%	7.80%	5.67%	4.26%
>25th up to 50th	4.96%	4.96%	7.80%	6.38%
<= 25th	2.83%	5.67%	5.67%	11.35%

CITATION INFORMATION: Placona A., Martinez C., Stuart M. The Association Between Environmental Determinants and High KDRI Organ Offer Acceptance Ratios *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.M. Placona: None. **C. Martinez:** None. **M. Stuart:** None.

Abstract# 31

Kidney Transplantation in Very Highly-Sensitized Patients with Maastricht Type III Non-heart-Beating Donors

F. Villanego[1], A. Mazuecos[1], L. Vigara[1], V. Lopez[2], G. Bernal[3], A. Rodriguez-Benot[4], M. de Gracia[5], P. Castro[6], A. Alvarez[6], *[1]Department of Nephrology, Hospital Puerta del Mar, Cadiz, Spain, [2]Department of Nephrology, Hospital Carlos Haya, Malaga, Spain, [3]Department of Nephrology, Hospital Virgen del Rocio, Sevilla, Spain, [4]Department of Nephrology, Hospital Reina Sofia, Cordoba, Spain, [5]Department of Nephrology, Hospital Virgen de las Nieves, Granada, Spain, [6]Andalusian Transplant Coordination, Sevilla, Spain*

Purpose: In 2012, a kidney transplant (KT) program for very highly-sensitized (VHS) patients (PRA ≥ 95%) based on virtual crossmatch began in Andalusia (Spanish region). Initially these patients used to receive grafts from brain-death donor (BDD). However, the development of Maastricht type III non-heart-beating donation (NHBD) in Spain led to the incorporation of these donors in 2018 in order to increase the donation pool.

Methods: Retrospective cohort study of deceased donor KT recipients within the Andalusian VHS patient program from August 2012 to April 2020. To compare the results between BDD and NHBD KT, we performed a case-control study with a minimum follow-up of 3 months. For each case of NHBD, the 4 closest BDD controls were selected according to the KT date. Clinical and demographic variables were analyzed. Kaplan Meier survival analysis and Cox regression multivariate analysis were performed for graft survival risk factors.

Results: During this period, 172 KT were performed in Andalusia in VHS patients, of which 26 belongs to NHBD.

A total of 130 KT were selected according to inclusion criteria (4 BDD: 1 NHBD). The median follow-up time was 547.5 days. Of them, 54.6% were women with a mean age of 50.4 years. A 68.5% of the patients received prior KT and they had a median PRA of 98% [96, 99]. The median time on the waiting list was 1487.5 days and 345 days since their inclusion in the VHS program until KT. Graft survival in the first year after KT was 90.5%. There were no differences when comparing graft survival between BDD and NHBD (p = .184). In the multivariate analysis, an older donor age and time preKT on renal replacement therapy were risk factors for graft survival. The age of the recipient was a protective factor.

Conclusions: The exchange based on virtual crossmatch facilitates the access to KT in VHS patients, shortening the time on the waiting list. In our program, the donor and recipient age and the time on renal replacement therapy influenced graft survival, but not the type of donor, so Maastricht type III NHBD may be considered a valid option for VHS patients.

CITATION INFORMATION: Villanego F., Mazuecos A., Vigara L., Lopez V., Bernal G., Rodriguez-Benot A., de Gracia M., Castro P., Alvarez A. Kidney Transplantation in Very Highly-Sensitized Patients with Maastricht Type III Non-heart-Beating Donors *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Villanego: None. **A. Mazuecos:** None. **L. Vigara:** None. **V. Lopez:** None. **G. Bernal:** None. **A. Rodriguez-Benot:** None. **M. de Gracia:** None. **P. Castro:** None. **A. Alvarez:** None.

Abstract# 32

Impact of CHA2DS2-VASc Score on Postoperative Mortality Following Kidney Transplant

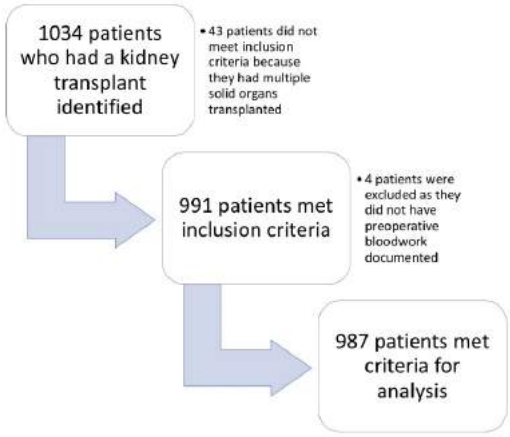
J. Klein[1], M. Rangel[1], Z. Spigel[2], E. Hollinger[1], D. Olaitan[1], M. Hertl[1], E. Chan[1], *[1]Surgery, Rush University Medical Center, Chicago, IL, [2]Surgery, Allegheny Health Network, Pittsburgh, PA*

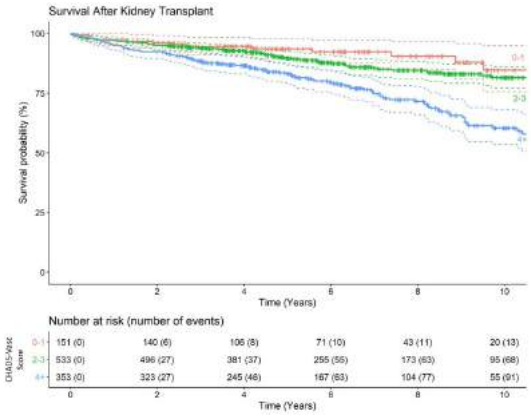
Purpose: This study aimed to assess the correlation between CHA2DS2-VASc score and postoperative kidney transplant survival. The conditions captured in the CHA2DS2-VASc score are commonly found in patients undergoing kidney transplant and are the leading causes for mortality in this patient population.

Methods: A retrospective chart review of all patients over 18 undergoing kindey transplant between 2009 and 2019 at a single institution was conducted. 1034 patients were identified, and after inclusion and exclusion criteria were identified, 987 patients were analyzed (Figure 1).

Results: 987 patients were stratified into three groups based on CHA2DS2-VASc score (0-1, 2-3, 4+). Not surprisingly, survival probability decreased over time following kidney transplantation. Median follow-up was 5.7 years (IQR 3.7-8.7). At one year there was a 94% survival rate, which decreased to 86% survival at 6 years. When comparing groups, the highest (4+) score group had at least a 64% higher risk in mortality compared to the lowest score group (HR 2.88, 95% CI 1.64-5.04, p<0.001). When controlling for the other components of the score, diabetes (HR 1.94; 95%CI 1.32-2.8, p<0.001) and peripheral vascular disease (HR 1.63; 95%CI 1.15-2.3, p=0.006) were associated with higher mortality. Age 65-74 (HR 1.71; 95%CI 1.21-2.4, p=0.003) was associated with higher mortality than age <65.

Conclusions: A CHA2DS2-VASc score of 4+ is associated with increased mortality following kidney transplantation, with diabetes, peripheral vascular disease, and older age the three independent contributory components. Current allocation algorithms incorporate age and diabetes, but inclusion of either CHA2DS2-VASc score or presence of peripheral vascular disease may help more appropriately allocate organs. This knowledge can be beneficial moving forward as transplant teams judge which donor offers to accept for an increasingly older population with more comorbidities.





CITATION INFORMATION: Klein J., Rangel M., Spigel Z., Hollinger E., Olaitan D., Hertl M., Chan E. Impact of CHA2DS2-VASc Score on Postoperative Mortality Following Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Klein: None. **M. Rangel:** None. **Z. Spigel:** None. **E. Hollinger:** None. **D. Olaitan:** None. **M. Hertl:** None. **E. Chan:** None.

Abstract# 33

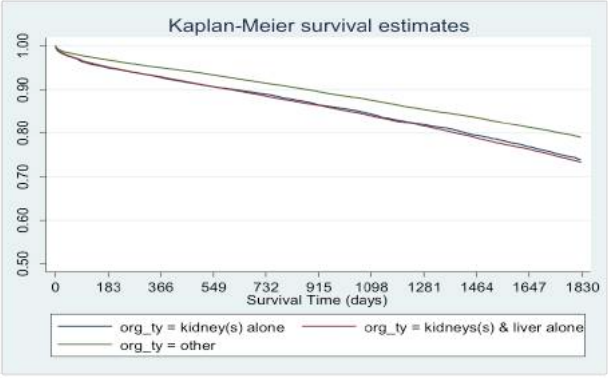
Renal Transplant Outcomes of Kidney-only vs. Multi-organ Deceased Donors

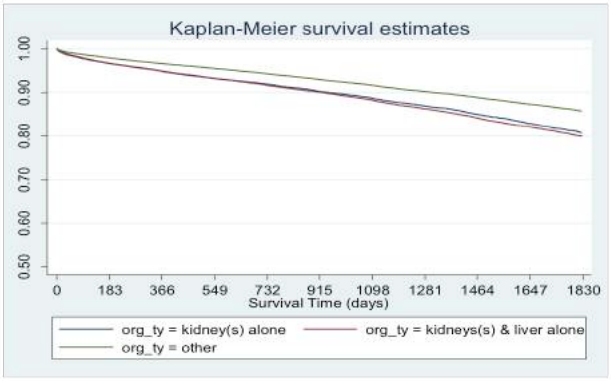
J. Espinales[1], Z. C. Giffen[1], D. Schneider[2], R. James[3], N. Koizumi[3], O. Ekwenna[1], J. Ortiz[4], *[1]University of Toledo Medical Center, Toledo, OH, [2]UC Irvine School of Medicine, Irvine, CA, [3]George Mason University, Arlington, VA, [4]Albany Medical Center, Albany, NY*

Purpose: We sought to determine the relative outcomes of kidneys from kidney-only or multi-organ deceased donors.

Methods: Scientific Registry of Transplant Recipients data from 2010-2019 were reviewed. Deceased donors were stratified into three groups: kidney-only donors (KOD), kidney/liver-only donors (KLOD), and multi-organ donors (MOD). The impact of donor type was evaluated using a multivariate Cox proportional-hazards model, controlling for KDPI. Primary outcome was death-censored recipient graft survival.

Results: Recipients of KOD/KLOD were younger, more likely to be male, and less likely to be white as compared to MOD (all p<0.01). Kidney-only recipients were more likely to be prior transplant recipients and less likely to be preemptive renal transplant recipients (both p<0.01). KOD were more likely to be donation after circulatory death (p<0.01). MOD had lower KDPI as compared to kidney- or kidney/liver-only procurements (p<0.01). Kidneys recovered from MOD were associated with a 2.4% reduced risk of recipient graft failure (HR = 0.976). MOD were associated with improved recipient survival (p<0.01).





Conclusions: Recipients of MOD grafts had better graft outcomes despite adjusting for KDPI. It is possible that more intensive perioperative monitoring of multi-organ donors, which serve to impact a greater number of recipients, is responsible for better renal graft outcomes for these recipients. These data may impact future decisions on graft allocation, and MOD status should be considered for addition to future allocation calculators.

CITATION INFORMATION: Espinales J., Giffen Z., Schneider D., James R., Koizumi N., Ekwenna O., Ortiz J. Renal Transplant Outcomes of Kidney-only vs. Multi-organ Deceased Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Espinales: None. **Z.C. Giffen:** None. **D. Schneider:** None. **R. James:** None. **N. Koizumi:** None. **O. Ekwenna:** None. **J. Ortiz:** None.

Abstract# 34

Construction of a Waiting Time Predictive Model for Kidney Transplant with Deceased Donor in the State of São Paulo

J. Silva[1], M. Contti[1], M. Valiatti[1], H. Nga[1], G. Santos[1], M. Perosa[2], G. Ferreira[3], L. Modelli de Andrade[1], *[1]UNESP, Botucatu, Brazil, [2]Hospital Leforte, São Paulo, Brazil, [3]Santa Casa de Juiz de Fora, Juiz de Fora, Brazil*

Purpose: Chronic kidney disease is an important public health problem and kidney transplant is the therapy of choice when possible. The transplant system in the State of São Paulo, Brazil is a valuable sample. Few investigations study the waiting time for kidney transplant with a deceased donor, therefore, developing a predictive model can contribute to better allocating the patients. Objectives: determine the predictors for waiting time on the list for kidney transplant, verify the applicability of the allocation criteria, and create a predictive model of waiting time.

Methods: Retrospective cohort study. All patients listed for transplantation between Jan/2000 to Dec/2017 in the database of the São Paulo State Department of Health were included. Variables studied: age, sex, race, baseline disease, regional reference centres, dialysis duration, ABO blood group, panel class I, HLA-A, HLA-B, HLA-DR, blood transfusions, pregnancies, and previous transplants. The data were randomly separated: 75% for training and 25% for model validation testing. Cox regression was performed having the transplant as the outcome. Sensitivity analyses were carried out in regional reference centres and regression analyses were carried out with competitive outcome.

Results: We analysed 54,055 records. In the period, 28.5% of the patients were transplanted (n = 13,694), WITH a higher probability in the first 50 months. The main factors that reduced the chance of transplantation were: Panel> 80%, belonging to the regional School of Medicine of the University of São Paulo (FMUSP) and blood type O. Factors associated with higher chance of transplantation: age <18 years, presence of anti-HBc and blood type AB. A predictive model was obtained capable of predicting the waiting time on the transplant list with excellent agreement in internal validation (c-index = 0.70).

Conclusions: Allocation system that is effective in prioritizing recipients under 18 and patients with greater compatibility in the HLA system. Patients with reduced chances of transplantation were those who were sensitized, those from blood group O, and those with HLA homozygosity. Regional differences were found which favoured centres with a lower number of patients placed on the transplant list. A predictive model that can help in the predictability of the transplant was created.

CITATION INFORMATION: Silva J., Contti M., Valiatti M., Nga H., Santos G., Perosa M., Ferreira G., Modelli de Andrade L. Construction of a Waiting Time Predictive Model for Kidney Transplant with Deceased Donor in the State of São Paulo *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Silva: None. **M. Contti:** None. **M. Valiatti:** None. **H. Nga:** None. **G. Santos:** None. **M. Perosa:** None. **G. Ferreira:** None. **L. Modelli de Andrade:** None.

Liver

Living Donor Liver Transplant and Partial Grafts

Abstract# 35

Paired Exchanges in LDLT- A Good Option for Patients with Incompatible Donors

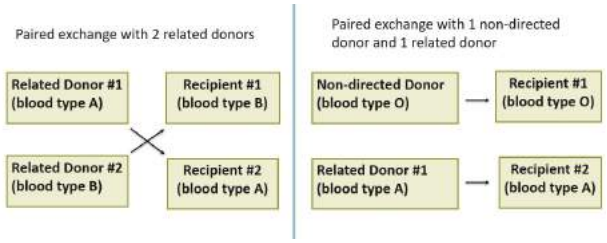
A. Humar, C. Hughes, G. Mazariegos, S. Kyle, A. Gallatin, K. Emmett, A. Tevar, M. Molinari, A. Ganoza, V. Gunabushanam, S. Ganesh, *University of Pittsburgh, Pittsburgh, PA*

Purpose: In the US, paired exchanges are common for LD kidney transplant but not for LDLT. We present our series of paired exchanges for LDLT, all done at a single large volume US LDLT program.

Methods: Data was collected on all donors and recipients that underwent paired exchange LDLTs at our center.

Results: A total of 8 paired exchanges (16 total transplants) were completed over the last 2 years. Of these, 3 involved ABO incompatible pairs with matched related donors for each recipient. The other 5 involved a non-directed donor, which was then used to initiate the paired exchange with an ABO incompatible donor/recipient pair. In all cases, the non-directed donor was blood type O. The 2nd recipient in these cases was chosen from the deceased donor list based on factors such as MELD/PELD, size match, and anatomic suitability. Living donor advocacy and psychosocial evaluation were done as in standard LDLT. Both transplants were performed within 1 week of each other. All 16 donors are well with no major complications. Of the 16 recipients, 15 were adults and 1 was pediatric. 15 recipients are alive and well with good graft function. One recipient died in the early postoperative period.

Conclusions: Paired exchange is technically feasible in a large volume LDLT center and can be a useful way to perform transplants in incompatible pairs. Use of a non-directed donor to initiate the exchange is a good option.



CITATION INFORMATION: Humar A., Hughes C., Mazariegos G., Kyle S., Gallatin A., Emmett K., Tevar A., Molinari M., Ganoza A., Gunabushanam V., Ganesh S. Paired Exchanges in LDLT- A Good Option for Patients with Incompatible Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Humar: None. **C. Hughes:** None. **G. Mazariegos:** None. **S. Kyle:** None. **A. Gallatin:** None. **K. Emmett:** None. **A. Tevar:** None. **M. Molinari:** None. **A. Ganoza:** None. **V. Gunabushanam:** None. **S. Ganesh:** None.

Abstract# 36

Impact of Advanced Renal Dysfunction on Post-Transplant Outcomes After Living Donor Liver Transplantation in the United States

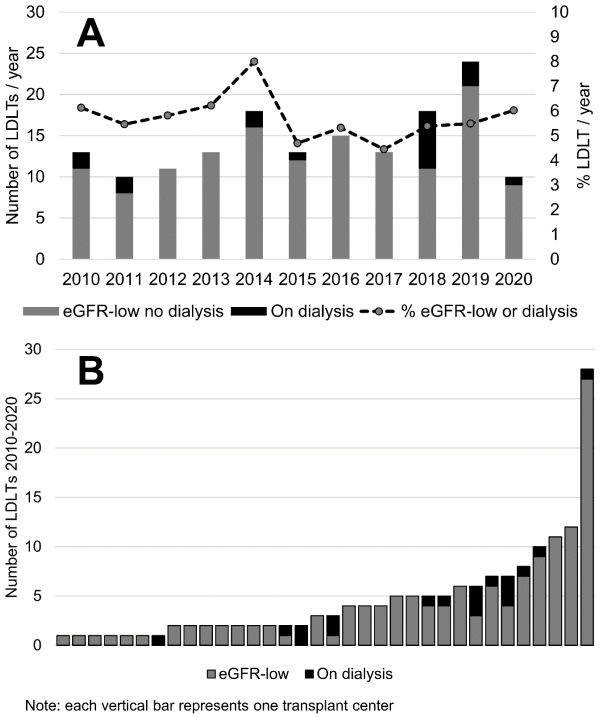
T. Bittermann[1], N. Kaur[2], P. L. Abt[1], K. M. Olthoff[1], J. K. Heimbach[3], J. Emamaullee[2], *[1]University of Pennsylvania, Philadelphia, PA, [2]University of Southern California, Los Angeles, CA, [3]Mayo Clinic College of Medicine, Rochester, MN*

Purpose: Survival after living donor liver transplantation (LDLT) in the U.S. is excellent. However, the significance of pre-transplant kidney disease on outcomes after LDLT is poorly understood.

Methods: This was a retrospective cohort study of 2,843 LDLT recipients nationally between 1/2010-6/2020. Baseline characteristics of recipients with estimated glomerular filtration rate <40mL/min/1.73m^2 (eGFR-low) or requiring dialysis were assessed. Multivariable survival analyses evaluated (i) eGFR-low as a predictor of post-LDLT survival, (ii) the survival of LDLT versus deceased donor liver transplant (DDLT) alone with eGFR-low.

Results: From 2010-2020, 140 (5.0%) patients had eGFR-low and 18 (0.6%) required dialysis pre-LDLT. The number of LDLTs requiring dialysis between 2017-2020 outnumbered the prior 7 years (Figure - Panel A) and heterogeneity in center experience was observed (Panel B). Nearly half (5/12) of eGFR-low recipients with active kidney transplant listing at LDLT experienced renal recovery. Overall LDLT case volume was higher at centers performing LDLT in recipients with renal dysfunction (p<0.001). Accounting for baseline clinical differences, eGFR-low independently predicted post-LDLT mortality (adjusted HR 1.63; p=0.01). However, the adjusted survival of patients with eGFR-low receiving LDLT versus DDLT alone was not different (p=0.08). Of the 8 total deceased-donor KTs performed within the first year post-LDLT, 5 were facilitated by the new 'safety-net' KT policy.

Conclusions: Overall, outcomes after LDLT with advanced renal dysfunction are acceptable. These findings are relevant given the recent 'safety net' kidney transplant policy.



CITATION INFORMATION: Bittermann T., Kaur N., Abt P., Olthoff K., Heimbach J., Emamaullee J. Impact of Advanced Renal Dysfunction on Post-Transplant Outcomes After Living Donor Liver Transplantation in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Bittermann: None. **N. Kaur:** None. **P.L. Abt:** None. **K.M. Olthoff:** None. **J.K. Heimbach:** None. **J. Emamaullee:** None.

Abstract# 37

Impact of Community- Targeted Educational Campaign on Living Donor Transplants

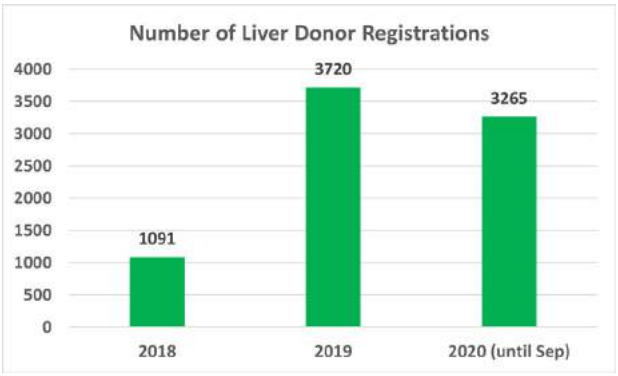
S. Ganesh, A. Humar, *Transplant, UPMC, Pittsburgh, PA*

Purpose: There is an urgent need to expand access to living donor liver transplants due to a wide gap in the availability of deceased donor organs. We developed a structured educational awareness campaign and a support program, designed to overcome barriers to identifying potential live liver donors for waitlisted recipients. While most live donations are targeted at specific recipients, increasing public awareness has led to an increase in anonymous, altruistic, and unrelated donors, defined as individuals willing to donate without a previously known recipient. The aim of this study was to determine the impact of the program on identification of such live donors.

Methods: We looked at the number of donor registrations at our tertiary-care, academic medical center. The structured program included the following steps: Educational campaign to general public which was launched in October of 2018, E Blasts, and Webinars through Advocacy groups including UNOS, Donate Life America, to create awareness and educate the general public on living donation, along with creating awareness in the social media including Face book. We looked at the number of altruistic or anonymous, unrelated donors who registered, that successfully underwent or qualified for donor evaluation, since the launch of the program.

Results: Since October of 2018 through September of 2020, a total of 8076 potential donors registered through the donor database. Of these individuals, 2757 (34%) were qualified based on the initial screening on the data base. 118 (4.2%) qualified for full donor evaluation and 40 (1.5%) either underwent donation or approved to donate.

Conclusions: A structured program designed to identify potential live donors for waitlisted liver transplant recipients resulted in an unexpected increase in identification of unrelated, anonymous, and altruistic live donors. Continued education and awareness is essential for the ongoing process



CITATION INFORMATION: Ganesh S., Humar A. Impact of Community- Targeted Educational Campaign on Living Donor Transplants *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Ganesh: None. **A. Humar:** None.

Abstract# 38

Trends in Liver Donors for Liver Transplantation Over Twenty Years: Donor Changes in Gender, Relationships, and Education, but Racial Disparities Remain

A. Kaplan, B. Fortune, R. Brown, MD, MPH, B. Samstein, K. Halazun, R. Rosenblatt, *Gastroenterology and Hepatology, New York Presbyterian/ Weill Cornell, New York, NY*

Purpose: Living donor liver transplant (LDLT) has grown over the past several decades as a response to critical organ shortages. Racial and ethnic disparities exist in recipients of liver transplant but have not been studied in the living donor population. We thus examined demographic changes in living donors over time.
Methods: Adult living donors who donated to adults were identified from 1998-2018 using the United Network for Organ Sharing (UNOS) database. Annual trends as well as trends across three eras were analyzed: pre-MELD (Model for End-Stage Liver Disease) (1998-2002), post-MELD (2003-2014), and post-DAA (Direct-acting antivirals) (2015-2018). The primary outcomes of interest were to examine demographic changes over time in living donors with regard to gender, race/ethnicity, education, and relationship. Annual trends were compared using annual percent change (APC), while comparisons across the time periods were assessed using chi-squared test.
Results: There were 4,769 LDLTs (4.25% of all transplants) between 1998 and 2018. While initially men donated more (55% in the pre-MELD era), the percentage of female donors increased annually (APC 0.9%, 95% CI 0.4-1.4) and ultimately comprised 53% in the post-DAA era. There were no significant changes over time with regard to race/ethnicity of donors; however, Whites made up a significant majority of living donors across all time periods ($p<0.001$). The percentage of Black donors remained low—4.5% in pre-MELD and falling to only 3% in post-DAA era. Of those with documented education, there was a significant change in education level over time, with increasing percentages of donors with higher education levels (APC 3.7%, 95% CI 2.9-4.4 for college and APC 8.6%, 95% CI 7.1-10.2 for post-college)—77% of living donors had college education or above in post-MELD era. Lastly, there was a significant change over time in donors' relationships to recipients with increasing percentages of child, paired, and anonymous donations while decreasing percentages of sibling and spouse donations ($p<0.001$).
Conclusions: Female and highly educated living donors are increasingly common and now represent the majority of donors for LDLT. Blacks appear underrepresented in living donation and this disparity has persisted for the last 20 years. Through future, prospective research, it will be important to understand why these disparities exist so that targeted efforts can be made to increase outreach and close the gap between organ supply and demand.

Figure 1: Changes in demographics of living donors across three eras

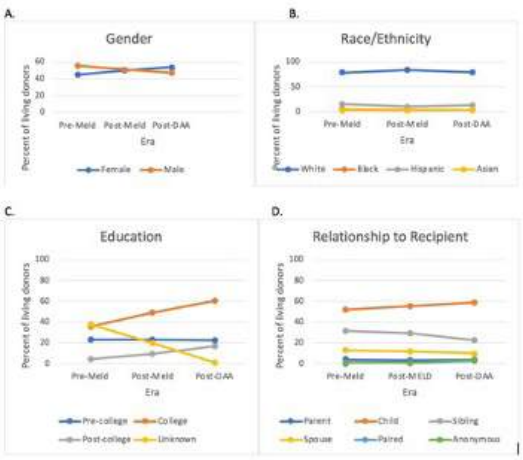


Figure 1. Changes in living donor gender (A), race/ethnicity (B), education (C) and relationship to recipient (D) across three eras—pre-MELD, post-MELD, and post-DAA.

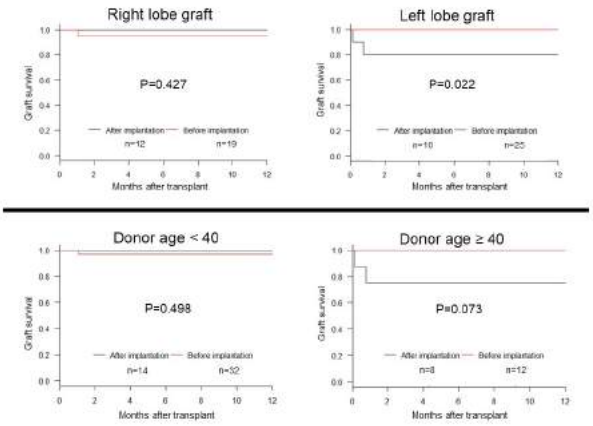
CITATION INFORMATION: Kaplan A., Fortune B., Brown, MD, MPH R., Samstein B., Halazun K., Rosenblatt R. Trends in Liver Donors for Liver Transplantation Over Twenty Years: Donor Changes in Gender, Relationships, and Education, but Racial Disparities Remain *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Kaplan: None. **B. Fortune:** None. **R. Brown, MD, MPH:** None. **B. Samstein:** None. **K. Halazun:** None. **R. Rosenblatt:** None.

Abstract# 39

The Impact of Splenectomy on Living Donor Liver Transplantation Using Small Grafts

M. Fujiki, E. Aleassa, C. Quintini, F. Aucejo, K. Sasaki, B. Eghtesad, T. Diago, D. Kwon, C. Miller, K. Hashimoto, *Cleveland Clinic Foundation, Cleveland, OH*

Purpose: Simultaneous splenectomy with living donor liver transplantation (LDLT) is widely used in Asian countries to decrease the risk of small-for-size syndrome (SFSS). However, the impact and adverse effect of splenectomy on LDLT recipients have not been well studied in Western countries. Herein, we report our series of simultaneous splenectomy to define its impact.
Methods: Between 2012 and 2020, LDLT was performed in 118 adults using 53 left-lobe grafts (45%) with median graft-to-recipient weight ratio (GRWR) of 0.84, ranging 0.49-1.5. Very small grafts with GRWR $\leq$0.7 were utilized in 26 LDLT (22%). Total of 66 (56%) patients received splenectomy before implantation of the allograft based on pre-operative risk factors (n=44) or after implantation because of portal hyper-perfusion (n=22). Complications related to splenectomy, incidence of SFSS, graft survival and the risk of early graft dysfunction (EGD) were analyzed. Furthermore, the impact of pre-implantation splenectomy opposed to post-implantation was assessed.
Results: There was no increase in surgical, thrombotic or infectious complications after simultaneous splenectomy compared to no-splenectomy group. Overall graft survival was 94%, 90%, and 84% at 1-, 3-, and 5-years, respectively with no difference between splenectomy and no-splenectomy group. Despite the aggressive use of small graft, SFSS developed in only one patient and EGD was observed in 15 patients (13%). Multivariable Cox regression revealed MELD score and left-lobe graft as independent risk factors of EGD and splenectomy as a protective factor (odds ratio, 0.104; p=0.036). Furthermore, among patients who received left-lobe, small grafts (GRWR $\leq$ 0.8), or grafts from donor age $\geq$ 40 years, patients who underwent pre-implantation splenectomy had better 1-year survival rate than those receiving post-implantation splenectomy.



Conclusions: Favorable overall graft survival with mitigated risk of graft dysfunction can be achieved with simultaneous splenectomy in LDLT using small grafts. Pre-implantation splenectomy may have a protective effect especially for grafts with an increased risk of SFSS.

CITATION INFORMATION: Fujiki M., Aleassa E., Quintini C., Aucejo F., Sasaki K., Eghtesad B., Diago T., Kwon D., Miller C., Hashimoto K. The Impact of Splenectomy on Living Donor Liver Transplantation Using Small Grafts *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Fujiki: None. **E. Aleassa:** None. **C. Quintini:** None. **F. Aucejo:** None. **K. Sasaki:** None. **B. Eghtesad:** None. **T. Diago:** None. **D. Kwon:** None. **C. Miller:** None. **K. Hashimoto:** None.

Abstract# 40

Re-Do Hepatic Artery Reconstruction for Thrombosis Can Save Grafts and Patients without Retransplantation: Lessons Learned from 1,355 Adult Living Donor Liver Transplantations

S. Hong, N. Yi, K. Hong, E. Han, S. Suh, J. Lee, S. Hong, Y. Choi, U. Jin, H. Chang, K. Lee, K. Suh, *Seoul National University Hospital, Seoul, Korea, Republic of*

Purpose: Hepatic artery thrombosis (HAT) after liver transplantation is associated with a marked increase in morbidity, being the main cause of graft loss and bile duct complication leading patients' deaths. Retransplantation is often unavailable in most Asian countries due to donor organ shortage. Herein, we evaluated the outcome of patients with HAT after adult living donor liver transplantation (ALDLT) under aggressive surgical correction strategy.

Methods: From January 2000 to June 2019, 1,355 recipients underwent ALDLT in Seoul National University Hospital. Surgical redo reconstruction for HAT was applied in every case except the evidence of graft necrosis or late detection (since postoperative day 60) of HAT. Median follow-up period was 89 months. Survival outcomes and the rates of biliary complication of patients with HAT were compared with others without HAT.

Results: Postoperative HAT was developed in 33 cases (2.4%) at a median time of 3.5 days (range 1-82). Overall graft survival rates were lower in patients with HAT (84.8%) than others without HAT (98.0%) (P<0.001). However, patient survival rates were similar between two groups (72.7% *vs.* 83.8%, P=0.115). Biliary complication rates were higher in patients with HAT (54.5%) than others without HAT (32.0%) (P=0.008). Among 33 patients with HAT, 30 patients (90.9%) underwent redo arterial reconstruction. The technical success rate of redo reconstruction was 83.3% (n=25). After redo-reconstruction, 3 patients (10.0%) underwent retransplantation and 76.6% of patients (n=23) were finally survived. Another 3 patients with HAT underwent conservative management (n=2) and retransplantation directly (n=1).

Conclusions: HAT after ALDLT was associated with increased rates of biliary complication and significantly attenuates graft survival outcome. However, aggressive surgical treatment can save the graft in 90% without retransplantation and patient survival was not affected.

CITATION INFORMATION: Hong S., Yi N., Hong K., Han E., Suh S., Lee J., Hong S., Choi Y., Jin U., Chang H., Lee K., Suh K. Re-Do Hepatic Artery Reconstruction for Thrombosis Can Save Grafts and Patients without Retransplantation: Lessons Learned from 1,355 Adult Living Donor Liver Transplantations *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Hong: None. **N. Yi:** None. **K. Hong:** None. **E. Han:** None. **S. Suh:** None. **J. Lee:** None. **S. Hong:** None. **Y. Choi:** None. **U. Jin:** None. **H. Chang:** None. **K. Lee:** None. **K. Suh:** None.

Abstract# 41

Death Among Living Liver Donors- Are We Overestimating the Risk?

H. J. Braun, A. M. Shui, N. L. Ascher, J. P. Roberts, *University of California, San Francisco, San Francisco, CA*

Purpose: In the United States, the estimated risk of death associated with live liver donation is currently quoted at 0.1% for left lobe donation, and 0.4-0.6% for right lobe donation. However, these numbers are based on historical data. The purpose of this study was to examine death rates in living liver donors in the United States between 2002-2020 in order to update this risk estimate. We hypothesized that the risk of death between 1-6 in 1000 liver donors would be an overestimate in the present day, particularly as the United States has accrued additional experience with live donor liver transplantation.

Methods: United Network for Organ Sharing (UNOS) data was obtained on living liver donors who underwent donor hepatectomy between June 1, 2002 and June 10, 2020. Liver donors for domino transplants were excluded. We defined two eras; Era 1: June 1, 2002-June 15, 2011 and Era 2: June 16, 2011-June 1, 2020. Death rates among the two eras were compared at the 75th, 90th, and 95th confidence intervals.

Results: A total of 5497 liver donors underwent donor hepatectomy during the time period, of whom 5150 had follow up data available for analysis. Of these 5150, 2477 occurred during Era 1 and 2673 occurred during Era 2. A total of eight deaths occurred, with four deaths in each era. Causes of death, and time frame of death, as reported by UNOS, are shown in Table 1.

The cumulative incidence of donor deaths was 0.14% in the entire study period, and was 0.16% in Era 1 and 0.15% in Era 2. In Era 1, 3 live liver donors died within the first 90 days after donation (1.2 deaths per 1000 donors; 95% CI 0.2-3.5; 90% CI 0.3-3.1; 75% CI 0.5-2.6). In Era 2, 4 live liver donors dies within the first 90 days after donation (1.5 deaths per 1000 donors; 95% CI 0.4-3.8; 90% CI 0.5-3.4; 75% CI 0.7-2.8). There was no statistically significant difference between these rates (p=0.78).

Conclusions: In the United States, the risk of death associated with living liver donation remains extremely low. In contrast to the historical quoted risk of death of 0.1-0.6%, our findings suggest that the risk of death may actually be closer to 0.1-0.2%. Importantly, the 95% confidence intervals of our estimates for death rates in both eras do not include the previously upper limit of 6 deaths per 1000 donors. These conclusions are limited by a lack of granular data, but suggest that living liver donation may be safer than previously thought.

Living Liver Donor Deaths by Cause and Time Interval

	Era 1 (n=2477)			Era 2 (n=2673)			
Timing (Days)	0-30	31-90	>90	0-30	31-90	>90	Total
Accidental	0	0	0	1	0	0	1
Homicide	0	0	0	1	0	0	1
Malignancy	0	0	1	0	0	0	1
Other	0	2	0	1	1	0	4
Suicide	1	0	0	0	0	0	1
Total	1	2	1	3	1	0	8

CITATION INFORMATION: Braun H., Shui A., Ascher N., Roberts J. Death Among Living Liver Donors- Are We Overestimating the Risk? *AJT, Volume 21 Supplement 3*

DISCLOSURES: H.J. Braun: None. **A.M. Shui:** None. **N.L. Ascher:** None. **J.P. Roberts:** None.

Abstract# 42

Liver Live Donor Champion: Advocacy Training to Facilitate Identification of Living Liver Donors

L. R. Herbst, Y. Yu, A. Love, K. Lee, A. Wells, K. Mohr, A. Massie, A. Gurakar, B. King, D. L. Segev, A. M. Cameron, J. Garonzik Wang, *Johns Hopkins University, Baltimore, MD*

Purpose: Liver transplant candidates face several barriers to finding a potential live donor (PLD), such as lack of education or knowledge, or discomfort approaching others about living donation. The Live Donor Champion (LDC) intervention has helped kidney transplant candidates address and overcome these barriers. We created and piloted a liver-oriented LDC to determine feasibility and translatability for liver transplant candidates.

Methods: We conducted a single-center Liver LDC pilot study of 43 adult, active liver transplant candidates and their champions. The Liver LDC is a three-month intervention to train champions for this advocacy role. We measured participant knowledge and comfort throughout the intervention. We compared outcomes of pilot participants to transplant candidates on our waiting list at the same time.

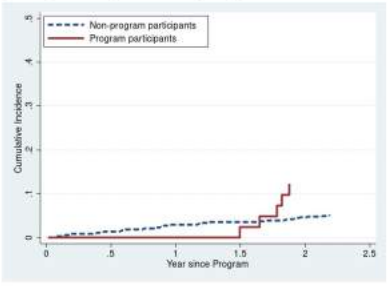
Results: Pilot participants had a median age of 57 years old, median BMI of 29, were 58% female, 79% White, and had a median waitlist time of 925 days (Table 1). Candidate and champion knowledge scores were higher after completing the LDC program (from 85% to 90%, p=0.058). Additionally, 47% of participants received at least one PLD inquiry, with an average of 6 PLDs. During the study period, 7

(16%) participants received a DDLT and 4 (12%) participants received an LDLT. Compared to non-program participants on the waitlist at our center, LDC participants were 3.31 times more likely to receive an LDLT (SHR: $_{1.07}$ 3.31 $_{10.26}$) (Figure 1).
Conclusions: Liver LDC may increase knowledge about living donation and liver transplantation and help transplant candidates identify PLDs and undergo LDLT.

Table 1. Demographics of LLDC participants

	LLDC Participants (n=43)
Calculated Candidate Age at Listing, median (IQR)	57 (51, 62)
Sex	
Female	25 (58.14%)
Male	18 (41.86%)
MELD, median (IQR)	11 (9, 14)
BMI, median (IQR)	29 (24, 32)
Days on waitlist, median (IQR)	925 (475, 1629)
Race	
White	34 (79.07%)
Black	7 (16.28%)
Other	2 (0.05%)
Education	
High school or less	11 (26.19%)
College or more	31 (73.81%)
Insurance type	
Public	14 (32.56%)
Private	29 (67.44%)
Primary Diagnosis	
Cirrhosis Type C	10 (23.26%)
Fatty liver (NASH) cirrhosis	9 (20.93%)
Other	24 (55.81%)
Transplant outcomes	
DDLT	7 (16.28%)
LDLT	5 (11.63%)
PLD Inquiries	
Patients receiving at least one PLD	20 (46.51%)
Average number of inquiries (SD)	5.85 (11.45)
Median number of inquiries (IQR)	2 (1, 5)

Figure 1. Adjusted competing risk of receiving a living donor liver transplant for LDC participants compared to non-participants at the center.



CITATION INFORMATION: Herbst L., Yu Y., Love A., Lee K., Wells A., Mohr K., Massie A., Gurakar A., King B., Segev D., Cameron A., Garonzik Wang J. Liver Live Donor Champion: Advocacy Training to Facilitate Identification of Living Liver Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.R. Herbst: None. **Y. Yu:** None. **A. Love:** None. **K. Lee:** None. **A. Wells:** None. **K. Mohr:** None. **A. Massie:** None. **A. Gurakar:** None. **B. King:** None. **D.L. Segev:** None. **A.M. Cameron:** None. **J. Garonzik Wang:** None.

Heart: Triple "D" in Heart Transplantation: DCD, Dual-Organ and Declined Hearts

Abstract# 43

Steroid-free Immunosuppression in Heart-Kidney Transplant Patients: Is It Safe?

R. Skorka, J. Patel, M. Kittleson, N. Patel, T. Singer-Englar, A. Velleca, B. Azarbal, D. Chang, E. Kransdorf, L. Czer, D. Megna, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

Purpose: Simultaneous heart and kidney transplantation (sHKTx) has increased in numbers over the past 10 years. There are reports that the kidney protects the heart from rejection. Currently, it is common to wean off prednisone after 6 months post-transplant in patients who have had no rejection episodes. This practice has not been performed routinely in sHKTx. Therefore, we reviewed our sHKTx patient population for those patients taken off prednisone compared to those left on prednisone and assessed their subsequent outcome.
Methods: Between 2010 and 2018, we assessed 50 sHKTx patients. 13 of these patients were weaned off prednisone within the first year after transplantation and 37 patients remained on prednisone. The endpoints included subsequent 1-year survival, 1-year freedom from cardiac allograft vasculopathy (CAV, as defined by stenosis ≥30% by angiography), and subsequent 1-year freedom from acute cellular rejection (ACR) and antibody-mediated rejection (AMR). Creatinine and glomerular filtration rate (GFR) were used to assess renal function pre- and post-prednisone wean.
Results: Patients who were weaned from prednisone compared to those that were not exhibited similar subsequent 1-year survival (100% vs. 94.5%), freedom from CAV (92.3% vs. 100%), and freedom from ACR (100% vs. 100%) and AMR (100% vs. 97.3%). In addition, renal function was not affected by the prednisone wean. (See table)
Conclusions: Steroid-free immunosuppression appears safe in sHKTx patient. Larger number of patients will be needed to confirm these findings.

Endpoints	sHKTx Patients Weaned Off Prednisone (n=13)	sHKTx Patients Not Weaned Off Prednisone (n=37)	P-value
Creatinine @ Start of Wean	1.34 ± 0.40	1.47 ± 0.87	0.597
Creatinine @ End of Wean	1.29 ± 0.25	1.27 ± 0.86	0.937
GFR @ Start of Wean	61.23 ± 21.84	64.57 ± 30.55	0.719
GFR @ End of Wean	61.00 ± 21.78	64.31 ± 30.40	0.721

CITATION INFORMATION: Skorka R., Patel J., Kittleson M., Patel N., Singer-Englar T., Velleca A., Azarbal B., Chang D., Kransdorf E., Czer L., Megna D., Kobashigawa J. Steroid-free Immunosuppression in Heart-Kidney Transplant Patients: Is It Safe? *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Skorka: None. **J. Patel:** Consulting Fee; Name of Commercial Interest; Pfizer, Akcea. Grant/Research Support; Name of Commercial Interest; Alexion Pharmaceuticals, Astra Zeneca. Other; Name of Commercial Interest; Alnylam Pharmaceuticals, Mallinckrodt Pharmaceuticals. **M. Kittleson:** None. **N. Patel:** None. **T. Singer-Englar:** None. **A. Velleca:** None. **B. Azarbal:** None. **D. Chang:** Grant/Research Support; Name of Commercial Interest; Mesoblast, Amgen, Biocardia. Other; Name of Commercial Interest; Abbott Laboratories, AbbVie Inc., Repligen, Portola Pharmaceuticals, Amarin Corp. **E. Kransdorf:** None. **L. Czer:** Grant/Research Support; Name of Commercial Interest; Abbott Laboratories. **D. Megna:** None. **J.A. Kobashigawa:** Consulting Fee; Name of Commercial Interest; Novartis, Sana Biotechnology, Sanofi-Aventis, TransMedics. Grant/Research Support; Name of Commercial Interest; CareDx Inc., Sanofi-Genzyme. Honoraria; Name of Commercial Interest; One Lambda Inc..

Abstract# 44

Adult Combined Liver-Heart Transplantation: The United States Experience

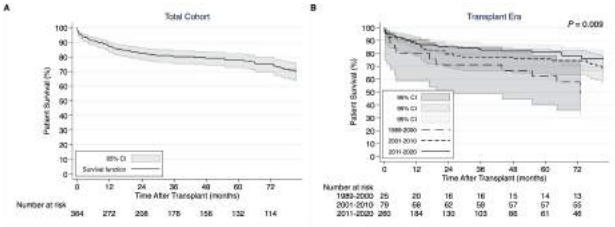
I. A. Ziogas[1], S. P. Alexopoulos[1], W. K. Wu[1], L. K. Matsuoka[1], M. A. Rauf[1], M. Izzy[2], R. Perri[2], K. H. Schlendorf[3], J. N. Menachem[3], A. S. Shah[4], *[1]Division of Hepatobiliary Surgery and Liver Transplantation, Vanderbilt University Medical Center, Nashville, TN, [2]Department of Medicine, Division of Gastroenterology, Hepatology and Nutrition, Vanderbilt University Medical Center, Nashville, TN, [3]Division of Cardiovascular Medicine, Vanderbilt University Medical Center, Nashville, TN, [4]Department of Cardiac Surgery, Vanderbilt University Medical Center, Nashville, TN*

Purpose: Combined heart-liver transplantation (CHLT) is now being practiced with increasing regularity and improved outcomes in the United States. We performed the most comprehensive review of all adult patients undergoing CHLT using national registry data.

Methods: All adult (≥18 years) CHLT recipients in the United Network for Organ Sharing database were included (09/1987-09/2020). Transplant era groups were generated by decade (era 1=1989-2000, era 2=2001-2010, era 3=2011-2020). Survival analysis was conducted by means of Kaplan-Meier method, log-rank test, and Cox regression.

Results: We identified 369 adult patients receiving CHLT (12/1989-08/2020). Both the number of adult CHLT recipients (R^2=0.75, P<0.001) and the number of centers performing CHLT (R^2=0.80, P<0.001) have increased over the study period. Cardiac diagnosis was different among the three eras (P=0.03); the most common in the first two eras was restrictive/infiltrative cardiomyopathy, while the most common in era 3 was congenital heart disease. During eras 1 and 2, nearly all CHLTs were sequential-heart first (100% and 97.1%, respectively), while in era 3, 79.9% were sequential-heart first, 13.8% sequential-liver first, and 6.3% simultaneous (P=0.001). The 1-, 3-, and 5-year post-CHLT cumulative patient survival rates were 86.8%, 80.1%, and 77.9%, respectively (Fig. A). Statistically significant differences in unadjusted patient survival were observed between the three transplant eras (P=0.009; Fig. B). In multivariable Cox regression, recipient diabetes (adjusted hazard ratio [aHR]=2.35, 95%CI: 1.23-4.48), receiving CHLT between 1989-2000 compared with 2011-2020 (aHR=5.00, 95%CI: 1.13-22.26), and receiving sequential-liver first CHLT compared with sequential-heart first CHLT (aHR=2.44, 95%CI: 1.15-5.18) were associated with increased risk of post-CHLT mortality. Increasing left ventricular ejection fraction was associated with decreased risk of post-CHLT mortality (aHR=0.96, 95%CI: 0.92-0.99).

Conclusions: CHLT is an increasingly performed and accessible therapy with evolving recipient demographics and disease etiologies, and excellent outcomes.



CITATION INFORMATION: Ziogas I., Alexopoulos S., Wu W., Matsuoka L., Rauf M., Izzy M., Perri R., Schlendorf K., Menachem J., Shah A. Adult Combined Liver-Heart Transplantation: The United States Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: I.A. Ziogas: None. **S.P. Alexopoulos:** None. **W.K. Wu:** None. **L.K. Matsuoka:** None. **M.A. Rauf:** None. **M. Izzy:** None. **R. Perri:** None. **K.H. Schlendorf:** None. **J.N. Menachem:** None. **A.S. Shah:** None.

Abstract# 45

High Degree of Center Variation in Simultaneous Heart Kidney Transplant: Opportunities for Standardization

B. I. Shaw[1], M. L. Samoylova[1], S. J. Kesseli[1], D. Olaso[2], A. S. Barbas[1], D. L. Sudan[1], L. E. Boulware[3], L. M. McElroy[1], *[1]Surgery, Duke University, Durham, NC, [2]School of Medicine, Duke University, Durham, NC, [3]Medicine-Nephrology, Duke University, Durham, NC*

Purpose: Simultaneous heart kidney transplant (SHK) is increasingly common and unregulated. We sought to understand variation in patient selection for SHK at the center level.

Methods: Data for adult heart transplant recipients and candidates since 2003 were obtained from the UNOS STAR file. Variability in center practice was assessed for all centers performing at least one SHK per year in the study period. Variability in the proportion of dialysis dependent (DD) patients undergoing SHK was determined. Variability in estimated glomerular filtration rate (eGFR) at transplant among non-dialysis dependent (NDD) SHK recipients was examined, including in relationship to center volume and waitlist mortality. Center level effects on the probability of SHK among non-DD patients were investigated by multivariable logistic regression controlling for age, transplant year, eGFR, ventricular assist device usage, and diabetes status.

Results: A total 33,463 transplant recipients and 20,390 waitlist registrants were included. There was a high degree of variability in the proportion of DD patients who underwent SHK at the center level (Range 25-82%, **Figure 1A**). The median eGFR of NDD patients undergoing SHK at the time of transplant varied widely both between (Range 19-56 mL/min/1.73m^2) and within centers (**Figure 1B**). There was no relationship between eGFR at transplant of SHK recipients and either center volume (p=0.448) or waitlist mortality (p=0.156). The odds of receiving SHK among NDD recipients varied widely by center with the odds ratio of the most to least SHK permissive center being 35.0 (95% CI 11.5-106.3). When examining the marginal probability of SHK, we noted that it decreased with increasing eGFR but was different between centers (**Figure 2**).

Conclusions: There is wide variation in patient selection for SHK both within and between centers. This variation may present an opportunity to improve allocation of kidneys for these dual organ transplants.

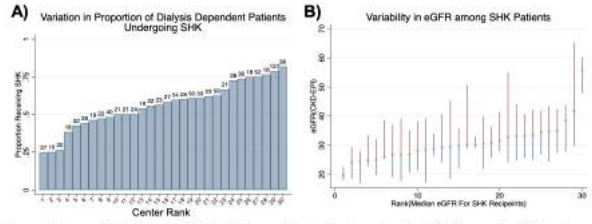


Figure 1 Legend: A) Percent of dialysis dependent patients undergoing SHK by center. Ordered By percent DD patients undergoing SHK. Bars labeled with total SHK performed by that in center In the study period **B)** Median and 95% CI of eGFR by center, ordered by median eGFR.

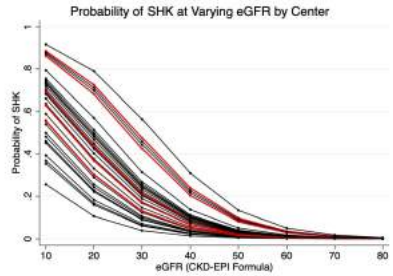


Figure 2 Legend: Marginal probability of SHK by eGFR based on multivariable logistic regression. Top 5 centers in terms of probability of SHK highlighted in red. Top 30 centers represented

CITATION INFORMATION: Shaw B., Samoylova M., Kesseli S., Olaso D., Barbas A., Sudan D., Boulware L., McElroy L. High Degree of Center Variation in Simultaneous Heart Kidney Transplant: Opportunities for Standardization *AJT, Volume 21 Supplement 3*

DISCLOSURES: B.I. Shaw: None. **M.L. Samoylova:** None. **S.J. Kesseli:** None. **D. Olaso:** None. **A.S. Barbas:** None. **D.L. Sudan:** None. **L.E. Boulware:** None. **L.M. McElroy:** None.

Abstract# 46

Allograft Discard Risk Index for Heart Transplantation

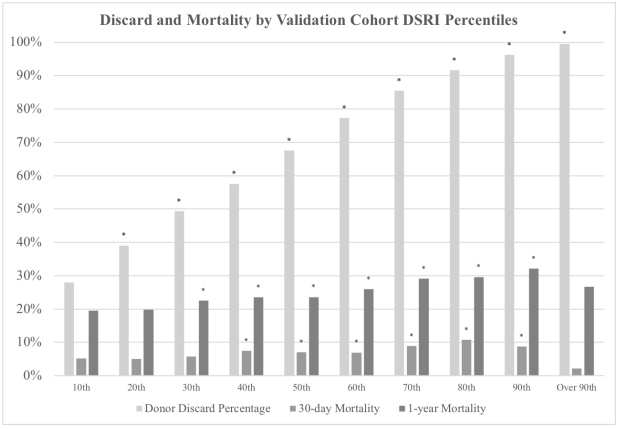
R. M. Reul[1], A. A. Saleem[1], C. N. Keller[1], T. H. Malik[1], J. A. Goss[2], A. A. Rana[2], *[1]Office of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

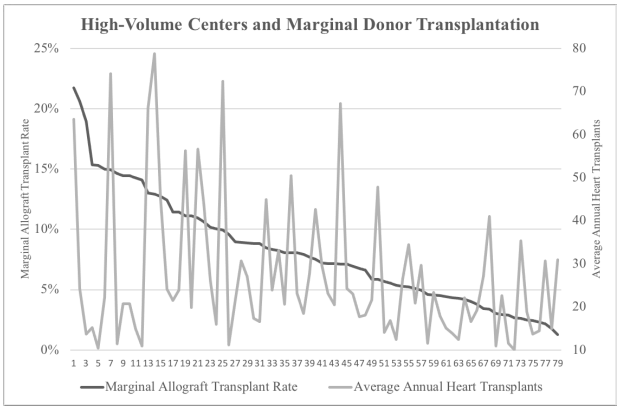
Purpose: The number of patients awaiting heart transplantation (HTx) substantially exceeds the number of donor hearts transplanted each year, yet nearly 70% of consented donor hearts are discarded rather than transplanted.

Methods: All deceased organ donors listed within the UNOS Deceased Donor Database between June 12, 2005 and June 12, 2020 were reviewed. Those greater than 10 years old and consented for heart donation were included and randomly separated into training (n=79,704) and validation (n=39,852) cohorts. Demographic factors were compared between groups. A univariate and multivariate analysis was run on the training set to determine factors significant for allograft discard. Those factors were then used to create the discard risk index (DSRI). Discard and mortality data were assessed at DSRI value deciles using the validation set, and stratum-specific likelihood ratio (SSLR) analysis was used to determine deciles with increased likelihood of 1-year mortality.

Results: Factors associated with higher DSRI values included donor age > 45, HCV or HBV-core antibodies, hypertension, diabetes, and prior myocardial infarction. Factors associated with lower DSRI values included donor age < 40 and trauma as

the donor cause of death. The DSRI C-statistic was 0.821 in the training cohort and 0.819 in the validation cohort. The DSRI did not reliably predict 30-day or 1-year mortality after transplantation (C-statistic 0.557 & 0.546, respectively). The highest SSLR for 1-year mortality was the top 4 DSRI deciles (SSLR 1.46). This group was used to define marginal donors. An analysis of high-volume centers (10 or more HTx per year) resulted in substantial variation in terms of marginal donor usage.
Conclusions: The factors leading to heart allograft discard have little correlation with post-transplant outcomes. This suggests that with proper allocation, allografts at higher risk for discard may be transplanted with limited impact on recipient mortality.





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DISCLOSURES: R.M. Reul: None. **A.A. Saleem:** None. **C.N. Keller:** None. **T.H. Malik:** None. **J.A. Goss:** None. **A.A. Rana:** None.

Abstract# 47

Waitlist and Post-Transplant Outcomes of Candidates With Lvad: Comparison of Old and New Heart Allocation Policies

M. Colvin[1], Y. Ahn[2], S. Hall[3], M. Walsh[4], A. Israni[2], *[1]Univ of Michigan, Ann Arbor, MI, [2]SRTR, Minneapolis, MN, [3]Baylor Univ, Dallas, TX, [4]St. Vincent Heart Ctr, Indianapolis, IN*

Purpose: The new heart allocation policy took effect in October 2018. Its risk stratification scheme prioritizes patients with short-term devices, raising concern that candidates with durable left ventricular assist devices (LVADs) may be disadvantaged and post-transplant (PT) outcomes compromised. We compared trends in LVAD use and outcomes under the old and new policies.
Methods: Using SRTR data, we estimated unadjusted cumulative incidence (CI) of waitlist (WL) outcomes and PT survival for heart candidates and recipients. The WL cohort included LVAD candidates 18+ years first listed in 2017 and 2019, respectively. WL follow-up was censored at death, transplant, WL removal, or the first June after the listing year. We fit a CI function to compare WL outcomes. The PT cohort included recipients with LVAD 18+ years who had transplants from 10/18/2017 to 7/31/2018 (PRE) and 10/18/2018 to 7/31/2019 (POST). PT follow-up was censored on death or 1 year after transplant. We fit unadjusted Kaplan-Meier survival curves for 30-day, 6-month, and 1-year survival.
Results: After the new policy took effect, the number of WL candidates with LVADs decreased 8%, from 1216 to 1118. Among WL candidates in 2017, 31.2% were still waiting, 3.5% died, 55.4% received transplants, and 10% were removed by 6/30/2018. Among WL candidates in 2019, 37.8% were still waiting, 1.6% died, 51.9% had transplants, and 8.7% were removed by 6/30/2020 (Table 1). The PT cohort included 1037 PRE and 771 POST recipients, a 26% decline. PRE PT mortality was 3% at 30 days, 6.3% at 6 months, and 7.7% at 1 year. POST PT mortality was 4.4% at 30 days, 7.8% at 6 months, and 9.5% at 1 year (Table 2).
Conclusions: Since implementation of the new policy, the proportion of LVAD candidates receiving transplants has declined. Although WL mortality has declined in LVAD patients, PT mortality has increased slightly, possibly from giving transplants to sicker LVAD patients. Although not statistically significant, this trend bears monitoring given the shift toward short-term devices.

Table 1. Cumulative incidence of waitlist

	Year 2017		Year 2019	
	Count	Percent	Count	Percent
Total LVAD candidates	1216	100.00	1118	100.00
Still Waiting	379	31.17	423	37.84
Died	42	3.45	18	1.61
Transplanted	674	55.43	580	51.88
Removed*	121	9.95	97	8.68

Removed*: candidates who have a removal code other than transplant or death by their followup date.
Year 2017: The cohort was followed up to 6/30/2018.
Year 2019: The cohort was followed up to 6/30/2020.

Table 2. Outcomes at 30 days, 6 months, and 1 year post-transplant

	Policy Implementation				
	Pre		Post		
	Count	Percent	Count	Percent	p-values
Total LVAD recipients	1037	100.0	771	100.0	
Alive at 30 days	1006	97.0	737	95.6	0.11
Died within 30 days	31	3.0	34	4.4	
Alive at 6 months	972	93.7	711	92.2	0.2
Died within 6 months	65	6.3	60	7.8	
Alive at 1 year	957	92.3	698	90.5	0.18
Died within 1 year	80	7.7	73	9.5	

30 days data is from the date of transplant to 30 days.
6 months data is from the date of transplant to 6 months.
1 year data is from the date of transplant to 1 year.
p-values are from unadjusted Kaplan-Meier analyses.

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DISCLOSURES: M. Colvin: Consulting Fee; Name of Commercial Interest; Medscape. Consulting Fee; Nature of Relationship; Advisory Board. **Y. Ahn:** None. **S. Hall:** Consulting Fee; Name of Commercial Interest; Abbott, Abiomed, Medtronic, Evaheart. Consulting Fee; Nature of Relationship; Advisory Board/ Consultant. Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Speakers Bureau. **M. Walsh:** None. **A. Israni:** None.

Abstract# 48

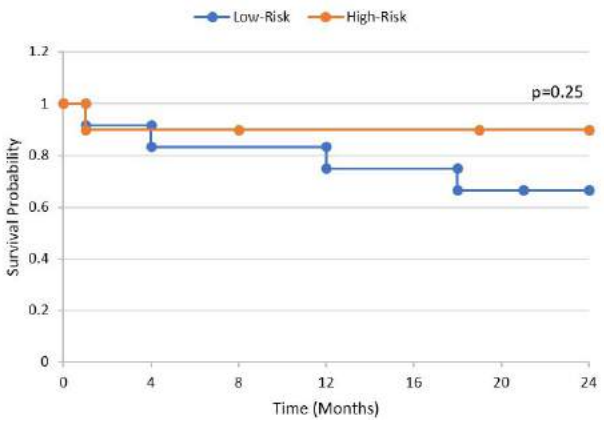
Liver Biopsy as a Predictor in Risk Stratification for Heart Transplant Candidates

S. Tolia[1], T. Al Saadi[1], N. Narang[2], A. Joshi[2], C. Sciamanna[2], S. Pauwaa[2], G. Macaluso[2], M. Dia[2], A. Tatooles[3], P. Pappas[3], W. Cotts[2], A. Andrade[2], *[1]Internal Medicine, Advocate Christ Medical Center, Oak Lawn, IL, [2]Cardiology, Advocate Christ Medical Center, Oak Lawn, IL, [3]Cardiovascular Surgery, Advocate Christ Medical Center, Oak Lawn, IL*

Purpose: Patients undergoing workup for Orthotopic Heart Transplant (OHT) undergo multi-organ evaluation for risk stratification. While cirrhosis is a known predictor of poor outcomes in this population, there is limited evidence regarding the impact of varying degrees of fibrosis. These patients undergo invasive liver biopsy to identify their pathology. We aimed to assess the association of baseline hepatic fibrosis severity from biopsy with clinical outcomes in waitlisted heart transplant patients.
Methods: Twenty-two patients listed for transplant underwent liver biopsy between 2008-2019. Patients with absent or sinusoidal fibrosis (grade 1) were classified as low-risk, while central, bridging and portal fibrosis (grades 2-3) were classified as high-risk. Cirrhotic patients were excluded.
Results: Among the 12 low-risk patients, 6 underwent OHT compared to the 7 of 10 high-risk patients. Congestive hepatopathy was the primary etiology of liver fibrosis in 70% of the patients. At time of listing, mean Model for End-Stage Liver Disease Excluding INR (MELD-XI), due to warfarin use, was 14 and 13 in low- and high-risk patients, respectively. We observed no significant difference in two-year survival and clinical outcomes of listed patients when stratified by degree of hepatic fibrosis (Figure).
Conclusions: There was no significant difference observed in relevant clinical outcomes and two-year survival among patients with low- or high-risk biopsies. In the absence of clear cirrhosis on lab work and imaging findings, these results may suggest a lack of significant benefit of liver biopsy in patients as part of the workup for heart transplant candidacy. Future studies should be conducted with larger data populations for ongoing analysis.

Figure. Primary and Secondary Outcomes by Grade of Fibrosis (n = 22)

Outcomes	Low-Risk n (%) n=12	High-Risk n (%) n=10	p-value
Transplanted	6 (50%)	7 (70%)	0.34
Fulminant Liver Failure	2 (17%)	0 (0%)	-
Thromboembolic	2 (17%)	2 (20%)	0.84
Bacteremia	4 (33%)	4 (40%)	0.75
GI Bleed	1 (8%)	1 (10%)	0.89
Intracranial hemorrhage	1 (8%)	0 (0%)	-
Acute Rejection	2 (17%)	0 (0%)	-
Status at 2-years	**n=10**	**n=8**	
Survival	6 (60%)	7 (88%)	0.2
Deceased on Waitlist	3 (30%)	1 (13%)	0.37
Deceased with OHT	1 (10%)	0 (0%)	-
Alive with OHT	4 (40%)	4 (50%)	0.67
Alive on Waitlist	2 (20%)	3 (38%)	0.35



CITATION INFORMATION: Tolia S., Al Saadi T., Narang N., Joshi A., Sciamanna C., Pauwaa S., Macaluso G., Dia M., Tatooles A., Pappas P., Cotts W., Andrade A. Liver Biopsy as a Predictor in Risk Stratification for Heart Transplant Candidates *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Tolia: None. **T. Al Saadi:** None. **N. Narang:** None. **A. Joshi:** None. **C. Sciamanna:** None. **S. Pauwaa:** None. **G. Macaluso:** None. **M. Dia:** None. **A. Tatooles:** None. **P. Pappas:** None. **W. Cotts:** None. **A. Andrade:** None.

Abstract# 49

Donor Factors Associated with In-field Decline of Heart Allografts

L. Piechura, F. Yazdchi, M. Harloff, H. Shim, M. Keshk, A. Coppolino, III, D. Rinewalt, H. Mallidi, *Brigham and Women's Hospital, Boston, MA*

Purpose: The decline of organs upon assessment within the field complicates optimal organ and resource utilization. We aimed to investigate if certain donor factors were associated with the in-field decline of heart allografts.

Methods: We utilized the United Network for Organ Sharing Standard Transplant Analysis and Research database to identify all heart allograft offers from adult donors between 1987 and March 2020. We compared hearts that were declined after in-field assessment to those that were accepted for transplant during the same time period. Categorical variables were compared via chi-squared tests, and continuous variables were compared with t-tests. A multivariate logistic regression model was used to ascertain the impact of particular donor characteristics on the likelihood of in-field heart decline.

Results: Between 1987 and March 2020, 1,586 hearts were declined following evaluation in the field, while 61,871 hearts were transplanted. Hearts that were declined were more often from older donors (37±11 vs 33±11 years, p<0.001) with higher BMI (27.8±6.4 vs 26.6±5.6, p<0.001). The cause of death for donors of declined hearts was more often anoxia (26 vs 17%, p<0.001) or cerebrovascular accident (33 vs 25%, p<0.001). Donors of declined hearts also more often had a clinical infection (64 vs 49%, p<0.001), required inotropic support (42 vs 35%, p<0.001), and had a history of cocaine use (19 vs 12%, p<0.001). A smaller proportion of donors of declined hearts had an AB blood type (0.4% vs 2%, p<0.001). In a multivariate logistic regression model developed from factors significant by univariate assessment, we found that death via natural circumstances (OR 1.34, p=0.008), Public Health Service increased-risk designation (OR 1.27, p=0.001), total bilirubin (OR 1.05, p=0.001), donor age (OR 1.03, p<0.001), and serum BUN (OR 1.01, p<0.001) were associated with a higher odds of in-field heart decline.

Conclusions: Direct in-field evaluation of heart allografts is essential prior to organ acceptance. However, we have identified risk factors that may warrant further investigation prior to allocating limited healthcare resources. Understanding the potential influence of these variables on in-field decline may ultimately contribute to streamlining organ allocation and procurement processes.

CITATION INFORMATION: Piechura L., Yazdchi F., Harloff M., Shim H., Keshk M., Coppolino, III A., Rinewalt D., Mallidi H. Donor Factors Associated with In-field Decline of Heart Allografts *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Piechura: None. **F. Yazdchi:** None. **M. Harloff:** None. **H. Shim:** None. **M. Keshk:** None. **A. Coppolino, III:** None. **D. Rinewalt:** None. **H. Mallidi:** None.

Abstract# 50

Waitlist and Post-Transplant Outcomes of Candidates with Iabp or Ecmo: Comparison of Old and New Heart Allocation Policies

M. Colvin[1], Y. Ahn[2], S. Hall[3], M. Skeans[2], M. Walsh[4], A. Israni[2], *[1]Univ of Michigan, Ann Arbor, MI, [2]SRTR, Minneapolis, MN, [3]Baylor Univ, Dallas, TX, [4]St. Vincent Heart Ctr, Indianapolis, IN*

Purpose: New heart allocation policy prioritizes candidates on short-term circulatory support to promote transplant of the sickest candidates. There has been a shift in the use of these devices as a bridge to transplant. We compared the use and outcomes of candidates with IABP or ECMO before and after the new policy.

Methods: Using SRTR data, we estimated unadjusted cumulative incidence (CI) of waitlist (WL) outcomes and post-transplant (PT) survival for adult heart candidates and recipients. The WL cohort included IABP or ECMO (SCSD) candidates 18+ years first listed in 2017 and 2019, respectively. WL follow-up was censored at death, transplant, WL removal, or the first June after the listing year. We fit a CI function to compare WL outcomes. The PT cohort included recipients with SCSD 18+ years who underwent transplant from 10/18/2017 to 7/31/2018 (PRE) and 10/18/2018 to 7/31/2019 (POST). PT follow-up was censored on death or 1 year after transplant. We fit unadjusted Kaplan-Meier survival curves for 30-day, 6-month, and 1-year survival.

Results: After implementation of the new allocation policy, the number of WL candidates with SCSD increased 137%, from 284 to 673. In 2019, 83% of SCSD WL candidates underwent transplant, versus 56% in 2017. In 2017, most SCSD candidates were listed as status 1A, and 61% received transplants. In 2019, most SCSD candidates were listed as status 1 or 2; 79% and 88% of them, respectively, received transplants (Table 1). The PT cohort included 192 and 746 recipients PRE and POST, respectively, a 289% increase. PT survival among PRE was 94.3% at 30 days, 89.6% at 6 months, and 88% at 1 year. PT survival POST was 96.1% at 30 days, 92% at 6 months, and 89.9% at 1 year.

Conclusions: Since implementation of the new policy, the number of recipients with SCSD and their survival, have increased slightly. Although the increase is not statistically significant, new strategies for advanced heart failure management may be needed given the increasing use and improved outcomes of short-term devices.

Table 1. Cumulative incidence of IABP or ECMO (SCSD) Waitlist, by waitlist status and urgency status

	Year 2017					Year 2019							
	Total	Status 1A	Status 1B	Status 2	Inactive	Total	Status 1	Status 2	Status 3	Status 4	Status 5	Status 6	Inactive
Total	284	220	18	22	24	673	138	438	19	25	7	34	12
Still Waiting	39	20	5	10	4	35	2	19	0	3	0	9	2
Died	35	30	1	4	0	26	10	8	0	2	3	0	3
Transplanted	159	134	9	3	13	560	109	385	18	20	2	22	4
Removed*	51	36	3	5	7	52	17	26	1	0	2	3	3

Removed*: candidates who have a removal code other than transplant or death by their followup date.
Year 2017: The cohort was followed up to 6/30/2018.
Year 2019: The cohort was followed up to 6/30/2020.

Table 2. Outcomes at 30 days, 6 months, and 1 year post-transplant

	Policy Implementation				
	Pre		Post		
	Count	Percent	Count	Percent	p-values
Total SCSD recipients	192	100.0	746	100.0	
Alive at 30 days	181	94.3	717	96.1	0.26
Died within 30 days	11	5.7	29	3.9	
Alive at 6 months	172	89.6	686	92.0	0.29
Died within 6 months	20	10.4	60	8.0	
Alive at 1 year	169	88.0	671	89.9	0.42
Died within 1 year	23	12.0	75	10.1	

30 days data is from the date of transplant to 30 days.
6 months data is from the date of transplant to 6 months.
1 year data is from the date of transplant to 1 year.
p-values are from unadjusted Kaplan-Meier analyses.

CITATION INFORMATION: Colvin M., Ahn Y., Hall S., Skeans M., Walsh M., Israni A. Waitlist and Post-Transplant Outcomes of Candidates with Iabp or Ecmo: Comparison of Old and New Heart Allocation Policies *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Colvin: Consulting Fee; Name of Commercial Interest; Medscape. Consulting Fee; Nature of Relationship; Advisory Board. **Y. Ahn:** None. **S. Hall:** Consulting Fee; Name of Commercial Interest; Abbott, Abiomed, Medtronic, Evaheart. Consulting Fee; Nature of Relationship; Advisory Board/Consultant. Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Speakers Bureau. **M. Skeans:** None. **M. Walsh:** None. **A. Israni:** None.

Pancreas & Small Bowel

Abstract# 51

Risk Factors for the Development of Posttransplant Lymphoproliferative Disorder (ptld) After Pancreas Transplantation- A Registry Analysis

A. Gruessner, S. Saggi, J. Renz, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

Purpose: A pancreas transplant provides patients with brittle diabetes the opportunity of good long-term metabolic control. However, it requires long-term immunosuppression with its associated risks including development of PTLD. Although immunosuppressive protocols have become standardized over the last decade, including regular use of antibody induction therapy, reports on the incidence of, and risk factors for, short- and long-term development of PTLD are scarce.

Methods: To assess the incidence of PTLD 13,287 primary successfully transplanted pancreas transplants (82% SPK, 10% PAK and 8% PTA) were included; transplants were performed between 1/1/2006 and 12/31/2019 and reported to the IPTR/UNOS. Median follow-up time was 68 months. The incidence of PTLD was based on the UNOS reports or information about PTLD leading to graft failure. Description of patient and donor characteristics was generated. To define risk factors for the development of PTLD several multivariable Cox regression models with time dependent variables were established including factors which proved to be significant in the univariate model. Possible risk factors were transplant type, transplant year, recipient and donor age, gender, ethnicity, EBV and CMV serology, HLA mismatch, depleting and non-depleting induction therapy, maintenance immunosuppression, and the treatment of acute rejection episodes of the pancreas and/or kidney.

Results: A total number of 160 cases of PTLD were identified - in SPK, 110 cases; in PAK, 27; and in PTA, 23. The 1-year (5-year) rate of PTLD were: for SPK, 0.4% (0.9%); for PAK, 0.2% (1.7%): and for PTA, 1.7% (2.3%). The rate in solitary pancreas transplants was significantly higher compared to SPK ($p<0.0001$), see Figure 1. The EBV serostatus of 76% of the recipients and 80% of the donors was positive. In 12 % of recipients and 13% of donors the EBV serostatus was unknown. The result of the first cox regression identified solitary pancreas transplant, negative EBV recipient serostatus, male gender, white race, induction therapy with depleting antibodies, and acute rejection treatment as risk factors. No significant impact of the interaction between recipient and donor EBV serology was found. A more detailed analysis is shown in Table 1.

Conclusions: The rate of PTLD was higher in solitary transplants: they received more immunosuppression than SPK due to their increased immunogenicity. Negative recipient serostatus carried the highest risk for the development of PTLD. Of note, the risk of PTLD was high when Campath or TMG for more than 4 days was given for induction therapy.

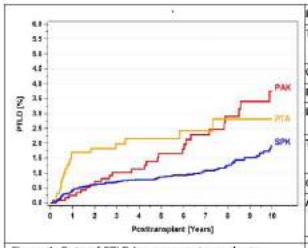


Figure 1: Rate of PTLD in pancreas transplants performed between 2006 and 2019

Parameter		P	HR	CI95%	
Tx Type	PAK vs SPK	0.04	1.58	1.03	2.44
	PTA vs SPK	0.014	1.83	1.13	2.95
Gender	Male vs Female	0.008	1.61	1.13	2.30
Race	Black vs White	0.002	0.35	0.17	0.69
EBV Serostatus	Negative vs Positive	<.0001	4.60	3.25	6.49
Tmg days_	1-4 vs 0	0.76	1.06	0.66	1.75
	>4 vs 0	0.02	1.78	1.10	2.89
Campath	Yes vs No	0.02	1.85	1.10	3.13
Acute Rejection	Yes vs No	0.0008	1.94	1.33	2.84

Table 1: Most influential risk factors for the development of PTLD

CITATION INFORMATION: Gruessner A., Saggi S., Renz J., Gruessner R. Risk Factors for the Development of Posttransplant Lymphoproliferative Disorder (ptld) After Pancreas Transplantation- A Registry Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gruessner: None. **S. Saggi:** None. **J. Renz:** None. **R. Gruessner:** None.

Abstract# 52

Evaluation and Experience with Hepatitis C Positive to Negative Pancreas Transplantation

B. K. Lindner, B. Thomas, M. Cooper, S. Yi, P. Abrams, *Medstar Georgetown University Hospital, Washington, DC*

Purpose: The use of hepatitis C virus (HCV) positive organs for transplant to HCV negative recipients has been reported on and has gained popularity across kidney, liver, heart, and lung transplantation. Currently, limited reports discuss HCV positive to negative transplantation specifically in pancreas transplantation. The most recent SRTR/OPTN Report shows < 0.3% of all pancreas transplants are HCV(+) to (-). The presented study examines a cohort of HCV(-) pancreas recipients who received HCV(+) grafts.

Methods: This is a single center, retrospective study of pancreas transplant recipients from May 2019 - October 2020. Patients were included if they received a HCV(+) (NAT+/Ab+ or NAT-/Ab+) transplant and were HCV(-) (NAT-/Ab-) at the time of transplant. Patients that seroconverted and developed a positive viral load were initiated on direct acting antiviral therapy once approved by their insurance post-transplant. Patients were considered cured if they exhibited sustained virologic response rates (SVR) 12 weeks following the end of therapy. Outcomes assessed include waitlist time, time to medication obtainment, viral clearance, and graft survival.

Results: Six simultaneous kidney-pancreas recipients were included in this study. Five patients (83.3%) had NAT(+) donors while 1 (16.7%) had a NAT(-)/Ab(+) donor. The average time from listing to transplantation was 82 days, and 3 out of 6 patients were transplanted within 15 days of their listing date. Of the 5 patients who received NAT+ grafts, 3 (60%) were treated with glecaprevir/pibrentasvir and 2 were treated with sofosbuvir/velpatasvir. The average time from transplant to the start of HCV therapy was 41 days, all paid for by commercial insurance. All patients (n=3) who are 12 weeks past the end of therapy have achieved SVR12. The patient who received a NAT(-)/Ab(+) graft has remained HCV(-) for all 11 months post-transplant. There have been no graft failures or rejection episodes, however one patient died 2 months post-transplant (not thought to be related to HCV or the treatment regimen). All other patients remain off insulin and have a mean creatinine of 1.4 mg/dL.

Conclusions: Hepatitis C negative kidney-pancreas transplant recipients can safely receive HCV(+) grafts and be cured of HCV post-transplant similar to other organ groups. Benefits in terms of waitlist time reduction and long-term outcomes will need to be studied further

CITATION INFORMATION: Lindner B., Thomas B., Cooper M., Yi S., Abrams P. Evaluation and Experience with Hepatitis C Positive to Negative Pancreas Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: B.K. Lindner: None. **B. Thomas:** None. **M. Cooper:** None. **S. Yi:** None. **P. Abrams:** None.

Abstract# 53

Simultaneous Pancreas-kidney Transplantation (spk) and, Simultaneous Deceased Donor Pancreas and Living Donor Kidney Transplantation (splk) in Diabetic Patients with End Stage Renal Disease

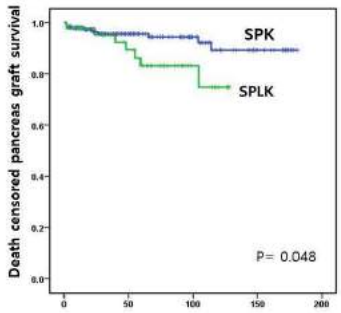
Y. Ko, *Department of Surgery, Asan Medical Center, Seoul, Korea, Republic of*

Purpose: The purpose of this study is to compare clinical outcomes of simultaneous pancreas-kidney transplantation (SPK) and simultaneous deceased donor pancreas and living donor kidney transplantation (SPLK) in diabetic patients with end stage renal disease.

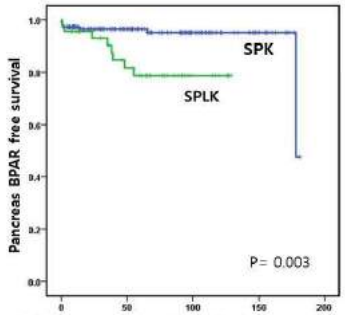
Methods: Data from patients who had SPK or SPLK from December, 2005 through June, 2020 at Asan medical center were retrospectively analyzed. Of 196 consecutive patients, 151 and 45 underwent SPK and SPLK, respectively. Presence of de novo DSA after transplantation, pancreas graft failure, kidney graft failure, biopsy-proven acute rejection of pancreas, biopsy-proven acute rejection of kidney were compared between the two groups.

Results: There was no significant difference in baseline characteristics between the two groups except that , cold ischemic time of kidney graft and duration of diabetes in the SPLK group were significantly shorter compared with the SPK group (331±132min vs 85±67min $P<0.001$, 21.07±6.14years vs 17.86±7.99years $p=0.004$) and donors of SPLK was younger than those of SPK (24.91±1.22years vs 32.08 ±12.13years, $p<0.001$). During ten-years follow-up, death-censored pancreas graft survival rate in the SPLK group was significantly lower compared with the SPK group ($P=0.048$). In addition, the incidence of biopsy-proven acute rejection of the pancreas graft in the SPLK group was significantly higher compared with the SPK group ($P=0.003$). There was no difference in the presence of de novo DSA and the incidences of kidney graft failure, kidney biopsy proven acute rejection and mortality between SPK and SPLK recipients.

Conclusions: It seems that there is a higher risk of death-censored graft failure and biopsy-proven acute rejection of pancreas in recipients having SPLK compared with SPK.



Duration between pancreas transplantation and pancreas graft failure (mon)



Duration between pancreas transplantation and pancreas BPAR (mon)

CITATION INFORMATION: Ko Y. Simultaneous Pancreas-kidney Transplantation (spk) and, Simultaneous Deceased Donor Pancreas and Living Donor Kidney Transplantation (splk) in Diabetic Patients with End Stage Renal Disease *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Ko: None.

Abstract# 54

Outcomes of Simultaneous Pancreas-Kidney Transplants from Donation After Circulatory Death Donors in the UK: A National Registry Analysis

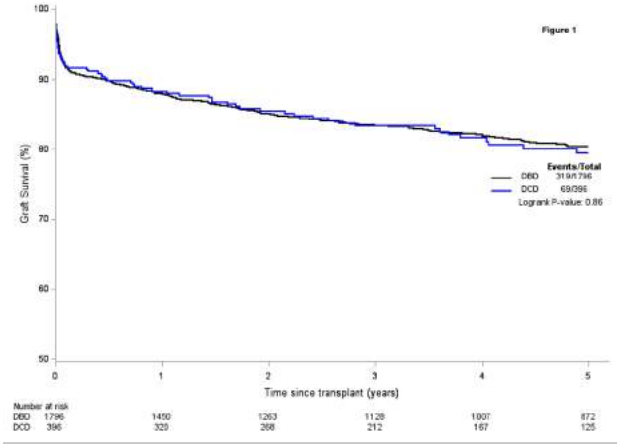
N. Karydis[1], M. Ibrahim[2], C. Counter[2], J. Casey[3], P. Friend[4], C. Watson[5], C. Callaghan[1], *[1]Nephrology and Transplantation, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, [2]NHS Blood and Transplant, Bristol, United Kingdom, [3]Transplant Unit, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom, [4]Nuffield Department of Surgical Sciences, University of Oxford, Oxford, United Kingdom, [5]Department of Surgery, Addenbrooke's Hospital and Cambridge NIHR Biomedical Research Campus, Cambridge, United Kingdom*

Purpose: The UK is a world leader in the use of pancreases from donation after circulatory death (DCD) donors. However, there is a perception that pancreases from DCD donors are sub-optimal when compared to similar grafts from donation after brain death (DBD) donors. We compared outcomes of pancreases transplanted from controlled DCD donors to those from DBD donors in the largest reported study to date.

Methods: Data were obtained from the UK Transplant Registry on deceased donor adult SPK transplants between 2005 - 2018. Kaplan-Meier estimates were used to compare pancreas, kidney, and patient survivals between those receiving organs from DCD or DBD donors, and multivariable analyses were used to identify factors associated with pancreas graft loss.

Results: 2,228 SPK transplants were implanted (1825 DBD; 403 DCD donors). Kidneys from DCD donors had equivalent graft survivals to those from DBD donors (log-rank p=0.99), and there were no differences in longer-term renal allograft function, or in five-year patient survivals when stratifying by donor type. On univariate analysis, there were no significant differences in five-year death-censored pancreas graft survival between the two donor types (Figure 1. 79.5% versus 80.4%; p=0.86). Multivariable analysis showed no significant differences in five-year pancreas graft loss between transplants from DCD (n=343) and DBD (n=1492) donors (hazard ratio 1.26, 95% CI 0.76-1.23; p=0.12). A Cox proportional hazards regression model for pancreas graft loss from DCD donors showed that increasing donor age or pancreas cold ischaemic time (CIT) were not associated with worse outcomes.

Conclusions: This large national study supports the increased utilisation of organs from DCD donors in SPK transplantation. Data on the effect of donor age and CIT on DCD donor graft outcomes suggest that a re-examination of donor age criteria and the pancreas offering schemes are warranted.



CITATION INFORMATION: Karydis N., Ibrahim M., Counter C., Casey J., Friend P., Watson C., Callaghan C. Outcomes of Simultaneous Pancreas-Kidney Transplants from Donation After Circulatory Death Donors in the UK: A National Registry Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Karydis: None. **M. Ibrahim:** None. **C. Counter:** None. **J. Casey:** None. **P. Friend:** None. **C. Watson:** None. **C. Callaghan:** None.

Abstract# 55

Two Hundred Total Pancreatectomy with Islet Autotransplantation Cases: A Single Center Experience

K. Kumano[1], S. Bruer[1], G. Saracino[1], M. Lawrence[1], G. Testa[1], A. Gupta[1], N. Onaca[1], E. Beecherl[1], M. F. Levy[2], B. Naziruddin[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Virginia Commonwealth University, Richmond, VA*

Purpose: Total pancreatectomy and islet autotransplantation (TPIAT) for patients with uncontrolled chronic pancreatitis has been performed at our center from 2006 and the number of TPIAT patient has reached 200 in 2020. We have attempted to improve the transplant outcome over time using novel anti-inflammatory treatment regimen utilizing combined use of anakinra (IL-1β blocker) and etanercept (a tumor necrosis factor-alpha (TNF-α) blocker). It is still challenging to standardize our procedure and predict outcomes after TPIAT. Therefore, we retrospectively reviewed our large data of islet isolation results and metabolic outcome in order to contribute to making further progress with TPIAT.

Methods: Our database of 200 consecutive TPIAT procedures performed between 2006 and 2020 were retrospectively reviewed. We collected the data of baseline demographics, pancreas characteristics and islet isolation results. Patient follow-up were performed at 3 and 6 months, 1 year, and then annually. Our outcomes measures included islet graft function, pain relief and narcotic use.

Results: Baseline patient characteristics (age, sex, BMI, etiology, pretransplant C-peptide and hemoglobin (Hb) A1c levels, duration of symptoms) and isolation results were shown in Table 1. Post-operative non-fasting glucose, HbA1c level, C-peptide level and the average daily insulin requirement were shown in Table 2. The insulin independence rate at 3, 6 and 1 year increased with time (15.4%, 24.0% and 26.7%, respectively), comparable results reported previously. At 1 year, pain score was significantly improved (pre: 6.1±2.7, 1year: 2.4±2.9, p<0.0001). Narcotic free rate also increased with time: the rates were 47% at 6 months and 56% at 1 year.

Conclusions: In our cohort of 200 patients, we showed that TPIAT effectively alleviated pain due to chronic pancreatitis. TPIAT has beneficial effect on pain relief and decrease of narcotic use. Although nearly 27% of our patients had achieved insulin independence at 1 year, further progress of islet autotransplantation procedure would be necessary to improve and maintain long term islet graft function after TPIAT.

Table 1. Demographic and baseline patient characteristics.

	Mean (n)	SD
Gender, n		
Male	73	
Female	127	
Age at TPIAT (years)	39.5	±12.3
Body mass index at TPIAT (kg/m²)	26.3	±5.8
Pretransplant HbA1c (%)	5.8	±1.0
Pretransplant basal C-peptide (ng/ml)	1.8	±1.2
Duration of diagnosed pancreatitis (years)	7.1	±6.5
Etiology (n)		
Idiopathic	86	
Genetic	39	
Pancreatic divisum	17	
Alcoholic	15	
Sphincter Oddi dysfunction	10	
Autoimmune	8	
Others	25	
Islet mass transplanted		
Total IEQ	381,438	±227,659
IEQ/kg body weight	5,111	±2,933

Table 2. Metabolic outcomes of TPIAT (mean±SD)

	3months	6months	12months
Non-fasting glucose (mg/dL)	141±68	151±83	147±90
HbA1c (%)	6.7±1.2	7.0±1.4	7.3±1.8
C-peptide (ng/mL)	1.2±1.05	1.4±1.2	1.3±1.3
daily insulin requirement (U)	14.8±14.6	13.2±14.2	14.9±15.6

CITATION INFORMATION: Kumano K., Bruer S., Saracino G., Lawrence M., Testa G., Gupta A., Onaca N., Beecherl E., Levy M., Naziruddin B. Two Hundred Total Pancreatectomy with Islet Autotransplantation Cases: A Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Kumano: None. **S. Bruer:** None. **G. Saracino:** None. **M. Lawrence:** None. **G. Testa:** None. **A. Gupta:** None. **N. Onaca:** None. **E. Beecherl:** None. **M.F. Levy:** None. **B. Naziruddin:** None.

Abstract# 56

Segmental Susceptibility of Intestinal Stem Cells to Cold Storage Preservation Injury in a Porcine Model

E. K. Ludwig[1], N. Abraham[2], D. Sudan[2], A. Barbas[2], C. Schaaf[1], J. Freund[1], A. S. Stewart[1], B. Veerasammy[1], L. M. Gonzalez[1], *[1]North Carolina State University, Raleigh, NC, [2]Duke University, Durham, NC*

Purpose: Cold storage (CS) is the current gold standard preservation method for small bowel (SB) prior to transplantation. However, CS can cause epithelial detachment, sloughing, and crypt damage. Epithelial loss can lead to bacterial translocation and sepsis, thus, epithelial regeneration is critical to both allograft and patient survival. Intestinal epithelial stem cells (ISC) are the source of epithelial regeneration, however, the extent to which CS injures ISCs, ultimately impairing epithelial repair, is unclear. Currently, allograft health is monitored post-transplantation via histologic assessment of ileal biopsies. However, the ileum may not represent overall graft health as there is histologic evidence that the ileum may either be more resistant to CS injury or may have a greater capacity to repair than other SB segments. The impact of CS on ISCs from different SB segments is not well characterized. We hypothesized that CS would negatively impact ISC viability and proliferative potential, but that the ileum would be affected less than either the duodenum or jejunum.

Methods: 9 porcine SB grafts were flushed with cold UW preservation solution and stored at 4ºC for 6h. 3-D ISC culture was used to determine the impact of CS on ISC viability and proliferative potential. Crypts isolated from duodenum, jejunum, and ileum segments obtained post-flushing (control, CO) and after 6h preservation were plated in culture. To assess ISC proliferative potential, spheroid area measurements were performed every 24h. To assess ISC viability, plating efficiencies were determined every 48h. Differences within and between groups were compared using a Kruskal-Wallis test and a Dunn's multiple comparison post-test followed by a Mann-Whitney test. Significance was set at $P<0.05$.

Results: CS jejunal spheroid area measurements were significantly smaller at all time points compared to CO tissues. When spheroid area measurements were compared between CS segments, ileal spheroids were significantly larger than duodenal or jejunal spheroids at all time points ($P<0.0001$). No significant differences were found when plating efficiencies were compared between CS and CO conditions for any segment.

Conclusions: CS injury does not appear to cause a difference in ISC viability between SB segments, but the ISC proliferative potential is significantly greater in the ileum compared to the duodenum or jejunum. Our findings are important clinically, as ileal biopsies from transplanted SB serve as the marker of the health of the allograft based on histologic morphology. As a result, the ileum may not be the best marker of graft regenerative capacity, however the addition of future porcine CS procedure data is warranted before a final conclusion can be made.

CITATION INFORMATION: Ludwig E., Abraham N., Sudan D., Barbas A., Schaaf C., Freund J., Stewart A., Veerasammy B., Gonzalez L. Segmental Susceptibility of Intestinal Stem Cells to Cold Storage Preservation Injury in a Porcine Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: E.K. Ludwig: None. **N. Abraham:** None. **D. Sudan:** None. **A. Barbas:** None. **C. Schaaf:** None. **J. Freund:** None. **A.S. Stewart:** None. **B. Veerasammy:** None. **L.M. Gonzalez:** None.

Abstract# 57

Islet Allotransplantation Into Pre-vascularized Sernova Cell Pouch™ - Preliminary Results from the University of Chicago

P. J. Bachul[1], P. E. Borek[1], G. S. Generette[1], A. Perez-Gutierrez[1], K. Jayant[1], K. Golab[1], L. Basto[1], L. Perea[1], M. Tibudan[1], C. Thomas[2], L. Philipson[2], J. Fung[1], P. Witkowski[1], *[1]Surgery, University of Chicago, Chicago, IL, [2]Medicine, University of Chicago, Chicago, IL*

Purpose: Previous first-in-human pilot study showed safety but the conditions did not allow for detectable islet function post-transplantation into the pre-vascularized Sernova Cell Pouches (SCPs) implanted subcutaneously. Herein, in the current Phase I/II study we tested clinically, islet engraftment in modified conditions after transplantation into the SCP.

Methods: First, SCPs were implanted below the anterior rectus sheath in type 1 diabetes patients with severe hypoglycemia unawareness and no stimulated C-peptide. Three weeks later Thymoglobulin, tacrolimus, and mycophenolate were initiated. During the infusion, islets were suspended in the patient's own serum instead of saline to provide an optimal microenviroment for engraftment. Islets with purity over 90% were transplanted. A sentinel pouch was excised for evaluation 3 months after each transplant. Islet graft function was monitored based on glucose control, C-peptide and insulin usage.

Results: Early in the ongoing study, wound infection required SCP excision in one of six SCP implanted individuals. The two furthest advanced patients received two subsequent islet transplants into the SCPs resulting in persistent islet graft function (positive serum C-peptide). Peak serum C-peptide remains currently at a level of 0.4-0.48 ng/ml, at 6 and 3 months after the second transplant in first and second patient, respectively. Islet engraftment was 9-fold higher when the islet mass was reduced by half to 3,300IEQ/kg (0.8 ml of tissue) during the second transplant in both patients. In the first patient, glucose control improved as A1c decreased from 6.3 to 6.0, insulin requirements dropped by 23% and CGM Time Below Range (TBR) dropped from 12% to 5%. In the second patient A1c dropped from 10.3 to 7.6, insulin requirements dropped by 40% and Time Above Range dropped from 76% to 48%. None of the patients experienced severe hypoglycemic episodes after the second islet transplant. Of note, both patients lost initially 7-15% of body weight and maintained stable weight afterwards. Preserved islet anatomy and endocrine function were found on histopathological evaluation of the vascularized environment within excised sentinel pouches.

Conclusions: Modified conditions resulted in persistent islet graft function after SCP transplantation. Limiting islet mass to 3,000IEQ/kg per transplant significantly improved islet engraftment into Sernova Cell Pouches.

CITATION INFORMATION: Bachul P., Borek P., S. Generette G., Perez-Gutierrez A., Jayant K., Golab K., Basto L., Perea L., Tibudan M., Thomas C., Philipson L., Fung J., Witkowski P. Islet Allotransplantation Into Pre-vascularized Sernova Cell Pouch™ - Preliminary Results from the University of Chicago *AJT, Volume 21 Supplement 3*

DISCLOSURES: P.J. Bachul: None. **P.E. Borek:** None. **G. S. Generette:** None. **A. Perez-Gutierrez:** None. **K. Jayant:** None. **K. Golab:** None. **L. Basto:** None. **L. Perea:** None. **M. Tibudan:** None. **C. Thomas:** None. **L. Philipson:** None. **J. Fung:** None. **P. Witkowski:** None.

Abstract# 58

The Impact of Early Narcotic Administration on Intestinal Transplantation Survival at an Urban Medical Center

L. Maliekal[1], N. Beltran[2], Y. Muszkat[2], S. Nagai[2], S. Jafri[2], *[1]School of Medicine, Wayne State University School of Medicine, Detroit, MI, [2]Department of Gastroenterology, Henry Ford Hospital, Detroit, MI*

Purpose: The impact of early narcotic administration on intestinal transplant patients is not well understood, with current practice suggesting the avoidance of narcotics among transplant patients. We examine patient survival and early intestinal rejection among intestinal transplant patients who were administered narcotic pain medication post-transplant surgery at a single urban medical center.

Methods: A retrospective chart review was conducted for 26 intestinal transplant patients at a large urban medical center. The patients were separated into two groups: those who utilized narcotics up to six-months post-transplant, and those who did not. Trends in early intestinal rejection and patient survival were then noted among the two groups.

Results: Twenty-six patients were transplanted after undergoing intestinal failure. Three patient charts were excluded due to medical charting discrepancies; 23 patient charts were utilized for analysis. 30% of these patients were prescribed narcotics at six-months or earlier post-transplant surgery. The average age of these patients was 49.4 years, with 71.5% being female. These patients were transplanted due to various secondary causes including Crohn's disease, neuroendocrine carcinoma, and abdominal trauma. On the other hand, the average age of the non-narcotic group of patients was 51.6 years, with 62.5% being female. These patients underwent intestinal transplant for causes similar to the narcotics group, including Crohn's disease, neuroendocrine carcinoma, gunshot wound, complications from ruptured appendices, and visceral myopathy. 85.7% and 71.4% of patients who had received narcotics after transplant were alive 1 year and 5 years post-transplant, respectively. On the other hand, 93.8% and 75.0% of patients who did not receive narcotics were

alive 1 year and 5 years post-transplant, respectively. Of the patients who received narcotics, 28.6% of these patients also experienced acute intestinal rejection at 6-months or earlier post-transplant, whereas 43.8% of patients not receiving narcotics experienced acute intestinal rejection at 6-months or earlier post-transplant.
Conclusions: Variations in 1-year survival can be noted amongst transplant patients who are receiving narcotics and who are not receiving narcotics, whereas variations in 5-year survival does not seem to be as significant between these two groups. It would be worthwhile to further investigate the impacts of narcotics on intestinal transplant patient morbidity and mortality through large, multi-center studies to better standardize patient care.
CITATION INFORMATION: Maliekal L., Beltran N., Muszkat Y., Nagai S., Jafri S. The Impact of Early Narcotic Administration on Intestinal Transplantation Survival at an Urban Medical Center *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Maliekal: None. **N. Beltran:** None. **Y. Muszkat:** None. **S. Nagai:** None. **S. Jafri:** None.

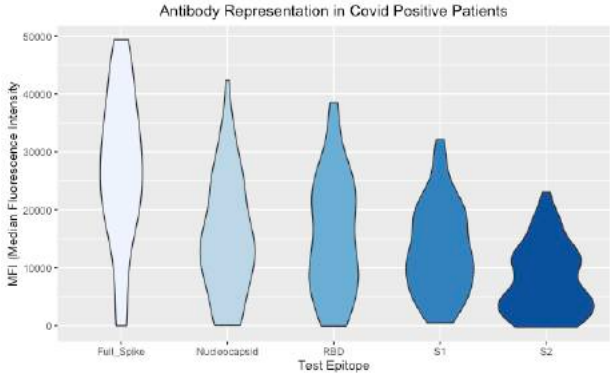
ID: COVID-19

COVID-19 in Kidney Recipients

Abstract# 59

COVID-19 in the Kidney Transplant Waitlist Population

A. C. Johnson[1], C. P. Larsen[1], H. Gebel[2], R. Bray[2], *[1]Surgery, Emory University, Atlanta, GA, [2]Pathology, Emory University, Atlanta, GA*
Purpose: Through banked serum samples from transplant candidates across Georgia, we characterize the prevalence, timing, and duration of SARS-CoV-2 seropositivity and investigate the impact on HLA alloantibodies.
Methods: We used a Luminex-based assay to detect antibodies against SARS-CoV-2. The assay is a semiquantitative measure of antibodies against Full Spike, S1, S2, Nucleocapsid and RBD epitopes as well as antibodies against 4 common coronaviruses, SARS-1, and MERS. We selected 400 waitlist candidates from Georgia counties with an above average case rate (>2200 cases per 100,000 people) as of August 2020 and screened the most recent serum sample from each candidate. For positive tests, we ran sequential historical samples to determine the earliest positive date and subsequently performed a geographic analysis of positive cases. Additionally, we cross-referenced SARS-CoV-2 reactivity with HLA antibody levels.
Results: Of 400 waitlist candidates, 33 tested positive for antibodies to SARS-CoV-2. Five of those candidates were positive on samples taken from as far back as 2019, pre-Covid. These samples also demonstrated high levels of binding to common coronavirus spike proteins. After removing these false positives (1.3%), there was a 7% test positivity rate. In counties with positive candidates, rates were approximately 10x higher than published by the GA department of public health. All 28 seropositive candidates maintained positive serology for the duration of the testing period (maximum of 5 months). Positive and negative groups had similar distributions of peritoneal and hemodialysis patients. In the 15 seropositive candidates with panel reactive antibodies (PRA), there was no apparent change associated with seroconversion.
Conclusions: Our analysis of transplant waitlist candidate SARS-CoV-2 serologies demonstrated a higher rate of positivity than that published by the state for the general population. This may be attributed to asymptomatic infections, insufficient testing, or an increased risk in this immune dysregulated population. While we intend to continue monitoring positive candidates to determine the duration of antibody presence, it is encouraging that candidates remained positive for the time studied. Finally, seroconversion does not appear to be a risk factor for the development of donor specific antibodies in this cohort of patients.



CITATION INFORMATION: Johnson A., Larsen C., Gebel H., Bray R. COVID-19 in the Kidney Transplant Waitlist Population *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.C. Johnson: None. **C.P. Larsen:** None. **H. Gebel:** None. **R. Bray:** None.

Abstract# 60

Predictors of Severe Covid-19 in Kidney Transplant Recipients in the First and Second Waves: Analysis of the Spanish Registry

M. Crespo[1], A. Mazuecos[2], I. Pérez-Flores[3], F. Moreso[4], A. Andrés[5], C. Jimenez[6], M. Molina[7], C. Canal[8], L. Sánchez-Cámara[9], S. Zárraga[10], M. Ruiz Fuentes[11], M. Aladrén[12], E. Melilli[13], V. López[14], E. Sanchez[15], J. Pascual for Spanish Nephro Society Covid-Registry[1], *[1]Nephrology, Hospital del Mar, Barcelona, Spain, [2]Nephrology, Hospital Puerta del Mar, Cadiz, Spain, [3]Nephrology, Hospital Clinico San Carlos, Madrid, Spain, [4]Nephrology, Hospital Valle Hebrón, Barcelona, Spain, [5]Nephrology, Hospital 12 Octubre, Madrid, Spain, [6]Nephrology, Hospital La Paz, Madrid, Spain, [7]Nephrology, Hospital Germans Trias i Pujol, Barcelona, Spain, [8]Nephrology, Fundacio Puigvert, Barcelona, Spain, [9]Nephrology, Hospital Gregorio Marañón, Madrid, Spain, [10]Nephrology, Hospital de Cruces, Bilbao, Spain, [11]Nephrology, Hospital Virgen de las Nieves, Granada, Spain, [12]Nephrology, Hospital Miguel Servet, Zaragoza, Spain, [13]Nephrology and Kidney Transplantation, Hospital de Bellvitge, Barcelona, Spain, [14]Nephrology, Hospital Regional de Málaga, Malaga, Spain, [15]Nephrology, Hospital de Cabueñes, Gijon, Spain*
Purpose: To better know the impact and characteristics of Covid-19 in renal patients, the Spanish Society of Nephrology set up a voluntary registry in March, 2020
Methods: Retrospective observational study of KT recipients included in the Spanish Covid-19 Registry (1st March to 14th November, 2020). We applied Cox multivariate analysis to identify risk factors for mortality and Kaplan-Meier and log rank survival analysis.
Results: 1080 KT with Covid-19 were registered, having 937 (86.1%) their outcome reported (cure or death). Most were men (63.2%), mean age 60 years infected a median of 72 months postransplantation. Death occurred in 204 patients. Multivariate analysis found age, neumonia and KT within the last 6 months before Covid-19 were risk factors for mortality and gastrointestinal symptoms were protective. Survival analysis showed significant increasing mortality risk in four subgroups: age<65 years&postransplant time> 6mo (n=526), age<65&time<6mo (n=49), age>65&time >6mo (n=325) and age>65&time<6mo (n=31)($$graphic). Of 1080 cases, 605 correspond to the first wave (1stW until June2020) and 475 to the second wave (2ndW). In the 2ndW, KT were younger (56.4 vs 61.1yr; p=.000), 15.8% were asymptomatic (p=.000) and presented less pneumonia (50.3% vs. 78%; p=.000). Fever, lymphopenia and respiratory symptoms were less frequent but gastrointestinal symptoms similar (30.9% vs. 34.2%; p=.256). Treatment has changed, with more use of remdesivir (p=.000) and steroids (p=.018), no use of ritonavir/lopinavir, hidroxycloroquine andazitromycin (p=.000), and no treatment in (37.1% vs 6.3% in 1stW, p=.000). Hospitalization decreased (89.2% vs. 63.2%; p=.000) but more KT were admitted to critical care units (14.5% vs 20%; p=.058). We found lower mortality (overall 26.4% vs 14.8%; p=.000, hospitalized 29% vs 23%; p=.088). Multivariate analysis of the 2ndW shows again that age, pneumonia and recent transplant (< 6 months) are mortality risk factors.
Conclusions: Over a thousand KT have suffered Covid-19 in Spain with a high mortality rate in the first and second waves, mainly related with age, pneumonia and recent transplantation. The interaction between age and time after transplant has to be considered when selecting recipients in the Covid-19 pandemic.

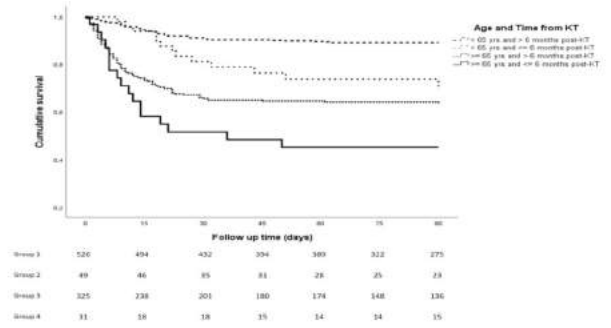


Figure. KT patient survival after Covid-19 related to age and time after transplantation

CITATION INFORMATION: Crespo M., Mazuecos A., Pérez-Flores I., Moreso F., Andrés A., Jimenez C., Molina M., Canal C., Sánchez-Cámara L., Zárraga S., Ruiz Fuentes M., Aladrén M., Melilli E., López V., Sanchez E., Pascual for Spanish Nephro Society Covid-Registry J. Predictors of Severe Covid-19 in Kidney Transplant Recipients in the First and Second Waves: Analysis of the Spanish Registry *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Crespo: None. **A. Mazuecos:** None. **I. Pérez-Flores:** None. **F. Moreso:** None. **A. Andrés:** None. **C. Jimenez:** None. **M. Molina:** None. **C. Canal:** None. **L. Sánchez-Cámara:** None. **S. Zárraga:** None. **M. Ruiz Fuentes:** None. **M. Aladrén:** None. **E. Melilli:** None. **V. López:** None. **E. Sanchez:** None. **J. Pascual for Spanish Nephro Society Covid-Registry:** None.

ID: COVID-19

Abstract# 61

SARS-CoV-2 Antibody Response After Induction Therapy in Kidney Transplant Recipients

M. Lubetzky[1], S. Sultan[2], Z. Zhao[3], M. Cushing[3], Z. Kapur[1], S. Albakry[1], N. Hauser[1], J. Marku-Podvorica[1], R. Craig-Schapiro[2], J. Lee[1], T. Salinas[1], M. Aull[2], S. Kapur[2], M. Suthanthiran[1], D. Dadhania[1], *[1]Nephrology, Weill Cornell-NYPresbyterian, New York, NY, [2]Transplant Surgery, Weill Cornell-NYPresbyterian, New York, NY, [3]Pathology, Weill Cornell-NY-Presbyterian, New York, NY*

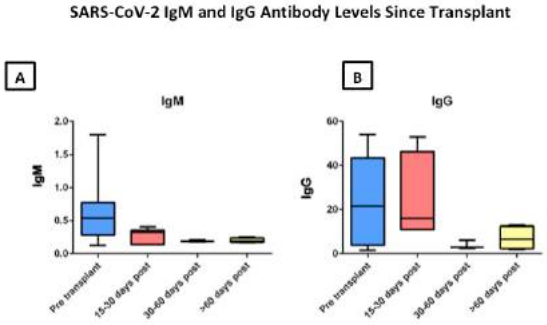
Purpose: SARS-CoV-2 antibody prevalence in kidney transplant recipients is beginning to be reported, although little is known about the humoral immune response in the immediate post-transplant period when immunosuppressive therapy burden is highest and graft recipients are least likely to mount a robust immune response.

Methods: Patients transplanted from May 28, 2020 until October 1, 2020 (n=78) were followed prospectively. SARS-CoV-2 antibody testing was performed at the time of transplant. Semi-quantitative IgM and IgG data was collected on a subset of patients and followed both before and after transplant.

Results: At the time of kidney transplantation, SARS-CoV-2 antibody prevalence was 22%. Patient demographics are shown in Table 1. Of the patients with a positive antibody (n=17), 10 either had symptoms consistent with COVID-19 infection or had documented SARS-CoV-2 PCR positive testing prior to transplant. A total of 13 patients had follow-up antibody testing between 30 and 60 days post transplantation and 12 (92%) had persistent antibodies at the time of follow up. Figures 1A and B demonstrate box and whisker plots of the median and the 25th and 75th percentile values (bottom and top of each box, respectively), levels of IgM and IgG from the pre- and post-transplant period. Both SARS-CoV-2 IgM and IgG antibody levels declined in the post transplantation period but remained above the threshold for positivity (an index value of 1) despite induction therapy with ATG and the initiation of maintenance immunosuppression with CNI and MMF. To date, none of the 78 patients transplanted has manifested new or recurrent SARS-CoV-2 infection.

Conclusions: SARS-CoV-2 antibodies remain positive despite the high dose immunosuppression in the early post transplant period. Our data provide a framework for future prospective studies on the kinetics and isotype of SARS-CoV-2 antibody response and as an essential reference to gauge immune response following vaccination.

Characteristic	Pre Transplant
	N=78
Days from Transplant to SARS-CoV-2 Ab Testing, median (IQR)	1 day prior to transplant (10 days prior to transplant, 0)
Age, mean (SD)	56 (14)
Gender N, (%), Female	33 (42)
Race N (%)	
Caucasian	30 (38)
Black	19 (24)
Hispanic	16 (21)
Asian	11 (14)
Type of Transplant, N (%) Living Donor	39 (50)
ATG induction	64 (82)
Steroid Maintenance	12 (15)
Cause of ESKD, N (%)	
HTN	23 (29)
DM	19 (24)
GN	7 (9)
SARS-CoV-2 Antibody Positive	17 (22)
SARS-CoV-2 PCR Positive at time of transplant	0
Symptoms or prior diagnosis of COVID-19	10/17 (59)
Follow up Antibody Testing	
Number Performed	13
Number Positive	12 (92)



CITATION INFORMATION: Lubetzky M., Sultan S., Zhao Z., Cushing M., Kapur Z., Albakry S., Hauser N., Marku-Podvorica J., Craig-Schapiro R., Lee J., Salinas T., Aull M., Kapur S., Suthanthiran M., Dadhania D. SARS-CoV-2 Antibody Response After Induction Therapy in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Lubetzky: None. **S. Sultan:** None. **Z. Zhao:** None. **M. Cushing:** None. **Z. Kapur:** None. **S. Albakry:** None. **N. Hauser:** None. **J. Marku-Podvorica:** None. **R. Craig-Schapiro:** None. **J. Lee:** None. **T. Salinas:** None. **M. Aull:** None. **S. Kapur:** None. **M. Suthanthiran:** None. **D. Dadhania:** None.

Abstract# 62

Characterizing Kidney Transplant Recipients with SARS-CoV-2: An Academic Single Center Experience

S. Nahi, A. Shetty, S. Tanna, J. Leventhal, *Northwestern University, Chicago, IL*

Purpose: Kidney transplant (KTx) recipients are a unique cohort in regard to SARS-CoV-2 susceptibility and clinical course, owing to their immunosuppressed state and propensity for kidney injury. This study investigated and characterized 53 SARS-CoV-2 positive KTx pts at Northwestern Memorial Hospital (NMH) in the first six months of the SARS-CoV-2 pandemic. We sought to identify risk factors and prognostic factors for severity of clinical disease, specific to this population.

Methods: This retrospective, single-center study included KTx recipients with a positive SARS-CoV-2 PCR at NMH from Jan. 1, 2020 to June 30, 2020. 53 pts met inclusion criteria. Clinical disease severity was ranked according to the WHO Ordinal Scale for SARS-CoV-2 Clinical Improvement, and the study population was divided into three groups based on disease severity {mild disease (ordinal scale of 0-2): n=11, moderate disease (ordinal scale of 3-4): n=29, severe disease (ordinal scale of 5-8): n=13}. We used a chi-squared analysis and a Welch's T-test to assess differences.

Results: Black American pts were overrepresented in the SARS-CoV 2 positive cohort, as compared to rates of KTx at NMH (p=0.025) (Figure 1). Hispanic pts were also overrepresented. In the total pt cohort, prevalence of risk factors are as follows: HTN (100%), diabetes (55%), obesity (42%),age ≥60 years) (34%), and heart disease (26%). The severe clinical disease cohort had statistically elevated rates of advanced age and diabetes. Proteinuria was identified in 42% of pts, significantly higher in the severe disease cohort as compared to mild disease (p=0.05). Enhanced immunosuppression (IS), defined by KTx or rejection episode in the last yr, was only present in 15% of cases, and not correlated with disease severity (Table 1). Fatality rate of this total pt cohort at 90 days post infection was 7.5%.

Conclusions: This single center experience reports disparity between the representation of racial minorities in the overall transplant pt group, and their representation in the SARS-CoV-2 infected transplant pt group (Figure 1). This finding is consistent with reports of overall of higher representation of Black Americans and Hispanic Americans in total SARS-CoV-2 cases and severity of illness. This study demonstrates risk factors previously correlated with severe disease do apply to the KTx recipient cohort as well. As a potential prognostic indicator of disease severity, these data support further investigation into the use of proteinuria. Importantly, this study reports no evidence of enhanced IS worsening clinical outcomes.

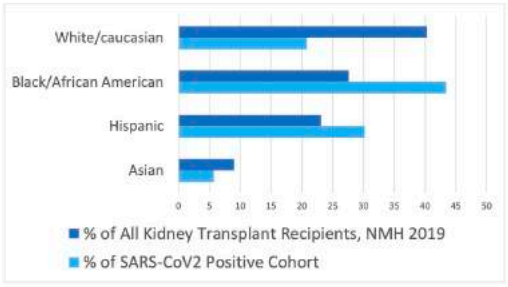


Figure 1. Racial discrepancies between NMH 2019 kidney transplant recipients and SARS-CoV2 positive kidney transplant recipients cohort.

Table 1. Characteristics of Kidney Transplant Recipients with SARS-CoV-2 at Presentation. (insignificant p values not reported).

Patient Characteristic	Mild Disease Cohort	Moderate Disease Cohort	Severe Disease Cohort	P value (a: mild vs. moderate; b: moderate vs. severe; c: mild vs. severe)
Advanced Age (>=60)	2 (18%)	8 (28%)	8 (62%)	0.04[b], 0.03[c]
HTN	11 (100%)	29 (100%)	13 (100%)	
Diabetes Mellitus	5 (45%)	13 (45%)	11 (85%)	0.02[b], 0.04[c]
Heart Disease	2 (18%)	6 (21%)	6 (46%)	
Obesity	2 (18%)	14 (48%)	6 (46%)	
Enhanced immunosuppression	1 (9%)	6 (21%)	1 (8%)	
Proteinuria	2 (18%)	13 (45%)	7 (58%)	0.05[c]

CITATION INFORMATION: Nahi S., Shetty A., Tanna S., Leventhal J. Characterizing Kidney Transplant Recipients with SARS-CoV-2: An Academic Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Nahi: None. **A. Shetty:** None. **S. Tanna:** None. **J. Leventhal:** Ownership Interest; Name of Commercial Interest; TRACT THERAPEUTICS. Ownership Interest; Nature of Relationship; FOUNDER.

Abstract# 63

Prevalence and Dynamics of SARS-COV-2 IgG in Kidney Transplant Recipients

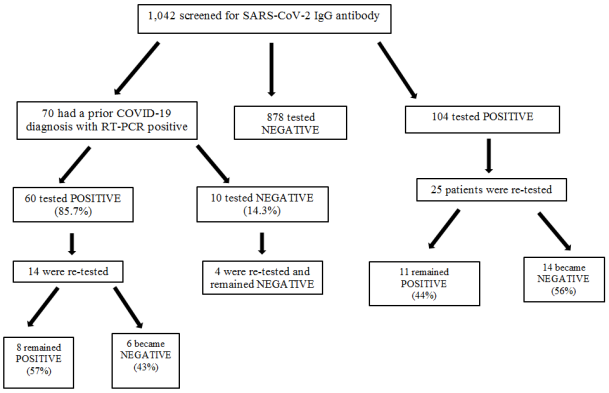
Y. Al Azzi, P. Loarte, C. Pynadath, O. Alani, L. Liriano-Ward, M. Ajaimy, R. Bartash, J. Graham, M. Le, H. Yaffe, S. Greenstein, J. Rocca, M. Kinkhabwala, E. Akalin, *Montefiore Medical Center, New York, NY*

Purpose: We aimed to investigate the prevalence and dynamics of SARS-CoV-2 IgG in kidney transplant recipients in the Bronx, New York, one of the epicenters of the pandemic

Methods: Between March 16 and November 30, 2020, 158 patients tested positive by SARS-CoV-2 RT-PCR. From May 3 to November 30, 2020, 1042 patients were screened for SARS-CoV-2 IgG antibodies and 164 (15.7%) were tested positive (Figure).

Results: Sixty of the 164 patients were previously diagnosed COVID-19 by RT-PCR, while the remaining 104 did not have significant symptoms and had not been previously tested by RT-PCR. Overall prevalence of COVID-19 diagnosis by RT-PCR and/or SARS-CoV-2 IgG in 1130 patients were 23.2%. Seventy RT-PCR positive patients were screened for SARS-CoV-2 IgG antibody at a median of 43 days post-diagnosis (IQR: 29-57) and 60 (85.7%) were positive. A total of 39 patients out 164 who previously tested positive for SARS-CoV-2 IgG (25 diagnosed with IgG and 14 with RT-PCR) were retested at a median time of 105 days (IQR: 83-116). Twenty patients (51.3%) became seronegative at a median time of 107 days (IQR: 87-134) from their first positive SARS-CoV-2 IgG. Six patients out of 14 (43%) who were diagnosed by positive RT-PCR became seronegative at a median time of 105 days (IQR: 83-166) from their first positive SARS-CoV-2 IgG while 14 patients out of 25 (56%) who were initially diagnosed by a positive SARS-CoV-2 IgG, became seronegative at a median time of 112 days (IQR: 91-138) from date of diagnosis

Conclusions: . In summary, 40% of kidney transplant recipients were asymptomatic or mildly symptomatic and developed SARS-CoV-2 IgG without requiring testing by SARS-CoV-2 RT-PCR. However, half of the patients who initially developed antibodies lost them over time raising the questions of lasting immunity against SARS-CoV-2 and how effective are those antibodies.



CITATION INFORMATION: Al Azzi Y., Loarte P., Pynadath C., Alani O., Liriano-Ward L., Ajaimy M., Bartash R., Graham J., Le M., Yaffe H., Greenstein S., Rocca J., Kinkhabwala M., Akalin E. Prevalence and Dynamics of SARS-COV-2 IgG in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Al Azzi: None. **P. Loarte:** None. **C. Pynadath:** None. **O. Alani:** None. **L. Liriano-Ward:** None. **M. Ajaimy:** None. **R. Bartash:** None. **J. Graham:** None. **M. Le:** None. **H. Yaffe:** None. **S. Greenstein:** None. **J. Rocca:** None. **M. Kinkhabwala:** None. **E. Akalin:** None.

Abstract# 64

The Impact of Covid-19 in Kidney Transplant Recipients: A Systematic Review and Meta-analysis

J. Kumar[1], J. Pyda[2], I. Reccia[3], F. VIrdis[4], P. Bachul[1], R. Barth[1], Y. Becker[1], J. Fung[1], P. Witkowski[1], *[1]University of Chicago, Chicago, IL, [2]Beth Israel, Boston, MA, [3]Imperial College, London, United Kingdom, [4]Royal London, London, United Kingdom*

Purpose: To determine pooled prevalence of clinical outcomes among hospitalized kidney transplant recipients with COVID-19 through meta-analysis.

Methods: A systematic database search between Dec1, 2019- Dec1, 2020, revealed twenty-nine studies, 875 renal transplant patients with COVID-19.

Results: The most prevalent symptoms were fever(83%), cough(65%), dyspnea(46%) and gastrointestinal(27%). The frequently observed co-morbidities were hypertension(86%), DM2 (34%), and cardiac disease(26%)(Table1,2). In-hospital mortality was 23%(95%CI,17%-29%); while, it increased significantly in ICU admissions 58%(95%CI,43%-74%) (P≤0.001)(Fig1A,B). Further, sub-group analysis showed significantly increased mortality risk in elderly(OR=3.40); however, no such association was observed in terms of time since transplant and gender(Fig1C-E).

Conclusions: To recapitulate, we observed a higher prevalence of dyspnea and gastrointestinal symptoms to general population. In-hospital mortality was similar to non-transplant population with high co-morbidities alongside and considered as important determinants of increased critical care admission, invasive ventilatory requirement. In-addition, observed higher mortality in elderly could be because of age-associated comorbidities.

Table 1: Summary statistics outlined as pooled estimates of outcomes of interest.

Attribute	Events	Total	Studies	**Single group summary (95%CI)**
Age(yrs)	NA	829	28	57.14 (54.49 - 59.80)
Male	573	875	29	0.70 (0.65 – 0.75)
DM2	260	659	22	0.34 (0.26 - 0.42)
Hypertension	564	648	22	0.86 (0.81 - 0.92)
Heart disease	158	615	18	0.26 (0.18 - 0.34)
Lung disease	147	495	10	0.20 (0.02 - 0.42)
Radiological evidence of pneumonia	385	529	23	0.84 (0.76 – 0.92)

Table 2: Summary statistics outlined as pooled estimate of outcomes of interests

Attribute	Events	Total	Studies	**Single group summary (95%CI)**
Fever	420	541	21	0.83 (0.76 – 0.90)
Cough	304	485	19	0.65 (0.57 – 0.73)
Dyspnea	239	537	21	0.46 (0.37 - 0.56)
Gastrointestinal symptoms	158	529	20	0.27 (0.22 - 0.33)
CNI withheld/reduced	246	618	22	0.50 (0.30 – 0.71)
MMF withheld/ reduced	461	554	22	0.89 (0.84 – 0.94)
Increase/pulse steroid	191	504	18	0.38 (0.23 – 0.54)

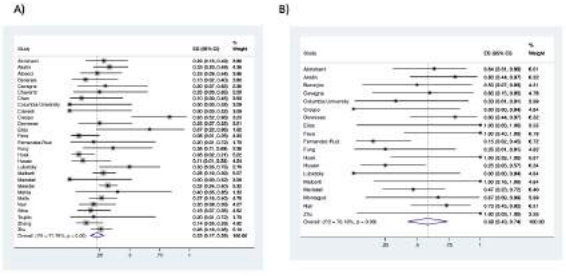


Fig 1. A) Pooled prevalence of hospital mortality in kidney transplant recipients diagnosed with COVID-19 was 20% with ES of 0.23 (95% CI 0.17 - 0.29).

Fig 1. B) Pooled prevalence of intensive care mortality was 58% with ES of 0.58 (95% CI 0.43 - 0.74). ES = Effect Size

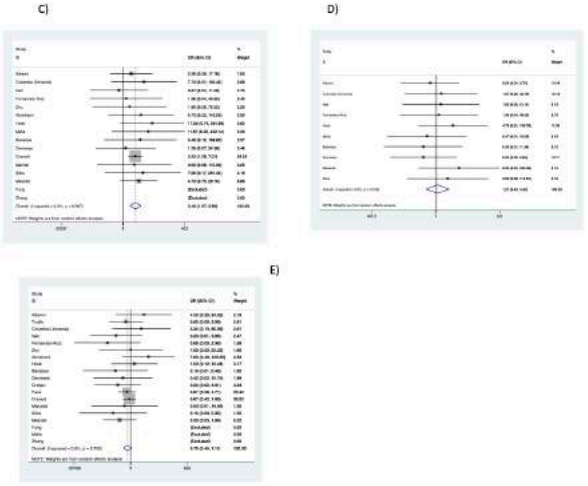


Fig 1 C) Figure shows significantly higher risk in ≥60/65 years group (red dotted line represents) with OR of 3.40 (95% CI 1.97-5.88).

Fig 1 D) Figure shows that both post-transplant period (>2 years) against (≤2 years) are comparable (red dotted line represents) with OR of 1.21 (95% CI 0.43-3.42).

Fig 1 E) Figure shows that both genders are comparable (red dotted line represents) with OR of 0.70 (95% CI 0.45-1.11).

CITATION INFORMATION: Kumar J., Pyda J., Reccia I., VIrdis F., Bachul P., Barth R., Becker Y., Fung J., Witkowski P. The Impact of Covid-19 in Kidney Transplant Recipients: A Systematic Review and Meta-analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Kumar: None. **J. Pyda:** None. **I. Reccia:** None. **F. VIrdis:** None. **P. Bachul:** None. **R. Barth:** None. **Y. Becker:** None. **J. Fung:** None. **P. Witkowski:** None.

Abstract# 65

Profile of SARS-CoV-2 Antibodies in Patients Awaiting Kidney Transplantation

L. Muir[1], A. Jaffer[2], C. Rees-Spear[1], V. Gopalan[2], F. Chang[2], G. Vaitkute[1], R. Fernando[3], C. Roustan[4], A. Rosa[4], C. Earl[4], A. Salama[2], P. Cherepanov[4], L. E. McCoy[1], R. Motallebzadeh[2], *[1]Institute of Immunity & Transplantation, University College London, London, United Kingdom, [2]Nephrology & Transplantation, Royal Free London Hospital NHS Trust, London, United Kingdom, [3]Anthony Nolan Institute, Royal Free London Hospital NHS Trust, London, United Kingdom, [4]The Francis Crick Institute, London, United Kingdom*

Purpose: Patients with end-stage kidney disease (ESKD) represent an extremely vulnerable group with many risk factors for adverse outcomes following SARS-CoV-2 infection. Key questions pertaining to ESKD patients awaiting transplantation include quantifying the rates of symptomatic & asymptomatic infection and determining if seroconverted patients have functional neutralising activity against SARS-CoV-2. The study of the immunological characteristics of COVID-19 in ESKD patients may help the design of an effective vaccination strategy against SARS-CoV-2 for potential transplant recipients.

Methods: Serum samples were analysed by direct ELISA to detect anti-SARS-CoV-2 IgG antibodies using a recombinant Spike $S1_{1-530}$ subunit and Nucleocapsid protein (NP). Recombinant human anti-SARS-CoV-2 mAbs that bind to spike RBD and NP were used as positive controls. Neutralization potency against SARS-CoV-2 was measured using HIV-1 luciferase-based pseudotype assays. Titres of neutralising antibodies were calculated as 50% inhibitory dose (ID50), expressed as the highest dilution of plasma which resulted in 50% reduction of luciferase luminescence compared with controls.

Results: 217 patients were on our wait-list as of May 2020 (115 receiving in-centre haemodialysis [ICHD], 41 on peritoneal dialysis and 61 pre-dialysis). 164 serum samples, of which 76% were obtained by June 2020 and coincided with the first peak of the pandemic in UK, were analysed. The observed seroprevalence of SARS-CoV-2 antibodies was 36% (95% CI 32-46). Seroconverted patients were more frail (median Clinical Frailty Scale score 3 [IQR: 3-4] vs 3 [IQR: 2-3]; p=0.02), mostly from BAME background (76.3% vs 52.4%, p=0.04), had higher prevalence of diabetes (27.1% vs 12.4%; p=0.02), and received ICHD (84.7% vs 60%; p=0.006). Levels of anti-S1 and anti-NP SARS-CoV-2 IgG strongly correlated with ID50 (r=0.58, p<0.0001 and r=0.41, p=0.004, respectively). Peak CRP levels were correlated with ID50 (r=0.30; p=0.05). There were significant declines of S1 and NP antibody titres as well as neutralising activity by a median of 90 days.

Conclusions: Analysis of SARS-CoV-2 antibodies and neutralising activity suggest robust functional responses are produced in infected ESKD patients, but titres wane significantly by 3 months. The level of functional immunity to SARS-CoV-2 in patients with ESKD may be used to risk stratify patients on national waiting-lists for renal transplantation and will help evaluate the efficacy of vaccination schedules in wait-listed patients once this becomes available.

CITATION INFORMATION: Muir L., Jaffer A., Rees-Spear C., Gopalan V., Chang F., Vaitkute G., Fernando R., Roustan C., Rosa A., Earl C., Salama A., Cherepanov P., McCoy L., Motallebzadeh R. Profile of SARS-CoV-2 Antibodies in Patients Awaiting Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Muir: None. **A. Jaffer:** None. **C. Rees-Spear:** None. **V. Gopalan:** None. **F. Chang:** None. **G. Vaitkute:** None. **R. Fernando:** None. **C. Roustan:** None. **A. Rosa:** None. **C. Earl:** None. **A. Salama:** None. **P. Cherepanov:** None. **L.E. McCoy:** None. **R. Motallebzadeh:** None.

Abstract# 66

Modification in Immunosuppression Regimens to Safely Perform Kidney Transplants Amid the Covid-19 Pandemic

L. Von Stein, O. Witkowsky, L. Samidurai, K. Flores, M. Doraiswamy, T. Pesavento, P. Singh, *The Ohio State University Wexner Medical Center, Columbus, OH*

Purpose: In the USA, there was a 51.1% reduction in kidney transplant (KTx) since March 2020 due to concerns for contraction of COVID-19 in transplant recipients. In our center, cumulative doses of ATG induction were reduced from 4-6mg/kg to 2-4 mg/kg in immunological high risk [HR] [age < 55 years, AA, cPRA > 20%, 2 DR mismatch, KP, retransplant], from ATG 2-4 mg/kg to 1-2 mg/kg in moderate-risk [MR] [age > 55 years, non-AA, CPRA <20% and <2 DR mismatch) and from ATG 0-2mg/kg to basiliximab for low risk [LR] patients [LDKT, age >65 years, cPRA < 20%, with 0 to 1 DR mismatch]. We used Tacrolimus and Myfortic as a maintenance agent and continued with a five-day rapid steroid withdrawal. This study assessed the effect of these changes on our transplant outcomes.

Methods: We conducted a retrospective chart review of all adults with KTx or KP from 3/1/2020 to 8/31/2020 with a follow-up of at least two months. Primary outcomes included the incidence of biopsy-proven rejection (BPAR), de-novo DSA, delayed graft function (DGF), infection rate, graft loss, and all causes of mortality.

Results: 180 KTx and 5 KP were reviewed with a median follow-up of 161 days [66, 250]. 13% were LDKT, and 11% retransplant. Median recipient age was 55 years [21, 78], and 28% were > 65 years old. 64% were white, and 63% were male. 46% of organs were PHS high-risk, median KDPI was 49 [2, 96], CIT 12 hours (2, 47).

Median donor creatinine was 1.3mg/dL (0.2, 7.15). 62% HR received ATG of 3-4mg/kg, 8% MR received 1-2mg/kg, and 30% LR received basiliximab. Creatinine nadir was 1.35mg/dL (0.52, 3.57). DGF was similar to the national average at 23%. 5% developed new DSA [MFI>2000]. Three patients had Banff 1a rejection. Patient 1 received basiliximab (LR) but likely rejected due to IS reduction during his COVID illness. Patients 2 and 3 both received ATG [HR] and were treated with increased IS and steroids. All three responded well to treatment. Three patients were diagnosed with COVID-19 and responded well to remdesivir, dexamethasone, and convalescent plasma. The median time of diagnosis from transplant was 90 days [12, 210], and the recent creatinine was 1.5mg/dL [1.2, 2.42]. 19% of CMV PCR (+) required dose reductions of IS, while 30% required CMV treatment. BK PCR of >10,000 was noted in 5.4% patients. Two graft losses occurred within a week of transplant secondary to the renal vein thrombosis. No mortality was noted.

Conclusions: With careful monitoring and reduction in induction immunosuppression, KT and KP transplants could be performed safely during the COVID pandemic.

CITATION INFORMATION: Von Stein L., Witkowsky O., Samidurai L., Flores K., Doraiswamy M., Pesavento T., Singh P. Modification in Immunosuppression Regimens to Safely Perform Kidney Transplants Amid the Covid-19 Pandemic *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Von Stein: None. **O. Witkowsky:** None. **L. Samidurai:** None. **K. Flores:** None. **M. Doraiswamy:** None. **T. Pesavento:** None. **P. Singh:** None.

Kidney

Kidney: Cardiovascular and Metabolic Complications

Abstract# 67

Cognition After Belatacept Conversion (CAB) Trial

W. Asch[1], K. Belfield[2], V. Do[2], E. Cohen[1], *[1]Yale University, New Haven, CT, [2]Yale New Haven Hospital, New Haven, CT*

Purpose: Extensive adverse effect profiles including neurotoxicity, manifesting as short-term memory loss, make CNIs less desirable despite their efficacy preventing acute rejection and increasing graft and patient survival. The increased risk for neurocognitive dysfunction induced by CNIs has been long recognized, but not well characterized by formal neurocognitive assessment. Furthermore, to what extent neurocognitive improvement occurs after CNI discontinuation is even less well known. Unlike improvements in renal function, which have an objective laboratory measure, improvements in neurocognition require more complex assessment to quantify.

Methods: Traditional cognitive assessment instruments are time intensive, costly, and ideally are administered by a formally trained assessor. The NIH Toolbox Cognition Battery (NIHTB-CB) offers many of the advantages of a traditional assessment, but via a semi-automated computer program administered on an iPad platform. Testing takes less than 45 minutes to administer and our team rapidly mastered the testing procedure and software interface. We performed a pilot study using the NIHTB-CB to measure neurocognitive function in 20 patients converted from tacrolimus to belatacept immunosuppression. A test-retest study design was utilized whereby patients were assessed prior to conversion to belatacept and retested within 6 months following discontinuation of tacrolimus.

Results: Patients experienced a statistically significant improvement in raw test scores for: Attention & Executive Function, Episodic Memory, Processing Speed, and the Cognition Fluid Composite Scores. A trend toward an improvement in Working Memory was also seen but did not achieve statistical significance. Executive Function did not show any changes following conversion (see Table). Scores remained on average below the general population mean even after normalizing for age, educational level, ethnicity, and sex.

Conclusions: Our pilot study assessing Cognition after Belatacept conversion substantiates the patient reported perception that cognitive function is mildly impaired on tacrolimus and demonstrates that recovery of this impairment is possible following conversion to belatacept. Furthermore, this pilot study confirms that neurocognitive assessment can be performed by transplant clinicians in the clinic setting using the NIHTB-CB testing platform.

Construct	Raw Score Improvement (%)	Effect Size: (μ1-μ0)/SD	p-value
Attention Executive Functioning	7%	0.67	0.004
Episodic Memory	9%	0.54	0.03
Working Memory	5%	0.41	0.09
Executive Function	0%	0.12	0.86
Processing Speed	11%	0.58	0.01
Cognition Fluid Composite	9%	1.01	0.0005

CITATION INFORMATION: Asch W., Belfield K., Do V., Cohen E. Cognition After Belatacept Conversion (CAB) Trial *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Asch: Other; Name of Commercial Interest; Amplyx Therapeutics, InRegen, Medeor Therapeutics. Other; Nature of Relationship; Other. Other; If "Other" Please Explain; Site PI Clinical Trial, Funds Paid to Institution. **K. Belfield:** None. **V. Do:** None. **E. Cohen:** None.

Abstract# 68

Insulin Secretion and Insulin Resistance Trajectories Over 1 Year After Kidney Transplantation: A Multicenter Prospective Cohort Study

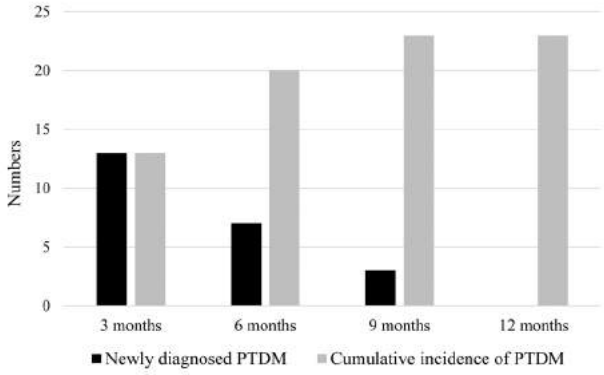
B. Jun Bae, C. Oh, *Department of Surgery, Ajou University Medical School, Suwon, Korea, Republic of*

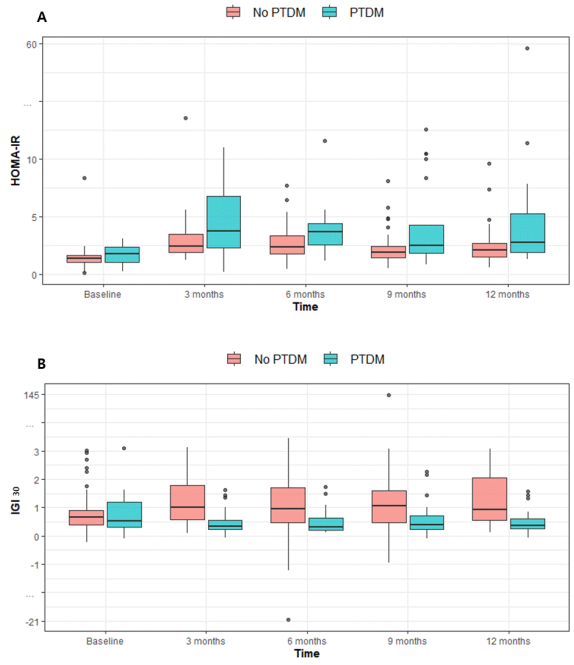
Purpose: We investigated the changing patterns of insulin secretion and resistance and risk factors contributing to the development of post-transplant diabetes mellitus (PTDM) in kidney recipients under tacrolimus-based immunosuppression regimen during 1 year after transplantation.

Methods: This was a multicenter prospective cohort study. Of the 168 subjects enrolled in this study, we analyzed a total 87 kidney transplant recipients without diabetes which was assessed by oral glucose tolerance test before transplantation. We evaluated the incidence of PTDM and followed up the index of insulin secretion (insulinogenic index [IGI]) and resistance (homeostatic model assessment for insulin resistance [HOMA-IR]) at 3, 6, 9 months, and 1 year after transplantation by oral glucose tolerance test and diabetes treatment. We also assessed the risk factors for incident PTDM.

Results: PTDM developed in 23 of 87 subjects (26.4%) during 1 year after transplantation. More than half of total PTDM (56.5%) occurred in the first 3 months after transplantation. During 1 year after transplantation, insulin resistance (HOMA-IR) was increased in both PTDM and no PTDM group. In no PTDM group, the increase in insulin secretory function to overcome insulin resistance was also observed. However, PTDM group showed no increase in insulin secretion function (IGI). Old age, status of prediabetes and episode of acute rejection were significantly associated with the development of PTDM

Conclusions: In tacrolimus-based immunosuppressive drugs regimen, impaired insulin secretory function for reduced insulin sensitivity contributed to the development of PTDM than insulin resistance during 1 year after transplantation





CITATION INFORMATION: Jun Bae B., Oh C. Insulin Secretion and Insulin Resistance Trajectories Over 1 Year After Kidney Transplantation: A Multicenter Prospective Cohort Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: **B. Jun Bae:** Grant/Research Support; Name of Commercial Interest; Chong Kun Dang (Seoul, Korea). **C. Oh:** Grant/Research Support; Name of Commercial Interest; Chong Kun Dang (Seoul, Korea)..

Abstract# 69

The Impact of 4-weeks of Supervised Exercise on Frailty and Lower Extremity (LE) Function in Patients with Advanced Chronic Kidney Disease (CKD)

E. Lorenz, L. Hickson, R. Weatherly, K. Thompson, M. Hogan, C. Kennedy, *Mayo Clinic, Rochester, MN*

Purpose: Although frailty is a modifiable risk factor for morbidity and mortality among kidney transplant (KT) candidates, the optimal duration of effective prehabilitation interventions is unknown. We have previously shown that 8-weeks of supervised exercise is associated with improved frailty parameters, quality of life (QOL), and LE function in patients with advanced CKD, including KT candidates. The objective of this study was to examine whether only 4-weeks of supervised exercise is also associated with improved frailty parameters, QOL, and LE function.
Methods: We conducted a prospective, pilot study between 7/2018 and 5/2020 involving adults with ≥ stage 4 CKD who were 1) frail or pre-frail by Fried phenotype and/or 2) had a Short Physical Performance Battery (SPPB) score ≤ 10. Quality of life was measured using the Kidney Disease Quality of Life (KDQOL) survey. The intervention consisted of 4-weeks of twice weekly supervised exercise sessions (8 sessions) in our pulmonary rehabilitation unit. Pre- and post-intervention comparisons were made using Wilcoxon signed-rank test for continuous variables and McNemar's test for categorical variables.
Results: We enrolled 35 participants of whom 27 (77%) completed the intervention. We excluded two participants whose intervention was interrupted by the COVID-19 pandemic. Of the remaining 25 participants, median age was 62 (range 40-87) years, 56% were male, 64% were on dialysis, and 84% had been evaluated for KT. Following the intervention, 67% of participants who were frail at baseline improved their frailty score (n=6/9). No improvement in grip strength was observed. However, multiple other parameters improved significantly, including fatigue, walking time, balance scores, and chair stand scores.

Outcomes at baseline compared to 4-weeks				
Outcome	Baseline	After 4-weeks	Median difference	p-value
Wasting	32.0% (n=8/25)	24.0% (n=6/25)		0.32
Fatigue (per KDQOL)	42.5 [0 to 75.0]	50.0 [20.0 to 70.0]	5.0 [-15.0 to 50.0]	0.02
Low physical activity	36.0% (n=9/25)	16.0% (n=4/25)		0.06
Walking time (s)	5.1 [3.4 to 8.5]	4.1 [2.5-5.5]	-1.1 [-3.9 to 0.7]	<0.0001
Grip strength (kg)	24.5 [9.8 to 80.6]	23.1 [11.6 to 89.8]	0.7 [-7.6 to 10.5]	0.59
Balance score	3 [1 to 4]	4 [1 to 4]	0 [-1 to 2]	0.05
Chair stand score	1 [0 to 4]	2 [0 to 4]	0 [-2 to 2]	0.04

Conclusions: Our pilot study suggests that 4-weeks of supervised exercise is associated with improved fatigue, walking time, balance scores, and chair stand scores among patients with advanced CKD. Longer interventions, however, may be required to modify grip strength. This study provides important preliminary data for future studies aimed at designing effective prehabilitation strategies prior to KT.
CITATION INFORMATION: Lorenz E., Hickson L., Weatherly R., Thompson K., Hogan M., Kennedy C. The Impact of 4-weeks of Supervised Exercise on Frailty and Lower Extremity (LE) Function in Patients with Advanced Chronic Kidney Disease (CKD) *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Lorenz: None. **L. Hickson:** None. **R. Weatherly:** None. **K. Thompson:** None. **M. Hogan:** None. **C. Kennedy:** None.

Abstract# 70

Growth Differentiation Factor 15 Predictor Value is Superior to Troponin I in the Evaluation of Kidney Transplant Candidates

M. de Cos Gomez[1], M. Garcia Unzueta[2], A. Benito Hernandez[1], J. Mazon Ruiz[1], M. Perez Arnedo[1], A. Aguilera Fernandez[1], R. Valero San Cecilio[1], J. Ruiz San Millan[1], E. Rodrigo Calabia[1], *[1]Nephrology, Marques de Valdecilla University Hospital - IDIVAL, Santander, Spain, [2]Clinical Analysis, Marques de Valdecilla University Hospital - IDIVAL, Santander, Spain*

Purpose: Pretransplant cardiac troponin I (cTNI) has demonstrated its predictor value of survival after kidney transplant in previous studies. Growth differentiation factor 15 (GDF-15) is a biomarker currently studied as a predictor of mortality and cardiovascular events (CVE) in multiple scenarios. The aim of this study is to compare the utility of cTNI and GDF-15 to predict posttransplant mortality and CVE in a cohort of kidney transplant recipients.
Methods: We included 359 kidney transplants performed between 2005 and 2015. cTNI and GDF-15 were measured on stored serum samples obtained pretransplant. Information about patients was extracted from the prospectively maintained database of renal transplant recipients at our center.
Results: Receptors had a median age of 54.1 and were 67.4% male. 22% were diabetic before the transplant, whereas 9.5% and 8.1% had prior history of coronary and peripheral artery disease respectively. 16.5% transplants were performed preemptively. Median GDF-15 was 5346.4 (R=50.5-18607.3) pg/ml and median cTNI was 5.6 (R=2.5-691.4) ng/l. Patients were stratified in tertiles according to GDF-15 and cTNT levels. In the univariate analysis, higher levels of GDF-15 significantly related to overall mortality, stroke, acute coronary syndrome and major adverse cardiovascular events (MACE). Higher cTNI related to cardiovascular mortality, acute coronary syndrome and MACE, but not overall mortality (Log Rank p=0.4). By multivariate cox analysis, including both biomarkers and clinical characteristics (age, diabetes, prior coronary and peripheral artery disease and pretransplant renal replacement therapy), the relation between survival and GDF-15 remained significant for the highest tertile (HR 2.2 CI95% (1.2-4.1), p = 0.01). GDF-15 relation with cerebrovascular accidents and MACE remained significant after the adjustment by clinical characteristics [HR 9.7 CI95% (2.2-43.1), p = 0.003 and HR 2.7 CI95% (1.4-5.1), p = 0.002] for the highest risk tertile. On the contrary, posttransplant acute coronary syndrome was only related to cTNI tertiles and previous coronary artery disease in the multivariate model [HR 3.2 CI95% (1.5-7.3), p = 0.003 for the highest cTNI tertile].
Conclusions: Our study highlights the potential utility of GDF-15 as a predictor of mortality and cardiovascular adverse events after transplant. By contrast, cardiac troponin was only related to acute coronary events, probably due to its specific production in myocardial tissue. Altogether, these two molecules could have high clinical potential in conjunction with clinical characteristics to better predict adverse events after kidney transplantation and find strategies to prevent them.
CITATION INFORMATION: de Cos Gomez M., Garcia Unzueta M., Benito Hernandez A., Mazon Ruiz J., Perez Arnedo M., Aguilera Fernandez A., Valero San

Cecilio R., Ruiz San Millan J., Rodrigo Calabia E. Growth Differentiation Factor 15 Predictor Value is Superior to Troponin I in the Evaluation of Kidney Transplant Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. de Cos Gomez: None. **M. Garcia Unzueta:** None. **A. Benito Hernandez:** None. **J. Mazon Ruiz:** None. **M. Perez Arnedo:** None. **A. Aguilera Fernandez:** None. **R. Valero San Cecilio:** None. **J. Ruiz San Millan:** None. **E. Rodrigo Calabia:** None.

Abstract# 71

Intensive Blood Pressure Control Preserves Kidney Allograft Function

K. A. Agarwal[1], U. K. Agarwal[2], G. S. Silva[3], K. J. Pollick[3], M. Pavlakis[1], *[1]Transplant Institute, Beth Israel Deaconess Medical Center, Boston, MA, [2]Biostatistics consultant, Boston, MA, [3]Beth Israel Deaconess Medical Center, Boston, MA*

Purpose: Kidney transplant recipients (KTRs) are at higher risk of major adverse cardiovascular events compared to the general population, with HTN being a crucial risk factor. BP targets for KTRs remain elusive. The 2009 KDIGO target of SBP<130 was based on studies in CKD population. The SPRINT trial, adopted by AHA, showed lower mortality with an intensive SBP goal (<130). We studied the effect of intensive BP control in KTRs.
Methods: This retrospective cohort analysis included adult KTRs performed between 1/1/2002-12/31/2015 at a single academic center. BP, serum creatinine and urine protein-creatinine ratio (UPCR) were followed at 3-month intervals for 5 years after kidney transplant. Patients were divided into 3 groups based on their mean SBP (mmHg): <=120, 121-130 and >130. eGFR was calculated at 12 and 60 months using the MDRD equation. Primary outcomes were patient survival, graft survival and an eGFR decline of 25% or greater in the 5 years of follow up. Graft failure was defined as new diagnosis of ESRD post-transplant. Comparison of categorical variables was done using Pearson Chi^2 test and continuous variables using Kruskal Wallis H test. Patient and graft survival were studied using Kaplan Meier survival analysis.
Results: Table 1 & 2. Patients with mean SBP 121-130 had better patient and graft survival (Fig 1). Higher proportion of patients with SBP>130 suffered a decline of 25% or greater in their GFR and had a UPCR>1g/g during the 5-year follow-up as compared to those with SBP<=130 (Table 2).
Conclusions: In this cohort, most patients had average SBP>130. We show that a SBP of 121-130 mmHg is associated with improved patient and graft survival compared both to higher (>130) or lower (<=120) mean values as well as slower decline of renal allograft function.

Table 1: Baseline characteristics

	Total (n=473)	SBP<=120 (n=73)	SBP 121-130 (n=122)	SBP>130 (n=278)	p-value
Males	295 (62.4%)	33 (45.2%)	75 (61.5%)	187 (67.3%)	0.002
Age in years (mean, min-max)	52.9 (23-82)	47.7 (29-69)	51.8 (23-82)	54.9 (25-78)	0.0001
Mean SBP (mmHg)	134 +/- 13.9	113.7 +/- 5.7	125.7 +/- 2.7	142.9 +/- 9.9	0.0001
Mean DBP (mmHg)	76.6 +/- 9.7	72.3 +/- 5.9	74.9 +/- 8.0	78.5 +/- 10.6	0.0001
Mean eGFR at 12mo (mL/min)	51.5 +/- 18.4	55.3 +/- 20.3	53.9 +/- 18.6	49.5 +/- 17.5	0.0065
Mean eGFR at 60mo (mL/min)	51.8 +/- 21.5	55.5 +/- 20.8	54.8 +/- 20.9	49.4 +/- 21.7	0.014

Table 2: Outcomes.

	Total (n=473)	SBP<=120 (n=73)	SBP 121-130 (n=122)	SBP>130 (n=278)	p-value
Patients with eGFR decline >=25%	15.9%	11.9%	12.2%	18.8%	0.22
Spot UPCR<0.5g/g	74.3%	81.5%	82%	69.4%	0.025
Spot UPCR 0.5-0.9g/g	9.5%	3%	9%	11.2%	0.025
Spot UPCR >=1g/g	16.2%	15.4%	9%	19.4%	0.025

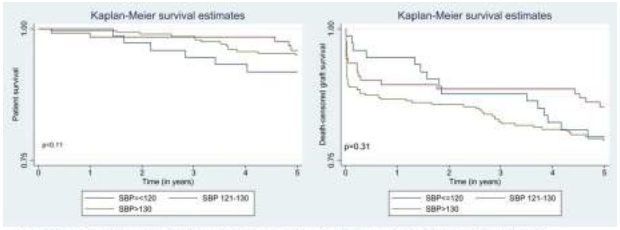


Fig.1: Kaplan-Meier curves showing a) Patient survival and b) Death-censored graft survival.

CITATION INFORMATION: Agarwal K., Agarwal U., Silva G., Pollick K., Pavlakis M. Intensive Blood Pressure Control Preserves Kidney Allograft Function *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.A. Agarwal: None. **U.K. Agarwal:** None. **G.S. Silva:** None. **K.J. Pollick:** None. **M. Pavlakis:** Grant/Research Support; Name of Commercial Interest; Medeor Therapeutics Inc.

Abstract# 72

Outcomes of Kidney Transplantation in Patients with Prosthetic Heart Valves

H. Ouahmi, *Nephrology, Dialysis, Transplantation, Nice University Hospital, Nice, France*

Purpose: Due to the aging of the population, a growing number of patients with end-stage kidney disease (ESKD) require cardiac valve replacement. As a consequence, the number of kidney transplant candidates with prosthetic heart valves (PHVs) is increasing. Yet, outcomes of kidney transplantation in these patients are unknown. We provide the first report of post-transplant outcomes in patients with prosthetic heart valves at time of kidney transplantation.
Methods: We conducted a matched cohort study among kidney transplant recipients from the French multicentric and prospective DIVAT cohort. We compared post-transplant outcomes in patients with left-sided PHVs at time of kidney transplantation (2000-2019) and a population of recipients without PHV matched for re-transplant dialysis time, recurrent renal disease, diabetes, cardiovascular events and pre-transplant donor-specific antibodies. Cox proportional hazards regression was used to identify independent predictors of death.
Results: Of 23018 kidney transplant recipients in the database, 368 were included in the study, 92 (0.4%) of whom had a PHV at time of transplantation and 276 had not. Delayed graft function and post-operative bleeding occurred more frequently in patients with PHVs than in those without PHV (34.8% vs 14.1%, p<0.0001 and 47.8% vs 11.6 %, p<0.0001, respectively). Kidney graft survival was similar between groups. 5-year overall survival was 68.5 % in patients with PHV versus 87.9 % in patients without PHV (HR, 2.72 [1.57-4.70], p=0.0004 by log-rank). Deaths from infection, endocarditis and bleeding were significantly more frequent in patients with PHV (14.1% vs 4.7%, p=0.004; 3.2% vs 0.4%, p=0.049; 3.3% vs 0%, p=0.02; respectively). In contrast with a bioprosthetic valve, a mechanical valve at time of transplantation was an independent risk factor for mortality (HR, 2.89 [1.68-4.97], p=0.0001) together with recipient age, pre-transplant dialysis time, diabetes and cardiac events.
Conclusions: ESKD patients with prosthetic heart valves have high mortality rates after kidney transplantation (more than 30% at 5 years post-transplantation). These data suggest that mechanical valves, but not biological valves, increase risks of post-transplant mortality, which has to be considered when choosing the type of prosthetic heart valve in ESKD patients eligible for kidney transplantation.
CITATION INFORMATION: Ouahmi H. Outcomes of Kidney Transplantation in Patients with Prosthetic Heart Valves *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Ouahmi: None.

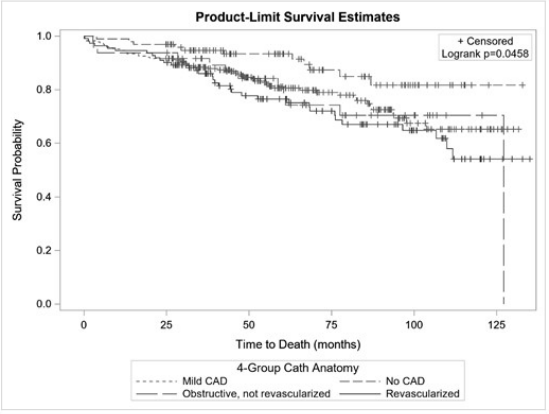
Abstract# 73

Correlation of Coronary Anatomy and Interventions with Post-kidney Transplantation Outcomes

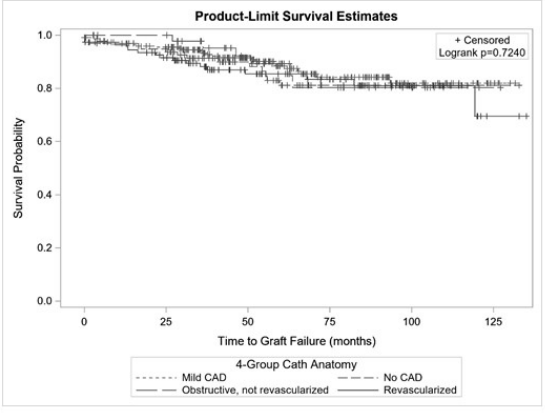
A. Sharma, T. Teigeler, D. Kumar, S. Moldowan, C. Bhati, G. Gupta, L. Kang, M. Levy, *Virginia Commonwealth University, Richmond, VA*

Purpose: There is considerable variation in the preoperative coronary evaluation before kidney transplantation (KT) and subsequent reporting of outcomes.
Methods: Patients who received a KT (from 05/2009 to 05/2018) at our center, as well as a cardiac catheterization within the preceding five years were studied. The *primary outcome* was defined as a postoperative composite adverse event of acute myocardial infarction (MI), urgent revascularization, new reduction in left ventricular ejection fraction (LVEF), peri-operative hemodynamic instability, and 30-day patient death or graft loss. Long-term patient and graft survival were followed.
Results: 484 KT recipients were divided into four groups based on coronary anatomy : no coronary disease (n=96), mild disease without obstruction (n=229), obstructive disease with revascularization (n=110), and obstructive disease without complete revascularization (n=49). There was no significant difference in the composite adverse events between the groups (21%, 28%, 30%, and 24%, respectively;

p=0.46). There was significant difference in patient survival between the four groups (Figure 1) but no significant difference in graft survival was observed (Figure 2). In multivariable regression analyses, coronary anatomy groups were not significantly associated with the primary outcome. Recipient age at transplant (OR=1.71, p=0.03) and history of severe valvular dysfunction (OR=10.53, p=0.02) were significantly associated with composite early adverse events. Recipient age at transplant, history of diabetes and LVEF significantly impacted patient survival, regardless of the coronary anatomy. History of MI was the only factor that significantly increased the risk of graft failure (HR=3.57, p=0.02), regardless of the way coronary anatomy was grouped.
Conclusions: Pre-transplant coronary interventions may result in good short-term outcomes but long-term patient survival after KT may still be adversely affected by CAD. Advanced age and severe valvular dysfunction may predict adverse events early after KT. There is a need to develop post-transplant protocols for monitoring recurrent or new onset CAD in KT recipients.



Patient survival after kidney transplantation



Graft survival after kidney transplant

CITATION INFORMATION: Sharma A., Teigeler T., Kumar D., Moldowan S., Bhati C., Gupta G., Kang L., Levy M. Correlation of Coronary Anatomy and Interventions with Post-kidney Transplantation Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Sharma: None. **T. Teigeler:** None. **D. Kumar:** None. **S. Moldowan:** None. **C. Bhati:** None. **G. Gupta:** None. **L. Kang:** None. **M. Levy:** None.

Abstract# 74

Kidney Transplant Recipients Who Had Covid-19 Prior to Transplant: A Single-center Experience

S. Sultan, M. Aull, R. Craig-Schapiro, E. C. Liu, J. H. Lee, S. Kapur, *New York Presbyterian / Weill Cornell, New York, NY*

Purpose: In the early recovery phase after the initial surge of the COVID-19 pandemic, a question emerged in the context of resuming transplant activity: should a patient who had recovered from COVID-19 be eligible for transplant, and under what conditions? Here we report our early experience of patients who had recovered from COVID-19 and then subsequently underwent kidney transplantation.
Methods: Patients who were known to have COVID-19 were required to be fully asymptomatic and to have a negative PCR test prior to being eligible to undergo transplant, but no specific waiting period was required. A retrospective chart review was performed on patients who underwent transplant between 6/3/2020 and 7/30/2020, allowing for at least 3 months of post-transplant follow-up. During this period we adjusted our protocol to reduce the total dose of anti-thymocyte globulin for induction, from a historical dose of 6 mg/kg, now to 4.5mg/kg in three divided doses, while the maintenance immunosuppression was unchanged.
Results: In the study period, there were 10 patients who were known to have had COVID-19, by a PCR test, who then underwent kidney transplant. The average duration between the first COVID test and the date of transplant was 97 days (range 47 - 137). All patients demonstrated the presence of antibodies, at a mean duration of 96 days (range 32 - 164) after the PCR test. There were 8 males and 2 females. The average age at the time of transplant was 51.3 years (range 31.0 - 68.7). There were 7 living donors and 3 deceased donors. There were no episodes of respiratory failure and no deaths. There were no cases of biopsy-proven acute rejection, or graft thrombosis. There was 1 case of recurrent FSGS, which was treated. There was 1 graft loss relating to a severe neurologic decompensation of unclear etiology and the resulting inability to tolerate immunosuppression. This patient had a positive PCR test 42 days post-transplant, but other PCR tests before and after that point were negative. In the remaining 9 cases with functioning grafts, the average Cr at 3 months of follow-up was 1.71 mg/dL (range 1.1 - 3.89).
Conclusions: In this small series with short-term follow-up, outcomes of patients who previously had COVID-19 and then underwent kidney transplant were generally good. However, caution is still advised until larger experiences and longer-term data are published.
CITATION INFORMATION: Sultan S., Aull M., Craig-Schapiro R., Liu E., Lee J., Kapur S. Kidney Transplant Recipients Who Had Covid-19 Prior to Transplant: A Single-center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Sultan: None. **M. Aull:** None. **R. Craig-Schapiro:** None. **E.C. Liu:** None. **J.H. Lee:** None. **S. Kapur:** None.

Pediatric Kidney

Abstract# 75

Racial and Ethnic Disparities in Pediatric Kidney Transplantation - Has KAS Made a Difference?

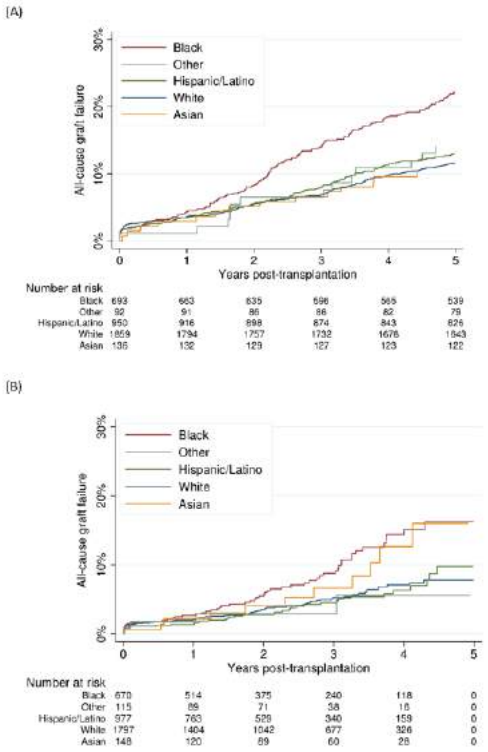
O. Charnaya[1], S. Yu[2], A. Goldberg[3], J. Garonzik-Wang[2], D. Segev[2], P. Verghese[4], *[1]Pediatrics, Johns Hopkins University, Baltimore, MD, [2]Transplant Surgery, Johns Hopkins University, Baltimore, MD, [3]University of Manitoba, Winninpeg, MB, Canada, [4]Northwestern University Feinberg School of Medicine, Chicago, IL*

Purpose: Racial and ethnic minority pediatric transplant candidates have known disparities in access to kidney transplantation. The Kidney Allocation System (KAS), implemented in 2014, was designed in part to alleviate some of these disparities thereby making transplant more equitable. We investigated the effect of KAS on reported disparities.
Methods: We utilized Scientific Registry of Transplant Recipients (SRTR) data to determine differences in new waitlist registrants, deceased donor (DDKT) and living donor kidney transplants (LDKT), HLA mismatch, and allograft survival among pediatric patients of different racial and ethnic backgrounds.
Results: Black pediatric patients represented 21.3% of new waitlist registrants pre-KAS and 18.9% post-KAS. Waitlist time increased for pediatric patients of all races post-KAS with the highest increase (131 days) in Asian patients ($p < 0.01$). The racial distribution of DDKT pre- and post-KAS was unchanged (White 38.4% vs 38.3%, Black 24.5% vs 22.5%, Hispanic 30.6% vs 31.1%, Asian 3.7% vs 4.4%, $p = 0.12$). Similarly, LDKT racial distribution pre- and post-KAS did not differ (White 68.9% vs 68.7%, Black 8.7% vs 9.3%, Hispanic 16.8% vs 16.9%, Asian 3.5% vs 3.2%, $p = 0.97$) and still occurs less frequently in Black and Asian patients. The 3-yr graft failure rate is disproportionately worse in Black children compared to other races pre- and post-KAS (White 6.8% vs 5.3%, Black 14% vs 8.7%, Hispanic 8% vs 4.5%, Asian 6.6% vs 6.7%, Other 6.5% vs 2.9%) although there is a trend towards better graft survival in the post-KAS era. Graft survival worsened in Asian children in the post-KAS era ($HR_{1.05}2.34_{5.25}$, p=0.038).
Conclusions: Racial and ethnic disparities in pediatric ESRD patients have not been ameliorated by KAS. Children of color have longer waitlist time and are more likely to have graft failure. Alarmingly, allograft failure rate increased in Asian patients post-KAS, which merits further evaluation.

Table 1: Demographic data and univariate analysis by race in pre-KAS (2010-2014) and post-KAS (2015-2019) eras among pediatric KT patients.

		Time Eras		
		2010 - 2014	2015 - 2019	p-value
New Waitlist Registrants		N=4805	N=5178	0.001
	White	2150 (44.7%)	2416 (46.7%)	
	Black	1025 (21.3%)	978 (18.9%)	
	Hispanic	1312 (27.3%)	1365 (26.4%)	
	Asian	193 (4.0%)	245 (4.7%)	
	Other	125 (2.6%)	174 (3.4%)	
Dialysis time prior to listing (days)				
	White	232 (81, 522)	277 (107, 565)	0.008
	Black	295 (123, 608)	319 (140, 698)	0.12
	Hispanic	264 (115, 527)	293 (130, 623)	0.034
	Asian	186 (91, 469)	228 (108, 517)	0.17
	Other	310 (133, 720)	359 (128, 679)	0.86
Wait Time (listing to KT)		N=3730	N=3707	
	White	91 (10, 233)	146 (53, 320)	<0.001
	Black	160 (54, 375)	190 (69, 433)	0.016
	Hispanic	167 (53, 412)	200 (74, 476)	<0.001
	Asian	125 (18, 270)	256 (102, 520)	<0.001
	Other	101 (41, 280)	191 (62, 428)	0.004
DDKT		N=2333	N=2465	0.12
	White	897 (38.4%)	944 (38.3%)	
	Black	572 (24.5%)	555 (22.5%)	
	Hispanic	715 (30.6%)	767 (31.1%)	
	Asian	87 (3.7%)	108 (4.4%)	
	Other	62 (2.7%)	91 (3.7%)	
KDPI, median (IQR)				
	White	14 (7, 27)	13 (6, 23)	0.008
	Black	15 (7, 29)	14 (7, 23)	0.017
	Hispanic	12 (6, 24)	13 (5, 22)	0.66
	Asian	13 (7, 31)	13 (6, 20)	0.079
	Other	15 (8, 23)	13 (5, 21)	0.26
LDKT		N=1397	N=1242	0.97
	White	962 (68.9%)	853 (68.7%)	
	Black	121 (8.7%)	115 (9.3%)	
	Hispanic	235 (16.8%)	210 (16.9%)	
	Asian	49 (3.5%)	40 (3.2%)	
	Other	30 (2.1%)	24 (1.9%)	
Antigen Mismatch #				
	White	4 (3, 5)	4 (3, 5)	0.027
	Black	5 (4, 5)	5 (4, 5)	0.92
	Hispanic	4 (3, 5)	4 (3, 5)	0.42
	Asian	4 (3, 5)	4 (3, 5)	0.98
	Other	4 (3, 5)	4 (3, 5)	0.23

Figure 1: Kaplan-Meier curve of allograft failure in pediatric patients (A) pre-KAS 2010 – 2014 and (B) post-KAS 2015 – 2019.



CITATION INFORMATION: Charnaya O., Yu S., Goldberg A., Garonzik-Wang J., Segev D., Verghese P. Racial and Ethnic Disparities in Pediatric Kidney Transplantation - Has KAS Made a Difference? *AJT, Volume 21 Supplement 3*

DISCLOSURES: O. Charnaya: None. **S. Yu:** None. **A. Goldberg:** None. **J. Garonzik-Wang:** None. **D. Segev:** None. **P. Verghese:** None.

Abstract# 76

Hla Antigens and Recurrence of Focal Segmental Glomerulosclerosis in Pediatric Kidney Transplantation

B. I. Shaw[1], A. Ochoa[2], C. Chan[2], R. A. Gbadegesin[3], A. M. Jackson[1], E. T. Chambers[3], *[1]Surgery, Duke University, Durham, NC, [2]Biostatistics and Bioinformatics, Duke University, Durham, NC, [3]Pediatrics, Duke University, Durham, NC*

Purpose: Recurrence of focal segmental glomerulosclerosis (FSGS) reduces graft survival yet risk factors remain elusive. While HLA risk alleles are known to be associated with primary nephrotic syndrome, we sought to determine the role of HLA in post-transplant recurrence.

Methods: Kidney transplant recipients under 19 years old diagnosed with FSGS were obtained from the Scientific Registry of Transplant Recipients. Simple logistic regression was performed to relate recipient HLA antigen and recurrence. The false discovery rate was controlled using the Benjamini-Hochberg method. For recipient HLA antigens associated with recurrence, we also examined the association of donor HLA and concordance between donor and recipient HLA and recurrence. Multiple logistic regression including HLA and clinical characteristics was performed to predict recurrence.

Results: Recipients who recurred were younger and had lower albumin; no association between deceased or living donor type and recurrence was seen (**Table 1**). Recipient HLA antigens B13, DR7, DR53, and DQ2 were associated with increased recurrence while DQ7, DQ6, DR52, B58 and C3 were associated with decreased recurrence (**Figure 1A**). HLA-DR7, DQ2, and DR53 presented as co-linear variables and represented a potential risk phenotype for recurrence (OR 1.92 95% CI [1.44-2.50]). This risk phenotype was associated with a shorter recurrence free survival (**Figure 1B**, Logrank p<0.0001). Donor organs with the risk phenotype did not significantly increase risk of recurrence, even in cases where recipient and donor both possessed the risk phenotype. DQ7 concordance between donor and recipient was associated with decreased recurrence (OR 0.36 95% CI [0.22-0.59]). Our multivariable model had moderate predictive value (c-statistic 0.67).

Conclusions: Certain HLA antigens were found to associate with either increased or decreased risk of recurrent FSGS post-transplantation. Validation of HLA risk alleles could impact risk assessment and donor selection in this population.

Patient Characteristics			
	No Recurrence N=943	**Recurrence N=388**	**p-value**
Gender(F)-n(%)	399(42)	173(45)	0.45
Age at Transplant-Med(IQR)	16(12-18)	14(10-17)	<0.001
Race Asian Black Multi Native Pacific White	 29(3) 364(39) 13(1) 5(1) 3(0) 529(56)	 7(2) 131(34) 7(2) 2(1) 5(1) 236(61)	0.11
Ethnicity(Latino)-n(%)	265(28)	87(22)	0.033
Deceased Donor-n(%)	705(75)	278(72)	0.24
Living Related Donor-n(%)	184(20)	84(22)	0.38
Albumin(g/dL)-Med(IQR)	3.7(3.2-4.2)	3.3(2.3-3.8)	<0.001

Figure 1

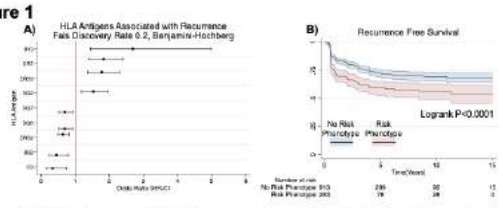


Figure Legend: A) HLA antigens associated with recurrence after controlling for the false discovery rate using the Benjamini-Hochberg method at a rate of 20%. **B)** Recurrence free survival stratified by the risk phenotype.

CITATION INFORMATION: Shaw B., Ochoa A., Chan C., Gbadegesin R., Jackson A., Chambers E. Hla Antigens and Recurrence of Focal Segmental Glomerulosclerosis in Pediatric Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: B.I. Shaw: None. **A. Ochoa:** None. **C. Chan:** None. **R.A. Gbadegesin:** None. **A.M. Jackson:** None. **E.T. Chambers:** None.

Abstract# 77

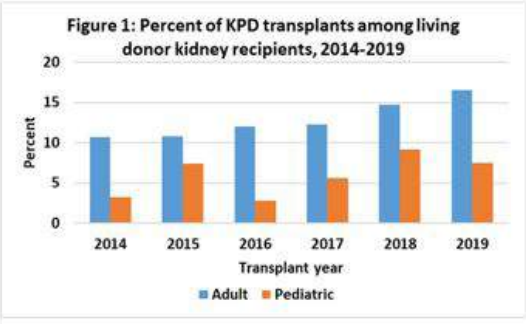
Kidney Paired Donation in Pediatrics: An Underused Opportunity?

J. Smith[1], M. Skeans[2], R. Engen[3], S. Bartosh[4], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN, [3]Lurie Children's Hospital, Chicago, IL, [4]Univ of Wisconsin, Madison, WI*

Purpose: Kidney paired donation (KPD) provides the opportunity for ABO-mismatched or HLA-incompatible pairs to receive a living donor kidney transplant. The superior graft survival among living donor kidney recipients is of particular importance in the pediatric population, who will likely require multiple transplants in their lifetime. KPD represents a potential strategy to increase living donation in this population. While the use of KPD in adults in increasingly common, its use in the pediatric population is not well described.
Methods: We used SRTR data to describe the population of pediatric living donor transplant recipients, 2014-2019, by KPD status. Chi-squared tests for difference by KPD status were performed. We compared the proportion of pediatric and adult KPD recipients during the same interval.
Results: The number of pediatric recipients of KPD kidneys is small but increased from 8 (3.3% of living donor recipients) in 2014 to 18 (7.5%) in 2019, with a peak of 25 (9.1%) in 2018. KPD use is higher in adults and has been growing steadily since 2014 (Figure 1). Characteristics more common to pediatric KPD recipients than to other pediatric living donor recipients were Black race (18.0% vs. 8.3%), previous transplant (15.7% vs. 6.5%), panel reactive antibodies >20% (33.7% vs. 13.8%), and donor <10 years older than the recipient (6.7% vs. 2.7%) (Table 1).
Conclusions: Participation in KPD programs presents logistical and financial challenges for pediatric kidney programs, but an increasing number have been performed in recent years. This program could provide increased transplant opportunities for pediatric recipients, especially for disadvantaged groups.

Table 1: Pediatric living donor kidney recipients, 2014-2019, by KPD status

		KPD		Other living donor		
Characteristic	Level	N	%	N	%	P-value
Patients	All	89	100	1398	100	
Age group	0-5 years	22	24.7	425	30.4	0.453
	6-10 years	16	18.0	261	18.7	
	11-17 year	51	57.3	712	50.9	
Sex	Female	37	41.6	538	38.5	0.562
	Male	52	58.4	860	61.5	
Race/ethnicity	White	55	61.8	981	70.2	0.017
	Black	16	18.0	116	8.3	
	Hispanic	15	16.9	228	16.3	
	Other	3	3.4	73	5.2	
Blood type	A	31	34.8	520	37.2	0.449
	B	18	20.2	198	14.2	
	AB	4	4.5	55	3.9	
	O	36	40.4	625	44.7	
Prior transplant	No	75	84.3	1307	93.5	0.001
	Yes	14	15.7	91	6.5	
PRA	<20%	59	66.3	1165	83.3	<0.0001
	20-<85%	25	28.1	164	11.7	
	85-100%	5	5.6	29	2.1	
	Unknown	0	0.0	40	2.9	
Donor age	18-34 year	42	47.2	511	36.6	0.131
	35-49 year	41	46.1	770	55.1	
	≥50 years	6	6.7	117	8.4	
Donor > 10 years older than recipient	No	6	6.7	38	2.7	0.044
	Yes	83	93.3	1360	97.3	



CITATION INFORMATION: Smith J., Skeans M., Engen R., Bartosh S. Kidney Paired Donation in Pediatrics: An Underused Opportunity? *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Smith: None. **M. Skeans:** None. **R. Engen:** None. **S. Bartosh:** None.

Abstract# 78

Drivers of Graft Failure in Pediatric Kidney Transplant Change Over Time

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Purpose: Short-term pediatric kidney transplant outcomes have improved over time with advanced surgical techniques and better immunosuppression, but long-term graft outcomes remain suboptimal - concerning for children who need multiple transplants over a lifetime. To target interventions, better understanding of contributors to positive and negative long-term outcomes are needed. We investigated whether induction choice was associated with graft outcomes over time. We also examined how donor and recipient characteristics impact short vs long-term outcomes.
Methods: Using SRTR, we analyzed incident kidney transplant recipients in the U.S. < 21 years of age transplanted from 2002-2019. Choice of a single induction agent (IL2-ra, T-cell depleting, or steroids only) was our primary exposure with all-cause graft failure as the outcome at different time intervals (1, 3, 5, 10 and 15 years post-transplant). Multivariable cox proportional hazard models looked at adjusted hazard ratios of different drivers of graft failure at these intervals. Models were adjusted for age, gender, race, etiology of ESKD, insurance status, pre-emptive transplant, maintenance therapy, donor type, donor age, HLA mismatches, transplant center volume and transplant year.
Results: T-cell depleting therapy (vs. IL2-ra) was not associated with graft failure at any post-transplant time interval. Initial maintenance therapy with Tacrolimus + anti-metabolite without steroids (vs. with steroids) did not show increased hazard of graft failure across time. Increased donor HLA mismatches were associated with worse long-term outcomes. Younger age (<6 yrs vs. 6-10 yrs) was associated with increased hazard of graft failure at 1 year, but protective for long-term graft survival >10 years post-transplant. Female gender, black race and public insurance were associated with increased hazard of graft failure at >3 years. Lower volume transplant centers (vs. high volume >15/yr) were associated with increased hazard of graft failure with longer follow up times, but not 1 year post-transplant.
Conclusions: Drivers of graft failure in pediatric kidney transplant change with increased duration of graft survival. Associations with poor long-term outcomes were age, race, gender, insurance status, and facility related factors, but not therapy related factors. Further studies are warranted to inform policy and systems level changes that promote equity in long-term graft survival.

Table 1: Multivariable Cox models for all-cause graft failure (Adjusted HR (95% CI)

	1-year graft failure	3-year graft failure	5-year graft failure	10-year graft failure	15-year graft failure
Induction Immunosuppression					
IL2-ra	Ref	Ref	Ref	Ref	Ref
T-cell Depleting	1.04 (0.82-1.33)	1.06 (0.93-1.21)	1.04 (0.94-1.16)	1.03 (0.95-1.13)	1.05 (0.97-1.14)
Steroids only/None	1.16 (0.78-1.72)	1.19 (0.96-1.47)	**1.27 (1.07-1.50)***	**1.16 (1.01-1.33)***	**1.20 (1.06-1.36)***
Maintenance Immunosuppression					
Tacro+MPA/AZA+Pred	Ref	Ref	Ref	Ref	Ref
Tacro+MPA/AZA	0.99 (0.73-1.33)	0.87 (0.74-1.03)	**0.88 (0.77-1.00)***	0.91 (0.82-1.00)	**0.90 (0.82-0.99)***
HLA Mismatch					
Zero	0.88 (0.43-1.84)	0.91 (0.62-1.34)	0.78 (0.56-1.07)	**0.72 (0.55-0.93)***	**0.68 (0.53-0.87)***
1-3	Ref	Ref	Ref	Ref	Ref
4-5	1.33 (0.98-1.82)	1.14 (0.96-1.35)	**1.17 (1.03-1.34)***	**1.15 (1.04-1.28)***	**1.14 (1.03-1.27)***
6	**1.62 (1.12-2.36)***	**1.37 (1.13-1.70)***	**1.26 (1.07-1.49)***	**1.23 (1.07-1.41)***	**1.22 (1.07-1.38)***
Age at Transplant					
<6	**1.68 (1.11-2.53)***	1.01 (0.78-1.32)	0.81 (0.65-1.01)	**0.78 (0.66-0.92)***	**0.83 (0.72-0.97)***
6-10	Ref	Ref	Ref	Ref	Ref
11-17	1.13 (0.79-1.63)	**1.45 (1.19-1.80)†**	**1.69 (1.43-1.98)†**	**1.67 (1.48-1.89)†**	**1.60 (1.42-1.79)†**
18-21	**1.60 (1.07-2.37)***	**1.96 (1.55-2.48)†**	**2.05 (1.71-2.45)†**	**1.93 (1.68-2.22)†**	**1.79 (1.57-2.04)†**
Gender					
Male	Ref	Ref	Ref	Ref	Ref
Female	1.15 (0.93-1.44)	**1.39 (1.22-1.58)†**	**1.28 (1.17-1.41)†**	**1.23 (1.14-1.32)†**	**1.20 (1.11-1.29)†**
Race					
White, non-Hispanic	Ref	Ref	Ref	Ref	Ref
White Hispanic	**0.73 (0.54-0.99)***	**0.80 (0.67-0.96)***	**0.87 (0.76-0.99)***	1.02 (0.92-1.13)	1.01 (0.91-1.11)
Black	1.21 (0.93-1.59)	**1.63 (1.41-1.90)†**	**1.63 (1.45-1.84)†**	**1.71 (1.55-1.88)†**	**1.68 (1.53-1.84)†**
Other	0.89 (0.55-1.44)	1.01 (0.77-1.32)	0.99 (0.80-1.23)	0.92 (0.77-1.11)	0.94 (0.79-1.11)
Insurance Type					
Private	Ref	Ref	Ref	Ref	Ref
Public	1.18 (0.93-1.50)	**1.17 (1.02-1.33)***	**1.16 (1.05-1.29)***	**1.19 (1.09-1.29)†**	**1.18 (1.09-1.27)†**
Other	0.51 (0.07-3.66)	0.73 (0.27-1.96)	0.66 (0.30-1.48)	0.79 (0.45-1.40)	0.94 (0.56-1.56)
Center Volume (transplants/year)					
<5	1.12 (0.82-1.52)	**1.20 (1.01-1.44)***	**1.20 (1.04-1.38)***	**1.18 (1.05-1.32)***	**1.16 (1.04-1.30)***
5-9	1.02 (0.74-1.40)	1.09 (0.91-1.31)	**1.17 (1.02-1.36)***	**1.22 (1.09-1.36)†**	**1.21 (1.09-1.35)†**
10-15	0.95 (0.68-1.33)	1.16 (0.96-1.40)	1.14 (0.98-1.33)	1.12 (0.99-1.27)	**1.13 (1.01-1.27)***
>15	Ref	Ref	Ref	Ref	Ref

*p<0.05
†p<0.001

CITATION INFORMATION: Benz E., Schaubel D., Amaral S. Drivers of Graft Failure in Pediatric Kidney Transplant Change Over Time *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Benz: None. **D. Schaubel:** None. **S. Amaral:** None.

Abstract# 79

Long Term Safety and Efficacy of Tocilizumab (anti-il6r, Tcz) Therapy in the Treatment of Refractory Chronic Antibody Mediated Rejection (cabmr) in 25 Pediatric Renal Transplant Recipients

M. Pearl[1], P. Weng[1], A. Dokras[2], H. Pizzo[3], J. Garrison[3], C. Butler[1], J. Q. Zhang[1], K. Lim[3], E. Reed[1], I. Kim[3], M. Haas[3], X. Zhang[3], R. Ettenger[1], S. Jordan[3], D. Puliyanda[3], *[1]Pediatric Nephrology, UCLA Medical Center, Los Angeles, CA, [2]Pediatric Nephrology, UT South Western, Dallas, CA, [3]Pediatric Nephrology, Cedars Sinai Medical Center, West Hollywood, CA*

Purpose: Development of de novo donor specific antibodies (DSA) post renal transplantation puts pediatric patients at risk for chronic Antibody Mediated Rejection (cABMR) and allograft failure. Treatment options for cABMR with transplant glomerulopathy are limited. Interleukin-6 (IL6), secreted by immune cells and macrophages stimulates immune responses, and may be important in mediating cABMR. Here we report our experience with TCZ (anti-IL6R) in pediatric renal transplant recipients with biopsy-proven cABMR, refractory to treatment with IVIg/ Rituximab ± plasmapheresis +/- Bortezomib.
Methods: From Jan 2013 to Nov 2018, we identified 25 patients who had ongoing biopsy proven cABMR despite treatment. These patients were treated with TCZ, 4-8mg/kg monthly for a median of 12 (4-26) doses. Patients were monitored for iDSA :immunodominant DSA - DSA with highest Mean Fluorescent Intensity (MFI); renal function, patient and graft survival and adverse effects of TCZ.
Results: Median age at TCZ: 17.8years (6.3- 21.5yrs). Median time from transplant to cABMR diagnosis: 44 months (3-154 months). Median time to TCZ from diagnosis of cABMR: 191(10-1777) days. At diagnosis of cABMR, 19 patients had iDSA :18 had class II;1 had Class I. 13/18 patients with class II DSA had >10,000 MFI. TCZ was well tolerated in 22/25 patients; 2 patients developed fatigue and one JC viremia and therefore discontinued TCZ. At median follow up of 36 (10-83) months post cABMR diagnosis there was no decline in graft function in 24/25 patients: median delta change in serum creatinine: +0.045mg/dl (-0.80 to 3.42); 1 patient lost allograft. 7/19 patients had resolution of DSA. Side effects of TCZ were: 3 patients had mild transaminitis, 2 BK viremia (no BK nephropathy), 1 JC viremia, 1 thrombocytopenia, 2 leucopenia. None had CMV viremia. 1 patient had previous history of PTLD and one had persistent EBV viremia prior to start of TCZ did not show recurrence of PTLD or worsening viremia. Patient and graft survival were 100% and 96% respectively.
Conclusions: Treatment of cABMR with transplant glomerulopathy is challenging. Administration of TCZ in cABMR refractory to anti-B cell therapy resulted in preservation of graft function in the majority of patients. TCZ was fairly well tolerated. The utility of TCZ in treatment of cABMR should be further explored.
CITATION INFORMATION: Pearl M., Weng P., Dokras A., Pizzo H., Garrison J., Butler C., Zhang J., Lim K., Reed E., Kim I., Haas M., Zhang X., Ettenger R., Jordan S., Puliyanda D. Long Term Safety and Efficacy of Tocilizumab (anti-il6r, Tcz) Therapy in the Treatment of Refractory Chronic Antibody Mediated Rejection (cabmr) in 25 Pediatric Renal Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Pearl: None. **P. Weng:** None. **A. Dokras:** None. **H. Pizzo:** None. **J. Garrison:** None. **C. Butler:** None. **J.Q. Zhang:** None. **K. Lim:** None. **E. Reed:** None. **I. Kim:** None. **M. Haas:** None. **X. Zhang:** None. **R. Ettenger:** None. **S. Jordan:** Consulting Fee; Name of Commercial Interest; caredx, CSL Behring, Vitaeris, Amplyx, Regeneron. Consulting Fee; Nature of Relationship; consultant, consultant, consultant, consultant, consultant. Grant/Research Support; Name of Commercial Interest; hansa, Novartis. Grant/Research Support; Nature of Relationship; research grant, research grant. **D. Puliyanda:** Honoraria; Name of Commercial Interest; Caredx. Honoraria; Nature of Relationship; speaker.

Abstract# 80

Leflunomide Therapy for Treatment of Bk Viremia in Pediatric Kidney Transplant Recipients

A. Aldieri[1], M. Chandran[2], D. Matossian[3], B. Magella[4], D. Lazear[4], M. Bock[2], E. Blanchette[2], *[1]Children's Hospital Colorado, Denver, CO, [2]Children's Hospital Colorado, Aurora, CO, [3]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [4]Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

Purpose: BK viremia (BKV) after kidney transplantation (KT) poses significant risk for BK virus-associated nephropathy (BKVN) and impacts graft survival. Conventional treatment involves reduction of immunosuppression therapy (IST) which, in turn may increase risk for rejection. To address this dilemma, use of antiviral therapy with immunosuppressive properties such as leflunomide is an attractive option. We report safety and efficacy of leflunomide use for the eradication of BKV and prevention of BKVN in pediatric kidney transplant recipients (KTRs).
Methods: We describe a multi-center experience with leflunomide for management of BKV over a 10-year period in pediatric KTRs. All patients prescribed leflunomide from 01/2010 - 10/2019 were included in this retrospective chart review and followed from initiation until 1 year following leflunomide completion. Data collected included leflunomide and IST dosing (mg/kg), metabolite trough values (mcg/mL), adverse drug reactions (ADRs), BKV status, renal function, and biopsy data.
Results: 83 pediatric KTR [mean age at KT: 11 years (SD 6.2)] were treated with leflunomide and followed for a mean of 24.4 (12 - 87) months post-BKV diagnosis. BKV was successfully eradicated in 77 (93%) KTR including all 7 (8.4%) with BKN on initial biopsy. Median time from KT to BKV was 6.8 (0 - 76.7) months. Following leflunomide initiation, median time to BKV eradication was 75 (5 - 885) days and to 50% reduction in viremia was 30 (5 - 300) days. IST was reduced from a mean mycophenolate (MMF) dose of 538mg/m^2/day (SD 349) to 316mg/m^2/day (SD 316) and to mean tacrolimus troughs of 4.3-8.1 ng/mL (SD 2.6, 3.4). 79% KTR received maintenance steroids pre-diagnosis and 69.4% post-diagnosis. 24% of subjects received additional therapies (e.g. cidofovir, IVIG). On univariate linear regression, leflunomide troughs (mean 32.3 mcg/mL, SD 15.1) were associated with decreased time to BK eradication (B 5.84, p = 0.004), whereas MMF dosing and steroid use were not. No grafts were lost to BKV or BKN. Estimated glomerular filtration rate (eGFR) was mildly reduced 1-year post BKV diagnosis (78.3, SD 30.0 vs. 72.0, SD 34.2; p = 0.047). Within 1 year of BKV diagnosis, biopsy proven acute rejection (BPAR) occurred in 19 (23.2%) KTR (30.4% cellular, 8.7% humoral, 4.3% mixed). On linear regression, reduced MMF dosing, blood BK PCR at diagnosis, steroid use, and leflunomide trough were not associated with increased BPAR. DSA at 1-year follow-up was associated with increased BPAR (slope 1.37, p = 0.026). Minimal ADRs were reported (10% gastrointestinal, 7.2% hematologic, 2.4% other).
Conclusions: Leflunomide is a promising adjunctive treatment for BKV eradication along with IST reduction and does not appear to increase risk for BPAR or graft loss. Moreover, treatment is associated with minimal ADRs.
CITATION INFORMATION: Aldieri A., Chandran M., Matossian D., Magella B., Lazear D., Bock M., Blanchette E. Leflunomide Therapy for Treatment of Bk Viremia in Pediatric Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Aldieri: None. **M. Chandran:** None. **D. Matossian:** None. **B. Magella:** None. **D. Lazear:** None. **M. Bock:** None. **E. Blanchette:** None.

Abstract# 81

Risk Factors Predicting Outcomes in Long-Term Pediatric Kidney Transplant Graft Survival

A. Anand, T. H. Malik, J. Dunson, M. F. McDonald, C. R. Christmann, N. Nguyen Galvan, C. O'Mahony, J. A. Goss, P. R. Srivaths, E. D. Brewer, A. Rana, *Baylor College of Medicine, Houston, TX*

Purpose: Pediatric kidney transplant recipients generally have good outcomes post-transplantation; however, the younger age and longer lifespan after transplantation in the pediatric population make understanding the multifactorial nature of long-term graft survival critical. This investigation analyzes factors associated with 10-year survival to identify areas for improvement in patient care.
Methods: Kaplan-Meier with log-rank test as well as univariate and multivariate logistic regression methods were used to retrospectively analyze 7,785 kidney transplant recipients under the age of 18 years from January 1, 1998 until March 9, 2008 using United Network for Organ Sharing (UNOS) data. Our endpoint was death-censored 10-year graft survival after excluding recipients whose grafts failed within one-year of transplant.
Results: Recipients aged 5-18 years had lower 10-year graft survival, which worsened as age increased: 5-9 years (Odds Ratio (OR) 0.66, CI 0.52-0.83), 10-14 years (OR 0.43, CI 0.33-0.55), 15-18 year (OR 0.34, CI 0.26-0.44). Recipient African American ethnicity (OR 0.67, CI 0.58-0.78) and Hispanic donor ethnicity (OR 0.82, CI 0.72-0.94) had worse outcomes than other donor and recipient ethnicities, as did patients on dialysis at the time of transplant (OR 0.82, CI 0.73-0.91). Recipient private insurance status (OR 1.35, CI 1.22-1.50) was protective for 10-year graft survival.

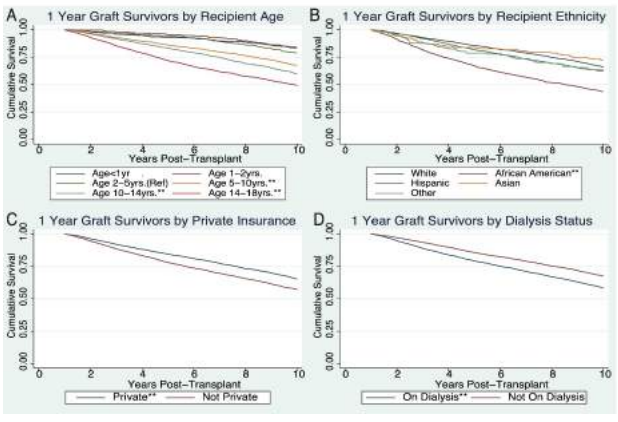


Fig.1 Kaplan-Meier survival function for four factors included in the study. (A) shows death-censored graft survival by recipient age. (B) shows death-censored

graft survival by recipient ethnicity. (C) shows death-censored graft survival by insurance status. (D) shows death-censored graft survival by dialysis status. ** indicates p<0.001.

Conclusions: By establishing the role of age, race, and insurance status on long-term graft survival, we hope to guide clinicians in identifying patients at high risk for graft failure. This study highlights the need for increased allocation of resources and medical care to reduce the disparity in outcomes for certain patient populations.

CITATION INFORMATION: Anand A., Malik T., Dunson J., McDonald M., Christmann C., Nguyen Galvan N., O'Mahony C., Goss J., Srivaths P., Brewer E., Rana A. Risk Factors Predicting Outcomes in Long-Term Pediatric Kidney Transplant Graft Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Anand: None. **T.H. Malik:** None. **J. Dunson:** None. **M.F. McDonald:** None. **C.R. Christmann:** None. **N. Nguyen Galvan:** None. **C. O'Mahony:** None. **J.A. Goss:** None. **P.R. Srivaths:** None. **E.D. Brewer:** None. **A. Rana:** None.

Abstract# 82

Delayed Graft Function in Pediatric Living Donor Kidney Transplantation

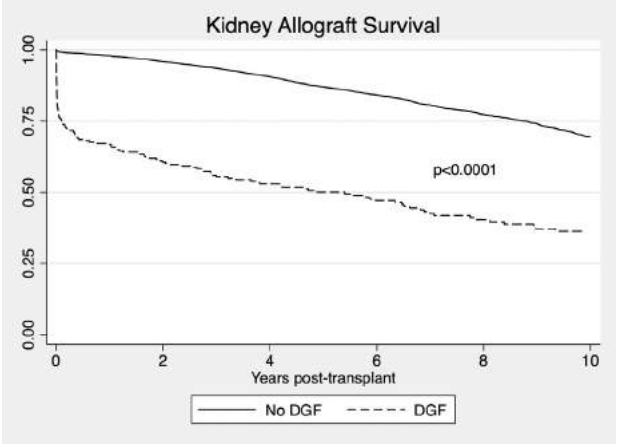
M. MacConmara, J. Shah, L. de Gregorio, D. Desai, P. Vagefi, C. S. Hwang, *Surgery, UT Southwestern Medical Center, Dallas, TX*

Purpose: Pediatric recipients of living donor kidneys have a low rate of delayed graft function (DGF). The aim of this study was to examine the incidence, risk factors and outcomes of DGF in pediatric patients who received a living donor allograft.

Methods: The UNOS database was queried to examine all pediatric patients transplanted with a living donor kidney between 2000—2020. A pediatric recipient was defined as one who was transplanted prior to the age of 18 years. Donor and recipient demographic data were examined, as were survival and outcomes. DGF was defined as the need for dialysis within the first week after transplant. A p-value of <0.05 was considered to be significant.

Results: 6,480 pediatric patients received a living donor (LD) kidney transplant during the study period. 269 (4.2%) developed DGF post-transplant. Donors were similar in age DGF and control groups (37.2 vs. 37.0 yrs), had similar preoperative creatinine (0.86 mg/dL in both), ethnicity, and gender, but donor BMI was higher in the DGF group (27.6 vs. 26.8 kg/m^2, p=0.004). Cold ischemia time (2.4 vs. 2.3 h) was also similar. Recipients of kidneys with DGF were similar in age (9.8 vs. 10.1 y), and had higher BMI (20.3 vs. 19.4 kg/m^2, p=0.002). Initial and final cPRAs were similar (2.2 vs. 2.4% initial; 10.5 vs. 8.9% final). HLA mismatch was similar in both groups (3.0 vs. 2.8). Focal segmental glomerulosclerosis (FSGS) was the most common diagnosis in recipients with DGF (23%) and was significantly more frequent in the DGF group compared to control (23% vs. 10%, p=0.001). Small recipients (weight < 15 kg) were found to have a significantly higher rate of DGF (24.9 vs. 19.8%, p=0.04). Length of stay for recipients with DGF was twice that of the control group (23.4 vs. 10.1 d, p<0.0001). Patients with DGF had higher rates of rejection at 6 and 12 months post transplant (24.8 vs. 8.0% at 6 months, p<0.0001; 26.4 vs. 11.6% at 12 months, p<0.0001). Recipients of LD kidneys who developed DGF had significantly worse allograft survival when compared to control (Figure 1, p<0.0001) with 1 year graft survival over 30% lower than control (67% vs. 98%). The most common causes of allograft loss were graft thrombosis (25.3%), rejection (17.5%), and recurrent disease (15.6%).

Conclusions: Pediatric living donor kidney transplant recipients who experience DGF have significantly poorer allograft survival. Immunologic events, recurrent disease and technical complications appear to underlie these poor outcomes and should be considered especially in younger recipients with FSGS. Optimizing the donor recipient combination to avoid compounding risks should allow for better outcomes.



CITATION INFORMATION: MacConmara M., Shah J., de Gregorio L., Desai D., Vagefi P., Hwang C. Delayed Graft Function in Pediatric Living Donor Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. MacConmara: None. **J. Shah:** None. **L. de Gregorio:** None. **D. Desai:** None. **P. Vagefi:** None. **C.S. Hwang:** None.

Liver

Liver Transplant Oncology

Abstract# 83

Outcomes of Downstaging Hepatocellular Carcinoma (HCC) to within Milan Criteria Before Liver Transplantation (LT): A Multicenter Analysis of the "All-comers" Protocol

B. Natarajan[1], P. Tabrizian[2], M. Hoteit[3], C. Frenette[4], T. Ghaziani[5], R. Dhanasekaran[5], N. Parikh[6], J. Guy[7], A. Shui[1], S. Florman[2], F. Yao[1], N. Mehta[1], *[1]UCSF, SF, CA, [2]Mt Sinai, NY, NY, [3]U Penn, Philadelphia, PA, [4]Scripps, La Jolla, CA, [5]Stanford, Palo Alto, CA, [6]U Michigan, Ann Arbor, MI, [7]CPMC, SF, CA*

Purpose: Patients with HCC meeting UNOS-downstaging (DS) criteria (1 lesion 5.1-8 cm, 2-3 lesions at least one 3.1-5 cm and total tumor diameter (TTD) ≤8 cm, or 4-5 tumors ≤3 cm with TTD ≤8 cm) have excellent LT outcomes after successful DS. However, the likelihood of successful DS and LT-related outcomes for "all-comers" (AC) patients with tumor burden initially exceeding UNOS-DS criteria is poorly understood.

Methods: Consecutive patients with HCC meeting AC (n=82) or UNOS-DS criteria (n=230) at 7 LT centers in 4 UNOS regions were enrolled from 2015-2020 and prospectively followed to evaluate downstaging and LT outcomes.

Results: Median pre-treatment characteristics between the AC and UNOS-DS groups did not significantly differ in terms of MELD (9 vs 9), Child-Pugh (CP) score (6 vs 6), and AFP (20 vs 12 ng/mL). TTD prior to first local-regional therapy (LRT) was 10.0 cm for AC (IQR 8.3-12.9) vs 6.2 cm for UNOS-DS (IQR 5.5-7.1) (p<0.001). AC patients required more LRT to be downstaged (2 vs 1; p=0.001) and had a lower probability of successful downstaging (69% vs 85% within 12 months; p<0.001). In multivariable (MV) analysis of the AC cohort, increasing sum of largest tumor diameter plus number of lesions prior to first LRT was negatively associated with successful downstaging (HR 0.82; p=0.026). Dropout probability due to tumor progression or death was similar at 3 years (AC 52% vs UNOS-DS 45%, p=0.27) with pre-treatment CP class B/C the only factor associated with dropout in the AC cohort (HR 2.58 vs CP A; p=0.009). Intention-to-treat (ITT) survival at 3 years was 69% for UNOS-DS vs. 58% for AC (p=0.07) and reduced to 23% in AC with CP B/C cirrhosis. Probability of LT at 3 years was 42% for AC vs. 58% in UNOS-DS (p=0.11) with no differences in explant tumor stage, grade, or vascular invasion. In the combined cohort, 39% were under-staged on explant. Factors associated with under-staging in MV logistic regression included increasing sum of largest tumor diameter plus number of lesions on last imaging prior to LT (OR 1.4; p=0.006) and AFP ≥20 (OR 6.4; p=0.004). Post-LT 2-year survival was 91% for AC vs 90% for UNOS-DS (p=0.67) with HCC recurrence observed in only 5% of AC after median post-LT follow-up of 19 mo.

Conclusions: In this first prospective multi-regional comparative study on HCC downstaging, we observed an overall 70% probability of successful downstaging in AC with increasing pre-treatment tumor burden associated with unsuccessful downstaging. 3-year ITT survival in AC was nearly 60% though AC with CP B/C had poor survival. Explant pathology and 2-year post-LT outcome was similar between cohorts suggesting that LT is a reasonable goal in selected AC patients though efforts to improve under-staging are needed.

CITATION INFORMATION: Natarajan B., Tabrizian P., Hoteit M., Frenette C., Ghaziani T., Dhanasekaran R., Parikh N., Guy J., Shui A., Florman S., Yao F., Mehta N. Outcomes of Downstaging Hepatocellular Carcinoma (HCC) to within Milan Criteria Before Liver Transplantation (LT): A Multicenter Analysis of the "All-comers" Protocol *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Natarajan: None. **P. Tabrizian:** None. **M. Hoteit:** None. **C. Frenette:** None. **T. Ghaziani:** None. **R. Dhanasekaran:** None. **N. Parikh:** Consulting Fee; Name of Commercial Interest; Bristol Myers-Squibb, Exact Sciences, Eli Lilly, Freenome. Grant/Research Support; Name of Commercial Interest; Bayer, Target Pharmasolutions, Exact Sciences, Glycotest. Other; Name of Commercial Interest; Genentech, Eisai, Bayer, Exelixis, Wako Diagnostics. **J. Guy:** None. **A. Shui:** Grant/Research Support; Name of Commercial Interest; Liver Center NIH Grant. **S. Florman:** None. **F. Yao:** Grant/Research Support; Name of Commercial Interest; Wako Diagnostics. **N. Mehta:** Grant/Research Support; Name of Commercial Interest; WAKO Diagnostics, Glycotest, Target Pharmasolutions.

Abstract# 84

Role of Baseline PD-1 Checkpoint Inhibitor Pathway Expression in Bridge to Liver Transplant Hepatocellular Carcinoma

K. Nunez, T. Sandow, M. Hibino, A. Cohen, P. Thevenot, *Ochsner Health, New Orleans, LA*

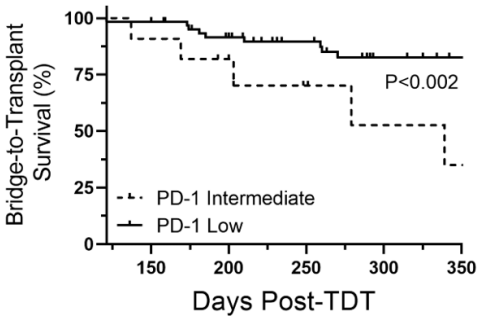
Purpose: Response to first line liver-directed therapy (LDT) in hepatocellular carcinoma (HCC) has important implications in both bridge to transplant (BTT)

success as well as post-transplant recurrence-free survival. An effective anti-tumoral T cell response following LDT is a critical barrier against tumor progression. In this study, we investigated baseline T cell count and the PD-1 checkpoint inhibitory pathway as indicators of T cell exhaustion and the role in LDT response and BTT outcome.

Methods: Treatment-naïve HCC patients receiving LDT were prospectively enrolled. Preprocedural peripheral blood was collected and T cells characterized for lineage and phenotype by flow cytometry. LDT response was assessed by mRECIST.

Results: Univariate analysis of the cohort (n=86) confirmed incomplete response to first line LDT (P=0.003, OR 7.6) was closely associated with BTT survival and waitlist tumor progression (P<0.001). We then performed univariate analysis to identify T cell-linked factors associated with an incomplete response to LDT. Pre-treatment absolute lymphocyte count (ALC) (P=0.009, OR 0.44) as well as CD4:CD8 lineage specific PD-1 expression (P=0.043, OR 3.0 and P=0.010, OR 3.3 respectively) were associated with risk of incomplete response. LDT-induced decrease in PD-1 expression in CD8 T cells in patients with elevated PD-1 at baseline (P<0.001) while a LDT-induced increase in PD-1 expression was observed in CD4 T cells in patients with low baseline PD-1 expression (P=0.018). Further, elevated PD-1 expression was associated with increased risk of BTT tumor progression (P=0.002, HR = 4.6, 95%CI 1.7-11.7). In patient's successfully bridged to liver transplantation, an elevated PD-1 expression profile at baseline or follow-up was associated with advanced tumor staging (P<0.001), with 75% of PD-1 high patients having T3-T4 TNM staging compared to 0% with intermediate/low PD-1 expression.

Conclusions: Low lymphocyte count and activation of the PD-1 checkpoint inhibitor pathway is associated with risk of incomplete response to LDT and waitlist tumor progression. Patients with impaired T cell homeostasis may benefit from adjuvant immunotherapy to improve response to LRT and improve bridge to transplant outcomes.



At Risk	0	150	200	250	300	350
PD-1 High	13	11	8	6	4	3
PD-1 Inter/Low	67	61	51	42	32	25

CITATION INFORMATION: Nunez K., Sandow T., Hibino M., Cohen A., Thevenot P. Role of Baseline PD-1 Checkpoint Inhibitor Pathway Expression in Bridge to Liver Transplant Hepatocellular Carcinoma *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Nunez: None. **T. Sandow:** None. **M. Hibino:** None. **A. Cohen:** None. **P. Thevenot:** Grant/Research Support; Name of Commercial Interest; Society of Interventional Oncology. Grant/Research Support; Nature of Relationship; Research Grant.

Abstract# 85

NASH-Related HCC is Associated with Lower Rates of Post-Transplant HCC Recurrence: A Large Database Analysis

P. J. Altshuler, R. Lamm, K. Patel, H. Dang, O. Shaheen, A. P. Shah, J. Glorioso, C. G. Ramirez, A. M. Frank, W. R. Maley, A. S. Bodzin, *Department of Surgery, Thomas Jefferson University, Philadelphia, PA*

Purpose: As incidence of hepatocellular carcinoma (HCC) and Non-Alcoholic Steatohepatitis (NASH) increase, NASH-related HCC is an increasingly common transplant indication. Large-scale studies evaluating transplantation for NASH-related HCC are limited, as are studies controlling for metabolic disturbances and systemic comorbidities characteristic of NASH patients. This study attempts to address both, comparing transplantation for NASH-related HCC to non-NASH-related HCC on a national scale.

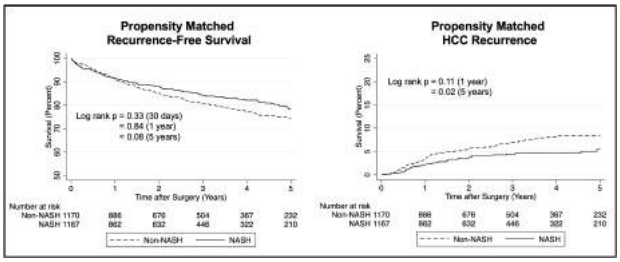
Methods: Retrospective analysis of the Organ Procurement and Transplantation Network database identified 1342 NASH and 10,642 non-NASH patients with HCC. After propensity score matching (PSM) to address patient and tumor-related confounders 1175 of each group remained. Primary outcomes assessed were recurrence and recurrence free survival. Additional regression modeling assessed NASH as a predictor of death or recurrence.

Results: Upon PSM baseline recipient, donor, transplant and tumor characteristics were largely similar between NASH and non-NASH groups. BMI did remain higher in NASH patients (31.7 vs. 28, p<0.01) as did recipient age (65 vs. 64, p=0.02) and incidence of diabetes (72.1% vs. 31.4%, p<0.01). Recipient ethnicity also remained disparate. As demonstrated in Table 1, recurrence at 5 years was lower 5.5% in NASH vs. 8.4% in non-NASH patients (p=0.02). Recurrence-free survival at 5 years was 78.3% in NASH vs. 74.5% in non-NASH patients (p=0.08). Adjusted multivariable regression accounting for factors independently predictive of recurrence at 5 years demonstrated that NASH was protective against recurrence (HR: 0.63, p<0.01).

Conclusions: In a large-scale propensity matched analysis, HCC in NASH patients appears less likely to experience HCC recurrence at 5 years leading to improved recurrence-free survival. This is supported by NASH itself being a protective factor against cancer recurrence in adjusted regression analysis. While ongoing investigations into the biology of HCC in NASH and non-NASH are essential, this study suggests that HCC in NASH may have improved cancer outcomes after transplant.

Table 1: Propensity matched transplant outcomes by diagnosis of NASH

		NASH	Non-NASH	HR	95% CI	p-value
Number		1175	1175			
Recurrent malignancy at 5 years		5.5%	8.4%	0.62	0.42-0.92	0.02
Median time to recurrence		360 (206-742)	358 (177-724)	-	-	0.51
Recurrence free survival						
	30-day	98.0%	98.5%	1.36	0.72-2.55	0.33
	1-year	91.3%	91.4%	1.03	0.77-1.37	0.84
	5-year	78.3%	74.5%	0.83	0.68-1.02	0.08



CITATION INFORMATION: Altshuler P., Lamm R., Patel K., Dang H., Shaheen O., Shah A., Glorioso J., Ramirez C., Frank A., Maley W., Bodzin A. NASH-Related HCC is Associated with Lower Rates of Post-Transplant HCC Recurrence: A Large Database Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: P.J. Altshuler: None. **R. Lamm:** None. **K. Patel:** None. **H. Dang:** None. **O. Shaheen:** None. **A.P. Shah:** None. **J. Glorioso:** None. **C.G. Ramirez:** None. **A.M. Frank:** None. **W.R. Maley:** None. **A.S. Bodzin:** None.

Abstract# 86

Adjuvant Immunotherapy for Liver Transplant Recipients with Hepatocellular Carcinoma Using Donor Liver-derived Natural Killer Cells

M. Ohira[1], R. Hotta[1], Y. Imaoka[1], K. Sato[1], N. Tanimine[1], Y. Tanaka[1], S. Nishida[2], A. Tzakis[2], H. Ohdan[1], *[1]Hiroshima University, Hiroshima, Japan, [2]University of Miami, Miami, FL*

Purpose: Hepatocellular carcinoma (HCC) is one of the most common cancers worldwide and is an indication for liver transplantation (LT). Immunosuppressive regimens currently used after LT reduce the proportion of adaptive components of cellular immunity while maintaining innate components. Natural killer (NK) cells play a central role in innate immunity against neoplastic cells; therefore, their augmentation is a promising immunotherapeutic approach against HCC recurrence after LT.

Methods: We propose that adoptive transfer of IL-2-stimulated TRAIL$^+$ NK cells extracted from donor liver graft perfusate can mount an anti-tumor response without causing toxicity to intact recipient tissues.

Results: We have successfully performed NK-cell immunotherapy in 45 living donor LT (LDLT) recipients with HCC in Japan. The median follow-up period is 68 months. In the series of LDLT with HCC, among the 101 patients who met the Milan criteria (MC) on preoperative imaging (NK group n=37; control group n=64), 38 patients (37%) had HCC exceeding MC on postoperative pathology. Of these 38 patients, the recurrent free survival (RFS) rates were significantly improved in the NK group (n=16) as compared to those in the control group (n=22). Their 5 year-RFS were 75% and 48%, respectively (p=0.042). After infusion of NK cells, the NK cytotoxicity and the proportion of TRAIL$^+$ NK cells in the peripheral blood of patients increased significantly (p<0.05). The inoculated donor NK cells could be confirmed for up to 1 month through the analysis of peripheral blood chimerism. We also applied the proposed approach to the deceased donor LT (DDLT) recipients in collaboration with the US since 2009. This phase I study included 17 subjects

with a median follow-up of 96 months. No study-related adverse events were noted in either of the studies. Regarding overall survival, the high-dose group had significantly better survival than the low-dose group (p = 0.0064). In the series of DDLT with HCC, among the 17 patients who met MC on preoperative imaging, 9 patients (53%) had HCC exceeding MC on postoperative pathology. None of the patients have shown any symptom of HCC recurrence. Interestingly, the number of HLA mismatches between donor and recipient was associated with tumor recurrence after NK cell therapy.

Conclusions: In conclusion, the administration of IL-2-stimulated NK cells derived from both living and deceased donor liver allografts was safely applied and is, therefore, a potential novel adjuvant immune treatment after LT in HCC patients.

CITATION INFORMATION: Ohira M., Hotta R., Imaoka Y., Sato K., Tanimine N., Tanaka Y., Nishida S., Tzakis A., Ohdan H. Adjuvant Immunotherapy for Liver Transplant Recipients with Hepatocellular Carcinoma Using Donor Liver-derived Natural Killer Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Ohira: None. **R. Hotta:** None. **Y. Imaoka:** None. **K. Sato:** None. **N. Tanimine:** None. **Y. Tanaka:** None. **S. Nishida:** None. **A. Tzakis:** None. **H. Ohdan:** None.

Abstract# 87

T Cell Repertoire Diversity in HCV-Associated Hepatocellular Carcinoma Patients Waitlisted for Liver Transplantation and Receiving Liver-Directed Therapy

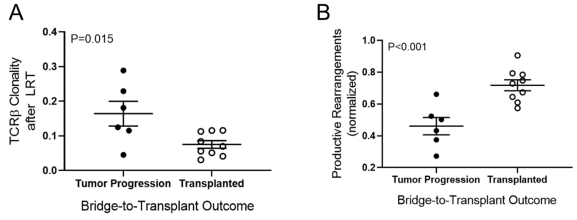
K. Nunez, T. Sandow, A. Cohen, P. Thevenot, *Ochsner Health, New Orleans, LA*

Purpose: T cell receptor (TCR) sequencing in hepatocellular carcinoma (HCC) patients revealed a diverse TCR repertoire in hepatitis B-associated HCC-infiltrating T cells. In this study, we investigate changes in TCR diversity in both viremic and nonviremic hepatitis C-associated HCC (HCV-HCC) patients following liver-directed therapy (LDT) and links to bridge to transplant waitlist outcome.

Methods: HCV-HCC patients receiving LDT as a bridge to liver transplantation were prospectively enrolled at a high-volume transplant center. Peripheral blood T cells were characterized by flow cytometry at baseline and treatment follow-up as well as longitudinally while on the waitlist. T cell DNA isolated at each time point was sequenced and analyzed using ImmunoSeq Analyzer (Adaptive Biotechnologies). Response to LDT was assessed by mRECIST.

Results: The cohort (n=17) was stratified based on HCV status (viremic n=10 and nonviremic n=7). Only 3 TCR clonotypes were shared over the entire cohort. Viremic HCV was associated with a more diverse T cell repertoire prior to and following LDT (P=0.007 and P=0.032). LDT resulted in a treatment-dependent increase in TCR diversity (P=0.034) and unique TCR clonotypes at follow-up independent of response to LDT. TCR diversity was strongly correlated with T cell senescence (CD57) as well as the PD-1 checkpoint inhibitor pathway in both CD4 (P=0.009 and P=0.037) and CD8 T cells (P=0.016 and P=0.019), respectively. Low TCR diversity following LDT was also associated with waitlist tumor progression (P=0.015). In patients successfully bridged to liver transplantation, 2.3-10.4% of intratumoral T cell clonotypes found in explant tumors were also found in circulating T cells prior to LDT. The percentage of clonotype overlap between TILs and circulating T cells did not change following treatment.

Conclusions: The TCR repertoire is diverse in HCV-HCC patients and shifted based on viremic HCV status and LDT. HCV-HCC patients with low TCR diversity following treatment are at greater risk of tumor progression which may be mediated by T cell senescence and checkpoint inhibitory pathways. Longitudinal TCR profiling may uncover unique HCC biology or treatment pathways linked to effective neoantigen responses and improved bridge to transplant outcomes.



CITATION INFORMATION: Nunez K., Sandow T., Cohen A., Thevenot P. T Cell Repertoire Diversity in HCV-Associated Hepatocellular Carcinoma Patients Waitlisted for Liver Transplantation and Receiving Liver-Directed Therapy *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Nunez: None. **T. Sandow:** None. **A. Cohen:** None. **P. Thevenot:** None.

Abstract# 88

Living Donor Liver Transplant for Unresectable Colorectal Metastasis: A Case Series

B. Emmanuel, H. Al-Harakeh, A. Humar, C. Hughes, A. Tevar, M. Molinari, A. Ganoza, *Starzl Transplant Institute, UPMC, Pittsburgh, PA*

Purpose: Colorectal Cancer (CRC) represents the third most common malignancy worldwide. In the US, CRC lifetime risk is approximately 1 in 23 (4.4%) for men and 1 in 25 (4.1%) for women. For those with unresectable disease, survival rates are 10% for 5 years. Liver transplantation has been sought out as a treatment for such unresectable malignancies and has been explored with the SECA study from Oslo University Hospital in Norway. Their results showed overall survival at 1, 3 and 5 years were 95%, 68% and 60% respectively. Disease-free survival (DFS) was 35% at 1 year and 0% at 2 years. This case series reports the experience of living donor liver transplantation for unresectable colorectal metastasis in 5 patients.

Methods: The medical records of five patients with CRC who underwent living donor liver transplant for unresectable colorectal metastasis to the liver from 2019 to 2020 were reviewed.

Results: Our 5 patients are Caucasian males with ages ranging from 38 to 67. Mean age for 5 participants is 56. Rectal tumors were identified in 3 of the 5 patients and the remaining 2 had colonic tumors. All patients had resection of their primary tumor and completed chemotherapy regimens prior to evaluation for transplant. All patients had Liver resections for treatment of metastasis with recurrence of tumor and were deemed unresectable. Average time from initial diagnosis to transplant was 72 months with a range of 13-113 months. On day of transplant, an exploratory laparotomy was performed prior to the donor to evaluate for extrahepatic metastasis. Patients were transplanted with a right lobe allograft from a living donor. Blood transfusion were utilized intra-operatively in 2 of 5 patients, and received 1, and 3 units packed red blood cells respectively. Post operatively, all patients placed on immunosuppression regimen with IL-2R induction, and tacrolimus/mycophenolate mofetil for first 4. Post-operative complications included 1 biliary leak, 1 episode of rejection treated with appropriate steroid therapy and recovered. All patients are alive, none lost to follow up. One evidence of recurrence in the transplanted allograft occurred and is currently under treatment with RFA. Time to recurrence in this patient was 7 months. Follow-up duration ranged from 1 month to 19 months, with a mean of 10.6 months.

Conclusions: Our case series describes 5 patients treated for CRC and presenting with, or later developed liver metastasis. After treatment with appropriate chemotherapeutic agents and recurrence after surgical intervention, they were all deemed further unresectable. Liver transplantation is a viable option to treat this group of patients and is currently being used in certain areas in Eastern countries. Long term follow-up will be needed to evaluate for recurrence in the allograft in our remaining patients.

CITATION INFORMATION: Emmanuel B., Al-Harakeh H., Humar A., Hughes C., Tevar A., Molinari M., Ganoza A. Living Donor Liver Transplant for Unresectable Colorectal Metastasis: A Case Series *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Emmanuel: None. **H. Al-Harakeh:** None. **A. Humar:** None. **C. Hughes:** None. **A. Tevar:** None. **M. Molinari:** None. **A. Ganoza:** None.

Abstract# 89

Liver Transplantation for Unresectable Colorectal Cancer Liver Metastases: A Multicenter Experience

L. I. Ruffolo[1], K. Sasaki[2], K. Tomiyama[1], A. Nair[1], M. Orloff[1], B. Al-Judaibi[3], M. Levstik[3], M. Laryea[3], K. Dokus[1], J. Errigo[1], A. Moro[2], C. Quintini[2], K. Hashimoto[2], M. Fujiki[2], K. Menon[2], C. Kwon[2], T. Diago Uso[2], R. Hernandez-Alejandro[1], F. Aucejo[2], *[1]Surgery, University of Rochester Medical Center, Rochester, NY, [2]Surgery, The Cleveland Clinic Foundation, Cleveland, OH, [3]Transplant Hepatology, University of Rochester Medical Center, Rochester, NY*

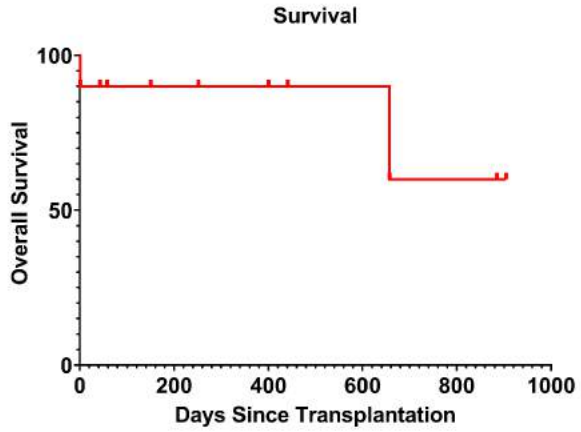
Purpose: Colorectal cancer is the third leading cause of cancer related death, unfortunately 50% of patients will develop colorectal liver metastases (CRLM), and a minority of these patients undergo resection. Unfortunately, best 5-year survival for liver-confined CRLM remains poor at ~10%. Here we present a North American experience in applying hepatectomy and orthotopic liver transplantation (LT) for CRLM.

Methods: Multidisciplinary teams reviewed available international data and developed strict criteria for evaluating liver-confined unresectable CRLM for LT. Patient and donor clinicopathologic data was prospectively collected following informed consent for inclusion into institutional registries. Experiences from two high-volume LT centers were pooled for outcome analysis.

Results: Independent protocols were established at two large volume transplant centers in the United States. Criteria between centers was similar in excluding established risk factors for recurrence including: failure to demonstrate response to chemotherapy, largest lesion exceeding 5 cm in diameter, oncogene activating mutations, and presence of extrahepatic disease during surveillance period of response. Between the two centers, 54 patients were evaluated and followed for consideration. Forty-four patients dropped out due to progression. The remaining 10 patients met criteria and underwent OLT, 8 receiving grafts from living donors, and two from donation after brain death. These patients were on average 46.3 years of age, and 40% female. Ninety-day mortality was 10%. With a median follow up

of 400 days, the cohort exhibits a 388 day median disease free survival, and 80% of patients are alive after LT. The four patients who experienced disease recurrence underwent select metastasectomy or adjuvant chemotherapy. Kaplan Meier estimate for overall survival is shown in Figure 1.

Conclusions: To date, our experience is rapidly evolving with LT for CRLM, however a clear finding is the high rate (81%) of drop out when utilizing strict selection criteria. Early followup data is encouraging with excellent overall survival and acceptable recurrence free survival. These results suggest that with strict selection criteria, good results are obtainable.



CITATION INFORMATION: Ruffolo L., Sasaki K., Tomiyama K., Nair A., Orloff M., Al-Judaibi B., Levstik M., Laryea M., Dokus K., Errigo J., Moro A., Quintini C., Hashimoto K., Fujiki M., Menon K., Kwon C., Diago Uso T., Hernandez-Alejandro R., Aucejo F. Liver Transplantation for Unresectable Colorectal Cancer Liver Metastases: A Multicenter Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.I. Ruffolo: None. **K. Sasaki:** None. **K. Tomiyama:** None. **A. Nair:** None. **M. Orloff:** None. **B. Al-Judaibi:** None. **M. Levstik:** None. **M. Laryea:** None. **K. Dokus:** None. **J. Errigo:** None. **A. Moro:** None. **C. Quintini:** None. **K. Hashimoto:** None. **M. Fujiki:** None. **K. Menon:** None. **C. Kwon:** None. **T. Diago Uso:** None. **R. Hernandez-Alejandro:** None. **F. Aucejo:** None.

Abstract# 90

Outcomes of Liver Transplantation for Combined Hepatocellular Cholangiocarcinoma: A Single-center Experience

Y. Liu[1], C. Hanlon[1], S. Zhou[1], D. Toy[1], K. King[2], K. Zhou[3], J. Kahn[3], L. Yuan[3], *[1]Internal Medicine, USC Keck School of Medicine, Los Angeles, CA, [2]Radiology, USC Keck School of Medicine, Los Angeles, CA, [3]Internal Medicine - Gastrointestinal and Liver Disease, USC Keck School of Medicine, Los Angeles, CA*

Purpose: Combined hepatocellular cholangiocarcinoma (cHCC-CCA) is a hepatic tumor that exhibits histological features of both hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCA). cHCC-CCA is often diagnosed incidentally on explant. Clinical traits associated with cHCC-CCA and predictors of transplant outcomes should be identified to best allocate organs.

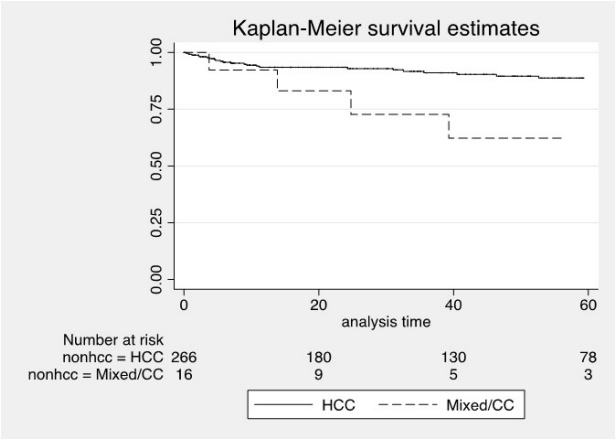
Methods: 308 patients who underwent OLT for the indication of HCC as well as those with cHCC-CCA found on explant at Keck Hospital from 2002 to 2020 were reviewed. A cohort of patients with cHCC-CCA on explant was identified, and features/outcomes were compared to patients with HCC alone on explant.

Results: 15 patients were identified to have cHCC-CCA or both HCC and CCA; 1 patient had isolated CCAs on explant. HCV was the major etiology of cirrhosis in both cohorts. Three cHCC-CCA phenotypes were identified: cHCC-CCA with other HCC or CCA nodules (n=6), cHCC-CCA alone (n=5), and concurrent discrete HCC and CCA nodules (n=4). Microvascular invasion on explant was present in 31% of the cHCC-CCA cohort compared to 7% in pure HCC (p=<0.001). 3-year survival was 62% in the cHCC-CCA cohort compared to 88% for HCC (p=0.02).

Conclusions: Demographic and clinical features between HCC and cHCC-CCA are nearly identical, necessitating further modalities such as biomarkers to be developed to identify cHCC-CCA to aid transplant evaluation. Three unique phenotypes of cHCC-CCA were identified, and further identification/long-term follow up of cases should be pursued to characterize survival respectively to revise exclusion/inclusion criteria for cHCC-CCA.

Demographics (%/median)			
	HCC (N=270)	**cHCC-CCA or CCA (N=16)**	**p-value**
Age	60 (54-64)	59 (51-66)	0.97
Male Sex	76%	75%	0.96
Race			0.89
-Hispanic	49%	63%	
-White	28%	25%	
-Asian	20%	13%	
MELD-Na at transplant	13 (9-18)	12 (9-16)	0.81

Clinical, Imaging, and Explant Features (%/median)			
	HCC (N=270)	**cHCC-CCA or CCA (N=16)**	**p-value**
Total tumor size at OLT imaging, cm	2.9 (1.5-4.2)	3.2 (2.0-4.7)	0.6
AFP at OLT	5.7 (3.3-13.2)	6.1 (3.3-23.6)	0.82
# of Tumors	1 (1-3)	2 (1-3)	0.09
Well differentiated	17%	6%	
Moderately differentiated	61%	63%	
Poorly differentiated	5%	19%	
Microvascular Invasion	6.5%	31.3%	<0.001



CITATION INFORMATION: Liu Y., Hanlon C., Zhou S., Toy D., King K., Zhou K., Kahn J., Yuan L. Outcomes of Liver Transplantation for Combined Hepatocellular Cholangiocarcinoma: A Single-center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Liu: None. **C. Hanlon:** None. **S. Zhou:** None. **D. Toy:** None. **K. King:** None. **K. Zhou:** Grant/Research Support; Name of Commercial Interest; Gilead. **J. Kahn:** None. **L. Yuan:** Grant/Research Support; Name of Commercial Interest; Intercept, Genfit.

Lung

How to Expect the Unexpected- Incorporating Predictors into Lung Transplant Decision Making

Abstract# 91

A Molecular Classifier Identifies Antibody-Mediated Rejection-Associated Changes in Lung Transplant Biopsies

K. S. Madill-Thomsen[1], K. M. Halloran[2], M. Parkes[1], P. F. Halloran[1], &. the INTERLUNG Study Group[3], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]University of Alberta, Edmonton, AB, Canada, [3]., ., AB, Canada*

Purpose: Identifying lung transplant antibody-mediated rejection (ABMR) has been controversial. We compared gene expression in donor-specific antibody (DSA)

positive vs. DSA negative lung transbronchial biopsies (TBBs) to determine if DSA was associated with molecular changes similar to those in rejecting kidney and heart transplant biopsies.

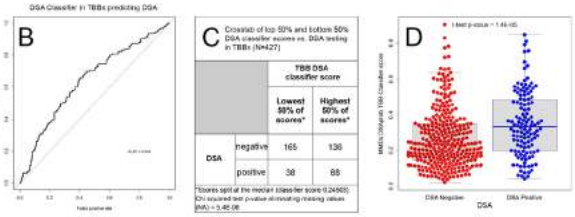
Methods: Biopsies were prospectively collected from 10 international centers in the INTERLUNG study: 635 TBBs from 532 patients and 348 third-bifurcation mucosal biopsies (3BMBs) from 307 patients. A machine learning classifier for predicting DSA positivity was trained on DSA in TBBs; scores were represented as the median of 12 estimates.

Results: Of 635 TBBs, 427 were DSA tested: 126 DSA positive (median 276 days post-transplant), and 301 DSA negative (median 303 days post-transplant). In TBBs, DSA was associated with increased expression of transcript sets representing inflammation, parenchymal dedifferentiation, and atrophy-fibrosis (Figure 1A). Transcripts increased in DSA positive TBBs included many interferon gamma (IFNG)-inducible transcripts increased in rejecting hearts and kidneys: CXCL9/10/11, IL18BP, PLA1A, SLAMF8, APOL6, HLA-DQA1, and HLA-DPB1. Transcripts associated with NK cells were not increased (e.g. KLRD1, GNY, and PRF1). A DSA probability classifier developed in TBBs predicted DSA positivity (AUC=0.64, Figure 1B). High classifier scores were strongly associated with DSA positivity in a chi-squared test (Figure 1C, p=5.4E-06) and t-test (p=1.4E-05, Figure 1D). Classifier scores were increased overall in DSA positive biopsies (Figure 1D). DSA probability classifiers developed in transplanted hearts and kidneys predicted DSA positivity in TBBs (AUC=0.60 and AUC=0.57, respectively). Many transcripts increased in DSA positive TBBs were also significantly associated with the TBB DSA classifier scores. Similar approaches in 3BMBs with available DSA testing results showed weaker signals for DSA positivity than in TBBs. There was no strong association of DSA with CLAD.

A Pathogenesis-based transcript set scores associated with DSA positivity in TBBs (N=635)

Class	Pathogenesis based transcript set scores[1]	DSA Positive (N=126) mean (p-value)	DSA Negative (N=301) mean (p-value)
Parenchymal injury	IRITD3 Injury/repair-induced transcripts	0.02 (0.05)	-0.01
	IRITD5 Injury/repair-induced transcripts	0.05 (0.01)	-0.02
Atrophy-fibrosis	COL1356 – Collagen transcripts	0.17 (0.01)	-0.05
	FICOL – Fibrillar collagen transcripts	0.19 (0.01)	-0.06
	IGT – Immunoglobulin transcripts	0.26 (0.001)	-0.08
Parenchymal	LT1 – TBB parenchymal transcripts	-0.10 (0.01)	0.11
	LT2 – TBB parenchymal transcripts (solute carriers excluded)	-0.05 (0.01)	0.06
Macrophages	AMAT1 – Alternatively activated macrophage transcripts	0.06 (0.03)	-0.06
Rejection	GRIT3 – Interferon gamma-inducible transcripts	0.06 (0.001)	-0.04
	QCAT – Cytotoxic T cell transcripts	0.05 (0.06)	-0.05
	RAT – Rejection-associated transcripts	0.07 (0.01)	-0.07

P-value from unpaired, two-sided Welch's t-test.
[1] Derived by Parkes et al. PubMed ID: 28640855



Conclusions: DSA positivity is associated with IFNG-induced and injury-related transcripts and transcript sets. DSA positivity can be used to derive a molecular classifier that identifies TBBs with antibody-mediated rejection-associated changes similar to those seen in transplanted hearts and kidneys. The functional and prognostic significance of lung ABMR changes can now be explored.

CITATION INFORMATION: Madill-Thomsen K., Halloran K., Parkes M., Halloran P., the INTERLUNG Study Group A Molecular Classifier Identifies Antibody-Mediated Rejection-Associated Changes in Lung Transplant Biopsies *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.S. Madill-Thomsen: None. **K.M. Halloran:** None. **M. Parkes:** None. **P.F. Halloran:** Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **&. the INTERLUNG Study Group:** None.

Abstract# 92

Molecular Classifiers for Chronic Lung Allograft Dysfunction Transbronchial and Mucosal Biopsies Predict Clinical CLAD and Graft Loss

M. D. Parkes[1], P. F. Halloran[2], K. M. Halloran[3], &. the INTERLUNG Study Group[4], *[1]Alberta Transplant Applied Genomics Centre, Edmonton AB, AB, Canada, [2]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [3]University of Alberta, Edmonton AB, AB, Canada, [4]., ., AB, Canada*

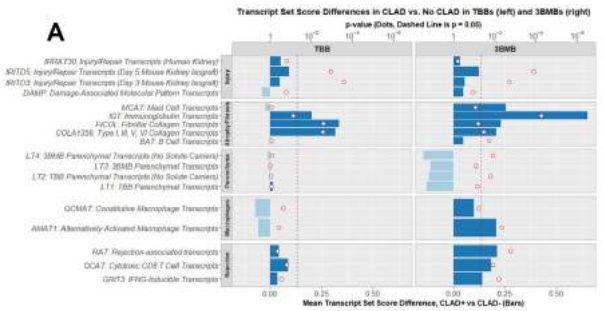
Purpose: Chronic lung allograft dysfunction (CLAD) portends poor outcomes yet is poorly understood. In the multi-center INTERLUNG study we measured transcripts in transbronchial biopsies (TBBs) and mucosal biopsies from the third bronchial bifurcation (3BMBs) using microarrays and documented CLAD-associated gene expression. We studied whether probabilistic gene-based estimates of CLAD are associated with risk of graft loss by 1 year post-biopsy.

Methods: We collected 498 TBBs from 423 transplants (3BMB: 324, 285) with known CLAD status. We identified CLAD-associated transcripts and gene set scores. Elastic net -regularized logistic regressions predicting CLAD were fit on 20 genes associated with CLAD after correcting for clinical confounders, time post-transplant, and MMDx T cell mediated rejection (TCMR). We fit multivariate Cox proportional hazards models on predicted CLAD probability, MMDx TCMR probability, time post-transplant, and interaction between CLAD and MMDx TCMR probabilities. TBBs represented 35 failures, 3BMBs 27.

Results: CLAD-associated gene expression changes reflected parenchymal dedifferentiation and response-to-wounding, especially atrophy/fibrosis, but some were also associated with clinical confounders and, in 3BMBs, time post-transplant. Some IFNG-inducible genes (e.g. HLA-DOA) were associated with CLAD in 3BMBs but not TBBs. CLAD and DSA were uncorrelated.

The regressions predicted CLAD with AUC 0.68 (TBB) and 0.73 (3BMB). In TBBs each 0.1 increase in CLAD probability was associated with 1.8x hazard of graft loss by 1 year post-biopsy (p=3x10^{-8}), compared to 1.4x in 3BMBs (p=0.005). The CLAD probability outperformed the clinical diagnosis in TBBs although not in 3BMBs. Each 0.1 increase in MMDx TCMR probability multiplied hazard by 1.2 in TBBs (p=0.02) and 3BMBs (p=0.08), but it did not compound hazards with the CLAD score.

Conclusions: CLAD resembles a parenchymal response to wounding that overlaps other pathologies and is better captured in 3BMBs. The CLAD classifiers agreed more closely with clinical diagnoses in 3BMBs than TBBs, but in both cases the scores reflected a CLAD-like phenotype and were associated with increased risk of graft loss by 1 year post-biopsy. Molecular detection of CLAD-like changes may aid patient management when other conditions exclude CLAD or when the diagnosis is uncertain.



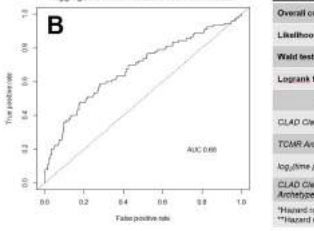


Table 1. Cox Proportional Hazards Model of Survival 1 Year Post-Biopsy (TBB)

Overall concordance			0.77
Likelihood ratio test p-value			$3x10^{-8}$
Wald test p-value			$6x10^{-10}$
Logrank test p-value			$<2x10^{-16}$
Variable	Hazard Ratio	95% C.I.	P-value
CLAD Classifier Score	1.8*	1.4 – 2.1	$3x10^{-8}$
TCMR Archetype Score	1.2	1.0 – 1.5	0.02
log_2(time post transplant)	1.0**	0.9 – 1.2	0.73
CLAD Classifier Score, TCMR Archetype Score interaction	1.0	0.9 – 1.0	0.53

*Hazard ratio associated with a 0.1 point increase in the CLAD classifier score
**Hazard ratio associated with a two-fold increase in days post-transplant

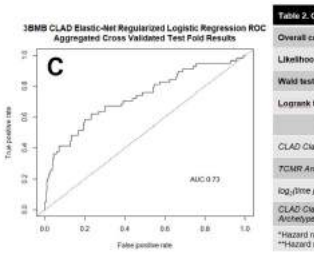


Table 2. Cox Proportional Hazards Model of Survival 1 Year Post-Biopsy (3BMB)

Overall concordance			0.69
Likelihood ratio test p-value			$4x10^{-3}$
Wald test p-value			$1x10^{-2}$
Logrank test p-value			$2x10^{-4}$
Variable	Hazard Ratio	95% C.I.	P-value
CLAD Classifier Score	1.42*	1.11 – 1.81	$5x10^{-3}$
TCMR Archetype Score	1.22	0.97 – 1.52	0.08
log_2(time post transplant)	0.93**	0.73 – 1.18	0.54
CLAD Classifier Score, TCMR Archetype Score interaction	0.99	0.92 – 1.07	0.81

*Hazard ratio associated with a 0.1 point increase in the CLAD classifier score
**Hazard ratio associated with a two-fold increase in days post-transplant

CITATION INFORMATION: Parkes M., Halloran P., Halloran K., the INTERLUNG Study Group Molecular Classifiers for Chronic Lung Allograft Dysfunction Transbronchial and Mucosal Biopsies Predict Clinical CLAD and Graft Loss *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.D. Parkes: None. **P.F. Halloran:** Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **K.M. Halloran:** None. **&. the INTERLUNG Study Group:** None.

Abstract# 93

Assessing the Accuracy of the Lung Allocation Score

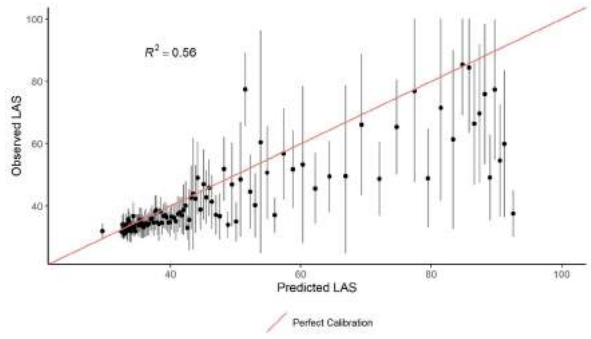
N. Dussault[1], W. Parker[1], R. Jablonski[1], E. Garrity[1], M. Churpek[2], *[1]University of Chicago, Chicago, IL, [2]University of Wisconsin-Madison, Madison, WI*

Purpose: The Lung Allocation Score (LAS) relies on the performance of two cox proportional hazards models that estimate waitlist and post-transplant survival. These models were developed using data from 2005-2008; it is unknown if they remain accurate.

Methods: This was an observational cohort study of all lung transplant candidates and recipients greater than 12 years listed or transplanted between February, 19th 2015 to February, 19th 2019 in the Scientific Registry of Transplant Recipients database. We evaluated the discrimination of the waitlist and post-transplant models with the concordance probability estimate and the calibration of each model by comparing predicted versus observed one-year restricted mean survival times. We evaluated the overall accuracy of the LAS by comparing a non-parametric estimate of the observed LAS with the actual LAS at transplant for each recipient percentile.

Results: During the study period, 11,539 eligible candidates were listed for transplant and 9,377 eligible recipients were transplanted. The waitlist model ranked candidates in the correct risk order 72% of the time (95% CI 71 - 73%) and underestimated survival by 59 days (95% CI 57 - 61 days) on average. The miscalibration increased from 6 days of error (95% CI 4 - 9 days) in the lowest risk decile to 136 days (95% CI 107 - 164 days) in the highest risk decile. The post-transplant model ranked recipients in the correct risk order 57% of the time (95% CI 55 - 58%) and underestimated post-transplant survival by 25 days (95% CI 23 - 27 days) on average. The miscalibration increased from 10 days of error in the lowest risk decile (95% 7 - 14 days) to 70 days (95% CI 64 - 77) in the highest risk decile. Overall, a recipient's LAS at transplant explained only 56% of variation in the observed LAS.

Conclusions: The waitlist and the post-transplant models that form the backbone of the LAS are inaccurate, limiting the ability of the system to rank candidates in the correct order. The LAS should be updated using a modern cohort patient cohort.



CITATION INFORMATION: Dussault N., Parker W., Jablonski R., Garrity E., Churpek M. Assessing the Accuracy of the Lung Allocation Score *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Dussault: None. **W. Parker:** None. **R. Jablonski:** None. **E. Garrity:** None. **M. Churpek:** None.

Abstract# 94

Liver Kinase B1 Knockdown Induces Platelet-Derived Growth Factor Receptor B Expression in Human Airway Epithelial Cells: A Potential Mechanism for Development of Fibrosis Leading to Chronic Lung Allograft Dysfunction

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Purpose: The platelet-derived growth factor and its receptor (PDGFRb) signaling pathway can be activated by epithelial mesenchymal transition which facilitates fibrosis. It is not known how PDGFRb is regulated following human transplant. We found that a tumor suppressor gene, liver kinase B1 (LKB1) knockdown induced epithelial mesenchymal transition in BEAS-2B airway epithelial cells. Furthermore, LKB1 was down regulated in lung transplant recipients diagnosed with chronic lung allograft dysfunction (CLAD). Since LKB1, a protein kinase 1, can regulate fibrosis, we investigated the role of LKB1 in the regulation of PDGFRb and, therefore, fibrosis leading to CLAD.

Methods: To investigate the relationship between LKB1 and PDGFRb signaling pathways to define the mechanisms of development of CLAD following lung transplant. LKB1 was knocked down by siRNA in an airway epithelial cell line, BEAS-2B. The effect of LKB1 knockdown on gene regulation was measured by nanoSTRING technology. Differential gene expression analysis was performed to identify genes which were up-regulated or downregulated by LKB1 siRNA or control siRNA. Further downstream analysis was done by knocking down PDGFRb using siRNA and the effect was measured by western blot analysis. We also analyzed PDGFRb expression by real-time PCR in BOS biopsies (n=5) and stable biopsies (n=5).

Results: In nanoSTRING platform, LKB1 knockdown significantly induced PDGFRb expression in BEAS-2B cells compared to the control siRNA (p=0.005). Densitometry analysis showed knocking down PDGFRb in BEAS-2B cells significantly inhibited NFκB (p=0.04), TNF-α (p=0.001), and phosphorylation of STAT3 (p=0.001). Kα1T (p=<0.05) and fibronectin (p=<0.05) expression were also significantly down-modulated following PDGFRb knockdown. We also analyzed the level of PDGFRb in human lung biopsies diagnosed as BOS and compared with biopsies from stable patients by real time PCR. We found PDGFRb expression was significantly increased in BOS biopsies when compared to stable biopsies (p=0.04).

Conclusions: We identified a novel molecular mechanism in which LKB1 knockdown induces PDGFRb expression and regulates the NFκB-TNFα-STAT3 signaling pathways. Therefore, LKB1 downregulation, can play a significant role in the pathogenesis of CLAD after lung transplant.

CITATION INFORMATION: Rahman M., Lee J., Ravichandran R., Fleming T., Smith M., Bremner R., Mohanakumar T. Liver Kinase B1 Knockdown Induces Platelet-Derived Growth Factor Receptor B Expression in Human Airway Epithelial Cells: A Potential Mechanism for Development of Fibrosis Leading to Chronic Lung Allograft Dysfunction *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Rahman: None. **J. Lee:** None. **R. Ravichandran:** None. **T. Fleming:** None. **M. Smith:** None. **R. Bremner:** None. **T. Mohanakumar:** Grant/Research Support; Name of Commercial Interest; NIH. Grant/Research Support; Nature of Relationship; PI.

Abstract# 95

Allograft Discard Risk Index for Lung Transplantation

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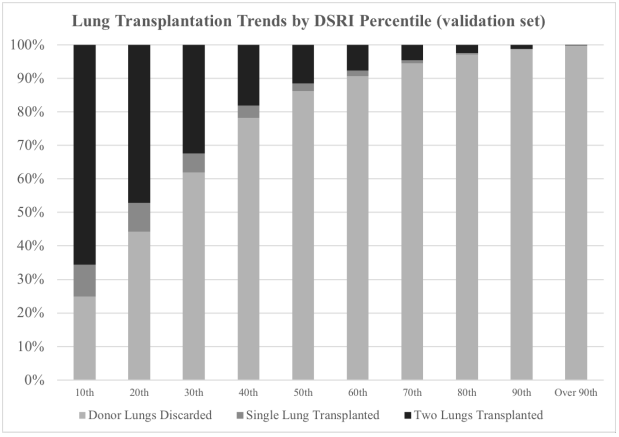
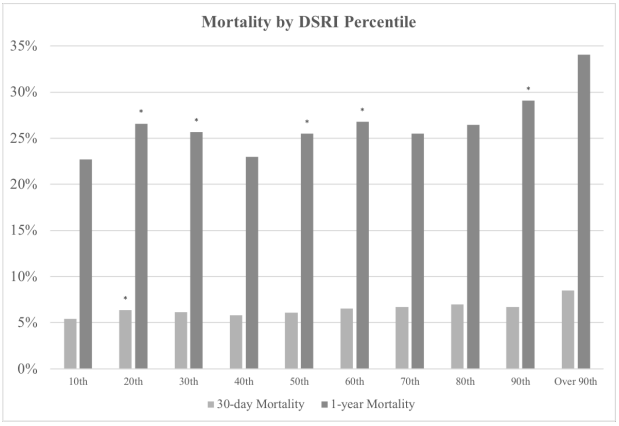
Purpose: The demand for donor lungs continues to outpace the supply, yet nearly 80% of donor lungs consented for lung transplantation (LTx) are discarded.

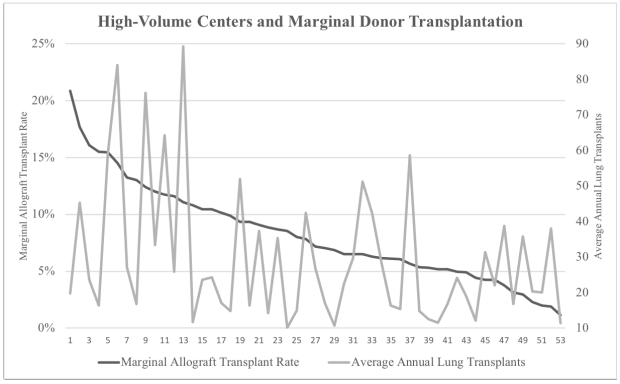
Methods: We reviewed all deceased organ donors listed within the UNOS Deceased Donor Database between 2005 and 2015. Donors > 10 years old and consented for lung donation were included in our analysis. Univariate and multivariate analyses were run on the training set (n=80,614) with the primary outcome of lung discard, and the results were used to create a discard risk index (DSRI). Discard data was assessed at DSRI value deciles using the validation set (n=40,306), and differences in 1-year mortality were assessed using stratum-specific likelihood ratio (SSLR) analysis. Marginal donors were defined as the top 50 percentiles of DSRI values for a high-volume center analysis.

Results: Donor factors most associated with higher DSRI values included age > 65, PaO2 < 300 on 100% FiO2, HCV, and cigarette use. Factors associated with lower DSRI values included donor age < 40, and PaO2 > 400. The DSRI was a reliable predictor of donor discard, with a C-statistic of 0.870 in the training set and 0.873 in the validation set. The DSRI was not a reliable predictor of 30-day or 1-year survival following transplantation (C-statistic of 0.520 & 0.518, respectively). SSLR analysis resulted in just two 1-year mortality strata (SSLR 0.89 in the 1st DSRI value decile & 1.06 in the 2nd-10th). Analysis of high-volume centers (>10 LTx per year) revealed substantial variation in the amount of marginal donor transplants by de-identified center.

Conclusions: The factors leading to lung allograft discard are not the same as those leading to beneficial outcomes. This suggests that with proper allocation, grafts that would have been historically discarded could be used in the future donor pool with limited impact on mortality.







CITATION INFORMATION: Reul R., Loor G., Garcha P., Rana A. Allograft Discard Risk Index for Lung Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: R.M. Reul: None. **G. Loor:** None. **P.S. Garcha:** None. **A.A. Rana:** None.

Abstract# 96

Perioperative Blood Transfusion is Associated with the Development of New HLA Antibodies After Adult Lung Transplantation

A. Hicks[1], A. Stoker[2], M. Cooter[2], A. Ali[3], J. Klapper[4], J. Poisson[5], D. Chen[5], J. Haney[4], K. Ghadimi[2], M. Hartwig[4], I. Welsby[2], B. Bottiger[2], *[1]Anesthesiology, Duke University Hospital, South Portland, ME, [2]Anesthesiology, Duke University Hospital, Durham, NC, [3]Pulmonology, Allergy and Critical Care Medicine, Duke University Hospital, Durham, NC, [4]Cardiothoracic Surgery, Duke University Hospital, Durham, NC, [5]Pathology, Duke University Hospital, Durham, NC*

Purpose: Lung transplant (LT) recipients who develop new antibodies to human leukocyte antigen (HLA) have associated with chronic lung allograft dysfunction and worsened outcomes. We hypothesized that perioperative transfusion is associated with new HLA antibody formation in the first post-operative year after LT.

Methods: In this single center retrospective cohort study, patients undergoing LT from September 2014 to June 2019 were included. Patients requiring multi-organ, redo LT, pre-operative extracorporeal membrane oxygenation support, or preoperative calculated panel reactive antibody screen >50% were excluded. Patient and procedural characteristics, blood products transfused within 72 hours, and HLA antibody profiles were abstracted from the medical record. The primary outcome was formation of new HLA antibodies within 12 months of transplant. Patients were grouped into those that developed new HLA antibodies ("new HLA") or those that did not change their HLA antibody profiles ("no change") and compared. Secondary outcomes included severe primary graft dysfunction (PGD grade 3), severe acute kidney injury by KDIGO (AKI). These are described by univariate analysis.

Results: Three hundred and twenty-eight patients were included, with 178 in the unchanged group and 150 in the new HLA group. Recipients in the new HLA group had more Caucasian donors, higher baseline cPRAs, different indications for transplant, slightly higher body mass indices, and more postoperative ECMO ***(Figure).*** Compared to the no change group, the new HLA group received more plasma (FFP; 1 [0,3] vs 0 [0,1], p<0.001), and cryoprecipitate (0 [0,2] vs 0 [0,1], p=0.003), while median units of red blood cells and platelets transfused were not statistically different. Total numbers of units transfused were significantly higher in the group with new HLA antibodies (4 [2, 12] vs 3 [1, 6], p=0.007). Patients in the new HLA group had a higher incidence of severe PGD (25% v 15%, p=0.015) and severe AKI (20% v 10%, p=0.019) compared to those in the no change group.

Conclusions: In lung transplant recipients, perioperative transfusion is associated with development of new HLA antibodies within the first year. Newly positive patients had a higher associated incidence of severe PGD and severe AKI.

	No Change in HLA Antibodies after LT (N=178)	New HLA Antibodies after LT (N=150)	Total (N=328)	p-value
Donor Characteristics				
Donor Gender (Female N, %)	69 (41.6%)	68 (47.6%)	137 (44.3%)	0.291[1]
Donor Age (yrs)	38 [29, 52]	36 [27, 52]	37 [28, 52]	0.580[2]
Donor Race (N, %)				**0.013[3]**
African American	44 (26.5%)	25 (17.5%)	69 (22.3%)	
Other	28 (16.9%)	14 (9.8%)	42 (13.6%)	
Caucasian	94 (56.6%)	104 (72.7%)	198 (64.1%)	
Donor BMI	26.5 [23.4, 30.0]	25.3 [23.0, 29.0]	25.9 [23.1, 29.4]	0.170[2]
Patient and Procedural Characteristics				
Indication (N, %)				**0.036[3]**
Chronic Obstructive Pulmonary Disease	29 (16.3%)	24 (16.0%)	53 (16.2%)	
Idiopathic Pulmonary Fibrosis	82 (46.1%)	77 (51.3%)	159 (48.5%)	
Cystic Fibrosis	41 (23.0%)	15 (10.0%)	56 (17.1%)	
Sarcoidosis	6 (3.4%)	8 (5.3%)	14 (4.3%)	
Primary Arterial Hypertension	3 (1.7%)	6 (4.0%)	9 (2.7%)	
Other (Congenital Heart Disease)	17 (9.6%)	20 (13.3%)	37 (11.3%)	
Age (years)	59 [43, 67]	60[50, 67]	60 [49, 67]	0.467[2]
Sex (Female N, %))	68 (38.2%)	58 (38.7%)	126 (38.4%)	0.931[1]
Race (N, %)				0.332[3]
African American	12 (6.7%)	17 (11.3%)	29 (8.8%)	
Caucasian	158 (88.8%)	125 (83.3%)	283 (86.3%)	
Not Reported	4 (2.2%)	2 (1.3%)	6 (1.8%)	
Other	4 (2.2%)	6 (4.0%)	10 (3.0%)	
Body Mass Index (BMI)	24.1 [20.1, 26.4]	25.5 [22.6, 27.1]	24.9 [21.2, 26.6]	**<0.001**
Lung Allocation Score	41.9 [36.0, 48.9]	42.7 [36.6, 50.6]	42.3 [36.3, 50.1]	0.424[2]
Previous Pregnancies	38 (21.7%)	38 (26.2%)	76 (23.8%)	0.347[1]
Preoperative cPRA >0	20 (11.2%)	60 (40.0%)	80 (24.4%)	**<0.001[1]**
Blood (ABO) type (N, %)				0.732[3]
A	56 (34.1%)	55 (39.0%)	111 (36.4%)	
AB	2 (1.2%)	3 (2.1%)	5 (1.6%)	
B	21 (12.8%)	16 (11.3%)	37 (12.1%)	
O	85 (51.8%)	67 (47.5%)	152 (49.8%)	
Preoperative hemoglobin (g/dL)	12.2 (1.8)	12.2 (1.8)	12.2 (1.8)	0.847[3]
Surgery type (BOLT N, %)	145 (81.5%)	125 (83.3%)	270 (82.3%)	0.658[1]
Cardiopulmonary bypass (N, %)	32 (18.0%)	35 (23.3%)	67 (20.4%)	0.231[1]
Intraoperative ECMO	32 (18.0%)	33 (22.0%)	65 (19.8%)	0.363[1]
Prior chest surgery (N, %)	51 (28.7%)	51 (34.2%)	102 (31.2%)	0.278[1]
Total Ischemic time (min)	395 [346, 463]	398 [349, 458]	396 [348, 462]	0.702[2]
Post Tx ECMO within 72 hours	36 (20.2%)	47 (31.3%)	83 (25.3%)	**0.021[1]**
Donor specific antigen within 1 year	--	82 (54.7%)	82 (54.7%)	--

[1]Chi-Square [2]Wilcoxon [3]Equal Variance T-Test

CITATION INFORMATION: Hicks A., Stoker A., Cooter M., Ali A., Klapper J., Poisson J., Chen D., Haney J., Ghadimi K., Hartwig M., Welsby I., Bottiger B. Perioperative Blood Transfusion is Associated with the Development of New HLA Antibodies After Adult Lung Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Hicks: None. **A. Stoker:** None. **M. Cooter:** None. **A. Ali:** None. **J. Klapper:** None. **J. Poisson:** None. **D. Chen:** None. **J. Haney:** None. **K. Ghadimi:** None. **M. Hartwig:** Grant/Research Support; Name of Commercial Interest; Mallinckrodt, Paragonix. **I. Welsby:** None. **B. Bottiger:** None.

Abstract# 97

A Randomized, Multicenter, Blinded Study Assessing the Effects of Gaseous Nitric Oxide in an Ex Vivo System of Human Lungs

M. G. Hartwig[1], J. A. Klapper[1], N. Poola[2], A. Banga[3], P. G. Sanchez[4], J. S. Murala[3], J. L. Potenziano[2], *[1]Duke University Medical Center, Durham, NC, [2]Mallinckrodt Pharmaceuticals, Bedminster, NJ, [3]University of Texas Southwestern Medical Center, Dallas, TX, [4]University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: The effects of nitric oxide (NO) on donor lungs during ex vivo lung perfusion (EVLP) have not been studied. We assessed whether the novel use of gaseous NO (gNO) in discarded human lungs improved lung health during EVLP.

Methods: This randomized, blinded, parallel, 2-arm, proof-of-concept study compared gNO delivered via the membrane oxygenator on the XVIVO Perfusion System (XPS) (gNO + P) versus the perfusate alone (P). An additional group of lungs were administered inhaled NO (iNO) via the ventilator circuit in open-label fashion (iNO V + P). Enrolled lungs were procured from brain-dead donors that were not suitable for transplantation with or without EVLP. Primary endpoints included a novel grading system for assessing the health of EVLP lungs and total time on EVLP (duration: minimum, 6 hours; maximum, 12 hours). Secondary and exploratory endpoints included clinical assessment of lung suitability for transplantation, left atrium partial pressure of oxygen, change in lung weight, and relevant biomarkers. A Mann-Whitney test was used for between-group comparisons.
Results: A total of 20 bilateral donor lungs (blinded study, n=16; open-label study, n=4) from 3 study centers were enrolled. Overall, lung mean and median grading system scores were generally the same or higher (indicating a better lung health) in the gNO + P group (median score range [min, max], 0-3.5 [0, 7]) versus the P alone group (median score range [min, max], 0-2.0 [0, 5]; *P*>0.12 for all between-group comparisons). In the open-label study, median scores were generally lower in the lungs in the iNO V + P group compared with the gNO + P group. Median (min, max) EVLP time was longer for lungs in the gNO + P group compared with the P alone group (12.4 [8.6, 12.6] vs 10.6 [6.0, 12.4] hours, respectively; *P*=0.01). In the open-label study, median (min, max) EVLP perfusion time was 12.4 (8.7, 13.0) hours in the iNO V + P group versus 12.4 (8.6, 12.6) hours in the gNO + P group (*P*=0.81).
Conclusions: Among lungs deemed unacceptable for transplantation, the addition of gNO to the perfusate was associated with longer stability during EVLP on the XPS system. Our results support further investigation of gNO use during EVLP.
CITATION INFORMATION: Hartwig M., Klapper J., Poola N., Banga A., Sanchez P., Murala J., Potenziano J. A Randomized, Multicenter, Blinded Study Assessing the Effects of Gaseous Nitric Oxide in an Ex Vivo System of Human Lungs *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.G. Hartwig: Consulting Fee; Name of Commercial Interest; Bridge to Life, Paragonix. Consulting Fee; Nature of Relationship; Consultant, Consultant. Grant/Research Support; Name of Commercial Interest; Mallinckrodt Pharmaceuticals, Biomedinnovations. Grant/Research Support; Nature of Relationship; Research, Research funding. Other; Name of Commercial Interest; Intuitive. Other; Nature of Relationship; Education. **J.A. Klapper:** None. **N. Poola:** Ownership Interest; Name of Commercial Interest; Mallinckrodt Pharmaceuticals. Ownership Interest; Nature of Relationship; Employee. **A. Banga:** None. **P.G. Sanchez:** None. **J.S. Murala:** None. **J.L. Potenziano:** Ownership Interest; Name of Commercial Interest; Mallinckrodt Pharmaceuticals. Ownership Interest; Nature of Relationship; Affiliation at the time that the research was conducted..

Abstract# 98

Outcomes of Cytomegalovirus Status Determining Induction Therapy in Lung Transplant

K. Heagler[1], J. Lyons[1], B. Bemiss[2], P. Stracener[1], *[1]Pharmacy, Loyola University Medical Center, Maywood, IL, [2]Loyola University Medical Center, Maywood, IL*

Purpose: At the study institution, basiliximab induction is withheld in lung transplant recipients who are cytomegalovirus (CMV) high risk due to concern for increased CMV infection. The purpose of this study was to assess the difference in rate of rejection and CMV infection between basiliximab induction compared to no induction in lung transplant recipients.
Methods: This retrospective cohort study compared adult lung transplant recipients who received basiliximab induction compared to no induction between January 1, 2015 and November 30, 2019. The primary endpoint was incidence of rejection within the first-year post-transplant. Secondary endpoints included patients with clinically significant rejection (ACR Grade A $\geq$ 2 or AMR), patients with greater than one rejection, incidence of CMV viremia, CMV disease, number of clinically significant positive cultures, and death at one-year post-transplant.
Results: A total of 140 patients were included, 97 in the basiliximab group and 43 in the no induction group. Baseline characteristics were similar between the groups as shown in Table 1. Median age was 60 years, 66% were male, and 60% received a bilateral sequential lung transplant (BSL). Primary and secondary endpoint results are displayed in Table 2. Incidence of rejection was numerically higher in the no induction group 26/43 (60.5%) compared to the basiliximab group 46/97 (47.4%) (P = 0.154). Rejection type and severity were similar between the two groups. A significantly higher number of patients had CMV viremia and disease in the no induction group compared to the basiliximab group. There was no difference between the groups in all other secondary endpoints.
Conclusions: Withholding induction therapy in lung transplant recipients due to CMV high risk status resulted in a numerically higher incidence of rejection and did not significantly impact the total number of infections. CMV viremia and disease was significantly higher in the no induction group, which is an expected finding given their CMV high risk status. Notably, a large number of patients in each group were not on prophylaxis at the time of viremia onset. These findings do not provide strong evidence to justify withholding induction based on CMV risk status. A study of direct comparison including CMV high risk patients receiving basiliximab versus no induction would be needed to better assess the impact of induction therapy on the incidence of CMV viremia and disease after lung transplant.

Table 1
Baseline Characteristics

	Basiliximab (n = 97)	No induction (n = 43)	P Value
Age, years [median (IQR)]	59.5 (52.9 – 65.9)	62.5 (53.4 – 57.6)	0.471
PRA [median (IQR)]	0 (0-0)	0 (0-4)	0.394
Male – n (%)	63 (64.9)	29 (67.4)	0.774
BSL – n (%)	57 (58.8)	27 (62.8)	0.654
White race – n (%)	82 (84.5)	36 (83.7)	0.903
Antiviral prophylaxis – n (%)			
Valganciclovir	71 (73.2)	33 (76.7)	0.658
Ganciclovir	6 (6.2)	1 (2.3)	0.438
Acyclovir	2 (2.1)	1 (1.3)	1
Valacyclovir	16 (16.5)	6 (14)	0.703
None	2 (2.1)	2 (4.7)	0.586
CMV risk status – n (%)			
High	-	43 (100)	-
Intermediate	66 (47)	-	-
Low	31 (22)	-	-

Table 2
Endpoints

	Basiliximab (n = 97)	No induction (n = 43)	P Value
Rejection – n (%)	46 (47.4)	26 (60.5)	0.154
Patients with clinically significant rejection (ACR Grade A $\geq$ 2 or AMR) – n (%)	20 (20.6)	10 (23.3)	0.726
Patients with > 1 rejection – n (%)	15 (15.5)	9 (20.9)	0.429
CMV viremia – n (%)	16 (16.5)	20 (46.5)	< 0.001
Patients on prophylaxis at the time of CMV viremia onset – n (%)	6 (37.5)	12 (60)	0.180
Time to CMV viremia, days (mean $\pm$ SD)	199 $\pm$ 99.3	196 $\pm$ 99.5	0.192
CMV disease – n (%)	1 (1.6)	5 (11.6)	0.011
Number of clinically significant positive cultures [median (IQR)]	3 (1-5)	3 (2-6)	0.184
Death	13 (13.4)	5 (11.6)	0.772

CITATION INFORMATION: Heagler K., Lyons J., Bemiss B., Stracener P. Outcomes of Cytomegalovirus Status Determining Induction Therapy in Lung Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Heagler: None. **J. Lyons:** None. **B. Bemiss:** None. **P. Stracener:** None.

VCA

VCA: Basic and Clinical

Abstract# 390

A Delphi Panel to Develop Public Educational Materials About Vascular Composite Allotransplantation (VCA)

C. Sidoti[1], A. Ferzola[2], H. Sung[2], S. Rasmussen[2], E. Gordon[3], N. Anderson[3], J. Uriarte[3], C. Cooney[4], G. Brandacher[4], M. Levan[2], *[1]Department of Surgery, Johns Hopkins School of Medicine, East Islip, NY, [2]Department of Surgery, Johns Hopkins School of Medicine, Baltimore, MD, [3]Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, [4]Department of Plastic and Reconstructive Surgery, Johns Hopkins School of Medicine, Baltimore, MD*

Purpose: As the field of Vascular Composite Allotransplantation (VCA) grows, so does the demand for VCA donations. The education materials about VCA and VCA donation currently accessible to the public are lacking, and there is no consensus on how to best educate the public about VCA.
Methods: We conducted an online Delphi panel with clinical and policy experts in the field of VCA to identify which topics should be presented in educational materials for the public about VCA donation in a comprehensive, relatable, and understandable manner. The modified Delphi method involved two rounds of surveys designed to facilitate consensus within a group. We developed an initial list of topics for inclusion in educational materials based on a previously reported focus group study that assessed information needs when considering VCA donation. Round one assessed the importance of different educational topics using Likert Scale questions. After presenting 29 topics to participants in the first round, we removed topics that had a mean Likert Scale response less than "neutral" and added new topics suggested by experts in the first-round survey. In round two, we presented 27 topics and corresponding educational statements and asked respondents to provide additional feedback on the importance of topics on a Likert Scale. The Likert Scale ranged from "Do Not Include" to "Definitely Include". Responses were analyzed using descriptive statistics.
Results: We received 18 and 15 responses to the first-round and second-round surveys, respectively. Participants were affiliated with institutions across the nation. At the conclusion of the second-round survey, 21 topics had a mean Likert Scale response greater than "Neutral", represented as 3.0 (Table 1). The five most important topics were: potential VCA recipients, the consent process for VCA donation, the definition of VCA, purpose of VCA, and most common VCA organs.
Conclusions: Our findings identified expert-driven topic areas for use in educational materials for the public about VCA. Future research will assess whether these

materials contribute to the public's understanding of VCA and VCA donation. Public education about the opportunity to be a VCA donor is crucial to increasing access to VCA.

Table 1: Topics to Include in Educational Materials

Topic	Mean (SD) Likert Scale Inclusion Response (1 = Do not include, 5 = Definitely Include)
Potential VCA Recipients	4.73 (.57)
Consent Process for VCA Donation	4.73 (.44)
Definition of VCA	4.47 (1.02)
Purpose of VCA	4.47 (.88)
Most Common VCA Organs Transplanted	4.47 (.62)
Authorization Process for VCA Donation	4.33 (.70)
VCA Outcomes	4.27 (1.06)
Presence of VCA in US	4.27 (.85)
VCA Success Stories	4.13 (1.31)
Functionality Return after VCA	4.00 (1.32)
VCA Recovery	4.00 (1.21)
Organ Allocation System	3.93 (1.00)
Screening Process for VCA	3.87 (.76)
Pre and Post-Transplant Images of VCA Recipient	3.73 (1.34)
VCA Organ Recovery Process	3.67 (1.40)
Risks of VCA	3.67 (.76)
Presence of VCA Globally	3.53 (1.20)
Specific Consent for Individual VCA Organs	3.40 (1.25)
VCAs are Organs	3.40 (1.12)
Life-long Commitment when Receiving a VCA Organ	3.27 (1.24)
Matching Process for VCA	3.20 (1.28)

CITATION INFORMATION: Sidoti C., Ferzola A., Sung H., Rasmussen S., Gordon E., Anderson N., Uriarte J., Cooney C., Brandacher G., Levan M. A Delphi Panel to Develop Public Educational Materials About Vascular Composite Allotransplantation (VCA) *AJT, Volume 21 Supplement 3*

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Abstract# 392

Trends in Vascularized Composite Allograft (VCA) Waiting List and Transplant Activity in the U.S

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Purpose: Vascularized Composite Allograft (VCA) transplantation has grown and changed rapidly in the past several years. This study investigates VCA waiting list and transplant trends in the U.S.

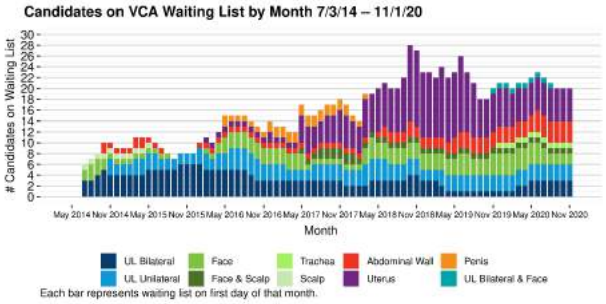
Methods: We used OPTN VCA waiting list data from July 3, 2014 through November 15, 2020 and OPTN VCA transplant data from January 1, 1998 through November 15, 2020.

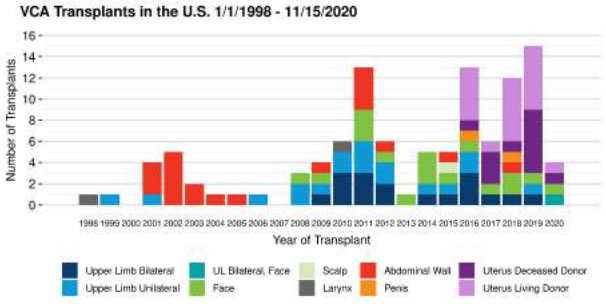
Results: Since the OPTN implemented the VCA waiting list on July 3, 2014, 99 candidates have been registered on the waiting list through November 15, 2020. VCA candidates were 60.6% female, 79.8% white, and 78.8% under 45 years old, but characteristics varied by organ type. The size of the VCA waiting list increased gradually over several years, largely due to the introduction of uterus transplants. In the past year, however, existing registrations for upper limb and head and neck candidates held steady while uterus registrations declined. New registrations were notably lower in 2020, likely due to the COVID-19 crisis. As of 11/15/20, the OPTN VCA waiting list included 4 head and neck (20%), 6 upper limb (30%), 4 abdominal wall (20%), and 6 uterus (30%) candidates. Median days on the list for those waiting for a deceased donor organ on 11/15/20 was 771 days (IQR: 524.8 - 971.0) - a large increase compared with analyses at the same time in 2019. Median days on the VCA waiting list for those transplanted with a deceased donor organ was 193 days (IQR: 71.25 - 376.5). A total of 109 VCA recipients have received VCA transplants in the US, including 59 since 7/3/14: 8 bilateral upper limb, 5 unilateral upper limb, 10 face, 1 scalp, 2 abdominal wall, 31 uterus (12 deceased donor; 19 living donor), and 2 penis transplants.

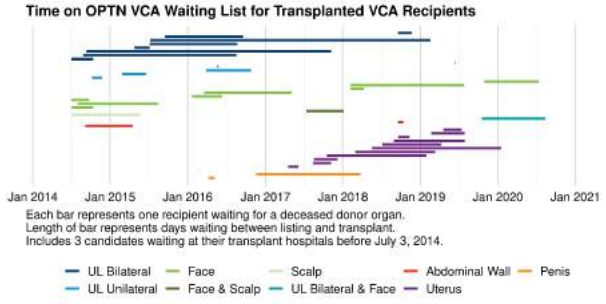
Conclusions: Continued monitoring of VCA trends is needed to support VCA donation and transplantation.

Table 1. Characteristics of VCA Candidates added to OPTN VCA Waiting List between July 3, 2014 and November 15, 2020

	Upper Limb	Head & Neck	UL Bilat. & Face	Abdominal Wall	Penis	Uterus
	n = 26	n = 16	n = 1	n = 9	n = 3	n = 44
GENDER						
Female	10 (38.5%)	4 (25%)	0 (0%)	2 (22.2%)	0 (0%)	44 (100%)
Male	16 (61.5%)	12 (75%)	1 (100%)	7 (77.8%)	3 (100%)	0 (0%)
Race						
White	20 (76.9%)	13 (81.2%)	1 (100%)	5 (55.6%)	3 (100%)	37 (84.1%)
Black	3 (11.5%)	1 (6.2%)	0 (0%)	2 (22.2%)	0 (0%)	3 (6.8%)
Hispanic	3 (11.5%)	2 (12.5%)	0 (0%)	1 (11.1%)	0 (0%)	0 (0%)
Asian	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (6.8%)
Nat.Haw. / P.I.	0 (0%)	0 (0%)	0 (0%)	1 (11.1%)	0 (0%)	0 (0%)
Multi-racial	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (2.3%)
Age						
<18	1 (3.8%)	0 (0%)	0 (0%)	2 (22.2%)	0 (0%)	0 (0%)
18-34	11 (42.3%)	4 (25%)	1 (100%)	2 (22.2%)	1 (33.3%)	38 (86.4%)
35-44	7 (26.9%)	1 (6.2%)	0 (0%)	4 (44.4%)	0 (0%)	6 (13.6%)
45-54	3 (11.5%)	6 (37.5%)	0 (0%)	1 (11.1%)	1 (33.3%)	0 (0%)
55+	4 (15.4%)	5 (31.2%)	0 (0%)	0 (0%)	1 (33.3%)	0 (0%)







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DISCLOSURES: J. Wainright: None. **K. Swanner:** None. **W. Cherikh:** None. **D. Klassen:** None.

Basic

Biomarkers, Immune Assessment and Clinical Outcomes

Abstract# 393

Utility of Screening-Bead Assay in Post-Transplant Testing of Donor-Specific Antibodies (DSA) and Antibody-mediated Rejection (ABMR) in Renal Allografts

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Purpose: ABMR is a major cause of poor long-term graft survival. Though post-transplant monitoring of HLA DSAs can aid in risk stratification and optimizing immunosuppression, it is limited by its high cost and lack of data supporting that early detection impacts outcomes. The optimal strategy for testing for DSA is debated. Some centres use screening-bead assays before single-antigen bead (SAB) assays to assess if HLA antibodies are present, believing it is cost-effective. Others forego the screening-bead assay, using the single-antigen bead assay directly, claiming screening is not sensitive enough. We aimed to establish a testing algorithm for HLA antibodies by determining screening's clinical utility.

Methods: Sensitivity (Sn), specificity (Sp), positive/negative predictive values (PPV/NPV) and likelihood ratios (LR+/-) of screening were defined by comparing it to SAB assays as a gold standard for detecting HLA antibodies, and renal biopsies as a gold standard for ABMR. Data were collected from patients between 2013-2017. 688 screens and SABs from 585 patients and 97 screens and biopsies from 87 patients were included. As our study population contained patients investigated for allograft dysfunction, its prevalence of HLA antibodies and ABMR (48.1% and 24.2% respectively) was higher than reported in the general recipient population. Thus, PPV and NPV were extrapolated to the literature-reported prevalence of HLA antibodies (30%), *de novo* DSAs (~15%) and ABMR (~15%).

Results: Sn for HLA antibodies was 90.6% [95% CI: 87.5%, 93.8%], NPV was 75.8% and LR- was 0.345. When extrapolated, NPV was 87.1% for HLA antibodies and 94.2% for *de novo* DSAs. Sn for ABMR was 91.3% [95% CI: 79.8%, 100%], NPV was 82.0% and LR- was 0.70. When extrapolated, NPV was 89.1%. Positive screens had poor clinical utility: Sp for anti-HLA antibodies was 27.2%, 95% CI [22.6%, 31.8%], PPV was 53.6% and +LR was 1.24; Sp for ABMR was 12.5%, 95% CI [4.9% to 20.1%], PPV was 25% and +LR was 1.04.

Conclusions: High Sn and NPV of the screening-bead assay warrant its use in ruling-out anti-HLA antibodies in previously unsensitized renal transplant recipients and those with low clinical suspicion of ABMR. However, it should not be used in pre-sensitized patients or those with high clinical suspicion of ABMR.

CITATION INFORMATION: Agrawal A., Dijke E., Murray A., Campbell P. Utility of Screening-Bead Assay in Post-Transplant Testing of Donor-Specific Antibodies (DSA) and Antibody-mediated Rejection (ABMR) in Renal Allografts *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Agrawal: None. **E. Dijke:** None. **A. Murray:** None. **P. Campbell:** None.

Abstract# 394

A Multimodal Interrogation of Human Renal Allografts

D. Dadhania[1], R. Ding[1], H. Xu[2], C. Lee[1], C. Snopkowski[1], T. Salinas[1], T. Muthukumar[1], J. Lee[1], R. Woodward[2], M. Grskovic[2], S. Dholakia[2], M. Suthanthiran[1], *[1]Weill Cornell Medicine - NYPH, New York, NY, [2]CareDx, New York, NY*

Purpose: Development and validation of noninvasive biomarkers of kidney allograft rejection should improve transplant outcomes. CTOT-04 study validated urinary cell mRNA signature (CTOT04-Sig) for T-cell rejection (ACR). Plasma donor derived cell-free DNA (dd-cfDNA) levels were associated with antibody mediated rejection (ABMR) in a multicenter setting. We tested the hypothesis that a composite signature of CTOT04-Sig and plasma dd-cfDNA percentage is diagnostic of AR with high accuracy.

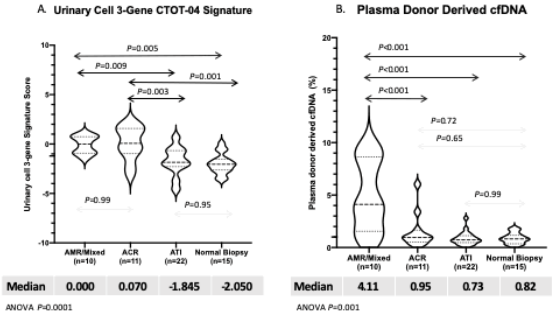
Methods: We profiled biopsy matched 58 urine & plasma specimens from 55 graft recipients: 11 ACR, 10 AMR/mixed rejection, 22 ATI & 15 normal (Nl) biopsies. RNA from urine cell pellets was reverse transcribed to cDNA and customized PCR assays were used to measure CTOT04-Sig consisting of 18S rRNA normalized CD3E mRNA and IP-10 mRNA and 18S rRNA copies. AlloSure measurements were performed by CareDx using a targeted next-generation sequencing assay consisting of 405 single-nucleotide polymorphisms.

Results:

Table 1. Clinical characteristics	AMR or Mixed Rejection (N=10)	ACR (N=11)	ATI (N=22)	Normal (N=15)	P
Patients, N	N=10	N=10	N=22	N=14	
Time since Transplant median (range)	35 (0.9, 75.8)	3.4 (1.3, 7.1)	2.1 (1.4, 5.6)	4.6 (3.3, 13.5)	0.12
Creatinine (mg/dl) at biopsy, mean ± SD	2.40 ±1.16	2.23 ±0.46	4.34 ± 2.48	1.45 ±0.42	<0.001
DSA present at biopsy, N (%)	10 (100%)	0 (0%)	2 (9%)	2 (13%)	0.65
C4d+ biopsy, N (%)	8 (80%)	0 (0%)	0 (0%)	0(0%)	n/a

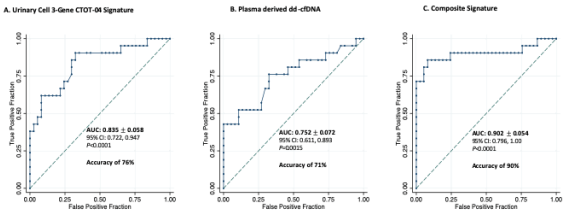
Table 1 is a summary of the study group characteristics.
Violin plots (Fig1A) show that the CTOT04-Sig score is significantly different increased in both ACR and AMR compared to ATI or Nl. dd-cfDNA is significantly increased in AMR vs. ACR, ATI or Nl (Fig1B).

Figure 1. Noninvasive Diagnosis of Acute Rejection in Kidney Allografts



The ability of the signatures to distinguish AR (TCMR + AMR + Mixed) from No AR (ATI+ Normal) was analyzed using receiver operating characteristic (ROC) curves (Fig2). The composite signature had the highest area under the ROC (Fig2C) with a diagnostic accuracy of 90%, outperforming the CTOT04-Sig (P=0.045) and dd-cfDNA (P=0.028).

Figure 2. Receiver Operator Characteristic Curves



Conclusions: Composite signature of CTOT-04 signature and dd-cfDNA allows for accurate and specific diagnosis of AR of kidney allografts and this multimodal approach should be validated in a prospective, multicenter study.

CITATION INFORMATION: Dadhania D., Ding R., Xu H., Lee C., Snopkowski C., Salinas T., Muthukumar T., Lee J., Woodward R., Grskovic M., Dholakia S., Suthanthiran M. A Multimodal Interrogation of Human Renal Allografts *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Dadhania: Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Advisory Committee. **R. Ding:** Other; Name of Commercial Interest; CareDx. Other; Nature of Relationship; Advisory Board. **H. Xu:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **C. Lee:** None. **C. Snopkowski:** None. **T. Salinas:** None. **T. Muthukumar:** None. **J. Lee:** None. **R. Woodward:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **M. Grskovic:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **S. Dholakia:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **M. Suthanthiran:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Advisory Committee Member.

KIDNEY

Abstract# 395

A Patient-Centered Perspective on Progress in Transplantation

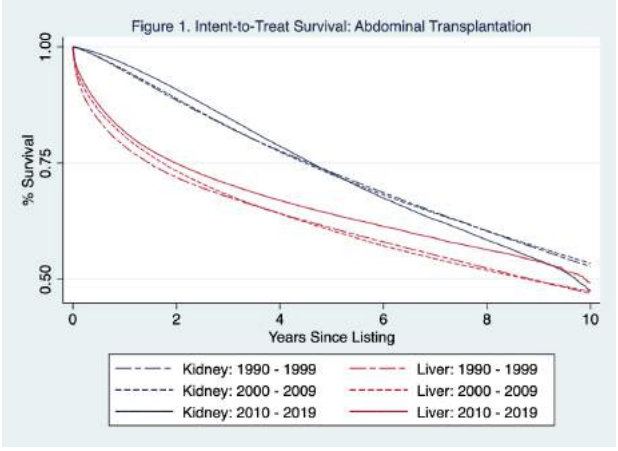
B. Hickner[1], N. Galvan[2], R. Cotton[2], C. O'Mahony[2], J. Goss[2], A. Rana[2], *[1]Department of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Department of Surgery, Baylor College of Medicine, Houston, TX*

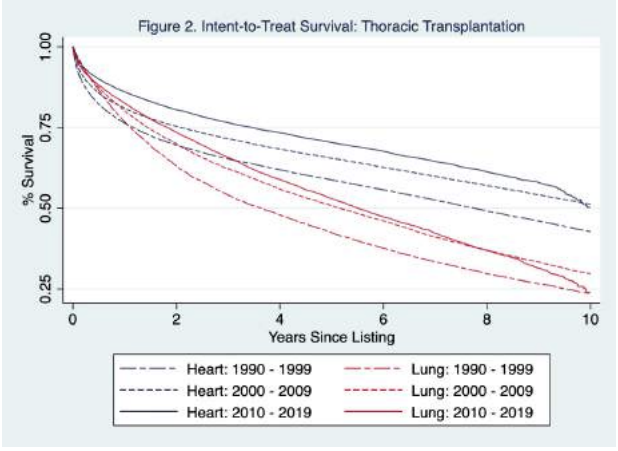
Purpose: This study aimed to provide a patient-centered perspective on change in transplantation outcomes through analysis of intent-to-treat survival, which accounted for donor shortages by following patients from listing to death regardless of whether a transplant was received.

Methods: The study population consisted of patients in the Organ Procurement and Transplantation Network database listed from January 1, 1990 to December 31, 2019. This included 483,523 patients listed for kidney transplant, 202,096 patients listed for liver transplant, 79,563 patients listed for heart transplant, and 48,680 patients listed for lung transplant. Patients were followed from listing until death or last known follow-up, whether on the waitlist or post-transplant. Cox proportional hazards regression was used to identify clinical and demographic factors associated with intent-to-treat survival. Factors significant in univariate analysis ($p < 0.05$) were included with decade of listing (1990-1999, 2000-2009, 2010-2019) in multivariate regression, with 2010-2019 used as the reference time period.

Results: For all organs, listing from 1990-1999 was associated with highest risk of death and listing from 2010-2019 was associated with lowest risk of death. For kidney transplant, hazard ratios (95% confidence intervals) were 1.43 (1.41-1.45) and 1.04 (1.04-1.05) for 1990-1999 and 2000-2009, respectively. Similarly, liver transplant hazard ratios were 1.30 (1.27-1.32) and 1.09 (1.08-1.10), heart transplant hazard ratios were 1.73 (1.67-1.79) and 1.14 (1.12-1.16), and lung transplant hazard ratios were 1.54 (1.49-1.60) and 1.11 (1.09-1.13). Kaplan-Meier survival curves for abdominal and thoracic organs can be seen in Figure 1 and Figure 2, respectively.

Conclusions: Intent-to-treat outcomes have improved significantly over the last three decades. While all organs displayed improvement in intent-to-treat survival, improvements were most significant in heart and lung transplant. This reflects the combined success of efforts directed at decreasing waitlist mortality, increasing post-transplant survival, and maximizing the respective pools of donor organs.





CITATION INFORMATION: Hickner B., Galvan N., Cotton R., O'Mahony C., Goss J., Rana A. A Patient-Centered Perspective on Progress in Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Hickner: None. **N. Galvan:** None. **R. Cotton:** None. **C. O'Mahony:** None. **J. Goss:** None. **A. Rana:** None.

Abstract# 396

Peripheral Blood Inflammatory Chemokines Uncover Rejection in the Absence of Histological Lesions

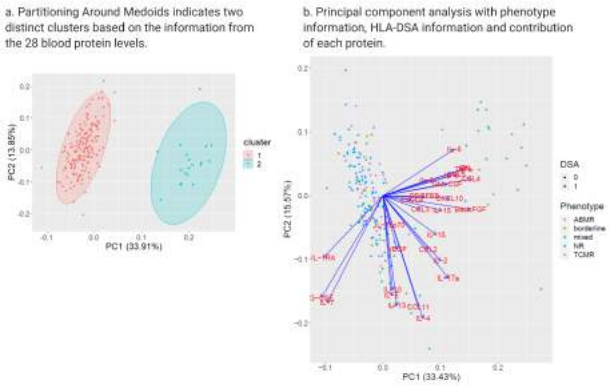
E. Van Loon[1], T. Barba[2], B. Lamarthée[1], A. Senev[1], O. Thaunat[2], D. Schols[3], M. Naesens[1], *[1]Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium, [2]Department of Transplantation, Nephrology and Clinical Immunology, Edouard Herriot Hospital Lyon, Lyon, France, [3]Laboratory of Virology and Chemotherapy, KU Leuven, Leuven, Belgium*

Purpose: Cytokines and chemokines play a critical role in the pathophysiology of allograft rejection, but the relation of peripheral blood cytokine expression profiles to clinical kidney transplant rejection is insufficiently investigated.

Methods: Levels of 28 cytokines, chemokines and growth factors were assessed using multiplexed Luminex magnetic bead testing in 293 peripheral blood samples. Blood samples were collected between 2012 and 2016, at time of a kidney allograft biopsy for graft dysfunction within the first year after transplantation in a cohort of 192 consecutive transplants at a single kidney transplant center.

Results: Principal component analysis and hierarchical clustering uncovered two clusters, distinct in their pro-inflammatory cytokine levels (Figure a). Patients in Cluster I (N=20) had higher pro-inflammatory protein expression compared to patients in cluster II (N=172) and were hallmarked by high prevalence of donor-specific anti-HLA antibodies (HLA-DSA) (N=15/20) (Figure b), and high acute inflammatory histological lesion scores. In 30% (N= 6/20) of biopsies in cluster I, there was no histological evidence of rejection. Cluster I had worse graft survival independent of female sex, repeat transplantation, induction therapy and ongoing histological rejection (adjusted hazard ratio 3.31, 95% CI 1.09 -10.03, p=0.03). The observed inflammatory cytokine profiles were confirmed in *in vitro* models of DSA-mediated NK cell and/or monocyte activation.

Conclusions: The expression of pro-inflammatory cytokines is increased in peripheral blood of kidney transplant patients with circulating HLA-DSA, even in the absence of histopathology of rejection. These results challenge the vision that kidney transplant histology is the gold standard for identification of ongoing allo-immune processes.



CITATION INFORMATION: Van Loon E., Barba T., Lamarthée B., Senev A., Thaunat O., Schols D., Naesens M. Peripheral Blood Inflammatory Chemokines Uncover Rejection in the Absence of Histological Lesions *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Van Loon: None. **T. Barba:** None. **B. Lamarthée:** None. **A. Senev:** None. **O. Thaunat:** None. **D. Schols:** None. **M. Naesens:** None.

Kidney

Kidney Deceased Donor Allocation 1

Abstract# 398

Donor-Recipient BSA Matching is Prognostically Significant in Solitary and En-bloc Kidney Transplantation from Pediatric Circulatory Death Donors

C. J. Little, A. A. Dick, J. D. Perkins, J. D. Reyes, *Department of Surgery, University of Washington, Seattle, WA*

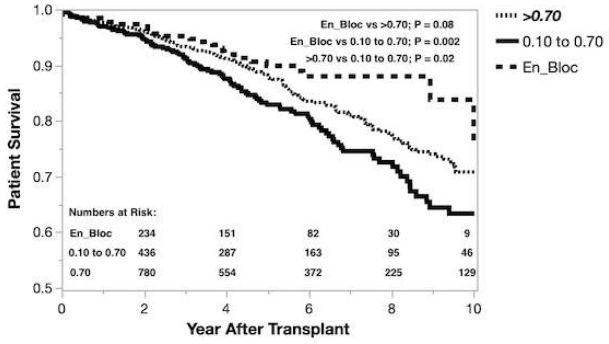
Purpose: The purpose of this study was to evaluate the pernicious effects of inadequate functional nephron mass in size disparate donation after cardiac death (DCD) kidney transplantation between pediatric donors and adult recipients by characterizing the impact of donor-recipient (D-R) body surface area (BSA) mismatch on long-term graft and patient survival.

Methods: Utilizing the Organ Procurement and Transplantation Network (UNOS) database, a retrospective analysis was performed for all adult (18 years or older) recipients of pediatric (17 years or younger) DCD kidneys in the US from 1/1/2004-

3/10/2020. The primary outcomes included death-censored graft survival, all-cause graft survival, and patient survival. The cohorts were defined by D-R BSA ratios of 0.10-0.70, >0.70-0.91, and >0.91.

Results: Solitary DCD pediatric allografts transplanted between D-R pairs with a BSA ratio of 0.10-0.70 carried an increased risk of all-cause graft failure (RR 1.36; CI 1.10-1.69) and patient death (RR 1.32; CI 1.01-1.73) when compared to pairings with a ratio of >0.91. There was no difference in death-censored graft survival between these cohorts. Additionally, there was no difference in graft or patient survival between the >0.70-0.91 and >0.91 cohorts. Kaplan-Meier survival analysis revealed improved 10-year patient survival in recipients of en-bloc allografts (P = 0.02) compared to recipients of single kidneys with D-R BSA ratios of 0.10-0.70. A similar survival advantage was demonstrated in recipients of solitary allografts with D-R BSA ratios >0.70 (P = 0.02).

Conclusions: Donor-recipient size disparity is associated with inferior patient and all-cause graft survivals, which can be overcome by appropriate BSA matching or en-bloc transplantation. The deleterious effects of mismatched D-R BSA ratios are likely attributed to the well described systemic sequelae of insufficient renal functional capacity. Therefore, D-R BSA matching is prognostically significant when considering allocation strategies for DCD kidneys from pediatric donors. Specifically, a D-R BSA ratio of >0.70 represents the safe lower limit for solitary kidney transplantation, while a ratio of 0.10-0.70 serves as criteria for en-bloc allocation.



CITATION INFORMATION: Little C., Dick A., Perkins J., Reyes J. Donor-Recipient BSA Matching is Prognostically Significant in Solitary and En-bloc Kidney Transplantation from Pediatric Circulatory Death Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.J. Little: None. **A.A. Dick:** None. **J.D. Perkins:** None. **J.D. Reyes:** None.

Abstract# 399

Characterizing the Early Impact of the Kidney Accelerated Placement Project on Hard-to-place Kidneys

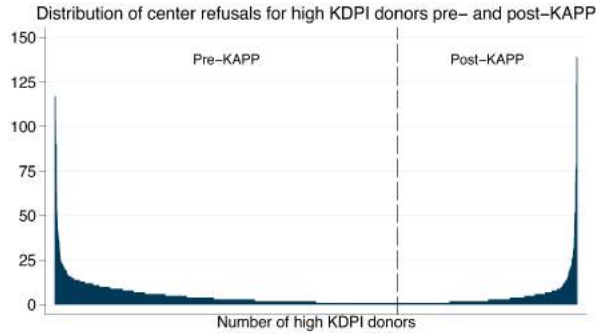
J. D. Motter, A. Kernodle, M. Levan, D. Segev, J. Garonzik-Wang, A. Massie, *Johns Hopkins University, Baltimore, MD*

Purpose: In 2019, the OPTN implemented the Kidney Accelerated Placement Project (KAPP) in an effort to increase the utilization of kidneys with a high Kidney Donor Profile Index (KDPI, 80-100%). This one-year pilot program accelerated the national-level offers for these hard-to-place kidneys first to programs with historic likelihood of acceptance. We sought to characterize KAPP's early impact on center-level acceptance practices, cold-ischemia time (CIT), and discard rate of high KDPI kidneys.

Methods: We conducted a quasi-experimental, difference-in-differences (DID) analysis using SRTR data from 07/18/2018-07/17/2019 (pre-KAPP) and 07/18/2019-01/06/2020 (post-KAPP). We used negative binomial regression to quantify the change in center refusals for high KDPI donors across eras. We then explored changes in CIT using log-linear and hierarchical logistic regression, accounting for center- and OPO-level variation, respectively.

Results: We identified 211 centers who were offered kidneys from 4499 high KDPI donors, of whom 1601 donors were offered post-KAPP. The median number of center refusals for high KDPI donors decreased from 2 (IQR: 0,5) pre-KAPP to 1 (IQR: 0,4) post-KAPP (p<0.001) (Figure). The proportion of donors with ≥10 center refusals decreased from 11% pre-KAPP to 6% post-KAPP (p<0.001). This translated into 14% fewer (IRR: $_{0.79}0.86_{0.94}$, p=0.002) center refusals for high KDPI kidneys post-KAPP compared to pre-KAPP, and 16% fewer (DID IRR: $_{0.74}0.84_{0.95}$, p=0.004) overall refusals between eras. However, there was no evidence of change in the discard rate across eras (DID OR: $_{0.76}0.88_{1.02}$, p=0.1). Conversely, CIT for high KDPI kidneys decreased by 4% (RR: $_{0.73}0.96_{0.99}$, p=0.1) post-KAPP compared to pre-KAPP, and 4% overall (DID RR: $_{0.92}0.96_{1.00}$, p=0.03) between eras.

Conclusions: Following the implementation of KAPP, there were fewer offers of high KDPI kidneys to centers that did not want them, reducing administrative burden for centers and OPOs. However, CIT decreased slightly, and there was no change in the discard rate.



CITATION INFORMATION: Motter J., Kernodle A., Levan M., Segev D., Garonzik-Wang J., Massie A. Characterizing the Early Impact of the Kidney Accelerated Placement Project on Hard-to-place Kidneys *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.D. Motter: None. **A. Kernodle:** None. **M. Levan:** None. **D. Segev:** None. **J. Garonzik-Wang:** None. **A. Massie:** None.

Abstract# 400

Comparison of Outcomes of Hepatitis C Virus (hcv) Nucleic Acid (nat) Positive Donor Between Hcv-naïVe and Hcv + Recpients - A Donor Mate Analysis

J. Kamal, B. Sharma, A. Doyle, A. Kumar, A. Nishio-Lucar, S. Rao, *University of Virginia, Charlottesville, VA*

Purpose: Despite a growing mismatch between organ need and supply, organs from HCV+ donors were only offered to HCV+ recipients (HCV R+) to avoid complications of de novo hepatitis. The advent of highly effective direct-acting antivirals, has ushered in a new era where kidneys from HCV+donors can be safely transplanted into HCV naïve recipients (HCV R-). We sought to evaluate the outcomes of the recipients at highest risk of HCV transmission (HCV NAT +/R-) compared to those at lowest risk (HCV NAT+/R+) by conducting a mate kidney analysis of same HCV NAT+ donors.

Methods: We analyzed data from the Organ Procurement and Transplantation Network database with transplant outcomes up till 12/2019. Sixty-two HCV NAT+ donors donated both kidneys to HCV-discrepant recipients.

Results: The first eligible donor was identified in 2017. Thereafter, a steep increase occurred in 2018 with 32 such pairs transplanted. Mean donor age was 32 ±7 y, 37% were women, and 4% were of Black race. Majority were donors after brain death (85%) with mean KDPI of 44 and optimized KDPI of 20.Recipients in the 2 groups were similar in most respects, with a mean age of 58 ± 9 y, 74% males, 47% Black and, 15% had prior transplant. Diabetes mellitus (37%) was the most common cause of end-stage kidney disease and 87% were on dialysis prior to transplant. While the dialysis vintage time was similar in both groups (2.7 y), the time of listing to transplant was shorter in the HCV R+ cohort (42 vs 604 d, p<0.001), reflecting the possible update of acceptance criteria of the HCV R- in order to avail of HCV NAT + donors. The relatively short cold ischemia time (17 hours) and the low rates of delayed graft function (4.9%) is indicative of very selective HCV NAT + donors being considered for kidney donation. Median follow-up was 216 days with similar outcomes (graft and patient survival) in both groups (Figure 1). R HCV status did not correlate with patient or graft survival.

Conclusions: Recipients who are at higher risk from HCV transmission, achieved an excellent short term patient and graft survival, similar to the HCV R+. While we were unable to analyze HCV treatment information due to the nature of the registry dataset, it is highly probable that successful HCV therapy post-transplant was the equalizing factor. The similar recipients characteristics in both cohorts reflects a uniform approach in picking eligible recipients of HCV + organs, regardless of recipient status. In conclusion, the use of HCV NAT + kidneys in HCV naive recipients appears to be a safe and should be promoted.

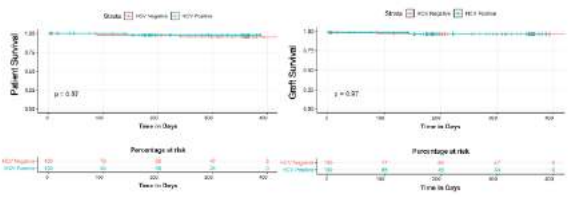


Figure 1. Patient and graft outcomes in HCV-discrepant Recipients

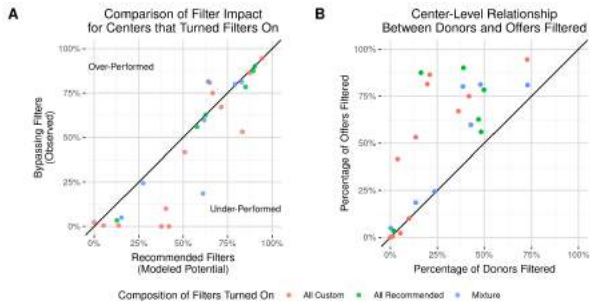
CITATION INFORMATION: Kamal J., Sharma B., Doyle A., Kumar A., Nishio-Lucar A., Rao S. Comparison of Outcomes of Hepatitis C Virus (hcv) Nucleic Acid (nat) Positive Donor Between Hcv-naïVe and Hcv + Recpients - A Donor Mate Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Kamal: None. **B. Sharma:** None. **A. Doyle:** None. **A. Kumar:** None. **A. Nishio-Lucar:** None. **S. Rao:** None.

Abstract# 401

Centers Avoided 67% of Kidney Offers by Participating in the OPTN's Multifactorial Offer Filter Pilot Project

A. Toll, H. McGehee, D. Stewart, R. McTier, *Research, United Network for Organ Sharing, Richmond, VA*

Purpose: Evaluate if multifactorial filters can reduce unwanted kidney offers to centers, thereby reducing administrative burden and getting to the accepting candidate quicker.
Methods: 40 centers participated in the second phase of the OPTN Offer Filters Pilot which ran from August 26, 2020 to December 2, 2020. The OPTN pre loaded a set of machine learning-derived recommended filters for each center prior to the start of the pilot. Recommended filters were derived using recursive partitioning trees based on centers' 2018-2019 acceptance practices and included donor profiles for which a center received offers from at least 20 donors with 0 acceptances. Centers were also able to create their own custom multi-factorial filters to reduce unwanted kidney offers. New in this phase, centers could exclude specific candidate groups from their filters (high CPRA, 0-ABDR mismatch, age limits). Additionally this phase introduced the ability to turn filters "on" to actually avoid receiving offers meeting filter criteria.
Results: Over the course of the study OPOs attempted to send 368,508 offers from 2,983 unique donors to the 40 pilot centers. The set of recommended filters pre-loaded at the start of the pilot, had the potential to bypass 59% of those offers (48% of the donors at centers). Of the pilot centers, 26 elected to turn on bypassing for at least one filter. OPOs attempted to send 308,335 offers from 2,532 unique donors to these 26 centers. The centers' bypass filters removed 206,933 (67%) offers. Individual center impacts ranged from 0% to 94% of offers filtered. Modeling closely predicted center performance (Fig 1A) despite centers not always using the set of pre-loaded recommended filters. Success in bypassing a large volume of offers was not associated with the number of filters turned on or the origin of filters (recommended vs custom). Of the 91 filters turned on for bypassing, 49 included candidate exclusion criteria. Some centers were very effective at filtering offers even from a small percentage of donors (Fig 1B).
Conclusions: The Offer Filters Pilot demonstrated both the potential of multifactorial filters to reduce unwanted organ offers and the willingness of centers to turn these filters on for bypassing. Candidate exclusion criteria provide protections to centers hesitant to turn on filters that would apply to their entire list. A national implementation could save centers administrative time, decrease allocation time, reduce cold ischemic time, and help avoid discard.



CITATION INFORMATION: Toll A., McGehee H., Stewart D., McTier R. Centers Avoided 67% of Kidney Offers by Participating in the OPTN's Multifactorial Offer Filter Pilot Project *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Toll: None. **H. McGehee:** None. **D. Stewart:** None. **R. McTier:** None.

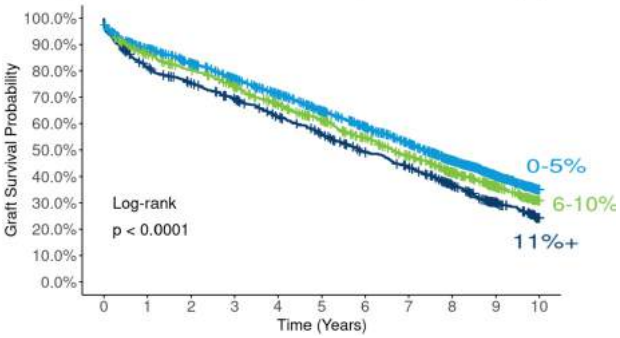
Abstract# 402

Can Procurement Biopsy Data Tell Us Anything? The Influence of Glomerulosclerosis on Long-term Kidney Graft Survival

D. Stewart[1], L. Kamal[2], J. Foutz[3], H. McGehee[3], P. Saravanane[2], S. Yu[2], R. Yousfi[2], G. Gupta[2], *[1]United Network for Organ Sharing, Richmond, VA, [2]Virginia Commonwealth University Health, Richmond, VA, [3]Research, United Network for Organ Sharing, Richmond, VA*

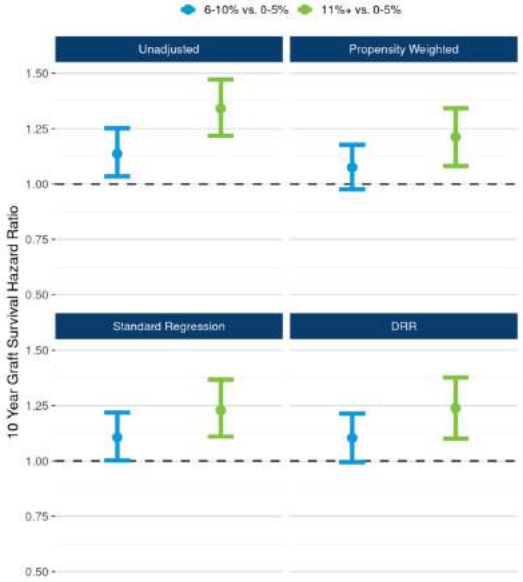
Purpose: Biopsy findings, particularly % glomerulosclerosis, have been shown to have a profound impact on kidney utilization decisions. Most studies of the association between procurement biopsy findings and kidney recipient outcomes have been limited in scale and focused on short-term survival. With a goal of aiding transplant decision-making, the "BARETO" (Biopsy, Anatomy, and Resistance Effects on Transplant Outcomes) national registry study unlocks previously trapped biopsy and anatomy data on DonorNet attachments to assess relationships between these findings and long-term renal graft outcomes.
Methods: Data were manually entered for a preliminary cohort of 4,473 ECD donor solitary kidney transplants from 2008-2011. Kaplan-Meier graft (all-cause, death-censored) and recipient survival analysis out to 10 years was stratified by degree of glomerulosclerosis (GS). Causal inference was performed using propensity-weighted, multivariable, and doubly robust regression (DRR) Cox modeling to adjust for 18 potential confounders.
Results: Survival analysis revealed an unequivocally significant ($p<0.0001$) association between GS and all-cause graft survival probability (Fig 1).

Fig 1. Ten-Year All-Cause Graft Survival by Glomerulosclerosis (%)



The graft failure hazard ratio for GS 11%+ vs. 0-5% (HR 1.34, 95% CI: 1.22, 1.47) was only moderately attenuated after DRR risk-adjustment (HR 1.24, 95% CI: 1.10, 1.38). (Fig 2)

Fig 2. All-Cause Graft Failure Hazard Ratios by Glomerulosclerosis



Considered as a linear effect, the DRR risk-adjusted graft failure hazard ratio per each 5% rise in GS was 1.02 (0.99, 1.07).
Conclusions: Despite questions about reliability and interpretation of procurement biopsies, GS as reported in DonorNet is highly associated with long-term graft outcomes. A dose-response relationship is evident, but further BARETO study data will help more precisely establish the nature of the effect beyond GS of 10%. Once established, incorporating GS as one component of a multifactorial composite donor score (e.g., KDRI) has the potential to improve organ offer decision-making and temper the impact of biopsy findings on the kidney discard rate.

CITATION INFORMATION: Stewart D., Kamal L., Foutz J., McGehee H., Saravanane P., Yu S., Yousfi R., Gupta G. Can Procurement Biopsy Data Tell Us Anything? The Influence of Glomerulosclerosis on Long-term Kidney Graft Survival *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Stewart: None. **L. Kamal:** None. **J. Foutz:** None. **H. McGehee:** None. **P. Saravanane:** None. **S. Yu:** None. **R. Yousfi:** None. **G. Gupta:** None.

Heart/LVAD: All Topics

Abstract# 403

Clinical Features and Outcomes of Candidemia in Patients with Left Ventricular Assist Devices

G. Krishnan, Y. Hamad, I. George, *Infectious Diseases, Washington University School of Medicine, St Louis, MO*

Purpose: Fungal infections represent an uncommon etiology of Left Ventricular Assist Device (LVAD) infections but can lead to significant morbidity and mortality. In this study, we sought to examine the clinical features and outcomes of candida blood stream infection (candidemia) in patients with LVADs.

Methods: We retrospectively analyzed all adult patients with LVAD who developed candidemia at a tertiary academic center from 01/2010 to 08/2020. Primary end points were thirty-day mortality, six-month mortality and recurrence of infections. Univariate Chi-square and Fischer's exact test were used for categorical variables and t-test for continuous variables.

Results: Among 41 LVAD patients with candidemia, 11 (26.8%) experienced the first episode of candidemia within 30 days and 21 (51.2%) had the first episode within the 100 days after LVAD placement. Sepsis with septic shock was the most common presentation (21/41, 51.2%) and C. *parapsilosis* was the most common species isolated (17/41, 41.5%). Large proportion required ICU admission (78%) and had underlying Chronic Kidney Disease (66.7%). Heartmate2 (23/41, 56.1%) was the most common LVAD in these patients followed by Heartware (9/41, 22.0%). Most patients (97.5%) had antibiotic exposure in the 30 days preceding candidemia. Micafungin was the most used initial antifungal therapy (30/41, 73.2%). Overall mortality in patients with candidemia was 80.5% with 36.6% and 53.7% mortality within 30 days and 6 months of candidemia, respectively. Among 19/41 patients who survived till 1 year, candidemia recurrence occurred in 9/19 (47.3%). Risk factors for 30-day mortality were older age (p=0.08), initial clinical presentation of sepsis with septic shock (p=0.03) or stroke with embolic phenomenon (p=0.05) and need for Intensive Care Unit (ICU) admission (p=0.02). Risk factors for 6 months mortality were older age (p=0.03), male gender (p=0.05), and diabetes mellitus (p=0.06). Chronic antifungal suppression after initial treatment was associated with lower 6 months mortality (p= 0.001). Median time to onset of candidemia from LVAD placement was 48 days among people who died at 6 months and 341 days for the survivors.

Conclusions: This is the largest single-center study analyzing candidemia in LVAD patients to date. Candidemia is associated with high mortality and high rate of recurrence in survivors. Earlier onset of candidemia after LVAD placement is associated with higher mortality. Older age, male gender and need for ICU admission are significant risk factors for candidemia-associated mortality in LVAD patients.

CITATION INFORMATION: Krishnan G., Hamad Y., George I. Clinical Features and Outcomes of Candidemia in Patients with Left Ventricular Assist Devices *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Krishnan: None. **Y. Hamad:** None. **I. George:** None.

Abstract# 404

Significance of Repeated 1r Rejections in Heart Transplantation

C. Hsueh[1], L. Wilson[2], L. Bow[2], L. Bellumkonda[2], *[1]Yale New Haven Hospital, New Haven, CT, [2]Yale University School of Medicine, New Haven, CT*

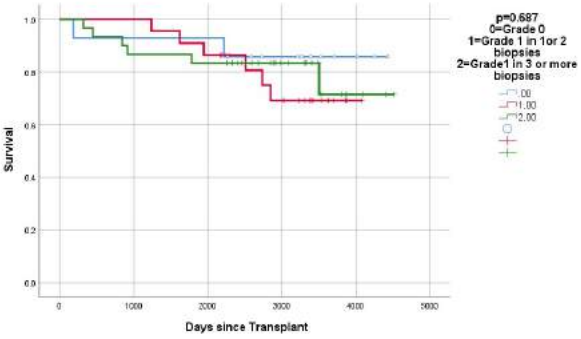
Purpose: 1R rejection is commonly seen in routine post-transplant biopsies. While presence of occasional 1R rejection is not considered to be detrimental, the significance of repeated 1R rejection is not well studied.

Methods: We conducted a retrospective analysis of patients transplanted at our center, between July 2008 and December 2014. A total of 1,128 biopsies were performed in 69 patients. Each patient on an average had 16 biopsies.

Results: 14 patients had grade 0 on all their biopsies, 22 had grade 1 on one or two of their biopsies, 30 had grade 1 on three or more of their biopsies. Three patients had grade 2 on their initial biopsy and were excluded from the study. Baseline characteristics are summarized in the table. Compared to grade 0, presence of grade 1 rejection and repeated occurrence of grade 1 rejection, did not predict increased risk of mortality or progression to grade 2 or grade 3 rejection. Grade 1 rejection and repeated occurrence of grade 1 rejection did not predict development of de novo donor specific antibodies or graft failure as defined by decrease in ejection fraction to less than 55%.

Conclusions: Grade 1 rejection or presence of repeated grade 1R was not associated with adverse outcomes. There was no difference in subsequent grade 2 or grade 3 rejection, development of de novo donor specific antibodies, graft failure and mortality in patients with grade 1 compared to grade 0 rejection.

	Grade 0 N=14	Grade 1 (1-2biopsies)n=22	Grade 1 (3 or more biopsies)n=30	P value
Age	50±14	52±15	54±11	0.57
Donor Age	41±13	38±14	30±12	0.015
BMI	24±3.3	26±4	28±5	0.015
Male Sex	57%	82%	67%	0.26
LVAD Bridge	36%	32%	36%	0.831
Blood Type				0.391
O	29%	27%	43%	
A	57%	36%	23%	
B	14%	27%	23%	
AB	0%	9%	10%	
Etiology of CMP				0.457
Ischemic	21%	32%	47%	
Non-ischemic	43%	46%	37%	
Other	36%	23%	17%	



CITATION INFORMATION: Hsueh C., Wilson L., Bow L., Bellumkonda L. Significance of Repeated 1r Rejections in Heart Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Hsueh: None. **L. Wilson:** None. **L. Bow:** None. **L. Bellumkonda:** Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Investigator Initiated Research Grant.

Abstract# 405

When is the Optimal Time to Initiate the Renal-Sparing Protocol with Calcineurin Inhibitor Withdrawal?

N. Patel, M. Kittleson, J. Patel, T. Singer-Englar, S. Kim, D. Chang, B. Azarbal, A. Nikolova, L. Czer, F. Esmailian, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

Purpose: Renal dysfunction after heart transplantation (HTx) has been associated with higher morbidity and mortality. The most common cause of this renal dysfunction is the use of calcineurin inhibitors (CNIs). Many programs will utilize a renal sparing protocol (RSP) after 6-months post-transplant whereby the CNI is tapered off with the addition of a proliferation signal inhibitor added to the pre-existing mycophenolate mofetil. It is believed that weaning RSP earlier during renal dysfunction leads to better outcome. We sought to answer this question with review of our RSP experience.

Methods: Between 1994-2017, we assessed 61 heart transplant patients with elevated creatinine. RSP was started at creatinine 1.5-2.0, 2.1-2.5, and 2.6-3.0 mg/dL. Renal function was measured by serum creatinine and glomerular filtration rate (GFR) at 6- and 12-months following initiation of RSP.

Results: RSP initiated at the lowest elevation of serum creatinine resulted in a higher GFR compared to RSP at higher ranges. However, the overall improvement from baseline was similar (change in GFR around 9 cc/min., see table). The average time between transplant and initiation of RSP was 5.3 ± 4.2 years.

Conclusions: RSP performed at earlier rising serum creatinine appears most beneficial in terms of restoring optimal kidney function.

Endpoints	Creatinine 1.5-2.0 mg/dL (n=21)	Creatinine 2.1-2.5 mg/dL (n=22)	Creatinine 2.6-3.0 mg/dL (n=18)	P-Value
Serum creatinine @ RSP initiation	1.80 ± 0.18	2.28 ± 0.13	2.75 ± 0.12	<0.001
Serum creatinine 6 months after RSP initiation	1.58 ± 0.39	1.85 ± 0.35	2.21 ± 0.52	<0.001
GFR @ RSP initiation	37.91 ± 5.40	29.28 ± 3.59	22.99 ± 2.51	<0.001
GFR 6 months after RSP initiation	46.99 ± 15.42	38.88 ± 9.98	31.24 ± 7.80	<0.001
ΔGFR (% change)	9.08 ± 13.44 (23.95%)	9.60 ± 9.19 (32.79%)	8.25 ± 7.56 (35.89%)	0.921

CITATION INFORMATION: Patel N., Kittleson M., Patel J., Singer-Englar T., Kim S., Chang D., Azarbal B., Nikolova A., Czer L., Esmailian F., Kobashigawa J. When is the Optimal Time to Initiate the Renal-Sparing Protocol with Calcineurin Inhibitor Withdrawal? *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Patel: None. **M. Kittleson:** None. **J. Patel:** Consulting Fee; Name of Commercial Interest; Pfizer, Akcea. Grant/Research Support; Name of Commercial Interest; Alexion Pharmaceuticals, Astra Zeneca. Other; Name of Commercial Interest; Alnylam Pharmaceuticals, Mallinckrodt Pharmaceuticals. **T. Singer-Englar:** None. **S. Kim:** None. **D. Chang:** Grant/Research Support; Name of Commercial Interest; Mesoblast, Amgen, Biocardia. Other; Name of Commercial Interest; Abbott Laboratories, AbbVie Inc., Repligen, Portola Pharmaceuticals, Amarin Corp. **B. Azarbal:** None. **A. Nikolova:** None. **L. Czer:** Grant/Research Support; Name of Commercial Interest; Abbott Laboratories. **F. Esmailian:** Consulting Fee; Name of Commercial Interest; Edwards Lifesciences. Grant/Research Support; Name of Commercial Interest; TransMedics. **J.A. Kobashigawa:** Consulting Fee; Name of Commercial Interest; Novartis, Sana Biotechnology, Sanofi-Aventis, TransMedics. Grant/Research Support; Name of Commercial Interest; CareDx Inc., Sanofi-Genzyme. Honoraria; Name of Commercial Interest; One Lambda Inc..

Abstract# 406

Are Pre-Transplant Diabetics on ACE Inhibitors at Risk for More Renal Dysfunction After Heart Transplantation?

M. Kittleson, J. Patel, D. Chang, N. Patel, S. Kim, T. Singer-Englar, R. Skorka, A. Hage, L. Czer, F. Esmailian, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

Purpose: Diabetic patients undergoing heart transplantation may be at greater risk of developing kidney dysfunction after heart transplantation due to calcineurin inhibitor (CNI) nephrotoxicity. It is not known whether diabetes in patients who have normal kidney function at the time of transplant are at greater risk of developing kidney dysfunction after heart transplantation compared to non-diabetic patients. Furthermore, it is not known whether the addition of angiotensin-converting enzyme inhibitors (ACEi) can ameliorate the development of proteinuria in these diabetic patients compared to those without diabetes.

Methods: Between 2010 and 2019, we assessed 34 heart transplant patients who had pre-transplant diabetes with normal kidney function (creatinine <1.3) at the time of transplant and were placed on an ACEi within 3 months of transplant for a minimum of 1 year. Comparison groups included pre-transplant non-diabetic patients on ACEi (n=66), pre-transplant diabetic patients not on ACEi (n=81), and pre-transplant non-diabetic patients not on ACEi (n=147). For all groups, renal function was measured by serum creatinine at 1 year post-transplant. 1-year freedom from proteinuria was also assessed.

Results: Pre-transplant diabetic patients not on ACEi had the greatest rise in creatinine at 1 year compared to the other groups (see table). 1-year freedom from proteinuria was not significantly different among the study groups.

Conclusions: The addition of ACEi in pre-transplant diabetic patients may be protective against CNI nephrotoxicity. Further studies will need to be done to confirm these findings.

Endpoints	Pre-Transplant Diabetic Patients on ACEi (n=34)	Pre-Transplant Non-Diabetic Patients on ACEi (n=66)	Pre-Transplant Diabetic Patients not on ACEi (n=81)	Pre-Transplant Non-Diabetic Patients not on ACEi (n=147)	P-value
Creatinine @ Transplant	1.06 ± 0.21	1.00 ± 0.24	1.08 ± 0.23	1.05 ± 0.22	0.220
Creatinine @ 1 Year	1.15 ± 0.40	1.00 ± 0.29	1.32 ± 0.93	1.08 ± 0.37	0.002
1-Year Freedom from Proteinuria	73.5% (9)	74.2% (17)	76.5% (19)	70.1% (44)	0.730

CITATION INFORMATION: Kittleson M., Patel J., Chang D., Patel N., Kim S., Singer-Englar T., Skorka R., Hage A., Czer L., Esmailian F., Kobashigawa J. Are Pre-Transplant Diabetics on ACE Inhibitors at Risk for More Renal Dysfunction After Heart Transplantation? *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Kittleson: None. **J. Patel:** Consulting Fee; Name of Commercial Interest; Pfizer, Akcea. Grant/Research Support; Name of Commercial Interest; Alexion Pharmaceuticals, Astra Zeneca. Other; Name of Commercial Interest; Alnylam Pharmaceuticals, Mallinckrodt Pharmaceuticals. **D. Chang:** Grant/Research Support; Name of Commercial Interest; Mesoblast, Amgen, Biocardia. Other; Name of Commercial Interest; Abbott Laboratories, AbbVie Inc., Repligen, Portola Pharmaceuticals, Amarin Corp. **N. Patel:** None. **S. Kim:** None. **T. Singer-Englar:** None. **R. Skorka:** None. **A. Hage:** Grant/Research Support; Name of Commercial Interest; United Therapeutics, Actelion, Janssen Research & Development. **L. Czer:** Grant/Research Support; Name of Commercial Interest; Abbott Laboratories. **F. Esmailian:** Consulting Fee; Name of Commercial Interest; Edwards Lifesciences. Grant/Research Support; Name of Commercial Interest; Transmedics. **J.A. Kobashigawa:** Consulting Fee; Name of Commercial Interest; Novartis, Sana Biotechnology, Sanofi-Aventis, Transmedics. Grant/Research Support; Name of Commercial Interest; CareDx Inc., Sanofi-Genzyme. Honoraria; Name of Commercial Interest; One Lambda Inc..

Abstract# 407

Management of Drug Interactions During Protocolized Implementation of Posaconazole Immediately Post Heart Transplant

G. Waldman, C. Rogers Marks, J. Clark, A. Woo, L. Irwin, A. Gerlach, G. D. Lewis, J. A. Fishman, *Massachusetts General Hospital, Boston, MA*

Purpose: Posaconazole (POSA) is a strong CYP3A4 inhibitor known to increase tacrolimus exposure by up to 4-fold. Initiation requires empiric tacrolimus dose adjustment and close monitoring upon discontinuation (d/c) to avoid low levels that may contribute to graft rejection. We describe our experience with a posaconazole prophylaxis protocol (PPP) in heart transplant recipients receiving tacrolimus.

Methods: All patients at our center who received an orthotopic heart transplant patients (OHT) after September 2019 were enrolled in the PPP. POSA was typically initiated within the first 3 days post-operatively with doses adjusted to maintain a target trough of 1000-2000 ng/mL for 3 months. Patients unable to swallow the oral delayed release formulation received the intravenous formulation. At the time of POSA d/c, tacrolimus doses were doubled with bi-weekly monitoring to maintain goal levels.

Results: 50 patients underwent OHT with PPP. Four patients were not initiated on POSA due to drug-drug interactions. Of the 46 patients included in analysis, 18 (39%) experienced a tacrolimus level > 15 ng/mL within the first 7 days of POSA initiation. Early discontinuation was necessary in 15% of patients (Table 1). Therapy was extended beyond 3 months in 3 patients due to rejection episodes necessitating pulse steroids. Six (15%) patients experienced ≥2R rejection within one month of POSA d/c. Half of these patients had no prior rejection episodes, while half had prior rejection with a negative biopsy immediately prior to the 2R diagnosis. Four (66%) of these patients had subtherapeutic tacrolimus levels at time of rejection. No patients have experienced fungal infections since initiation of PPP.

Conclusions: Use of PPP in the first 3 months after heart transplant can be used to prevent fungal infections; however, this practice requires close monitoring upon discontinuation to prevent low tacrolimus levels that may contribute to rejection risk.

Table 1: Results

Baseline Characteristics (N=50)	
Age (years), mean ± st dev	50 ±12.5
Male, n (%)	38 (76)
Transplant type, n (%)	
Heart	48 (96)
Heart-Kidney	1 (2)
Heart-Liver	1 (2)
POSA Initiation (N=46)	
Days post-transplant to POSA initiation, median (IQR)	2 (1)
Tacrolimus level > 15 ng/mL within 7 days of POSA initiation, n (%)	18 (39)
POSA dose adjustment required, n (%)	
Dose increase	3 (8)
Dose decrease	9 (20)
POSA Discontinuation (n = 46)	
Patients with extended POSA > 120 days, n (%)	3 (8)
POSA discontinued early, n (%)	7 (15)
LFT elevation	4 (57)
QTc Prolongation	2 (29)
Cost of medication	1 (14)
Alternative antifungal used, n (%)	7 (15)
Isavuconazonium sulfate (due to cost and QTc shortening)	3 (43)
Nystatin suspension	4 (57)
≥ 2R Rejection within 30 days of POSA discontinuation*, n (%)	6 (13)
Tacrolimus variability > 30% post POSA until 2R rejection	5 (83)

*Prior biopsy to all rejection episodes was ≤ 1R

CITATION INFORMATION: Waldman G., Rogers Marks C., Clark J., Woo A., Irwin L., Gerlach A., Lewis G., Fishman J. Management of Drug Interactions During Protocolized Implementation of Posaconazole Immediately Post Heart Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Waldman: None. **C. Rogers Marks:** None. **J. Clark:** None. **A. Woo:** None. **L. Irwin:** None. **A. Gerlach:** None. **G.D. Lewis:** None. **J.A. Fishman:** None.

Pancreas: Small Bowel

Pancreas & Small Bowel

Abstract# 408

Do Pretransplant C-peptide Levels Influence Outcomes in Simultaneous Pancreas-Kidney Transplantation? A Matched Case-Control Study

K. B. Gurung, V. Gurram, J. Rogers, A. C. Farney, G. Orlando, C. L. Jay, A. Reeves-Daniel, A. Mena-Gutierrez, N. Sakhovskaya, W. Doares, S. Kaczmorski, M. D. Gautreaux, R. J. Stratta, *Abdominal Transplant Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC*

Purpose: Experience with simultaneous pancreas-kidney transplant (SPKT) in uremic patients (pts) with detectable pretransplant C-peptide (Cp) levels and a "type 2" diabetes mellitus (DM) phenotype have demonstrated survival outcomes equivalent to those with type 1 (Cp negative) DM. The study purpose was to evaluate outcomes in SPKT recipients according to presence or absence of pretransplant Cp in a case-control fashion.

Methods: Selection criteria for Cp positive (Cp+, ≥2.0 ng/ml) were similar to Cp negative (Cp-) pts. We retrospectively analyzed 215 SPKTs performed at our center between 8/02 - 5/19 and identified 41 pts who were Cp+ pretransplant (mean level 5.4 ng/ml) and compared to 41 Cp- (level undetectable) case controls matched for recipient age, gender, race, and date of SPKT. All SPKTs were performed as intent to treat with portal-enteric drainage; all pts received depleting antibody induction with FK/MMF ± steroids. Pancreas graft failure (GF) was defined as return to daily insulin therapy and kidney GF as need for dialysis.

Results: Mean follow-up was 7.8 years. The 2 groups were well-matched for numerous donor, preservation, recipient, and immunological characteristics. Mean donor (26 Cp+ vs 23 years Cp-) and recipient (both 44 years) ages were similar. Both groups had 21 males/20 females and 19 Caucasian/20 African American/2 Hispanic pts. There was one early death secondary to infection in each group. There were no other early (<6 month) kidney GFs but there were 5 other early pancreas GFs, 3 in Cp+ and 2 in Cp- pts. 5-year pt survival (PS, 93% vs 95%), kidney graft survival (GS, 73% vs 85%), and pancreas GS (68% vs 85%, p=0.11) rates were slightly lower in Cp+ vs Cp- pts, respectively. Death-censored kidney (69% vs 73%) and pancreas GS (59% vs 81%, p=0.07) rates were also slightly lower in Cp+ vs Cp- pts, respectively. The Cp+ group had fewer deaths with functioning grafts (9.8% Cp+ vs 19.5% Cp-, p=NS) but more pancreas GFs due to either insulin resistance (9.8% Cp+ vs 0 Cp-, p=0.12) or rejection (19.5% Cp+ vs 12% Cp-, p=NS). There were no differences in outcomes according to gender or race. Post-SPKT weight gain >5 kg occurred in 76% of Cp+ vs 32% of Cp- pts (p=.0001). Mean post-SPKT weight gain was 15 kg in Cp+ vs 6.5 kg in Cp- pts (p<.001). In pts with functioning grafts, mean post-SPKT Cp (4.9 vs 2.6 ng/ml), HbA1c (5.5 vs 5.2%) and serum creatinine (1.4 vs 1.2 mg/dl) levels were slightly higher in Cp+ pts whereas mean eGFR levels (61 vs 66 ml/min/1.73 m^2) were slightly lower compared to Cp- pts.

Conclusions: In this matched case-control study, medium-term survival and functional outcomes in pretransplant Cp+ pts are slightly inferior following SPKT, with more post-SPKT weight gain and pancreas GF due to either insulin resistance or rejection in Cp+ pts accounting for differences in outcomes.

CITATION INFORMATION: Gurung K., Gurram V., Rogers J., Farney A., Orlando G., Jay C., Reeves-Daniel A., Mena-Gutierrez A., Sakhovskaya N., Doares W., Kaczmorski S., Gautreaux M., Stratta R. Do Pretransplant C-peptide Levels Influence Outcomes in Simultaneous Pancreas-Kidney Transplantation? A Matched Case-Control Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.B. Gurung: None. **V. Gurram:** None. **J. Rogers:** None. **A.C. Farney:** None. **G. Orlando:** None. **C.L. Jay:** None. **A. Reeves-Daniel:** None. **A. Mena-Gutierrez:** None. **N. Sakhovskaya:** None. **W. Doares:** None. **S. Kaczmorski:** None. **M.D. Gautreaux:** None. **R.J. Stratta:** None.

Abstract# 409

Peri-covid Trends on the Intestinal Transplant Waiting List

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Purpose: We aim to describe the trends in intestinal and multivisceral transplant waiting list activity and outcomes before and after the COVID-19 pandemic.

Methods: We used the cohort of intestinal and multivisceral transplant candidates who were on the waiting list November 1, 2020 - June 12, 2020 as recorded in the UNOS STAR files pulled on June 12, 2020. March 1, 2020 was considered "post-COVID." We used the INTESTINE_WLHISTORY_DATA file to evaluate the frequency of waitlist additions, modifications, and removals over time. Monthly regional Expected events were calculated using the average monthly number of events February 2019-February 2020, and compared to monthly regional Observed events during March 2020-May 2020

Results: In the four months pre-COVID, 193 changes were made to the intestine waiting list, compared with 257 post-COVID. One center reported a dramatic increase in waiting list activity in May 2020, with high activation & inactivation of candidates. All other centers combined exhibited a decrease in intestinal transplant waitlist additions and activations post-COVID. Observed:Expected ratios (O:E) for waitlist activity and transplants stratified by intestine-only and multivisceral candidates are shown in **Figure 1.** Regions 6 and 7 had no recorded multivisceral waiting list additions, removals, or modifications after March 1, 2020. After March 1, 2020, most regions performed fewer transplants, with a minority increasing their monthly transplant volume. National monthly transplant rates remained stable. **Figure 2.** There were very few waiting list deaths, with only two recorded post-COVID.

Conclusions: Though most regions reduced intestinal and multivisceral transplant volumes after March 1, 2020, national transplant rates remained stable demonstrating significant regional variation in COVID-19 effect on practice.

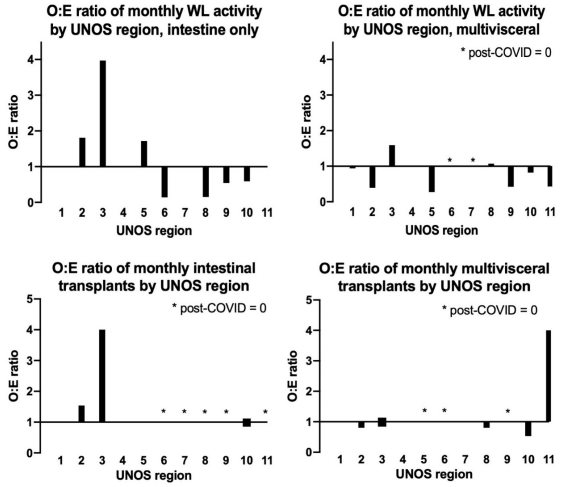


Figure 1. Observed : Expected ratios of monthly waitlist activity and transplants by UNOS region, March – May 2020.

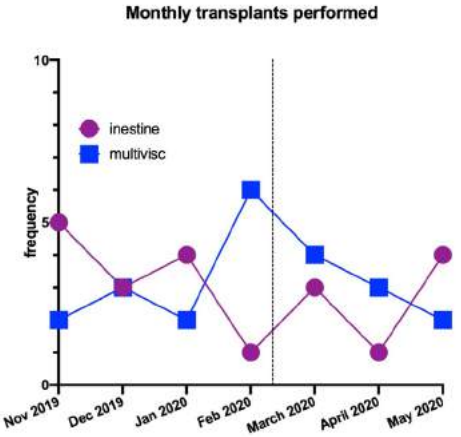


Figure 2. Monthly intestine-only and multivisceral transplants performed, November 2019 – May 2020.

CITATION INFORMATION: Samoylova M., Jafri S., Fiel M., Horslen S., Mavis A., Schiano T., Summers B., Segovia M. Peri-covid Trends on the Intestinal Transplant Waiting List *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.L. Samoylova: None. **S. Jafri:** None. **M.I. Fiel:** None. **S. Horslen:** None. **A. Mavis:** None. **T. Schiano:** None. **B. Summers:** None. **M.C. Segovia:** None.

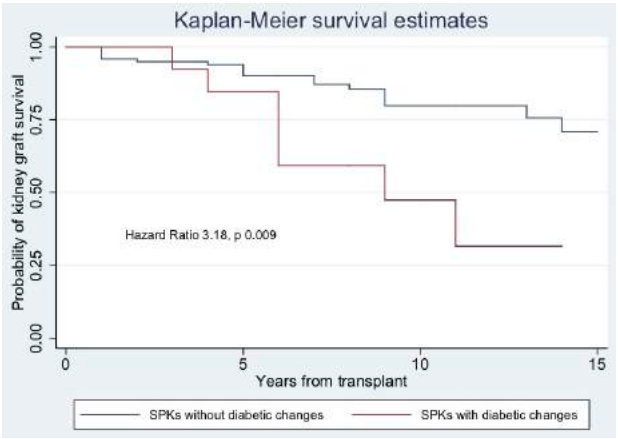
Abstract# 410

Prevalence of Diabetic Changes on Kidney Allograft Biopsies of Normoglycemic Simultaneous Pancreas-Kidney Transplant Recipients

C. Mejia, G. Giannini, D. C. Brennan, A. Rosenberg, S. Alasfar, *Johns Hopkins University, Baltimore, MD*

Purpose: Small studies suggest that achieving normoglycemia with simultaneous pancreas-kidney transplant (SPK) prevents the development of diabetic nephropathy (DN) among type 1 diabetics (T1DM). However, hemodynamic pathways, profibrotic cytokines, and genetic predisposition also contribute to the pathogenesis of DN and may not be reversed by an SPK. We sought to determine if diabetic changes (DC) occur in kidney graft biopsies of normoglycemic SPK recipients.
Methods: We conducted a retrospective review of medical records of all SPK recipients at our center from 1996-2019. For our analysis, we included recipients with at least 1 kidney graft biopsy ≥ 6 months after SPK and a functioning pancreas at the time of biopsy (defined as having a hemoglobin A1c < 6.5% without oral hypoglycemic agents or chronic insulin use). Our primary outcome was the prevalence of early structural DC namely glomerular basement membrane thickening and/or mesangial matrix expansion. Secondary outcomes included kidney graft outcomes. We expressed categorical data as absolute numbers (%) and continuous data as medians (interquartile range, IQR).
Results: Of 150 T1DM SPK recipients, 43 had a kidney graft biopsy. 23 (53%) met inclusion criteria. Most of those excluded had pancreas failure. Baseline characteristics are shown in Table 1. 14/23 recipients (61%) had a biopsy showing early DC at a median of 34.5 months (18.7-101.7) after SPK. 5 (22%) had DN as part of the final pathologic diagnosis (median of 42 months after SPK, IQR 36-134). At the time of the first biopsy with DC, median serum creatinine was 1.7 mg/dl (1.35-2.24) and hemoglobin A1c was 5.4% (5.2-5.9). Median kidney graft follow-up was 102 months (60.5-159). During follow-up of the 14 recipients with DC, 8 (57%) had acute cellular rejection, 2 (14%) had antibody mediated rejection, and 8 (57%) progressed to kidney graft failure. Graph 1 shows the difference of kidney graft survival between recipients with DC versus those without.
Conclusions: This is the first study that shows that DC (61%) and DN (22%) can recur after SPK despite good glucose control and is seen relatively early after transplant. This suggests that other mechanisms contribute to the development of DN after SPK.

Table 1. Baseline recipient and donor characteristics (n= 23)	
Age at transplant, (IQR)	36 years (31.5-45)
Men (%)	16 (70)
White (%)	13 (56)
Body mass index at transplant (IQR)	23.5 kg/m^2 (22-24.8)
Deceased Donor (%)	22 (96)
Thymoglobulin induction	19 (82)
Maintenance immunosuppression: Prednisone + Tacrolimus	23 (100)
Mycophenolate mofetil	22 (96)



CITATION INFORMATION: Mejia C., Giannini G., Brennan D., Rosenberg A., Alasfar S. Prevalence of Diabetic Changes on Kidney Allograft Biopsies of Normoglycemic Simultaneous Pancreas-Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Mejia: None. **G. Giannini:** None. **D.C. Brennan:** None. **A. Rosenberg:** None. **S. Alasfar:** None.

Abstract# 411

Evaluation of Preperitoneal Space as an Extrahepatic Transplant Site in Clinical Total Pancreatectomy with Islet Autotransplantation

K. Kumano, B. Naziruddin, S. Bruer, G. Saracino, M. Lawrence, G. Testa, A. Gupta, E. Beecherl, N. Onaca, *Baylor University Medical Ctr, Dallas, TX*

Purpose: Total pancreatectomy and intraportal islet autotransplantation (TPIAT) is an effective treatment for patients with refractory chronic pancreatitis. Large volume islet preparations cannot always be infused fully intraportally due to rise in portal vein (PV) pressure and risk of PV thrombosis. We previously showed that dissected preperitoneal pouch (preperitoneal space) can serve as an extrahepatic islet transplant site with long-term graft function in syngeneic mouse model. Here, we evaluated the safety of combined sites of intrahepatic and preperitoneal space in clinical TPIAT and analyzed the outcome.
Methods: Between 2019 and 2020, patients underwent TPIAT using a combined intraportal and preperitoneal pouch technique (IPV+PP) if the infused intraportal islet mass was >4,000 IEQ/kg and PV pressure was > 20mmHg during infusion. Study patients were monitored for complications, and metabolic outcome was assessed and compared with controls who received only intraportally transplanted islets (IPV) or combined intraportal and peritoneal cavity (IPV+PC).
Results: Ten patients underwent IAT into the PV and preperitoneal pouch. Baseline demographics (age, sex, BMI, pretransplant C-peptide and HbA1c, duration of symptoms) and isolation results (PV pressure, IEQ/kg) of each group are shown in Table 1. There were no serious post-operative complications in IPV+PP group during the first post-transplant admission. At 6 months after IAT, there were no significant differences in glycemic control or graft function among three groups. (Table 1)
Conclusions: The preperitoneal space is an alternative supplemental IAT site in patients who do not tolerate a full intraportal islet infusion. It is safe, easily accessible and it tolerates large volume islet preparations. Further studies are needed on a larger cohort of patients to validate our results.

Table 1. Univariate analysis of demographic characteristics of patients, islet isolation, and metabolic outcomes of TPIAT for alternative islet transplant sites

	IPV (N=86)	IPV+PC (N=23)	IPV+PP (N=10)	p-value	p.IPV vs PV+PC	p.IPV vs PV+PP	p.IPV+PC vs PV+PP	N
Recipient Sex:				0.029	0.396	0.056	0.049	119
Female	66.3%	78.3%	30.0%					
Male	33.7%	21.7%	70.0%					
Age at transplant (years)	41.5 [30.2;49.0]	39.0 [33.5;47.5]	25.0 [22.0;30.2]	0.009	0.929	0.007	0.012	119
Body Mass Index (BMI)	27.3 [24.1;31.0]	24.6 [20.9;29.0]	30.0 [23.4;31.1]	0.223	0.293	0.719	0.360	119
Duration of symptom (years)	5.00 [4.00;9.75]	6.00 [3.00;7.00]	4.00 [3.25;5.75]	0.354	0.413	0.413	0.413	119
Pre transplant HbA1c (%)	5.60 [5.20;5.85]	5.40 [5.10;5.70]	5.45 [5.32;5.65]	0.384	0.514	0.793	0.793	101
C-peptide Basal (ng/mL)	1.80 [1.30;2.70]	1.20 [1.00;1.90]	2.25 [1.83;2.95]	0.084	0.104	0.278	0.104	113
Maximum PV pressure (mmHg)	16.0 [12.0;19.0]	21.0 [15.5;22.0]	15.5 [15.0;19.8]	0.007	0.006	0.801	0.074	119
IEQ /kg infused into portal vein	6766 [4796;7830]	5688 [5023;6813]	5085 [4357;6115]	0.175	0.282	0.282	0.282	119
Month 6 C-peptide (ng/ml)	1.50 [0.90;2.40]	0.95 [0.72;1.10]	1.00 [0.65;1.57]	0.323	0.421	0.421	0.562	71
Month 6 HbA1c (%)	6.25 [5.88;7.03]	6.10 [5.77;6.35]	7.15 [6.53;7.55]	0.192	0.284	0.284	0.195	78

Categorical variables are summarized as frequency and percentage, continuous variables as median [quartiles, Q1, Q3].

CITATION INFORMATION: Kumano K., Naziruddin B., Bruer S., Saracino G., Lawrence M., Testa G., Gupta A., Beecherl E., Onaca N. Evaluation of Preperitoneal Space as an Extrahepatic Transplant Site in Clinical Total Pancreatectomy with Islet Autotransplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Kumano: None. **B. Naziruddin:** None. **S. Bruer:** None. **G. Saracino:** None. **M. Lawrence:** None. **G. Testa:** None. **A. Gupta:** None. **E. Beecherl:** None. **N. Onaca:** None.

Abstract# 412

Simultaneous Pancreas-Kidney Transplantation in Caucasian versus African American Patients: Does Recipient Ethnicity Influence Outcomes?

J. Rogers[1], A. Farney[2], G. Orlando[2], C. Jay[2], K. Gurung[2], B. Sharda[2], A. Reeves-Daniel[3], A. Mena-Gutierrez[3], N. Sakhovskaya[3], W. Doares[4], S. Kaczmorski[4], M. Magid[4], M. Gautreaux[2], R. Stratta[2], *[1]Wake Forest Baptist Medical Center, Winston-Salem, NC, [2]Department of Surgery, Wake Forest Baptist Medical Center, Winston-Salem, NC, [3]Internal Medicine, Wake Forest Baptist Medical Center, Winston-Salem, NC, [4]Department of Pharmacy, Wake Forest Baptist Medical Center, Winston-Salem, NC*

Purpose: The influence of African American (AA) recipient ethnicity on outcomes following simultaneous pancreas-kidney transplantation (SPKT) in the modern era is uncertain.

Methods: From 11/01 to 2/19, we retrospectively studied 158 Caucasian (C) and 57 AA patients (pts) undergoing SPKT at our center. All pts received depleting antibody induction (alemtuzumab - 155, rATG - 60) with tacrolimus/mycophenolate ± steroids maintenance immunosuppression. All pts underwent SPKT with intent-to-treat portal-enteric (PE) drainage (192 PE, 23 systemic-enteric drainage).

Results: Mean follow-up was 97 months C vs 88 months AA; 80% of C and 70% of AA pts had at least 5 years f/u. Mean donor age (27 years C vs 23 AA), recipient age (44 years C vs 40 AA), and pancreas cold ischemia (15 hours) were similar between groups. Recipient gender (41% C female vs 44% AA female) was likewise similar. The AA group had fewer pts on peritoneal dialysis (30% C vs 10% AA), more pts with a longer duration (> 20 months) of dialysis (24% C vs 51% AA), more sensitized (PRA ≥ 20%) patients (6% C vs 19% AA), more 5-6 HLA mismatches (49% C vs 67% AA), more pts with pretransplant C-peptide levels ≥ 2.0 ng/ml (13% C vs 33% AA), and more pts with a shorter duration (< 20 years, 23% C vs 47% AA) and later age of onset (≥ 24 years old) of diabetes (13% C vs 30% AA, all p<0.05). The latter 3 differences suggest that a type 2 diabetes phenotype was more prevalent in the AA group. Overall patient survival (74% C vs 88% AA, p=0.04), kidney (63% C vs 67% AA), and pancreas (57% C vs 61% AA) graft survival rates (GSRs) slightly favored the AA group. Death-censored kidney (77% C vs 73% AA) and pancreas (69% C vs 66% AA) GSRs demonstrated that death with a functioning graft (DWFG) was more common in C (18%) vs AA pts (8%, p=0.05). Rates of early graft loss (usually thrombosis) were 7.6% C vs 3.5% AA whereas cumulative clinical acute rejection rates were 27% C vs 33% AA. The incidence of death-censored dual graft loss, usually due to acute and chronic rejection, was 11% C vs 23% AA (p=0.06).

Conclusions: SPKT in AA recipients is characterized by longer pretransplant dialysis duration and less peritoneal dialysis, more sensitized patients and HLA-mismatching, more patients with a type 2 diabetes phenotype, and lower mortality. AA patients are at a greater risk for dual immunological graft loss whereas C patients are at greater risk for DWFG.

CITATION INFORMATION: Rogers J., Farney A., Orlando G., Jay C., Gurung K., Sharda B., Reeves-Daniel A., Mena-Gutierrez A., Sakhovskaya N., Doares W., Kaczmorski S., Magid M., Gautreaux M., Stratta R. Simultaneous Pancreas-Kidney Transplantation in Caucasian versus African American Patients: Does Recipient Ethnicity Influence Outcomes? *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Rogers: None. **A. Farney:** None. **G. Orlando:** None. **C. Jay:** None. **K. Gurung:** None. **B. Sharda:** None. **A. Reeves-Daniel:** None. **A. Mena-Gutierrez:** None. **N. Sakhovskaya:** None. **W. Doares:** None. **S. Kaczmorski:** None. **M. Magid:** None. **M. Gautreaux:** None. **R. Stratta:** None.

Plenary 2

Abstract# 99

Trends in Mortality Among Solid Organ Transplant Recipients Hospitalized for Covid-19 During the Course of the Pandemic

M. R. Heldman, O. S. Kates, R. M. Rakita, E. D. Lease, C. E. Fisher, A. P. Limaye, *University of Washington, Seattle, WA*

Purpose: Actual and comorbidity-adjusted mortality in hospitalized patients with COVID-19 has declined in the general population during the course of the pandemic. Whether a similar reduction has occurred in solid organ transplant recipients (SOTR) is unknown.

Methods: We used a multicenter prospective registry of SOTR with laboratory-confirmed COVID-19 to compare 28-day mortality between the early COVID-19 pandemic (3/1/20- 6/19/20) and a late (more recent) period (6/20/20-11/20/20) for those with 28 day follow-up by 11/12/20. A multivariable logistic regression model including previously identified risk factors for mortality (age >65 years, obesity, diabetes mellitus (DM), congestive heart failure (CHF), chronic lung disease, absolute lymphocyte count <0.5 x 10^9/L, and abnormal chest imaging) was used to adjust for covariates.

Results: Of 938 SOTR with COVID-19, 638 (68%) were hospitalized; 165 (26%) hospitalized cases occurred in the late (more recent) period and 472 (74%) cases occurred in the early period . The proportion hospitalized was similar in both periods [late: 165/244 (67.6%) vs. early: 472/692 (68.2%])]. The prevalence of several baseline comorbidities was lower in the late cohort: DM [74/165 (44.8%) vs. 251/472 (54.9%), p=0.01), chronic lung disease [5/165 (3.0%) vs. 47/472 (10.0%)], p=0.01), and CHF [5/165 (3.0%) vs. 37/472 (7.8%), p= 0.03). Presenting features were similar between periods (Figure 1), and treatment with remdesivir, convalescent plasma, and corticosteroids was more frequent in the late period (Figure 2). Crude 28-day mortality was lower in the late period (12.7% vs 20.8%, p=0.02), but mortality did not differ significantly from the early period after adjusting for comorbidities (crude OR 0.56 (95% CI 0.33-0.93) vs. adjusted OR 0.62, (95% CI 0.34-1.10), p=0.11.

Conclusions: There have been shifts in the demographics of SOTR hospitalized for COVID-19 during the course of the pandemic. Although crude mortality was lower in the more recent period, the comorbidity-adjusted mortality has remained constant. Advancements in management strategies shown to reduce mortality in the general population might not be applicable to SOTR.

Figure 1: Characteristics of SOTR hospitalized with COVID-19 during early and late (more recent) time periods

All Cases	Total [a]	Early period [b]	Late period [b]	p-value [e]
Total, n (% total)	938	692 (73.8)	244 (26.1)	
Hospitalized, n (%) [c]	638 (68.0)	472 (68.2)	165 (67.6)	0.93
Features of hospitalized patients	n=638	n=472	n=165	
Male, n (%)	404 (63.3)	308 (65.3)	96 (58.2)	0.1
Median age, years (IQR)	59 (49-67)	59 (49-67)	59 (49-67)	
Age > 65 years	190 (29.7)	143 (30.3)	47 (28.5)	0.66
Organ Transplant Type, n (%) [d]				
Lung	73 (11.4)	36 (7.6)	37 (22.4)	<0.001*
Heart	75 (11.8)	58 (12.3)	17 (10.3)	0.41
Kidney or Kidney/Pancreas	401 (62.9)	309 (65.4)	91 (55.2)	0.02*
Liver	86 (13.5)	66 (14.0)	20 (12.1)	0.5
Other	3 (0.47)	3 (0.6)	0 (0.0)	
Comorbidities, n (%)				
Obesity (BMI > = 30)	232 (36.9)	172 (37.0)	60 (36.8)	0.97
Diabetes mellitus	334 (52.4)	259 (54.9)	74 (44.8)	0.03*
Chronic lung disease	52 (8.2)	47 (10.0)	5 (3.0)	0.01*
Congestive heart failure	42 (6.6)	37 (7.8)	5 (3.0)	0.03*
Clinical presentation, n (%)				
ALC < 0.5 x 10^9/L	194 (30.4)	136 (28.8)	58 (35.2)	0.13
Abnormal chest imaging	546 (93.3)	545 (93.3)	140 (92.1)	0.48

Abbreviations: absolute lymphocyte count (ALC), body mass index (BMI)

[a] Diagnosis time period was unavailable for 2 cases (1 hospitalized)
[b] Early study period refers to cases diagnosed between March 1, 2020 and June 19, 2020; late period refers to cases diagnosed between June 20, 2020 and November 12, 2020
[c] Excludes patients who were hospitalized for another indication at time of COVID-19 diagnosis [early period (n=34), later period (n=9), unknown season (n=1)]
[d] Lung includes 1 lung/liver and 2 heart/lung recipients; heart includes 8 heart/kidney and 1 heart/kidney/small bowel recipient; Liver includes 17 liver/kidney recipients; Kidney or Kidney/Pancreas includes 11 kidney/pancreas recipients; Other includes 2 small bowel and 1 vascular composite graft recipient
[e] Calculated using chi-square test; * indicates statistical significance at $\alpha = 0.05$.

Figure 2: Treatment strategies for COVID-19 in hospitalized SOTR

Treatment, n (%)	Total (n=638)	Early period (n=472)	Late period (n=165)	p-value[a]
Remdesivir	111 (17.4)	42 (8.9)	69 (41.8)	<0.001*
Glucocorticoids	161 (25.3)	56 (11.9)	105 (63.6)	<0.001*
Hydroxychloroquine	287 (45.2)	286 (60.8)	1 (0.01)	<0.001*
Anti-IL6/IL-6R	69 (10.2)	66 (14.0)	3 (1.9)	<0.001*
Convalescent plasma	101 (15.8)	42 (8.9)	59 (35.8)	<0.001*

Abbreviations: IL-6 (interleukin 6), IL-6R (interleukin 6 receptor)

Calculated using chi-square test; * indicates statistical significance at α = 0.05.

CITATION INFORMATION: Heldman M., Kates O., Rakita R., Lease E., Fisher C., Limaye A. Trends in Mortality Among Solid Organ Transplant Recipients Hospitalized for Covid-19 During the Course of the Pandemic *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.R. Heldman: Honoraria; Name of Commercial Interest; Cigna LifeSource. Honoraria; Nature of Relationship; Speaker. **O.S. Kates:** None. **R.M. Rakita:** None. **E.D. Lease:** None. **C.E. Fisher:** None. **A.P. Limaye:** None.

Abstract# 100

Treg Engagement of Lymphotoxin Beta Receptor in Lymphatic Endothelial Cells is Required for Allograft Protection

V. Saxena[1], W. Piao[1], L. Li[1], Y. Xiong[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

Purpose: Sequential migration of regulatory T cells (Treg) from graft to afferent lymphatics and lymph nodes (LN) is needed for Treg suppressive function. Migration requires Treg lymphotoxin alpha (LTα) to stimulate LT beta-receptor (LTβR) in lymphatic endothelial cells (LEC). We used three genetically distinct mouse models to test the hypothesis that Treg engagement of LTβR is required for allograft protection.
Methods: Treg engagement of LTβR was tested in germline deficient $LT\beta R^{-/-}$ and $LT\alpha^{-/-}$ mice. A conditional knockout (KO) of LTβR was made by crossing $LT\beta R^{fl/fl}$ with $Prox1\text{-}Cre\text{-}ER^{T2}$, to generate KO^{fl} mice in which LTβR is depleted in LEC after tamoxifen treatment. Treg function was analyzed by flow cytometry and histology in the islet transplant model.
Results: In vitro, Treg LTα stimulated LTβR and regulated expression and secretion of LEC CCL21, a chemokine important for T cell migration to lymphatic vessels and LN. In KO^{fl} mice, tamoxifen treatment reduced LTβR expression only in LEC, while fibroblastic reticular cells and blood vessel endothelial cells maintained expression. Depletion of LTβR in the LEC of the LN led to a marked reduction in the expression of CCL21, non-canonical NFκB kinase (NIK), chemotactic lipid sphingosine-1-phosphate (S1P) and accumulation of Foxp3+ Tregs in T cell zones. LTβR depletion did not affect overall LN architecture or composition of stromal cells, leukocytes, or innate lymphoid cells in primary or secondary lymphoid organs, suggesting normal immune system homeostasis. In an in vivo model of tissue to draining LN (dLN) lymphatic migration, Tregs migrated less well in the KO^{fl} mice, while Treg entry from blood into LN was not inhibited. In the islet allograft model, when Tregs were transferred locally with the islets, allograft survival was reduced from 25d to 13d in KO^{fl} recipient mice (p<.03), to 15d in germline $LT\beta R^{-/-}$ (p<.03) recipient mice, and to 13d in wild type mice receiving $LT\alpha^{-/-}$ Treg (p<.03). Treg migrated less well from islet allografts to the dLN in the KO^{fl} mice and in mice receiving $LT\alpha^{-/-}$ Treg. Non-migrating Tregs lost Foxp3 and CD25 expression to become exTreg.
Conclusions: Using three different genetic mouse models, Treg-LTα-LTβR-LEC interactions were characterized. Disruption of these interactions inhibits Treg accumulation and migration to LN, execution of Treg suppressive function, and conferred significant disadvantage for islet allograft protection.
CITATION INFORMATION: Saxena V., Piao W., Li L., Xiong Y., Shirkey M., Iyyathurai J., Lakhan R., Abdi R., Bromberg J. Treg Engagement of Lymphotoxin Beta Receptor in Lymphatic Endothelial Cells is Required for Allograft Protection *AJT, Volume 21 Supplement 3*
DISCLOSURES: V. Saxena: None. **W. Piao:** None. **L. Li:** None. **Y. Xiong:** None. **M.W. Shirkey:** None. **J. Iyyathurai:** None. **R. Lakhan:** None. **R. Abdi:** None. **J. Bromberg:** None.

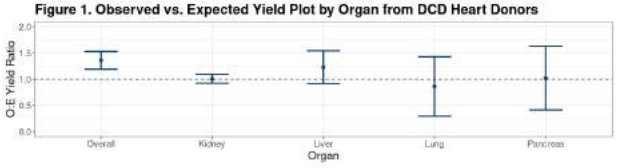
Abstract# 101

DCD Heart Donation: Impact on Organ Yield

K. Gauntt, B. Carrico, D. Klassen, *United Network for Organ Sharing, Richmond, VA*

Purpose: Recent advances in technology and recovery procedures has enabled donation after circulatory death (DCD) heart donation resulting in a significant increase in the number of patients receiving heart transplantation. There has been concern that DCD heart procurement may impair the procurement of other organs, particularly liver. We sought to examine this issue by determining if the overall and organ specific recovery and transplantation or yield of these donors' organs are impacted by these advancements.
Methods: Observed to expected (O:E) yield ratios for each organ were calculated using the OPTN data on DCD heart donors from 12/1/2019 to 8/29/2020 (9 months). Organ yield models as developed by the SRTR were used to calculate the expected organ yield for these donors.
Results: There were 94 DCD heart donors in the cohort and 84 hearts were recovered and transplanted. The procurement of hearts from DCD donors did not appear to have any significant impact on the recovery and transplantation of other organs. The observed yields of liver (O:E: 1.23 (0.91-1.54)), kidney (O:E : 1.01 (0.92-1.09)), lung (O:E: 0.86 (0.39-1.43)), and pancreas (O:E: 1.02 (0.41 - 1.63)) did not significantly differed from their expected yield (Figure 1). However, the O:E yield ratio for each organ was above one with the exception of lung. The overall organ yield of DCD heart donors was observed to be 36% higher than expected (338 vs. 249, p value < .001). The overall yield difference was primarily driven by the significant increase in heart yield.
Conclusions: The advances in DCD recovery procedures and the incorporation of thoracic and abdominal perfusion in recent years have been revolutionary, leading to a significant increase in heart and overall organ yield from these donors. There has been no impairment of the procurement of other organs based on the expected yields for these donors. The impact of these advancements has been substantial, representing a new source of heart donation while maintaining successful recovery and transplantation of other organs.

Figure 1. Observed vs. Expected Yield Plot by Organ from DCD Heart Donors



Organ	Overall	Kidney	Heart	Liver	Lung	Pancreas
Total Actual Yield	338	174	84	58	15	7
Total Expected Mean Yield	248.83	173.05	4.17	47.28	17.43	6.86
Ratio (95% CI)	1.36 (1.19 - 1.53)	1.01 (0.92 - 1.09)	20.13 (20.13 - 20.13)	1.23 (0.91 - 1.54)	0.86 (0.29 - 1.43)	1.02 (0.41 - 1.63)
p-value	0.000	0.450	0.000	0.079	0.315	0.475

CITATION INFORMATION: Gauntt K., Carrico B., Klassen D. DCD Heart Donation: Impact on Organ Yield *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Gauntt: None. **B. Carrico:** None. **D. Klassen:** None.

Abstract# 102

Anti-CD8 Immuno-PET for Non-invasive Tracking of Early Graft Rejection in a Non-human Primate Kidney Transplant Model

K. Bruestle[1], R. Tavare[2], F. Fredriksson[1], E. Duggan[1], F. Huang[1], B. Bhola[1], J. Giurleo[2], R. Foster[2], P. Krueger[2], M. Dobosz[2], D. Ekanayake-Alper[1], H. Sakai[1], B. Piegari[1], J. Castrillion[1], S. M. Coley[1], O. Harari[2], A. Mintz[1], D. Ma[2], A. Griesemer[1], *[1]Columbia University Medical Center, New York City, NY, [2]Regeneron Pharmaceuticals, Inc, New York City, NY*

Purpose: Infiltration of CD8 T cells into solid organ grafts is an early sign of rejection. REGN5054 is a fully human monoclonal antibody that binds specifically to human and cynomolgus T cell CD8. When radiolabeled with ^{89}Zr, REGN5054 immuno-PET is a non-invasive method that may detect early graft rejection.
Methods: REGN5054 was conjugated to the bifunctional chelator p-SCN-Bn-deferoxamine (DFO) for ^{89}Zr radiolabeling to generate ^{89}Zr-DFO-REGN5054. 4 cynomolgus macaques underwent induction with splenectomy, rituximab, mycophenolate-mofetil, tacrolimus, steroids, and orthotopic kidney transplantation. The contralateral, naïve kidney served as control. An initial phase of immunosuppression (IS) was followed by a phase of simulated graft rejection by tapering down IS, and a phase of rescue by tapering up IS. At the end of each phase, antibody was injected and immuno-PET/CT images followed Day1 and Day4. Graft kidney biopsies and ultrasound were performed and plasma samples collected for immunogenicity and PK analysis.
Results: ^{89}Zr-DFO-REGN5054 showed low uptake in both graft and native kidneys during pre-rejection. Increased uptake was detected in the graft during rejection by immuno-PET (Figure 1), correlating with histologic lymphocyte infiltration and increased resistance indices in ultrasound (Figure 2). Post-rejection, uptake in the kidney grafts was incompletely reduced compared to the rejection phase, while the uptake in the native kidney remained similar.
Conclusions: Anti-CD8 Immuno-PET is a sensitive, non-invasive tool to track early graft rejection.

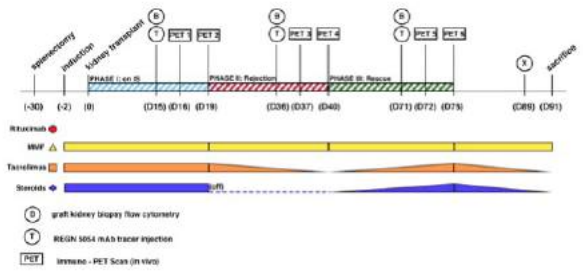


Table 1

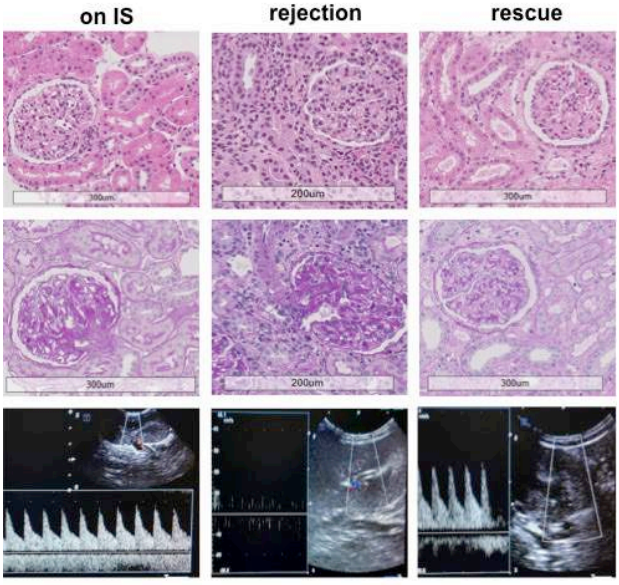


Figure 2 histology, ultrasound

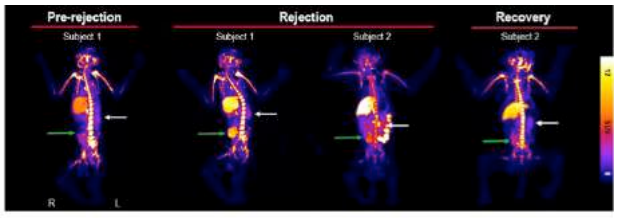


Figure 1 Immuno-PET Day 4, White arrow (native), green arrow (graft)

CITATION INFORMATION: Bruestle K., Tavare R., Fredriksson F., Duggan E., Huang F., Bhola B., Giurleo J., Foster R., Krueger P., Dobosz M., Ekanayake-Alper D., Sakai H., Piegari B., Castrillion J., Coley S., Harari O., Mintz A., Ma D., Griesemer A. Anti-CD8 Immuno-PET for Non-invasive Tracking of Early Graft Rejection in a Non-human Primate Kidney Transplant Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Bruestle: None. **R. Tavare:** None. **F. Fredriksson:** None. **E. Duggan:** None. **F. Huang:** None. **B. Bhola:** None. **J. Giurleo:** None. **R. Foster:** None. **P. Krueger:** None. **M. Dobosz:** None. **D. Ekanayake-Alper:** None. **H. Sakai:** None. **B. Piegari:** None. **J. Castrillion:** None. **S.M. Coley:** None. **O. Harari:** None. **A. Mintz:** None. **D. Ma:** None. **A. Griesemer:** Grant/Research Support; Name of Commercial Interest; Regeneron Grant/Research Support.

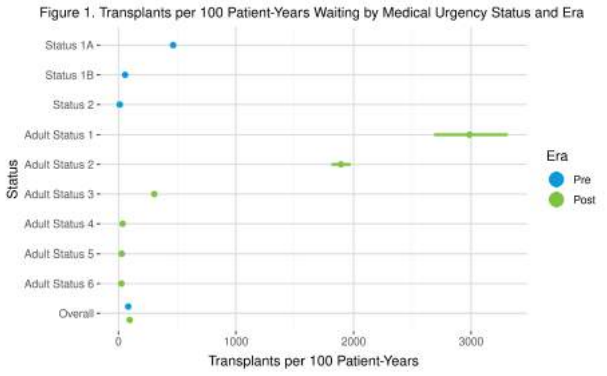
Potpourri of Public Policy and Allocation

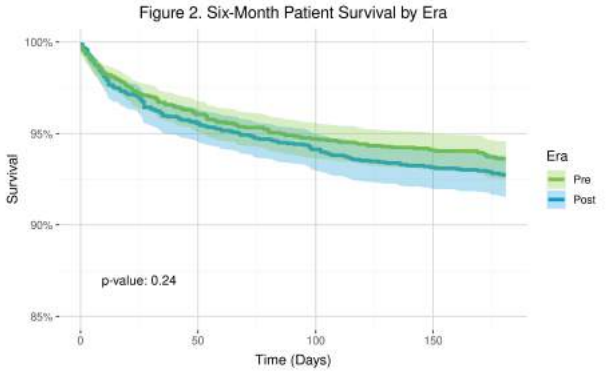
Abstract# 103

Changes to Adult Heart Allocation Improve Candidate Stratification

K. Bradbrook[1], K. Lindblad[1], R. R. Goff[1], R. Daly[2], S. Hall[3], *[1]Research, United Network for Organ Sharing, Richmond, VA, [2]Mayo Clinic, Rochester, MN, [3]Baylor University Medical Center, Dallas, TX*

Purpose: Historically, heart allocation has been driven by waitlist (WL) mortality rather than post-transplant survival. On 10/18/2018 the Organ Procurement and Transplantation Network (OPTN) implemented modifications to the adult heart allocation system intended to better stratify the most medically urgent candidates by WL mortality.
Methods: The impact of changes to the adult heart allocation system were assessed by comparing cohorts of WL additions and candidates transplanted pre (04/18/17-10/17/18) and post (10/18/18-04/17/20) implementation. WL mortality, median time to transplant, transplant rates and six-month survival were compared between medical urgency statuses, status criteria and era. Fine-Grey competing risks and unadjusted Kaplan Meier methods were used to estimate median days to transplant and 6-month patient survival, respectively.
Results: WL mortality was significantly higher for Status 1 vs. Status 2 and for Status 2 vs. Status 3 candidates. Criteria within medical urgency statuses had similar WL mortality rates. Median days to transplant decreased pre- to post-implementation (M_{pre}= 224, M_{post}= 105) with higher statuses having shorter wait times (Status 1 M_{post}= 5, Status 2 M_{post}= 10, Status 3 M_{post}= 28 days). Median time to transplant varied across criteria within statuses, with a maximum within-status difference of 226 days. Transplant rates were significantly higher for the most medically urgent candidates compared to each subsequent status (Status 1: 2987 [2685, 3313]; Status 2 1891 [1810, 1976]; Status 3: 305 [286, 326]; Transplants per 100 patient years). Six-month patient survival did not differ between eras (pre=93.6%, post=92.7%; p=0.24).
Conclusions: Overall, the implementation of the new adult heart allocation policy resulted in better stratification of the most medically urgent heart candidates according to risk of death on the WL with decreased median wait times, higher transplant rates and no observed adverse effect on 6-month patient survival.





CITATION INFORMATION: Bradbrook K., Lindblad K., Goff R., Daly R., Hall S. Changes to Adult Heart Allocation Improve Candidate Stratification *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Bradbrook: None. **K. Lindblad:** None. **R.R. Goff:** None. **R. Daly:** None. **S. Hall:** None.

PUBLIC POLICY: ETHICS

Abstract# 104

Incorporation of Donor Liver Macrovesicular Steatosis Into Srtr Risk Adjustment Models for Deceased Donor Yield and Post-Transplant Outcome

A. Kwong[1], C. Wang[2], A. Wey[3], N. Salkowski[3], J. Snyder[4], J. Wetmore[2], A. Israni[2], J. Lake[4], P. Stock[5], W. Kim[1], *[1]Stanford University, Redwood City, CA, [2]Medicine, Hennepin Healthcare, Minneapolis, MN, [3]Scientific Registry of Transplant Recipients, Minneapolis, MN, [4]University of Minnesota, Minneapolis, MN, [5]University of California, San Francisco, San Francisco, CA*

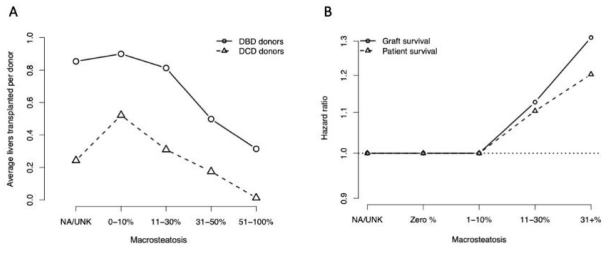
Purpose: The SRTR had not traditionally included biopsy results in post-transplant risk adjustment, yet biopsy results may influence outcomes and thus decisions regarding organ acceptance. The aim of this study was to evaluate the impact of donor macrovesicular steatosis on organ yield and graft outcome after liver transplantation, and the effect of incorporating this variable into SRTR risk adjustment models for organ yield and program-specific graft outcomes.

Methods: This study used data from the Scientific Registry of Transplant Recipients, which includes all donors, waitlisted candidates, and transplant recipients in the United States. We examined the association between macrovesicular steatosis and deceased donor yield, and the relationship between macrovesicular steatosis and 1-year posttransplant graft outcome using multivariable logistic regression and Cox models with the least absolute shrinkage and selection operator (LASSO).

Results: 3.3% of donors had 31-50% macrovesicular steatosis on liver biopsy, and 1.3% with >50%. Increasing levels of steatosis on donor liver biopsy predicted lower organ yield; 31-50% and >50% macrovesicular steatosis was associated with 88 and 96% lower odds of utilization, respectively (Figure A). The risk of posttransplant graft failure with donor livers with >30% macrovesicular steatosis was 30% higher (HR 1.30), compared to those with no pre-transplant liver biopsy or those with 0-10% macrovesicular steatosis (Figure B). There was minimal change on organ procurement organization (OPO)-specific deceased donor yield or program-specific post-transplant outcome assessments when macrovesicular steatosis was added to the existing SRTR risk adjustment models.

Conclusions: Macrovesicular steatosis is associated with lower organ yield and reduced graft survival. This risk factor has been added to the SRTR risk adjustment models for OPO and program-specific assessments and may facilitate more judicious use of these higher-risk organs.

Figure. (A) Average livers transplanted per donor, and (B) 1-year post-transplant graft and patient survival by degree of macrovesicular steatosis.



CITATION INFORMATION: Kwong A., Wang C., Wey A., Salkowski N., Snyder J., Wetmore J., Israni A., Lake J., Stock P., Kim W. Incorporation of Donor Liver Macrovesicular Steatosis Into Srtr Risk Adjustment Models for Deceased Donor Yield and Post-Transplant Outcome *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Kwong: None. **C. Wang:** None. **A. Wey:** None. **N. Salkowski:** None. **J. Snyder:** None. **J. Wetmore:** None. **A. Israni:** None. **J. Lake:** None. **P. Stock:** None. **W. Kim:** None.

Abstract# 105

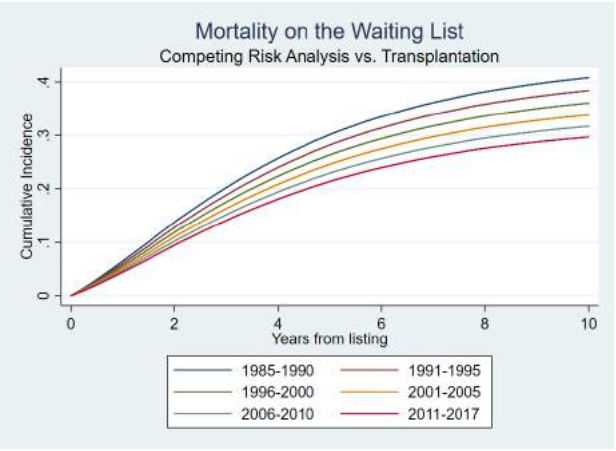
Increasing Survival on the Kidney Transplant Waiting List: A Thirty-Three Year Analysis

E. L. Godfrey[1], P. T. Kambhampati[1], J. A. Goss[2], A. Rana[2], *[1]Baylor College of Medicine, Houston, TX, [2]Division of Abdominal Transplantation, Department of Surgery, Baylor College of Medicine, Houston, TX*

Purpose: The shortage of available donor kidneys remains the greatest obstacle to transplantation, with many patients spending years on the transplant list. During this time, dialysis and comorbidity management are the standard of care. Given numerous improvements in dialysis and medical management, we sought to evaluate survival on the kidney waiting list across the modern era of transplantation. We hypothesized that survival on the waiting list has increased over time, despite increased presence of comorbid risk factors over the last three decades.

Methods: A retrospective cohort study was conducted of all adults (at least 18 years of age) listed for kidney transplant along between 1984 and 2017 in the OPTN STAR files. Single and multivariable competing risk, Kaplan-Meier survival, and Cox regression analyses were performed to assess the relationship between listing era, patient characteristics and risk factors, and the primary outcome of death prior to transplantation - measured as waiting list death or disease progression resulting in delisting.

Results: A total of 734,665 listed candidates were identified. Candidate BMI at listing increased from 24.6 in 1984-1990 to 28.1 in 2011-2017, and age from 41.2 years to 51.6. Frequency of comorbid diabetes increased from 14.6% to 42.3%, and more patients are on dialysis at the time of listing - 75.1% in the 2011-2017 era, compared to 66.1% in the 1996-2000 era. Fewer individuals are receiving transplants (57.1% in 2006-10 vs 66.5% in 1984-90) and time spent on the waiting list has increased to1039 days in 2006-10 from 660 days in 1984-90. Despite these changes, survival on the waiting list over time has increased in each successive era in single and multivariable Cox and competing risk analysis (HR = 0.857 for era, 95% CI 0.831 - 0.883). This is the case across all risk sub-groups and diagnoses, with the exception of the small number of individuals listed in poor functional status.



Conclusions: This analysis demonstrates an increase in survival on the kidney waiting list over the past three and a half decades, despite an increase in risk factors for mortality among the candidates listed in the same period.

Demographics and Clinical Characteristics of Patients listed for Kidney Transplantation by Era						
Era	1984-1990	1991-1995	1996-2000	2001-2005	2006-2010	2011-2017
Candidate age	41.3 ± 12.8	44.0± 13.0	47.0± 13.2	49.0± 13.5	50.9± 13.5	51.6± 13.7
Body Mass Index (BMI)	24.9 ±5.8	25.5 ±5.5	26.5 ± 5.6	27.4 ± 5.7	28.3 ± 5.7	28.8 ± 5.6
% with Diabetes	-	26.7	30.6	35.4	40.1	42.3
% on Dialysis at Listing	0.5	5.01	66.0	80.4	76.0	75.1
Days on the List (mean ± SD)	660 ± 904	749 ± 896	914 ± 944	955 ± 938	1039 ± 889	733 ± 590* (reduced due to f/u time)
% Transplanted	66.5	68.6	64.0	61.3	57.1	40.0*
% Died Prior to Transplantation	10.5	13.5	18.4	16.9	15.1	7.3*

CITATION INFORMATION: Godfrey E., Kambhampati P., Goss J., Rana A. Increasing Survival on the Kidney Transplant Waiting List: A Thirty-Three Year Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: E.L. Godfrey: None. **P.T. Kambhampati:** None. **J.A. Goss:** None. **A. Rana:** None.

Abstract# 106

The Evolution of the National Liver Review Board

S. Noreen[1], J. Trotter[2], J. Pomposelli[3], M. Cafarella[1], J. Heimbach[4], *[1]UNOS, Richmond, VA, [2]BSWHealth, Dallas, TX, [3]UCHealth, Aurora, CO, [4]Mayo Clinic, Rochester, MN*

Purpose: The National Liver Review Board (NLRB) was implemented 5/14/2019, establishing a national structure for liver exceptions comprised of three specialty review boards and a scoring system based on the median score for the area of distribution. The area of distribution was revised with the implementation of Acuity Circles (AC) on 2/4/2020. The OPTN Liver Committee has been closely evaluating this policy.

Methods: OPTN exception requests and liver waitlist (WL) registrations data during 8/21/2018-5/13/2019 (RRB era), 5/14/2019-2/03/2020 (pre-AC NLRB era), and 2/04-10/26/2020 (post-AC NLRB era) were used, as well as snapshots of the WL

each month from 8/2019 - 10/2020. OPTN transplant data was used for deceased donor liver-alone transplants, divided into RRB (8/21/2018-3/18/2019), pre-AC NLRB (5/14-12/09/2019), and post-AC NLRB (2/04-8/31/2020) eras. Chi-square and Kruskal-Wallis tests assessed differences between eras.

Results: The proportion of auto-approvals significantly increased over the study period (38% post-AC NLRB, 31% pre-AC NLRB, 24% RRB eras, p<0.001). Time for reviewers to resolve cases in the post-AC NLRB era continued to decrease over time (average 4.4 days post-AC NLRB, 5.1 pre-AC NLRB, 5.8 RRB eras, p<0.001). WL dropout rates increased for exception candidates, with similar rates for non-HCC exceptions and non-exceptions post-AC NLRB era, and the relationship between non-exception and HCC exception transplant rates has reversed (Figure 1). There was a decrease in the proportion of exceptions on the WL and transplants (Figure 2).

Conclusions: More exception forms continue to be automatically approved, decreasing the burden on reviewers. Reviewers also continue to resolve cases quicker. Exception candidate priority relative to non-exception candidates has begun to decrease, particularly for HCC exception candidates, and this has allowed non-exception candidates with higher medical urgency to receive transplants while driving down the scores at which exception candidates access transplant.

Figure 1. Liver waitlist dropout rates (Panel A) and transplant rates (Panel B), by exception status and policy era

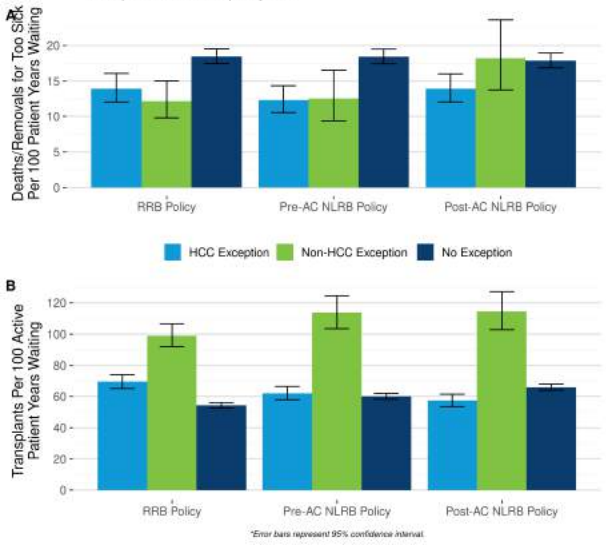
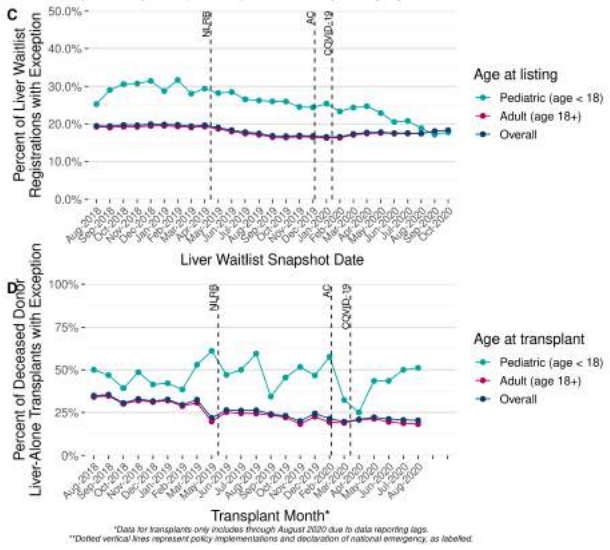


Figure 2. Percentage of the liver waiting list (Panel C) and deceased donor liver-alone transplant recipients (Panel D) with an exception by age and month



CITATION INFORMATION: Noreen S., Trotter J., Pomposelli J., Cafarella M., Heimbach J. The Evolution of the National Liver Review Board *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Noreen: None. **J. Trotter:** None. **J. Pomposelli:** None. **M. Cafarella:** None. **J. Heimbach:** None.

Abstract# 107

Profound Opportunities Lost: Patients with High Priority for Ideal Donor Kidneys That are Not Placed on the Kidney Transplant Waiting List

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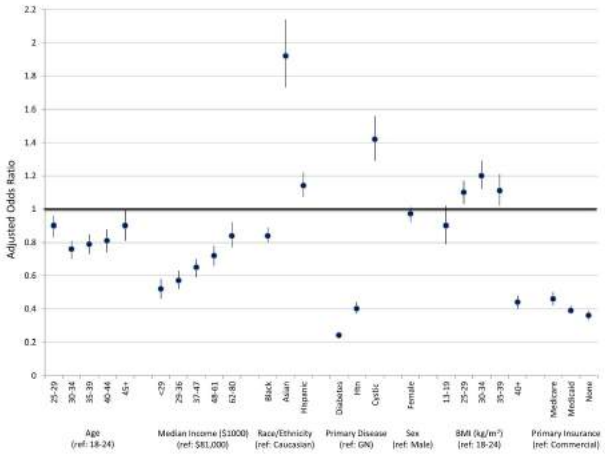
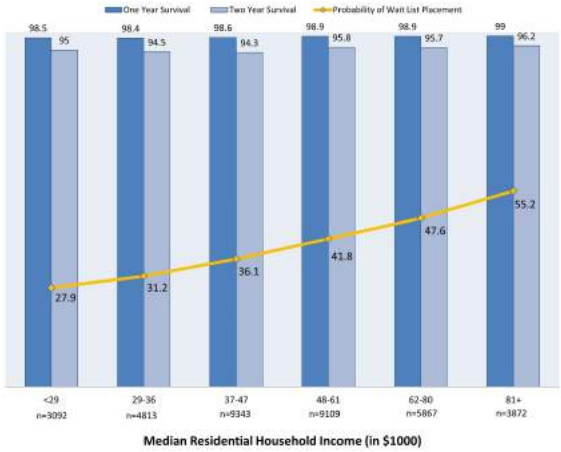
Purpose: The national Kidney Allocation System(KAS) prioritizes patients with high (top 20%) Estimated Post-Transplant Survival (EPTS) with expedited access to high quality deceased donor kidneys. The primary aim of this study was to evaluate the proportion and characteristics of ESKD patients that would qualify with top 20% EPTS scores but are not placed on the kidney transplant waiting list.

Methods: The study included adult (18+ years) ESKD patients in the United States Renal Data System on the waiting list or dialysis who qualify for top 20% EPTS from 12/4/2014-12/31/2016. We compared characteristics and outcomes of patients that were and were not placed on the transplant waiting list.

Results: There were 36,934 patients with top 20% EPTS score with mean age=32.0 years(std=8.0), 55% male, 38.9% non-Hispanic Caucasian, 32.0% African American and 19.9% Hispanic. Of these, 14,954(40.5%) were on the waiting list and independent factors associated with reduced likelihood of waitlist placement included diabetes(Adjusted Odds Ratio[AOR]=0.24,95%CI 0.22-0.26), African American race(AOR=0.89,95%CI 0.80-0.84), lowest residential income quintile(AOR=0.52,95%C.I.0.46-0.58), non-commercial insurance, end-stage renal networks and comorbidities. Results persisted excluding patients with any documente marginal contraindications including morbid obesity. Two-year survival for patients not on the waiting list was 95%.

Conclusions: There are substantial numbers of ESKD patients that would qualify for top 20% EPTS status not on the waiting list when they would receive prioritization to ideal donors. Non-listing for patients that are likely ideal transplant candidates were markedly reduced for African Americans, non-privately insured and patients in lower income communities. These lost opportunities may have profound impact on patients' long-term prognoses. Efforts to expedite care for qualifying candidates are needed and polices automating transplant referral for these patients should be considered.





PUBLIC POLICY: ETHICS

CITATION INFORMATION: Schold J., Huml A., Poggio E., Sedor J., Husain S., King K., Mohan S. Profound Opportunities Lost: Patients with High Priority for Ideal Donor Kidneys That are Not Placed on the Kidney Transplant Waiting List *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Schold: None. **A. Huml:** None. **E. Poggio:** None. **J. Sedor:** None. **S. Husain:** None. **K.L. King:** None. **S. Mohan:** None.

Abstract# 108

Impact of Donor Kidney Biopsy on Kidney Yield and Post-Transplant Outcomes

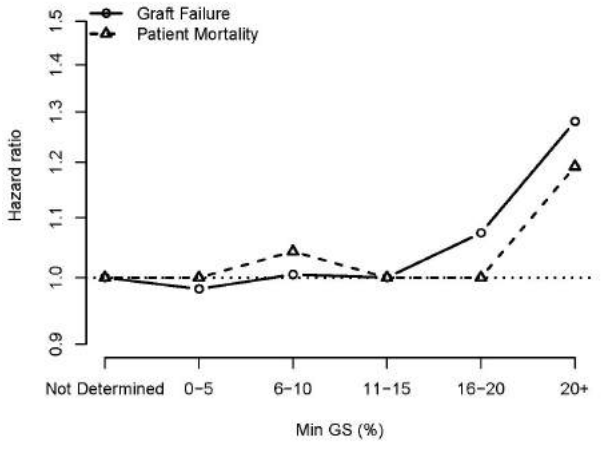
C. Wang[1], J. Wetmore[1], A. Wey[2], N. Salkowski[2], J. Snyder[2], A. Israni[1], *[1]Nephrology, Hennepin County Medical Center, Minneapolis, MN, [2]Scientific Registry of Transplant Recipients, Minneapolis, MN*

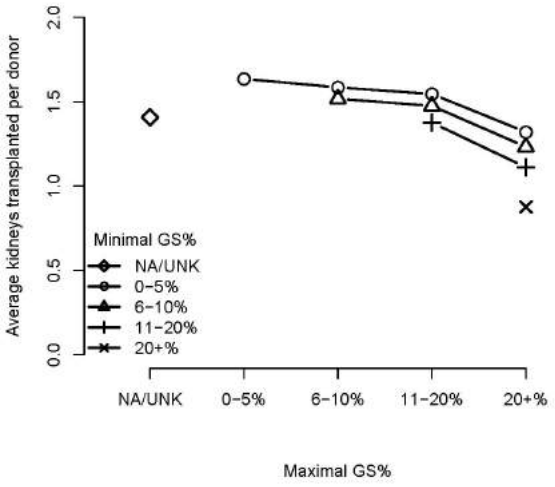
Purpose: Kidney procurement biopsy findings, such as Glomerulosclerosis (GS) is frequently used to determine kidney quality, but it remains unclear the degree of GS in increasing the risk of kidney discard and graft and patient loss. We sought to investigate the impact of GS% on organ yield of organ procurement organizations (OPOs) and patient outcomes of transplant programs by including GS% in yield models and program-specific report (PSR) models.

Methods: Demographic, clinical and histological information of deceased donors from July 1, 2017 through June 30, 2019 were included in the analysis. Multivariable logistic regression and Cox models with Least absolute shrinkage and selection operator (LASSO) were used in logistic and Cox models to analyze the association of GS with organ yield and 1-year post transplant outcomes, respectively.

Results: Both maximal GS% and minimal GS% must be known to determine the overall relationship between GS and yield, so maximal GS% was plotted against kidney yield, stratified by level of minimal GS%. Shown in Figure 1, increasing level of maximal GS or minimal GS was associated with lower yield. For example, kidney yield was 1.6 when both maximal and minimal GS were <5%, but only 0.88 when both maximal and minimal GS were >20%. Only minimal GS is needed to determine transplant outcomes. Shown in Figure 2, minimal GS 16-20% was associated with increased risk graft failure (HR 1.05 with GS 16-20% and HR 1.3 with GS>20%) and minimal GS >20% was associated with increased risk mortality (HR 1.2).

Conclusions: Increased GS was associated with lower organ yield and inferior patient and graft survival after kidney transplantation. Incorporation of GS into the yield and PSR models that occurred since January 2020, likely will reassure OPOs and transplant centers pursuing kidneys with relatively high levels of GS and this approach may promote use of organs with higher levels of GS and reduce discard rates.





CITATION INFORMATION: Wang C., Wetmore J., Wey A., Salkowski N., Snyder J., Israni A. Impact of Donor Kidney Biopsy on Kidney Yield and Post-Transplant Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Wang: None. **J. Wetmore:** None. **A. Wey:** None. **N. Salkowski:** None. **J. Snyder:** None. **A. Israni:** None.

Abstract# 109

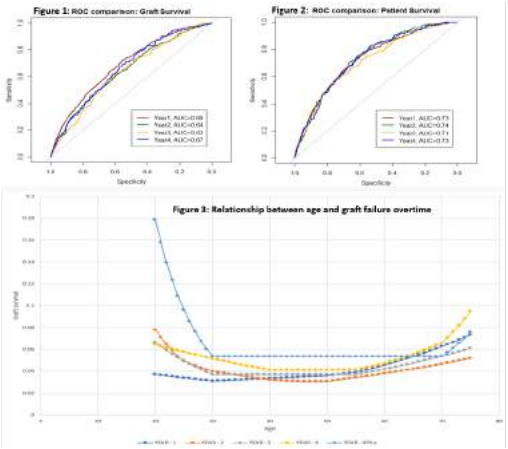
Predicting Post-transplant Death and Graft Loss Risk: Insight at Listing

N. Dzebisashvili[1], M. Schnitzler[2], K. Lentine[2], K. Venkataramani[1], S. Ghosh[1], *[1]CareDx, Brisbane, CA, [2]Saint Louis University, St. Louis, MO*

Purpose: Prognostication models for post-transplant outcomes deriving inputs from information collected on donor (DDR/LDR), candidate (TCR) and transplant recipient (TRR) registrations can provide useful information to guide risk assessment and management. Our novel machine learning approach assesses patients at listing and different points during pre-transplant phase to predict post-transplant graft and patient survival.

Methods: Organ Procurement and Transplant (OPTN) registry data for 97,963 adult kidney-only transplant recipients (2009-2019) was used to estimate 1-, 2-, 3-, and 4-year post-transplant graft (GS) and patient survival (PS). Pediatric and multi-organ transplants were excluded. Follow-up was censored at the end of study (09/08/2019). Cox models were built using LASSO regularization and shrinkage with 10-fold cross-validation. Features included listing data, co-morbidities and functional status. Waiting time was accounted for utilizing earliest of dialysis or listing dates for the listing record. To account for effect-size of covariates across time, GS and PS estimates were derived for each post-transplant year independently. For improved accuracy, variance inflation factor was used to detect multicollinearity and assign predictor weights appropriately.

Results: AUCs for 1-, 2-, 3-, and 4-year post-transplant GS were 0.68, 0.64, 0.63 and 0.67 (Figure 1), respectively. AUCs for 1-, 2-, 3-, and 4-year post-transplant PS were 0.73, 0.74, 0.71 and 0.73, respectively (Figure 2). We observed a change in relationship between age and graft survival over time (Figure 3). Risk of graft failure increased linearly with age during year 1 but was more pronounced for younger and older patients over in later years. Finally, outcomes for each post-transplant year were estimated for representative donor groups (living donor and KDPI categories) for the purpose of providing augmented intelligence for clinical practices.



Conclusions: Assessment of post-transplant outcomes using patient information collected at the time of listing demonstrated utility to assess post-transplant risk for patients on the waiting list. Machine learning models could be translated into decision support tools to standardize and optimize waitlist management.

CITATION INFORMATION: Dzebisashvili N., Schnitzler M., Lentine K., Venkataramani K., Ghosh S. Predicting Post-transplant Death and Graft Loss Risk: Insight at Listing *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Dzebisashvili: Salary; Name of Commercial Interest; CareDx (employee). **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Sanofi (speaker). **K. Venkataramani:** Salary; Name of Commercial Interest; CareDx (employee). **S. Ghosh:** Salary; Name of Commercial Interest; CareDx (employee).

Abstract# 110

Framing the Conceptualization of Uterus Transplantation: A Mixed Methods Study

A. Wall[1], L. Johannesson[1], M. Sok[2], A. Warren[3], E. Gordon[4], G. Testa[1], *[1]Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX, [2]Obstetrics and Gynecology, Baylor University Medical Center, Dallas, TX, [3]Trauma and Critical Care, Baylor University Medical Center, Dallas, TX, [4]Northwestern University, Dallas, TX*

Purpose: Absolute uterine factor infertility (AUFI) affects 1-5% of women of childbearing age, and was recently the only untreatable cause of infertility. Clinical trials have demonstrated the feasibility and reproducibility of uterus transplantation (UTx) to treat UFI. Because UTx aims to enhance the quality of life among women with UFI by enabling them to experience pregnancy and child-birth, clinical feasibility is not enough to ethically justify this procedure. The experiences of women who undergo UTx must truly be life-enhancing to justify the risks of surgery and immunosuppression. This study aimed to assess the perceptions of UTx recipients regarding their experiences with infertility and UTx, and their responses to societal perceptions of UTx.

Methods: Semi-structured interviews of UTx recipients from a single center. Interviews were conducted by phone or in-person, audio recorded, transcribed, and coded independently by two analysts. Qualitative data were analyzed for themes. Quantitative demographic and transformed qualitative data were analyzed using descriptive statistics.

Results: Twenty of twenty UTx recipients consented to participate and completed interviews. Thematic saturation occurred at 12 interviews. Major themes and representative quotations are shown in the figure.

Theme	Representative quotations
Life experience with uterine factor infertility	➢ It feels like your womanhood was taken away from you. ➢ It meant every vision that I had had for my future was immediately erased from my mind and taken away from me because I had always grown up thinking like I wanted to have a big family and I couldn't wait to be pregnant and all this stuff and it was gone. ➢ When you're told at a young age that it's just not an option for you to have your own child- how that cuts into you, you can't describe that. It feels like part of you is just ripped out and completely taken away.
Experience with uterus transplant	➢ I felt like this would have been the best thing for me not only to be able to have my own biological child but to be able to experience pregnancy. And that's one of the main things that I wanted to do, too. You know I wanted to be able to look down and see my belly growing and feel my baby kick and have a baby shower and see how it felt to be pregnant. ➢ And there is now that sateen or seventeen year old finding out… that it's [UFI] getting diagnosed and now has hope for the future. Now she has options. So, was worth it? Yes. ➢ I actually had a doctor that participated in my C-section that actually came into my postpartum room and told me, "I was against these transplants until I was in the room with you. And it gets me emotional and I realized how much, why you did this." And, so, you know to hear that from a medical professional about someone who was completely against these transplants because he thought it was a waste of money and a waste of time. And then to hear my story and see my baby girl be born like people just can't put a number on that financially, and they can't say it's not worth it.
Conceptualization of the uterus transplant enterprise	➢ And that anyone that tries to make someone feel bad about a decision that they have made to start their family… it's ignorant. They don't understand everything involved in infertility and all of the emotional things that are involved, or that go into making a decision. It's such a big decision. ➢ While I do think adoption is beautiful, if your heart's not in it, your hearts not in it. You can't force it. The same goes for a surrogate or for a uterus transplant. If you don't want to do it, don't do it. ➢ Well when you're born, you know you expect to have all the pieces. If you have something, I don't want to say wrong. But if you have something wrong on the outside people fix it, and they're more than happy to fix it. If you have a club foot, a cleft lip, people are ready and willing to help you. ➢ It's not a life-saving transplant. I understand that but it's a life giving and I think it's very important to be able to give everybody that chance to give a life.
Living versus deceased donor approaches	➢ You could say from an ethical standpoint the deceased donor is better but there's just there's just there's not enough. You would never you would never have enough. ➢ A living donor was my ideal to me because it felt like good energy, because that person wanted to help. ➢ I honestly don't know that I would have any preference as long as the success rate for all of them was the same.

Conclusions: All interviewees were negatively affected by their diagnosis of AUFI and found value in uterus transplantation, even recipients with early graft failures or miscarriages. Our study reports the first insights into the personal experiences of UTx recipients, demonstrating both personal perceptions of the value of uterus transplantation and the profound effect of UFI on women who seek this option.

CITATION INFORMATION: Wall A., Johannesson L., Sok M., Warren A., Gordon E., Testa G. Framing the Conceptualization of Uterus Transplantation: A Mixed Methods Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Wall: None. **L. Johannesson:** None. **M. Sok:** None. **A. Warren:** None. **E. Gordon:** None. **G. Testa:** None.

Basic

Biomarkers, Immune Assessment and Clinical Outcomes - II

Abstract# 111

Development and Validation of a Novel Peripheral Blood Based Gene Signature for Acute Rejection Following Renal Transplantation

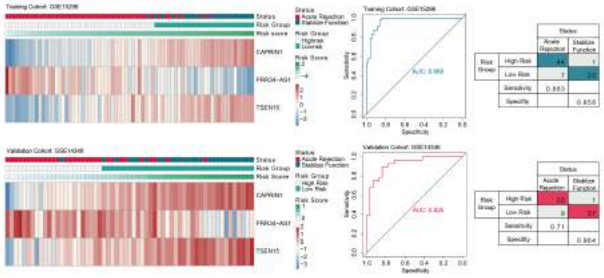
D. Zhang, Y. Wang, X. Hu, *Department of Urology, Beijing Chao-Yang Hospital, Capital Medical University, Beijing, China*

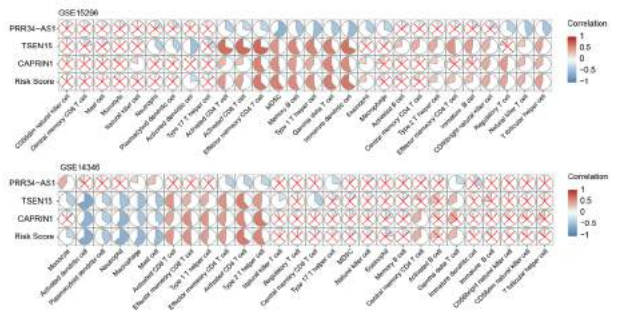
Purpose: The aim of this study is to utilize advanced machine learning methods to construct a peripheral blood-based gene signature for acute rejection following kidney transplantation.

Methods: After systematically screened the databases, two independent cohorts of high quality with blood expression profiles and biopsy-proven graft status from the Gene Expression Omnibus database were employed as training and validation cohorts. Then, two machine learning algorithms (support vector machine recursive feature elimination and random forest) were used to identify key biomarkers for acute rejection. Subsequently, the least absolute shrinkage and selector operation logistic regression method was applied to construct a gene signature for acute rejection in the training cohort. Patients were divided into high-risk and low-risk groups based on the cutoff point identified by the ROC curve. The signature was validated in an independent validation cohort with fixed formula and same cutoff point. ssGSEA was used to estimate immune cells in the blood.

Results: Combining two advanced machine learning algorithms, seven key biomarkers were filtered out. Then, using the least absolute shrinkage and selector operation logistic regression method, a novel three-gene signature was constructed. The signature had high accuracy in both training (AUC=0.968) and validation cohort (AUC=0.925). Notably, the signature had high specificity in diagnosing acute rejection (0.958 in training cohort and 0.964 in validation cohort). Additionally, these three genes were found to have significant and consistent relationships with blood immune cells in both cohorts.

Conclusions: We developed a novel blood-based three-gene signature to non-invasively diagnose renal acute rejection, which offered an accurate and convenient tool for clinical practice. Besides, the current study addressed the promising prospect of blood gene biomarkers in the field of kidney transplantation.





CITATION INFORMATION: Zhang D., Wang Y., Hu X. Development and Validation of a Novel Peripheral Blood Based Gene Signature for Acute Rejection Following Renal Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Zhang: None. **Y. Wang:** None. **X. Hu:** None.

Abstract# 112

Multiplexed Imaging Mass Cytometry of the Alloimmune Landscape of Rejection in Clinical Liver Transplantation

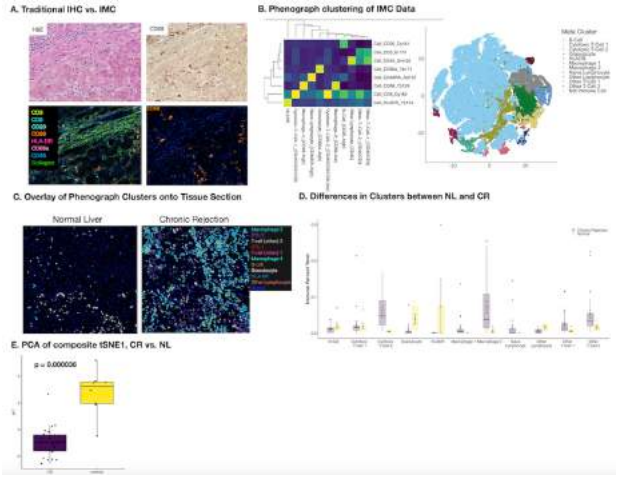
J. Emamaullee, N. Ung, C. Man, J. Hoeflich, C. Goldbeck, A. Barbetta, R. Sun, N. Matasci, J. Katz, J. Lee, S. Chopra, L. Sher, S. Asgharzadeh, O. Akbari, Y. Genyk, *University of Southern California, Los Angeles, CA*

Purpose: Rejection continues to be an important cause of graft loss and failure post-liver transplant (LT). Imaging Mass Cytometry (IMC) is an emerging preclinical technique that allows for highly multiplexed simultaneous analysis of immune phenotypes within fixed tissue specimens. In this study, we developed a liver-specific IMC panel as well as an informatics-based analysis pipeline to deeply analyze the immune landscape of chronic rejection (CR) post-LT.

Methods: A retrospective review of our center identified cases of re-transplant for CR. Regions of interest were identified by our clinical pathologist. A panel of heavy metal-tagged antibodies (Collagen, CD45RA, CD45, CD20, CD3, CD8, CD66a, CD68, CD235, HLA-DR) and a nuclear tag (Iridium) were used simultaneously to label fixed tissue sections for spatial characterization using Hyperion CyTOF IMC. A post-IMC Analysis Pipeline was developed for segmentation and spatial molecular mapping via quantification and co-localization of labeled markers. A total of 18 CR and 5 normal liver (NL) cases were examined.

Results: Examples of IMC staining versus traditional immunohistochemistry (IHC) are shown in Fig. 1A. Detailed quantification of 109,245 cells was completed, of which 30,646 were some type of immune cells after identification. Single cell segmentation followed by Phenograph clustering was used to identify immune subpopulations (Fig. 1B). These clusters were then applied back to the tissue sections to understand density and spatial relationships for each immune population (1C) and quantified (1D), showing significant differences in the proportion of each population between CR and NL ($p<0.0001$ for each cluster). The entire population of patients was examined using tSNE dimensionality reduction techniques across the IMC marker panel. Modeling via principal component analysis revealed highly consistent immune phenotypes across patients with CR when compared to NL, despite the inherent heterogeneity of clinical LT patients (1E, $p=0.000036$).

Conclusions: This study highlights the power of IMC to provide high-resolution, multiplexed analysis of the intragraft immune microenvironment during clinical rejection episodes. Hepatic macrophages have not typically been considered to be involved in CR post-LT, and these data suggest that they may represent a new therapeutic target to treat CR. Further development of IMC has the potential to generate predictive models of clinical outcomes using tissue-specific immune mapping.



CITATION INFORMATION: Emamaullee J., Ung N., Man C., Hoeflich J., Goldbeck C., Barbetta A., Sun R., Matasci N., Katz J., Lee J., Chopra S., Sher L., Asgharzadeh S., Akbari O., Genyk Y. Multiplexed Imaging Mass Cytometry of the Alloimmune Landscape of Rejection in Clinical Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Emamaullee: None. **N. Ung:** None. **C. Man:** None. **J. Hoeflich:** None. **C. Goldbeck:** None. **A. Barbetta:** None. **R. Sun:** None. **N. Matasci:** None. **J. Katz:** None. **J. Lee:** None. **S. Chopra:** None. **L. Sher:** None. **S. Asgharzadeh:** None. **O. Akbari:** None. **Y. Genyk:** None.

Abstract# 113

Hypothermic Oxygenated Machine Perfusion Protects Against Cholangiocyte and Hepatocyte Injury and Mitigates Inflammation vs Static Cold Storage: Preliminary Results from a Single Center

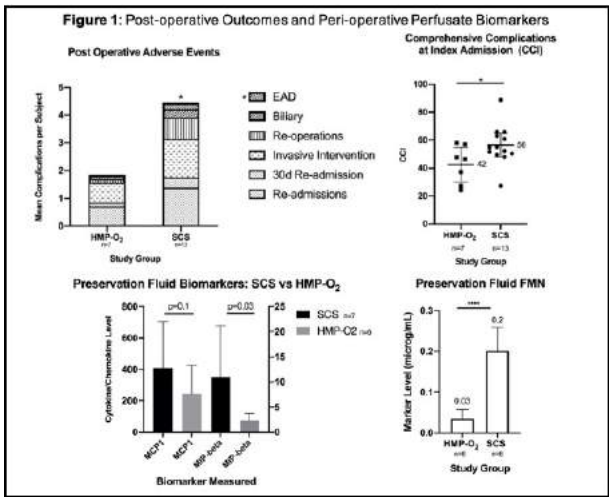
G. Panayotova, F. Paterno, M. McCarty, G. Dikdan, S. Simonishvili, Y. Qin, L. Brown, A. Amin, K. E. Lunsford, J. V. Guarrera, *Transplant Surgery, Rutgers NJMS, Newark, NJ*

Purpose: Hypothermic-oxygenated machine perfusion ($HMP-O_2$) is a promising preservation technique with potential to mitigate ischemia/reperfusion injury and improve graft and patient outcomes. Here we present preliminary results from a single center within the PILOT trial (NCT03484455), a prospective, multi-center randomized controlled trial comparing $HMP-O_2$ to Static Cold Storage (SCS), using the LifePort Liver Transporter (Organ Recover Systems, Itasca, IL).

Methods: 13 SCS and 7 $HMP-O_2$ cases were analyzed over a median of 10mo. Preservation fluid samples were serially collected during $HMP-O_2$ and after flush for SCS to normalize for volume of distribution. Liver and bile duct biopsies and bile fluid were collected 1hr post reperfusion. Bile analysis was performed via the iSTAT-1/$CG8^+$ system. Preservation and bile fluid cytokine/chemokine levels were measured by Luminex (Millipore). Preservation fluid FMN, a known predictive biomarker for poor outcomes post-transplant, was measured via fluorescence absorbance. A $p<0.05$ was considered significant.

Results: Donor and recipient characteristics were similar between groups. Cold time was longer for $HMP-O_2$ vs SCS (6.9 vs 5.4hrs, $p<0.01$). RBC utilization was greater following SCS vs $HMP-O_2$ (14 vs 7 units, $p=0.05$). Overall patient and graft survival was 100% for both. Patients experienced more immediate complications and more long-term post-operative adverse events after SCS vs $HMP-O_2$ (Comprehensive Complication Index, CCI, 56 vs 42, $p<0.05$), **Figure 1**. Post-reperfusion cholangiocyte injury was mitigated by perfusion, as reflected by higher bile glucose in SCS cases (156 vs 55 mg/dL, $p<0.05$). Biliary and acute liver injury-associated chemokine MIP-1β (2 vs 10 pg/mL, $p<0.05$) and perfusate FMN (0.03 vs 0.2 μg/mL, $p<0.001$) were significantly lower in preservation fluid following $HMP-O_2$ vs SCS, **Figure 1**. These markers correlate with improved post-operative graft function and decreased acute liver injury following transplant.

Conclusions: $HMP-O_2$ appears to be a safe and effective preservation method. Preliminary results demonstrate improved short-term outcomes, improved inflammatory profile, and better early graft function. Biomarkers in perfusate may provide targets for future intervention in efforts to mitigate IRI, expand the liver donor organ pool, and improve long-term patient outcomes. Further study is needed to fully characterize the benefits of $HMP-O_2$ in liver transplantation.



CITATION INFORMATION: Panayotova G., Paterno F., McCarty M., Dikdan G., Simonishvili S., Qin Y., Brown L., Amin A., Lunsford K., Guarrera J. Hypothermic Oxygenated Machine Perfusion Protects Against Cholangiocyte and Hepatocyte Injury and Mitigates Inflammation vs Static Cold Storage: Preliminary Results from a Single Center *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Panayotova: None. **F. Paterno:** None. **M. McCarty:** None. **G. Dikdan:** None. **S. Simonishvili:** None. **Y. Qin:** None. **L. Brown:** None. **A. Amin:** None. **K.E. Lunsford:** None. **J.V. Guarrera:** Consulting Fee; Name of Commercial Interest; Organ Recovery Systems. Consulting Fee; Nature of Relationship; Consultant. Consulting Fee; If "Other" Please Explain; Principal Investigator in Industry Sponsored Clinical Trial.

Abstract# 114

The Effect of the Affordable Care Act on Insurance Status, Waitlist, and Transplant Outcomes in Liver Transplantation

B. I. Shaw[1], M. L. Samoylova[1], V. Wang[2], T. Risoli Jr[3], S. Peskoe[3], K. Caddell[3], L. M. McElroy[1], *[1]Surgery, Duke University, Durham, NC, [2]Population Health Sciences, Duke University, Durham, NC, [3]Biostatistics, Duke University, Durham, NC*

Purpose: The Affordable Care Act (ACA) intended to expand Medicaid to cover all adults with income below 138% of federal poverty level. We describe the effect of the ACA on payor status and outcomes of liver transplant candidates.

Methods: We conducted a retrospective cohort study of liver transplant candidates and assessed changes in payor sources and outcomes in the years before (2007-2010), during (2011-2014), and after (2015-2018) ACA implementation. For waitlist outcomes (death/delisting and transplant), multivariable competing risks models were used to estimate sub-distribution hazard ratios (SHR), with interaction terms used to assess the changing impact of insurance over time. Poisson models were used to estimate incidence rate ratios (IRR) for inactivations within the first year. For transplant outcomes, Cox proportional hazards models were used to estimate the effect of insurance status on death and graft loss over time.

Results: In our cohort of 121,298 liver waitlisted candidates, the proportion insured by Medicaid increased over time (Table 1). Medicaid patients had higher risk of death or de-listing (SHR 1.31 95%CI 1.26-1.35, p<0.001) and lower risk of receiving transplant (SHR 0.81 95%CI 0.79-0.83, p<0.001) than those privately-insured. After 2014, the likelihood of transplant for Medicaid candidates further decreased (Figure 1). Medicaid-insured patients had a higher rate of inactivation within the first year on the waiting list than the privately insured (IRR 1.20 95%CI 1.19-1.20,p<0.001). Among those receiving liver transplant, Medicaid-insured patients had higher risk of death (HR 1.16 95% CI 1.11-1.21,p<0.001) and graft loss (HR 1.20 95%CI 1.14-1.25, p<0.001); these risks did not significantly change over time.

Conclusions: Medicaid expansion via the ACA is associated with an increase in the number of patients listed for liver transplant, but these patients continue to have inferior waitlist and post-transplant outcomes relative to the privately insured.

Table 1. Proportion of waitlist on Medicaid, by listing state ACA expansion timing and waitlist era

Characteristic	**2007-2010.** (n=38,575)	**2011-2014.** (n=39,656)	**2015-2018.** (n=43,067)	p-value
Initial Expansion	n=20,364	n=20,803	n=22,234	
Medicaid	3,625 (17.8%)	4,059 (19.5%)	5,225 (23.5%)	<0.001
Later Expansion	n=5,024	n=4,774	n=5,025	
Medicaid	739 (14.5%)	758 (15.9%)	885 (17.6%)	<0.001
No Expansion	n=12,996	n=13,843	n=15,639	
Medicaid	1,559 (12.0%)	1,751 (12.6%)	1,598 (10.2%)	<0.001

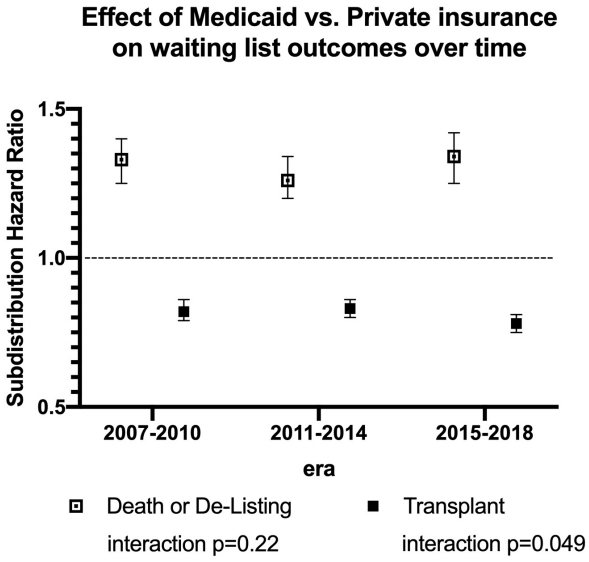


Figure 1. Effect of Medicaid vs Private insurance on liver transplant waitlist outcomes, by era.

CITATION INFORMATION: Shaw B., Samoylova M., Wang V., Risoli Jr T., Peskoe S., Caddell K., McElroy L. The Effect of the Affordable Care Act on Insurance Status, Waitlist, and Transplant Outcomes in Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: B.I. Shaw: None. **M.L. Samoylova:** None. **V. Wang:** None. **T. Risoli Jr:** None. **S. Peskoe:** None. **K. Caddell:** None. **L.M. McElroy:** None.

Abstract# 115

Gain of Function Mutations in Latent Membrane Protein 1 of Epstein Barr Virus are Associated with Increased Risk of Post-Transplant Lymphoproliferative Disorder

O. M. Martinez[1], S. M. Krams[1], M. Robien[2], M. Lapasaran[1], M. Arvedson[1], K. Weinberg[1], S. Boyd[1], B. Armstrong[3], C. Twist[4], D. Gratzinger[1], B. Tan[1], A. Trickey[1], M. Sever[3], M. Brown[2], D. Bernstein[1], C. O. Esquivel[1], *[1]Stanford University Sch of Med, Stanford, CA, [2]NIAID, Rockville, MD, [3]Rho, Durham, NC, [4]Roswell Park, Buffalo, NY*

Purpose: Post-transplant lymphoproliferative disorder (PTLD) remains a serious problem in the pediatric transplant population. Clinical Trials of Organ Transplantation in Children (CTOTC)-06 is a prospective NIAID-sponsored multi-institutional study intended to identify viral and immune biomarkers of Epstein-Barr virus (EBV)-associated PTLD. Here we report analysis of the complete CTOTC-06 data set.

Methods: 944 pediatric subjects were enrolled at 7 centers in the US from 2014-18, of whom 872 received a transplant: liver (n=421), kidney (n=219), heart (n=180), or intestine (n=52). Immunosuppression and anti-viral therapy were per each center's standard protocol. Mean age at transplant was 6.7±6.3 years (range <1-21 years) with 54% males and 46% females. Over 4700 blood samples were prospectively collected at enrollment or transplant, every 3 months during the first 2 years, twice yearly thereafter, and at PTLD diagnosis. DNA was isolated from whole blood and the cytoplasmic region of the EBV oncogene LMP1 was PCR amplified, cloned and sequenced to determine the presence of G212S and S366T gain of function mutations.

Results: 34 subjects (3.9%) reached the primary endpoint of biopsy-proven EBV+ PTLD. Incidence varied by organ type: small intestine 13.5%, heart 4.4%, kidney 3.2%, and liver 2.9%. The mean time post-transplant to diagnosis of EBV+ PTLD was 564.9±525.3 days (range 51-2303) and the mean time from EBV positivity to PTLD was 384.1±526.6 days (range 0-2310). PTLD WHO subtypes were early lesion (38.2%), monomorphic (44.1%) and polymorphic (17.7%). EBV serostatus of donors (D) and recipients (R) for those who developed PTLD vs all transplanted subjects was D+R+ (26.5% vs 43%), D+R- (41.2% vs 23.7%), D-R+ (8.8% vs 11.2%), D-R- (8.8% vs 8.3%) and unknown (14.7% vs 13.8%). DNA was available for LMP1 sequencing from 32 PTLD cases and 62 matched controls. Both mutations (G212S and S366T) were present in 31 of 32 PTLD cases (96.9%) and in 45 of 62 matched controls (72.6%) (p=0.005, OR=11.7, 95% CI 1.5, 92.6). For EBV+ PTLD, the presence of both mutations had a positive predictive value of 5.1% and a negative predictive value of 99.5% with a very high sensitivity of 96.9% and a modest specificity of 27.4%.

Conclusions: In this prospective, multicenter clinical trial we demonstrate a significant association between the presence of both LMP1 mutations G212S and S336T and the development of EBV+ PTLD. Pediatric transplant recipients who lacked both mutations in LMP1 had a very high probability of not developing PTLD. Thus, determination of LMP1 mutation status post-transplant could be informative in stratifying patients for risk for PTLD development.

CITATION INFORMATION: Martinez O., Krams S., Robien M., Lapasaran M., Arvedson M., Weinberg K., Boyd S., Armstrong B., Twist C., Gratzinger D., Tan B., Trickey A., Sever M., Brown M., Bernstein D., Esquivel C. Gain of Function Mutations in Latent Membrane Protein 1 of Epstein Barr Virus are Associated with Increased Risk of Post-Transplant Lymphoproliferative Disorder *AJT, Volume 21 Supplement 3*

DISCLOSURES: O.M. Martinez: None. **S.M. Krams:** None. **M. Robien:** None. **M. Lapasaran:** None. **M. Arvedson:** None. **K. Weinberg:** None. **S. Boyd:** None. **B. Armstrong:** None. **C. Twist:** None. **D. Gratzinger:** None. **B. Tan:** None. **A. Trickey:** None. **M. Sever:** None. **M. Brown:** None. **D. Bernstein:** None. **C.O. Esquivel:** None.

Abstract# 116

Clinical and Molecular Profiling Can Help in Predicting the Response to Alemtuzumab Treatment in Kidney Transplant Recipients with Severe or Glucocorticoid-Resistant Acute Rejection

D. M. Peelen[1], M. van der Zwan[1], M. C. Clahsen-van Groningen[2], D. A. Mustafa[2], C. C. Baan[1], D. A. Hesselink[1], *[1]Internal Medicine - Nephrology & Transplantation, Erasmus MC, Rotterdam, Netherlands, [2]Pathology, Erasmus MC, Rotterdam, Netherlands*

Purpose: Alemtuzumab is an effective drug for the treatment of severe or glucocorticoid-resistant acute kidney allograft rejection (AR), but can also cause severe adverse events. There is a clinical need for superior treatment stratification to assess which patients will respond to alemtuzumab treatment. This study aimed to find clinical variables and gene expression profiles related to alemtuzumab treatment response in AR.

Methods: One hundred and thirteen patients from the Erasmus MC, that were treated with alemtuzumab for severe or glucocorticoid-resistant AR in January 2012 until January 2018 were included in this retrospective study. Clinical characteristics were retrieved from electronic health records. mRNA was isolated from formalin-fixed paraffin-embedded tissues of diagnostic kidney transplant biopsies and used for targeted gene expression profiling using the Banff-Human Organ Transplant panel of NanoString®. Response to alemtuzumab treatment was defined as allograft survival plus an estimated glomerular filtration rate (eGFR) above 30 mL/min/1.73 m^2 at 1 year after alemtuzumab therapy. The advanced analysis module of nSolver software and SPSS statistics were used to analyze the data.

Results: For clinical variable analysis, data of 101 patients (50 responders and 51 non-responders) was available and for gene expression analysis mRNA samples of 58 patients (29 responders and 29 non-responders) were available. Multivariate analysis identified three clinical factors that were associated with a good response to treatment: early timing of AR (<3 months after transplantation: 64% of responders and 41% of non-responders, p=0.002), a low delta eGFR between baseline eGFR and eGFR at the moment of AR (<25%/25-50%/>50%: responders:18/15/4 and non-responders: 11/11/15, p=0.01), and glucocorticoid maintenance therapy at the time of AR (90% of responders and 65% of non-responders, p=0.002). In addition, gene expression analysis revealed that genes involved in the B-cell receptor signaling pathway were related to inferior response to therapy.

Conclusions: Alemtuzumab treatment appears to be most effective in patients with severe or refractory AR in whom the diagnosis is made less than three months after transplantation, kidney function loss is limited and those who are on glucocorticoid maintenance therapy. Moreover, patients with high expression of B-cell receptor signaling genes are less likely to respond to alemtuzumab therapy. These findings can add to the development of superior stratification of patients who will benefit from alemtuzumab treatment.

CITATION INFORMATION: Peelen D., van der Zwan M., Clahsen-van Groningen M., Mustafa D., Baan C., Hesselink D. Clinical and Molecular Profiling Can Help in Predicting the Response to Alemtuzumab Treatment in Kidney Transplant Recipients with Severe or Glucocorticoid-Resistant Acute Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.M. Peelen: None. **M. van der Zwan:** None. **M.C. Clahsen-van Groningen:** None. **D.A. Mustafa:** None. **C.C. Baan:** None. **D.A. Hesselink:** None.

Abstract# 117

Identification of Distinct Blood Monocyte Phenotypes from Transplant Kidney Recipients Undergoing Cellular (TCMR) and Mixed Antibody Mediated Rejection (ABMR)

C. Macedo, E. Bailly, K. Louis, M. Lucas, A. Zeevi, P. Randhawa, D. Metes, *Starzl Transplantation Institute, Pittsburgh, PA*

Purpose: Monocytes play an important role in immune defense by initiating adaptive immunity. They are heterogeneous, plastic, and present different subsets: classical ($CD14^{++}CD16^{-}$), intermediate ($CD14^{+}CD16^{+}$), and non-classical ($CD14^{dim}CD16^{++}$). While recent clinical studies have demonstrated a critical role for monocytes and macrophages to allo-immunity, a comprehensive phenotypic analysis of circulating blood monocyte subsets during rejection is still lacking. Here, we hypothesize that monocytes with distinct inflammatory programs may differently contribute to TCMR or mixed-ABMR after kidney transplantation (KTx).

Methods: Peripheral blood samples from 48 KTx were analyzed using 22 multi-color panel flow cytometry. Patients were classified as: Stable (without donor-specific antibodies (DSA), TCMR and/or ABMR before or at time of sample); TCMR (without DSA, at the time of a for cause biopsy Banff ≥1A); and mixed-ABMR (with DSA , at the time of a biopsy-proven mixed-ABMR). All samples were downsized to same number of monocytes and concatenated for unsupervised analysis by viSNE and FlowSOM, enabling visualization of high dimensional single-cell data. In addition, we performed scRNA-sequencing on bead-sorted monocytes from selected patients (n=3 from each group).

Results: Our results reveal significant phenotypic heterogeneity of blood circulating monocytes among the 3 groups. Specifically, TCMR patients displayed one unique classical $CD14^{++}CD16^{-}$ cluster that expressed low checkpoint inhibitory receptors (PD1/PDL-1), intermediate levels of CD11b (adhesion), CCR2 (migration), HLA-DR (antigen presentation) and of the scavenger receptor CD36. Conversely, monocytes from patients undergoing mixed-ABMR comprised of two activated, unique intermediate $CD14^{+}CD16^{+}$ cell clusters that expressed high CD32, CD86 (both activation markers) and CCR5 (chemokine receptor), but that differed in CX3CR1 (migration) and CD163 (scavenger) expression. None of these clusters were present in stable patients. Moreover, we identified 43 differentially expressed protein coding genes between TCMR and mixed-ABMR patients' circulating monocytes, including genes related to apoptosis modulation and signaling, Toll-like receptor signaling pathways, and IL1R associated kinases genes.

Conclusions: In conclusion, our data suggest that different monocyte subsets may contribute TCMR vs mixed-ABMR, suggesting the potential need for distinct therapeutic targeting of monocytes during cellular vs humoral rejection.

CITATION INFORMATION: Macedo C., Bailly E., Louis K., Lucas M., Zeevi A., Randhawa P., Metes D. Identification of Distinct Blood Monocyte Phenotypes from Transplant Kidney Recipients Undergoing Cellular (TCMR) and Mixed Antibody Mediated Rejection (ABMR) *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Macedo: None. **E. Bailly:** None. **K. Louis:** None. **M. Lucas:** None. **A. Zeevi:** None. **P. Randhawa:** None. **D. Metes:** None.

Abstract# 118

Validation of a Novel Gene Expression Biomarker of Rejection Following Liver Transplantation

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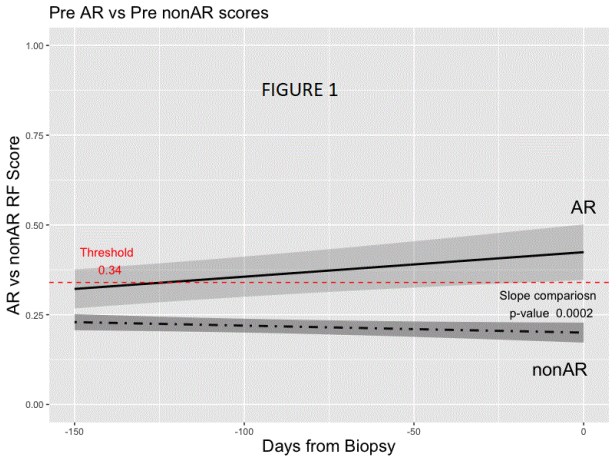
Purpose: Non-invasive biomarkers distinguishing early signs of immune activation vs. quiescence could more objectively guide immunosuppression management after liver transplantation (LT). Our aim was to validate blood-based gene expression profiles that can serially detect immune activation prior to acute rejection (AR) distinct from immune quiescence (non-AR).

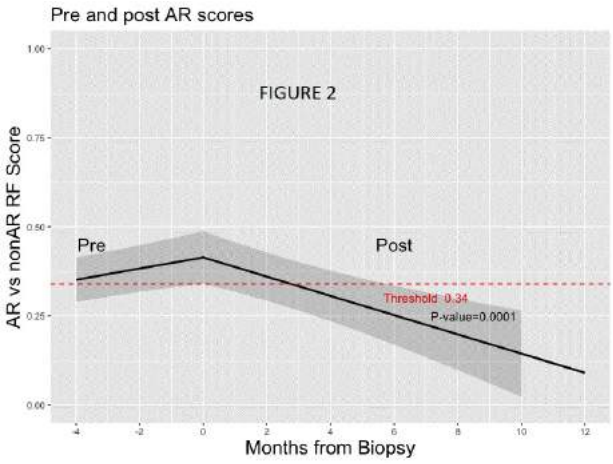
Methods: Gene expression results in LT recipients with AR vs. non-AR (combination of other causes of graft dysfunction and normal graft function) were analyzed from two published cohorts (Northwestern University (NU); multicenter NIAID CTOT-14). A 70:30 approach (61 AR; 162 non-AR) was used for discovery and validation. Serial sample results before AR and non-AR were available in the CTOT-14 study (all <1 year post-LT). Microarray data was normalized utilizing a liver-specific fRMA vector. Variable selection was done using a specific variance (0.5), expression (8.0) and bootstrap (0.3) threshold.

Results: Random forest modeling was used to generate a classifier on the discovery set distinguishing AR vs. non-AR (AUC 0.83; accuracy of 0.78, sensitivity 0.70, specificity 0.81, PPV 0.54, NPV 0.89; F-score .61). The final 59 probe model and locked probability threshold performed well on the validation set (accuracy of 0.72, sensitivity 0.67, specificity 0.73, PPV 0.48, NPV 0.86; F-score 0.56). The probability

score line slopes were positive preceding AR and negative preceding non-AR and following AR treatment (all p<0.001; Figs. 1 & 2) in CTOT-14; the threshold was crossed at ~120 days prior to AR. Among the top 36 pathways that were significant using IPA (p <0.01) for the 59 probes, >40% were within immune response pathways, including allograft rejection.

Conclusions: We have developed a blood-based biologically relevant genomic biomarker diagnostic for AR that can be detected prior to AR-associated graft injury and distinct from non-AR. Prospective interventional trials are needed to evaluate its utility in precision-guided immunosuppression following LT.





CITATION INFORMATION: Levitsky J., Kandpal M., Whisenant T., Guo K., Kurian S., Abecassis M. Validation of a Novel Gene Expression Biomarker of Rejection Following Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Levitsky: Consulting Fee; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc., Mallinckrodt. Consulting Fee; Nature of Relationship; Consulting Fee. Grant/Research Support; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc., Novartis. Grant/Research Support; Nature of Relationship; Research Support. Honoraria; Name of Commercial Interest; Gilead. Honoraria; Nature of Relationship; Speaker's Bureau. **M. Kandpal:** None. **T. Whisenant:** Consulting Fee; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc.. Consulting Fee; Nature of Relationship; Consulting. **K. Guo:** None. **S. Kurian:** Consulting Fee; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc. Consulting Fee; Nature of Relationship; consulting. **M. Abecassis:** Consulting Fee; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc. Consulting Fee; Nature of Relationship; Consulting. Royalty; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc.

COVID-19 Session 2

Abstract# 119

COVID-19 Potential Donor Derived Transmission Events Investigations: Early DTAC Experience

R. La Hoz, A. Agarwal, S. Aslam, K. Dunn, J. Goldman, D. Levine, C. Marboe, G. F. Marklin, S. M. Pouch, M. Rana, R. Razonable, H. L. Stevenson, H. Te, A. E. Woolley, M. Michaels, L. Danziger-Isakov, *OPTN DTAC, Richmond, VA*

Purpose: US Solid organ transplantation rates significantly decreased during the initial wave of the COVID-19 pandemic. The concern for potential donor derived COVID-19 was one of many contributing factors. We describe the early experience of the Organ Procurement and Transplantation Network (OPTN) Disease Transmission Advisory Committee (DTAC) Coronavirus disease 2019 (COVID-19) investigations.

Methods: COVID-19 cases reported to DTAC between January 2020 and October 2020 as potential donor-derived transmission events (PPDTE) were included. All of the events were investigated by the Centers for Disease Control and Prevention and adjudicated by the DTAC based on consensus definitions.

Results: Eighteen PDTE COVID-19 events were reported during the study period. 12 PDTE reports have completed DTAC adjudication (Table 1). These included 12 donors with 44 recipients. Ten investigations were initiated by the transplant center due to recipient testing (36 total recipients). The median time to presentation in these index cases was 11 days (IQR 7-16). Nine donors in these events (35 recipients) had a prospective or retrospective pre-recovery negative SARS-CoV-2 PCR result. In all of these events, the index recipient had either a possible or confirmed community or hospital exposure. In one recipient index case (5 total recipients), the positive SARS-CoV-2 PCR result post-transplant was ultimately deemed a false positive and considered not a case by the committee. Two investigations were initiated by an OPO (8 recipients). In both events, the OPO performed SARS-CoV-2 PCR was negative, but a post-procurement nasopharyngeal SARS-CoV-2 PCR performed by the tissue collector was reported as positive and retrospectively deemed false positives. None of these recipients developed COVID-19; the events were adjudicated as not cases.

Conclusions: The initial DTAC experience reflecting the early pandemic era emphasizes the need to implement hospital prevention measures to avoid nosocomial transmission, provide patient education to avoid community exposure and to recognize the possibility of post-procurement SARS-CoV-2 false positive testing. Vigilance for the possibility of a SARS-CoV-2 donor derived event remains important as the pandemic continues.

Summary of 12 Potential Donor Derived Transmission events investigated by DTAC between January 2020

Initial Report	Donors	Recipients	Proven/ Probable	Possible	Unlikely	Excluded	Not a case
Recipient	10	36	0	3	6	18	9
Donor	2	8	0	0	0	0	8

CITATION INFORMATION: La Hoz R., Agarwal A., Aslam S., Dunn K., Goldman J., Levine D., Marboe C., Marklin G., Pouch S., Rana M., Razonable R., Stevenson H., Te H., Woolley A., Michaels M., Danziger-Isakov L. COVID-19 Potential Donor Derived Transmission Events Investigations: Early DTAC Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. La Hoz: None. **A. Agarwal:** None. **S. Aslam:** None. **K. Dunn:** None. **J. Goldman:** None. **D. Levine:** None. **C. Marboe:** None. **G.F. Marklin:** None. **S.M. Pouch:** None. **M. Rana:** None. **R. Razonable:** None. **H.L. Stevenson:** None. **H. Te:** None. **A.E. Woolley:** None. **M. Michaels:** None. **L. Danziger-Isakov:** None.

Abstract# 120

The Impact of Covid-19 Pandemic on Living Donor Liver and Renal Transplantations in Japan: A Nationwide Survey

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Purpose: COVID-19 brought a huge impact on the field of organ transplantation. On 6th March, the Japan Society for Transplantation (JST) COVID-19 task force published an initial statement recommending the temporal suspension of non-life-threatening living donor transplant program. Until the revised statement documenting a stepwise reopening of transplant activity was released on 29th May, many transplant

centers suspended the living donor transplant program accordingly. We aimed to investigate the actual impact of COVID-19 pandemic on living donor liver and renal transplant programs and the efficacy of safety measures to sustain transplant activities.
Methods: On behalf of the JST, we performed an internet-based survey toward living donor liver and renal transplant centers nationwide in the study period (January ~ September). The survey was disseminated via e-mail to 165 living donor transplant programs including 32 livers and 133 kidneys. Centers performing both liver and renal transplants were requested to reply respective organs. This survey was funded by the Japanese government (Health and Labor Sciences Special Research Grants).
Results: The replies were collected from a total of 155 programs including 31 livers (97% response) and 124 kidneys (93% response). Ninety-three percent of centers followed the statement of JST. A total of 1262 living donor transplantations (229 livers, 1033 kidneys) were performed in the study period. The monthly numbers of liver transplantations did not drop, while kidney dropped 55% from the average during March through June. Preoperative safety measures were taken as follows (% indicates "yes"): SARS-CoV2 screening recipients "89%"/donors "88%", Chest CT recipients "69%"/donors "58%", and Self-quarantine (7-28 days) recipients "75%"/donors "65%". Ninety-five centers performed RT-PCR test for screening and samples were taken through nasopharyngeal, saliva, and nasal in 59%, 30%, and 23%, respectively. Mortality and morbidity of the waitlist patients were reported in 6.5% centers. Postoperative adverse events related to pandemic were occurred in 2.6% centers. Thirty-nine percent of outpatient visits were postponed, and 25% of centers set up tele-medicine accordingly.
Conclusions: Most of the living donor renal transplant programs were forced to experience temporal suspension while liver was not. A certain number of waitlist and postoperative patients were affected by COVID-19 pandemic. Standardized safety measures are required to keep the living donor transplant activities in this COVID-19 era.
CITATION INFORMATION: Yamanaga S., Hibi T., Osawa R., Yuzawa K., Egawa H., Kuramitsu K. The Impact of Covid-19 Pandemic on Living Donor Liver and Renal Transplantations in Japan: A Nationwide Survey *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Yamanaga: None. **T. Hibi:** None. **R. Osawa:** None. **K. Yuzawa:** None. **H. Egawa:** None. **K. Kuramitsu:** None.

Abstract# 121

T-Cell Responses in Solid Organ Transplant Recipients with SARS-CoV-2 Infection

V. H. Ferreira, T. M. Marinelli, T. Ku, M. Ierullo, B. Majchrzak-Kita, I. Bahinskaya, N. Pinzon, A. Humar, D. Kumar, *University Health Network, Toronto, ON, Canada*

Purpose: Preliminary data suggest solid organ transplant (SOT) recipients may be at high-risk for developing severe COVID-19. This may be due in part to alterations in T-cell physiology owing to use of immunosuppressive agents to prevent rejection. In this study we evaluated convalescent T-cell responses against SARS-CoV-2 in SOT recipients who had COVID-19.
Methods: Peripheral blood mononuclear cells (PBMC) were isolated from peripheral blood of 20 SOT recipients and 15 non-transplant controls (NTCs), all of whom had COVID >=14 days prior (convalescent samples). A total of 10^6 PBMCs were stimulated for 16 hours with megapools of overlapping 15mer peptides corresponding to the spike (S), nucleoprotein (NP) or membrane (Mb) protein of SARS-CoV-2 (each peptide at 5 μg/mL). After incubation, flow cytometry was performed for intracellular cytokines (IFN-γ, TNF-α, IL-2) and cell-surface T-cell exhaustion markers (CTLA4, PD-1, TIM-3). Total and SARS-CoV-2 antigen-specific CD4+ and CD8+ T-cells were identified. Polyfunctional T-cells were defined as those expressing ≥ 2 of the cytokines investigated.
Results: The median age among SOT recipients was 54 years (range 24-86). The majority (15/20) were male, and kidney (12/20) transplant recipients. The majority (60.0%) of SOT recipients were hospitalized with COVID-19; three (15.0%) required ICU admission and mechanical ventilation. SOT recipients had significantly lower total CD4+ T-cells (51.6% vs. 62.2%, p=0.002) but significantly higher proportions of total CD8+ T-cells relative to NTCs (41.9% vs. 31.2% of live CD3+ cells, p=0.0016). SOT recipients also had significantly higher proportions of PD-1 on total CD4 (15.2% vs. 3.7%, p<0.0001) and CD8 T-cells (9.4% vs. 4.1% of live CD3+ cells, p=0.014). The majority of SOT recipients and NTCs generated S, NP and Mb specific CD4 and CD8 T-cells. More specifically, compared to NTCs, SOT recipients had increased proportions of IFN-γ, or IL-2 producing CD4+ T-cells, as well as polyfunctional CD4+ T-cells reactive to S peptides. SOT recipients also had increased proportions of IFN-γ, IL-2 or TNF-α producing CD4+ T-cells, and CD4+ polyfunctional T-cells reactive to NP peptides. NTCs were also characterized by lower proportions of IL-2 producing CD8+ T-cells reactive to S peptides. Hospitalization of SOT recipients (severe illness) was associated with higher proportions of total PD-1+ CD4 T-cells (22.2% vs 13.3% of CD4 T-cells, p=0.02) and low frequencies of CD8+ polyfunctional T-cells reactive to NP peptides (5.80 vs. 49.9 per 10^6 polyfunctional CD8 T-cells, p=0.014).
Conclusions: Despite immune suppression, SOT recipients mount SARS-CoV-2 reactive T-cells at magnitudes often exceeding non-transplant controls. However, perturbations in global T-cell proportions, and increased expression of T-cell exhaustion markers, such as PD-1, may compromise the SARS-CoV-2-specific immune response.
CITATION INFORMATION: Ferreira V., Marinelli T., Ku T., Ierullo M., Majchrzak-Kita B., Bahinskaya I., Pinzon N., Humar A., Kumar D. T-Cell Responses in Solid Organ Transplant Recipients with SARS-CoV-2 Infection *AJT, Volume 21 Supplement 3*
DISCLOSURES: V.H. Ferreira: None. **T.M. Marinelli:** None. **T. Ku:** None. **M. Ierullo:** None. **B. Majchrzak-Kita:** None. **I. Bahinskaya:** None. **N. Pinzon:** None. **A. Humar:** None. **D. Kumar:** Consulting Fee; Name of Commercial Interest; Roche. Consulting Fee; Nature of Relationship; Advisory Board.

Abstract# 122

Mortality, Risk Factors, and Treatment of Covid-19 Infection in Solid Organ Transplants: A Systematic Review and Meta-analysis

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Purpose: Outcomes for solid organ transplants (SOT) with COVID-19 have not been summarized, and prognostic factors for COVID-19 in SOT patients are not well established yet.
Methods: We searched PubMed, EMBASE, and Cochrane library up to November 10, 2020, to identify reports of SOT patients and COVID-19. This study was performed to estimate the risk of death and other important outcomes. Further, we also evaluated the risk factors associated with mortality and severe COVID-19 infection in SOT patients. Pooled prevalence, odds ratios (OR), and 95% confidence intervals (CI) were calculated using a random-effects model.
Results: Fifty-nine studies involving 7071 SOT patients were included. 22% of SOT patients with COVID-19 were dead (20%-25%), 48% had acute kidney injury, 39% developed severe infection, 28% needed intensive care unit (ICU) admission, 35% had acute respiratory distress syndrome, and 23% needed invasive ventilation. Univariate analysis revealed that advanced age (OR=3.01, OR=2.97), obesity (OR=1.44, OR=2.05) and diabetes (OR=2.00, OR=1.73) were associated with severe infection and mortality. Laboratory abnormalities at admission including higher C reaction protein, D-Dimer, lactate dehydrogenase, procalcitonin, and lower lymphocyte also increased the risk of death. Initial MMF use (OR=1.61) contributed to severe infection, and tacrolimus (OR=1.70) led to more deaths. Further, calcinurin inhibitors withdrawal (OR=2.62), high dose steroids (OR=2.46), Tocilizumab (OR=1.75), ICU admission (OR=5.00), and invasive ventilation (OR=7.56) were associated with mortality.
Conclusions: Our study demonstrated that SOT patients with COVID-19 had a high mortality and risk factors identification may contribute to patients stratification and management.
CITATION INFORMATION: Yin S., Song T., Zhong Q., Lin T. Mortality, Risk Factors, and Treatment of Covid-19 Infection in Solid Organ Transplants: A Systematic Review and Meta-analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Yin: None. **T. Song:** None. **Q. Zhong:** None. **T. Lin:** None.

Abstract# 123

Propensity Matched Analysis of Death and Non-favorable Discharge Among Hospitalized Transplant Recipients with COVID-19

J. T. Swan[1], E. Rizk[2], S. L. Jones[1], N. Nwana[1], J. C. Nicolas[1], A. Tran[1], T. Nisar[1], T. Menser[1], S. G. Yi[2], L. W. Moore[1], A. O. Gaber[2], R. J. Knight[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX*

Purpose: This study compared death and non-favorable discharge following a hospital admission for Coronavirus Disease 2019 (COVID-19) management for patients with a history of solid organ transplant (SOT) vs without (control).
Methods: All non-pregnant adults who tested positive with symptomatic or asymptomatic COVID-19 and were admitted at a multihospital health-system from March 17, 2020 through August 24, 2020 were eligible for the study. Patients were excluded if their first positive COVID-19 test occurred >7 days before admission (potentially resolved) or >7 days after admission (potentially nosocomial). Patients not taking immunosuppression immediately prior to COVID-19 diagnosis were excluded from the SOT group. Outcomes included death at 60 days after admission and non-favorable discharge (death or hospice). To adjust for confounding due to differences in baseline demographics, a propensity score was calculated using age, sex, race, body mass index, hypertension, diabetes mellitus, chronic kidney disease, underlying liver disease, month of hospital admission, and area deprivation index (a surrogate for socioeconomic status). The matched cohort was generated using 1:1 nearest neighbor matching without replacement. Outcomes were analyzed using logistic regression that accounted for matching.
Results: Among 4,562 included patients (108 SOT recipients and 4,454 controls), 60-day death occurred in 17% SOT vs 10% control (P=0.033) and non-favorable discharge in 18% SOT vs 9% control (P=0.004). Among 214 matched patients (107 SOT recipients, 107 controls), 60-day death occurred in 17% SOT vs 9% control (OR=2.0, 95%CI=0.9 to 4.4, P=0.106) and non-favorable discharge in 18% SOT vs 9% control (OR=2.1, 95%CI=1.0 to 4.6, P=0.063). As expected, propensity matching reduced confounding due to differences in baseline characteristics (Table 1). Transplanted organs included kidney (*n*=64), liver (*n*=13), lung (*n*=12), history of >1 organ (*n*=13), and heart (*n*=5).

Conclusions: Recipients of SOT had a greater risk of 60-day death and non-favorable discharge among hospitalized patients with COVID-19 using unadjusted analysis. Preliminary data from the propensity matched analysis reported similar magnitudes of association but did not find statistical significance. A larger study may be needed to clarify whether immune-suppressed SOT recipients have greater risk of death or non-favorable discharge from COVID-19.

Balance of selected covariates before and after matching				
	SOT before matching (*n*=108)	**Controls before matching (*n*=4,454)**	**SOT after matching (*n*=107)**	**Controls after matching (*n*=107)**
Age, mean ± SD	56 ± 13	59 ± 17	56 ± 13	56 ± 17
Male gender, *n* (%)	61 (56%)	2,286 (51%)	61 (57%)	62 (58%)
BMI, mean ± SD	29 ± 6	32 ± 8	29 ± 6	30 ± 8
Chronic kidney disease, *n* (%)	68 (63%)	992 (22%)	67 (63%)	70 (65%)
Underlying liver disease, *n* (%)	5 (5%)	283 (6%)	5 (5%)	8 (7%)
Hypertension, *n* (%)	87 (81%)	2,827 (63%)	86 (80%)	89 (83%)
Diabetes mellitus, *n* (%)	85 (79%)	2,097 (47%)	84 (79%)	85 (79%)

CITATION INFORMATION: Swan J., Rizk E., Jones S., Nwana N., Nicolas J., Tran A., Nisar T., Menser T., Yi S., Moore L., Gaber A., Knight R. Propensity Matched Analysis of Death and Non-favorable Discharge Among Hospitalized Transplant Recipients with COVID-19 *AJT, Volume 21 Supplement 3*

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Abstract# 124

Covid-19 Related Deaths Across the U.S. in Kidney Transplant Recipients

K. Goli, N. T. Galvan, R. Cotton, J. A. Goss, C. A. O'Mahony, A. Rana, *Department of Abdominal Transplantation, Baylor College of Medicine, Houston, TX*

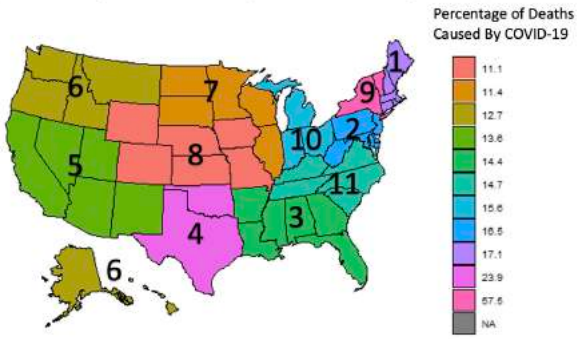
Purpose: The COVID-19 pandemic poses a unique challenge for immunosuppression patients following kidney transplantation. Studies involving a single center or few centers have suggested that kidney transplant recipients generally have multiple other co-morbidities, such as diabetes and obesity, and are at high risk of developing the COVID-19 disease and mortality. This study aims to evaluate the nationwide impact of COVID-19 on mortalities in kidney transplant recipients.

Methods: The UNOS database was queried for kidney transplant recipient deaths in the year 2020, where cause of death was known or specified. The final sample consisted of 1804 patients who died this year. Percentages of deaths caused by COVID-19 in the kidney transplant population were graphed by month from January to September and mapped by UNOS region. Risk factors associated with deaths caused by COVID-19 that were found to be significant in a univariate logistic regression analysis were then entered into a multivariate logistic regression analysis to determine odds ratios (OR). Statistical significance was determined at α=0.05. STATA Version 13.0 and R were used for this analysis.

Results: After adjusting for over 30 covariates, UNOS region 9 was associated with significantly increased risk (O.R: 5.93 [4.23 - 8.29]) for deaths in kidney transplant recipients caused by COVID-19. The distribution of percentages of deaths caused by COVID-19 across the 11 UNOS regions is shown in Figure 1. A BMI ≥ 30 (O.R: 1.70 [1.24 - 2.33]), African American ethnicity (O.R: 2.92 [2.15 - 3.97]), Hispanic ethnicity (O.R: 3.65 [2.55 - 5.23]), and functional status of 90% at follow-up (O.R: 2.21 [1.07 - 4.58]) were associated with increased risk for death caused by COVID-19 in a kidney transplant recipient. Age ≥ 65yrs (O.R: 0.59 [0.44 - 0.79]) was associated with decreased risk for death caused by COVID-19 in a kidney transplant recipient.

Conclusions: These results are consistent with the accelerated increase health disparities caused by COVID-19. Obese patients who had a kidney transplant tend to be at a higher risk because of multiple co-morbidities. Additionally, patients who have a higher functional status and are thus more active may be more likely to get exposed to COVID-19 while on immunosuppression. In contrast, the elderly who are under immunosuppression may be more likely to remain at home and limit exposure to COVID-19.

Figure 1: Percentages of deaths caused by COVID-19 distributed by UNOS region



CITATION INFORMATION: Goli K., Galvan N., Cotton R., Goss J., O'Mahony C., Rana A. Covid-19 Related Deaths Across the U.S. in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Goli: None. **N.T. Galvan:** None. **R. Cotton:** None. **J.A. Goss:** None. **C.A. O'Mahony:** None. **A. Rana:** None.

Abstract# 125

Impact of COVID-19 on Solid Organ Transplantation

E. Sampson[1], S. Hall[2], K. Robichaux[3], A. Kumar[2], N. Kemmer[4], J. Buggs[5], *[1]Lake Erie College of Osteopathic Medicine, Tampa, FL, [2]Morsani College of Medicine, University of South Florida, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Hepatology, Tampa General Hospital, Tampa, FL, [5]Transplant Surgery, Tampa General Hospital, Tampa, FL*

Purpose: Patterns of racial disparities have been identified throughout the history of American medicine. In December 2019, COVID-19 was first detected and has had a significant impact at a global level. Evidence suggests that racial and ethnic minorities bear a disproportionate COVID-19 burden. Since the onset of the pandemic, there has been a decrease in the number of solid organ transplants (SOT) performed. The main objective of this study was to evaluate the impact of COVID-19 on the field of solid organ transplantation.

Methods: We conducted a retrospective cohort study on consecutive solid organ transplants performed in the U.S. before and after the onset of the COVID-19 pandemic from January 2019 through June 2020. We utilized national data from the United Network for Organ Sharing (UNOS) and the Organ Procurement Transplantation Network (OPTN). Deidentified data were analyzed on patients who underwent either kidney, liver, heart, lung, or combined heart and lung transplants. The number of transplants based on UNOS regions, age, gender, and ethnicity were analyzed.

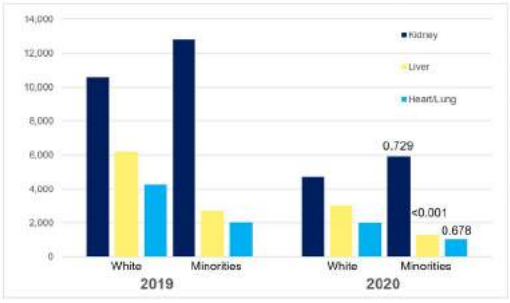
Results: Our data demonstrated significant declines in liver transplants among ethnic minorities compared to the white population ($p<0.001$). In patients under 18, liver transplants were significantly reduced ($p<0.001$), while liver and heart/lung transplants were most impacted in the 18-49 age group ($p<0.001$). When comparing the number of SOTs by UNOS region, a significant decrease in kidney transplants was observed across regions 1, 7, 8, 9, and 10 ($p<0.001$). Additionally, liver transplants were markedly decreased in region 5 ($p<0.001$), as well as regions 4 and 7 ($p<0.05$). Finally, regions 2 and 9 demonstrated a statistically significant drop in heart/lung transplants ($p<0.05$).

Conclusions: Amid the pandemic, organ transplantation has been deemed a medical emergency and yet there has been a significant decline in the number of transplants across UNOS regions, age groups, genders, organ types, and ethnicities. Despite the unique challenges brought about by COVID-19, physicians have managed to continue to carry out lifesaving transplant procedures.

Figure 1.

Solid organ transplants before and after COVID 19

By race and organ (Jan – June 2019 and 2020)



CITATION INFORMATION: Sampson E., Hall S., Robichaux K., Kumar A., Kemmer N., Buggs J. Impact of COVID-19 on Solid Organ Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Sampson: None. **S. Hall:** None. **K. Robichaux:** None. **A. Kumar:** None. **N. Kemmer:** None. **J. Buggs:** None.

Abstract# 126

Covid-19 in Solid Organ Transplantation (SOT): Results of the National Covid Cohort Collaborative (N3C)

G. Agarwal[1], A. Vinson[2], R. Dai[3], E. French[4], S. Lee[5], A. Olex[4], A. Anzalone[6], V. Madhira[7], R. B. Mannon[8], *[1]Medicine, University of Alabama at Birmingham, Birmingham, AL, [2]Medicine/Nephrology, Nova Scotia Health Authority, Halifax, NS, Canada, [3]Biostatistics, University of Nebraska Medical Center, Omaha, NE, [4]Wright Center for Clinical and Translational Research, VIrginia Commonwealth University, Richmond, VA, [5]Medicine/Infectious Disease, University of Saskatchewan, Saskatoon, SK, Canada, [6]Neurology, University of Nebraska Medical Center, Omaha, NE, [7]Palia Software, Not sure, OR, [8]Medicine/Nephrology, University of Nebraska Medical Center, Omaha, NE*

Purpose: SARS-CoV-2 infection has resulted in significant mortality in solid organ transplant (SOT) recipients based on reports from single centers or voluntary registries. The N3C Enclave was developed to facilitate analysis of patient-level data across the US for multiple conditions, consisting of weekly electronic medical record (EMR) data extraction and transmission into a federally secured platform. Herein is our report of the largest cohort of US COVID-19 positive SOT patients to date.

Methods: We identified a cohort of SOT recipients who received a positive or negative COVID-19 test (COVID$^+$ and COVID$^-$, respectively) between 01/01/2020 and 11/23/2020. In COVID$^+$ SOT, we evaluated outcomes including requirement for hospitalization, major adverse cardiac events (MACE), and graft rejection and failure occurring until study end. Significant differences between COVID$^+$ and COVID$^-$ patients were identified using t-test and chi-square testing, as indicated.

Results: 34 sites account for 2.15 million patients in the Enclave, of whom 292,226 are COVID$^+$. We identified 19,031 SOT patients, of whom 2,183 were COVID$^+$ (11.5%) with a median follow-up time of 119 days. Demographics are shown in Figure 1. Compared to COVID$^-$ SOT patients, COVID$^+$ SOT patients were more likely to have a kidney transplant and be non-white or Hispanic. Hypertension, diabetes, coronary artery disease and chronic kidney disease were common comorbidities in all SOT, but significantly more common in those who were COVID$^+$. Of COVID$^+$ SOT, 51.8% required hospital admission for a median of 1 days (range 0-114). Following COVID diagnosis, 13.7% of COVID$^+$ SOT patients experienced MACE, 3.8% had graft rejection and 3.4% had graft loss over the study period.

Conclusions: In the largest US cohort of COVID$^+$ SOT recipients to date, we identify patient factors associated with the diagnosis of COVID-19 and outcomes following infection including a relatively high incidence of MACE. This is an evolving dataset and provides novel opportunities for analyses of COVID in SOT recipients on a granular level.

Variable	*All SOT in N3C N=19031*	*SOT COVID POS N=2183*	*SOT COVID NEG N=16848*	*P-value*
Age (IQR)	58 (0-88)	56 (1-87)	58 (0-88)	0.025
Male Sex (N, %)	11197 (58.8)	1311 (60.1)	9886 (58.7)	0.217
White Race (N, %)	12033 (63.2)	1032 (47.3)	11001 (65.3)	< 0.0001
Hispanic or Latino Ethnicity (N, %)	2123 (11.2)	377 (17.3)	1746 (10.4)	< 0.0001
Transplant Type (N, %)				
Heart	2520 (13.2)	264 (12.1)	2256 (13.4)	0.082
Lung	2524 (13.3)	162 (7.4)	2362 (14)	< 0.0001
Liver	4670 (24.5)	401 (18.4)	4269 (25.3)	< 0.0001
Kidney	11233 (59)	1568 (71.8)	9665 (57.4)	< 0.0001
Multi-organ	1891 (9.9)	204 (9.3)	1687 (10)	0.315
Comorbidity (N, %)				
Hypertension	15562 (81.8)	1892 (86.7)	13670 (81.1)	<0.001
Diabetes	11353 (59.7)	1407 (64.5)	9946 (59)	<0.001
COPD/Asthma	1953 (10.3)	248 (11.4)	1705 (10.1)	0.078
Cancer	4469 (23.5)	544 (24.9)	3925 (23.3)	0.098
Coronary Artery Disease	12950 (68)	1555 (71.2)	11395 (67.6)	0.001
Congestive Heart Failure	6024 (31.7)	707 (32.4)	5317 (31.6)	0.448
Chronic Kidney Disease	13487 (70.9)	1665 (76.3)	11822 (70.2)	<0.001
Peripheral Vascular Disease	4530 (23.8)	622 (28.5)	3908 (23.2)	<0.001

CITATION INFORMATION: Agarwal G., Vinson A., Dai R., French E., Lee S., Olex A., Anzalone A., Madhira V., Mannon R. Covid-19 in Solid Organ Transplantation (SOT): Results of the National Covid Cohort Collaborative (N3C) *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Agarwal: Grant/Research Support; Name of Commercial Interest; Vitaerris, Mallinckrodt. **A. Vinson:** Consulting Fee; Name of Commercial Interest; Palladin Labs. **R. Dai:** None. **E. French:** None. **S. Lee:** None. **A. Olex:** None. **A. Anzalone:** None. **V. Madhira:** None. **R.B. Mannon:** Grant/Research Support; Name of Commercial Interest; Transplant Genomics. Honoraria; Name of Commercial Interest; Vitaerris. Honoraria; Nature of Relationship; Member, IMAGINE Steering Committee.

Kidney

Kidney Deceased Donor Selection

Abstract# 127

Findings from the Bareto Study: Associations Between Chronic Vascular Changes and 10-year Transplant Graft Outcomes

L. Kamal[1], D. Stewart[2], J. Foutz[2], H. McGehee[2], P. Saravanane[1], S. Yu[1], R. Yusfi[1], G. Gupta[1], *[1]Virginia Commonwealth University, Richmond, VA, [2]UNOS, Richmond, VA*

Purpose: As part of a broader study on Biopsy, Anatomy, and Resistance Effects on Transplant Outcomes (BARETO), we aim to characterize the poorly understood relationship between vascular changes and long-term kidney graft survival to help inform decision making.

Methods: DonorNet anatomy attachments were manually entered into electronic format for a preliminary cohort of 3,697 solitary, biopsied, ECD kidney transplants from 2008-2011. Chronic vascular changes (arteriosclerosis) were characterized as absent/minimal, mild (1-25%), or mild-moderate (26-50%)/severe(>50%). Analyses include Kaplan-Meier all-cause graft survival and 3 types of Cox models (propensity weighted, multivariable regression, and doubly robust regression (DRR)) to adjust for 19 possible confounders.

Results: Unadjusted, 10-year graft survival was slightly worse with more severe vascular changes (p=0.016, Fig 1). However, risk adjustment suggests these observed differences may be attributable to correlations with other factors, in particular glomerulosclerosis, interstitial fibrosis, CIT, and KDPI. Nominally, the graft failure hazard ratio for mild-moderate+ vs. absent/minimal was 1.19 (1.02, 1.37) but was attenuated to 1.12 (0.91, 1.34) in DRR (Fig 2).

Conclusions: Early results suggest renal vascular changes have little or no independent effect on post-transplant outcomes in a causal inference adjusting for confounding factors.

Fig 1. Ten-Year All-Cause Graft Survival by Degree of Vascular Changes

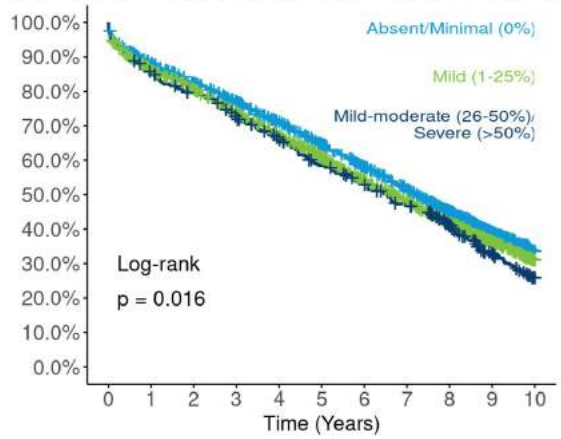
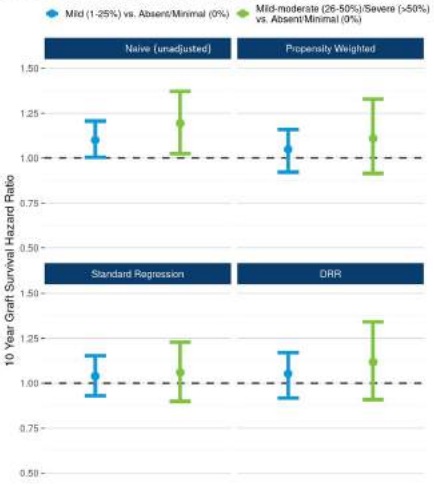


Fig 2. All-Cause Graft Failure Hazard Ratios by Degree of Vascular Changes



CITATION INFORMATION: Kamal L., Stewart D., Foutz J., McGehee H., Saravanane P., Yu S., Yusfi R., Gupta G. Findings from the Bareto Study: Associations Between Chronic Vascular Changes and 10-year Transplant Graft Outcomes *AJT, Volume 21 Supplement 3*

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Abstract# 128

An HLA Class II Matching Strategy That Predicts De Novo Donor-specific HLA Antibody Formation Using Low Resolution HLA Types

L. Hidalgo[1], I. Martinez Juarez[2], L. Morales Buenrostro[2], S. Shojai[3], P. Campbell[1], *[1]University of Wisconsin Madison, Madison, WI, [2]Instituto Nacional de Ciencias Medicas Y Nutricion Salvador Zubrian, Mexico City, Mexico, [3]Medicine, University of Alberta, Edmonton, AB, Canada*

Purpose: The development of de novo donor-specific HLA antibodies (dnDSA) is predominantly against HLA-Class II antigens and is a function of the degree of HLA-DQ and -DR mismatch (MM) between donor and recipient. New methods to gauge HLA MM focus on predicted epitopes or amino acid differences rather than conventional HLA MM but ideally require high resolution HLA types that limits their common application. We examined whether a modified serology-based HLA-DR and -DQ matching strategy using low resolution HLA typing could similarly assess the risk for dnDSA.

Methods: We devised an HLA Class II MM strategy that groups Class II antigens (DRB1, DRB3/4/5, and DQB1) based on serologic relation (Figure 1). The incidence of dnDSA formation was examined in 349 kidney transplant recipients with negative DSA at time of transplant. This strategy was compared to eplet calculations and conventional HLA MM for the risk to develop dnDSA.

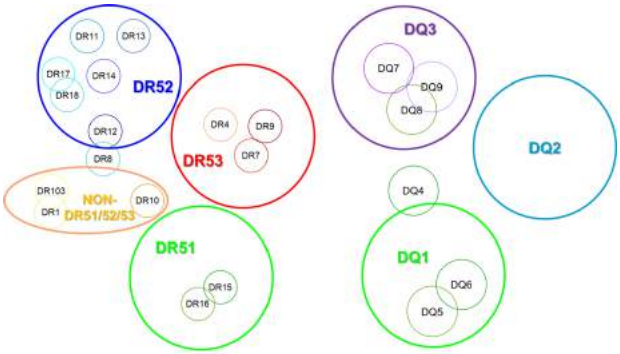


Figure 1. HLA-DR and -DQ groups used for modified, serology-based mismatch calculations.

Results: 95 patients (27.2%) developed Class II dnDSA between 0.5-32 years post-transplant. The incidence of dnDSA against HLA-DR gradually increased with the number of MMs outside of the serology-based groupings (p<0.001, Figure 2). Using a DR eplet MM threshold of 10 showed a subtler increased risk for dnDSA (p=0.019). The risk for dnDSA with DQ MMs outside serology-based groups also increased with number of MMs (p<0.006). DQ eplet MM threshold of 10 eplet MMs similarly assessed DQ dnDSA (p<0.006). Conventional antigen MM was unable to stratify dnDSA risk for DR but could stratify for DQ (p=0.004).

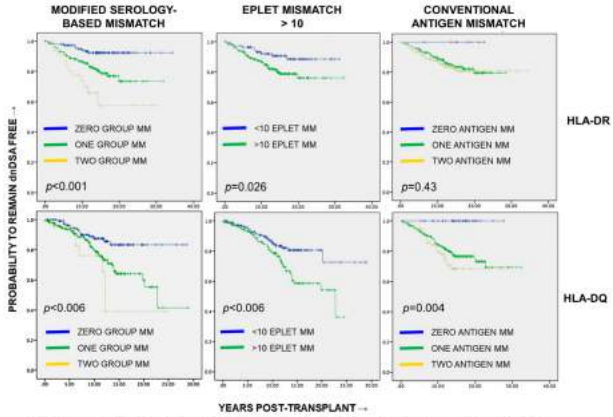


Figure 2. Comparison of three HLA mismatch assessment methods and the resulting incidence of dnDSA.

Conclusions: Our data suggest that dnDSA formation can be predicted using low resolution HLA typing and grouping of HLA antigens into serology-based groups. The associations with dnDSA were comparable to eplet mismatch calculations and better than conventional HLA matching. The simplicity of our matching strategy does not require imputations or high resolution HLA typing and may be an option for improved HLA matching from deceased donors or for programs with limited access to high resolution HLA typing resources.

CITATION INFORMATION: Hidalgo L., Martinez Juarez I., Morales Buenrostro L., Shojai S., Campbell P. An HLA Class II Matching Strategy That Predicts De Novo Donor-specific HLA Antibody Formation Using Low Resolution HLA Types *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Hidalgo: None. **I. Martinez Juarez:** None. **L. Morales Buenrostro:** None. **S. Shojai:** None. **P. Campbell:** None.

Abstract# 129

Outcomes from High KDPI Kidneys Utilized for Dual Kidney Transplantation

J. Wagler[1], K. Mitchell[2], S. Ohara[3], R. Heilman[2], S. K. Reddy[2], H. Khamash[2], C. Jadlowiec[2], *[1]Mayo Clinic Arizona, Phoenix, AZ, [2]Mayo Clinic, Phoenix, AZ, [3]Valleywise Health General Surgery Residency Program, Phoenix, AZ*

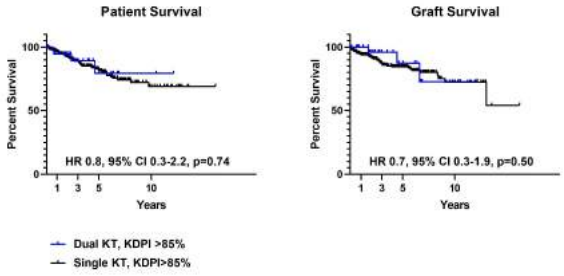
Purpose: In light of the ongoing organ shortage, dual kidney transplantation (DKT), utilizing two adult kidneys from the same donor for one recipient, has been proposed as a means to expand the available donor pool. These kidneys often come from high Kidney Donor Profile Index (KDPI) donors (KDPI >85%). Data comparing outcomes of DKT with high KDPI single kidney transplants (SKT) remains limited.

Methods: We assessed 336 high KDPI kidney transplants performed at our center between 2003 to 2020. Pediatric high KDPI kidneys were excluded. Dual kidneys were selected based on biopsy findings of moderate-to-severe chronic changes, donor age ≥75 years, or kidneys coming from a small donor.

Results: Of the 336 high KDPI kidney transplant performed, 37 (11.0%) were DKT. Recipients of DKT were older in age (median 69.0 vs 67.0, p=0.02) and more likely to be diabetic (p=0.02). Donors for DKT had a higher KDPI score (median 96.0 vs. 91.0, p<0.0001) and were older in age (p<0.0001). For recipients, there were no differences in hospital length of stay (p=0.21) or rates of delayed graft function (54.1% vs. 51.5%, p=0.77). At one-year, eGFR was higher in the DKT cohort (52.7±23.9 vs 44.0±16.7, p=0.02). Time-zero biopsies had a more favorable profile for DKT kidneys. At one-year protocol biopsies were similar between DKT and SKT with DKT having more glomerulosclerosis (p=0.03) and arterial intimal thickening (p=0.01). One-year patient survival was 93.3% for DKT and 97.0% for SKT (HR 0.8, 95% CI 0.3-2.2, p=0.74); one-year graft survival was 93.3% for DKT and 91.6% SKT (HR 0.7, 95% CI 0.3-1.9, p=0.50).

Conclusions: Graft and patient survival rates with DKT are similar to those of SKT high KDPI kidneys despite the kidneys coming from donors with a higher KDPI score. DKT is a good option to help further utilize high KDPI kidneys and minimize discard. In our series, one-year eGFR with DKT was superior to that observed in solitary high KDPI kidneys.

Post-Transplant Outcomes			
	Dual Adult High KDPI n=37	**Single Adult High KPDI** n=299	***P* Value**
Hospital length of stay (median)	4.2±2.0 (4.0)	3.6±3.0 (3.0)	0.21
DGF	20 (54.1%)	154 (51.5%)	0.77
eGFR at 1 Year	52.7±23.9	44.0±16.7	0.02
eGFR <30 at 1 Year	2 (5.4%)	33 (11.0%)	0.29



CITATION INFORMATION: Wagler J., Mitchell K., Ohara S., Heilman R., Reddy S., Khamash H., Jadlowiec C. Outcomes from High KDPI Kidneys Utilized for Dual Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Wagler: None. **K. Mitchell:** None. **S. Ohara:** None. **R. Heilman:** None. **S.K. Reddy:** None. **H. Khamash:** None. **C. Jadlowiec:** None.

Abstract# 130

Successful Outcomes from Selected Akin3 Donors Requiring Renal Replacement: Avenue for Increase in Organ Utilization

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Purpose: Our aim was to determine outcomes with transplanting kidneys from deceased donors with severe acute kidney injury requiring acute renal replacement therapy.

Methods: We included all patients who received deceased donor kidney transplant during 2008 to 2019. We compared the graft survival, estimated glomerular filtration rate (eGFR) and findings on surveillance biopsy in three groups of deceased donor kidneys: AKIN3 with RRT, AKIN3 without RRT, and <85% KDPI donors without AKI (AKIN 0).

Results: There were 172 recipients who received a kidney from donors with Acute Kidney injury stage 3 (AKIN3) requiring renal replacement therapy (RRT). We compared the study group to 528 recipients who received a kidney from donors with AKIN stage 3 not on RRT and 463 recipients who received Kidney Donor profile Index (KDPI)<85% AKIN stage 0 kidney. The study group donors were younger (p <0·001), and had lower KDPI (p <0·001) compared to the two control groups. The rate of Delayed Graft Function (DGF) was 91% in the AKIN 3 RRT compared to 76% in AKIN 3 no RRT group and 41% in the KDPI<85% AKIN 0 group (p=<0·001). Despite higher DGF, length of hospital stay and acute rejection within one year were similar between the groups. Primary graft failure was rare. Estimated GFR at 4 months, 1 year and 3 years were similar across the three groups. Death censored graft survival at 3 years was 93·5% in AKIN3-RRT group, 95% in the AKIN3 no RRT, and 91·7% in KDPI<85%AKIN0 (p=0·549). Interstitial fibrosis and tubular atrophy (IFTA) score ≥2 on protocol biopsy at 4 months and 1 year was similar across the three groups.

Conclusions: Transplanting selected kidneys from deceased donors with AKIN3 requiring RRT is safe and has excellent outcomes.

CITATION INFORMATION: Budhiraja P., Heilman R., Smith M., Khamash H., Kodali L., Moss A., Mathur A., Jadlowiec C., Reddy K. Successful Outcomes from Selected Akin3 Donors Requiring Renal Replacement: Avenue for Increase in Organ Utilization *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Budhiraja: None. **R.L. Heilman:** None. **M.L. Smith:** None. **H.A. Khamash:** None. **L. Kodali:** None. **A.A. Moss:** None. **A.K. Mathur:** None. **C. Jadlowiec:** None. **K.S. Reddy:** None.

Abstract# 131

Outcomes of Kidney Transplant Recipients (KTRs) Comparing Brain Dead Donors' vs Donation After Cardiac Death Stratified by KDPI, Focus on Marginal Kidneys: A UNOS Database Analysis

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Purpose: In deceased donor kidney transplantation (DDKT), donation after cardiac death (DCD) is associated with increased cytokine release and renal tubular injury with consequent increase in the risk for delayed graft function (DGF). These cascade of events could increase acute rejection (AR) risk and potentially impact graft and patient survival. The impact of donation after brain death (DBD) vs DCD status on the long term outcomes following DDKT has conflicting reports in the literature especially for transplants from marginal donors. The aim of this study was to compare the outcomes of DDKT from DBD vs DCD in groups stratified by different degrees of kidney donor profile index (KDPI).

Methods: Using OPTN/UNOS database, we identified adult DDKT recipients from 2005 to 2019 who received induction followed by calcinurine inhibitor/ mycophenolate mofetil maintenance. Patients were divided into 4 KDPI groups: 0-20%, 21-50%, 51-84% and ≥85%. In each KDPI category, short and long-term outcomes including DGF, AR, adjusted overall graft, death-censored graft, and patient survivals were compared between patients who received kidneys from DBD vs DCD donors.

Results: There were 99548 DDKT recipients included in the study. Outcomes are shown in Table 1. Utilization of machine perfusion and the incidence of DGF were higher for kidneys from DCD donors across all KDPI groups (***=p <0.0001). The AR rates and patient survivals were similar for DBD vs DCD in all KDPI categories. The overall graft and death-censored graft survivals were similar in all KDPI categories except in 21-50% KDPI group, where DBD group had better outcomes (**= p<0.05). In particular, graft (over all and death-censored) and patient survivals were similar for DBD vs. DCD kidney recipients among the high KDPI (≥85%) group.

Results Table				
	KDPI (0-20%) N= 33581	KDPI (21-50%) N= 23400	KDPI (51-84%) N=33896	KDPI ≥ 85% N= 8671
	DBD= 27739 vs DCD=5842	DBD= 20900 vs DCD=2500	DBD=27,718 vs DCD=6178	DBD= 7792 vs DCD= 879
Machine perfusion (%)	24.5% vs. 46.4% ***	15.7% vs. 40.6% ***	19.3% vs. 43.4% ***	34.4% vs 48.8% ***
Delayed Graft Failure (%)	27.3% vs. 45.5% ***	14.9% vs. 32.9% ***	22.7% vs. 42.8% ***	29.9% vs. 48.2% ***
Acute Rejection (%)	6.4% vs. 6.3%	5.1% vs. 5.5%	5.8% vs. 6.4%	7.5% vs. 6.1%
Adjusted Graft Survival [HR(95%CI)]	0.99 (0.94-1.05)	1.12 (1.01-1.23) **	1.00 (0.94-1.07)	1.02 (0.94-1.07)
Adjusted Death censored Graft Survival [HR(95%CI)]	1.02 (0.94-1.1)	1.21 (1.06-1.39) **	1.02 (0.93-1.12)	1.03 (0.85-1.19)
Adjusted Patient Survival [HR(95%CI)]	1.04 (0.96-1.1)	0.94 (0.83-1.07)	1.02(0.94-1.1)	0.99 (0.86-1.15)

Conclusions: Despite the increased incidence of DGF in DCD kidney recipients, long-term graft and patient outcomes were similar between DBD and DCD groups across KDPI categories. This observation is particularly important in the highest

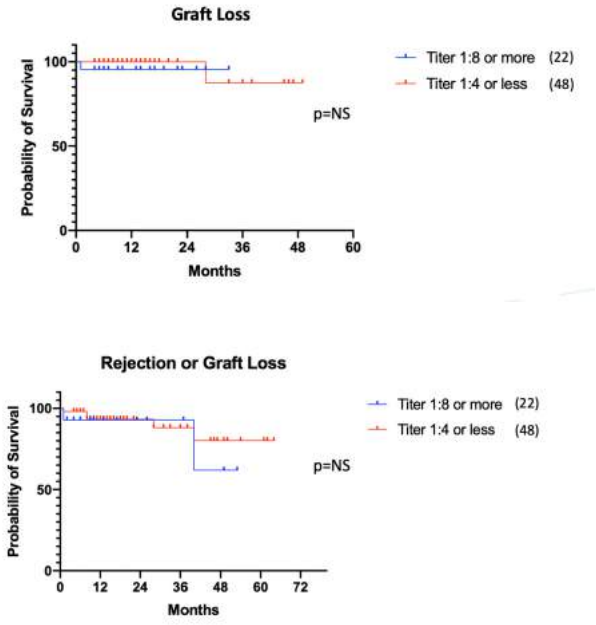
KDPI group where there is still higher rates of organ discard. Our findings support more robust utilization of kidneys from DCD donors for transplantation especially from the higher KDPI groups in order to alleviate existing organ shortage.
CITATION INFORMATION: Chopra B., Sureshkumar K., Rajasundaram D., Rodrigo E. Outcomes of Kidney Transplant Recipients (KTRs) Comparing Brain Dead Donors' vs Donation After Cardiac Death Stratified by KDPI, Focus on Marginal Kidneys: A UNOS Database Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Chopra: None. **K.K. Sureshkumar:** None. **D. Rajasundaram:** None. **E.C. Rodrigo:** None.

Abstract# 132

Expanding A_2 to B Kidney Transplantation: Safe and Effective Use of Recipients with High Titer Antibodies

A. Gilbert[1], S. Radomski[2], J. Verbesey[1], J. Vucci[1], M. Cooper[1], *[1]Medstar Georgetown Transplant Institute, Washington, DC, [2]Department of Surgery, Johns Hopkins Medical Center, Baltimore, MD*

Purpose: Minor ABO incompatible (ABOi) transplants from blood group A_2 or A_2B donors have increased since 2014, but virtually all centers limit recipients to having anti-A titers of 1:4 or less. We reviewed our center's experience transplanting patients with higher anti-A titers and their longer term outcomes.
Methods: This is a single center retrospective study. We reviewed all patients who received kidneys from donors across minor ABOi. At our center, these patients are transplanted using our standard protocol including induction with lymphodepleting antibodies and a maintenance regimen of tacrolimus and mycophenoloic acid. No plasmapheresis or other treatment was given to any patient regardless of titer. Recipients were classified as having either high anti-A_2 titers (1:8 or greater) or low anti A_2 titers (1:4 or less). Outcomes included graft loss and biopsy proven rejection as well as 3 month and 12 month serum creatinine. Outcomes were evaluated using Kaplan-Meier plots compared with the Mantel-Cox long rank test.
Results: Since December of 2014 we performed a total of 70 transplants across minor ABOi. These included 56 deceased donor transplants from A_2 or A_2B donors into blood group B recipients, 14 living donor A_2/A_2B to group B transplants, and 10 living donor A_2/A_2B transplants into O recipients. Of these, 22 were high titer: 1:8 (n=11), 1:16 (n=6), 1:32 (n=5) and 48 were low titer. Follow up was similar in each group with mean follow up of 20 months in the high titer group (range 3-40 months) and 21 months in the low titer group (range 3-54 months). There was no statistically significant difference in graft survival (figure 1) between the groups, nor was there a statistically significant difference in the composite endpoint of rejection or graft loss (figure 2). At 3 months, serum creatinine was similar between the groups (median 1.41 vs 1.42, mean 1.58 vs 1.52, p=ns). 12 month serum creatinine was also statistically similar (median 1.47 vs 1.27, mean 1.58 vs 1.52 p=ns).
Conclusions: With modern immunosuppression, high-titer recipients show excellent results which are fully equivalent to results in low titer recipients of minor ABOi transplants.



CITATION INFORMATION: Gilbert A., Radomski S., Verbesey J., Vucci J., Cooper M. Expanding A_2 to B Kidney Transplantation: Safe and Effective Use of Recipients with High Titer Antibodies *AJT, Volume 21 Supplement 3*

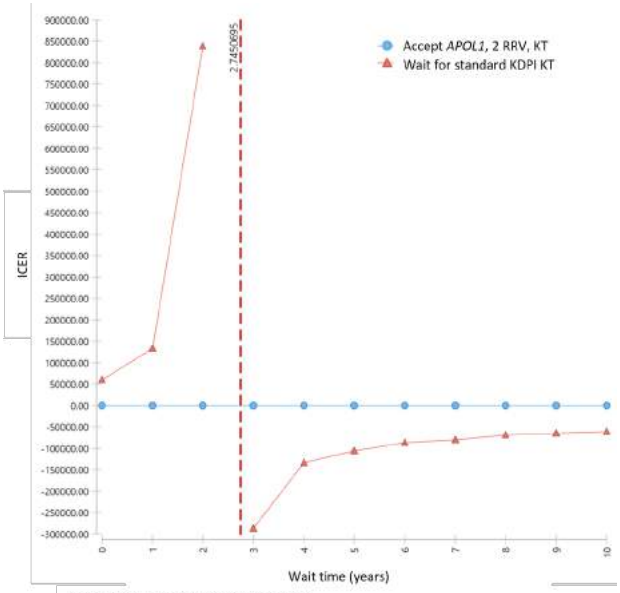
DISCLOSURES: A. Gilbert: None. **S. Radomski:** None. **J. Verbesey:** None. **J. Vucci:** None. **M. Cooper:** None.

Abstract# 133

How Long is the Wait Worthwhile: Cost-Effectiveness of Accepting a Kidney from a Donor with Apolipoprotein L1 High-Risk Genotype

K. Lentine[1], D. Brennan[2], M. Wang[3], M. Schnitzler[4], H. Xiao[4], D. Axelrod[5], J. Snyder[6], K. Lentine[4], *[1]Saint Louis University, St. Louis, MO, [2]Johns Hopkins, Baltimore, MD, [3]Washington Univ, Saint Louis, MO, [4]Saint Louis Univ, Saint Louis, MO, [5]Univ of Iowa, Iowa City, IA, [6]SRTR, Minneapolis, MN*

Purpose: The Apolipoprotein *L1* (*APOL1*) Long-Term Outcomes (APOLLO) study is underway to define the impact of kidney donor renal risk variants (RRVs) on the survival of kidney transplants (KTs) from African American donors. Pending completion of APOLLO, we conducted a preliminary cost-effectiveness analysis comparing acceptance of KT allografts with high-risk (2 RRV) *APOL1* genotype versus waiting for standard Kidney Donor Profile Index (KDPI) <85% KTs.
Methods: Discrete event simulation models with a lifetime horizon were constructed from the perspective of Medicare for 100,000 patients aged 50 to 60 years. Distributions of time to graft failure, dialysis, and death were estimated from the national Scientific Registry of Transplant Recipients (SRTR) data (2010-2019) for standard KDPI KT outcomes. Published evidence available to date was used for *APOL1*, 2 RRV, KT outcomes, and costs and utilities. Costs were evaluated at the 2020 price level. Both costs and effectiveness were discounted at an annual rate of 3%. Analyses were conducted using MATLAB (R2020b, MathWorks Inc, Natick, MA).
Results: Accepting an *APOL1*, 2 RRV, KT yielded averages of 6.83 quality-adjusted life years (QALYs) and lifetime cost of $294,006 ($43,046/QALY). If standard KDPI KT were available immediately (wait time=0), standard KDPI KT would yield 8.29 QALYs and lifetime cost of $381,769 ($46,052/QALY). As the wait time for standard KDPI KT increased, average QALYs decreased, and lifetime costs increased due to longer dialysis waiting times for standard KDPI KT while facing a risk of death on the waiting list. When the wait time was longer than 2.7 years, an *APOL1* 2 RRV KT became cost-saving (higher QALYs and lower costs, see Figure).



ICER: Incremental cost-effectiveness ratio
= (Cost of standard KDPI KT-Cost of *APOL1*, 2 RRV, KT)/(QALYs for standard KDPI KT-QALYs for *APOL1*, 2 RRV, KT)

Figure. Threshold analysis for the value of accepting *APOL1*, 2 RRV KT compared to waiting for standard KDPI KT

Conclusions: Our preliminary analysis demonstrates that accepting an *APOL1* 2 RRV KTs may be cost-saving if the expected wait time for a standard KDPI kidney is longer than 3 years. The APOLLO study will enable refinement of these estimates.
CITATION INFORMATION: Lentine K., Brennan D., Wang M., Schnitzler M., Xiao H., Axelrod D., Snyder J., Lentine K. How Long is the Wait Worthwhile: Cost-Effectiveness of Accepting a Kidney from a Donor with Apolipoprotein L1 High-Risk Genotype *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Lentine: None. **D. Brennan:** Consulting Fee; Name of Commercial Interest; Allovir, Amplyx, CareDX, Medeor, Natera, Sanofi, Veloxis. Consulting Fee; Nature of Relationship; Consulting. Grant/Research Support; Name of Commercial Interest; CareDX, Allovir, Amplyx, Natera. Grant/Research Support; Nature of Relationship; Research Support. Honoraria; Name of Commercial Interest;

CareDx, Veloxis. Honoraria; Nature of Relationship; Speakers Bureau. **M. Wang:** None. **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. **H. Xiao:** None. **D. Axelrod:** Consulting Fee; Name of Commercial Interest; CareDx, Sanofi. Consulting Fee; Nature of Relationship; Consulting, Specialist Direct. **J. Snyder:** None. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speakers Bureau.

Liver

Hemodynamic Consequences of Portal Hypertension Including Kidney Issues

Abstract# 134

The Rate of Hospitalization Among Patients with Cirrhosis is More Than Twice as High as Patients Over 85 Years

N. R. Mazumder[1], K. Guo[2], L. Zhao[3], A. Kho[1], K. Walters[4], T. S. Carey[4], C. Loftus[1], D. P. Ladner[1], *[1]Northwestern Memorial Hospital, Chicago, IL, [2]Biostatistics, Northwestern Memorial Hospital, Chicago, IL, [3]Biostatistcs, Northwestern Memorial Hospital, Chicago, IL, [4]University of North Carolina Chapel Hill, Chapel Hill, NC*

Purpose: Cirrhosis is a common disease however it is understudied because population data on patients with cirrhosis is lacking. While the risk of hospitalization in the general population in 2017 was 6.5% per year and in patients 85 yrs or above was 22% per year, little is known about the risk for hospitalizations in patients with cirrhosis. We used National Patient-Centered Clinical Research Network (PCORnet) data to examine this question.

Methods: PCORnet data from two centers between 2012-2018 were used and patients with cirrhosis were identified through an algorithm of ICD-9, ICD-10, or RXCUI codes. Only adult patients (>18yrs) were included. Demographics were assessed and hospitalizations were calculated.

Results: 62,580 patients with cirrhosis were identified with 87,489 patient-years of follow up. Patients mean age was 51.25 yrs, 38.2% were Female, 38.3% were White, and 51.6% were Black. The mean MELD-Na was 11.0.During the study period patients had 171,397 emergency visits and underwent 41,643 admissions, or 45.6 hospitalizations per 100 patient-years of follow up. Patients were admitted for a total of 330,469 days (904.8 patient-years) or 1.03 days admitted per 100 days of follow up. Patients with cirrhosis had a seven times higher rate of hospitalization than the general population and a 2.1 times higher rate than patients over 85 years old, the highest risk subset of the general population.

Conclusions: Hospitalizations are very frequent in patients with cirrhosis. Large datasets may provide insight into prevention of hospitalizations.

CITATION INFORMATION: Mazumder N., Guo K., Zhao L., Kho A., Walters K., Carey T., Loftus C., Ladner D. The Rate of Hospitalization Among Patients with Cirrhosis is More Than Twice as High as Patients Over 85 Years *AJT, Volume 21 Supplement 3*

DISCLOSURES: N.R. Mazumder: None. **K. Guo:** None. **L. Zhao:** None. **A. Kho:** None. **K. Walters:** None. **T.S. Carey:** None. **C. Loftus:** None. **D.P. Ladner:** None.

Abstract# 135

A Novel Liver Assist Device as a Bridge to Liver Transplantation in Acute on Chronic Liver Failure Patients with Multi-Organ Failure

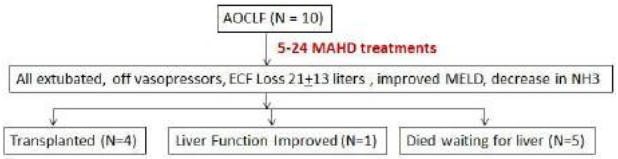
S. Ahmad[1], I. W. Liou[1], J. Reyes[2], R. Bakthavatsalam[3], N. C. Smith[4], R. L. Carithers[1], C. Martin[1], D. Gao[5], *[1]Medicine, University of Washington, Seattle, WA, [2]Surgery, University of Washington, Seattle, WA, [3]Surgery, University of Washington, Seattle, WA, [4]Nursing, University of Washington, Seattle, WA, [5]Engineering, University of Washington, Seattle, WA*

Purpose: Acute on chronic liver failure (AOCLF) occurs in nearly 25% of patients with acutely decompensated cirrhosis, with many developing multi-organ failure requiring ventilatory, vasopressor and dialysis support, and in the most severe cases, they become unsuitable for liver transplantation. The 28-day mortality with 3 or more organ system failure is 75-90%. Trials of liver assist devices to improve clinical condition allowing transplantation have been disappointing. Purpose of the study was to improve outcome in AOCLF patients with more than 3 organ failure.

Methods: A modified hemodialysis machine with added albumin circuit (MAHD) was developed and used at University of Washington in 10 AOCLF patients with more than 3 organ failures. All patients were made inactive on the liver transplant wait list, once their encephalopathy worsened, they developed respiratory failure requiring mechanical ventilation, became hypotensive requiring vasopressors, and/or developed large fluid excess with renal failure needing hemodialysis. In all patients the MELD scores were over 40, bilirubin more than 5 mg/dL, with elevated ammonia levels and there was presence of active bleeding from various sites.

Results: With the use of the MAHD, all patients were eventually extubated, with significant improvement in encephalopathy to baseline status, discontinuation of vasopressor support, and removal of large volumes of extracellular fluid. Four patients underwent liver transplantation, and one recovered liver function and came off the transplant wait list. Five patients died while waiting for a liver, for a period ranging from 12 - 74 days. The causes of death were bleeding (n=4), sepsis (n=3), and stroke and cardiac arrest (n=1), (some patients had more than one cause of death).

Conclusions: In this limited study, the 28-day survival of 90% was better than expected, and the ability to reactivate wait list status was achieved in all patients (100%), with successful liver transplantation and one native liver recovery seen in 50% of patients (Figure). MAHD was very effective in fluid removal while traditional HD was ineffective. No complications of this treatment were encountered. Thus, MAHD appears to be successful as a bridge to transplantation in patients with AOCLF. The major limitation of the study is the small number of patients.



CITATION INFORMATION: Ahmad S., Liou I., Reyes J., Bakthavatsalam R., Smith N., Carithers R., Martin C., Gao D. A Novel Liver Assist Device as a Bridge to Liver Transplantation in Acute on Chronic Liver Failure Patients with Multi-Organ Failure *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Ahmad: None. **I.W. Liou:** None. **J. Reyes:** None. **R. Bakthavatsalam:** None. **N.C. Smith:** None. **R.L. Carithers:** None. **C. Martin:** None. **D. Gao:** None.

Abstract# 136

Rabbit Anti-thymocyte Globulin Induction is Not Associated with Improved Outcomes in Liver Transplant Recipients

P. Nguyen, N. Wilson, G. Saracino, R. Patel, S. K. Asrani, G. Testa, T. Sam, *Baylor University Medical Center, Dallas, TX*

Purpose: Controversy remains on the role of rabbit anti-thymocyte globulin (rATG) induction for calcineurin inhibitor (CNI) delay after liver transplantation (LT). We examined the effect of rATG with and without CNI delay on outcomes after LT.

Methods: We analyzed primary LT recipients from 01/2016 to 06/2020. Combined LT and cardiothoracic transplant were excluded. Analysis was performed based on rATG receipt and CNI initiation ≥ 3 days post-LT. Infection was assessed by provider notes, medications, and lab results. Rejection was defined as biopsy-proven or clinically diagnosed by lab values.

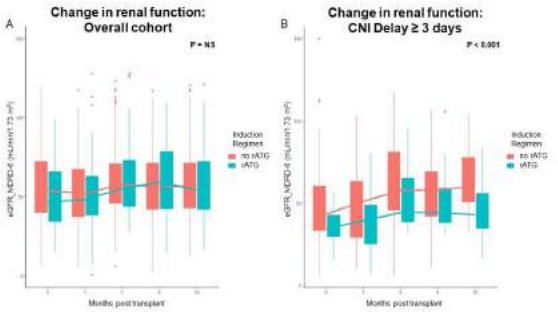
Results: Of 528 eligible patients, 110 received rATG and 418 did not. RATG group was younger, had higher MELD-Na scores, and had more females. Renal function was not different at baseline or at 1 year. Patients receiving rATG had significantly higher rates of bacterial infection (50%, vs 26%, p<0.001). However, survival and rejection rates were not different at 1 year. We examined a subset of patients that had CNI delay ≥ 3 days post-transplant. In this subset, those that received rATG had worse renal function over a year (p<0.001).

Conclusions: Use of rATG was not associated with improved patient/graft survival but resulted in more bacterial infections. In the setting of CNI delay, use of rATG resulted in significantly worse renal function. The use of rATG in renal preservation strategies above and beyond CNI delay needs to be reconsidered.

Baseline characteristics

	No rATG N = 418	rATG N = 110	P value
Baseline characteristics			
Recipient age, yrs, median [IQR]	58 [51;63]	55 [44;62]	0.01
Female, %	36	49	0.02
African American, %	3	96	NS
MELD-Na score, median [IQR]	18 [12;23]	17 [11;25]	NS
Donor age, yrs, median [IQR]	43 [30;51]	36 [27;47]	<0.01
Donor			<0.001
Living Donor, %	12	43	
DCD, %	15	13	
DBD, %	12	43	
Warm ischemia time, min, median [IQR]	42 [35;50]	37 [31;44]	<0.001
Cold ischemia time, hrs, median [IQR]	5 [3;6]	3 [1;5]	<0.001
Results			
Time to CNI, %			NS
<3 days	73	69	
3+ days	26	30	
Tacrolimus level, ng/mL, median [IQR]			
1 month	8.6 [6.8;10.4]	8.7 [7.0;10.3]	NS
3 month	7.6 [6.1;9.4]	7.8 [5.7;9.2]	NS
6 month	7.5 [5.9;9.7]	7.2 [5.6;8.7]	NS
Infection at 6 months, %			
Bacterial	26	50	<0.001
Fungal	12	19	0.10
Viral	11	5	0.11

P values > 0.2 denoted as NS



CITATION INFORMATION: Nguyen P., Wilson N., Saracino G., Patel R., Asrani S., Testa G., Sam T. Rabbit Anti-thymocyte Globulin Induction is Not Associated with Improved Outcomes in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Nguyen: None. **N. Wilson:** None. **G. Saracino:** None. **R. Patel:** None. **S.K. Asrani:** None. **G. Testa:** None. **T. Sam:** None.

Abstract# 137

Effects of Timing of Everolimus Transition on Renal Outcomes in Liver Transplant Recipients

M. Leick[1], H. Belleau[2], T. McCashland[3], *[1]Nebraska Medicine, Omaha, NE, [2]Bryan Health, Lincoln, NE, [3]University of Nebraska Medical Center, Omaha, NE*

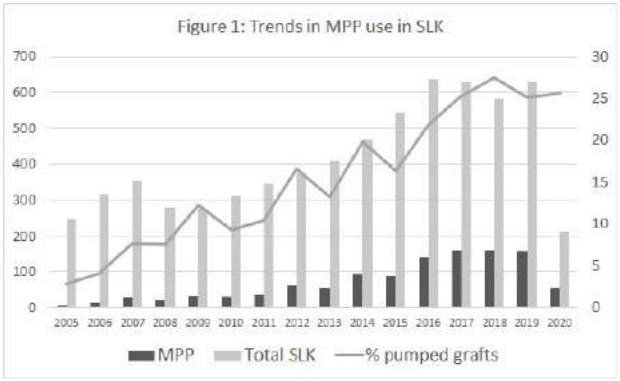
Purpose: The purpose of this study is to evaluate the effects of the timing of everolimus transition on renal outcomes in liver transplant recipients.
Methods: This retrospective review included adult liver transplant recipients from 01/01/2013 to 05/31/2018. Patients transitioned to everolimus were included in this subgroup analysis. Patients were separated into groups based upon timing of transition: group 1 (<90 days), group 2 (91-180 days), group 3 (181-365 days), and group 4 (>365 days). The primary outcome was renal function (creatinine clearance (CrCl) per Cockcroft-Gault equation) at 1 month post-transition compared to baseline. Secondary outcomes included renal function at 12 months post-transition and biopsy proven acute rejection (BPAR) following conversion. Paired *t*-tests were used for analysis.
Results: Of 350 adult liver transplants during the study period, eighty patients were transitioned to everolimus in combination with other immunosuppression or as monotherapy according to physician discretion. Group 1 included 25 patients, group 2 had 20, group 3 had 19, and group 4 had 16. The average age was 56.2 years; the majority were male (67.5%) and Caucasian (90%). The most common indications for transplant were nonalcoholic steatohepatitis (26.3%), hepatitis C virus (25%), and alcohol (23.8%). Hepatocellular carcinoma was present in 27.5% of patients. Average MELD and MELD-NA was 22.8 and 24.2, respectively. Renal sparing induction with antithymocyte globulin occurred in 37.5%. Group 1 had a mean CrCl 45.4 ml/min at time of transition, which significantly improved at 1 month and 12 months (69.6 and 61.6 ml/min, p=0.004 and 0.035). Group 2 had mean CrCl 43.9 ml/min at time of transition, which also significantly improved at 1 month and 12 months (60.7 and 57.5 ml/min, p=0.02 and 0.008). Group 3 had a mean CrCl 52.6 ml/min at time of transition, which significantly improved at 1 month but not at 12 months (63.8 and 55.2 ml/min, p=0.0004 and 0.43). Group 4 had a mean CrCl 54.6 ml/min at time of transition and did not show renal improvement at 1 month or 12 months (58.6 and 49.6 ml/min, p=0.2 and 0.84). BPAR occurred in 40% of group 1, 20% of group 2, 10.5% of group 3, and 6.25% of group 4. Median time to rejection (days) following transition for each group was 87.5, 108, 220.5, and 85, respectively.
Conclusions: Early everolimus conversion (less than 180 days) showed improvement in renal function in adult liver transplant recipients, while later transition did not show the same sustained renal benefit. Early transition also showed higher rates of BPAR. Our data would suggest conversion was optimal for renal function and BPAR rates 181-365 days from transplant. Timing of everolimus transition must balance the risk of rejection with the benefit of renal improvement.
CITATION INFORMATION: Leick M., Belleau H., McCashland T. Effects of Timing of Everolimus Transition on Renal Outcomes in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Leick: None. **H. Belleau:** None. **T. McCashland:** None.

Abstract# 138

Machine Perfusion of Kidney Grafts in Simultaneous Liver Kidney Transplantation: National Trends and Outcomes

A. Chang[1], M. Chen[1], P. Abt[1], T. Bittermann[2], *[1]Surgery, University of Pennsylvania, Philadelphia, PA, [2]Gastroenterology, University of Pennsylvania, Philadelphia, PA*

Purpose: In this study we analyze the SRTR liver data set to determine the trends in machine perfusion of kidney grafts prior to SLK and its effect on graft function.
Methods: This was a retrospective cohort study of 6,594 SLK recipients between 2005-2020 using the United Network for Organ Sharing database. Differences in recipient and donor characteristics according to use of kidney allograft MPP were compared. Temporal and geographic trends were assessed. Multivariable logistic regression was used to evaluate predictors of MPP. Multivariable logistic regression and Cox regression were used to assess the relationship between MPP and kidney delayed graft function (DGF) and graft survival, respectively.
Results: Overall, 17% (n=1,134) of SLK kidney allografts were placed on MPP. Nationally, the utilization of machine perfusion in SLK has increased from under 3% in 2005 to 25% in 2020 (Figure 1), however significant center variability exists. Allografts that underwent MPP were older (median 36 vs 34 years old, p<0.01), had a higher incidence of donor diabetes (6.3% vs 4.2%, p<0.01), came from DCD donors (7.9% vs 4.5%, p<0.01), and had longer cold ischemic time (12.9 vs 9.9 hours, p<0.01). However, center preference was the primary determinant of MPP use (intraclass correlation 64%; i.e., only 36% of variability in MPP use was explained by donor or recipient factors). In multivariable analysis, a possible trend towards reduced DGF with MPP was observed (OR 0.81, p=0.08), while adjusted graft survival was not different (HR 0.95, p=0.54).
Conclusions: Despite increasingly widespread use of MPP for storage of kidney allografts prior to transplantation, this technique does not appear to alter outcomes in simultaneous liver and kidney transplantation.



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DISCLOSURES: A. Chang: None. **M. Chen:** None. **P. Abt:** None. **T. Bittermann:** None.

Abstract# 139

Outcomes of Transjugular Intrahepatic Portosystemic Shunts (TIPS) in Dialysis-Dependent ESLD Patients: The ALTA Study

J. Ge[1], J. Boike[2], M. German[3], G. J. Morelli[4], E. Spengler[3], A. Said[3], A. S. Lee[3], A. Hristov[3], A. Desai[5], T. Couri[6], S. Paul[6], C. Frenette[7], N. Christian-Miller[7], M. Laurito[8], E. Verna[8], U. Rahim[9], A. Goel[9], D. Gregory[2], L. VanWagner[2], K. P. Kolli[1], J. Lai[1], *[1]University of California, San Francisco, San Francisco, CA, [2]Northwestern Memorial Hospital, Chicago, IL, [3]University of Wisconsin, Madison, WI, [4]University of Florida Health, Gainsville, FL, [5]Indiana University School of Medicine, Indianapolis, IN, [6]University of Chicago, Chicago, IL, [7]The Scripps Clinic, La Jolla, CA, [8]Columbia University, New York, NY, [9]Stanford University, Stanford, CA*

Purpose: Data on the outcomes of patients with cirrhosis who require renal replacement therapy (RRT) at the time of transjugular intrahepatic portosystemic shunts (TIPS) is exceptionally limited. We aimed to describe the outcomes of this patient population.
Methods: Adult patients with cirrhosis who underwent TIPS in the retrospective portion of the Advancing Liver Therapeutics Approaches (ALTA) Study from 2010-2015 were included. We grouped patients based on RRT status at TIPS, defined as ≥2 RRT encounters in the 28 days prior to TIPS. We calculated the relative risks of death and transplantation and used competing risk regressions (competing event = transplantation) to estimate the subhazard of death at 1-year.
Results: Of 1,260 patients, 57 (4.5%) required RRT prior to TIPS. Of those 57, 60% (34) had RRT 2-28 days and 40% (23) had RRT within 2 days prior to TIPS. RRT patients had higher median MELD-Na (31 vs 17, p<0.01), INR (1.6 vs 1.5, p=0.04), bilirubin (2.8 vs 1.8mg/dL, p<0.01), and creatinine (2.4 vs 1.0mg/dL, p<0.01) at TIPS. RRT patients had a higher prevalence of heart failure (HF) at 19.3% vs 6.6% for the non-RRT group (p<0.01). At 1-year post-TIPS, the RRT group had substantially higher rates of death and transplant versus the non-RRT group at 51% vs 25% (p<0.01) and 19% vs 128% (p<0.01), respectively. The relative risks (RR) of death and transplantation for RRT vs. non-RTT groups were 2.7 (95%CI 2.04-3.57, p<0.01) and 2.1 (95%CI 1.29-3.36, p<0.01), respectively, at 1-year. Of those who died, median times to event were 11 days (IQR 3-32) in RRT and 42 days (IQR

13-134) in non-RRT patients. Adjusted (for age, bilirubin, INR, and HF) competing risk regression showed a subhazard ratio of 2.56 (95%CI 1.47-4.46) for death in RRT compared to non-RRT patients.
Conclusions: In one of the largest studies of patients who require RRT at the time of TIPS, we found RR of death in RRT patients was 2.7 times that of non-RRT patients. Death occurred rapidly at median of 11 days. More investigation is required to determine whether the increased risk of mortality experienced by end-stage liver disease patients who require RRT is due to the TIPS procedure or an artifact of a higher baseline mortality rate.
CITATION INFORMATION: Ge J., Boike J., German M., Morelli G., Spengler E., Said A., Lee A., Hristov A., Desai A., Couri T., Paul S., Frenette C., Christian-Miller N., Laurito M., Verna E., Rahim U., Goel A., Gregory D., VanWagner L., Kolli K., Lai J. Outcomes of Transjugular Intrahepatic Portosystemic Shunts (TIPS) in Dialysis-Dependent ESLD Patients: The ALTA Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Ge: None. **J. Boike:** None. **M. German:** None. **G.J. Morelli:** None. **E. Spengler:** None. **A. Said:** None. **A.S. Lee:** None. **A. Hristov:** None. **A. Desai:** None. **T. Couri:** None. **S. Paul:** None. **C. Frenette:** None. **N. Christian-Miller:** None. **M. Laurito:** None. **E. Verna:** None. **U. Rahim:** None. **A. Goel:** None. **D. Gregory:** None. **L. VanWagner:** None. **K.P. Kolli:** None. **J. Lai:** None.

Abstract# 140

Home-based Liver Frailty Intervention (lift) in Liver Transplant Candidates: A Pilot Study

A. J. Thuluvath[1], K. Belfanti[1], S. Morrissey[1], O. Siddiqui[1], J. Peipert[1], A. Daud[1], J. Levitsky[1], T. Bogg[2], A. Flores[1], D. P. Ladner[1], *[1]Northwestern University Transplant Research Collaborative, Chicago, IL, [2]Department of Psychology, Wayne State University, Detroit, MI*
Purpose: Frailty is highly prevalent in patients awaiting LT and is associated with increased waitlist and post-transplant mortality, hospitalizations and LOS. While reduction of frailty is known to improve outcomes, logistically simple and affordable interventions are lacking. In this ongoing pilot study, we tested the feasibility and effectiveness of an evidence-informed home PT intervention to decrease frailty in LT candidates.
Methods: In a single-center prospective study, adult patients were enrolled starting in 10/2020. The "LIver FrailTy" (LIFT) intervention consisted of a baseline evaluation (LFI, 4-meter gait speed [4MGS]), individualized home exercise regimen (with dumbbells, exercise bands), monitoring (smart phone exercise tracking, remote LFI measurement) and check-ins (email reminders, weekly phone calls). Clinical details were extracted from the EHR. Primary outcomes reported are LFI change over time and exercise adherence.
Results: 21 LT candidates were enrolled between 10/2020-12/2020 (expecting enrollment of 150 by 5/2021). Mean age was 54.3 (±10.4) yrs, 12 (57%) were female, 76% White, 10% Black, 10% Hispanic and mean BMI was 30. Cirrhosis etiologies were Biliary (29%), NASH (19%), ETOH (14%), HCV (14%), and Other (24%). The mean MELD was 14.9 (±6.1) and 48% had decompensated cirrhosis. Mean baseline LFI was 3.65 (±0.59) with 5 (26%) robust, 13 (69%) pre-frail and 1 (5%) frail. Baseline grip strength was 27.1 (±10.1) kg and 4MGS was 2.82 (±0.64) sec. Exercise adherence was 56%. The exercise regimen was adjusted 1x for 3 patients, 2x for 1 patient and 3x for another based on patient feedback. Since enrollment (mean time 37 days), no patients developed new decompensating events, received a LT or died. Of the 8 patients who had a repeat LFI measured at 1 month after enrollment, the mean change in LFI was -0.06. LFI improved in 7 (88%) patients and worsened in 1 patient, who was hospitalized 2x during the study period including an ICU stay.
Conclusions: We demonstrate feasibility of a home-based liver frailty intervention. We aim to enroll 150 patients, follow them longitudinally by 5/2021 and present correlations with clinical outcomes (hospitalization, complications and mortality).
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DISCLOSURES: A.J. Thuluvath: None. **K. Belfanti:** None. **S. Morrissey:** None. **O. Siddiqui:** None. **J. Peipert:** None. **A. Daud:** None. **J. Levitsky:** None. **T. Bogg:** None. **A. Flores:** None. **D.P. Ladner:** None.

Abstract# 141

Kidney Transplantation Alone in Patients with Compensated Cirrhosis: A Multicenter Study

A. Kassem[1], S. Asrani[1], S. W. Biggins[2], Y. Darwish[1], M. Nadim[3], B. Fischbach[1], T. Fong[3], *[1]Baylor University Medical Center at Dallas, Dallas, TX, [2]University of Washington, Seattle, WA, [3]USC - Keck, Los Angeles, CA*
Purpose: Patients undergoing kidney transplant (KTA) often have risk factors for liver disease including viral hepatitis and non-alcoholic fatty liver disease (NAFLD). Recent European Association for the Study of the Liver (EASL) and Kidney Disease: Improving Global Outcomes (KDIGO) guidelines recommend kidney transplant alone in patients with cirrhosis without portal hypertension. However, there is limited data on long term outcomes, especially in patients without hepatitis C (HCV). We hypothesized that compensated cirrhosis patients are still at risk for liver related complications after KTA.
Methods: We performed a multi-center study (Baylor University Medical Center at Dallas, Baylor Scott & White All Saints Medical Center, Keck Hospital of University of Southern California, and University of Washington) to assess clinical outcomes in cirrhosis patients undergoing KTA. Clinical outcomes included liver decompensation, hepatocellular carcinoma (HCC), and death. Baseline patient characteristics and outcomes were evaluated over a 5-year period post-KTA.
Results: Across the four centers, 30 KTA recipients were identified to have cirrhosis before or after transplant between 1999-2019. The median age of the patient population was 57 years (IQR 48.5-61.5). 14 of the patients carried a diagnosis of cirrhosis prior to KTA, while 16 were diagnosed after-KTA. Cirrhosis etiologies included HCV (33.3%), alcohol-related liver disease (10%), and NAFLD (26.7%). In total, 6 patients had portal hypertension and grade 1 esophageal varices, with 4 of these patients having been identified prior to transplantation. Early liver decompensation as a result of kidney alone transplant was rare. Within the first year post-KTA, only one patient developed ascites and progressed to CP class B, requiring a liver transplant. 2 patients developed ascites 3-years post-KTA, while 3 patients developed ascites 5-years post-KTA. However, 2 patients developed HCC 1-year post-KTA, and one patient developed HCC 5 years post-KTA. One patient died at the 1-year time point, no patients died at the 3-year time point, and two died at the 5-year time point.
Conclusions: Diagnosis of cirrhosis is common after KTA and may be related to inadequate workup for NAFLD. KTA in compensated cirrhosis is feasible. However, complications of portal hypertension, re-transplantation, liver cancer and death were observed in 40% unique patients within 5 years after KTA. Continued vigilance and surveillance is needed, especially after introduction of recent guidance by relevant professional societies. This is especially important given the increasing burden of NAFLD in patients being evaluated for kidney transplantation.
CITATION INFORMATION: Kassem A., Asrani S., Biggins S., Darwish Y., Nadim M., Fischbach B., Fong T. Kidney Transplantation Alone in Patients with Compensated Cirrhosis: A Multicenter Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Kassem: None. **S. Asrani:** None. **S.W. Biggins:** None. **Y. Darwish:** None. **M. Nadim:** None. **B. Fischbach:** None. **T. Fong:** None.

Heart

Do's and Don'ts of Heart Transplant Care

Abstract# 142

Pregnancy Outcomes in 108 Heart Transplant Recipients

L. A. Coscia[1], A. Yusuf[1], S. Rao[2], S. Constantinescu[3], M. J. Moritz[4], *[1]Transplant Pregnancy Registry International, Philadelphia, PA, [2]University of Virginia Heath System, Charlottesville, VA, [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, [4]Surgery, Lehigh Valley Health Network, Allentown, PA*
Purpose: The purpose of this study was to describe 185 pregnancies in 108 heart transplant recipients.
Methods: Data regarding conceptions occurring between June 1987 and Dec 2019 were collected by the Transplant Pregnancy Registry International (TPRI) via questionnaires, telephone interviews, and medical records. There were 5 recipients included from outside of North America.
Results: The mean age at first transplant was 20±8.4 yrs (range 0.5-39.4 yrs). The transplant to conception interval was 7.7±6.1 yrs (range 0.15-26 yrs) and 44% of the pregnancies were reported as unplanned. Immunosuppression was calcineurin inhibitor-based with 20% exposed to a mycophenolic acid product (MPA). Comorbid conditions during pregnancy included: hypertension 49%, preeclampsia 29%, and diabetes requiring insulin 8%. Rejection occurred during 14 pregnancies (8%) and within 3 months post-partum in 11 pregnancies. Graft loss within 2 years of delivery occurred in 3 recipients; 1 recipient was successfully re-transplanted. Pregnancy outcomes (n=190, includes multiple births) included: 129 live births (16 with MPA exposure), 49 miscarriages (23 with MPA exposure), 8 terminations, 2 ectopic and 2 stillbirths. Of the 129 newborn the mean gestational age was 36.2 ± 3.4 wks and mean birth weight was 2586 ± 713 g; 42 children were breastfed. Birth defects were reported in 10 children and included: duodenal atresia, AV canal defect, Tetralogy of Fallot (MPA exposure); facial deformities (MPA exposure), laryngomalacia (MPA exposure), cystic hygroma, vermian hypoplasia of the cerebellum, hypospadias, undescended testicle, pectus excavatum, hydronephrosis, and tongue-tie. Seven children inherited their mother's cardiac disease; 4 children have received a heart transplant. At last follow-up, mean 8.5 ± 6.8 yrs, 36 recipients had died (average age of their 40 children at time of maternal death was 10.2 ± 6.8 yrs), 6 had reduced cardiac function, 1 lost to follow-up, and 65 recipients reported adequate transplant function.
Conclusions: This is the largest reported series of pregnancies in heart transplant recipients to date. Live births were reported in 68% of the pregnancies. MPA exposure continues to present significant concerns. Pre-pregnancy counseling should include discussion of the possibility of pregnancy, inheritable cardiac conditions, MPA avoidance, risk of rejection/graft dysfunction, and long-term maternal survival. All centers worldwide are encouraged to have their recipients participate in the TPRI.

CITATION INFORMATION: Coscia L., Yusuf A., Rao S., Constantinescu S., Moritz M. Pregnancy Outcomes in 108 Heart Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.A. Coscia: None. **A. Yusuf:** None. **S. Rao:** None. **S. Constantinescu:** None. **M.J. Moritz:** None.

Abstract# 143

DSA is Associated with Molecular Changes in Many Hearts with Minor Abnormalities but Not Diagnosed as Antibody-Mediated Rejection

P. Halloran[1], K. S. Madill-Thomsen[1], &. the INTERHEART Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]., ., AB, Canada*

Purpose: We previously developed a microarray-based diagnostic system (MMDx) for heart transplant endomyocardial biopsies, measuring gene expression and interpreting antibody-mediated and T cell-mediated rejection (ABMR, TCMR) using machine-learning classifiers. The present study aimed to determine whether DSA induced mild ABMR-related changes in hearts not diagnosed as rejection.

Methods: The multicenter INTERHEART study NCT02670408 included 1320 biopsies (645 patients) assessed by MMDx; 824 biopsies had DSA measured at time of biopsy. Figure 1 plots biopsies' molecular distribution using Uniform Manifold Approximation and Projection (UMAP) based on rejection-associated transcript scores as inputs, colored by various features.

Results: Using published rules, MMDx subdivided biopsies with No-rejection into Normal, Minor, and Early injury (fig 1A). DSA was associated with ABMR but was positive in many biopsies with No-Rejection (fig 1B).

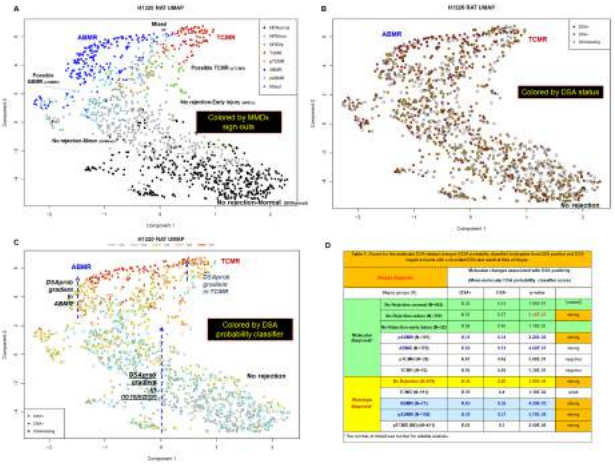
A "DSAprob" molecular classifier was developed to estimate probability of DSA positivity and detect DSA-related and ABMR-related transcript changes. DSAprob predicted ABMR (AUC 0.90) better than DSA positivity (AUC 0.72) because some DSA does not produce molecular changes. DSAprob was strongly associated with ABMR-related NK cell (e.g. CCL4, KLRD1) or IFNG-inducible (e.g. TAP1, PLA1A) transcripts.

DSAprob detected a gradient of mild molecular changes in biopsies with No rejection, particularly those with Minor changes (fig 1C). DSAprob in No rejection biopsies correlated with DSA positivity.

In Table 1, DSAprob was low in pristine No rejection-Normal biopsies, even if DSA positive, but mildly increased in many No-rejection-Minor biopsies, particularly when DSA-positive (Table 1). DSAprob was also increased in histology No-rejection when they were DSA positive. DSAprob scores were highest in DSA positive biopsies with ABMR but also in TCMR (Table 1).

DSA positive biopsies with No rejection had mildly elevated transcript set scores and classifier scores related to ABMR, but not to TCMR or injury. No rejection biopsies from DSA positive patients had elevated NK and IFNG-inducible transcripts compared to DSA negative patients.

Conclusions: Thus DSA is associated with mild molecular ABMR-related changes in many hearts not currently diagnosed clinically or histologically as ABMR, particularly those with Minor changes. Thus DSA stress on the microcirculation is considerably more widespread than previously appreciated. ClinicalTrials.gov NCT02670408 (heart).



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DISCLOSURES: P. Halloran: Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **K.S. Madill-Thomsen:** None. **&. the INTERHEART Study Group:** None.

Abstract# 144

Quilty Lesions are Associated with a Tolerance Profile in Heart Allografts Biopsies

J. Torrealba, S. Moore, S. Sathirareuangchai, L. De Las Casas, Q. Cai, *Pathology, UTSW Medical Ctr, Dallas, TX*

Purpose: Previously, in 42 cardiac allograft biopsies, we demonstrated that the presence of Foxp3+ innate and TGF- β + adaptive regulatory lymphocytes in Quilty lesions are associated with higher heart allograft acceptance. In the current study, we aimed to characterize immunomodulatory pathways associated with Quilty lesions by measuring mRNA expression.

Methods: Endomyocardial biopsies of heart allograft from nine patients were included in this study, four with unremarkable endomyocardium (control group) and five with at least one Quilty lesion (Quilty group). No acute T-cell or antibody mediated rejection was present histologically in any of these specimens. Total RNA was extracted from formalin fixed paraffin embedded tissue. Multiplexed mRNA measurement was performed using the nCounter system (NanoString Technologies, Seattle, WA), and data were analyzed with nSolver software (NanoString Technologies, Seattle, WA).

Results: Of 771 gene mRNA levels measured in the NanoString Transplant Immunology Panel, 274 were upregulated in the Quilty group over the control group, with approximately one third related to adaptive immunity and 5% to innate immunity. Higher levels of mRNA expression in the Quilty group were also shown in pathways for hematopoiesis (11%), cytokine (9%), chemokine (7%), cell-extracellular matrix interaction (7%), and apoptosis & cell cycle regulation (5%). More specifically, the mRNA expression of tolerance-associated immunity markers, including FoxP3, TGF-β, and CTLA4, were higher in the Quilty group (2.82, 1.42, and 3.97 fold increase, respectively, with $p < 0.05$). Markers of rejection-associated immunity, including IL-2 and INF-γ, although lower in the quilty group, were not statistically different.

Conclusions: Heart allografts with Quilty lesions have dominant adaptive immunity related mRNA expression with significantly higher mRNA expression of tolerant immunity markers. These data suggest that Quilty lesions, far from passive bystanders, may serve an immunomodulatory role in cardiac allografts. The presence of intra-allograft regulatory T-lymphocyte related signaling in Quilty lesions may help to reduce the risk of rejection and foster allograft acceptance.

CITATION INFORMATION: Torrealba J., Moore S., Sathirareuangchai S., De Las Casas L., Cai Q. Quilty Lesions are Associated with a Tolerance Profile in Heart Allografts Biopsies *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Torrealba: None. **S. Moore:** None. **S. Sathirareuangchai:** None. **L. De Las Casas:** None. **Q. Cai:** None.

Abstract# 145

The Pathology of Heart Allograft Biopsies: Discrepancies in Interpretation Between Conventional Histology and the Molecular Microscope Diagnostic (MMDx®) System

P. Randhawa[1], A. Seitz[2], Y. Huang[1], B. Feingold[2], *[1]Department of Pathology, Pittsburgh, PA, [2]Pediatrics, University of Pittsburgh, Pittsburgh, PA*

Purpose: There is growing interest in using transcriptomics to complement histologic evaluation of allograft hearts. The present study scrutinizes discrepancies between histologic and MMDx® systems and provides a logical framework to understand the underlying reasons.

Methods: Sixty-two allograft biopsies from 22 pediatric HT recipients were clinically graded using the International Society of Heart Transplantation (ISHLT) 2005 criteria. Grade 1R biopsies were further subcategorized into grades 1A, 1B and 2, and grade 2R biopsies into grade 3A and higher, using ISHLT 1990 criteria. Antibody mediated injury was graded as pAMR (0), pAMR (1h+), pAMR (1i+) and pAMR (2). Typically, 2 fragments of tissue from each biopsy were sent for MMDx® analysis by clinical protocol among recipients with clinical concern for rejection (symptoms, new graft dysfunction, increase in DSA, or immediate prior biopsy ≥1B and/or pAMR1h+ or pAMR2-3. Histologic and gene expression findings were correlated and compared with the clinical parameters.

Results: All biopsies without histologic evidence of TCMR and ABMR were also characterized as such by MMDx® (n = 30). MMDx® reported no TCMR in 15/15 biopsies with ISHLT grade 1A and 10/12 grade 1B TCMR (see Table) . The single grade 2 TCMR biopsy in our dataset was interpreted as molecular TCMR. Amongst the 4 biopsies with grade 3A TCMR, 2 were classified as molecular TCMR, one as molecular mixed ABMR/TCMR, and one with neither TCMR nor ABMR. Amongst 36 biopsies with pAMR (0), 8 were classified as molecular ABMR and all patients had concurrent circulating DSA, despite the negative C4d staining. Among biopsies graded pAMR 1h+, 11/18 had molecular findings interpreted as ABMR. MMDx® did not classify ABMR in 5 biopsies (two patients) with pAMR 2 histology, including one with diffuse C4d staining and circulating DSA. However, these biopsies were classified as showing severe injury phenotype.

Conclusions: In this pediatric HTx cohort, MMDx® did not identify TCMR in biopsies with grade 1A, most grade 1B, and occasional grade 2 or 3A rejection. This may reflect lower sensitivity, an arbitrary threshold setting for molecular diagnosis, or misclassification by histologic grading. Detection of ABMR by MMDx® on biopsies graded pAMR0 with circulating DSA highlights the challenges of histology-based diagnosis of ABMR. While these diagnostic discrepancies demonstrate the need for further investigation, they may also suggest that histology and molecular analyses have complementary roles.

Comparison of Histologic and MMDX Diagnoses					
	#	MMDX TCMR	MMDX AMR	Histologic TCMR	Histologic AMR
Grade 1A	15	0	0	15	0
Grade 1B	12	2	0	12	0
Grade 2	1	0	1	1	0
Grade 3A	4	2	1	4	0
pAMR 0	36	1	8	11	0
pAMR 1h+	18	2	11	16	18
pAMR 2	5	0	0	1	5

CITATION INFORMATION: Randhawa P., Seitz A., Huang Y., Feingold B. The Pathology of Heart Allograft Biopsies: Discrepancies in Interpretation Between Conventional Histology and the Molecular Microscope Diagnostic (MMDx®) System *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Randhawa: None. **A. Seitz:** None. **Y. Huang:** None. **B. Feingold:** None.

Abstract# 146

Impact of Statin Intensity on the Incidence of Vascular Events and Graft Survival in Heart Transplant Recipients

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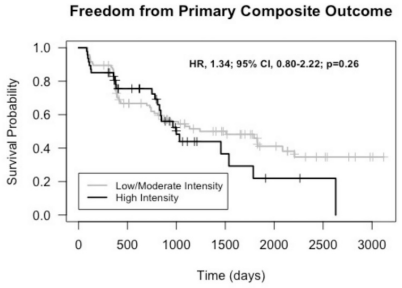
Purpose: Cardiac allograft vasculopathy (CAV) limits long-term graft survival of heart transplant (HT) recipients. In addition to decreased synthesis of cholesterol, statins also demonstrate immunomodulatory effects and slow progression of CAV. Few studies have assessed the effects of statin potency on long-term graft outcomes.

Methods: This single-center, retrospective, cohort study included HT recipients from 2012-2020 who were started on high-intensity statins and compared them to those started on low/moderate-intensity statins within the first six months of HT. The primary endpoint was freedom from a composite of ISHLT CAV1-3, need for percutaneous coronary intervention (PCI), graft loss, or death. Secondary endpoints included each component of the composite endpoint. Cox proportional hazards models were used for primary and secondary outcomes, and event curves were generated using the Kaplan-Meier method. Metabolic parameters were assessed using repeated measures ANOVA.

Results: Of 142 patients included, 47 received high-intensity and 95 received low/moderate-intensity statins within six months of HT. Mean follow-up was longer in the low/moderate-intensity cohort (4.4 ± 2.2 vs. 3.1 ± 1.9 years; p=0.0008). Baseline characteristics were similar between groups, aside from induction therapy and baseline triglycerides (Table 1). Aspirin use was common (97.9% high-intensity vs. 96.8% low/moderate-intensity; p=0.99); Sirolimus conversion was similar between groups (38.3% high-intensity vs. 34.7% low/moderate-intensity; p=0.82). There was no significant difference in the primary outcome (HR, 1.34; 95% CI, 0.80-2.22; p=0.26), even after controlling for induction therapy and pre-transplant hyperlipidemia. There were no significant differences in any of the secondary outcomes. After 12 months of follow-up, low-density lipoprotein marginally increased in the low/moderate-intensity cohort (0.87 ± 43.3 mg/dL high-intensity vs. 12.6 ± 32.1 mg/dL low/moderate-intensity; p=0.22).

Conclusions: This study suggests that early initiation of high-intensity statins provides no benefit in the prevention of long-term adverse vascular and graft outcomes compared to low/moderate-intensity statins. Given their increased propensity for adverse effects (e.g., myalgias), high-intensity statins may better serve HT recipients with refractory post-HT hyperlipidemia.

Table 1. Baseline Characteristics	High Intensity (n=47)	Low/Moderate Intensity (n=95)	p-value
Age, median (IQR)	57 (50.5-64.5)	59.3 (50.3-65.1)	0.34
White, n (%)	25 (53.2)	45 (47.4)	0.80
Male, n (%)	33 (70.2)	68 (71.6)	0.99
Ischemic cardiomyopathy, n (%)	15 (31.9)	33 (34.7)	0.88
Left-ventricular assist device, n (%)	23 (48.9)	54 (56.8)	0.48
Cold ischemic time (minutes), median (IQR)	162 (125.5-216.5)	148 (121-188.5)	0.11
Comorbidities, n (%)			
Hypertension	31 (66)	65 (68.4)	0.92
Hyperlipidemia	24 (53.3)	45 (47.4)	0.72
Diabetes	23 (48.9)	39 (41.1)	0.48
CVA/TIA	6 (12.8)	14 (14.7)	0.99
PVD	2 (4.3)	7 (7.4)	0.72
Induction, n (%)			
Steroids	19 (40.4)	48 (50.5)	
Alemtuzumab	9 (19.1)	24 (25.3)	
Anti-thymocyte globulin	17 (36.2)	13 (13.7)	0.04
Desensitization	2 (4.3)	9 (9.5)	
Basiliximab	0 (0)	1 (1.1)	
CMV high-risk mismatch, n (%)	9 (19.1)	19 (20)	0.99
cPRA (%), median (IQR)	30 (0-65)	33 (2-62)	0.72
Changes over 12 months, mean ± SD			
Triglycerides (mg/dL)	18.8 ± 74.7	-5.7 ± 87.9	0.10
HDL (mg/dL)	6 ± 19.9	7.4 ± 20.1	0.84
LDL (mg/dL)	0.87 ± 43.3	12.6 ± 32.1	0.22
Hemoglobin A1c (%)	0.17 ± 1	0.17 ± 1.9	0.84



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Abstract# 147

Assessing the Impact of Acute Major Adverse Kidney Events on Clinical Outcomes in Heart Transplant Recipients

J. E. Kelly[1], C. Perez[1], D. Taber[1], R. J. Tedford[2], B. McMahon[2], S. Alzaidi[1], H. B. Meadows[1], *[1]Pharmacy, MUSC Health, Charleston, SC, [2]Medicine, MUSC Health, Charleston, SC*

Purpose: The purpose of this study was to elucidate contributors to the Major Adverse Kidney Events at 30 days (MAKE-30) outcome in heart transplant recipients and the effect on clinical outcomes.

Methods: This was a single-center longitudinal cohort study of heart transplant recipients from 1/1/2015 to 6/30/2020. Patients less than 18 years old were excluded. MAKE-30, a composite of death, doubling serum creatinine, and renal replacement therapy requirements within the first 30 days after transplant was used to assess differences in clinical outcomes for the patient population. The primary outcome was length of stay post-transplant. Secondary outcomes included eGFR at 3 and 6 months, worsening CKD or diagnosis of ESRD at 6 months, length of ICU stay post-transplant, death within one year of transplant, and readmissions within 6 months.

Results: A total of 81 patients were included in the study. Cardiopulmonary bypass (CPB) time and the presence of right ventricular (RV) failure were higher in the patients that met the MAKE-30 criteria. Otherwise, baseline characteristics were similar between groups (Table 1). In the univariate analysis, length of stay post-transplant was significantly shorter in the patients that did not meet the MAKE-30 criteria (13.6±8.8 vs. 25.8±28.5 days; p=0.014). There was a trend towards less readmissions at 6 months with the non-MAKE-30 group (45.5% vs. 66.7%; p=0.057). eGFR was significantly better in the non-MAKE-30 population at 3 (p=0.002) and 6 months (p=0.029; Table 2). In the multivariable regression analysis, pre-transplant LVADs and the presence of RV failure were associated with a significantly increased risk of meeting the MAKE-30 outcome after controlling for CPB time, UF requirements, time to initiation of calcineurin inhibitors, dose of vancomycin, and inotropic and vasoactive-inotropic score. Less UF requirements offered protection against meeting MAKE-30, although it was not statistically significant (Table 3).

Conclusions: Length of stay was significantly shorter in patients that did not meet the MAKE-30 criteria in this study, and these patients had significantly better long-term renal function at 3 and 6 months. As shown in the multivariate analysis, having

an LVAD prior to transplant and the presence of RV failure put patients at a higher risk of meeting this outcome. As this was a small retrospective study, subsequent studies are warranted to validate these findings.

Table 1. Baseline Characteristics

Characteristic	Met MAKE-30 (n=44)	Did Not Meet MAKE-30 (n=37)	p-value
Age (yr), mean ± SD	52.7 ± 11.0	49.8 ± 13.4	0.293
Black, n (%)	18 (41)	17 (46)	0.649
Male, n (%)	25 (57)	26 (70)	0.212
Weight (kg), mean ± SD	83.3 ± 16.9	83.2 ± 16.0	0.979
Baseline SCr (mg/dL), mean ± SD	1.22 ± 0.36	1.21 ± 0.32	0.854
Baseline GFR (mL/min/m^2), mean ± SD	71.6 ± 33.3	73.5 ± 21.6	0.767
Diabetic, n (%)	16 (36)	10 (27)	0.370
Baseline hemoglobin A1C, mean ± SD	5.9 ± 1.0	5.9 ± 0.8	0.995
Hypertension, n (%)	30 (68)	22 (60)	0.415
Proteinuria present on urinalysis, n (%)	12 (27)	7 (19)	0.318
Etiology for heart failure, n (%) NICM ICM Other	 22 (50) 12 (27) 10 (23)	 16 (43) 9 (24) 12 (32)	0.619
Time to initiation of CNI (days), mean ± SD	**5.3 ± 3.9**	**2.4 ± 1.7**	**<0.001**
IABP requirement pre-transplant, n (%)	11 (25)	12 (32)	0.541
LVAD explant, n (%)	17 (39)	7 (19)	0.053
Hypotension in OR (min ≤ MAP 55), mean ± SD	34.0 ± 35.2	29.7 ± 51.5	0.460
Cardiopulmonary bypass time (min), mean ± SD	**198.8 ± 105**	**155.9 ± 45.5**	**0.024**
Ultrafiltration requirements/kg/min CBP, mean ± SD	0.072 ± 0.078	0.110 ± 0.113	0.084
Piperacillin-tazobactam use, n (%)	25 (57)	19 (51)	0.623
Dose of vancomycin (mg/kg), mean ± SD	15.2 ± 3.3	14.2 ± 2.9	0.154
Inotropic score at 24 hours, mean ± SD	9.97 ± 5.0	8.78 ± 4.7	0.277
Vasoactive-inotropic score at 24 hours, mean ± SD	22.4 ± 13.3	18.8 ± 12.7	0.218
Right ventricular failure present, n (%)	**16 (36)**	**3 (8)**	**0.003**
Primary graft dysfunction present, n (%)	6 (14)	2 (5)	0.216
MAKE-30 criteria met, n (%)* Death Doubling SCr RRT requirements	 3 (7) 44 (100) 14 (32)	 - -	 - -

Table 2. Clinical Outcomes

Characteristic	Met MAKE-30 (n=44)	Did Not Meet MAKE-30 (n=37)	p-value
GFR at 3 months (mL/min/1.73m^2), mean ± SD	**54.6 ± 30.9**	**73.3 ± 19.5**	**0.002**
GFR at 6 months (mL/min/1.73m^2), mean ± SD	**48.1 ± 34.1**	**62.1 ± 18.1**	**0.029**
Length of stay after transplant (days), mean ± SD	**25.8 ± 28.5**	**13.6 ± 8.8**	**0.014**
Length of ICU stay after transplant (days), mean ± SD	14.4 ± 23.2	7.3 ± 7.2	0.076
Worsening CKD at 6 months, n (%)	12 (27.9)	6 (16.2)	0.212
Declared ESRD at 6 months, n (%)	2 (4.7)	0 (0)	0.184
Readmissions within 6 months, n (%)	26 (59.1)	21 (56.8)	0.832

Table 3. Multivariate Analysis of MAKE-30

Characteristic	Odds Ratio	95% Confidence Interval	p-value
LVAD explant	**4.547**	**1.090 to 18.962**	**0.038**
Cardiopulmonary bypass time	1.004	0.993 to 1.014	0.467
Dose of vancomycin	1.093	0.910 to 1.313	0.343
Ultrafiltration/kg/min	0.001	0.000 to 1.276	0.058
Time to initiation of CNI	**1.630**	**1.206 to 2.202**	**0.001**
Inotropic score	0.880	0.747 to 1.038	0.130
Vasoactive-inotropic score	1.018	0.969 to 1.069	0.476
Right ventricular failure present	**10.306**	**1.555 to 68.300**	**0.016**

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DISCLOSURES: J.E. Kelly: None. **C. Perez:** None. **D. Taber:** None. **R.J. Tedford:** None. **B. McMahon:** None. **S. Alzaidi:** None. **H.B. Meadows:** None.

Abstract# 148

Acute Kidney Injury Requiring Dialysis in Heart Transplant Recipients is a Risk Factor for Graft Failure and Overall Mortality

M. A. Merzkani, H. Murad, A. Pottebaum, A. Java, A. Malone, J. Schilling, A. Itoh, R. Delos Santos, T. Alhamad, *Transplant, Washington University, Saint Louis, MO*

Purpose: Acute Kidney Injury (AKI) is a frequent complication of heart transplantation. However, with recent allocation changes, we have increasingly complex patients with a higher incidence of AKI requiring renal replacement therapy. In this study, we evaluate the impact of AKI requiring dialysis on heart graft survival and overall mortality.

Methods: We identified adult patients (≥ 18 years old) with a solitary heart transplant between 1/1/2000 and 9/04/2020 from the Organ Procurement Transplantation Network data. We excluded patients who were on hemodialysis prior to heart transplant. Multivariate Cox regression analysis was performed and adjusted for age, sex, Body Mass Index, length of stay, ischemic time, serum creatinine prior to transplant, previous heart transplant and rejection in the first year.

Results: A total of 40910 solitary heart transplant recipients were identified. Of these, there were 3927 (9.6%) that required dialysis after transplantation. Our cohort's mean age was 52.69 ±12.69 years, with a predominance of males (74.31%) and Caucasians (68.87%). Compared to patients without the need for dialysis, patients that developed AKI requiring dialysis had a significantly higher risk of graft failure [adjusted hazard ration (aHR 1.31 95% CI 1.095-1.57)] and patient death (aHR1.28 95% CI (1.17-1.40) over 5.82 ± 5.03 years of follow up

Conclusions: There was a significant association between AKI requiring dialysis and the risk of overall mortality and heart graft failure. Large, prospective studies will be needed to identify how to prevent severe AKI in these patients in order to improve heart graft and patient survival.

Table 1. Baseline characteristics

Clinical Characteristics	f(%) or mean ±SD
Sex recipient (Male)	30302 (74.31%)
Age (years)	52.69 ± 12.69
BMI (kg/m2)	27.14 ± 4.88
Caucasians	28171(68.87%)
Age of the donor (years)	31.85 ± 13.68
Sex donor(Male)	26970 (70.44%)
Time (min) censored (years)	5.82±5.03
Ischemic time (hours)	3.19 ± 1.05
CVD	3276 (8.32%)
Serum Creatinine baseline (mg/dl)	1.24 ± 0.60
Length of stay (days)	20.33 ±
Previous transplant	995 (2.44%)
Rejection the first year	7907 (19.32%)

Table 2. Hazard regression of heart graft failure and overall mortality

	Graft failure				Overall mortality			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
Risk factors	HR	95% CI	HR	95% CI	HR	CI	HR	95% CI
AKI with dialysis	5.14	2.87-5.45	1.31	1.095-1.57	5.16	1.02-1.51	1.28	1.17-1.40
Age	0.973	0.971-0.976	0.985	0.982-0.988	1.0086	1.007-1.010	1.007	1.005-1.009
Male recipient	0.84	0.78-0.89	0.96	0.861-1.01	1.06	1.01-1.09	1.08	1.02-1.13
BMI	1.014	1.007-1.021	1.01	1.001-1.014	1.017	1.013-1.020	1.01	1.11-1.02
Creatinine prior transplant	1.017	0.96-1.07	1.024	0.965-1.086	1.1	1.087-1.12	1.05	1.02-1.08
Age of the donor	1.008	1.006-1.010	1.011	1.007-1.015	1.011	1.010-1.012	1.012	1.008-1.016
Sex donor	0.96	0.89-1.03	1.09	0.99-1.21	0.97	0.94-1.009	1.04	1.02-1.13
Length of stay	1.0026	1.0013-1.0039	1	0.997-1.002	1.0049	1.0036-1.0061	1.004	1.001-1.006
Ischemic time	1.086	1.051-1.122	1.004	0.97-1.56	1.065	1.046-1.090	1.017	0.996-1.037
Extended Criteria donor	1.43	1.401-1.47	1.08	0.89-1.42	1.41	1.39-1.54	1.024	0.91-1.26
Previous heart Transplant	1.753	1.47-2.085	1.25	0.95-1.57	1.08	1.018-1.33	1.23	1.08-1.49
Rejection in the first year	1.65	1.53-1.80	1.55	1.42-1.70	1.36	1.30-1.42	1.38	1.33-1.45

CITATION INFORMATION: Merzkani M., Murad H., Pottebaum A., Java A., Malone A., Schilling J., Itoh A., Delos Santos R., Alhamad T. Acute Kidney Injury Requiring Dialysis in Heart Transplant Recipients is a Risk Factor for Graft Failure and Overall Mortality *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.A. Merzkani: None. **H. Murad:** None. **A. Pottebaum:** None. **A. Java:** None. **A. Malone:** None. **J. Schilling:** None. **A. Itoh:** None. **R. Delos Santos:** None. **T. Alhamad:** None.

Abstract# 149

Acute Dialysis, Mortality and Renal Failure After Heart Alone Transplant by Egfr and Dialysis Requirement in the United States

M. Aljuhani[1], T. Alexy[1], S. Jackson[2], C. Martin[1], R. Kandaswamy[3], S. Riad[1], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Complex Care Analytics, Fairview Health Services, Minneapolis, MN, [3]Surgery, University of Minnesota, Minneapolis, MN*

Purpose: We examined the early acute dialysis, 90-day mortality and one-year ESRD among OHT recipients by eGFR and dialysis requirement before transplantation.

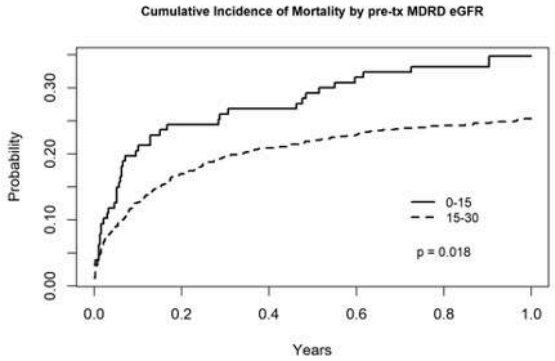
Methods: Utilizing the SRTR file, we identified all adult primary heart transplant recipients with eGFR less than 30 mL/min between 2000 and 2018. Recipients were categorized into 2 groups based on eGFR < 15 mL/min (n=127) and between 15-30 mL/min (n=901). Pre-transplant variables and post-transplant outcomes not subject to censoring were compared between the study groups using chi-square or Wilcoxon tests. For multivariable analysis, the outcomes of acute dialysis, 90-day mortality and one-year ESRD were analyzed using a generalized linear mixed model with transplant center as a random effect. Models were adjusted for age, gender, transplant indication, pre-transplant dialysis, last waitlist status and time on the waiting list.

Results: Acute dialysis post-transplant was more frequently observed in recipients with eGFR < 15 mL/min as compared to recipients with eGFR> 15 mL/min (54% vs. 32.7%, p<0.001). 90-day mortality was observed in 24.9 % of the lower eGFR group and 18.2% of the other group. Overall, the cumulative risk of mortality was higher in the lower eGFR group (Figure 1). The prevalence of renal failure among the surviving recipients was higher in recipients with eGFR< 15 mL/min as compared to those with > 15 -30 mL/min (29.3 % vs. 10.2%, p < 0.001). In the multivariable model, dialysis requirement before heart transplant alone was a strong predictor of acute dialysis, 90-day mortality and 1-year ESRD. Compared to recipients with eGFR< 15 mL/min, those with eGFR > 15-30 mL/min had lower risks of needing acute dialysis and 1-year ESRD. Recipients with congenital heart disease had a 2.6-fold increased risk of 90-day mortality than recipients with non-ischemic transplant indications.

Conclusions: Owing to the high mortality of 35% at one year, heart transplant alone does not appear to be a viable option for those with low eGFR (<15 mL/min) or requiring dialysis. In comparison, the 15-30 mL/min group had lower mortality, approaching that of the Heart-Kidney transplant, and of those who survived, the majority 90% remained free of dialysis at one year. Perhaps, heart transplant alone with a safety net (either with advanced LD or DD) should be considered in this group. Our results are limited by the lack of data on renal failure acuity, which will need to be addressed in the future.

Table 1: Post-Transplant Acute Dialysis, 90-Day Mortality and 1-year ESRD

	0-15 mL/min	>15-30 mL/min	p-value
Recipient Cardiac Output L/min	4.77 [3.30, 6.05]	4.60 [3.60, 5.70]	0.846
Post-Transplant Acute Dialysis	***67 (54.0)***	***288 (32.7)***	***<0.001***
90-Day Mortality	31 (24.4)	164 (18.2)	0.120
1-Year Mortality	***44 (34.6)***	***228 (25.3)***	***0.033***
1-Year ESRD	***24 (29.3)***	***68 (10.4)***	***<0.001***



CITATION INFORMATION: Aljuhani M., Alexy T., Jackson S., Martin C., Kandaswamy R., Riad S. Acute Dialysis, Mortality and Renal Failure After Heart Alone Transplant by Egfr and Dialysis Requirement in the United States *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Aljuhani: None. **T. Alexy:** None. **S. Jackson:** None. **C. Martin:** None. **R. Kandaswamy:** None. **S. Riad:** None.

Pharmacy

The Metabolism Milleu: Updates in Pharmacokinetics and Pharmacogenomics

Abstract# 150

Economic and Clinical Benefit of Cmv Matching in Kidney Transplantation

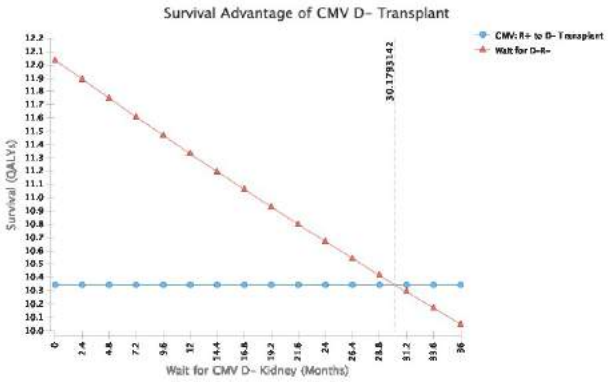
D. Axelrod[1], S. Chang[2], A. Olyaei[3], D. Malinoski[3], D. Norman[3], K. Lentine[4], M. Schnitzler[4], D. Segev[5], J. Lockridge[3], *[1]Univ of Iowa, Iowa City, IA, [2]Washington Univ, Seattle, WA, [3]Oregon Health Sciences Univ, Portland, OR, [4]Saint Louis Univ, Saint Louis, MO, [5]Johns Hopkins, Baltimore, MD*

Purpose: Recently, kidney transplant (KTx) centers in Oregon collaborated to preferentially allocate cytomegalovirus-seronegative (CMV D-) kidneys to seronegative recipients (CMV R-), successfully reducing high-risk CMV D+/R- KTx by 84%. CMV R- recipients waited 5.5 months longer for KTx than those who were CMV D+. This protocol was evaluated using a decision analysis with a lifetime horizon to assess the potential clinical and economic benefits of a national policy change to reduce CMV mismatch transplant.

Methods: A Markov model was used to compare the cost and outcome of D+/R- transplant with D-/R- transplant, including 5.5 months of additional waiting time. Economic inputs included Medicare part A and B payments for dialysis-dependent waitlist patients through post-transplant. Prophylaxis cost was determined using average wholesale price for 6 months of valganciclovir with PCR monitoring (D+/R-) and 1 month valacylovir (D-/R-). Utility estimates for dialysis, KTx, and post-KTx were used to calculate quality-adjusted life years (QALYs) from UNOS graft and patient survival data, including a 3% annual discount rate. Results were applied to 2018 deceased donor KTx results.

Results: The estimated cost of KTx and lifetime post-transplant care differed significantly by donor status (D+R- $542,963 vs. D-R- $516,867 per person, P <.0001), including the cost of 5.5 months of additional waiting time. Similarly, D-R- KTx was associated with a quality-adjusted lifetime survival (D-R-: 11.7 QALYs vs. D+/R- 10.4 QALYS). These results were robust, with waiting times as long as 30 months (Figure). In 2018, 2699 D+/R- deceased KTx were performed. Reallocating D- organs from R+ to R- KTx could have saved $70,433,104 and increased survival by 3,378 QALYs.

Conclusions: A shift to a national strategy of CMV donor and recipient matching would result in decreased cost and improved survival for CMV-seronegative recipients, despite slightly longer waiting times. Because D+ could be reallocated to R+ recipients, transplant access should not be adversely affected. The allocation system could be adjusted to allow for CMV mismatch exceptions in difficult-to-match patients (eg, high PRA).



CITATION INFORMATION: Axelrod D., Chang S., Olyaei A., Malinoski D., Norman D., Lentine K., Schnitzler M., Segev D., Lockridge J. Economic and Clinical Benefit of Cmv Matching in Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Axelrod: Consulting Fee; Name of Commercial Interest; CareDx, Sanofi. Consulting Fee; Nature of Relationship; Consulting, Specialist Direct. **S. Chang:** None. **A. Olyaei:** None. **D. Malinoski:** None. **D. Norman:** Other; Name of Commercial Interest; Astellas. Other; Nature of Relationship; Chairman of Data Safety Monitoring Board. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. **D. Segev:** None. **J. Lockridge:** Consulting Fee; Name of Commercial Interest; Alexion. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Alexion, Sanofi. Honoraria; Nature of Relationship; Speakers Bureau.

Abstract# 151

Belatacept Pharmacokinetic Analysis Comparing Belatacept Early Steroid Withdrawal Trial (BEST) with Benefit and Benefit-ext Trials

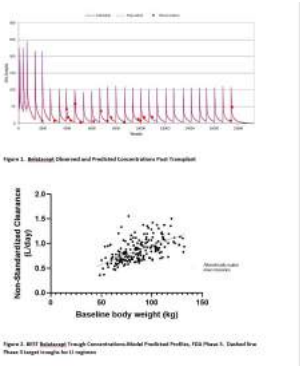
A. Bickenbach[1], M. McGowan[1], B. Miyagawa[2], T. Mizuno[2], A. Shields[3], A. Christianson[1], P. West-Thielke[4], J. Leone[5], E. Woodle[1], D. Kaufman[6], A. Wiseman[7], A. Matas[8], A. Vinks[2], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Childrens Med Center, Cincinnati, OH, [3]Christ Hospital, Cincinnati, OH, [4]UIC, Chicago, IL, [5]Tampa Gen, Tampa, FL, [6]U Wisconsin, Madison, WI, [7]Centura Transplant, Denver, CO, [8]U Minnesota, Minneapolis, MN*

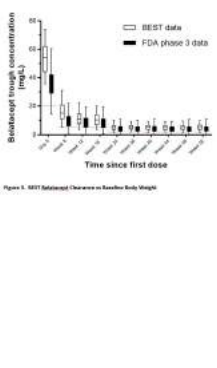
Purpose: Belatacept(BELA) pharmacokinetic(PK) studies informed dosing in phase 3 studies where fixed mg/kg dosing compared a less intense(LI) and more intense(MI) regimen. LI was preferred over MI due to better risk/benefit profile. We compared PK parameters observed in the BELA Early Steroid withdrawal Trial (BEST) with previous reports.

Methods: Samples analyzed BELA troughs via a validated quantitative enzyme-linked immunoassay. Clearance(Cl) was estimated with Bayesian estimation using clinical software MWPharm++(Mediware). Published population PK model was employed as the Bayesian prior. Allometric scaling adjusted for body weight. Individual concentration profiles generated estimated exposure parameters; troughs, area under the curve(AUC), average concentration(Cave), cumulative AUC(cAUC), and cumulative average(cCave). PK parameters were analyzed by age ≥60, race, gender, BMI ≥30, rejection and infection.

Results: 876 BELA troughs in 191pts were analyzed. Bayesian predicted concentrations agreed with observed concentrations(R^2=0.88)**.** Figure 1 illustrates the model-based BELA concentration profiles with observations. Exposure was higher compared to previous reports (Figure 2) especially during induction phase. There were no differences in PK parameters observed based upon alemtuzumab vs r-ATG induction. The allometrically standardized Cl was comparable (0.74 vs 0.86L/day/70kg) and inter-individual variability in Cl was low (CV=22% vs 21%) in BEST and Zhou et al. Positive correlation between body weight and Cl(Figure 3) and Cavg was consistent across body weights. Significantly higher Cl was observed for patients <60 and AA. No differences in allometrically scaled Cl was observed by BMI or sex. Exposure was greater when BMI≥30 and male. There were no differences in exposure in rejecting pts, however, pts with any infection, viral, and BK had significantly higher exposure.

Conclusions: BELA PK was no different between alemtuzumab and r-ATG, but was higher than observed in trials using basiliximab and steroids. Reducing BELA exposure during the induction phase by reduced mg/kg doses or other anthropometric measures may be warranted. BELA concentration controlled trials may be considered to further optimize dosing.





CITATION INFORMATION: Bickenbach A., McGowan M., Miyagawa B., Mizuno T., Shields A., Christianson A., West-Thielke P., Leone J., Woodle E., Kaufman D., Wiseman A., Matas A., Vinks A. Belatacept Pharmacokinetic Analysis Comparing Belatacept Early Steroid Withdrawal Trial (BEST) with Benefit and Benefit-ext Trials *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Bickenbach: None. **M. McGowan:** None. **B. Miyagawa:** None. **T. Mizuno:** None. **A. Shields:** None. **A. Christianson:** None. **P. West-Thielke:** None. **J. Leone:** None. **E. Woodle:** None. **D. Kaufman:** None. **A. Wiseman:** None. **A. Matas:** None. **A. Vinks:** None.

Abstract# 152

Cyp3a5 Extensive Metabolizer Phenotype May be Associated with an Increase in Class 2 Donor Specific Antibodies and Antibody-Mediated Rejection

S. Mirza[1], N. Wilson[2], J. Van Zyl[2], P. Nguyen[2], T. Sam[2], S. Hall[2], M. Askar[2], R. Patel[2], *[1]Texas Tech Univeristy Health Sciences Center Jerry H. Hodge School of Pharmacy, Dallas, TX, [2]Baylor University Medical Center at Dallas, Dallas, TX*

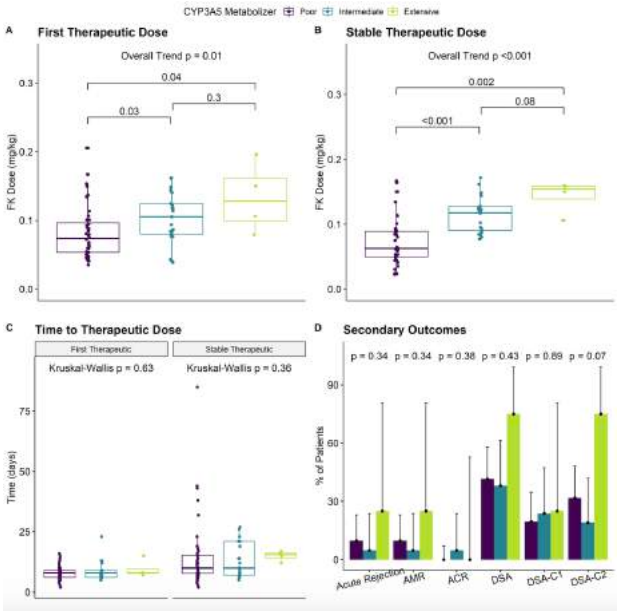
Purpose: Tacrolimus (TAC) metabolism is highly dependent on CYP3A5, yet there is limited data on the effect of CYP3A5 genetic polymorphisms in heart transplant recipients (HT). The purpose of this study is to identify associations between CYP3A5 phenotypes and weight-normalized TAC dose at therapeutic level (TL), time to TL, time to stable TL, donor specific antibodies (DSA) development, and rejection.

Methods: We conducted a retrospective, single center review of HT transplanted 12/2018 to 08/2020. Patients were excluded if they were started on extended-release TAC, received combined organ transplant, or discharged on medications that significantly interact with TAC. TL was defined as 8-15 ng/mL and stable TL as 3 consecutive TLs. Patients were grouped by non-CYP3A5*1 carriers (poor metabolizers, PM), *1 heterozygous (intermediate metabolizers, IM), and *1 homozygous (extensive metabolizers, EM). If the patient was on sublingual TAC, the dose was reported as two-fold. All patients were on fluconazole 100 mg daily. Overall differences between metabolizer groups were assessed using Kruskal Wallis and Jonckheere Trend tests if continuous, and Chi-Square, Fisher Exact, or Cochran-Armitage Trend tests if categorical. Two group comparisons were made with Wilcoxon Rank Sum, Chi-Square, or Fisher Exact tests.

Results: Of 66 HT analyzed, 41 were CYP3A5 PM, 21 IM, and 4 EM. First therapeutic TAC doses were significantly higher in the EM and IM compared to the PM (Fig. 1A). The stable therapeutic TAC dose was significantly lower in the PM group when compared to the IM and EM (Fig. 1B). Time to TLs were similar in all groups, however a trend towards longer time to stable TL in EM was observed (Fig. 1C). Additionally, there was a trend for a higher rate of Class 2 DSA (DSA-C2) and AMR in EM (Fig. 1D).

Conclusions: We observed higher incidence of DSA-C2 and AMR in the EM group that might be related to prolonged time to stable TL. Thus, CYP3A5 phenotype testing may help identify HT who would benefit from increased DSA monitoring. These data warrant further exploration in larger cohorts.

	Poor Metabolizers (PM): non-CYP3A5*1 carriers (n=41)	Intermediate Metabolizers (IM): CYP3A5*1 heterozygous (n=21)	Extensive Metabolizers (EM): CYP3A5*1 homozygous (n=4)	P value
Gender, male, n (%)	31 (76)	18 (86)	4 (100)	0.51
Age, years, median [IQR]	58 [55, 65]	63 [60, 67]	58 [55, 62]	0.14
Race, n (%)				<0.001
• Caucasian	33 (80)	9 (43)	0 (0)	
• Hispanic/Latino	2 (5)	5 (24)	0 (0)	
• African American	5 (12)	7 (33)	4 (100)	
• Other	1 (2)	0 (0)	0 (0)	
Length of Hospital Stay, days, median [IQR]	13 [9, 18]	12 [8, 22]	13 [7, 18]	0.78
Cause of Heart Failure, n (%)				0.17
• ICM	14 (41)	8 (38)	0 (0)	
• NICM	20 (49)	10 (48)	3 (75)	
• Infiltrative	0 (0)	0 (0)	1 (25)	
• Other	4 (10)	3 (14)	0 (0)	
Tacrolimus Initial Formulation, n (%)				0.97
• Sublingual	4 (10)	2 (10)	0 (0)	
• Suspension	9 (22)	4 (19)	0 (0)	
• Capsule	28 (68)	15 (71)	4 (100)	
Tacrolimus Initial Dose				
• mg/day, median [IQR]	2 [2, 4]	3 [2, 4]	2 [1.75, 2]	0.12
• mg/kg/day, median [IQR]	0.02 [0.02, 0.05]	0.03 [0.02, 0.05]	0.02 [0.02, 0.02]	0.17
Antimetabolite at Discharge, n (%)				0.84
• Mycophenolate	32 (78)	15 (71)	3 (75)	
• Azathioprine	7 (17)	4 (19)	1 (25)	
• None	2 (5)	2 (10)	0 (0)	
Antibody Induction, n (%)				0.70
• None	34 (83)	19 (90)	4 (100)	
• Simulect	3 (7)	2 (10)	0 (0)	
• Antithymocyte Globulin	4 (10)	0 (0)	0 (0)	
Positive Flow Crossmatch, n (%)				
• T cell	3 (7)	0 (0)	0 (0)	0.62
• B cell	8 (20)	2 (10)	0 (0)	0.62



CITATION INFORMATION: Mirza S., Wilson N., Van Zyl J., Nguyen P., Sam T., Hall S., Askar M., Patel R. Cyp3a5 Extensive Metabolizer Phenotype May be Associated with an Increase in Class 2 Donor Specific Antibodies and Antibody-Mediated Rejection *AJT, Volume 21 Supplement 3*

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Abstract# 153

Evaluate the Effect of Cresemba (isavuconazonium Sulfate) Capsule and Noxafil (posaconazole) Delayed Release Tablets on Tacrolimus Dose to Concentration (D/C) Ratios in Lung Transplant Recipients

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Purpose: Evaluate the effect of Cresemba (isavuconazonium sulfate) capsule and Noxafil (posaconazole) delayed release tablet on tacrolimus dose to concentration (D/C) ratio in lung transplant.

Methods: This retrospective review included adult lung transplant recipients at University Transplant Center from 1/1/2017-10/1/2020. Patients received concomitant therapy of immediate-release tacrolimus with one of the following triazoles for antifungal prophylaxis or treatment of invasive fungal disease for a minimum of 7 days: posaconazole (PSZ) delayed release (DR) tablet or isavuconazonium sulfate (ISV) capsule. A matched pair analysis compared the following outcomes pre-triazole initiation and 7-30 days post-triazole initiation: tacrolimus trough (mg/dL), total daily dose of tacrolimus (mg), total weight-based total daily dose of tacrolimus (mg/kg), and tacrolimus D/C ratio. In addition, percentage change in tacrolimus D/C ratio was calculated pre- and post-triazole initiation.

Results: Fifty lung transplant recipients were screened for inclusion in the study, with 41 patients meeting study criteria. A total of 34/41 patients received PSZ DR

tablets (Table 1). Of these patients, 22/34 were transitioned from previous triazole therapy to PSZ DR tablets and experienced a 47% reduction in tacrolimus D/C ratio after conversion to PSZ DR tablets. Twelve patients were newly initiated (de novo initiation) on PSZ DR tablets and experienced a 50% reduction in tacrolimus D/C ratio post-triazole initiation. A 35% reduction in tacrolimus D/C ratio was observed when transitioning to ISV from previous triazole therapy (P=0.69) (Table 2).

Conclusions: This data suggests when initiating patients on PSZ DR tablets or converting from a previous triazole, a tacrolimus dose reduction of approximately 50% is required. Although there was not statistical significance, switching from a previous triazole to ISV may require less of a tacrolimus dose reduction. More patients would need to be gathered to see if this holds true. Limited evidence exists to navigate tacrolimus dose adjustments with de novo initiation and converting between triazole antifungals. This study provides guidance on management of tacrolimus dosing when initiating newer triazole antifungal agents.

Table 1. Effects of posaconazole delayed release tablets on concomitant therapy with tacrolimus (N=34)

Outcome (Median, IQR)	De Novo PSZ DR start (N=12)			Switch to PSZ DR from prior triazole (N=22)		
	Pre-PSZ	Post-PSZ	P value	Pre-PSZ	Post-PSZ	P value
Tacrolimus trough (mg/dL)	10.2 (8.2-12.1)	12.4 (9.5-15)	**0.002**	10.3 (8.23-12.18)	11.65 (9.45-14.2)	**0.02**
Tacrolimus daily dose (mg)	3 (1.5-6)	2 (1-3)	**0.002**	3 (1-6)	2 (1-3)	**0.03**
Tacrolimus daily dose (mg/kg)	0.04 (0.02-0.08)	0.03 (0.02-0.05)	**0.002**	0.04 (0.02-0.08)	0.03 (0.02-0.05)	**0.02**
Tacrolimus D/C ratio	0.32 (0.13-0.56)	0.16 (0.1-0.27)	**0.0005**	0.32 (0.12-0.58)	0.17 (0.1-0.27)	**0.0006**

PSZ DR: posaconazole delayed release tablet; D/C: Dose to concentration

Table 2. Effects of switching to ISV from prior triazole on concomitant therapy with tacrolimus (N=7)

Outcome (Median, IQR)	Pre-ISV	Post-ISV	P value
Tacrolimus trough (mg/dL)	10.4 (8.6-12.2)	10.2 (9.4-13.5)	0.73
Tacrolimus daily dose (mg)	2.5 (1.5-5.5)	2 (1.5-3.5)	0.88
Tacrolimus daily dose (mg/kg)	0.03 (0.02-0.07)	0.03 (0.02-0.05)	0.81
Tacrolimus D/C ratio	0.31 (0.12-0.61)	0.2 (0.1-0.3)	0.69

ISV: isavuconazonium sulfate; D/C: Dose to concentration

CITATION INFORMATION: Sweiss H., Kincaide E., Levine D., Hall R. Evaluate the Effect of Cresemba (isavuconazonium Sulfate) Capsule and Noxafil (posaconazole) Delayed Release Tablets on Tacrolimus Dose to Concentration (D/C) Ratios in Lung Transplant Recipients *AJT, Volume 21 Supplement 3*

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Abstract# 154

ABCC2 Haplotypes Associations to Mycophenolic Acid Pharmacokinetics in Stable Renal Transplant Recipients

K. Tornatore[1], D. Brazeau[2], C. Meaney[3], J. Consiglio[4], A. Gundroo[5], S. Chang[6], G. Wilding[4], L. Cooper[3], *[1]Pharmacy Practice, School of Pharmacy; University at Buffalo- SUNY, Buffalo, NY, [2]Pharmacy Practice, Marshall University, Huntington, WV, [3]Pharmacy Practice, School of Pharmacy; University at Buffalo, Buffalo, NY, [4]Biostatistics, School of Public Health; University at Buffalo, Buffalo, NY, [5]Medicine, School of Medicine; Ohio State University, Columbus, OH, [6]Medicine, School of Medicine; University at Buffalo, Buffalo, NY*

Purpose: Mycophenolic acid (MPA), exhibits interpatient pharmacokinetic (PK) variability attributed to enterohepatic circulation of the glucuronide metabolite (MPAG) to MPA. This is mediated by multidrug resistance-associated protein 2(MRP2), which is encoded by *ABCC2.* MPAG conversion contributes to MPA PK variability and may be impacted by calcineurin inhibitors or transporter polymorphisms. This study investigated *ABCC2* haplotypic associations to MPA pharmacokinetics in stable renal transplant recipients receiving calcineurin inhibiters.

Methods: Pharmacogenomic analysis of prospective, cross-sectional studies evaluated 147 stable recipients receiving tacrolimus(TAC) and MPA or cyclosporine (CYA) and MPA. MPA pharmacokinetics included trough 12hr, Area Under the Concentration-Time curve 0-12 hours (AUC 0-12hr),and clearance (CL). The MPA therapeutic target exposure (AUC 0-12hr) was 30 to 60 mg•hr/L. The *ABCC2* genotypes: *ABCC2* 1249 C>T(rs2273697); *ABCC2* -24C.T (rs717620) and *ABCC2* 3972 C>T (rs3740066) were determined. Haplotype phenotypic associations were computed using THESIAS(v. 3.1) based upon the Combined Treatment groups (TAC-MPA plus CYA-MPA) with a sub-analysis based upon individual calcineurin inhibitor regimens.

Results: For the Combined Treatment analysis, 51% of all participants exhibited the wild-type (WT) haplotype, CGC, and had slower MPA CL with greater AUC 0-12hr that was in the target range compared to the 18% of recipients with the variant haplotype, CGT who achieved sub-therapeutic exposure. Similar findings are reported for the Tacrolimus-MPA regimen. No differences were found between the WT and variant haplotype with the Cyclosporine-MPA regimen. See Table below which summarizes significant results of Combined and Tacrolimus-MPA Treatment groups.

Conclusions: The variant *ABCC2* haplotype, CGT, contributes to sub-therapeutic MPA exposures and influences interpatient variability in pharmacokinetic phenotypes when compared with the WT, CGC in the Combined Treatment groups and Tacrolimus-MPA regimens.

ABCC2 Haplotype Associations to MPA Pharmacokinetic Phenotypes

		Combined Treatment N=147 (% Partici-pants)			TAC-MPA N=67 (% Partici-pants)	
MPA PK Mean (±95% Confidence Interval)	WT CGC (51%)	Variant CGT (18%)	P Value	WT CGC (52%)	Variant CGT (22%)	P Value
Trough C12hr (mg/L)	1.63 (1.39-1.87)	1.01 (0.42-1.61)	0.078	2.25 (1.87-2.63)	1.33 (0.411-2.25)	0.081
AUC 0-12hr (mg•hr/L)	31.06 (27.83-34.30)	18.03 (8.40 -27.66)	0.018	39.96 (34.59-45.32)	20.06 (4.08 -36.0)	0.031
Clearance (L/hr)	7.11 (5.74 - 8.49)	11.04 (8.80 -13.27)	0.013	4.58 (3.53 - 5.63)	7.22 (5.7-8.73)	0.014

CITATION INFORMATION: Tornatore K., Brazeau D., Meaney C., Consiglio J., Gundroo A., Chang S., Wilding G., Cooper L. *ABCC2* Haplotypes Associations to Mycophenolic Acid Pharmacokinetics in Stable Renal Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Tornatore: None. **D. Brazeau:** None. **C. Meaney:** None. **J. Consiglio:** None. **A. Gundroo:** None. **S. Chang:** None. **G. Wilding:** None. **L. Cooper:** None.

Abstract# 155

Impact of Cypa5 Status on the Clinical and Financial Outcomes of Kidney Transplant

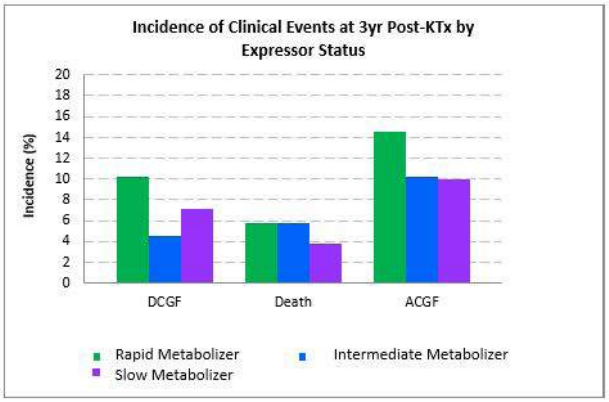
J. Obayemi[1], B. Keating[2], K. Lentine[3], M. Schnitzler[3], H. Xiao[3], V. Dharnidharka[4], D. Axelrod[5], *[1]Univ of Michigan, Ann Arbor, MI, [2]Univ of Pennsylvania, Philadelphia, PA, [3]Saint Louis Univ, Saint Louis, MO, [4]Washington Univ, Seattle, WA, [5]Univ of Iowa, Iowa City, IA*

Purpose: Pharmacogenetic profiling of transplant recipients has demonstrated marked variation in the metabolism of immunosuppressive medications, particularly tacrolimus. Patients of African ancestry have been found to express loss-of-function mutations in the CYP3A5 gene less often than patients of other racial backgrounds, resulting in rapid metabolism of tacrolimus. Patients with this rapid metabolism require higher dosing to achieve adequate trough levels and are exposed to a greater risk of toxicity from elevated peak levels.

Methods: The CYPA5 mutation status (*3,*6, or *7) of 286 adult AA kidney transplant (KTx) recipients (96%) was determined retrospectively using gene-wide analysis and categorized as 0 mutations (rapid metabolizers), 1 mutation (intermediate metabolizers), and 2 mutations (slow metabolizers). KTx outcomes (patient survival, kidney survival, and total Medicare spending) were determined using linked transplant registry and transplant claims data.

Results: Among the cohort, 23% were rapid, 47% were intermediate, and 30% were slow metabolizers of tacrolimus. At 3 years, the rate of death-censored graft failure and all-cause graft failure was highest in the rapid metabolizers and lowest in the intermediate metabolizers (Figure). First-year Medicare reimbursement differed significantly (rapid, $79,535; intermediate, $72,796, and slow, $79,346, *P*=0.02). After adjustment for donor and recipient characteristics, intermediate metabolizers were $4400 less expensive than rapid metabolizers (*P*=.007).

Conclusions: Pharmacogenomic assessment of AA KTx recipients may be useful to guide therapy, because CYPA5 status appears to be associated with outcome and spending after transplant.



Characteristics	Estimate	Pr > ChiSq
Intercept	74488.47	<.0001
Fast metabolizer	Ref	
Intermediate metabolizer	-4404.19	0.0073
Slow metabolizer	-734.957	0.6767
Age 18-30	10195.11	0.0011
Age 30-45	Ref	
Age 45-60	1847.150	0.2658
Age >60	1083.964	0.5795
Female	-1817.26	0.1990
Preemptive transplant	-11194.2	0.0189
Dialysis duration 0-25 months	Ref	
Dialysis duration 25-60 months	-62.1738	0.9762
Dialysis duration >60 months	320.4488	0.8800
PRA <10	Ref	
PRA10-79	1799.462	0.3263
PRA >80	1160.986	0.6270
Previous transplant	-1016.98	0.6230
Living donor	1522.514	0.6724
KDPI ≤20	-2363.64	0.2098
KDPI 20-85	Ref	
KDPI >85	2770.376	0.2614

CITATION INFORMATION: Obayemi J., Keating B., Lentine K., Schnitzler M., Xiao H., Dharnidharka V., Axelrod D. Impact of Cypa5 Status on the Clinical and Financial Outcomes of Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Obayemi: None. **B. Keating:** Consulting Fee; Name of Commercial Interest; United Health. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Optum. Honoraria; Nature of Relationship; Speaker. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. **H. Xiao:** None. **V. Dharnidharka:** Consulting Fee; Name of Commercial Interest; Atara Bio. Consulting Fee; Nature of Relationship; Consulting. **D. Axelrod:** Consulting Fee; Name of Commercial Interest; CareDx, Sanofi. Consulting Fee; Nature of Relationship; Consulting, Specialist Direct.

Abstract# 156

Pharmacokinetic Analysis of Direct Acting Antiviral Use on Weight-Adjusted FK506 Trough/dose Ratios in Obese Kidney Transplant Recipients

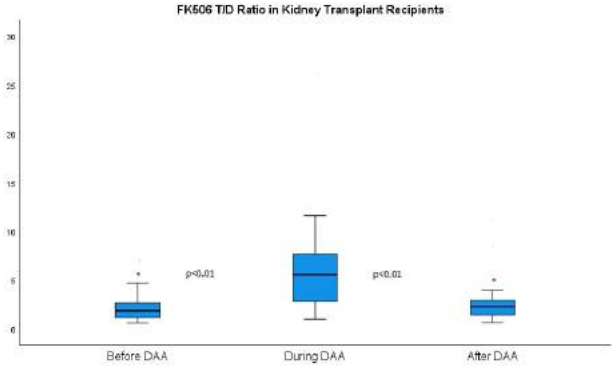
A. Demirag[1], P. L. Lobo[2], J. Oberholzer[1], A. Kumar[2], B. Rawashdeh[1], S. L. Lennon[1], H. N. Guvener Demirag[1], A. Doyle[2], J. Geystone[3], K. L. Brayman[1], *[1]Transplantation, University of Virginia Medical Center, Charlottesville, VA, [2]Transplantation Nephrology, University of Virginia Medical Center, Charlottesville, VA, [3]Clinical Pharmacy, University of Virginia Medical Center, Charlottesville, VA*

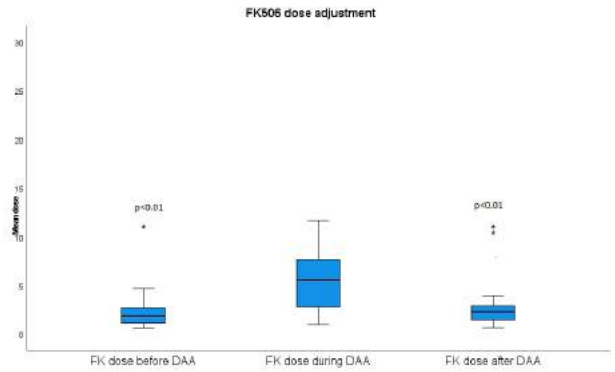
Purpose: Using hepatitis C viremic (HCV) organs in kidney transplant recipients(KTRs) is very important to decrease the number of patients on the waiting list. Direct acting antivirals (DAA) are highly effective at curing HCV infection, but the pharmacokinetic implications of DAA use on calcineurin inhibitor therapy in KTRs are incompletely described. The aim of this study is to investigate the effects of DAA on FK506(FK) trough/dose (T/D) ratio and rejection rate in KTRs.

Methods: This is a single-center, retrospective analysis of HCV negative KTRs who received HCV kidneys followed by 12-weeks of DAA therapy. Immunosuppression(IS) was administered based on our transplant center protocol: prednisone, FK and mycophenolate. Dose of FK was adjusted to keep FK levels at desired levels based on our IS protocol. FK T/D ratio was determined while patients were on a stable dose of FK to maintain the desired steady-state T level prior to, during, and after DAA treatment. FK T levels were quantitated twice per week and a steady state was determined when the desired level was attained at three consecutive measurements.

Results: Fourty-four HCV negative organ recipients received HCV positive deceased donor kidney allografts between 3-2019 and 6-2020. Median age was 57 years (IQR 50-66). The FK T/D ratio was greater during DAA treatment (5.54, IQR 2.79-7.65) compared to before treatment (1.85, IQR 1.12-2.67) (p<0.01), after completion of treatment (2.25, IQR 1.41-2.89) (p<0.01). Six KTRs developed cellular acute rejection (ACR) post DAA treatment within the first 6 months post-transplant(p<0.01).

Conclusions: DAA treatment in kidney transplant recipients decreases FK elimination leading to a decrease, by about 40% in FK dosing during DAA therapy. Cessation of DAA therapy leads to an increase in ACR possibly because of delays in increasing the FK dose. Larger studies are warranted to validate these findings.





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Abstract# 157

De-novo Use Comparison Between Extended-release Once-daily Tacrolimus (Envarsus Xr®) and Immediate-release Twice-daily Tacrolimus (Prograf®) - A Single Center's Experience

N. Singh[1], T. Le[1], M. S. Naseer[1], S. Asmil[1], A. Palermini[1], A. Qamar[1], R. Chand[1], S. Tandukar[1], D. Aultman[2], H. Shokouh-Amiri[2], G. Zibari[2], *[1]Transplant, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA, [2]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA*

Purpose: Envarsus XR® is approved for de-novo use post-kidney transplantation at a higher starting dose (0.14mg/kg/day) as compared with Prograf® (0.1 mg/kg/day) despite better bioavailability. The goal of this study was to compare the initial dosing and pharmacokinetic profile of these two formulations at our center early post-transplantation.

Methods: We evaluated 106 Envarsus XR® patients (Aug 2016 to Jun 2020) and 109 Prograf® patients (Jun 2008 to Nov 2016). We compared the two formulations for patient demographics, initial dose, therapeutic dose, maintenance dose, and time taken for drug level to become detectable and therapeutic.

Results: Compared with Prograf®, Envarsus XR® patients received a higher initial starting dose (0.09 ± 0.03 vs. 0.06 ± 0.03 mg/kg/day, $p < 0.01$), but required lower doses to reach target level ≥ 6 ng/ml (0.12 ± 0.05 vs. 0.16 ± 0.06 mg/kg/day, $p < 0.01$) and target level ≥ 10 ng/ml (0.14 ± 0.06 vs. 0.17 ± 0.07 mg/kg/day, $p < 0.01$). Time taken for drug level to first become detectable and achieve therapeutic levels were also significantly lower in Envarsus XR® patients (Table 1). The rejection episodes, graft survival, patient survival, delayed function, and adverse events is currently being compared between the two groups.

Table 1: Results

	Envarsus (n=106)	Prograf (n=109)	P-Value
Time (d) for drug level to be first detectable, mean ± SD	2.77 ± 1.60	4.45 ± 2.12	<0.01
Time (d) to reach drug level ≥6 ng/ml, mean ± SD	4.12 ± 2.37	7.12 ± 4.82	<0.01
Time (d) to reach drug level ≥10 ng/ml, mean ± SD	6.67 ± 6.23	12.00 ± 8.72	<0.01
Initial starting dose (mg/kg), mean ± SD	0.09 ± 0.03	0.06 ± 0.03	<0.01
Therapeutic dose (mg/kg) for target level ≥6 ng/ml, mean ± SD	0.12 ± 0.05	0.16 ± 0.06	<0.01
Therapeutic dose (mg/kg) for target level ≥10 ng/ml, mean ± SD	0.14 ± 0.06	0.17 ± 0.07	<0.01
Maintenance dose (mg/kg) at Day-30, mean ± SD	0.13 ± 0.08	0.16 ± 0.07	>0.05

Conclusions: Envarsus XR® provides the advantage of reaching a therapeutic level earlier with a lower dose as compared with Prograf®.

CITATION INFORMATION: Singh N., Le T., Naseer M., Asmil S., Palermini A., Qamar A., Chand R., Tandukar S., Aultman D., Shokouh-Amiri H., Zibari G. De-novo Use Comparison Between Extended-release Once-daily Tacrolimus (Envarsus Xr®) and Immediate-release Twice-daily Tacrolimus (Prograf®) - A Single Center's Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Singh: Grant/Research Support; Name of Commercial Interest; CareDx, Transplant Genomics. Grant/Research Support; Nature of Relationship; PI on Studies. Honoraria; Name of Commercial Interest; CareDx, Transplant Genomics, Viracor, Mallincrokdt, Veloxis. Honoraria; Nature of Relationship; Speaker Bureau. **T. Le:** None. **M.S. Naseer:** None. **S. Asmil:** None. **A. Palermini:** None. **A. Qamar:** None. **R. Chand:** None. **S. Tandukar:** None. **D. Aultman:** None. **H. Shokouh-Amiri:** None. **G. Zibari:** None.

Infections in Kidney Recipients

Abstract# 158

Posttransplant Malignancy in HIV+ Kidney Transplant Recipients

D. Sawinski[1], R. Fitzsimmons[1], J. Locke[2], J. Trofe-Clark[1], B. Shelton[2], P. Reese[1], E. Blumberg[1], *[1]Hospital of the University of Pennsylvania, Philadelphia, PA, [2]University of Alabama at Birmingham, Birmingham, AL*

Purpose: Kidney transplant recipients and people living with HIV are both at increased risk for malignancy, including cancers that are virally-mediated. Despite the recognition of malignancy as an important contributor to mortality in both populations, the impact of HIV and kidney transplantation together on post-transplant cancer rates has not been systematically studied.

Methods: We linked data from the OPTN/UNOS and USRDS to assemble a cohort of first kidney transplant recipients from 1/1/01-12/31/16 who had Medicare Part A and B claims. Using ICD-9 codes, we identified cancer outcomes via validated cancer claims from Medicare data. We used Poisson and negative binomial regression to estimate post-transplant malignancy adjusted incidence rate ratios (aIRR), by HIV and HCV sersostatus. HIV+ and HIV+/HCV+ patients were combined for analysis to improve power. Cancers were considered both individually and in groups: epithelial (breast, prostate, colon, ovary, trachea/bronchus, lung); HPV-related, tobacco-related, and infection-related.

Results: We identified 135,702 HIV-/HCV-, 6781 HCV+, 815 HIV+ and 203 HIV+/HCV+ recipients who met study criteria. 25.3% of the cohort overall had a post-transplant cancer-related Medicare claim and the median time to a cancer claim was 4.9 (1.9-8.9) years after transplant. HIV+ recipients had elevated rates of epithelial (aIRR 1.41, 95% CI 1.10-1.81), HPV (aIRR 4.03, 95% CI 2.59-6.26) and tobacco-related cancers compared to HIV-/HCV- or HCV+ recipients. Infection-related cancers were increased in both HIV+ and HCV+ recipients. Among cancers most prevalent in the general population, HIV+ recipients had elevated rates of lung and colon cancers, as well as melanoma and Non-Hodgkin's lymphoma (Table1).

Conclusions: HIV+ kidney transplant recipients experience rates of many cancers that are elevated beyond rates expected due to transplant alone. Post-transplant screening efforts in HIV+ recipients should focus on lung, colon and skin cancer screenings in addition to HPV-related malignancy surveillance.

Table 1. Adjusted incidence rate ratios among HIV+ and HCV+ kidney transplant recipients for the most common cancer types observed in the general population

	All HIV+		HCV+	
	aIRR*	95% CI	aIRR*	95% CI
Lung	1.97	1.20-3.23	1.51	1.29-1.77
Colon	2.81	1.81-4.35	1.01	0.82-1.25
Liver	1.16	0.44-3.07	6.35	5.43-7.39
Pancreas	1.39	0.45-4.27	1.43	1.05-1.96
Leukemia	1.41	0.73-2.72	1.03	0.79-1.34
NHL	2.26	1.46-3.50	1.05	0.86-1.27
Kidney	0.49	0.31-0.77	0.89	0.78-1.01
Bladder	1.03	0.45-2.31	0.87	0.66-1.13
Melanoma**	2.47	1.03-5.94	0.85	0.61-1.18
Prostate	0.91	0.60-1.38	0.92	0.81-1.06
Breast	1.66	0.80-3.47	0.86	0.66-1.12
Ovary	2.39	0.58-9.79	0.99	0.55-1.78
Uterus	2.21	0.30-16.01	0.83	0.41-1.68

*model adjusted for age, sex, race, cause of end-stage renal disease, pretransplant cancer diagnosis, time on dialysis, donor type, induction, discharge immunosuppression, and transplant year

**limited to Caucasians

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Abstract# 159

Influence of Induction Therapy and Antiretroviral Regimen on Outcomes in HIV Positive Renal Transplant Recipients

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Purpose: Transplantation of HIV+ individuals has become more common over the past decade with increasing data supporting good outcomes. Questions remain regarding the impact of induction and antiretroviral (ARV) choice on long-term outcomes.

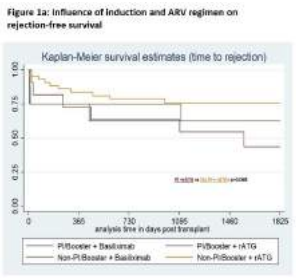
Methods: We performed a multicenter retrospective analysis of outcomes in HIV+ kidney transplant (KT) recipients from 2004-2019. Recipients of HIV + donors and kidneys with primary non-function were excluded. Outcomes included rejection, graft and patient survival stratified by induction immunosuppression and ARV regimen.

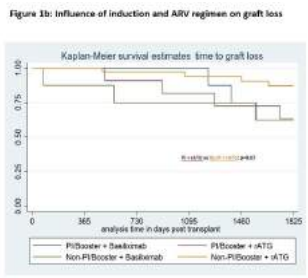
Results: There were 78 KT in 77 patients at 5 US transplant centers. Clinical characteristics and outcomes are shown in Table 1. Rejection at any time occurred in 38% (30/78 KT). Those with rejection were more likely to be younger, African American, and to have received a deceased donor kidney (all p<0.05). Among 78 the transplants, 29 were on a protease inhibitor (PI) at KT; 11 of 29 (37%) switched to non-PI-based ARVs. This occurred more frequently after 2009 (58.8%) compared to before 2009 (8.3%). The lowest rates of rejection and highest graft survival were seen in recipients who received Anti-thymocyte globulin (rabbit) (rATG) induction and were on non-PI-based ARVs as illustrated in Figure 1a and Figure 1b. Among those receiving rATG, there was a trend to higher rejection and graft loss in those on PI-based ARV (p=0.07). There were no differences in death-censored graft loss or patient survival.

Conclusions: Our results align with previous studies showing a benefit of rATG and non-PI-based ARVs on KT outcomes. Results from this study may influence selection of ARV regimens and induction therapy in HIV+ kidney transplant recipients.

	No Rejection (n=48)	Rejection (n=30)	p-value
Demographics			
Age (Median[IQR])	51 [45 – 56]	47 [41 – 51]	0.028
Male gender (n [%])	41 [85.4%]	21 [70.0%]	0.10
Race			
Caucasian	19 [39.6%]	5 [16.7%]	0.03
African American	25 [52.1%]	23 [76.7%]	0.03
Hispanic	4 [8.3%]	2 [6.7%]	0.58
End Stage Renal Disease Cause			
Diabetes Mellitus	15 [31.2%]	5 [16.7%]	0.19
Hypertension	16 [33.3%]	12 [40.0%]	0.55
Glomerulonephritis	3 [6.2%]	2 [6.7%]	1.00
HIV nephropathy	24 [50.0%]	23 [76.7%]	0.019
Drug Induced	5 [10.4%]	1 [3.3%]	0.40
Other	12 [25.0%]	4 [13.3%]	0.26
Other Clinical Characteristics			
Donor type			
Living donor recipient	14 [29.2%]	1 [3.3%]	0.005
Deceased donor recipient	34 [70.8%]	29 [96.7%]	
Repeat transplant	2 [4.2%]	2 [6.7%]	0.64
Baseline CD4 count (Median[IQR])	547 [383 – 742]	485 [310 – 660]	0.30
Positive HIV VL at transplant	5 [10.6%]	3 [10.0%]	1.00
HCV Ab+ recipient	11 [22.9%]	7 [23.3%]	1.00
CMV status		18 [60.0%]	
Intermediate – (R+)	34 [70.8%]	12 [40.0%]	0.26
High – (D+/R-)	13 [27.1%]		
Induction agent			
Anti-thymocyte globulin (rabbit)	34 [70.8%]	21 [70.0%]	
Basiliximab	10 [20.8%]	6 [20.0%]	1.0
No induction	4 [8.3%]	3 [10.0%]	
PI based regimen*	11 [22.9%]	10 [33.3%]	0.43
Induction ARV Combo			
PI/Booster + no induction	1 [2.1%]	1 [3.3%]	
PI/Booster + Basiliximab	5 [10.4%]	3 [10.0%]	
PI/Booster + rATG	5 [10.4%]	6 [20.0%]	0.86
Non-PI/Booster + no induction	3 [6.2%]	2 [6.7%]	
Non-PI/Booster + Basiliximab	5 [10.4%]	3 [10.0%]	
Non-PI/Booster + rATG	29 [60.4%]	15 [50.0%]	
Outcomes			
Delayed Graft Function	23 [47.9%]	14 [46.7%]	0.91
Graft loss	10 [20.8%]	16 [53.3%]	0.003
Death	8 [17.4%]	3 [10.3%]	0.51
Death with a functioning graft	7 [14.6%]	2 [6.7%]	0.47
Time to rejection in days (Median[IQR])	—	217 [20 – 988]	n/a
Length of follow up in years (Median[IQR])	6.5 [4.0 - 9.6]	8.0 [4.4 - 11.2]	0.35

*- Protease inhibitor (PI) based regimen = Patients who received a PI based ARV regimen for > 6 months or who experienced rejection while on a PI within 6 months of transplant





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Abstract# 160

Outcomes of Kidney Transplantation in HIV Positive Highly Sensitized Recipients

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Purpose: Since the introduction of highly active antiretroviral therapy, HIV+ individuals are living longer, which has led to higher rates of end stage renal disease and kidney transplantation has become of increasing interest in this demographic. Renal allograft survival in HIV+ patients has lagged behind that of comparable cohorts and has been associated with increased rates of acute rejection. Additionally, increased rates of positive cross-matches in these recipients has impacted organ utilization. This study focuses on outcomes of kidney transplantation in HIV+ patients who are highly sensitized as described by a PRA value 90%-100% and/or with a positive cross match.

Methods: Data was gathered from the 2018 UNOS database, in which a total of 1530 HIV+ patients who received kidney transplants were selected. PRA values were grouped to create sensitization levels: non-sensitized (0%), low (1%-50%), medium (51%-89%), and highly sensitized (90%-100%). A demographics table was created to compare characteristics and outcomes between the four sensitization groups. A separate demographics table was created for non-sensitized and highly sensitized groups who also had a positive cross match. Subject characteristics were summarized using means and standard deviations or frequencies and percentages, as applicable. Significance between groups was determined by independent samples t-tests and χ^2 tests ($\alpha = 0.05$.). Death-censored graft survival for various subgroups was estimated using Kaplan-Meier with Log-Rank to assess significance. All analysis was completed using SPSS Statistics 26.

Results: The median graft survival for all 1530 patients is 792 days. The median graft survival for the non-sensitized group is 738 days while the median graft survival for the highly sensitized group is 990 days. The corresponding Kaplan-Meier graph displays no significant difference in the survival curves of the four groups; furthermore the highly sensitized group is the highest curve. The median graft survival for the non-sensitized group with a positive cross match is 2031 days while the median graft survival for the highly sensitized group with a positive cross match is 1606.5 days. The corresponding Kaplan-Meier graph displays that the survival curve of the highly sensitized group is slightly less than that of the non-sensitized group.

Conclusions: Graft survival is comparable for the highly sensitized compared to the non-sensitized group.HIV+ patients with a PRA value >= 90% should not be excluded from transplantation nor considered at higher risk when compared to non-sensitized patients. The highly sensitized HIV+ patients with a positive cross match did exhibit a lower median graft survival, however, when comparing both the non-sensitized and highly sensitized to the overall study population, both groups had significantly higher median graft survival.

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DISCLOSURES: S. Karhadkar: None. **J. Panichella:** None. **H. Resweber:** None. **K. Nguyen:** None. **A. Di Carlo:** None. **S. Karhadkar:** None.

ID

Abstract# 161

Infectious Complications After Belatacept Conversion in Kidney Transplant

J. E. Marvin[1], D. Amenyedor[1], M. M. Azar[2], K. Belfield[1], V. Do[1], R. Formica[3], E. Cohen[1], *[1]Pharmacy, Yale New Haven Hospital, New Haven, CT, [2]Section of Infectious Diseases, Yale School of Medicine, New Haven, CT, [3]Section of Nephrology, Yale School of Medicine, New Haven, CT*

Purpose: Tacrolimus (tac), a calcineurin inhibitor, is associated with multiple adverse effects when used for immunosuppression following kidney transplant (KT). Belatacept (bela) is a monoclonal antibody that blocks the co-stimulatory T-cell activation pathway that has been shown to be effective with a favorable side effect profile. However, studies assessing long-term infectious complications with bela compared to tac are limited. The purpose of this study was to determine the incidence of infections in patients converted to bela compared to those maintained on tac.

Methods: In this retrospective study, KT recipients receiving bela between 2012 and 2020 were matched 1:1 to those receiving tac based on transplant date, decade of age, induction immunosuppression, and CMV mismatch. Tac patients were followed from the matched date of bela conversion. Baseline demographics collected were cause of kidney failure, bela dosage, incidence of infections, hospitalizations, biopsy-proven acute rejection (BPAR) and mortality. Patients were followed until study conclusion, death, or discontinuation of bela. The primary outcome was the incidence of an infection. Outcome data was calculated using chi-square, Fisher's exact test, or student's t-test where appropriate.

Results: A total of 328 matched patients (164 bela, 164 tacrolimus) were included in the analysis with no differences in baseline characteristics. Median time from transplantation to bela conversion was 254 days (IQR 102 - 597). Median time of overall bela exposure was 584 days (IQR 274 - 1022). 119 patients had at least one infection, 42.7% in bela vs 29.9% in tac (RR 0.7; 95% CI: 0.520 - 0.936). Median time to infection post-conversion was 304 days in bela vs 267 days in tac (p = 0.927). There were no significant differences in the incidence of infections between groups, except for bacterial pneumonia leading to hospitalization which occurred in 11 patients; 10 in bela and 1 in tac (RR 0.1; 95% CI: 0.017 - 0.595). There were 43 initial episodes of BPAR post-conversion, 65.1% in bela vs 34.9% in tac (RR 0.5; 95% CI: 0.299 - 0.954).

Conclusions: In this retrospective analysis of KT recipients, bela was associated with a higher rate of bacterial pneumonia leading to hospitalization and BPAR compared to tac.

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Abstract# 162

Optimal Antimicrobial Duration for Donor Positive Cultures in Kidney Transplant Recipients

J. Ferrante, K. Schnelle, M. Palettas, S. Sarwar, H. Winters, M. Chunduru, *Pharmacy, The Ohio State University Wexner Medical Center, Columbus, OH*

Purpose: Utilization of organs from infected donors carries the risk of transmission of the donor organism to the recipient. While antimicrobials are recommended in recipients for 7 to 14 days, the optimal duration is unknown. This study compared the incidence of clinical failure in kidney transplant recipients (KTR) receiving a short (≤7 days) (SC) vs long course (>7 days) (LC) of antimicrobial therapy.

Methods: This was a retrospective single center study. Adult deceased donor KTR from 10/2011 to 11/2019 were included if the recipient was treated for a positive donor blood or urine culture. KTR were excluded if they received a multi-organ transplant, donor culture data was unavailable, or the donor had a documented complicated infection. The primary outcome was 30-day incidence of clinical failure defined as rehospitalization with receipt of antimicrobials, resumption of antimicrobials for the original donor-derived infection, all-cause mortality, or graft loss. Secondary objectives included the incidence of *Clostridioides difficile* infection (CDI), multidrug resistant organisms (MDRO), and adverse effects from antimicrobials.

Results: A total of 81 KTR were included [Table 1]. Of the donor cultures, 40 were blood, 40 were urine, and both were positive in one donor. The majority of organisms were gram positive (54%). The most commonly prescribed initial therapy was a penicillin (31%) and a fluoroquinolone (28%) was the main step-down therapy [Table 2]. No difference was detected in the clinical failure composite between the SC vs LC groups (32% vs 26%, p=0.55) and no documented transmission was detected. However, more recipients in the LC group had a CDI (14% vs 0%, p=0.021) and more recipients in the SC group developed a MDRO (26% vs 9%, p=0.048). The groups were similar for the secondary outcomes of acute kidney injury, hepatotoxicity, gastrointestinal toxicity, and rash.

Conclusions: The incidence of clinical failure was not significantly different between the SC and LC groups. However, using shorter durations of antimicrobials may minimize the incidence of CDI, while maintaining the ability to prevent donor-derived infections.

Table 1. Baseline Characteristics

	SC (n=38)	LC (n=43)	p-value
Age (years), mean ±(SD)	52.6 (13.5)	50.5 (11.2)	0.448
Female, n (%)	14 (37)	15 (35)	0.854
Caucasian, n (%)	18 (47)	23 (53)	0.621
BMI (kg/m^2), mean ±(SD)	30.7 (6.2)	28.8 (5.7)	0.155
Length of Stay (days), median [IQR]	6 [5, 9]	6 [6, 9]	0.719
Peri-operative Antibiotics, n (%)			
Cefazolin	33 (87)	36 (84)	0.439
Clindamycin	4 (11)	7 (16)	
Other	1 (3)	0 (0)	
ATG Induction, n (%)	36 (95)	38 (88)	0.180
Immunosuppression at Discharge, n (%)			
CNI	31 (82)	40 (93)	0.118
MTOR	19 (50)	28 (65)	0.169
MPA	27 (71)	18 (42)	0.008
Maintenance Steroids	4 (11)	2 (5)	0.412
PJP Prophylaxis with TMP/SMX, n (%)	36 (95)	37 (86)	0.510

Table 2. Antimicrobial Characteristics

	SC (n=38)	LC (n=43)	p-value
Initial Antimicrobial, n (%)			
Penicillin	10 (26)	15 (35)	0.405
Cephalosporin	9 (24)	12 (28)	0.665
Fluoroquinolone	8 (21)	7 (16)	0.581
Vancomycin	7 (18)	7 (16)	0.799
Antifungal	3 (8)	2 (5)	0.661
Other	4 (11)	1 (2)	0.181
Initial Antimicrobial Route, n (%)			
IV	16 (42)	28 (65)	0.038
PO	22 (58)	15 (35)	
Final Antimicrobial, n (%)			
Penicillin	7 (18)	14 (33)	0.147
Cephalosporin	9 (24)	9 (21)	0.766
Fluoroquinolone	11 (29)	12 (28)	0.918
Vancomycin	4 (11)	1 (2)	0.126
Antifungal	3 (8)	2 (5)	0.661
Other	7 (18)	7 (16)	0.799
Final Antimicrobial Route, n (%)			
IV	10 (26)	5 (12)	0.090
PO	28 (74)	38 (88)	
PICC Line Placed, n (%)	0 (0)	3 (7)	0.097
Antimicrobial duration (days), median [IQR]	7 [6, 7]	12 [10, 14]	<0.001

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Abstract# 163

Treatment of Biopsy-Proven Pyelonephritis of the Transplanted Kidney is Associated with Better Graft Outcomes

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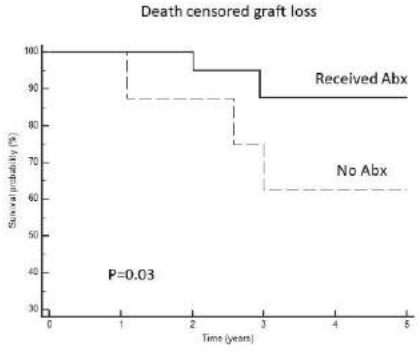
Purpose: The outcomes of treatment of pyelonephritis of the transplant kidney is not known.

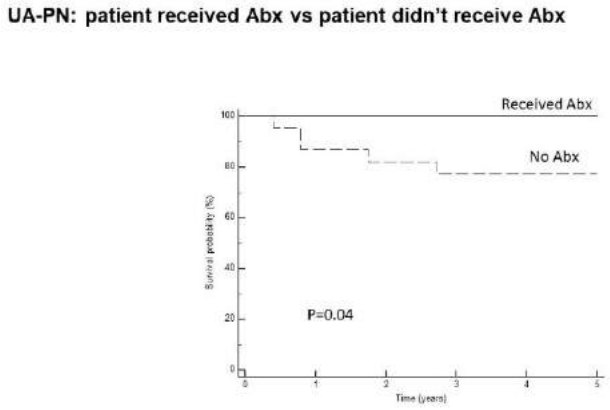
Methods: From 01/1998 to 12/2019, 101 patients were found to have pyelonephritis (PN) on the transplant kidney biopsy. Patients were divided into two groups: those who had positive urine for urinary tract infection (WBC ≥10/hpf with the presence of bacteria on dipstick with squamous cells < 5) (UA+PN) and those who had negative urine for urinary tract infection (UA-PN). The groups were further subdivided into patients who received antibiotics and those who did not.

Results: The mean age at transplant was 44 ± 13 years. The mean time from transplant to diagnosis of pyelonephritis on transplant kidney biopsy was 3.3 ± 4 years. The most common reason for the biopsy in this cohort was elevated creatinine (86%). 38 (37.6%) of the patients with pyelonephritis on biopsy had a negative UA. UA+PN group had significant history of previous UTIs (p=0.004) and had more clinical symptoms of UTI (p=0.01) as compared to UA-PN group. Out of 63 patients in the UA+PN group, 55 (87.3%) received antibiotics. Only 11 of the UA-PN patients (29%) received antibiotics. In the UA+PN group, E. coli was the most common microorganism (62%), followed by klebsiella pneumonia (19%). No organisms were isolated in the UA-PN group. The use of antibiotics in both the UA+PN group (p=0.03) and UA-PN group (p=0.02) was associated with improved death censored graft survival. On multivariate analysis, being white (HR=0.31, p=0.003, 95%Cl 0.142 to 0.68) and the use of antibiotics (HR=0.22, p=0.0002, 95%Cl 0.10 to 0.48) were associated with better graft survival, but evidence of infection in urine did not reach statistical significance (HR=0.52, p=0.09, 95%Cl 0.25 to 1.10). An analysis limited to the 75 patients who had no symptoms of UTI at the time of biopsy produced similar findings, including the benefits of treating biopsy proven PN with antibiotics.

Conclusions: Treatment of this finding with antibiotics regardless of evidence of infection in the urine is associated with improved graft survival. Future studies are needed to better define the risk factors and treatment strategies for this condition.

UA+PN: patient received Abx vs patient didn't receive Abx





CITATION INFORMATION: Aziz F., Saddler C., Alstott J., Swanson K., Parajuli S., Garg N., Djamali A., Mandelbrot D. Treatment of Biopsy-Proven Pyelonephritis of the Transplanted Kidney is Associated with Better Graft Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Aziz: None. **C. Saddler:** None. **J. Alstott:** None. **K. Swanson:** None. **S. Parajuli:** None. **N. Garg:** None. **A. Djamali:** None. **D. Mandelbrot:** None.

Abstract# 164

The Metagenomic Landscape of Renal Transplant

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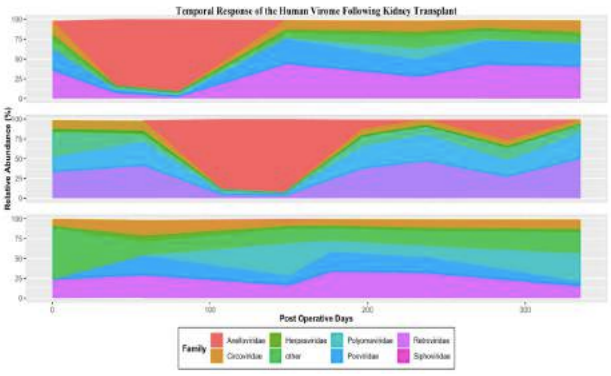
Purpose: The selective targeting of T cells in transplant immunosuppression medications leads to a high rate of viral infections. Different immunosuppression regimens have been shown to have variable effects on protective immunity. We aim to use next-generation sequencing (NGS) to characterize the microvirome of renal transplant patients and examine variance in the context of immunosuppression, rejection, and clinically apparent infection.
Methods: Plasma samples are collected at baseline and at regular intervals after kidney transplant. Three patients with a total of 21 samples were selected as a pilot cohort. These patients were selected because of known clinically significant and quantified viremias (BK and CMV). Cell-free DNA was isolated from plasma using the QIAamp Circulating Nucleic Acid Kit (Qiagen). The isolated DNA was fragmented and appended with dual-indexed bar codes using the NexteraXT DNA Library Preparation kit (Illumina). Libraries were validated by capillary electrophoresis on an Agilent 4200 TapeStation, pooled at equimolar concentrations, and sequenced on an Illumina NovaSeq 6000 at 150PE to a depth of approximately 30 million reads/sample. Low quality reads were computationally removed, and adapters trimmed. Host and contaminant reads were removed, and the remaining sequences aligned against the known virome.
Results: After removal of human, contaminant, and low-quality reads, an average of approximately 400,000 reads per sample remained, representing only 2% of overall reads. Total counts of BK virus or CMV obtained from NGS were compared to viral load levels obtained clinically. The two measurements demonstrated parallel trajectories, confirming the ability of NGS methods to detect and quantify clinically significant viremias. Aligned sequences were plotted by relative abundance over time for each sample. Two samples demonstrated notable expansion of anelloviridae during the first year after transplant. In addition to anelloviridae, herpesviridae, and polyomaviridae, samples also had significant levels of retroviridae and poxviridae.
Conclusions: The microvirome is an underutilized tool to understand protective immunity in the transplant population. We plan to expand this method to banked samples for an additional 20 kidney transplant patients to study the influence of medications and other clinical features on the microvirome. We will also use a complementary contig assembly method to strengthen the mapping of reads to the known virome.



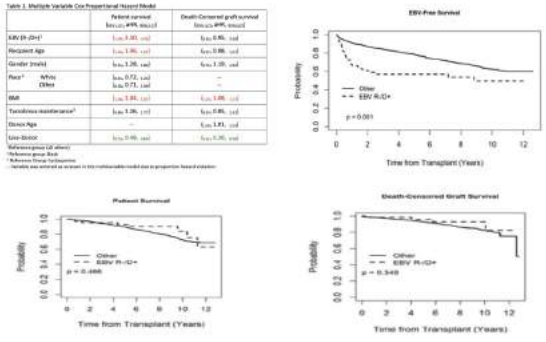
CITATION INFORMATION: Johnson A., Karadkhele G., Larsen C. The Metagenomic Landscape of Renal Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Johnson: None. **G. Karadkhele:** None. **C. Larsen:** None.

Abstract# 165

Impact of High-Risk EBV Discordance Status on Survival Outcomes in Kidney Transplant Recipients: A Multivariable Analysis

A. Dinesh[1], S. Jackson[2], T. L. Pruett[1], S. Riad[3], *[1]Division of Transplantation, Department of Surgery, University of Minnesota, Minneapolis, MN, [2]Biostatistics, Analytics Consulting Services- Solid Organ Transplant, M Health Fairview, Minneapolis, MN, [3]Department of Medicine, University of Minnesota, Minneapolis, MN*

Purpose: High-risk EBV discordance has been linked to Post-Transplant Lymphoproliferative Disorder (PTLD) after kidney transplantation; however, the impact on recipient and graft survival is under-reported. We sought to examine the survival outcomes by EBV concordance status.
Methods: We retrospectively reviewed all primary kidney transplant recipients from 2008-2019. At our institution, we use Thymoglobulin (r-ATG) induction with early steroid withdrawal followed by CNI plus MMF maintenance. We grouped the patients according to EBV status into high-risk status recipients (EBV IgG R-/D+) (n=62) and low-risk status recipients (EBV IgG R+/D+, R+/D- or R-/D-) (n=1224). Kaplan-Meier curves were generated for recipient survival, death-censored graft survival, and EBV infection-free survival. We examined the effect of EBV high-risk status on outcomes of interest in a multivariable Cox proportional hazards model adjusted for age, gender, race, BMI, maintenance immunosuppression, and donor type. EBV-free survival was not modeled due to severe proportional hazard violations.
Results: In univariate analysis, neither patient (log-rank, p=0.466) nor death censored graft survival (log-rank, p=0.349) differed between low and high-risk groups. However, EBV-free survival was significantly lower in the high-risk group (log-rank, p<0.001). In the multivariable model, high-risk EBV status was associated with a 2.3-fold increased risk of mortality compared to low-risk status [HR 2.3, 95% C.I. (1.09, 4.76), p=0.03]. However, EBV status was not a predictor for death-censored graft survival in the adjusted model. The live-donor kidney was associated with 52% improved patient survival and 64% improved graft survival, independent of EBV status.
Conclusions: In primary kidney transplant recipients receiving r-ATG induction immunosuppression followed by CNI plus MMF maintenance with early steroid withdrawal, the incidence of post-transplant EBV viremia is significantly higher in the (R-/D+) group. As compared to low-risk status recipients, EBV high-risk status recipients had increased mortality.



CITATION INFORMATION: Dinesh A., Jackson S., Pruett T., Riad S. Impact of High-Risk EBV Discordance Status on Survival Outcomes in Kidney Transplant Recipients: A Multivariable Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Dinesh: None. **S. Jackson:** None. **T.L. Pruett:** None. **S. Riad:** None.

Kidney

Kidney Desensitization/KPD

Abstract# 166

Desensitization Using Clazakizumab® (anti-il-6) in Highly-hla Sensitized Patients Awaiting Kidney Transplant (nct03380962)

A. A. Vo[1], N. Ammerman[1], E. Huang[1], M. Toyoda[2], S. Ge[2], A. Peng[1], R. Najjar[1], S. Sethi[1], S. Williamson[1], C. Myers[1], K. Lim[1], M. Gillespie[1], S. Jordan[1], *[1]Kidney Transplant, Cedars Sinai Medical Ctr, Los Angeles, CA, [2]Transplant Immunology Laboratory, Cedars Sinai Medical Ctr, Los Angeles, CA*

Purpose: IL-6 is a critical cytokine for plasma cell IgG production. Clazakizumab (CSL Behring LLC) is a humanized monoclonal aimed at the cytokine IL-6. Here we report on 12M follow-up of Phase I/II study of Clazakizumab for DES in highly-HLA sensitized (HS) patients.

Methods: Twenty HS patients received PLEX x5 followed by IVIg 2gm/kg X1; then claza, 25mg SC Q4W X6, with monitoring of HLA antibody and immune parameters. Study end points examined reduction in HLA MFI, rates of transplantation and DSAs pre-& post-tx. Transplanted patients received claza 25mg SC Q4W for up to 12M post-tx, induction with alemtuzumab, and maintained on tac/mmf/pred and protocol biopsy @6M.

Results: Eighteen of 20 showed reduction of HLA MFI after desensitization; 16 were transplanted. Time from dialysis to transplant was 102±54M and from last claza to transplant was 2.5±3.5M. All patients had previous transplants; 63% had cPRA 99-100%, 50% were FCMX+ and 75% were DSA+ @transplant. Figure 1A shows % reduction in MFI specificities after desensitization for CI+II of individual patient. Figure 1B shows that claza Des resulted in a mean reduction of MFI of 45±33% for CI+II HLA antibodies. Figure 2 shows reduction of DSA MFI pre ->12M post-tx. One patient had detectable DSA out to 12M post-tx. Three patients developed rejection CMR/cABMR episodes. Mean eGFR @12M was 56±30ml/min.

Conclusions: Claza treatment resulted in a significant reduction in MFI for CI&II specificities. Only 1 patient had detectable DSAs after 12M post-tx. Clazakizumab appears promising as a desensitization agent when used with PLEX+IVIg.

Figure 1A

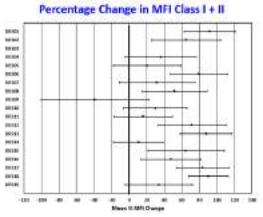


Figure 1B

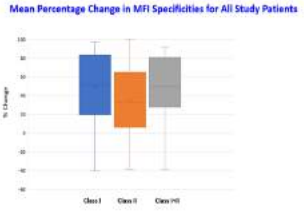
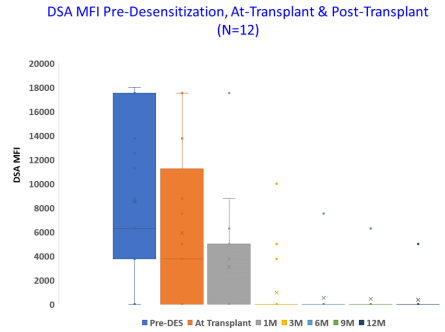


Figure 2



CITATION INFORMATION: Vo A., Ammerman N., Huang E., Toyoda M., Ge S., Peng A., Najjar R., Sethi S., Williamson S., Myers C., Lim K., Gillespie M., Jordan S. Desensitization Using Clazakizumab® (anti-il-6) in Highly-hla Sensitized Patients Awaiting Kidney Transplant (nct03380962) *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.A. Vo: Consulting Fee; Name of Commercial Interest; CareDx. **N. Ammerman:** None. **E. Huang:** Grant/Research Support; Name of Commercial Interest; CareDx, CSL Behring, Veloxus. **M. Toyoda:** None. **S. Ge:** None. **A. Peng:** None. **R. Najjar:** None. **S. Sethi:** None. **S. Williamson:** None. **C. Myers:** None. **K. Lim:** None. **M. Gillespie:** None. **S. Jordan:** Grant/Research Support; Name of Commercial Interest; CSL Behring, Astellas, CareDx.

Abstract# 167

The Effect of Daratumumab (Dara, Humanized Anti-CD38 Monoclonal Antibody) on Immune Cells In Vitro and in a HLA-Sensitized Kidney Transplant Patient (HS KTx Pt) Desensitized (DES) with Dara

S. Ge[1], M. Chu[1], A. De Guzman[1], E. Ortiz[1], A. Vo[2], N. Ammerman[2], S. C. Jordan[2], M. Toyoda[1], *[1]Transplant Immunology Laboratory, Cedars Sinai Medical Center, Los Angeles, CA, [2]Comprehensive Transplant Center, Cedars Sinai Medical Center, Los Angeles, CA*

Purpose: Antibody-Mediated Rejection (ABMR), primarily mediated by B cells, plasma cells (PC) and antibodies (Ab), is an obstacle for successful transplantation in HS KTx Pts. Removal of those by Dara is a promising treatment for DES and ABMR. Here, we investigated the effect of Dara on immune cells (IC) in vitro and in a HS KTx Pt with Dara-DES.

Methods: CD38 expression on IC in normal control (NC) whole blood, and IC numbers in NC PBMC incubated w/ Dara (0-500μg/ml, 0-48 hrs) were measured by flow cytometry. IC profiles pre- and post-Dara (1wk post-1st and 3rd, and 1M post-4th Dara) in a HS KTx Pt with DES w/plasma-exchange + IVIG followed by weekly Dara (16 mg/kg IVPB, ×4) were tested by flow cytometry. Ab-CD16-mediated NK cell (NK) response in Pt PBMC was tested by the modified allo-CFC where Pt PBMC was stimulated with Ab-coated allo-PBMCs followed by intracellular IFNγ+ NK detection.

Results: 100% of monocytes (M), >90% of NK, 80% of B cells (B), 40-50% of T (T) cells expressed CD38. The CD38 expression level is the highest in PC and plasmablasts (PB), high in Breg, NK and M, and moderate in T and the remaining cells. After NC PBMC incubation w/ Dara, the number of M and all lymphocyte (L) cell subsets decreased at 24 & 48 hrs vs. 0 hr in a dose dependent manner. NK% in L significantly decreased, while T% & B% in L did not. A similar IC change was seen in the Dara-treated patient (Table 1); The number of M and all L cell subsets significantly decreased post-Dara. The NK% in L significantly decreased even at 1M post-4th Dara, while the change in T% & B% in L, and follicular T helper (Tfh)% and Treg% in CD4+ T (T4) was minimal. IFNγ+ cell% in NK in the modified allo-CFC decreased post-Dara (2.06, 2.32, 0.51 and 1.23, respectively), while those in NC PBMC tested as control at each time point showed similar NK response (24.8, 33.7, 31.5 and 34.9, respectively). Anti-HLA Ab Class I &II score reduced post-Dara from 619 to 513.

Conclusions: Dara significantly reduced the number of M and L, especially NK, high CD38 expressing cells, and likely PC and PB as well as anti-HLA Ab decreased post-Dara. It also reduced Ab-CD16-mediated NK activation in Dara-treated Pt. This suggests possible utility of Dara for DES or ADCC-mediated ABMR treatment in HS KTx Pts.

Patient Immnune Cell Profile Pre-& Post-Dara

Cell% in Parent Cells	In Leukocytes		In L			In T4 Cells	
	M%	L%	T3%	B%	NK%	Treg%	Tfh%
Ref. Median (Range)	6.1 (4.8 - 8.0)	36.2 (24.9 - 53.5)	75.5 (62.3 - 83.4)	12.7 (5.6 - 18.3)	9.4 (6.2 - 20.7)	4.8 (3.4 - 7.1)	0.31 (0.14 - 0.61)
Pre-Dara	6.2	27.8	83.6	5.0	5.5	2.1	0.33
1wk post-1st Dara	5.8	14.0	84.5	6.5	2.4	2.8	0.25
1wk post-3rd Dara	4.8	11.4	88.1	5.0	3.1	1.3	0.10
1M post-4th Dara	4.3	16.8	92.2	3.0	1.6	1.5	0.32

CITATION INFORMATION: Ge S., Chu M., De Guzman A., Ortiz E., Vo A., Ammerman N., Jordan S., Toyoda M. The Effect of Daratumumab (Dara, Humanized Anti-CD38 Monoclonal Antibody) on Immune Cells In Vitro and in a HLA-Sensitized Kidney Transplant Patient (HS KTx Pt) Desensitized (DES) with Dara *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Ge: None. **M. Chu:** None. **A. De Guzman:** None. **E. Ortiz:** None. **A. Vo:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; consulting. **N. Ammerman:** None. **S.C. Jordan:** Consulting Fee; Name of Commercial Interest; Hansa Biopharma, CSL Behring, CareDx, Amplyx. Consulting Fee; Nature of Relationship; consulting. Grant/Research Support; Name of Commercial Interest; Hansa Biopharma, CSL Behring, CareDx. Grant/Research Support; Nature of Relationship; Grant. **M. Toyoda:** None.

Abstract# 169

Additional Value to Participation in a National Paired Kidney Exchange Program: Exploring Characteristics of Chain End Living Donors and Waitlist Recipients

N. Osbun[1], A. Thomas[2], M. Cooper[3], S. Flechner[4], D. Segev[2], J. Veale[1], *[1]Urology, University of California Los Angeles, Los Angeles, CA, [2]Johns Hopkins University, Baltimore, MD, [3]Medstar Georgetown Transplant Institute, Washington DC, DC, [4]Cleveland Clinic, Cleveland, OH*

Purpose: Non-directed kidney donors can initiate living donor chains that end to patients on the deceased donor waitlist. While many studies of paired exchange practices focus on the whole population of transplant recipients, the characteristics and outcomes of chain end recipients may differ from other paired exchange recipients due to their history on the kidney wait list.

Methods: In this retrospective cohort study we compared 748 National Kidney Registry (NKR) chain end recipients to controls from the NKR and the Scientific Registry of Transplant Recipients between February 2008 and June 2019.

Results: : Compared to other living donor recipients, chain end recipients were more often older, black, publicly insured, and spent longer on dialysis. Black patients received chain end kidneys at a rate approaching that of receiving deceased donor kidneys (31% vs 33%, p=0.2). Chain end donors were older and had slightly lower glomerular filtration rates and higher Living Kidney Donor Profile Index (LKDPI) scores. There were 127 (17%) of chain end kidneys with a LKDPI<0, meaning they were predicted to outperform any deceased donor kidney. Chain end blood type O donors had similar characteristics to other O donors in NKR. There was a similar cumulative incidence, but an increased adjusted hazard, of graft failure among chain ends compared to other living donor recipients. No difference in mortality was seen after adjusting for recipient, donor, and transplant factors. Compared with deceased donor recipients, NKR chain end recipients had lower graft failure (5 year: 6.9% vs 12.5%, p<0.001) and mortality (5 year: 7.2% vs. 14.4%, p<0.001).

Conclusions: These findings demonstrate high donor quality at chain end. Sharing non-directed donors among a multicenter network may improve the diversity of recipients who benefit from living donation.

Table 1.

	NKR Chain End	Not Chain End (NKR)	SRTR	Deceased Donor
N	748	2951	66336	124392
Recipient Characteristics				
Female, %	39.3	47.4	37.3	39.3
African-American, %	31.6	14.7	12.8	33.6
Hispanic, %	10.6	11.5	15.1	17.7
Median (IQR) Age	53.0 (41.0-60.0)	51.0 (39.0-61.0)	49.0 (36.0-60.0)	55.0 (43.0-63.0)
Preemptive Transplant, %	16	27.8	35.7	10.5
Median (IQR) Years on Dialysis	3.0 (1.0-4.8)	1.0 (0.0-2.4)	0.5 (0.0-1.6)	3.6 (1.6-5.9)
Median (IQR) BMI	26.4 (23.5-31.0)	26.7 (23.3-30.9)	27.2 (23.6-31.4)	27.9 (24.2-32.1)
College Educated, %	59.6	68.1	61.2	47.6
Public Insurance, %	70.9	46.1	42.4	77.7
Diabetes, %	27	18.1	20.9	28.6
Hypertension, %	21.5	14	15.7	24.4
Previous Transplant, %	11.2	25	11.2	14.2
PRA>80 at Transplant, %	6.3	21.7	3.8	16.6
Median (IQR) eGFR Pre-transplant	7.4 (5.2-10.6)	8.0 (5.6-11.7)	8.9 (6.2-12.9)	6.7 (4.9-9.5)
Delayed Graft Function, %	7.5	4.3	3.1	27.7
Donor Characteristics				
Female, %	64.7	62.6	62.5	39.3
African-American, %	7.1	8.7	10.6	13.6
Hispanic, %	9.4	9.8	14.7	14.4
Median (IQR) Age	52.0 (41.0-58.0)	44.0 (34.0-53.0)	42.0 (33.0-52.0)	41.0 (29.0-52.0)
Median (IQR) BMI	26.1 (23.4-28.8)	26.1 (23.3-29.0)	26.7 (23.9-29.7)	27.1 (23.7-31.6)
Median (IQR) eGFR	93.1 (81.7-103.0)	98.2 (86.5-109.4)	98.9 (86.0-111.0)	89.0 (59.4-112.5)
Biologically Related, %	0	0	51	0
Median (IQR) LKDPI/KDPI	19.7 (5.5-35.5)	11.9 (-1.5-25.7)	12.6 (-1.3-27.3)	46.5 (25.2-68.3)
Blood Type O, %	2.3	47.6	64.8	47.5
Transplant Characteristics				
ABO Incompatible, %	2.7	2.5	1.5	0.9
Zero HLA mismatch, %	0.4	0.9	6.9	6.9
Median (IQR) Cold Ischemia Time	6.4 (1.4-9.7)	9.3 (6.4-12.6)	1.0 (0.7-1.9)	16.5 (11.2-22.3)

CITATION INFORMATION: Osbun N., Thomas A., Cooper M., Flechner S., Segev D., Veale J. Additional Value to Participation in a National Paired Kidney Exchange Program: Exploring Characteristics of Chain End Living Donors and Waitlist Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Osbun: None. **A. Thomas:** None. **M. Cooper:** None. **S. Flechner:** None. **D. Segev:** None. **J. Veale:** None.

Abstract# 170

Kidney Paired Exchange in Children in the United-states

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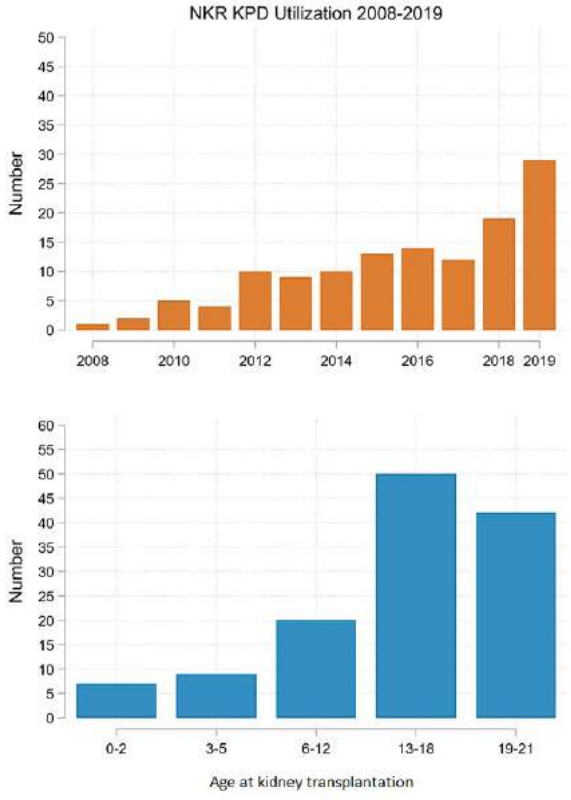
Purpose: Kidney paired exchange (KPE) plays an increasing role in the landscape of adult living donor transplant (LDTx) in the US. LDTx is the treatment of choice in children with end-stage kidney disease. Despite the allocation of high quality transplants from deceased donors and relatively short waiting times in children, improving access to living donor transplant is of high importance. In this study, we describe the characteristics and outcomes of pediatric transplants performed through KPE.

Methods: We studied 5,022 pediatric (recipient age≤21) living donor transplants (2/2008-12/2019), including 128 National Kidney Registry (NKR) transplants, using the Scientific Registry of Transplant Recipients (SRTR) linked with the NKR database. We compared death-censored graft failure (DCGF) and mortality between NKR recipients and three control groups (1) all non-NKR SRTR living donor recipients, (2) all non-NKR unrelated SRTR living donor recipients, and (3) all non-NKR SRTR paired exchange recipients.

Results: There were 352 pediatric KPE transplants during the study period (36% participated in NKR). Among NKR pediatric recipients, 44% were female, 23% were African American (AA), 14% were Hispanic, and the median age was 16 (Figure 1). Compared to SRTR controls, NKR pediatric participants were more often AA (23% vs 9%, p<0.001), less likely to receive preemptive transplant (28% vs. 38% p=0.02), more often had a previous transplant (27% vs. 9%), and more often had a PRA>80 (23% vs. 4%, p<0.001). NKR participants experienced longer cold ischemia times (median 8 vs. 1 hour) but did not experience increased risk of delayed graft function (4% vs 3%, p=0.6), 5-year DCGF (5% vs. 0.5%, p=0.1), or 5-year mortality (1.7% vs. 1.9%, p=0.2).

Conclusions: The use of KPE to improve access to LDTx in children increased over the last decade. This especially benefited children with traditionally lower access to LDTx such as AA and highly sensitized patients and demonstrated good patients and transplant outcomes similar to non-KPE LDTx.



CITATION INFORMATION: Hogan J., Thomas A., Verbesey J., Segev D. Kidney Paired Exchange in Children in the United-states *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Hogan: Consulting Fee; Name of Commercial Interest; Alnylam Pharmaceutical. Consulting Fee; Nature of Relationship; Participation in

Board meetings. Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Grant Support. **A.G. Thomas:** None. **J. Verbesey:** None. **D.L. Segev:** None.

Abstract# 171

Right Kidneys and Kidneys with Complex Anatomy are More Likely to be Transplanted to the Waiting List in a National Kidney Paired Donation Program

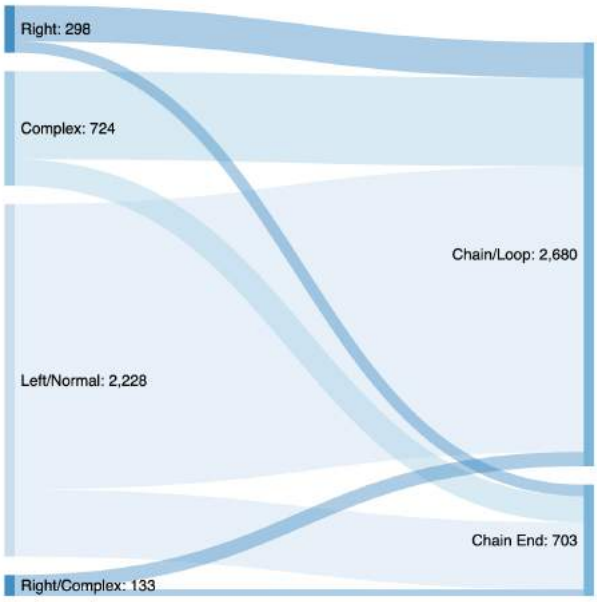
N. Osbun[1], A. Thomas[2], A. Waterman[3], J. Veale[1], D. Segev[2], D. Leeser[4], *[1]Urology, University of California Los Angeles, Los Angeles, CA, [2]Johns Hopkins University, Baltimore, MD, [3]University of California Los Angeles, Los Angeles, CA, [4]East Carolina University, Greenville, NC*

Purpose: In the era of laparoscopic donor nephrectomy, there is a preference for left kidneys with a single renal artery. In paired exchange, the receiving transplant center may have less control over the donor nephrectomy and may receive a right kidney or a kidney with complex anatomy (more than one renal artery or renal vein). Despite clear evidence on adverse outcomes in living donor transplantation, these organs may be deemed less desirable and instead sent to the deceased donor waiting list at the end of a paired exchange chain.

Methods: Using data from the national transplant registry (SRTR) and the National Kidney Registry (NKR) with anatomy data, we describe the end of chain distribution and outcomes of right and complex kidneys (2/2008-12/2019). We also assessed center-level behavior in the transplantation of these organs.

Results: Out of 3,383 eligible NKR transplants, there were 431 (12%) right kidneys transplant and 857 (25%) complex kidneys transplanted. Out of 703 chain ends (transplants to the waiting list), 114 (16%) were right and 207 (28%) were complex kidneys. There were 41 (6%) chain end kidneys that were right and complex. Right, complex, and right/complex kidneys were more likely to be transplanted to the list ($p<0.001$), although the absolute difference is small. There were no statistically significant differences in delayed graft function, death-censored graft failure, or mortality when comparing NKR recipients of left/normal chain end kidneys to right and/or complex kidneys. Center-level practice varied significantly. Among 94 NKR centers, 13 never utilized a right or complex kidney. Among 73 centers receiving a chain end kidney, 39 centers used right chain end, 50 centers used a complex chain end, and 22 used a right/complex chain end.

Conclusions: Despite insignificant differences in outcomes, many NKR centers avoid right and/or anatomically complex kidneys. Right and/or complex kidneys were more likely to be sent to the waiting list instead of being used in paired exchange chain or loop. Anatomically complex and right living donor kidneys from the National Kidney Registry, and other KPD systems, are an important source of kidneys for patients on the deceased donor waiting list.



CITATION INFORMATION: Osbun N., Thomas A., Waterman A., Veale J., Segev D., Leeser D. Right Kidneys and Kidneys with Complex Anatomy are More Likely to be Transplanted to the Waiting List in a National Kidney Paired Donation Program *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Osbun: None. **A. Thomas:** None. **A. Waterman:** None. **J. Veale:** None. **D. Segev:** None. **D. Leeser:** None.

Abstract# 172

The Benefits of Sharing Non-Directed Donors Nationally Through Paired Exchange

J. Verbesey[1], A. G. Thomas[2], A. D. Waterman[3], J. Vucci[1], G. Vranic[1], A. Gilbert[1], S. Ghasemian[1], M. Cooper[1], *[1]Georgetown University Hospital, Washington, DC, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]UCLA, Los Angeles, CA*

Purpose: Non-directed donors (NDDs) are a valuable resource that can "unlock" incompatible transplants. Recent advances in paired kidney exchange (PKE) suggest that NDDs may facilitate a greater than expected number of transplants, while receiving additional protections by PKE participation. In 2019, the largest PKE clearinghouse in the US, the National Kidney Registry (NKR), transitioned NDDs to the Family Voucher (FV) program, where living donors (LDs) can name up to 5 family members to receive vouchers for a future kidney should they need one. As a leading center in the NKR, we performed a retrospective review of our NDD/FV donors in an effort to expand the program in the future.

Methods: Retrospective cohort study of LD transplants at a single center from 1/2015 to 12/2020. Additional data on PKE transplants used NKR data. We assess clinical characteristics of NDDs, including those in the FV program and NKR Advanced Donation Program (ADP) donors who donate in advance of their intended recipient.

Results: During the study period, our center had 45 NDDs (15 in 2015-2018, 30 in 2018-2020). NDD demographics: 51% male (n=23), 97.8% Caucasian (n=44), mean age 45 years, mean BMI 25.36. NDD blood types: 48.9% O, 40% A. NDDs plus 28 ADP donors enabled 162 resultant transplants (Table 1). This included 36 highly sensitized (PRA > 80%) patients, including 15 who had PRA > 98% (Table 2), and 71 DD waitlist patients that received LD kidneys as end chain recipients (Table 3). For the highly sensitized patients, average wait time for PRA > 80% went from 4.74 years to 3.33 months, and PRA > 98% went from 4.33 years to 6 months. For the past 2 years, NDDs and FV donors represent 25-27% of the NKR donor population; since 2020 virtually all NKR NDDs are in the FV program.

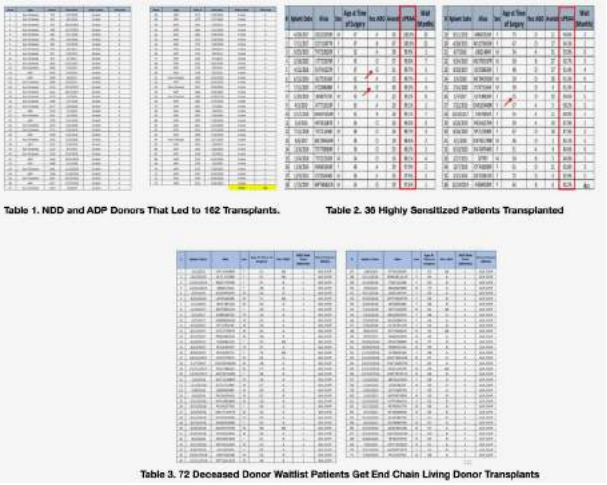


Table 1. NDD and ADP Donors That Led to 162 Transplants.

Table 2. 36 Highly Sensitized Patients Transplanted

Table 3. 72 Deceased Donor Waitlist Patients Get End Chain Living Donor Transplants

Conclusions: Our results show that a single center can see a dramatic rise in volume and decrease in wait time from full participation in a national PKE. NDDs were diverse in age and gender, although almost universally Caucasian. Since the FV program benefits future generations, centers should concentrate on exposing potential AA donors to this option. The FV program offers donors a voucher, in addition to other donor protections like travel reimbursement and insurance. Centers throughout the country should be working to educate their patients as to this option. By putting NDDs into a PKE, numerous highly sensitized patients and many on the deceased donor waitlist can receive transplants, and the addition of these donors will lead to much higher transplant rates overall.

CITATION INFORMATION: Verbesey J., Thomas A., Waterman A., Vucci J., Vranic G., Gilbert A., Ghasemian S., Cooper M. The Benefits of Sharing Non-Directed Donors Nationally Through Paired Exchange *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Verbesey: None. **A.G. Thomas:** None. **A.D. Waterman:** None. **J. Vucci:** None. **G. Vranic:** None. **A. Gilbert:** None. **S. Ghasemian:** None. **M. Cooper:** None.

Kidney

Kidney Complications

Abstract# 173

Mapping Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI) in Kidney Transplant Biopsies Reveals Two Classes of Early AKI That Differ in Their Response-to-Wounding

P. Halloran[1], J. Reeve[1], G. Böhmig[2], O. Viklicky[3], M. Myslak[4], G. Gupta[5], &. the INTERCOMEX Study Group[6], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]Medical University of Vienna, Vienna, Austria, [3]Institute for Clinical and Experimental Medicine, Prague, Czech Republic, [4]Pomeranian Medical University, Szczecin, Poland, [5]Virginia Commonwealth University, Richmond, VA, [6]., ., AB, Canada*

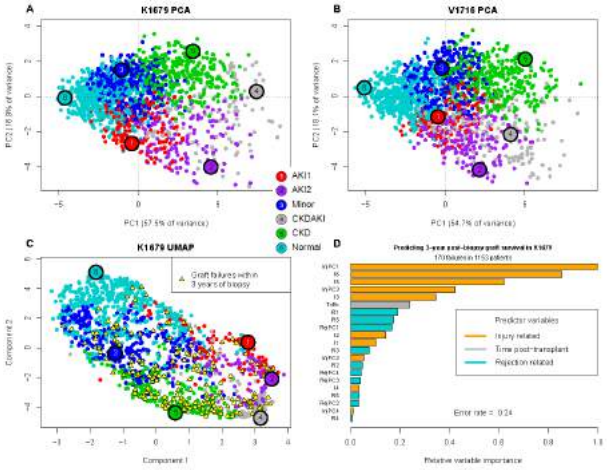
Purpose: We recently analyzed injury-induced molecular changes in kidney transplant biopsies using principal component analysis (PCA) (AJT https://doi.org/10.1111/ajt.16374). PC1 reflected all injury, PC2 distinguished early AKI (negative) vs. late CKD (positive). Positive PC3 discovered a new type of injury response: increase in epithelial polarity genes (e.g. PARD3) with minimal inflammation that adversely impacted survival in early transplants. Negative PC3 reflected inflamed injury e.g. TCMR. We explored how these features could be used to classify injury in kidney transplantation.

Methods: We studied 1526 indication biopsies, using archetypal analysis of injury-induced transcripts to assign injury archetype classes to each biopsy.

Results: Six injury archetype groups emerged: 1. AKI1; 2. AKI2; 3. Minor injury; 4. CKD (atrophy-fibrosis); 5. CKD+AKI; and 6.Normal (Fig. 1A). The robustness of this classification was validated in a new independent set of 1426 biopsies (Fig. 1B). When all 1526 biopsies were distributed in UMAP and the failures were visualized by triangles, most failures were related to CKD, but AKI1 had relatively common failure (Fig.1C). In random forests comparing rejection ("R") and injury ("I") scores, injury PC1, PC3, and archetype scores were the main determinants of three-year survival (Fig.1D).

Donor age was highest in AKI1 and AKI2, and lowest in Minor and Normal, which had the best GFR. AKI and AKI2 kidneys similar rates of delayed graft function (DGF) and low GFR. After removing all rejection, AKI1 had much lower expression of molecular and histologic inflammation than AKI2, low PC1, low expression of injury-induced genes, but high PC3. Among biopsies <6 weeks post-transplant with no rejection, AKI1 kidneys had significantly worse survival than AKI2 (12/46 vs. 3/39, p<0.05), suggesting poor response-to-wounding in AKI1.

Conclusions: While many kidney transplants fail with CKD, early AKI can also lead to failure, particularly AKI1. Kidneys in the AKI1 state fail to initiate appropriate healing/recovery responses, probably related to the features annotated in injury PC3.



CITATION INFORMATION: Halloran P., Reeve J., Böhmig G., Viklicky O., Myslak M., Gupta G., the INTERCOMEX Study Group Mapping Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI) in Kidney Transplant Biopsies Reveals Two Classes of Early AKI That Differ in Their Response-to-Wounding *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Halloran: Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **J. Reeve:** None. **G. Böhmig:** None. **O. Viklicky:** None. **M. Myslak:** None. **G. Gupta:** None. **&. the INTERCOMEX Study Group:** None.

Abstract# 174

Oxalate Nephropathy After Kidney Transplant: Defining Histological Patterns, Contributing Factors and Graft Outcome

N. Jakob[1], A. Chuu[1], J. Ninan[1], E. Lim[1], N. Zhang[1], H. Amer[2], F. Cosio[2], H. Wadei[3], M. Ryan[1], C. Cortese[3], L. Cornell[2], M. Keddis[1], *[1]Nephrology, Mayo Clinic, Scottsdale, AZ, [2]Nephrology, Mayo Clinic, Rochester, MN, [3]Nephrology, Mayo Clinic, Jacksonville, FL*

Purpose: The objective of this study is to evaluate KTx recipients with biopsy proven oxalate nephropathy (ON) to better define risk factors, histologic patterns and graft outcome in patients without primary hyperoxaluria (PH).

Methods: All renal allograft biopsy reports from 2008 to 2018 at the three Mayo transplant centers (Arizona, Florida, Minnesota) were queried for pathologist diagnosis of ON and verified by chart review. All patients with PH diagnosis were excluded. Risk factors for enteric causes for ON, histological findings, serum and urine oxalate levels around time of biopsy, treatment, and allograft outcomes were analyzed.

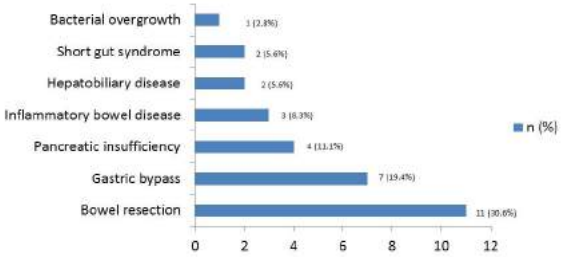
Results: 36 patients were identified. Mean age at diagnosis of ON was 57.5 years, 50% were female, 83.3% white, 88.9% first KTx, and 36% were pre-emptive to Tx. Most common cause of ESRD was diabetes (36%), and 11.1% due to enteric oxalosis. 17% had pre-KTx history of kidney stones. Median baseline GFR was 43.8ml/min. Median time from KTx to ON diagnosis was 6.9 months (range 1.25-47 months). Diarrhea was the most prevalent risk factor in 42% of patients. Enteric disorders were identified in 83% of patients as shown in Figure 1. 61% of patients had stage II or III acute kidney injury (AKI) and 55.6% required dialysis at the time of biopsy. Plasma oxalate (median 15.7micromol/L, n=25), and urine oxalate (median 58.1mg/24hr, n=21) were elevated. Histological findings are described in table 1. Management included low oxalate diet education (64%), calcium supplementation with food (61%), pyridoxine (14%), and steroid treatment (81%). After a median follow-up of 33.5 months, median eGFR was 27.7ml/min, with 53% of patient with eGFR<30ml/min.

Conclusions: This is the largest case series of ON after KTx showing that enteric causes account for 83% of cases and chronic diarrhea is a common risk factor. Severe AKI and acute tubular injury are common. Despite low rates of severe inflammation or IFTA, there was a significant drop in GFR from baseline to last follow-up. Further studies need to define histologic characteristics linked with adverse outcomes.

Table 1. Histologic characteristics

Total number of glomeruli, median (range)	20 (13, 28)
Number of tubules with intratubular calcium oxalate crystals, median (range)	22 (16, 30)
Interstitial inflammation **Moderate-severe**	22 (61%) 4 (11%)
Interstitial fibrosis and tubular atrophy **Moderate-severe**	22 (61%) 4 (11%)
Acute tubular injury (ATI)	34 (94%)

Figure 1. Enteric risk factors for oxalate nephropathy



CITATION INFORMATION: Jakob N., Chuu A., Ninan J., Lim E., Zhang N., Amer H., Cosio F., Wadei H., Ryan M., Cortese C., Cornell L., Keddis M. Oxalate Nephropathy After Kidney Transplant: Defining Histological Patterns, Contributing Factors and Graft Outcome *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Jakob: None. **A. Chuu:** None. **J. Ninan:** None. **E. Lim:** None. **N. Zhang:** None. **H. Amer:** None. **F. Cosio:** None. **H. Wadei:** None. **M. Ryan:** None. **C. Cortese:** None. **L. Cornell:** None. **M. Keddis:** None.

KIDNEY

Abstract# 175

Kidney Donor Risk Index: Significance as a Predictor of Kidney Transplant Outcomes Beyond Allograft Survival, Analysis of 18 Adjusted Regression Models Involving Adult Deceased Donor Kidney Recipients

A. Santos, E. Bueno, M. A. Leghrouz, *University of Florida, Gainesville, FL*

Purpose: We aimed to study the role of kidney donor recipient index (KDRI) as a predictor for multiple transplant-related outcomes in adult deceased-donor (DD) kidney transplant (KT) recipients (KTR).

Methods: Using OPTN data, we used multivariable logistic regressions to analyze the 1-yr. post-kidney transplant likelihood of acute rejection (AR), delayed graft function (DGF), and hospitalization; and multivariable Cox models to analyze 5-year risks of overall graft loss (OAGL), death, and death-censored graft loss (DCGL) inDD- KTRs stratified into groups based on CPRA levels of <10%, 10%-79%, and >/=80%. In all the 18 regression analyses, we used a uniform set of 14 risk factors (RF)s including kidney donor risk index by Rao (KDRI-Rao). We used the Wald Chi-sq. P for each model in classifying RF as a significant (P<.05) and/or highly significant (P<.0001) outcome predictor.

Results: Among over sixty-two thousand DDKTRs studied, KDRI-Rao was the most highly significant risk factor (RF) with a P<.0001 for all (100%) outcomes (OAGL, death, DCGL, AR, DGF, and hospitalization) in all CPRA groups (**Fig. 1**). Ethnicity/ race of KTRs and maintenance immunosuppression regimen at discharge were significant RFs (P<.05) in 100% and highly significant RFs (P<.0001) in 89% and 67% of analyses conducted, respectively (**Fig. 1**). Induction agent, HLA mismatch (HLA-mm), and recipient age group were significant or highly significant RFs for 1-year AR in all CPRA groups (**Table 1**). Cold ischemia time is a highly significant RF for DGF and pre-transplant dialysis as well as insurance type were significant RFs for DGF and hospitalization in all CPRA groups (**Table 1**). Finally, recipient age group was a highly significant RF; while pre-transplant dialysis duration and insurance type were significant RFs for 5-year (OAGL, death, DCGL) outcomes (**Table 1**).

Conclusions: KDRI-Rao is a consistent highly significant predictor of allograft and other important outcomes after adult DDKT. Therefore, KDRI or its derivative kidney donor performance index (KDPI) should be considered in adjustments of multivariable models in adult kidney transplant studies.

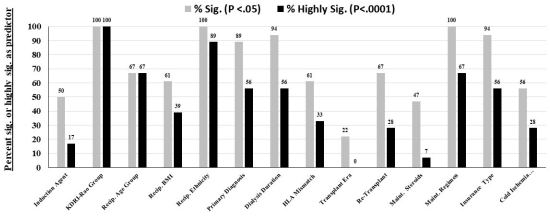


Fig. 1 Incidence in Percent of Significant and Highly Significant Prediction of Outcomes* by Each Risk Factor Used in Multivariable Models for CPRA-Stratified Kidney Transplant Groups

***Outcomes: Overall graft loss, Death, Death-censored graft loss, Acute rejection, Delayed graft function &, Hospitalization**

Risk Factors	CPRA<10% Wald's x² P						CPRA 10-79% Wald's x² P						CPRA>=80% Wald's x² P					
	OAGL	Death	DCGL	AR	DGF	Hospit.	OAGL	Death	DCGL	AR	DGF	Hospit.	OAGL	Death	DCGL	AR	DGF	Hospit.
Induction Agent	0.063	0.038	0.099	<.0001	<.0001	0.017	0.073	0.495	0.036	<.0001	0.088	0.390	0.842	0.597	0.331	0.001	0.450	0.037
KDRI-Rao Group	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Recip. Age Group	<.0001	<.0001	<.0001	<.0001	0.371	0.219	<.0001	<.0001	<.0001	<.0001	0.232	0.014	<.0001	<.0001	<.0001	<.0001	0.315	0.082
Recip. BMI	<.0001	0.057	<.0001	<.0001	<.0001	0.0003	0.593	0.899	0.143	0.0001	<.0001	0.023	0.042	0.393	0.050	0.009	<.0001	0.218
Recip. Ethnicity	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0004	0.043	<.0001
Primary Diagnosis	<.0001	<.0001	<.0001	0.007	<.0001	<.0001	<.0001	<.0001	0.315	0.032	0.0003	0.003	<.0001	<.0001	0.001	0.003	0.066	<.0001
Dialysis Duration	<.0001	<.0001	<.0001	0.149	<.0001	0.0003	<.0001	0.0002	0.004	0.100	<.0001	0.0003	<.0001	<.0001	<.0001	0.027	<.0001	0.001
HLA Mismatch	<.0001	0.001	<.0001	<.0001	<.0001	<.0001	0.132	0.383	0.046	<.0001	0.003	0.152	0.031	0.774	0.005	0.002	0.403	0.702
Transplant Era	0.002	0.001	0.145	0.023	0.240	0.152	0.138	0.004	0.325	0.358	0.078	0.052	0.997	0.186	0.229	0.138	0.435	0.052
Re-Transplant	<.0001	<.0001	0.007	0.048	0.411	0.002	0.002	0.018	0.023	<.0001	<.0001	0.008	0.552	0.869	0.768	0.084	<.0001	0.429
Maint. Steroids	0.015	<.0001	0.800	0.018	-----	0.163	0.625	0.394	0.966	0.138	-----	0.002	0.286	0.672	0.008	0.004	-----	0.494
Maint. Regimen	<.0001	<.0001	<.0001	<.0001	-----	<.0001	<.0001	<.0001	<0001	0.0004	-----	<.0001	<.0001	0.0004	0.001	0.013	-----	0.006
Insurance Type	<.0001	<.0001	0.0001	0.003	<.0001	<.0001	<.0001	0.001	<.0001	0.489	0.015	<.0001	<.0001	<.0001	0.007	0.003	0.004	<.0001
Cold Isch. Time	<.0001	<.0001	0.009	0.264	<.0001	0.568	0.005	0.015	0.073	0.843	<.0001	0.326	0.328	0.027	0.682	0.191	<.0001	0.934

Table 1. Significance of Risk Factors as Predictors of Outcomes Across CPRA-Stratified Kidney Transplant Groups

Cox Regression Models of 5-year outcomes:
OAGL:overall graft loss
Death: recipient death
DCGL: death-censored graft loss

Logistic Regression Models:
AR: acute rejection 1st yr. post-transplant
DGF: delayed graft function
Hospit.: hospitalization 1st yr. post-transplant

CITATION INFORMATION: Santos A., Bueno E., Leghrouz M. Kidney Donor Risk Index: Significance as a Predictor of Kidney Transplant Outcomes Beyond Allograft Survival, Analysis of 18 Adjusted Regression Models Involving Adult Deceased Donor Kidney Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Santos: None. **E. Bueno:** None. **M.A. Leghrouz:** None.

Abstract# 176

The Effect of Delayed Graft Function on Early versus Late Mortality Following Kidney Transplantation

W. Irish[1], Y. Fu[2], D. B. Leeser[1], K. V. Ravindra[3], C. Haisch[1], J. Tuttle[1], *[1]Surgery, East Carolina University, Greenville, NC, [2]Mathematics, East Carolina University, Greenville, NC, [3]Surgery, Duke University, Durham, NC*

Purpose: Delayed graft function (DGF) is associated with increased risk of long-term graft survival but it's impact on patient survival has not been studied. Using data from the Organ Procurement and Transplantation Network (OPTN) database, we evaluated the effect of DGF on early versus late mortality following kidney transplantation (KTx).

Methods: Data on adult (age ≥ 18 years), solitary, primary, deceased donor KTx (2005-2015) were obtained from the OPTN. Pediatric recipients, and recipients of previous KTx or multi-organ transplants were excluded. DGF was defined as the need for dialysis within the first seven days post-transplant. Time-dependent Cox's hazard model was used to evaluate the effect of DGF on early versus late risk of mortality following KTx. Early mortality was defined as death within the first-year post-KTx. Hazard ratio (HR) and 95% confidence interval (CI) are provided as measures of strength of association and precision, respectively. Results are adjusted for donor age, kidney donor profile index, donation after cardiac death, recipient age, sex, race, and history of diabetes, and transplant year.

Results: 95,271 patients were eligible for study (mean age (SD) = 53.5 (13.0) years, 60.6% were male and 33.3% were Black). Of these, 25.8% had DGF. The prevalence of DGF ranged from 24.4% in 2005 to 29.9% in 2015. Median follow-up was 7 years. Of the 95,271 patients, 27.0% died (33.5% with DGF versus 24.7% without DGF). One-, 5- and 10-year patient survival was 93.1%, 75.9% and 47.3% with DGF, respectively, versus 96.9%, 85.1% and 62.0% without DGF (log-rank p<0.0001). For early mortality, the adjusted HR for DGF versus No DGF was 2.02 (95% CI=1.89, 2.15). For mortality after 1-year post-KTx, the adjusted HR for DGF versus No DGF was 1.42 (95% CI=1.37, 1.46). Further breakdown of the time-dependent effect of DGF on the risk of mortality is provided in Table 1.

Conclusions: DGF has a significant impact on mortality. The effect of DGF on mortality is more pronounced in the first-year post-KTx, but is still impactful even after 5-years post-KTx.

Table 1: Time-dependent Effect of DGF on Risk of Mortality Following Kidney Transplantation

Time-dependent Risk	Adjusted Hazard Ratio for DGF versus No DGF (95% CI)
<= 1 year	2.20 (1.89, 2.15)
Between 1 and 2 years	1.50 (1.37, 1.63)
Between 2 and 3 years	1.39 (1.27, 1.51)
Between 3 and 4 years	1.51 (1.40, 1.64)
Between 4 and 5 years	1.40 (1.29, 1.52)
> 5 years	1.39 (1.33, 1.45)

CITATION INFORMATION: Irish W., Fu Y., Leeser D., Ravindra K., Haisch C., Tuttle J. The Effect of Delayed Graft Function on Early versus Late Mortality Following Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Irish: None. **Y. Fu:** None. **D.B. Leeser:** None. **K.V. Ravindra:** None. **C. Haisch:** None. **J. Tuttle:** None.

Abstract# 177

Outcomes of Kidney Transplant Recipients With Sickle Cell Disease: An Analysis of the 2000-2019 UNOS/OPTN Database

N. Leeaphorn[1], C. Thongprayoon[2], C. Jadlowiec[3], A. Chewcharat[4], P. Hansrivijit[5], S. Katari[1], P. Vaitla[6], L. Cummings[1], M. Cooper[7], W. Cheungpasitporn[2], *[1]Saint Luke's Health System, Kansas City, MO, [2]Mayo Clinic, Rochester, MN, [3]Mayo Clinic, Phoenix, AZ, [4]Mount Auburn Hospital, Cambridge, MA, [5]University of Pittsburgh Medical Center Pinnacle, Harrisburg, PA, [6]University of Mississippi Medical Center, Jackson, MS, [7]Medstar Georgetown Transplant Institute, Washington, DC*

Purpose: Lower patient survival has been observed in sickle cell disease (SCD) patients who go on to receive a kidney transplant. This study aimed to assess the post-transplant outcomes of SCD kidney transplant recipients in the contemporary era.

Methods: We used the OPTN/UNOS database to identify first-time kidney transplant recipients from 2010 through 2019. We compared patient and allograft survival between recipients with SCD vs. all other diagnoses (non-SCD) as the reported

cause of end-stage kidney disease. We examined whether post-transplant outcomes improved among SCD in the recent era (2010-2019), compared to the early era (2000-2009).

Results: This study included 105 SCD and 146,325 non-SCD kidney transplant recipients. SCD recipients were younger, more likely to be female, African-American, and have a lower body mass index. They were more likely to have a higher panel reactive antibody and be on dialysis at the time of transplant. Five-year death-censored graft survival in SCD was lower than non-SCD recipients (71% vs. 89%; p<0.001), whereas five-year patient survival was comparable between two groups (83% vs. 87%; p=0.12). After adjusting for differences in baseline characteristics, SCD was significantly associated with lower patient survival (HR 2.87; 95% CI 1.75-4.68, p<0.001) and death-censored graft survival (HR 1.98; 95% CI 1.30-3.01, p=0.001), compared to non-SCD recipients. When we further investigated outcomes, compared to recipients with diabetes mellitus, hypertension, and glomerular disease as a cause for their end-stage kidney disease, SCD was significantly associated with lower patient survival and death-censored graft survival. There were no differences in patient survival (p=0.61), and death-censored graft survival (p=0.38) of SCD recipients in the recent and early era.

Conclusions: Patient and allograft survival in SCD kidney recipients were worse than recipients with other diagnoses. The outcomes of SCD in the recent era did not improve from the early era. Thus, there is an urgent need for scientific research on interventions to improve post-transplant outcomes of SCD kidney transplant recipients.

CITATION INFORMATION: Leeaphorn N., Thongprayoon C., Jadlowiec C., Chewcharat A., Hansrivijit P., Katari S., Vaitla P., Cummings L., Cooper M., Cheungpasitporn W. Outcomes of Kidney Transplant Recipients With Sickle Cell Disease: An Analysis of the 2000-2019 UNOS/OPTN Database *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Leeaphorn: None. **C. Thongprayoon:** None. **C. Jadlowiec:** None. **A. Chewcharat:** None. **P. Hansrivijit:** None. **S. Katari:** None. **P. Vaitla:** None. **L. Cummings:** None. **M. Cooper:** None. **W. Cheungpasitporn:** None.

Abstract# 178

Worsening Impact of Acute Kidney Rejection on Long Term Graft Survival from 2000 to 2014

D. Leeser[1], W. Irish[1], K. Ravindra[2], V. Villani[2], A. Connor[2], J. Tuttle[1], *[1]Surgery, East Carolina University, Greenville, NC, [2]Surgery, Duke University, Durham, NC*

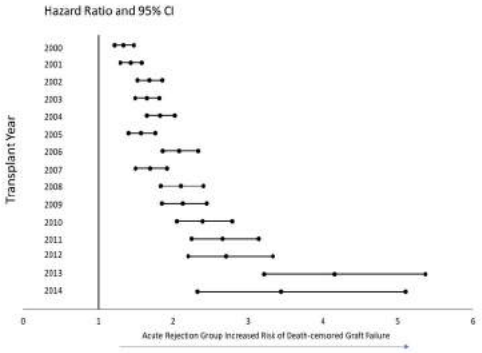
Purpose: Acute rejection (AR) has been shown to impact graft survival after kidney transplant (KTx), however there is limited data on its impact on long term graft outcomes. We sought to study how this impact has changed over time.

Methods: Using data from the Organ Procurement and Transplantation Network (OPTN) database, we studied adult (age ≥ 18 years) recipients of an isolated, ABO-compatible, kidney transplant in the period between January 2000 and December 2014. Patients were divided in two groups: AR group and no rejection group (NR), based on the presence of both an AR episode and treatment recorded on the OPTN database at one-year post-KTx. Patients lost to follow-up within one year, or whose rejection status was unknown were excluded. A multivariable Cox's hazards model was used to evaluate the association between AR and the risk of death-censored graft failure (DCGF). Hazard ratio (HR) and 95% confidence interval (CI) are provided as measures of strength of association and precision, respectively. Results are adjusted for donor age and donor type, recipient age, gender, race and diabetes status at transplant, total HLA mismatches at the A,B,DR loci, calculated panel reactive antibodies, delayed graft function and maintenance immunosuppression at one-year post-KTx.

Results: 154,399 patients were included in the study (60%/40% deceased/living donor); of these 10.3% had AR. There was a decrease in AR over time, from 17.6% in 2000 to 6.0% in 2014. Median follow-up was 7 years. Cumulative incidence of DCGF at 7 years post-KTx was 26.6% in the AR group versus 12.9% in the NR group (HR 1.77, 95% CI 1.71-1.83). AR HR increased over time, from 1.34 (95% CI 1.22-1.47) in 2000 to 3.44 (95% CI 2.32-5.10) in 2014. (Figure 1).

Conclusions: Despite the steady decline in the prevalence of AR, AR has a clinically significant impact on long term graft survival. This impact has worsened from 2000 to 2014 which suggest AR seen now may be much worse than in the past - likely due to selection of higher immunological risk patients with increased use of induction immunosuppression and a higher proportion of antibody mediated rejection. AR is still a clinically relevant event and strategies to minimize its occurrence are needed to mitigate long-term graft loss.

Figure 1: Hazard Ratio (AR versus NR) for Death-censored Graft Failure by Year of Transplantation



CITATION INFORMATION: Leeser D., Irish W., Ravindra K., Villani V., Connor A., Tuttle J. Worsening Impact of Acute Kidney Rejection on Long Term Graft Survival from 2000 to 2014 *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Leeser: None. **W. Irish:** None. **K. Ravindra:** None. **V. Villani:** None. **A. Connor:** None. **J. Tuttle:** None.

Abstract# 179

Angiotensin II Type-1 Receptor Antibodies are Associated with Inferior Renal Allograft Survival

P. Martin, E. Santos, N. Gunby, M. Willicombe, *Renal Department, Imperial College Healthcare NHS Trust, London, United Kingdom*

Purpose: AT1R-antibodies have been implicated in antibody-mediated vascular rejection in the absence of detectable HLA donor specific antibody (DSA), in addition to cardiovascular diseases. Transplant renal artery stenosis (TRAS) or macrovascular disease has also been shown to be associated with rejection. We aim to investigate the prevalence and outcomes of AT1R antibodies in patients undergoing angiography for suspected TRAS with biopsy proven rejection.

Methods: 82 patients with no HLA DSA were identified and serum at the time of angiography was tested for AT1R-Abs using an enzyme-linked immunosorbent assay technique. A threshold of >17u/ml was considered a positive result. Prospectively collected outcomes up to 5 years were obtained from our unit's transplant registry.

Results: The prevalence of AT1R-Abs was high at 21/82 (26%). 49/82 (59.8%) of patients were found to have significant TRAS at the time of angiography, 13/49 (26.5%) of patients with TRAS had Abs compared with 8/33 (24.2%) of patients with no TRAS, p=0.82. There was no difference in gender, ethnicity, donor type, cause of ESKD, total HLA mismatch in the Ab positive versus Ab negative groups. However, Ab+ patients were more likely to be younger than Ab- patients, 46.9±12.2 versus 54.4±12.0 respectively, p=0.017. AT1R-Ab+ patients at the time of angiography had an inferior 5-year allograft survival compared with Ab- patients, p=0.017 (fig. 1). Outcome by TRAS and Ab status, showed that TRAS+Ab+ patients had significantly worse outcomes than either TRAS+Ab- and TRAS-Ab+ patients, p=0.009 (fig. 2).

Conclusions: In a highly selected patient population, we found a high prevalence of AT1R-Abs. Although we found no association with TRAS, further work is underway to compare the prevalence with patients with normal renal artery imaging. Importantly, we did find a negative association with allograft survival, which highlights the potential importance of AT1R-Abs in renal transplantation which warrants further investigation.

Fig 1.

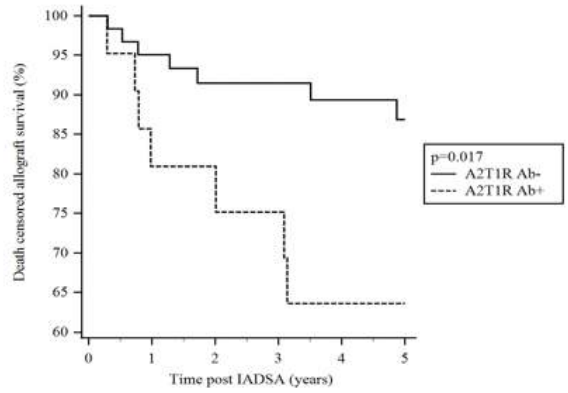
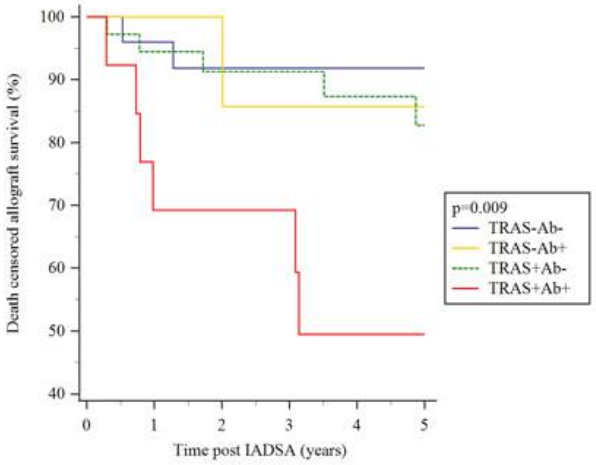


Fig. 2



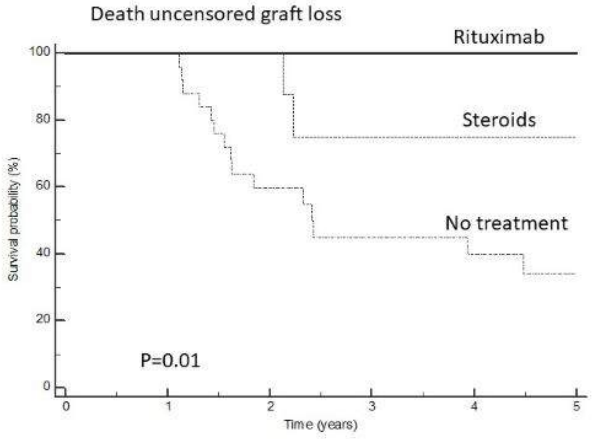
CITATION INFORMATION: Martin P., Santos E., Gunby N., Willicombe M. Angiotensin II Type-1 Receptor Antibodies are Associated with Inferior Renal Allograft Survival *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Martin: None. **E. Santos:** None. **N. Gunby:** None. **M. Willicombe:** None.

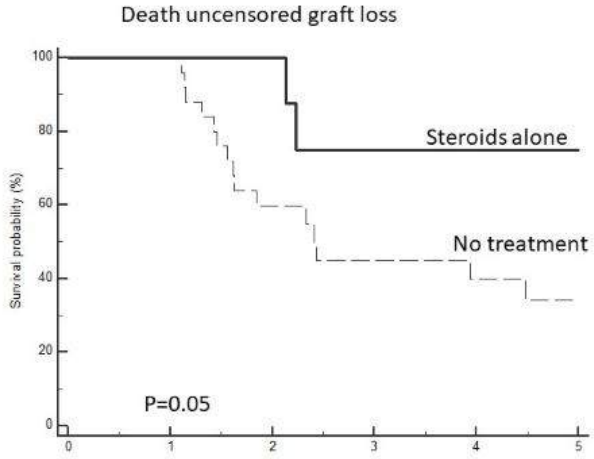
Abstract# 180

Post-Transplant Idiopathic Immune Complex Glomerulonephritis

F. Aziz, T. Singh, N. Garg, D. Mandelbrot, *University of Wisconsin, Madison, WI*

Purpose: The appropriate treatment for post-kidney transplant immune complex glomerulonephritis (ICGN) of unknown cause is unclear.
Methods: From 01/2004 to 12/2018, 71 patients were diagnosed with post-transplant ICGN on transplant kidney biopsies. Forty-one of these were found to have post-transplant idiopathic ICGN, and were included in this study. The patients with active infection (12), acute rejection (11), IgA nephropathy (3), lupus (3) and monoclonal gammopathy (1) were excluded.
Results: The mean age of the cohort at the time of transplant was 50 ± 13 years. The mean time from transplant to the diagnosis of idiopathic ICGN was 6 ± 5 years. The most common cause of kidney failure was diabetes (49%). Only 11 (27%) patients had glomerulonephritis (9 with focal segmental glomerular sclerosis and 2 with membranous nephropathy) as the cause of their native kidney failure. The mean follow-up from the time of transplant was 9 ± 5 years. The majority of patients had proteinuria (UPC > 0.3) (93%), and only 39% had hematuria (> 3RBC/hpf) at the time of biopsy. Twenty-five patients (61%) had no change in their baseline immunosuppression. Eight patients (19.5%) received steroids alone, and eight patients (19.5%) received rituximab with (7) or without (1) steroids. The patient who received rituximab had better graft survival than the patients who received no treatment (p=0.02), but the benefit of steroids compared to no treatment did not reach statistical significance (p=0.05). The multivariate analyses retained eGFR < 30 ml/min/1.73m^2 at time of diagnosis (HR=3.30, p=0.02; 95% Cl 1.15 to 9.46) as a significant predictor of graft loss. The multivariate analyses also showed that the treatment of ICGN was associated with lower graft loss (HR=0.22, p=0.02; 95%Cl 0.06 to 0.78).
Conclusions: Although not well described in the literature, post-transplant idiopathic ICGN is an important cause of kidney allograft dysfunction. Treatment of idiopathic ICGN seems associated with better graft outcomes. Future studies are needed to determine risk factors and treatment strategies to improve grafts outcomes with idiopathic ICGN.





CITATION INFORMATION: Aziz F., Singh T., Garg N., Mandelbrot D. Post-Transplant Idiopathic Immune Complex Glomerulonephritis *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Aziz: None. **T. Singh:** None. **N. Garg:** None. **D. Mandelbrot:** None.

Liver

MELD, Allocation and Donor Issues

Abstract# 181

Improved Outcomes Over Time of Extended Criteria Donor Grafts for Acute-on-chronic Liver Failure

T. Kitajima, T. Ivanics, D. Moonka, T. Shamaa, A. Mohamed, K. Delvecchio, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

Purpose: Given the high waitlist mortality of patients with acute-on-chronic liver failure (ACLF), liver transplant (LT) with an extended criteria donor (ECD) can be considered. The use of ECD livers has been associated with increased post-transplant mortality in ACLF patients. However, the trends over time for LT with ECD have not been investigated. This study aims to analyze trends in post-transplant outcomes with ECD in ACLF and determine risks associated with specific ECD criteria.
Methods: Using OPTN/UNOS data, we analyzed LT recipients with ACLF between 2004 and 2019. Patients with status 1A, multi-organ and re-transplant were excluded. ACLF was defined using EASL-CLIF criteria. In recipients with donor risk index

(DRI)≥1.7, one-year graft survival (GS) was compared between 3 eras: Era1 (2004-08), Era2 (2009-13), and Era3 (2014-19). The cut-off of 1.7 is based on the definition of marginal grafts in the literature. Donor risk factors for one-year graft loss were analyzed in each era using Cox proportional hazard model, with adjustments for recipient variables. Finally, the impact of DRI as an independent continuous predictor of one-year graft loss was evaluated in each Era.

Results: 30,080 eligible ACLF patients were identified, of whom 7,909 (26.3%), 9,511 (31.6%), and 12,660 (42.1%) were transplanted in Era1, Era2 and Era3. When comparing post-transplant outcomes in ACLF patients with DRI≥1.7, Era3 (85.1%) had significantly better 1-year GS than Era1 (75.4%, P<0.001) and Era2 (82.5%, P=0.007). On multivariable analysis, older donor (age 51-60, >60), DCD donor, and prolonged CIT (>8 hours) were independent risk factors for 1-year graft loss in Era1. In contrast, risk factors in Era2 included older donor age (age>60) and DCD, whereas in Era3 only older donor age (age 51-60, >60) was associated with 1-year graft loss (Table). On evaluation of DRI as a continuous predictor, a higher DRI was associated with an increased hazard of 1-year graft loss in Era1 and Era2. In contrast, a similar risk of graft loss was found across all DRI values in Era3 (Figure).

Conclusions: In ACLF patients, outcomes using ECD livers improved over time. Only older donor age was significantly associated with worse post-transplant outcomes across all three eras. The use of DCD graft and prolonged CIT was associated with graft loss in the earlier but not late era. DRI is not an independent risk factor for graft loss in the most current era. These findings support the contemporary use of ECD livers in ACLF patients.

Table. Donor risk factors for one-year graft loss in ACLF patients (adjusted by recipient characteristics)

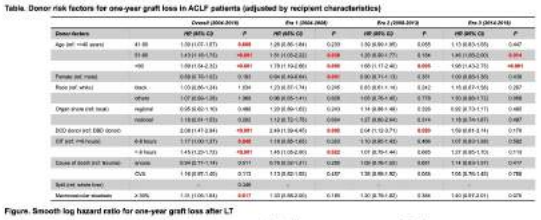
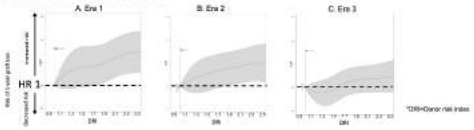


Figure. Smooth log hazard ratio for one-year graft loss after LT



CITATION INFORMATION: Kitajima T., Ivanics T., Moonka D., Shamaa T., Mohamed A., Delvecchio K., Collins K., Rizzari M., Yoshida A., Abouljoud M., Nagai S. Improved Outcomes Over Time of Extended Criteria Donor Grafts for Acute-on-chronic Liver Failure *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Kitajima: None. **T. Ivanics:** None. **D. Moonka:** None. **T. Shamaa:** None. **A. Mohamed:** None. **K. Delvecchio:** None. **K. Collins:** None. **M. Rizzari:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **S. Nagai:** None.

Abstract# 182

Impact of Transplant Center Volume on Utilization of and Outcomes Following Donation After Circulatory Death Liver Transplantation in the United States

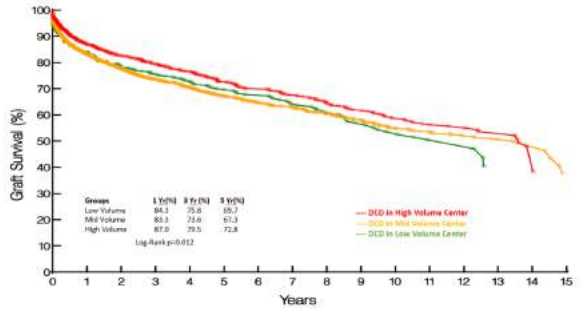
S. Kumar[1], S. Lin[2], J. D. Schold[2], *[1]Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates, [2]Department of Quantitative Health Sciences, Cleveland Clinic Foundation, Cleveland, OH*

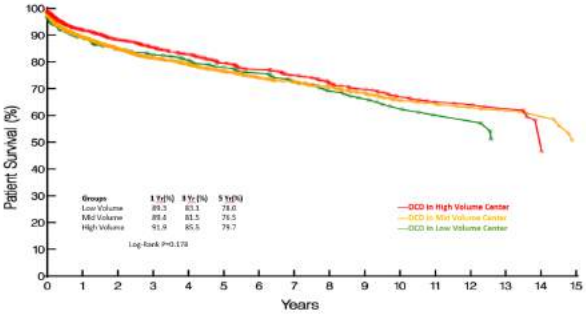
Purpose: Despite increased utilization of donation after circulatory death (DCD) grafts in the US, impact of center volume on DCD liver transplantation (LT) remains unclear. Our aim was to evaluate impact of center volume on utilization of DCD and outcomes.

Methods: Utilizing SRTR we evaluated all DCD LT from 2005-2019, divided into era 1: 2005-2009; era 2: 2010-2014; era 3: 2015-2019. Centers were categorized based on average annual LT as low volume (LVC): < 30, mid volume (MVC): 30-99 and high volume (HVC): ≥ 100. Primary outcome measures were graft and patient survival. A chi-square test was used for categorical and Student's t-test for continuous variables. Survival comparison was performed using Kaplan-Meier method and multivariable analysis using Cox proportional hazard models.

Results: DCD LT increased from 5.2% in era 1 to 7.7% in era 3. 77% of centers used DCD donors, with the top 10 HVCs accounting for 37% of DCD LT. Proportion of DCD LT in HVC was greater in all 3 eras (%): era 1: 7.0 vs 4.8 vs 5.2; era 2: 7.1 vs 5.1 vs 4.2; era 3: 9.6 vs. 7.6 vs. 5.6 (p<0.0001). DCD recipients in HVC were more likely to be > 50 (79% vs 78% vs 72%; p=0.006) with shorter mean time from listing to LT (206 vs 277 vs 281 days; p<0.0001) and cold ischemia time (5.87 vs 6.04 vs 6.47 hours; p<0.0001). Mean donor age (37.5 vs 34.6 vs 33.7; p<0.0001) and proportion > 50 (21% vs 15% vs 13%; p<0.0001) were higher in HVC. 1-, 3- and 5-year graft survival in LVC were comparable to MVC, but inferior to HVC (Fig 1). However, 1-, 3- and 5-year patient survival were comparable in the 3 groups (Fig 2). Multivariable analysis identified recipient age, male gender, donor age, and cold ischemia time as predictors of graft and patient survival.

Conclusions: HVCs account for a disproportionate amount of DCD LT and are more likely to transplant older recipients using older DCD donors, with shorter time from listing to LT. Expanding DCD LT in LVC and MVC may improve access and reduce waitlist mortality without compromising outcomes. Improved understanding of factors determining center variations in DCD LT will help improve organ allocation practices.





CITATION INFORMATION: Kumar S., Lin S., Schold J. Impact of Transplant Center Volume on Utilization of and Outcomes Following Donation After Circulatory Death Liver Transplantation in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Kumar: None. **S. Lin:** None. **J.D. Schold:** None.

Abstract# 183

The Impact of Donor and Recipient Age Differenceon Long Term Prognosis in Young Liver Transplant Recipients

A. Pita, A. Moro, J. C. McVey, D. J. Firl, M. Fujiki, T. Diago, C. Quintini, F. Aucejo, C. D. Kwon, K. V. Menon, K. Hashimoto, B. Eghtesad, C. Miller, K. Sasaki, *The Cleveland Clinic, Cleveland, OH*

Purpose: Although the importance of donor and recipient age in liver transplant (LT) are well-studied, the prognostic influences of donor and recipient age differences are still unknown. Especially, since young recipient have a long life expectancy, the influence of the old donor liver on their long-term prognosis should be elucidated. The study aims to reveal the long-term prognostic influence of donor-recipient age difference in young recipients.

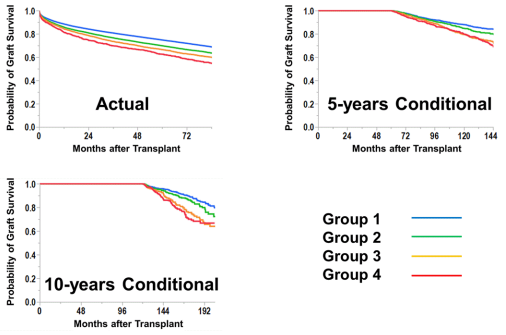
Methods: Adult patients who received initial LT using brain dead donor between 2002 and 2020 were identified from the UNOS database. Patients who received pediatric donor and split liver grafts were excluded. Young recipient was defined as ≤ 45 year old. The age difference between donor and recipient was categorized as follows: Group 1: younger than recipient, Group 2: ≤10 years older, Group 3: 10-19 years older, Group 4: 20 years or older. To examine the influence of donor recipient age difference in long-term survivors, conditional survival (CS) analysis was conducted.

Results: Among 89145 patients, 14258 patients were ≤ 45 years old (16.3%), which were categorized into 5839 (41.0%) as Group 1, 3390 (23.8%) as Group 2, 2488 (17.5%) as Group 3, 2541 (17.8%) as Group 4. The recipient and donor characteristics are summarized (Table). The actual overall survival, 5-years CS, and 10-year CS according to the donor recipient age differences are shown (Figure). Among the recipients who survived 5-years from LT, the survival curves were divided into two clusters (Group 1 and 2 vs. Group 3 and 4). This trend was more prominent when the recipient survived longer than 10 years from LT.

Conclusions: Donor and recipient age difference affected not only short term but also in long-term after LT. When the donor is ≥ 10 years older, a significant difference in survival in long-term was confirmed. Transplanting a donor liver of ≤10 years difference should be considered in young patients who are expected to have a long term prognosis.

Median (IQR)	Group 1 (<0)	Group 2 (0-9)	Group 3 (10-19)	Group 4 (≥20)	P
	N=5839	N=3390	N=1522	N=1412	
Recipient age	40 (35-43)	38 (31-43)	38 (31-42)	33 (26-39)	0.03
Recipient gender, male (%)	3579 (61.2)	2069 (61.0)	1522 (61.2)	1412 (55.6)	<0.01
Lab MELD score at LT	28 (19-36)	27 (19-35)	27 (18-35)	26 (18-34)	<0.01
Donor age	26 (21-32)	43 (36-48)	52 (46-57)	61 (54-66)	< 0.01
Donor gender, male (%)	3964 (67.9)	1923 (56.7)	1328 (53.4)	1205 (47.4)	<0.01
Waiting time, days	26 (5-144)	32 (6-155)	27 (5-141)	30 (5-160)	0.05

Donor and Recipient Age difference (Donor-Recipient age)



CITATION INFORMATION: Pita A., Moro A., McVey J., Firl D., Fujiki M., Diago T., Quintini C., Aucejo F., Kwon C., Menon K., Hashimoto K., Eghtesad B., Miller C., Sasaki K. The Impact of Donor and Recipient Age Differenceon Long Term Prognosis in Young Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Pita: None. **A. Moro:** None. **J.C. McVey:** None. **D.J. Firl:** None. **M. Fujiki:** None. **T. Diago:** None. **C. Quintini:** None. **F. Aucejo:** None. **C.D. Kwon:** None. **K.V. Menon:** None. **K. Hashimoto:** None. **B. Eghtesad:** None. **C. Miller:** None. **K. Sasaki:** None.

Abstract# 184

State-level Trend in the Prevalence of Non-alcoholic Steatohepatitis for Liver Transplant Candidates in the United States, 2001-2017

S. Chang[1], M. Wang[1], M. Pozo[2], D. Ladner[2], D. Borja-Cacho[2], *[1]Washington University School of Medicine, Saint Louis, MO, [2]Northwestern University, Chicago, IL*

Purpose: As variation in the prevalence of obesity across states continues to grow, the prevalence of nonalcoholic steatohepatitis (NASH) is also rising. However, little is known about NASH cirrhosis as the primary indication for liver transplant (LT) at the state level.
Methods: OPTN and BRFSS data from 2001-2017 were used. NASH as the primary indication for LT was defined as NASH as the primary diagnosis; and cryptogenic as the primary diagnosis and patient body mass index ≥35 or a diagnosis of diabetes. Patients' state of residency at registration was geocoded. State-level prevalence was computed for obesity, obesity+hypertension, obesity+hypertension+diabetes (per 100 state population for all above), NASH and HCC for waitlisted patients (per 10 million state population), and obesity+hypertension or obesity+diabetes (obesity+hypertension/diabetes) for donors (per 100 state donors) were assessed. Linear time trend analyses were conducted on the prevalence for each state and the entire nation. One-sided tests to detect positive linear trends were used using α=0.05.
Results: The prevalence of obesity, obesity+hypertension, obesity+hypertension+diabetes increased over time (see **Figure**). The prevalence of NASH and HCC increased in LT candidates. The prevalence of obesity+hypertension/diabetes in deceased liver donors had a significantly increasing trend (all p<0.0001). States with increasing trend in all studied prevalence included MD, NJ, PA, VA, WV, FL, GA, NC, SC, IL, MI, OH, WI, AL, TN, NE, MO, AR, LA, OK, TX, AZ, NV, UT, and WY. Except for donor prevalence in obesity+hypertension/diabetes, most of the states had increasing trend in the studied prevalence. NASH demonstrated an increased trend as the primary diagnosis for LT in all states, except for RI, VT, DC, NY (p=0.0635), SD, MT, NM, and OR (p=0.0516).
Conclusions: The prevalence of NASH as the primary diagnosis for LT has increased significantly from 2001-2017 in almost all states (from 7 to 90 per 10 million state population). The prevalence of predisposing comorbidities has also increased in the general population including deceased donors. We found that these trends were correlated/aligned.

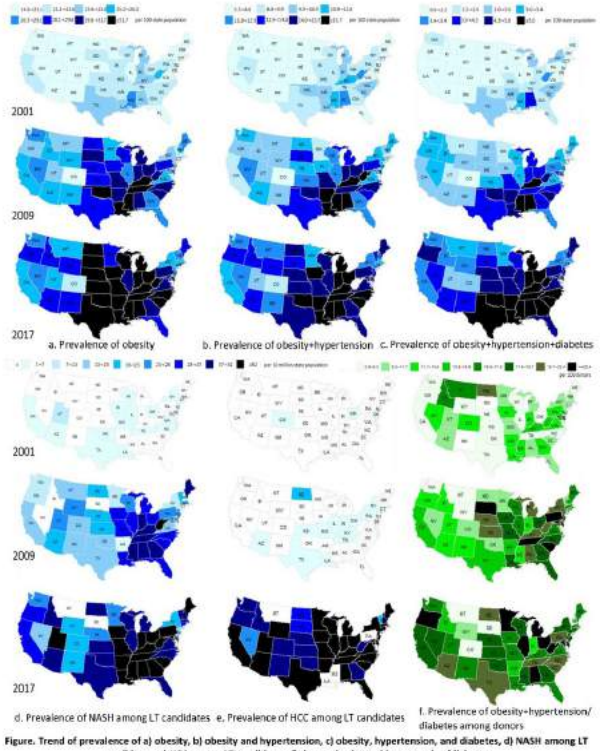


Figure. Trend of prevalence of a) obesity, b) obesity and hypertension, c) obesity, hypertension, and diabetes, d) NASH among LT candidates, e) HCC among LT candidates, f) donor obesity and hypertension/diabetes

CITATION INFORMATION: Chang S., Wang M., Pozo M., Ladner D., Borja-Cacho D. State-level Trend in the Prevalence of Non-alcoholic Steatohepatitis for Liver Transplant Candidates in the United States, 2001-2017 *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Chang: None. **M. Wang:** None. **M. Pozo:** None. **D. Ladner:** None. **D. Borja-Cacho:** None.

Abstract# 185

Liver Transplant Justified at Any Meld Score?

H. Oden-Brunson, E. Godfrey, H. Flores, A. Rana, *Baylor College of Medicine, Houston, TX*

Purpose: Assessing the survival benefit of transplantation in patients with chronic liver failure is critical in guiding the decision-making process for liver allocation. Current protocols prioritize patients for transplantation by severity of illness as reflected by higher Model for End-Stage Liver Disease (MELD) scores. Previous guidance in the field has been to avoid transplantation below a MELD of approximately 18, based on retrospective studies that demonstrated increased mortality risk for those transplanted below that score compared to candidates who remained on the waitlist. Given improved short-term outcomes of liver transplantation and a changing landscape of liver disease, we aimed to evaluate the survival benefit of liver transplantation at lower MELDs using intent-to treat analysis, with specific attention to the risk of transplant at low MELD scores.
Methods: This retrospective cohort study used the UNOS database to analyze 161,823 candidates who were waitlisted for liver transplantation between March 1, 2002 and December 31, 2017. Stratified MELD cohorts were used to compare patients who were transplanted in a MELD score group to those listed in the same MELD group (omitting any who were transplanted in the same MELD group as listing) and then followed in an intent-to-treat manner. Kaplan-Meier analysis and multivariable Cox proportional hazard regression analysis were used to compare mortality between the transplantation and intent-to-treat cohorts.
Results: While the survival benefit of transplantation does increase with increasing MELD scores, a survival benefit was shown for transplantation even at the lowest MELD scores. Most notably, those transplanted at a MELD between 6-11 showed a 10% reduction in mortality (HR = 0.90 [95% CI, 0.85-0.94]; $p < 0.001$), compared to the intent-to-treat cohort listed at this MELD. This mortality benefit increased to a 28% reduction for those transplanted at MELD between 12-14 (HR = 0.72 [95% CI, 0.68-0.75]; $p < 0.001$) and a 38% reduction for those transplanted at a MELD between 14-17 (HR = 0.62 [95% CI, 0.59-0.65]; $p < 0.001$).
Conclusions: These findings challenge the current practice of deferring liver transplant below a particular MELD score such as 18, even if a possible match is offered, by showing a survival benefit for transplant patients even at the lowest

MELD scores. Further analysis into the justification of transplantation at any MELD score could have strong implications in the allocation and management of patients waitlisted for liver transplant.

CITATION INFORMATION: Oden-Brunson H., Godfrey E., Flores H., Rana A. Liver Transplant Justified at Any Meld Score? *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Oden-Brunson: None. **E. Godfrey:** None. **H. Flores:** None. **A. Rana:** None.

Abstract# 186

Impact of Graft Quality on Patient Survival in Sick Patients

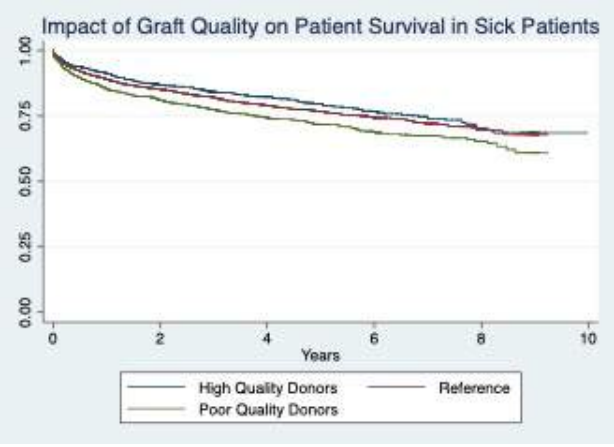
G. Handing[1], S. Keeling[1], C. Christmann[1], N. Galvan[2], C. O'Mahony[2], J. Goss[2], R. Cotton[2], A. Rana[2], *[1]School of Medicine, Baylor College of Medicine, Houston, TX, [2]Michael E DeBakey Department of Surgery, Division of Abdominal Transplant, Houston, TX*

Purpose: It is widely accepted in the literature that patients who have a Model for End Stage Liver Disease (MELD) Score greater than 30 incur an increased survival benefit from transplantation, regardless of allograft quality, compared to patients remaining on the waitlist. While immediate transplantation with any available organ is preferential from the patient perspective, it is also important to consider allograft allocation from a societal perspective—in which case population level survival should be maximized.

Methods: Using the Organ Procurement and Transplantation Network database, we retrospectively analyzed one-year patient survival in 7910 patients with MELD scores greater than 35. The impact of low- and high-quality allografts—quality determined by the donor risk index—was measured by adjusting for recipient risk factors in a multivariate analysis. The impact of graft quality on length of post-transplant hospital stay and graft survival were computed as well.

Results: High quality organs were associated with 60% increased patient survival (odds ratio [OR] 0.752, p=0.006) at 1 year post-transplant compared to low quality organs (OR 1.352, p=0.001) in patients with high MELD scores. Low quality organs were also associated with increased post-transplant hospital stays and decreased graft survival.

Conclusions: Although high risk patients experience significant survival benefit even with low quality organs, our analysis shows that selecting for high quality organs in this population is associated with better transplantation outcomes overall. Thus, there may be room for improvement in our current allocation system.



CITATION INFORMATION: Handing G., Keeling S., Christmann C., Galvan N., O'Mahony C., Goss J., Cotton R., Rana A. Impact of Graft Quality on Patient Survival in Sick Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Handing: None. **S. Keeling:** None. **C. Christmann:** None. **N. Galvan:** None. **C. O'Mahony:** None. **J. Goss:** None. **R. Cotton:** None. **A. Rana:** None.

Abstract# 187

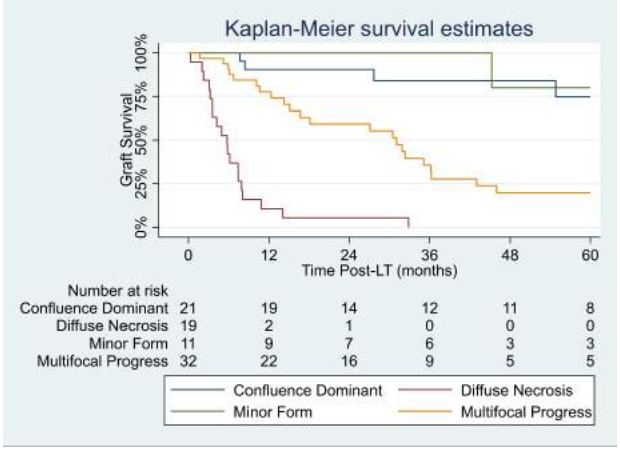
Classification of Distinct Patterns of Ischemic Cholangiopathy Following DCD Liver Transplantation: Distinct Clinical Courses and Long-Term Outcomes from a Multicenter Cohort

K. P. Croome[1], A. K. Mathur[2], B. Aqel[2], L. Yang[1], J. K. Heimbach[3], T. Taner[3], C. B. Rosen[3], R. Paz-Fumagalli[1], C. Taner[1], *[1]Mayo Clinic Jacksonville, Jacksonville, FL, [2]Mayo Clinic Arizona, Scottsdale, AZ, [3]Mayo Clinic Rochester, Rochester, MN*

Purpose: As the number of donation after circulatory death (DCD) liver transplants (LTs) performed in the United States continues to increase annually, there has been interest to develop a more robust exception point safety net for patients who develop ischemic cholangiopathy(IC) following DCD LT. As such, there is a need for better understanding of the clinical course and long-term outcomes in patients who develop IC, as well as determining if IC can be classified into distinct categories with distinctly different clinical outcomes.

Methods: All DCD LT (N=770) performed at Mayo Clinic-Florida, Mayo Clinic-Arizona and Mayo Clinic-Rochester from 1/1/1999-3/30/2020 were included. Clinical course and outcomes were investigated for the overall cohort of patients developing IC, as well as compared between four distinct radiologic patterns of IC: Diffuse Necrosis (DN), Multifocal Progressive (MP), Confluence Dominant (CD) and Minor Form(MF).

Results: A total of N=83 (10.8%) patients developed IC, of which N=41 (5.5%) were ultimately listed for retransplantation (ReLT). Patient survival following ReLT for IC was 88.4%, 79.0% and 72.4% at 1-, 3- and 5-years, respectively. Patients with DN and MP patterns suffered from frequent hospital admissions for cholangitis in the first year following DCD LT (median 3 and 2), were largely stent dependent (100% and 85.7%) and almost universally required ReLT. Patients with CD disease were managed with multiple stents and frequently recovered, ultimately becoming stent free without need for ReLT. Patients with the MF of IC did well with limited need for stent placement or repeat procedures and did not require ReLT. Graft survival was significantly different between the 4 distinct IC patterns (p<0.001).



Conclusions: The present analysis provides the largest and most detailed analysis to date on the natural history and clinical course of IC. IC development appears as a spectrum of damage in the bile ducts rather than an all or none phenomenon. Patients developing IC can be classified into 4 distinct patterns with distinct clinical courses.

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DISCLOSURES: K.P. Croome: None. **A.K. Mathur:** None. **B. Aqel:** None. **L. Yang:** None. **J.K. Heimbach:** None. **T. Taner:** None. **C.B. Rosen:** None. **R. Paz-Fumagalli:** None. **C. Taner:** None.

Abstract# 188

The Unintended Financial Consequences of Acuity Circles for Liver Allocation - Two-fold Increase in Import Fees and Higher Organ Acquisition Cost Despite Unchanged Travel Patterns

A. Wall, S. Asrani, G. McKenna, E. Martinez, R. Ruiz, H. Fernandez, J. Bayer, A. Gupta, N. Onaca, R. Goldstein, J. Trotter, G. Testa, *Abdominal Transplant Surgery, Baylor University Medical Center, Dallas, TX*

Purpose: The recent initiation of acuity circles (AC) as the basis for liver allocation is associated with broader sharing and potentially greater travel and increased costs for organ acquisition. We compare liver acquisition costs before and after AC-based liver allocation.

Methods: We collected the OPO and flight invoices for all liver donors for our transplant center pre-AC (7/1/2019-2/3/2020) and post-AC (2/4/2020-10/30/2020).

Results: (Figure A) Comparing expenses from the post-AC to pre-AC period, there was a **>2-fold**increase both in % donors incurring an import fee (31.4% vs 12.6%, p<0.01), and surgeon fee (17.8% vs 7.4% p<0.01). Costs were significantly higher in the post-AC period compared to pre-AC, as total cost per accepted donor increased **16%**(mean $52,966 vs $45,725, p<0.01), cost per declined donor increased **55%**(mean $15,865 vs 10,217, p<0.01) acquisition fees increased **10%**(mean $39,979 vs 43,860, p<0.01) and flight expenses increased **43%**(mean $12,903 vs $9,048 p<0.01). The donor charges themselves varied widely. The highest and lowest donor costs for separate donors at the exact same donor city 200 NM from our center, differed by >$20,000 (Figure B)

Comparing donor parameters in the post-AC to the pre-AC period, there was no change in the Median MELD Score (24 vs 25, p=0.271) or match run sequence (15 vs 10, p=0.305), although the DCD acceptance rate was significantly higher (46% vs 29%, p=0.016).

Comparing travel patterns, there was no difference in median nautical miles travelled (146 vs 144, p=0.324) or percent of donors requiring flights (58% vs 57%, p = 0.8). There was no difference in the donor acceptance rate and most donors were within 150 NM.

Conclusions: Post-AC, our center had a higher % of donors incurring an import fee of $10,000, and surgeons fee ranging from $2,500-$4,000, as well as increased total costs for accepted donors (+16%), declined donors (+55%), acquisition fees (+10%) and flight fees (+43%). The unintended consequences of these ballooning costs of liver allocation needs urgent regulation by UNOS/OPTN in a similar vein to kidney acquisition, so as to ensure this change in AC allocation doesn't threaten the financial viability of liver transplant programs.

	Pre-AC (N/%)	Post-AC (N/%)	p value
Donor characteristics	N=95	N=118	
Donors accepted	85.26%	77.97%	0.24
DCD donors accepted	29.47%	46.61%	0.016*
Import	18.95%	63.56%	<.001*
Import fees charged ($10,000 per donor)	12.63%	31.36%	0.002*
Surgeons fees charged ($2500-4000/donor)	7.37%	17.8%	0.0026*
Flight	36.84%	58.47%	0.8
Donors per NM category	N=95	N=118	
<150	49.47%	50.00%	1
150-249	34.74%	33.90%	
250-500	14.74%	15.25%	
>500	1.05%	0.85%	
Donor Characteristics (Median)			
MELD	25	24	.271
Sequence	10	15	.3
Travel distance	144	140	.32
Cost (Mean)	$	$	
Total fees for accepted	45925.9	52966.37	<0.001*
Total fees for declined	10217.22	15865.32	<0.001*
Acquisition fee for accepted	39979.50	43860.99	<0.001*
Flight charges	9048.75	12903.73	0.002*

Figure: A (Left)- comparison of donor characteristics and costs pre- and post-AC. B (Right)- cost comparison of accepted donors for all donors accepted from a single city, approximately 200 NM, and charge breakdown per donor.

CITATION INFORMATION: Wall A., Asrani S., McKenna G., Martinez E., Ruiz R., Fernandez H., Bayer J., Gupta A., Onaca N., Goldstein R., Trotter J., Testa G. The Unintended Financial Consequences of Acuity Circles for Liver Allocation - Two-fold Increase in Import Fees and Higher Organ Acquisition Cost Despite Unchanged Travel Patterns *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Wall: None. **S. Asrani:** None. **G. McKenna:** None. **E. Martinez:** None. **R. Ruiz:** None. **H. Fernandez:** None. **J. Bayer:** None. **A. Gupta:** None. **N. Onaca:** None. **R. Goldstein:** None. **J. Trotter:** None. **G. Testa:** None.

Lung

When Opportunity Knocks... Identifying Interventions to Optimize Lung Transplant Outcomes

Abstract# 189

Pregnancy Outcomes in 39 Lung Transplant Recipients

S. Constantinescu[1], L. A. Coscia[2], A. Yusuf[2], S. Rao[3], M. J. Moritz[4], *[1]Lewis Katz School of Medicine at Temple University, Philadelphia, PA, [2]Transplant Pregnancy Registry International, Philadelphia, PA, [3]University of Virginia Heath System, Charlottesville, VA, [4]Lehigh Valley Health Network, Allentown, PA*

Purpose: The purpose of this study is to describe 52 pregnancies in 39 lung transplant recipients reporting to the Transplant Pregnancy Registry International (TPRI) from 1992-2019; 3 recipients are from outside of North America.

Methods: Data were collected via questionnaires, telephone interviews, and medical records review.

Results: Cystic fibrosis was the indication for transplant in 22 (56%) of the women. The mean age at transplant was 27.5 ± 4.9 yrs and the transplant to conception interval was 4.0 ± 2.9 yrs (range 0.11-11.3 yrs). Only 41% of the pregnancies were reported as being planned. Most of recipients were on calcineurin inhibitor therapy for immunosuppression; 20% on cyclosporine and 78% on tacrolimus; 13% of pregnancies were exposed to a mycophenolic acid product (MPA) during the first trimester. Of the 54 pregnancies (including multiples) the outcomes were 33 live births, 15 miscarriages, 5 terminations, 0 stillbirths, and 1 ectopic pregnancy. There were 6 first trimester exposures to MPA resulting in 3 miscarriages, 2 live births (no birth defects) and 1 neonatal death due to prematurity (26 wks, also umbilical cord anomaly). Comorbid conditions during pregnancy included: hypertension 62%, rejection 14%, preeclampsia 12.5%, and diabetes requiring insulin 32%. Of the 33 livebirths the mean gestational age was 33.9 ± 4.8 wks and mean birthweight was 2151± 895 g. Neonatal deaths were reported in association with the triplet pregnancy: one fetus spontaneously aborted at 14 weeks, followed by the death of the two remaining infants delivered at 22 wks. There were 4 birth defects in 3 children. One child had both hypospadias (repaired at 8 mos) and cerebral arteriovenous malformation (corrected when discovered at age 18), one child had Tetralogy of Fallot, and one child had atrial and ventricular defects with pacemaker placement (mother had same diagnosis). There were 8 infants who were breastfed. The TPRI has been following the offspring long-term: mean age of the children 8.9 ± 8 yrs. With a mean maternal follow-up of 8.5 ± 7.3 yrs, 11 recipients have died (mean age of 6 children at maternal death 7.4 ± 5.7 yrs), 4 reported reduced function, and 24 had adequate transplant function.

Conclusions: Successful pregnancy is possible after lung transplantation, though caution is advised as these are extremely high-risk pregnancies with high incidences of graft rejection, prematurity, low birthweight infants. Close surveillance of these recipients is warranted due to the negative impact of rejection during pregnancy on graft and long-term maternal survival. All centers worldwide are encouraged to have their recipients report all pregnancies to the TPRI.

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DISCLOSURES: S. Constantinescu: None. **L.A. Coscia:** None. **A. Yusuf:** None. **S. Rao:** None. **M.J. Moritz:** None.

Abstract# 190

Guiding Therapeutic Plasma Exchange for Amr Treatment in Lung Transplant Recipients Using Serial Dilution in Single Antigen Bead Assay

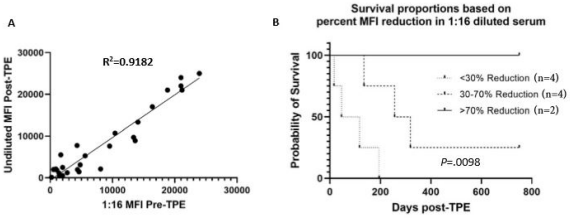
O. A. Timofeeva[1], J. Choe[2], M. Alsammak[2], E. J. Yoon[2], S. Geier[2], K. Carney[2], J. Au[2], A. Diamond[2], J. A. Galli[2], K. Shenoy[2], A. Mamary[2], S. Seghal[2], P. Mullhal[2], Y. Toyoda[2], N. Shigemura[2], F. Cordova[2], G. Criner[2], J. Brown[2], *[1]MedStar Georgetown University Hospital, Washington, DC, [2]Temple University Hospital, Philadelphia, PA*

Purpose: Development of donor-specific antibodies (DSA) is associated with poor outcomes in lung transplantation. Patients who are presented with at least probable AMR require treatment; however, currently there are no guidelines on which treatment regiment to use. We investigated how DSA characteristics measured by Single antigen bead assay (SAB) such as antibody titers, C1q-binding, and mean fluorescence intensity (MFI) values in undiluted and diluted sera may be used to predict a response to therapeutic plasma exchange (TPE) and inform patient's prognosis after treatment.

Methods: Out of 357 consecutively transplanted patients without detectable pre-existing DSA between 01/01/16 and 12/31/18, 10 patients were identified treated with 5 sessions of TPE/IVIG. DSA characteristics were collected before and after treatment. The statistical analyses including log-linear regression, two-way ANOVA, and Kaplan-Meier survival were performed. All $P < 0.05$ were considered to indicate statistical significance.

Results: There was no significant difference in mean MFI, titers, or C1q-binding after treatment, suggesting that single-modality TPE treatment was not always effective. Also, there was no significant difference in titers and MFI or response to treatment between early and late DSAs. When post-treatment MFI were expressed as a percentage of pre-treatment levels and divided into 3 groups as responders (MFI levels decreased by more than 70%), partial responders (MFI decreased by 30-70%), and non-responders (MFI decreased by less than 30%), Kaplan-Meier Survival analyses showed a statistically significant difference between responders vs. partial responders and vs. non-responders (p= 0.0127). Linear regression test and Kaplan-Meyer survival analyses showed that percent of MFI reduction in 1:16 diluted pre-TPE sera was predictive of a response to standard TPE treatment (Figure A) and patient survival (Figure B).

Conclusions: Our data suggest that effective AMR treatment improves patient survival. Using 1:16 dilution can help identify patients likely to respond to a standard protocol vs those who require a more aggressive treatment to help guide clinicians as to which patients would be expected to respond to standards protocol or require more aggressive treatment.



CITATION INFORMATION: Timofeeva O., Choe J., Alsammak M., Yoon E., Geier S., Carney K., Au J., Diamond A., Galli J., Shenoy K., Mamary A., Seghal S., Mullhal P., Toyoda Y., Shigemura N., Cordova F., Criner G., Brown J. Guiding Therapeutic Plasma Exchange for Amr Treatment in Lung Transplant Recipients Using Serial Dilution in Single Antigen Bead Assay *AJT, Volume 21 Supplement 3*

DISCLOSURES: O.A. Timofeeva: None. **J. Choe:** None. **M. Alsammak:** None. **E.J. Yoon:** None. **S. Geier:** None. **K. Carney:** None. **J. Au:** None. **A. Diamond:** None. **J.A. Galli:** None. **K. Shenoy:** None. **A. Mamary:** None. **S. Seghal:** None. **P. Mullhal:** None. **Y. Toyoda:** None. **N. Shigemura:** None. **F. Cordova:** None. **G. Criner:** None. **J. Brown:** None.

Abstract# 191

Renal Preservation with Belatacept-Based versus Everolimus-Based Immunosuppression in Lung Transplant Recipients

E. Sartain[1], K. Schoeppler[1], B. Crowther[1], J. Smith[2], A. Gray[2], *[1]University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Aurora, CO, [2]Department of Medicine, Division of Pulmonary Sciences and Critical Care, University of Colorado, Denver, CO*

Purpose: Renal dysfunction is one of the most common long-term complications among lung transplant recipients (LTRs). Calcineurin-inhibitor (CNI) nephrotoxicity is a recognized contributor to renal insufficiency. CNI-minimization strategies using belatacept (BELA) based immunosuppressive regimens have not been as established in LTRs as everolimus (EVR) based immunosuppressive regimens. We sought to compare the impact of these two CNI sparing strategies on renal function in LTRs.

Methods: This retrospective analysis compared LTRs on BELA to those on EVR between 1/2012 and 9/2020. Patients maintained on therapy at least 3 months were eligible for inclusion. Primary outcome was change in eGFR at 6 months. Secondary outcomes at 6 months included change in FEV1, biopsy-proven acute rejection (BPAR), cytomegalovirus infection, fungal infection, *de novo* donor-specific antibody formation, post-transplant diabetes mellitus, and change in triglyceride level.

Results: Seventy-three patients were analyzed (14 BELA, 59 EVR). CNI minimization was used in the majority of patients on BELA or EVR. Baseline characteristics were similar between BELA and EVR, including pre-transplant eGFR, diabetes mellitus, and hypertension as well as renal failure during transplant hospitalization (Table 1). Tacrolimus levels were significantly lower at 3 and 6 months in the EVR group. On average, both strategies were associated with numerical improvement in eGFR at 6 months (BELA +6 mL/min/1.73m^2 , p=0.11; EVR +3 mL/min/1.73m^2 , p=0.04). There was no significant difference when change in eGFR was compared between groups (p=0.62). Secondary outcomes were similar, however there was a trend toward increased triglyceride levels in the EVR cohort (Table 2).

Conclusions: To our knowledge, this is the first study to compare BELA and EVR as renal-sparing strategies among LTRs. A BELA-based strategy appears to result in similar renal effects to EVR, despite significantly higher tacrolimus levels, without increased risk of BPAR at 6 months. Larger studies with longer term follow up are needed to understand the impact on lung function, CLAD rates and infection risks with these two regimens.

Table 1. Baseline Characteristics

	Belatacept (n=14)	Everolimus (n=59)	P-value
Age, median (IQR), y	59 (57 - 62)	61 (54 - 64)	0.51
Male, n	8 (57%)	30 (50.8%)	0.67
Caucasian	11 (79%)	54 (92%)	0.16
cPRA ≥ 20%	2 (14%)	5 (9%)	0.61
Bilateral lung transplant	12 (86%)	41 (70%)	0.22
Donor age, median (IQR), y	34 (22 - 55)	31 (22 - 47)	0.64
CMV donor +, recipient -	5 (36%)	20 (34%)	0.35
eGFR at time of transplant, median (IQR), mL/min/1.73m^2	97 (68 - 127)	86 (67 - 115)	0.64
Diagnosis of diabetes mellitus prior to transplant	4 (29%)	7 (12%)	0.21
Diagnosis of hypertension prior to transplant	4 (29%)	16 (27%)	>0.99
Transplant LOS, median (IQR), d	16 (11 - 31)	14 (11 - 26)	0.62
Renal failure during transplant hospitalization	7 (50%)	23 (39%)	0.45
Days from transplant to study group initiation, median (IQR)	530 (281 - 886)	333 (194 - 688)	0.17
Diagnosis of CLAD at time of study group initiation	2 (14%)	3 (5%)	0.24
eGFR at time of study group initiation, median (IQR), mL/min/1.73m^2	31 (27 - 35)	36 (29 - 45)	0.14

Table 2. Primary and Secondary Outcomes at 6 Months

	Belatacept (n=14)	Everolimus (n=59)	P-value
Change in eGFR, mean (± SD), mL/min/1.73m^2	6 ± 11	3 ± 16	0.62
eGFR, mean (± SD), mL/min/1.73m^2	39 ± 14	42 ± 12	0.43
Tacrolimus trough at 3 months, median, ng/mL	5.3	2.4	**<0.001**
Tacrolimus trough at 6 months, median, ng/mL	4.6	2.6	**0.006**
Everolimus trough at 3 months, median, ng/mL	-	5.3	-
Everolimus trough at 6 months, mean, ng/mL	-	5.5	-
Change in FEV1, median (IQR), %	0 (-4.6 - 3.8)	-1.8 (-13.3 - 5.2)	0.56
CMV infection	0 (0%)	7 (12%)	0.59
Asymptomatic DNAemia	0 (0%)	5 (8%)	
CMV syndrome or disease	0 (0%)	2 (3%)	
Proven or probable IFI	0 (0%)	1 (2%)	>0.99
Biopsy-proven rejection	2 (14%)	7 (12%)	>0.99
***De novo* donor-specific antibodies**	0 (0%)	2 (3%)	>0.99
Change in triglyceride level, median (IQR), mg/dL	0 (-45 - 74)	111 (-35 - 153)	0.21
New diagnosis of post-transplant diabetes mellitus	0 (0%)	4 (7%)	>0.99

CITATION INFORMATION: Sartain E., Schoeppler K., Crowther B., Smith J., Gray A. Renal Preservation with Belatacept-Based versus Everolimus-Based Immunosuppression in Lung Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Sartain: None. **K. Schoeppler:** None. **B. Crowther:** None. **J. Smith:** None. **A. Gray:** None.

Abstract# 192

Elexacaftor/ivacaftor/tezacaftor in Lung Transplant Recipients: A Case Series

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Purpose: Little data is published describing the safety or efficacy of elexacaftor/ivacaftor/tezacaftor in lung transplant recipients. Even though it is not expected to offer pulmonary benefits in lung transplant recipients with cystic fibrosis (CF), it may improve extrapulmonary manifestations.

Methods: This retrospective case series summarizes the clinical experience of 7 lung transplant recipients on elexacaftor/ivacaftor/tezacaftor therapy.

Results: Patients were 39 +/- 11 years old, 71% male, and 7.6 +/- 7 years post transplant when starting elexacaftor/ivacaftor/tezacaftor. After 211 +/- 89 days on therapy, 4 (57%) note improvement in at least one domain: 4 (47%) report improved GI symptoms, 2 (29%) report improvement in sinus symptoms, 2 (29%) had pancreatic enzyme dose reductions. Of the 5 patients with CF-related diabetes, 3 (40%) report improvement in diabetes control. Most patients required a tacrolimus dose reduction after starting elexacaftor/ivacaftor/tezacaftor. In order to maintain the same tacrolimus trough goal, doses were adjusted from 9.3 +/- 5.9 mg/day at baseline to 7.4 +/- 5.3 mg/day after dose titration was complete; this was an average 20% dose reduction. There were no cases of allograft rejection. With regard to drug-related side effects severe enough to warrant intervention, 2 (29%) experienced leukopenia and 1 (14%) experienced transaminitis. Of the two with leukopenia, one improved with dose adjustment to other medications whereas one required elexacaftor/ivacaftor/tezacaftor discontinuation. The discontinuation rate for any cause was 1 patient (14%).

Conclusions: In sum, elexacaftor/ivacaftor/tezacaftor may offer a benefit for management of the extrapulmonary manifestations of cystic fibrosis after lung transplantation. Enhanced monitoring for tacrolimus dose adjustments and drug-related side effects is warranted.

CITATION INFORMATION: Potter L., Vargas B., Rotolo S., McEwen C., Tsui K. Elexacaftor/ivacaftor/tezacaftor in Lung Transplant Recipients: A Case Series *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.M. Potter: Grant/Research Support; Name of Commercial Interest; Astellas. Grant/Research Support; Nature of Relationship; Research support. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Advisory board. **B. Vargas:** None. **S.M. Rotolo:** Salary; Name of Commercial Interest; CVS Caremark. Salary; Nature of Relationship; spouse's employer. **C. McEwen:** None. **K. Tsui:** None.

Abstract# 193

Use of Granulocyte Colony Stimulating Factor After Lung Transplantation is Not Associated with Increased Likelihood of Acute Cellular Rejection

S. Fredrick[1], C. Iasella[2], L. Sacha[3], R. Rivosecchi[3], M. Morrell[3], P. Sanchez[3], J. Pilewski[3], M. Snyder[3], J. McDyer[3], C. Moore[3], *[1]University of Rochester Medical Center, Rochester, NY, [2]University of Pittsburgh School of Pharmacy, Pittsburgh, PA, [3]University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: The cause of neutropenia in lung transplant recipients is multifactorial, including medications, viral infections, and antecedent disease. Granulocyte colony-stimulating factor (G-CSF) is commonly used to treat neutropenia in this population. This study examines whether the use of G-CSF is independently associated with acute cellular rejection (ACR) in lung transplant recipients.

Methods: This was a matched cohort study of adult lung transplant recipients between January 2010 and October 2019. Patients who received G-CSF were matched 1:1 to those who did not based on transplant indication, age, and sex. The primary outcome was biopsy-proven ACR in the 6-month period after first G-CSF administration or from a matched post-transplant time point in the no G-CSF group. Variables with a p-value <0.2 were included with G-CSF in a multivariable logistic regression to assess their effect on likelihood of ACR. Secondary outcomes included time to first ACR, severity of ACR, chronic lung allograft dysfunction, survival, and infections.

Results: 212 patients were included in the final analysis (106 per group). Baseline characteristics were similar between groups, except there were more patients at high risk for cytomegalovirus (CMV) in the G-CSF group and more patients at low risk for CMV in the no G-CSF group. 50 (47.2%) patients in the G-CSF group experienced ACR in the first 6 months, compared to 37 (34.9%) in the no G-CSF group (p=0.070). Of those who experienced ACR, severity of ACR was similar between groups. Time to first rejection episode was shorter in the G-CSF group (p=0.049; figure 1). In a multivariable logistic regression analysis (table 1) with G-CSF use, male sex, transplant indication, CMV serostatus, type of induction, maintenance immunosuppression regimen, and use of valganciclovir/ganciclovir, use of G-CSF was not significantly associated with ACR at 6 months (OR (95% CI) 1.409 (0.772-2.571); p=0.264). Patients in the G-CSF group had a higher 1-year mortality rate and a higher incidence of EBV viremia and bacterial pneumonia. All other secondary outcomes were similar between groups.

Conclusions: In this study in lung transplant recipients, G-CSF was not independently associated with ACR at 6 months. Treatment of neutropenia is often multimodal, and careful consideration of G-CSF therapy and other medication adjustments is warranted.

	Univariable analysis		Multivariable analysis	
Variable	Odds ratio (95% CI)	P-value	Odds ratio (95% CI)	P-value
Age	1.007 (0.985, 1.028)	0.547		
Male sex	1.560 (0.893, 2.723)	**0.118**	1.834 (0.970, 3.469)	0.062
White Race	0.597 (0.232, 1.538)	0.232		
Indication (reference: COPD)		**0.083**		**0.031**
CF	0.281 (0.099, 0.797)	0.017	0.193 (0.061, 0.611)	0.005
IPF	0.686 (0.349, 1.350)	0.275	0.590 (0.277, 1.256)	0.171
Other	0.513 (0.235, 1.118)	0.093	0.451 (0.197, 1.034)	0.060
Transplant type (single vs. double)	0.877 (0.430, 1.788)	0.717		
CMV status (reference: D-/R-)		**0.056**		0.829
R+	1.429 (0.666, 3.066)	0.360	0.839 (0.336, 2.097)	0.707
D+/R-	2.524 (1.125, 5.664)	0.025	1.057 (0.316, 3.531)	0.929
Induction (lymphocyte depleting vs. basiliximab)	0.479 (0.275, 0.837)	**0.010**	0.542 (0.252, 1.168)	0.118
Class I PRA	0.992 (0.967, 1.018)	0.547		
Class II PRA	0.981 (0.952, 1.011)	0.216		
G-CSF use	1.665 (0.959, 2.892)	**0.070**	1.409 (0.772, 2.571)	0.264
Neutropenia severity (reference: none)		0.278		
Mild	0.930 (0.362, 2.390)	0.880		
Moderate	1.798 (0.962, 3.361)	0.066		
Severe	1.356 (0.468, 3.927)	0.574		
Standard immunosuppression	0.623 (0.355, 1.093)	**0.099**	0.685 (0.370, 1.271)	0.231
MMF at baseline	0.783 (0.421, 1.455)	0.440		
MMF/AZA held or decreased	0.833 (0.410, 1.692)	0.614		
Valganciclovir at baseline	1.967 (1.103, 3.507)	**0.022**	1.838 (0.855, 3.949)	0.119
Antiviral held or decreased	0.597 (0.215, 1.659)	0.323		

CITATION INFORMATION: Fredrick S., Iasella C., Sacha L., Rivosecchi R., Morrell M., Sanchez P., Pilewski J., Snyder M., McDyer J., Moore C. Use of Granulocyte Colony Stimulating Factor After Lung Transplantation is Not Associated with Increased Likelihood of Acute Cellular Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Fredrick: None. **C. Iasella:** None. **L. Sacha:** None. **R. Rivosecchi:** None. **M. Morrell:** None. **P. Sanchez:** None. **J. Pilewski:** None. **M. Snyder:** None. **J. McDyer:** None. **C. Moore:** None.

Abstract# 194

Impact Analysis of Virtual Transplant Ambulatory Pharmacist During Covid-19

L. Park, G. Waldman, J. Kim, C. Rogers, J. Clark, *Massachusetts General Hospital, Boston, MA*

Purpose: During the COVID-19 pandemic, transplant centers were challenged to meet the demand for new telemedicine strategies. High-risk immunocompromised patients, such as lung transplant recipients (LTR) require close follow-up due to their medical complexity and need for frequent medication changes. The pandemic significantly limited the ability of lung transplant providers (LTP) to safely conduct face-to-face clinic visits. Transplant pharmacists, previously unable to provide medication management visits for all patients due to time and space restraints of clinic, were now able to conduct virtual telehealth visits to assist LTP in the transition to telemedicine.

Methods: A retrospective chart review of telephone encounters from cardiothoracic pharmacists (CTRx) at our center from March to September 2020 was completed. LTR scheduled for clinic visits with LTP were called prior to the visit by CTRx who conducted chart reviews, medication reconciliations, adherence assessments, and medication access assistance. Clinical recommendations were then communicated directly to the LTP and documented in patient electronic medical records. The primary outcome was the number of pharmacist-driven clinical interventions made during COVID-19 virtual lung transplant visits. Secondary endpoints included the total number of medication discrepancies, average number of interventions, and average number of discrepancies found per visit.

Results: From March to September 2020 the CTRx conducted 385 virtual visits on 157 LTR with an average of 23.4 minutes spent per visit. There were 864 total interventions made by CTRx and a total of 778 medication discrepancies identified. An average of 2.8 interventions were sent to LTP per visit. The most common interventions made were medication education (20.8%), adherence counseling (19.5%), update on adherence level (20.4%), and reinforcement of social distancing and COVID-19 precautions (17.1%). There was an average number of 2.5 medication discrepancies identified out from an average of 22.6 medications reconciled per visit. (Table 1)

Conclusions: Implementation of CTRx telehealth visits has potential for increased patient access to pharmacy care, improved accuracy of medication lists and increased collaboration with LTP given the flexibility that telemedicine provides. Further investigation is needed to determine the significance of CTRx clinical interventions on clinical patient outcomes.

Table 1. Results

Type of Medication Discrepancy, n (%)	
Medication discontinued by CTRx	299 (39)
Medication added by CTRx	188 (39)
Incorrect dose updated by CTRx	156 (20)
Other	135 (17)
Type of Intervention, n (%)	
Medication education	311 (21)
Report changes in medication adherence	305 (20)
Adherence counseling	291 (20)
Social distancing/COVID safety reinforcement	255 (17)
Report change in clinical status	70 (5)
Adverse event reporting	69 (5)
Change to pharmacologic therapy	65 (4)
Nonpharmacologic therapy recommendation	38 (3)
Renal dose adjustment	30 (2)
Recommend immunosuppressant adjustment	26 (2)
Cost savings intervention	23 (2)
Avoidance of drug-drug interaction	9 (1)

CITATION INFORMATION: Park L., Waldman G., Kim J., Rogers C., Clark J. Impact Analysis of Virtual Transplant Ambulatory Pharmacist During Covid-19 *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Park: None. **G. Waldman:** None. **J. Kim:** None. **C. Rogers:** None. **J. Clark:** None.

Abstract# 195

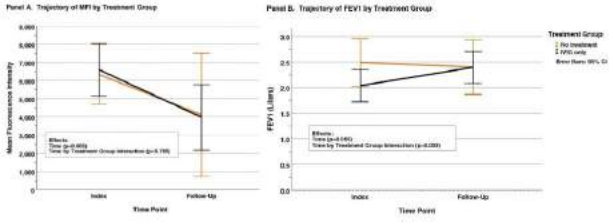
Outcomes of IVIG Monotherapy for Donor-Specific Antibodies After Lung Transplantation

K. Spence, S. Heeney, M. Morrison, S. A. Rega, F. D. Irene, K. B. Harrison, C. M. Shaver, *Vanderbilt University Medical Center, Nashville, TN*

Purpose: *De novo* donor-specific antibodies (DSA) are a risk factor for antibody mediated rejection (AMR) and poor clinical outcomes after lung transplant (LT). Intravenous immune globulin (IVIG) neutralizes circulating DSA and is thought to disrupt AMR. We tested the hypothesis that IVIG therapy is associated with reduced DSA intensity and increased FEV1 compared to observation alone.

Methods: LT recipients from 2009 to 2019 with *de novo* DSA with mean fluorescence intensity (MFI) >3000 were included in this retrospective, single-center, observational analysis. Subjects were excluded if they had treatment in addition to IVIG, had a positive crossmatch, had IVIG prior to DSA, or had no follow-up DSA in 28-100 days. Subjects received IVIG only (n=23) or did not receive treatment (n=16). The trajectories of DSA MFI and FEV1 between the index and follow-up DSA were each tested via repeated measures analysis of variance with time by treatment group interaction effects. Additional outcomes were chronic lung allograft dysfunction and survival. Between-group comparisons were made using parametric and non-parametric tests and Kaplan Meier survival methods.

Results: The study cohort included 39 LT patients (mean age 53±13y, 59% male, 80% double LT) with most having IPF (41%) or COPD (36%). The majority (85%) of DSAs targeted class II antigens. These baseline characteristics and the median interval between index and follow-up testing did not differ between groups (all p>0.203). While overall DSA MFI decreased over time (p=0.003), there was no significant difference in the trajectory of MFI between treatment groups (Panel A, p=0.789). In contrast, the trajectory of FEV1 increased over time in the IVIG group, but not in the no treatment group (Panel B, time by treatment interaction p=0.003). Mean FEV1 at DSA detection was 2.04±0.72 and 2.49±0.77 for the IVIG and no treatment groups, respectively (p=0.087). There was no between-group difference in CLAD (22% vs. 38%, p=0.307) or patient survival (log rank p=0.396).



Conclusions: Although patients treated with IVIG alone for *de novo* DSA after LT have similar DSA MFI trajectories over time, their FEV1 increased after therapy. This result may be due to the trend towards lower FEV1 in the IVIG group at the time of DSA detection. Future studies are needed to determine the mechanisms by which IVIG affects FEV1 in the setting of DSA.

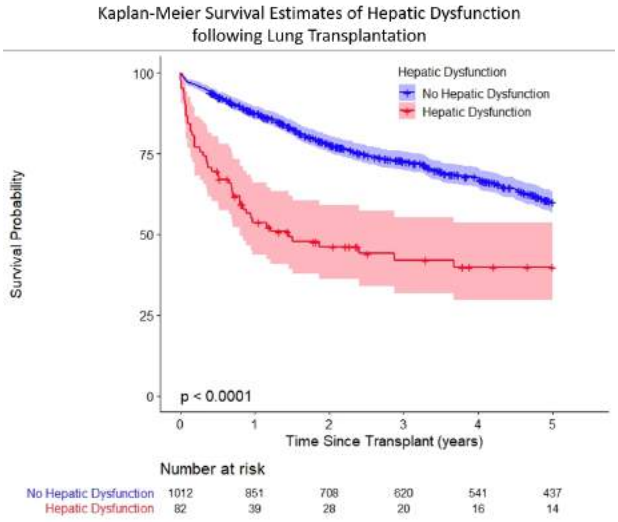
CITATION INFORMATION: Spence K., Heeney S., Morrison M., Rega S., Irene F., Harrison K., Shaver C. Outcomes of IVIG Monotherapy for Donor-Specific Antibodies After Lung Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Spence: None. **S. Heeney:** None. **M. Morrison:** None. **S.A. Rega:** None. **F.D. Irene:** None. **K.B. Harrison:** None. **C.M. Shaver:** Grant/Research Support; Name of Commercial Interest; REDCap. Grant/Research Support; Nature of Relationship; Data Collection. Grant/Research Support; If "Other" Please Explain; UL1 TR000445 from NCATS/NIH, NIH HL136888, UL1 TR000445.

Abstract# 196

Liver Dysfunction Following Lung Transplantation

E. J. Hyzny[1], E. G. Chan[1], J. P. Ryan[1], T. Harano[1], M. R. Morrell[2], P. G. Sanchez[1], *[1]Cardiothoracic Surgery, University of Pittsburgh School of Medicine, Pittsburgh, PA, [2]Pulmonary, Allergy and Critical Care Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: To describe the incidence and risk factors for postoperative hepatic dysfunction (POHD) following lung transplantation (LT) and long-term outcomes for these patients.
Methods: We performed retrospective analysis of 1261 adult LT recipients performed at our center between 1/1/2007- 12/1/2019. Patients were excluded for re-do LT or concurrent solid organ transplantation. POHD was defined by ICD-9 code designation. Chi-square analysis was performed for categorical variables and Mann Whitney U tests for continuous variables. Survival curves were estimated using Kaplan-Meier and log-rank test analysis.
Results: Out of the 1,094 primary lung transplants included, 82 (8.1%) developed POHD following LT. Predictors of POHD included a preoperative history of cirrhosis or portal hypertension (OR:22.13 (CI:5.19-94.40), p<0.001). Right upper quadrant ultrasonography (RUQ-US), performed in 112 (10.3%) patients for high preoperative suspicion of liver disease, was a significant predictor for POHD (OR: 2.73 (CI:1.55-4.80), p<0.001). Transplant diagnoses associated with obtaining preoperative RUQ-US due to clinical suspicion of preoperative liver dysfunction include pulmonary hypertension (p<0.001) and cystic fibrosis (p=0.01). Evidence of fibrosis on RUQ-US conveyed additional risk for POHD (OR:2.76 (CI:1.11-6.86, p=0.03). Other risk factors included use of intraoperative mechanical support (OR: 2.65 (CI: 1.62-4.25), p<0.001) and delayed chest incision closure (OR: 3.73 (CI:2.34-5.92), p<0.001). POHD was associated with longer ICU stay overall (10.5 vs 5 days, p < 0.001), increased duration requiring mechanical ventilatory support (15 vs 2.71 days, p < 0.001), and higher post-operative mortality (HR:11.23 (CI:6.34-19.88), p<.0001). Developing POHD was also associated with significantly lower long-term survival at 3 (p<0.001) and 5 years (p<0.001)(Figure 1).
Conclusions: Following lung transplantation, hepatic dysfunction is a prevalent and morbid complication associated with high mortality. Additional studies are necessary to identify best treatment algorithm and practices to better avoid hepatic dysfunction in the postoperative setting following lung transplantation.



CITATION INFORMATION: Hyzny E., Chan E., Ryan J., Harano T., Morrell M., Sanchez P. Liver Dysfunction Following Lung Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: E.J. Hyzny: None. **E.G. Chan:** None. **J.P. Ryan:** None. **T. Harano:** None. **M.R. Morrell:** None. **P.G. Sanchez:** None.

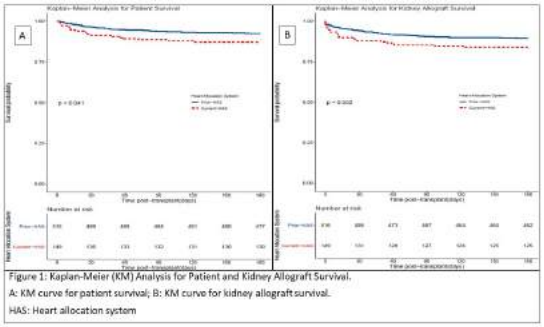
Adherence, Economics, and Ethics

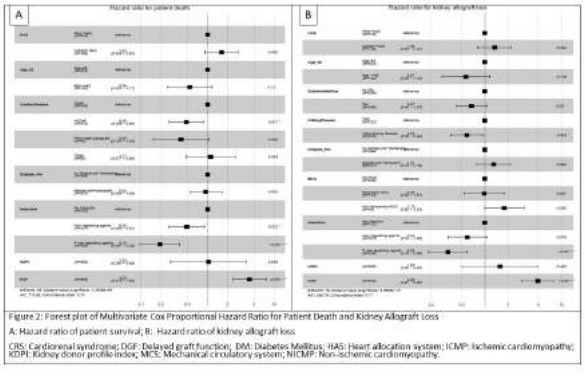
Abstract# 413

Early Outcome of Heart-Kidney Transplantation in the Current Heart Allocation System in the United States

S. Rao[1], A. Doyle[1], D. Brennan[2], S. Constantinescu[3], *[1]University of Virginia, Charlottesville, VA, [2]Johns Hopkins Medical Institute, Baltimore, MD, [3]Lewis Katz School of Medicine at Temple University, Philadelphia, PA*

Purpose: In the United States, heart allograft allocation is a primary determinant for heart-kidney transplantation (HKT). We analyzed the OPTN dataset and compared the outcomes of HKT performed under the prior heart allocation system (prior-HAS, October 1, 2015-October 18, 2018, n= 516) and the current-HAS which prioritized sicker patients (after October 18, 2018, n=149)).
Methods: We acquired de-identified data from the OPTN registry with follow up through December 6, 2019.Baseline demographics, comorbidities, etiology of cardiac and kidney dysfunction were collected. Pre-transplant cardiac support was assessed by inotropic and/or mechanical circulatory support (MCS). The kidney dysfunction pre-transplant was assessed by the serum creatinine at listing, the need for pre-transplant dialysis, and duration of dialysis (short ≤6 weeks, medium 7-12, long >12 weeks).
Results: Under the current-HAS, the percentage of HKT amongst the total heart transplants has increased to 6.4% from 5.3% (p=0.038). Although the prevalence of pre-transplant dialysis was similar (about 50%) amongst the groups, a higher percentage in the current-HAS group had a short duration (less than 6 weeks) of dialysis (24.5% vs 7.3%, p= 0.01). On univariate Cox-regression, the current-HAS group had lower 180-day survival (87.2% vs 92.4%, HR 1.75, 95%CI 1.01-3.04, p=0.04) and a trend towards lower kidney allograft survival (83.9% vs 85.9%, HR 1.60, 95%CI 0.09-2.59, p= 0.05). After adjusting for covariates, HAS era was not an independent predictors of outcomes. Delayed graft function of kidney allograft remained a strong predictor of poorer outcomes and was higher in the current-HAS group (35% vs 26%, p=0.03).
Conclusions: Our study shows that the rates of HKT have continued to increase under the current HAS. Similar to the higher mortality in heart transplant recipients under the current-HAS era, patient mortality was higher in the HKT recipients too. This study highlights the need for a novel HKT allocation policy with standardized listing and allocation criteria aimed to improve HKT outcomes.





CITATION INFORMATION: Rao S., Doyle A., Brennan D., Constantinescu S. Early Outcome of Heart-Kidney Transplantation in the Current Heart Allocation System in the United States *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Rao: None. **A. Doyle:** None. **D. Brennan:** None. **S. Constantinescu:** None.

PUBLIC POLICY: ETHICS

Abstract# 414

Liver Simulated Allocation Model Does Not Accurately Predict Organ Offer Decisions in Pediatric Liver Transplant Candidates

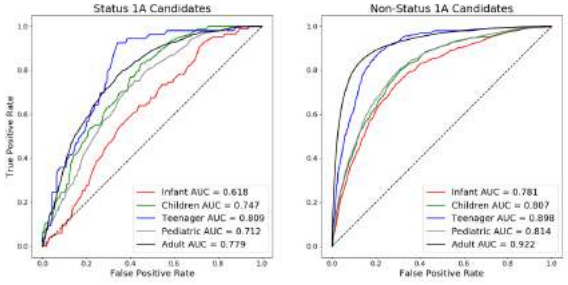
N. L. Wood[1], D. B. Mogul[2], E. K. Hsu[3], E. R. Perito[4], G. V. Mazariegos[5], D. Vanderwerken[1], D. L. Segev[2], S. Gentry[1], *[1]US Naval Academy, Annapolis, MD, [2]Johns Hopkins, Baltimore, MD, [3]Univ of Washington, Seattle, WA, [4]UCSF, San Francisco, CA, [5]Univ of Pittsburgh, Pittsburgh, PA*

Purpose: The U.S. relies on the Scientific Registry of Transplant Recipient's (SRTR's) Liver Simulated Allocation Model (LSAM) to predict the effect of allocation policy changes on liver transplant (LT) outcomes. To effectively inform policy changes, LSAM's model must accurately predict liver offer accept/decline decisions for candidates in general--and for vulnerable subgroups in particular. We hypothesized that liver offer decisions for children differ fundamentally from adults, and thus that LSAM may not accurately model accept/decline decisions for children.

Methods: SRTR data on all deceased donor liver offers from 07/01/2013-06/30/2016 were compared to LSAM's model predictions on accept/decline decisions for these LT candidates, to evaluate LSAM predictions in pediatric (listing age <18yrs) vs. adult candidates (≥18yrs). 0.5% of all offers excluded for missing data. Performance of LSAM's two models, for Status 1A candidates and for non-1A candidates, was evaluated by age group using area under the receiver operator characteristic curves (AUC).

Results: Of 39,351 offers to pediatric candidates and 894,221 to adults during the analysis period, 95.4% and 99.6% respectively were to non-1A candidates; 2.9% of these offers to children and 1.8% of offers to adults were accepted for LT. Among Status 1A candidates (1,829 children, 3,833 adults), 11.7% and 14.8% of offers were accepted respectively. Among non-1A candidates, LSAM's prediction of waitlist mortality was substantially worse for pediatric candidates than for adults (AUC 0.814, 0.922 respectively, FIGURE). Stratifying children by age demonstrates that LSAM performed comparably for teenagers (12-17yrs, AUC 0.922) and adults (≥18yrs, AUC 0.898) but much worse for children (2-11yrs, AUC 0.807) and infants (<2yrs, AUC 0.781). For the smaller group of Status 1A candidates, AUC was lower for all age groups but again the lowest for infants (0.618), followed by children (0.747); AUC for teenagers (0.712) was comparable to that of adults (0.779).

Conclusions: LSAM does not accurately predict liver offer accept/decline decisions for pediatric liver transplant candidates. Predictions are least accurate for the youngest children. To truly predict the impact of allocation policy changes on children, for liver and all solid organ transplants, SAM models specific to pediatrics should be derived and utilized.



CITATION INFORMATION: Wood N., Mogul D., Hsu E., Perito E., Mazariegos G., Vanderwerken D., Segev D., Gentry S. Liver Simulated Allocation Model Does Not Accurately Predict Organ Offer Decisions in Pediatric Liver Transplant Candidates *AJT, Volume 21 Supplement 3*

DISCLOSURES: N.L. Wood: None. **D.B. Mogul:** None. **E.K. Hsu:** None. **E.R. Perito:** None. **G.V. Mazariegos:** None. **D. Vanderwerken:** None. **D.L. Segev:** None. **S. Gentry:** None.

Abstract# 415

Impact of Covid-19 in Transplant Care: Attitudes, Feeling and Behaviors of Liver, and Kidney Pre and Post Transplant Patients

J. Ramos-Ayes, *Beth Israel Deaconess Medical Center, Boston, MA*

Purpose: The SARS-CoV-2(COVID-19) pandemic poses unique challenges for transplant patients, which may impact their attitudes, emotions and behaviors associated with transplant care. This study surveys liver and kidney transplant patients about the COVID-19 pandemic's impact on their transplant care.

Methods: Method: We evaluated the attitudes, feelings and behaviors about their healthcare associated to COVID-19 in 123 pre and post liver and kidney transplant patients (34.4% pre-kidney, 10.7% pre-liver, 33.6% post-kidney, and 18.9% post liver) in the New England area, for the month of July 2020. Data collection (email), entry and validation were facilitated via REDCap and statistical analysis using the Statistical Package for the Social Sciences (SPSS; Chicago, Illinois).

Results: Most patients (89.5%) feel confident in their ability to understand information about COVID-19. 25.4% were tested for COVID-19, with 2 positives (6.5%). The majority of the patients adhered to the CDC guidelines to prevent COVID19 infection in regards to hand washing (often 29.4%; all the time (68.3%), social distancing (often 38.2%; all the time 58.5%), and wearing mask (often 7.3%; all the time 87.0%). Most patients were able to obtain their medication when needed and are getting their surveyance labs at the same schedule than before the pandemic. Most are not worried about COVID-19 infection doing labs (62.6%), however, most of them are concern about getting COVID-19 if they need to be admitted to the hospital (63.7%) and 30% will consider not going to the hospital. Most patients express some level of concern about other people not considering organ donation because of COVID-19 (55.6%), however, most will accept a deceased donor transplant if available (94.6%). Most of the patients showed a normal distress level (72%), 19.8% reported a mild distress, and 7.9% reported a severe distress.

Conclusions: Most patients reported appropriate adherence to prevent infection, appropriate transplant-related self-care, and capacity to psychologically adapt to the COVID-19 pandemic. The potential impact of the virus in those patients who are struggling with transplant care due to the pandemic is still an area of concern for transplant centers and relevant to clinical and operational initiatives that aims to mitigate the risk of COVID-19 infection among transplant patients.

CITATION INFORMATION: Ramos-Ayes J. Impact of Covid-19 in Transplant Care: Attitudes, Feeling and Behaviors of Liver, and Kidney Pre and Post Transplant Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Ramos-Ayes: None.

Abstract# 416

Influence of Frailty on Psychometric Factors and Health-related Quality of Life in Patients on the Waitlist for Liver Transplantation

C. G. Klein, J. Latuske, E. Malamutmann, A. Paul, A. Oezcelik, *University Medicine Essen, Essen, Germany*

Purpose: The aim of this prospective study was to evaluate the influence of frailty on depression, anxiety and health-related quality of life for patients on the waitlist for liver transplantation.

Methods: Between September 2015 and November 2019 all patients listed for liver transplantation were included to the study. Fried Frailty criteria were assessed. Validated standard questionnaires/tests were used for the assessment of depression, anxiety and health related quality of life. All tests were repeated every six months and 12 months after transplantation. Prä-, intra and postoperative data were reported, as well

Results: Total of 114 patients in median age of 53 years were included to the study. Non-frail were 27 patients (23.7%), pre-frail 58 patients (50.9%) und frail 29 patients (25.4%). The comparison of the psychometric factors between the three groups has shown, that anxiety and depression was seen significantly more often in pre-frail or frail patients ($p< 0.001$). The health-related quality of life was significantly better in none-frail patients ($p< 0.001$). During this timeframe 62 patients (54.4%) underwent liver transplantation. Number of pre-frail and frail patients with depression was postoperatively decreased but not significantly. Number of patients with anxiety was significantly decreased after LT. The health related quality of life has not changed 6 months after LT. There was no significant correlation between frailty and psychometric factors postoperatively.

Conclusions: Rate of depression and anxiety is significantly higher in frail patients on waitlist for liver transplantation. Psychological support/treatment of these patients on waitlist seems to be useful. Although patients need more than 6 months after transplantation for recovery of life qualitity and depression, however anxiety improves right after successfull liver transplantation.

CITATION INFORMATION: Klein C., Latuske J., Malamutmann E., Paul A., Oezcelik A. Influence of Frailty on Psychometric Factors and Health-related Quality of Life in Patients on the Waitlist for Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.G. Klein: None. **J. Latuske:** None. **E. Malamutmann:** None. **A. Paul:** None. **A. Oezcelik:** None.

Abstract# 417

Psychosocial Factors Influencing Patients' Decision Making About Upper Extremity Vca

B. Kuramitsu[1], J. Gacki-Smith[1], A. Ferzola[2], K. Vanterpool[2], C. Kunkle[3], M. Hewitt[3], A. Schultheis[3], T. Riggleman[3], J. Taylor[3], C. Cooney[2], M. Levan[2], S. Tintle[3], G. Brandacher[2], E. Gordon[1], *[1]Northwestern University, Chicago, IL, [2]Johns Hopkins University, Baltimore, MD, [3]Walter Reed National Military Medical Center, Bethesda, MD*

Purpose: The informed consent process for upper extremity (UE) Vascularized Composite Allotransplantation (VCA) has yet to be standardized. Consequently, the information provided to patients about UE VCA varies. Such variation may contribute to people with UE amputations being inadequately informed and under-prepared for decision making about UE VCA. This study examined decision making and psychosocial factors affecting decisions about UE VCA among people with UE amputations.

Methods: We conducted in-depth interviews among people with acquired UE amputations. Open-ended questions assessed psychosocial factors informing decision making about UE VCA. Thematic analysis was used to analyze qualitative data.

Results: To date, 12 people completed in-depth interviews (75% participation rate). Most were male (71%) and had a mean age of 49 years. Most had a unilateral amputation (75%) and had undergone amputation a mean of 8 years earlier. Forty-two percent of participants were 'completely' or 'a lot' willing to pursue VCA. Psychosocial factors influencing decisions to pursue VCA included: expecting an increase in social and physical confidence; seeking independence with activities of daily living; enabling more active involvement as a parent; family or friend enthusiasm; and prosthetic device problems. Psychosocial factors influencing decision making not to pursue VCA included: feeling mentally unprepared for a transplant; having already adapted to life without upper limb(s); concerns about the long-term commitment to taking immunosuppressants; discouragement from family or friends; concerns about the rigorous rehabilitation process; concerns about receiving a graft that appears mismatched in size or skin color; concerns that the transplant may be unsuccessful; concerns about health or limb function becoming "worse off" from the UE VCA; and concerns about logistical barriers to accessing transplant and rehabilitation services.
Conclusions: Preliminary findings suggest that people with UE amputations hold concerns that diminish their enthusiasm for UE VCA. Addressing patients' psychosocial concerns may foster informed decision making about UE VCA.
CITATION INFORMATION: Kuramitsu B., Gacki-Smith J., Ferzola A., Vanterpool K., Kunkle C., Hewitt M., Schultheis A., Riggleman T., Taylor J., Cooney C., Levan M., Tintle S., Brandacher G., Gordon E. Psychosocial Factors Influencing Patients' Decision Making About Upper Extremity Vca *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Kuramitsu: None. **J. Gacki-Smith:** None. **A. Ferzola:** None. **K. Vanterpool:** None. **C. Kunkle:** None. **M. Hewitt:** None. **A. Schultheis:** None. **T. Riggleman:** None. **J. Taylor:** None. **C. Cooney:** None. **M. Levan:** None. **S. Tintle:** None. **G. Brandacher:** None. **E. Gordon:** None.

Pharmacy

Pharmacokinetics, Pharmacogenetics, and Drug Interactions, Oh My!

Abstract# 418

Higher Number of Tacrolimus Dose Adjustments and Trough Level Measurements in Kidney Transplant Recipients with CYP3A5*1 Alleles

K. Reininger[1], G. Onyeaghala[2], T. Anderson-Haag[1], B. Wu[2], W. Guan[2], C. R. Dorr[2], R. Remmel[2], R. Mannon[3], A. Matas[2], W. Oetting[2], A. Israni[1], P. Stahler[1], P. Jacobson[2], *[1]Hennepin County Medical Center, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN, [3]University of Nebraska Medical Center, Omaha, NE*

Purpose: Tacrolimus (TAC) metabolism is dependent on the functional status of the cytochrome P450 family enzyme CYP3A5 which has three common loss of function (LoF) genetic alleles *3, *6, and *7. Presence of the functional CYP3A5*1 allele has been linked to increased tacrolimus dose, risk of rejection and graft loss. We hypothesized that patients with one or two CYP3A5*1 alleles would require a greater number of TAC dose adjustments and troughs measured relative to patients without a *1 allele.
Methods: This was a retrospective review of kidney transplant recipients from a single center participating in the GEN03 study with available genotype data for CYP3A5 *1 *3, *6, and *7 and at least 6 months of TAC information. The primary endpoints were number of TAC dosage adjustments and trough levels measured in the first six months, and data were analyzed using quasi-likelihood based Poisson regression. Secondary endpoints included incidence of biopsy proven acute rejection (BPAR) and estimated glomerular filtration rate (eGFR) at 1, 3, and 6 months post-transplant.
Results: 78 patients had available CYP3A5 genotype data and were included. Fifty-five patients were CYP3A5 poor metabolizers (PM, carriers of two LoF alleles), 17 were intermediate metabolizers (IM, carriers of one LoF allele), and 6 were extensive metabolizers (EM, no LoF alleles). Compared to PMs, EMs were more likely to require more trough measurements and dosage adjustments, RR 1.2 [95% CI 1.00-1.44] and RR 1.53 [95% CI 1.11-2.11] respectively. No differences in number of troughs or dosage adjustments were observed between PMs and IMs. Incidence of BPAR was low with 1 PM and 1 EM experiencing rejection. At 6 months, mean (SD) eGFR in mL/min/1.73m^2 was 60.5 (20.3) for PMs, 64.1 (16.7) for IMs, and 43.8 (13.5) for EMs. PMs had significantly higher eGFR than EMs ($p = 0.047$).
Conclusions: CYP3A5 EMs required more dose adjustments and additional trough measurements relative to PMs. Although changes in graft outcomes were not different among the metabolizer groups, the frequency of the events was low. Further research is warranted to investigate whether initial TAC dosing optimized based on CYP3A5 genotypes would reduce cost of care, result in better goal attainment, and improve time to the therapeutic range.

CYP3A5 Phenotype	White	Black or African American	Asian	American Indian or Alaska Native	Other	Mean Number of Troughs/Dose Adjustments (95% CI)	Relative Risk (95% CI)	p-value
Number of Troughs								
Poor Metabolizer	44	4	3	2	2	19.5 (18.3 – 20.7)	Reference	
Intermediate Metabolizer	6	6	4	1	0	18.9 (16.9 – 21.1)	0.96 (0.84 – 1.09)	0.545
Extensive Metabolizer	0	3	2	0	1	24.0 (20.3 – 28.3)	1.20 (1.00 – 1.44)	0.0493
Number of Dose Adjustments								
Poor Metabolizer	44	4	3	2	2	6.1 (5.4 – 6.8)	Reference	
Intermediate Metabolizer	6	6	4	1	0	7.5 (6.1 – 9.1)	1.19 (0.94 – 1.50)	0.1414
Extensive Metabolizer	0	3	2	0	1	10 (7.5 – 13.2)	1.53 (1.11 – 2.11)	0.0089

Table 1: Primary outcome stratefied by CYP3A5 genotype. Quasi-likelihood based Poisson regression models were adjusted for age at transplant, sex, BMI, and baseline diabetes status

CITATION INFORMATION: Reininger K., Onyeaghala G., Anderson-Haag T., Wu B., Guan W., Dorr C., Remmel R., Mannon R., Matas A., Oetting W., Israni A., Stahler P., Jacobson P. Higher Number of Tacrolimus Dose Adjustments and Trough Level Measurements in Kidney Transplant Recipients with CYP3A5*1 Alleles *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Reininger: None. **G. Onyeaghala:** None. **T. Anderson-Haag:** None. **B. Wu:** None. **W. Guan:** None. **C.R. Dorr:** None. **R. Remmel:** None. **R. Mannon:** None. **A. Matas:** None. **W. Oetting:** None. **A. Israni:** None. **P. Stahler:** None. **P. Jacobson:** None.

Abstract# 419

The Impact of De Novo Dose-Adjustment Strategies with Tacrolimus XR (LCP-Tac) in Kidney Transplant Recipients

T. Carcella, F. Bartlett, N. Patel, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

Purpose: LCP-Tac is a once daily formulation of tacrolimus indicated for the prophylaxis of rejection in de novo kidney transplant recipients. It provides less variable bioavailability, but high intra- and inter-patient variability remain a challenge. We sought to determine the impact of baseline characteristics and dose-adjustment strategies on achieving target levels of LCP-Tac in adult kidney transplant recipients.
Methods: This was a retrospective longitudinal study of adult kidney recipients transplanted between May and September 2020 who received de novo LCP-Tac. The primary endpoint was time to first therapeutic level (7-12 ng/mL). Secondary endpoints included time to stable level and time in therapeutic range (TTR) in the first month. Categorical data were analyzed with chi square or fisher's exact. Continuous data were assessed using one-way ANOVA. Multivariable linear regression analysis of the primary endpoint included variables that were statistically associated in univariable analyses.
Results: A total of 122 patients were included. Median time to first therapeutic level was 5 days. We assessed baseline and peri-operative factors; none of which impacted the primary endpoint (Table 1). Median time to stable level was 13 days. Eighteen patients never achieved a stable level during 1-month follow-up. TTR in the first month was 65% ± 22%. In the multivariable analysis, over-conservative dose adjustments significantly impacted TTR; for every dose adjustment ≥ 20% lower than expected using linear kinetics, the TTR decreased by 6.3% (95% CI 3.5% to 9.1%; $p<0.01$).
Conclusions: Most patients given de novo LCP-Tac achieve a therapeutic level in the first week post-transplant, which does not appear to be influenced by baseline or post-op characteristics. TTR was significantly impacted by the number of dose adjustments lower than expected. This study emphasizes the importance of avoiding under-adjusting doses early after transplant with de novo LCP-Tac use.

Factor	B (95% CI)	P-value
Initial mg/kg dose	-29.74 (-63.67 – 4.19)	0.09
Waitlist time	0.43 (0.01 – 0.86)	0.04
Recipient age	0.06 (-0.02 – 0.14)	0.13
African American	0.74 (-1.01 – 2.50)	0.40
Functional status	0.01 (-0.05 – 0.07)	0.69
KDPI	-3.14 (-6.98 – 0.70)	0.11
Dose adjustment >20% lower than expected	0.80 (0.20 – 1.39)	0.01
Dose adjustment >20% higher than expected	-1.46 (-3.47 – 0.56)	0.15

Table 1. Multivariable model of time to first therapeutic level

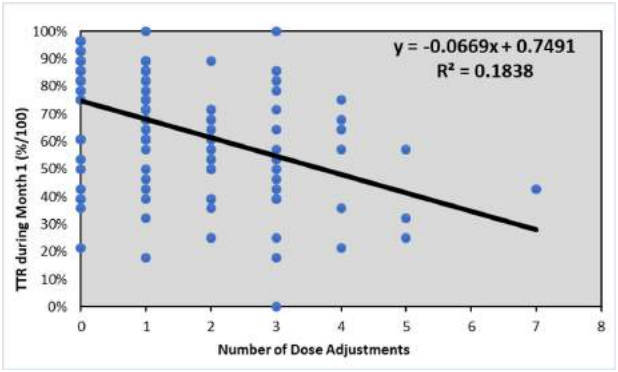


Figure 1. Linear regression for number of dose adjustments that were at least 20% below expected and the TTR during the first month post-transplant

CITATION INFORMATION: Carcella T., Bartlett F., Patel N., Rohan V., Taber D. The Impact of De Novo Dose-Adjustment Strategies with Tacrolimus XR (LCP-Tac) in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Carcella: None. **F. Bartlett:** None. **N. Patel:** None. **V. Rohan:** None. **D. Taber:** None.

Abstract# 420

Managing the Significant Drug-Drug Interaction Between Tacrolimus and Letermovir in Solid Organ Transplant Recipients

J. Hedvat, J. Choe, D. Salerno, J. Scheffert, D. Bley, A. Anamisis, T. Shertel, J. Lee, E. Liu, N. W. Lange, *NewYork-Presbyterian Hospital, New York, NY*

Purpose: Letermovir does not appear to share cross-resistance with ganciclovir and is not associated with nephrotoxicity or myelosuppressive effects, making it an attractive option for management of cytomegalovirus in solid organ transplant (SOT) recipients. Letermovir is a moderate inhibitor of cytochrome P450 3A4 and may lead to increased serum concentrations of tacrolimus. We conducted this study to assess the magnitude of this drug-drug interaction in clinical practice among SOT recipients receiving either immediate-release (IR) or extended-release (XR) tacrolimus upon starting letermovir therapy.

Methods: This was an IRB-approved, single-center retrospective study of adult SOT recipients receiving IR or XR tacrolimus who began letermovir therapy (480 mg or 720 mg once daily) between January 2018 and July 2020. Patients were excluded if they were on concomitant medications that are known to interact with tacrolimus. Tacrolimus dose and trough concentrations were collected for 30 days before and after the initiation of letermovir. The primary outcome was normalized IR and XR tacrolimus dose requirements with and without concomitant letermovir therapy. Linear interpolation was used to estimate tacrolimus trough concentrations if a dose adjustment was not made on the same date that the trough was obtained. Sign-test was used to compare differences in weight-based dose and dose-corrected trough concentrations within the same patient while on/off letermovir.

Results: A total of 14 SOT recipients were identified. Median patient age was 57 (IQR 44 - 68) years and 57% of patients were kidney transplant recipients. Patients were predominantly white (43%) and male (79%). Patients began treatment with letermovir at a median time of 263 (135 - 443) days post-transplant. Most patients received letermovir 480 mg once daily (57%). Median weight-based tacrolimus dose when used without letermovir was 0.09 (0.04 - 0.14) versus 0.05 (0.03 - 0.11) mg/kg/day when used concomitantly with letermovir, P=0.016 (Figure 1A). Dose-corrected trough concentrations of tacrolimus without letermovir was 1.54 (1.15 - 2.77) versus 2.16 (1.31 - 3.16) ng/mL/mg when used concomitantly with letermovir, P=0.013 (Figure 1B).

Conclusions: An approximate tacrolimus dose reduction of 30% may be warranted when initiating letermovir to achieve a comparable dose-corrected trough concentration. Regardless of empiric adjustment, we recommend repeating a tacrolimus trough concentration within 5-7 days after starting letermovir.

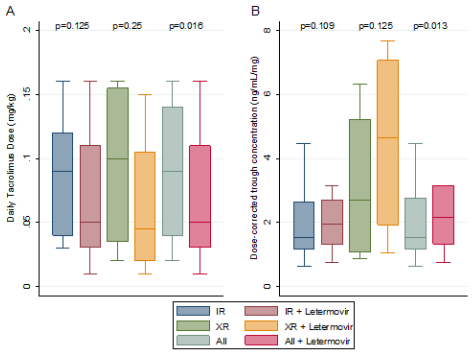


Figure 1.

A) Total daily tacrolimus dose (mg/kg) and B) dose-corrected trough concentration (ng/mL/mg) for patients with and without letermovir.

CITATION INFORMATION: Hedvat J., Choe J., Salerno D., Scheffert J., Bley D., Anamisis A., Shertel T., Lee J., Liu E., Lange N. Managing the Significant Drug-Drug Interaction Between Tacrolimus and Letermovir in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Hedvat: None. **J. Choe:** None. **D. Salerno:** Honoraria; Name of Commercial Interest; Dova Pharmaceuticals. Honoraria; Nature of Relationship; Advisory board. **J. Scheffert:** None. **D. Bley:** None. **A. Anamisis:** None. **T. Shertel:** None. **J. Lee:** None. **E. Liu:** None. **N.W. Lange:** None.

Abstract# 421

Tacrolimus Therapeutic Exposure is Not Consistently Predicted by Target Troughs or CYP3A5 Variants in Stable Renal Transplant Recipients

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Purpose: Tacrolimus (TAC) immunosuppression requires therapeutic trough monitoring post-transplant due to notable interpatient pharmacokinetic(PK) variability which may be attributed to CYP3A5 polymorphisms. We investigated the relationship of therapeutic tacrolimus troughs to the corresponding drug exposure with CYP3A5 variants in stable renal transplant recipients(RTR) on long-term immunosuppression.

Methods: The relationship between tacrolimus troughs(target: 4-12ng/ml) and Area Under the Concentration Time Curve 0-12 hours (AUC 0-12hr) with target exposure of 120 to 200 ng▪hr/ml, and CYP3A5 variants was investigated in 65 stable RTR treated with maintenance immunosuppression of immediate release tacrolimus and mycophenolic acid. A prospective study collected 12-hour serial samples for determination of steady-state tacrolimus PK including: AUC 0-12hr, 12hr troughs(C-12hr) and clearance(CL). The C-12hr were achieved using therapeutic drug monitoring. The CYP3A5 polymorphisms: *3[rs776746],*6[10264272],*7[41303343], associated with loss of protein function, were characterized. RTR were classified as Extensive, Intermediate and Poor metabolizers using the CYP3A5*3*6*7 metabolic composites based on functional genotypes and analyzed with tacrolimus PK using SAS V 9.4.

Results: The table below summarizes the RTR according to AUC 0-12hr greater than 120 ng▪hr/ml and less than 120 ng▪hr/ml. The combined groups had mean eGFR: 55.8 (15.5) ml/min/1.73m2 and time post-transplant: 3.0(2.6) years. Therapeutic troughs of 4-12ng/ml were achieved in 98.5% of RTR with 53.9% of recipients within the therapeutic AUC 0-12hr and 44.6% below the therapeutic exposure (P < <0.001). No difference in CL between groups was noted. No association of CYP3A5*3*6*7 composite was found within or below AUC 0-12 range.

Conclusions: Although stable RTR achieved the trough targets using therapeutic drug monitoring, approximately 45% of these recipients were below the recommended tacrolimus AUC 0-12hr. The composite CYP3A5*3*6*7 variants demonstrated no predictive associations toward achieving the therapeutic target exposure.

Tacrolimus Pharmacokinetics and CYP3A5 Variants			
+=Mean(SD); #: N(%Freq)	Less than 120 AUC 0-12hr [N=30]	Greater or equal to 120 AUC 0-12hr [N=35]	P Value
Race W: White; B:Black	B: 10(33.3%); W: 20(60%)	B:23(65.7%); W:12(34.3%)	0.013
TAC Dose(mg)+	3.0(1.8)	3.7 (1.6)	0.02
TAC C-12hr(ng/ml)+	6.0 (1.3)	8.3 (1.5)	< <0.001
TAC AUC 0-12hr (ng▪hr/ml)+	99.5 (16.6)	148.7 (22.8)	< <0.001
Poor CYP3A5 Com #	17(56.7%)	18(51.4%)	0.94
Intermediate CYP3A5 Com #	10(33.3%)	13(37.1%)	-
Extensive CYP3A5 Com #	3(10%)	4(11.4%)	-

CITATION INFORMATION: Tornatore K., Attwood K., Brazeau D., Murray B. Tacrolimus Therapeutic Exposure is Not Consistently Predicted by Target Troughs or CYP3A5 Variants in Stable Renal Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Tornatore: None. **K. Attwood:** None. **D. Brazeau:** None. **B. Murray:** None.

Kidney

Kidney Deceased Donor Allocation 2

Abstract# 422

The Impact of Combined Warm and Cold Ischemia Times on Post Transplant Outcomes

M. E. Foley[1], A. J. Vinson[2], K. K. Tennankore[2], *[1]Faculty of Medicine, Dalhousie University, Halifax, NS, Canada, [2]Division of Nephrology, Medicine, Dalhousie University/ Nova Scotia Health, Halifax, NS, Canada*

Purpose: Both prolonged warm ischemia time (WIT) and cold ischemia time (CIT) have been associated with an increased risk of graft failure following kidney transplantation, however their combined impact has yet to be studied. In this analysis of United States kidney transplant recipients, we explored the additive effect of prolonged WIT and CIT on the risk of death or graft failure following kidney transplantation.

Methods: The Scientific Registry of Transplant Recipients was used to identify renal transplant patients who underwent deceased donor kidney transplantation between 2005 and 2014. We included only those with complete data for WIT and CIT and excluded extremes of both exposures (WIT<10 minutes or >120 minutes, CIT<1 hour or >24 hours). The outcomes of death/graft failure were captured until September 1, 2017. WIT and CIT were separately categorized using linear splines to determine cut points. WIT and CIT were classified as short, medium and long (0-40 min, 40-80 min, >80 min respectively for WIT; 1-8.7 hrs, 8.7-16.3 hrs, >16.3 hrs respectively for CIT). A combined WIT-CIT variable included all WIT-CIT combinations, with the reference group being short WIT-short CIT (0-40 min WIT, 1-8.7 hrs CIT). Multivariable cox proportional hazard models were used to determine the association of combined WIT-CIT on the composite outcome of death or graft failure.

Results: A total of 54, 745 deceased donor kidney transplant recipients had complete data for WIT and CIT. Median WIT and CIT were 35 (IQR 18) minutes and 14.5 (IQR 8.8) hours, respectively. There was an incremental increase in the risk of death/graft loss for categories of CIT and WIT. Adjusted hazard ratios for death or graft failure increased across combined WIT-CIT groupings relative to reference patients, with the highest risk of an event being in the setting of combined long WIT-long CIT (HR 1.24, 95% CI 1.05-1.47), Figure 1.

Conclusions: Prolonged WIT-CIT was associated with an increased risk of the composite outcome of death or graft failure in a small but graded manner. Attempts should be made to minimize both CIT and WIT in order to optimize post-transplant outcomes.

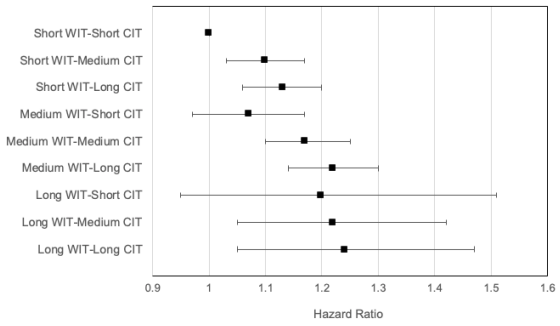


Figure 1. Combined Warm Ischemia Time and Cold Ischemia Time and the Risk of Death or Graft Failure; Adjusted for recipient sex, recipient race, recipient weight, recipient body mass index (BMI), recipient coronary artery disease, recipient hypertension (HTN), recipient peripheral vascular disease , recipient diabetes mellitus (DM), donor sex, donor race, donor weight, donor BMI, donor HTN, donor DM, Human leukocyte antigen mismatch, Panel reactor antibody group, Expanded criteria donor, Donation after cardiac death

CITATION INFORMATION: Foley M., Vinson A., Tennankore K. The Impact of Combined Warm and Cold Ischemia Times on Post Transplant Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.E. Foley: None. **A.J. Vinson:** None. **K.K. Tennankore:** Consulting Fee; Name of Commercial Interest; Baxter, Canada, Astra Zeneca, Janssen, Otsuka. Consulting Fee; Nature of Relationship; Advisory Committee Member, Advisory Committee Member, Advisory Committee Member, Advisory Committee Member. Grant/Research Support; Name of Commercial Interest; Astellas, Otsuka. Grant/Research Support; Nature of Relationship; Investigator Initiated, Investigator Initiated. Honoraria; Name of Commercial Interest; Astra Zeneca, Bayer.

Abstract# 423

Non-Invasive Measurement of Transplant Kidney Fibrosis Using Photoacoustic Imaging

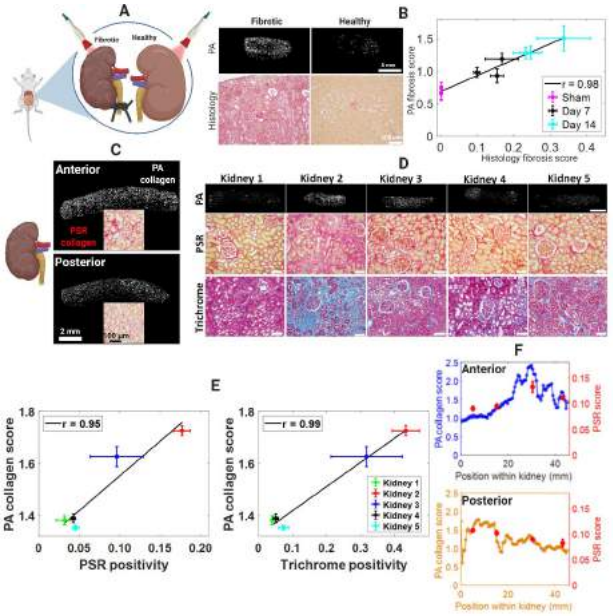
E. Hysi[1], X. He[1], A. Krizova[1], M. Ordon[1], K. T. Pace[1], M. Farcas[1], M. C. Kolios[2], D. A. Yuen[1], *[1]St. Michael's Hospital, Toronto, ON, Canada, [2]Ryerson University, Toronto, ON, Canada*

Purpose: The presence of donor kidney fibrosis adversely impacts transplant outcome. Biopsy remains the only method that can assess fibrosis, despite being subjected to sampling bias as it measures <1% of the kidney volume. In this work we propose to use collagen-specific photoacoustic (PA) imaging as a non-invasive and contrast-free tool for measuring kidney fibrosis. PA imaging relies on the detection of sound waves produced by short laser burst illuminations of the kidneys.

Methods: This technology was tested in a unilateral ureteral obstruction (UUO) model of mouse kidney fibrosis (Fig. 1A). Surgery was performed on n = 10 mice and the left ureter was obstructed for either 7 or 14 days. Comparisons with sham surgery performed on n = 5 mice were also conducted. The kidneys were procured, and PA imaging was performed before sectioning each kidney for histology. Using multiwavelength PA images acquired from a handheld probe, a novel collagen estimation algorithm was implemented to compute renal fibrotic burden. Its accuracy in estimating collagen was compared to the gold standard histology. The algorithm was further tested in human radical nephrectomy specimens, as well as in whole human kidneys in a setting mimicking the ex vivo phase of kidney transplantation surgery.

Results: PA-measured fibrosis scores correlated strongly with gold standard histology measurements, being able to detect increasing levels of fibrosis (Fig. 1B). PA imaging of the cortex of whole human kidneys was possible by imaging over the entire kidney surface (Fig. 1C). Our PA technique was able to accurately capture inter-kidney variation in fibrosis levels (Fig. 1D) with excellent accuracy (Fig. 1E). As seen in mouse kidneys, PA imaging could also to detect intra-renal differences in human kidney fibrosis (Fig. 1F).

Conclusions: This study demonstrates for the first time the potential of PA imaging as a non-invasive renal fibrosis measurement tool. By directly imaging collagen, this technology is non-invasive, contrast-free, sensitive to a wide range of fibrosis burdens and can be performed in just minutes without impeding the transplant procedure. Taken together, these findings suggest that PA imaging may be able to play an important role in assessing the level and spatial distribution of fibrosis in *ex vivo* donor kidneys. A clinical trial to assess the feasibility of ex vivo donor kidney PA imaging at the time of transplant to assess allograft fibrosis and outcomes is scheduled to commence early next year.



CITATION INFORMATION: Hysi E., He X., Krizova A., Ordon M., Pace K., Farcas M., Kolios M., Yuen D. Non-Invasive Measurement of Transplant Kidney Fibrosis Using Photoacoustic Imaging *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Hysi: None. **X. He:** None. **A. Krizova:** None. **M. Ordon:** None. **K.T. Pace:** None. **M. Farcas:** None. **M.C. Kolios:** None. **D.A. Yuen:** None.

Abstract# 424

Towards National Organ Sharing: Fair Distribution of Eplets in Canada

S. Parto, B. Liu, W. Klement, S. Oikonomopoulos, I. Ragoussis, R. Sapir-Pichhadze, *McGill University, Montreal, QC, Canada*

Purpose: Eplet matching is being promoted as a rational approach to prevent immune-mediated injuries in transplantation. We studied the frequencies of eplets in a Canadian population to inform strategies to secure HLA compatible transplants regionally and nationally.
Methods: We analyzed data from the first phase of the Canadian Longitudinal Study on Aging (CLSA). A total of 6298 participants were of diverse ancestry from Alberta (N=613), British Columbia (N=1348), Manitoba (N=646), Newfoundland (N=493), Nova Scotia (N=665), Ontario (N=1357) and Quebec (N=1176)). All these participants had complete allele-level genotypes for 11-loci (HLA-A, -B, -C, -DRB1/3/4/5, -DQA1, -DQB1, -DPA1 and -DPB1) imputed by the HLA*IMP:02 method. HLA genotypes were converted to epitypes using the eplet repertoire recorded on the HLA Epitope Registry (accessed September 2018). Frequencies of antibody-verified (AbVer) and non-AbVer eplets were determined. Intraclass Correlation Coefficients (ICC) were calculated to assess differences in eplet frequencies by participants' province.
Results: A total of 223 class I (72 AbVer) and 286 class II (82 AbVer) were observed in the cohort. Five eplets (0.01%) were not observed in any participant. There was significant agreement in eplet frequencies across Canadian provinces (ICC of 0.99). The eplets were distributed in the studied population as follows: 6 class I (0 AbVer) and 5 class II (0 AbVer) eplets were observed in <1%; 51 class I (22 AbVer) and 42 class II (11 AbVer) eplets were observed in 1-25%; 50 class I (22 AbVer) and 71 class II (25 AbVer) were observed in 25-50%; 45 class I (14 AbVer) and 59 class II (30 AbVer) were observed in 50-75%; and of 68 class I (14 AbVer) and 107 class II (16 AbVer) were observed in >75%.
Conclusions: Similar eplet frequencies were observed across Canadian provinces. Thus, a strategy of matching at the eplet level to prevent immune-mediated injuries is expected to perform similarly across Canada. The understanding of risk associated with particular mismatched eplets, coupled with measured frequencies, can guide when regional allocation may need to be supplemented by national organ sharing policies.
CITATION INFORMATION: Parto S., Liu B., Klement W., Oikonomopoulos S., Ragoussis I., Sapir-Pichhadze R. Towards National Organ Sharing: Fair Distribution of Eplets in Canada *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Parto: None. **B. Liu:** None. **W. Klement:** None. **S. Oikonomopoulos:** None. **I. Ragoussis:** None. **R. Sapir-Pichhadze:** None.

Abstract# 425

Effect of Multi-Organ Transplant Allocation on Pediatric Kidney Waitlist Candidates

D. Shepherd, R. M. Engen, *Pediatric Nephrology, Ann & Robert H. Lurie Children's Hospital, Chicago, IL*

Purpose: Multi-Organ Transplants (MOTs) have variable allocation policies and often take precedence over other waitlist candidates. Lack of defined MOT guidelines divert kidneys to MOT recipients who have worse morbidity and mortality and supersede qualified pediatric candidates who generally are healthier and have much greater estimated post-transplant survival; however, the impact of this allocation policy is poorly defined.
Methods: We analyzed UNOS kidney transplant alone (KTA) match list data from 4/1/2015-10/31/2019 for kidneys with a Kidney Donor Profile Index <35% that were allocated to a MOT. Our cohort consisted of pediatric candidates listed for KTA who were the next-sequential candidate and who did not receive the contralateral kidney from the same donor.
Results: Of the next-sequential candidates on the kidney-match run lists for kidneys allocated to MOT recipients, 256 were pediatric candidates. Overall, 6.9% of pediatric recipients were affected by MOT allocation. At the time of the offer 78.1% of these candidates were receiving dialysis. Subsequent kidney transplants occurred in 80.9% of the next-sequential pediatric candidates, at a median additional wait time of 84 days (IQR 37-187 days). Forty-nine children (19.1%) had no documented transplant as of 3/20/2020. No pediatric candidates died or were removed from the waitlist during the study period. Median additional accrued wait time was significantly longer for recipients with B blood type (118 days (IQR 64-208 days), p=0.004) and calculated panel reactive antibody >0% (125.5 days (IQR 33-150 days), p=0.014). There were no significant differences by recipient ethnicity or UNOS region.
Conclusions: Multiorgan allocation policies affect pediatric KTA wait times, with more significant effect seen in individuals already at a disadvantage, such as those with sensitization or B blood type. Further discussion of MOT allocation policies is needed to ensure that policies maximize utility and equity.
CITATION INFORMATION: Shepherd D., Engen R. Effect of Multi-Organ Transplant Allocation on Pediatric Kidney Waitlist Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Shepherd: None. **R.M. Engen:** None.

Abstract# 426

Response to a Pandemic: The Fall and Rise of Kidney Transplantation in the US

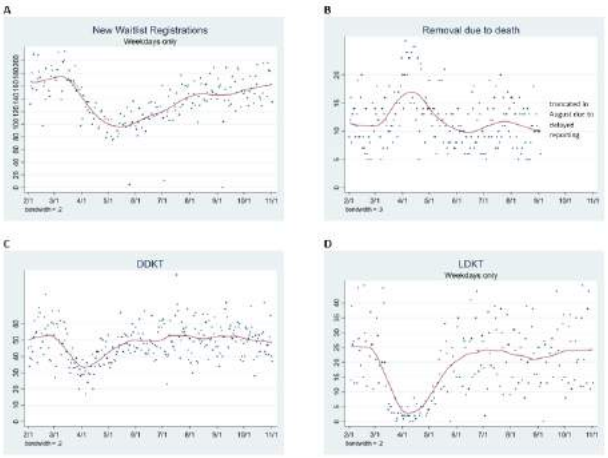
S. Bisen[1], B. Boyarsky[1], W. Werbel[1], J. Snyder[2], J. Garonzik-Wang[1], D. Segev[1], A. Massie[1], *[1]JHU, Baltimore, MD, [2]SRTR, Minneapolis, MN*

Purpose: During the first wave of the COVID-19 epidemic in March-April 2020, waitlist registrations and living/deceased donor kidney transplants (LDKT/DDKT) dropped substantially. A second wave of infection peaked in August; a third wave began in late October and has not yet peaked. The effects on kidney transplantation in the US during the most recent waves have not yet been described.
Methods: Using SRTR data, we compared observed waitlist registrations, waitlist mortality, LDKT, and DDKT 3/15/2020-10/31/2020 to expected events based on calculations from pre-epidemic data 1/2016-2/2020, overall and stratifying by state-level COVID-19 incidence, while accounting for patient casemix.
Results: New listings bottomed at 45% below expected in May (IRR = $_{0.52}0.55_{0.57}$) but steadily recovered to 6% below expected by October (IRR = $_{0.91}0.94_{0.97}$) (Table, Figure). Waitlist deaths peaked at 72% above expected in March/April (IRR = $_{1.60}1.72_{1.85}$), bottomed at 7% above expected in June (IRR = $_{0.96}1.07_{1.20}$), and have since risen only slightly to 16% above expected in August (IRR = $_{1.04}1.16_{1.29}$); July/August waitlist mortality increases were restricted to states with the highest COVID-19 burden (August IRR = $_{1.05}1.19_{1.36}$). DDKT was below expected through June in states with the highest COVID-19 burden (IRR = $_{0.64}0.80_{0.99}$). Nationwide, DDKT peaked in July at 11% above expected (IRR = $_{1.06}1.11_{1.17}$) and have since dropped only slightly to 5% above expected by October (IRR = $_{0.99}1.05_{1.10}$). LDKT bottomed at 87% below expected in March/April (IRR = $_{0.10}0.13_{0.15}$), peaked at 10% below expected in July (IRR = $_{0.82}0.90_{0.98}$), before the second wave peaked, and then dropped slightly to 14% below expected during September and October (IRR = $_{0.79}0.86_{0.94}$).
Conclusions: Each successive wave had a lesser impact on transplant and waitlist mortality rates. New listings have approached pre-pandemic rates, suggesting that the medical system has successfully adapted to the challenges of COVID-19, despite occasionally high patient load caused by additional epidemic waves. Decreased mortality may reflect improved care, but may also indicate that true COVID-19 incidence during the first wave was substantially higher than detected.

Table. Observed center-level events as a proportion of expected events, March 15 - June 30, 2020. Bold denotes statistically significant IRRs.

Time Frame	New listings	Waitlist death	LDKT	DDKT	DCD DDKT	Regional import	National import
3/15-4/30	0.78 **0.81** 0.83	1.60 **1.72** 1.85	0.10 **0.13** 0.15	0.71 **0.75** 0.78	0.57 **0.63** 0.69	0.77 **0.85** 0.95	0.58 **0.66** 0.75
5/1-5/31	0.52 **0.55** 0.57	1.12 **1.24** 1.38	0.48 **0.54** 0.60	0.92 **0.97** 1.02	0.73 **0.81** 0.91	0.98 **1.11** 1.24	0.71 **0.81** 0.94
6/1-6/30	0.67 **0.70** 0.72	0.96 **1.07** 1.20	0.82 **0.89** 0.97	0.99 **1.04** 1.09	0.92 **1.01** 1.12	0.76 **0.87** 0.99	0.85 **0.98** 1.12
7/1-7/31	0.79 **0.82** 0.85	1.11 **1.23** 1.37	0.82 **0.90** 0.98	1.06 **1.11** 1.17	1.01 **1.11** 1.22	0.87 **0.98** 1.12	0.80 **0.91** 1.05
8/1-8/31	0.81 **0.84** 0.87	1.04 **1.16** 1.29	0.72 **0.78** 0.86	1.01 **1.06** 1.11	0.95 **1.05** 1.15	0.71 **0.81** 0.93	0.80 **0.92** 1.05
9/1-9/30	0.87 **0.90** 0.93		0.79 **0.86** 0.94	1.02 **1.07** 1.13	0.92 **1.02** 1.12	0.84 **0.96** 1.09	0.83 **0.95** 1.09
10/1-10/31	0.91 **0.94** 0.97		0.79 **0.86** 0.94	0.99 **1.05** 1.10	0.97 **1.06** 1.17	0.77 **0.88** 1.00	0.82 **0.94** 1.07

Figure. Center-level outcomes, February-November 2020. Counts of new DDKT waitlist registrations (A); removals due to death (B); counts of all DDKT per day (C); and counts of LDKT per day (D), with Lowess smooth.



CITATION INFORMATION: Bisen S., Boyarsky B., Werbel W., Snyder J., Garonzik-Wang J., Segev D., Massie A. Response to a Pandemic: The Fall and Rise of Kidney Transplantation in the US *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Bisen: None. **B. Boyarsky:** None. **W. Werbel:** None. **J. Snyder:** None. **J. Garonzik-Wang:** None. **D. Segev:** None. **A. Massie:** None.

Liver

Liver 1

Abstract# 427

Developing and Validation of a Liver Transplantation Donation After Cardiac Death Risk Index Using the UNOS Database

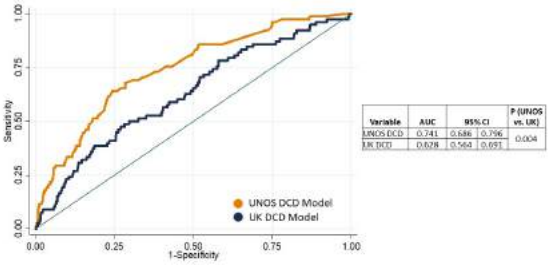
L. Chau, K. Delvecchio, A. Mohamed, M. Lu, T. Kitajima, S. Yedulla, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Division of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI*

Purpose: Donation after cardiac death (DCD) liver transplantation is an increasing form of organ donation. Shlegal et. al. identified seven factors predicting 1-year DCD graft survival based on the UK transplantation population. This project aims to validate the existing predictive model and to develop a novel DCD graft failure prediction model based on the UNOS database.

Methods: We examined all adult DCD transplanted Jan 1 2014 to Mar 31 2020 in the UNOS registry. The population was divided into train (66%) and validation (34%) subsets. Variables of interest were selected from the train subset with backwards stepwise selection with criteria for entry P = 0.05 and exit P = 0.06. Logistic regression models were fitted based on selected variables to predict 1-year graft failure. Performance of the model was assessed in the validation population by computing the area under the receiver operating characteristic curve (AUROC) after 10-fold stratified cross-validation. The performance of the novel model was compared to the UK DCD prediction model.

Results: 2738 DCD transplants were included in this study with 1835 in the train and 903 in the validation subsets. The model identified 12 factors predictive for 1-year graft failure among DCD recipients. The model AUROC was 0.741 (95% CI: 0.686, 0.796). When validating the UK DCD model in the UNOS database, the model achieved AUROC of 0.628 (0.564, 0.691).

Conclusions: This model identified 12 predictive factors predictive of 1-year graft failure among DCD recipients from the UNOS database, which outperformed the existing model.



Variable	AUC	95% CI		P (UNOS vs. UK)
UNOS DCD	0.741	0.686	0.796	0.004
UK DCD	0.628	0.564	0.691	

Variable	OR	P	95% CI
Caucasian donor	0.62	0.041	0.39, 0.98
Donor LVEF ≥75%	1.72	0.038	1.03, 2.87
Donor cancer history	3.17	0.01	1.31, 7.64
Donor pH ≤7.3	2.82	<0.001	1.60, 4.98
Donor history cocaine use	1.67	0.02	1.15, 3.07
Donor history diabetes	1.53	0.019	1.16, 2.79
Recip previous transplant	2.85	0.006	1.34, 6.03
Recip pre-transplant dialysis	1.93	0.027	1.08, 3.46
Male recipient	1.92	0.017	1.12, 3.29
Recip bacterial peritonitis	2.73	0.011	1.26, 5.92
Recip HCV+	0.24	0.02	0.07, 0.80
Recip BMI ≥40	1.86	0.023	1.09, 3.17

CITATION INFORMATION: Chau L., Delvecchio K., Mohamed A., Lu M., Kitajima T., Yedulla S., Collins K., Rizzari M., Yoshida A., Abouljoud M., Nagai S. Developing and Validation of a Liver Transplantation Donation After Cardiac Death Risk Index Using the UNOS Database *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Chau: None. **K. Delvecchio:** None. **A. Mohamed:** None. **M. Lu:** None. **T. Kitajima:** None. **S. Yedulla:** None. **K. Collins:** None. **M. Rizzari:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **S. Nagai:** None.

Abstract# 428

Clinical Correlation of Frailty Measures and Evaluation of Complementary Molecular Frailty Biomarker Candidates in a Prospective National Cohort of Liver Transplant Candidates

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Purpose: Frailty is a clinical condition characterized by a loss of physiologic reserve and increased susceptibility to stressors. Molecular frailty biomarkers may reflect the dysregulation of physiological systems leading to this reduced physiological reserve, but as yet such complementary biomarkers have not been identified. The aims of this research were to assess the prevalence of frailty in those referred to the Irish Liver Transplant Program, assess its impact on outcomes and analyse the relationship between clinical frailty and biomarkers of frailty.

Methods: 70 patients were prospectively evaluated while undergoing liver transplant assessment. Frailty assessments included Liver Frailty Index (LFI), Fried Frailty Index (FFI), and Rockwood Frailty Score (RFS) and standardized sarcopenia measurements. Serum irisin, S100B, leptin and PAI-1 concentrations were assayed (ELISA) in a subset of patients Assessments were repeated at 3-monthly intervals whilst wait-listed. Clinical outcomes included decompensation-related hospitalisations, time on the waiting-list, post-transplant ICU- and overall-length of stay, 30-day mortality and morbidity post-transplant.

Results: Clinical frailty ranged from 20% to 37%, depending on the frailty score. Increasing FFI and RFS scores were associated with increased S100B (p=0.02). There was also a positive correlation between higher MELD-Na (Model for End-Stage Liver Disease) and PAI-1 (p=0.014) and negative correlation between MELD-Na and Leptin (p=0.059). While waitlisted, frail patients showed a trend towards increased admissions with decompensation compared to non-frail patients (70% vs 29.4%, p=0.057). Increasing MELD-Na, RFS and female sex were associated with an increased likelihood of admission with liver decompensation while on the waiting list. Frailty increased while on the waitlist, but the frailest patients spent a significantly shorter period on the waiting list, due to transplantation or death (Median 22 days (frail) vs 95 days (non-frail), p= 0.026).

Conclusions: Frail patients portended towards a worse stage of liver disease and were admitted to hospital more frequently with decompensation, but spent less time on the waiting list. This adds objectivity to what was previously a nuanced aspect of patient selection at the time of donor offer. An association between clinical frailty scores and novel molecular biomarkers of frailty was demonstrated for the first time. This has significant diagnostic and prognostic implications going forward and warrants validation in larger cohorts.

CITATION INFORMATION: Cremen S., Robinson M., Gallagher T. Clinical Correlation of Frailty Measures and Evaluation of Complementary Molecular Frailty Biomarker Candidates in a Prospective National Cohort of Liver Transplant Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Cremen: None. **M. Robinson:** None. **T. Gallagher:** None.

Abstract# 429

Systematic Implementation of Alcohol Screening Program Using Urine Ethyl Glucuronide Can Identify Post-transplant Alcohol Use and Aid Return to Sobriety in Liver Transplant Recipients

N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[1], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Division of Transplantation, University of Minnesota, Minneapolis, MN*

Purpose: Rates of liver transplantation (LT) for alcohol-related liver disease (ALD) are increasing, particularly in patients with acute alcoholic hepatitis. Post-LT alcohol (ETOH) use has significant implications for graft and overall survival. We report the findings from the implementation of a ETOH screening program using urine ethyl glucuronide (EtG) for post-LT patients with ALD at our center.

Methods: As part of a prospective quality improvement initiative starting on 6/1/2016, patients who received LT for ALD underwent mandatory quarterly screening for ETOH use with urine EtG for the first 12 months after LT. Patients who had received a LT for any cause underwent urine EtG testing on an "as needed" basis when ETOH misuse was suspected. Adherence to screening was defined as completion of 4 urine EtG tests over the first 12 months after LT. A positive test was defined as urine EtG>500ng/ml, indicative of significant ETOH use. Positive tests resulted in the execution of a protocol involving the patient's RN coordinator, hepatologist, social worker and chemical dependency resources.

Results: 296 adult patients underwent LT from June 1st 2016 to 30th September 2020. 106 patients were transplanted for ALD- 103 patients with cirrhosis, 3 patients with ETOH hepatitis. Median age at LT was 53 years, 80 (75%) patients were male, 87 (85%) patients were white and median laboratory MELD at LT was 29. 69 (65%) patients had a pre-LT diagnosis of mental illness. Adherence to ETOH screening was low overall (Table 1). Reasons for non-adherence included hemodialysis, patient refusal and laboratory error. 11/106 (10.4%) patients who received LT for ALD were EtG(+). 2/11 (18%) patients successfully completed chemical dependency treatment. 3 patients who received a LT for non-ALD tested positive: 1 patient with HCV, 1 with AIH & 1 with NASH. Of note, an additional 11 patients who received LT prior to the study period were EtG(+), up to 6 years post-LT.

Conclusions: Systematic implementation of regular ETOH biomarker screening identifies ETOH use in patients transplanted for ALD and can identify significant ETOH use in patients with no prior diagnosis of ETOH misuse. Despite the application of protocols for positive testing, mandatory chemical dependency treatment is difficult to enforce in the post-LT period.

Table 1- Adherence to ETOH Screening per transplant year

Year	Adherence (%)
2016	2/7 (28.6%)
2017	4/25 (16%)
2018	3/13 (23.1%)
2019	9/33 (27.3%)
2020	15/28 (53.6%)
p-value (Fisher's Exact)	0.483

CITATION INFORMATION: Lim N., Leventhal T., Thomson M., Hassan M., Thompson J., Chinnakotla S., Kirchner V., Pruett T., Kandaswamy R., Humphreville V., Adams A., Lake J. Systematic Implementation of Alcohol Screening Program Using Urine Ethyl Glucuronide Can Identify Post-transplant Alcohol Use and Aid Return to Sobriety in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Lim: None. **T. Leventhal:** None. **M. Thomson:** None. **M. Hassan:** None. **J. Thompson:** None. **S. Chinnakotla:** None. **V. Kirchner:** None. **T. Pruett:** None. **R. Kandaswamy:** None. **V. Humphreville:** None. **A. Adams:** None. **J. Lake:** None.

Abstract# 430

Growing LDLT Volumes at a US Center- What Does It Take to Do Over 100 LDLTs Per Year

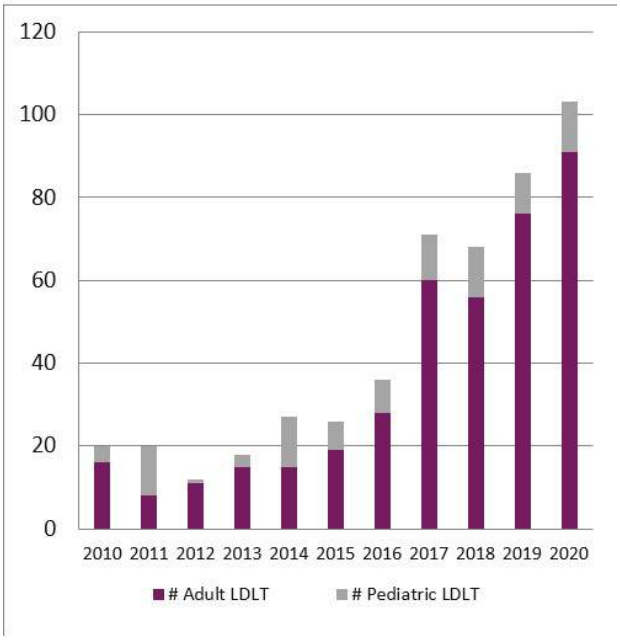
A. Humar, C. Hughes, G. Mazariegos, K. Soltys, A. Gallatin, K. Emmett, A. Tevar, M. Molinari, A. Ganoza, V. Gunabushanam, S. Ganesh, *University of Pittsburgh, Pittsburgh, PA*

Purpose: LDLT remains underutilized in the US, accounting for <6% of the annual total liver transplant volume. We examined methods we have incorporated to expand LDLT volume at our center.

Methods: Data was collected on all donors and recipients that underwent LDLT at our center, looking at the impact of various programs on total volumes.

Results: LDLT remains underutilized in the US, accounting for <6% of the annual total liver transplant volume. We have made a concerted effort to grow LDLT at our program and it now represents 60% of our annual total adult liver transplant volume and 40% pediatric total volume. In 2020, we will perform >100LDLTs at our program (91 adults, 12 pediatric, Figure1). Growth in volume has been due to many factors, including a change in our philosophy to consider an LDLT as the 1st and best option for the vast majority of our patients. We utilized paired exchanges (6 pairs, 12 transplants), ABO incompatible donors (n=1), as well as non-directed donors (n=13) to maximize donor acceptance and utilization. Our donor acceptance rate is 70%, with our most common reason for donor exclusion being steatotic liver or psychosocial factors. We have excluded very few donors based on GW/RW ratio; 11% of the adult transplants had GW/RW<0.8%. We have utilized extensive education programs, targeted for individual recipients as well as for the general public to raise awareness regarding LDLT. All recipients are seen by the LD team and are offered programs such as our Champions program to help them identify suitable living donors. For recipient selection, MELD- either at the upper or lower end- are not considered contraindications to LDLT. We also offer LDLT to recipients who may not qualify for a deceased donor, but we know are likely to have a better outcome with liver transplant vs best other therapy. This includes patients with HCC beyond Milan, cholangiocarcinomas (hilar and intrahepatic, n=2), metastatic colorectal cancers (n=2), as well as other expanded indications. Despite expanded indications, results have been acceptable. All donors are well with 2 early bile leaks (both managed non-operatively), and 3 reoperations (1 bleeding, 1 SBO, 1 incisional hernia). No donor required blood transfusion. Recipient graft and patient survival is 95% and 96% in the adult patients. Survival has been 100% in the pediatric patients.

Conclusions: Utilization of LDLT can be safely expanded as programs gain more comfort level and experience with the procedure.



CITATION INFORMATION: Humar A., Hughes C., Mazariegos G., Soltys K., Gallatin A., Emmett K., Tevar A., Molinari M., Ganoza A., Gunabushanam V., Ganesh S. Growing LDLT Volumes at a US Center- What Does It Take to Do Over 100 LDLTs Per Year *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Humar: None. **C. Hughes:** None. **G. Mazariegos:** None. **K. Soltys:** None. **A. Gallatin:** None. **K. Emmett:** None. **A. Tevar:** None. **M. Molinari:** None. **A. Ganoza:** None. **V. Gunabushanam:** None. **S. Ganesh:** None.

Abstract# 431

Impact of Extended Living Donor Criteria on Donor Safety in Living Donor Liver Transplantation

J. KIM, *Department of Surgery, Catholic University of Daegu College of Medicine, Daegu, Korea, Republic of*

Purpose: Donor safety is major concern during living donor liver transplantation (LDLT) and most transplant centers accept strict selection criteria although some centers have been trying to modify these strict criteria to expand donor pools. Herein, we describe out center's experience for extended living donor criteria for LDLT focusing on donor safety.

Methods: retrospectively reviewed the outcomes of 424 living donor right hepatectomy (LDRH) including 105 donors under extended criteria at our institution from January 2010 to June 2019. Extended Donor was defined with criteria as follows; 1) old donor (age >40 years) with remnant liver volume of <35%, 2) young donor (age ≤40 years) with remnant liver volume <29% and minimal fatty change (<15%), 3) young donor with mild hepatosteatosis (15%-30%) and remnant liver volume of < 35%. The outcomes in extended living donors were compared with those in living donors under conventional criteria focusing on donor safety. We also analyzed risk factors related to posthepatectomy liver failure (PHLF).

Results: PHLF occurred in 43 donors (10.1%) and most cases were grade A except one case in conventional donor group (grade B) and PHLF did not occur more frequently in extended donor group. (7.6% vs. 11.0% % P = 0.32) and the incidence of major postoperative complications did not differ between the 2 groups. Moreover, no difference in either posttransplant graft function or survival was apparent between the 2 groups. In multivariate logistic regression analyses, only the event for major complications (OR, 3.002; 95% CI, 1.042-8,649; P = 0.042) was associated with PHLF but not related to our extended criteria.
Conclusions: LDRH under our extended criteria could be performed to expand donor pools without adverse effects on donor safety.
CITATION INFORMATION: KIM J. Impact of Extended Living Donor Criteria on Donor Safety in Living Donor Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Kim: None.

Lung

Lung Transplant Topics

Abstract# 432

Pre Transplant Estimated Glomerular Filtration Rate and Other Predictors of Mortality and End Stage Kidney Disease After Lung Transplantation

A. Kumar[1], L. N. Bonnell[2], C. Thomas[3], *[1]Internal Medicine, University of Vermont, Burlington, VT, [2]Department of General Internal Medicine Research, University of Vermont, Burlington, VT, [3]Internal Medicine, University of Iowa, Iowa City, IA*

Purpose: Lung transplantation is an established treatment for end stage lung disease and as survival has improved, chronic kidney disease (CKD) has become a common complication. Prevalence of CKD has been reported at 22% at one year and about 50%-70% at five years after transplantation. Patient age, acute kidney injury, high serum tacrolimus levels, hypertension and diabetes have been associated with increased frequency of CKD post lung transplant. Aim of the present study is to determine if pre transplant CKD is a predictor of long term risk of post lung transplant mortality and end stage kidney disease (ESKD).
Methods: We evaluated United Network of Organ Sharing (UNOS) database from 2000-2017 to include adult patients who had lung transplant, had no prior history of any transplant and were not on dialysis. We divided our cohort into four clinically relevant groups based on their estimated glomerular filtration rate (eGFR) at the time of transplant (≤44, 45-59, 60-89, ≥90ml/min/1.73m^2). Our primary outcome was death and secondary outcome was ESKD. Cox regression was used to assess the effect of eGFR on mortality and cumulative incidence competing risk (CICR) (death as a competing event) method was used to see the effect of eGFR on ESKD.
Results: We had 131, 344, 3227 and 15870 patients in groups with eGFR ≤44, 45-59, 60-89, ≥90ml/min/1.73m^2 respectively. Absolute number and percent of deaths and ESKD are shown in table 1. Kaplan Meier curves for mortality and ESKD shown in figure 1 and 2 respectively. Table 2 shows the adjusted hazard ratios for mortality and ESKD in each group.
Conclusions: Our findings shows that risk of mortality post lung transplant increases with worsening eGFR at the time of transplant. Risk of ESKD is higher for patients with eGFR between 60-89ml/min/1.73m^2 as compared to patients with eGFR ≥90ml/min/1.73m^2 but not for patients who had eGFR<60ml/min/1.72m^2. This reflects the competing risk of high mortality in patients with eGFR <60ml/min/m^2 diminishing the residual risk of ESKD.

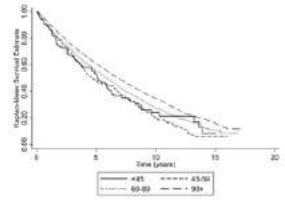


Figure 1: Kaplan Meier curve for mortality

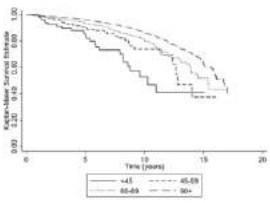


Figure 2: Kaplan Meier curve for ESKD

Table 1: Absolute numbers of death and ESKD in each of the four groups

eGFR at listing (numbers)	≤44 (131)	45-59 (344)	60-89 (3227)	≥90 (15870)
Mortality (%)	91 (72)	226 (66)	1834 (58)	8116 (52)
ESKD (%)	25 (19)	35 (10)	249 (8)	904 (6)

Table 2: Adjusted hazard ratio (aHR) (with p value and confidence interval (CI))

eGFR at listing	≤44	45-59	60-89	≥90
Mortality (aHR)	1.39 (p=0.009 CI 1.08-1.79)	1.19 (p=0.017 CI 1.03-1.39)	1.06 (p=0.028 CI 1.007-1.13)	1
ESKD (aHR using Cox regression)	4.28 (p=<0.001 CI 2.85-6.3)	1.76 (p=0.002 CI 1.24-2.50)	1.29 (p=0.001 CI 1.11-1.49)	1
ESKD (aHR using CICR)	1.91 (p=0.259 CI 0.62-5.8)	1.88 (p=0.078 CI 0.93-3.80)	1.57 (p=0.003 CI 1.16-2.13)	1

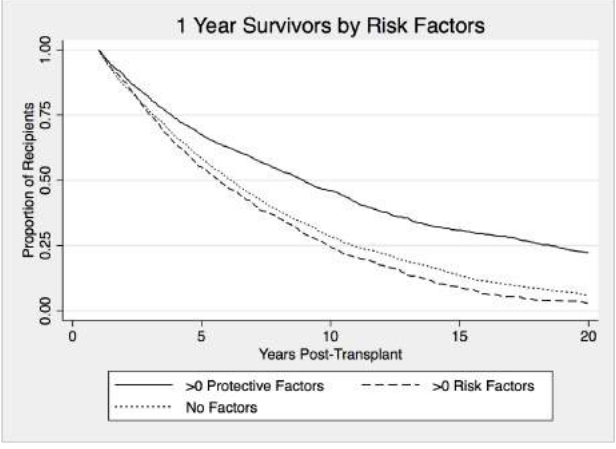
CITATION INFORMATION: Kumar A., Bonnell L., Thomas C. Pre Transplant Estimated Glomerular Filtration Rate and Other Predictors of Mortality and End Stage Kidney Disease After Lung Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Kumar: None. **L.N. Bonnell:** None. **C. Thomas:** None.

Abstract# 433

20 Year Survival Following Lung Transplantation

R. M. Reul, Jr[1], S. Barrett[1], A. Alnajar[2], J. Dunson[1], P. S. Garcha[3], G. Loor[4], J. A. Goss[4], A. A. Rana[4], *[1]Office of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Department of Surgery, University of Miami Health System, Miami, FL, [3]Department of Medicine, Baylor College of Medicine, Houston, TX, [4]Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

Purpose: Outcomes following lung transplantation (LTx) have been poor compared to those of heart, liver, and kidney transplants, with 5-year survival rates around 50%. To our knowledge, there has been no analysis on factors associated with extended survival past 20 years post-transplantation.
Methods: All LTx cases performed between 1987 and 2000 within the United Network for Organ Sharing (UNOS) database were reviewed. Adult patients undergoing single or bilateral LTx who survived at least 1-year post-transplant were included. Demographic factors were compared between 1-20 year survivors and those surviving greater than 20 years using Student's t-test (continuous) and Chi-square test (categorical). Kaplan-Meier and logistic regression analyses were performed to identify trends and risk factors associated with survival long-term survival. Cox regression analysis was then used to assess the impact of protective and risk factors on survival.
Results: A total of 4,731 recipients were included in the analysis, including 311 recipient who lived greater than 20 years following transplantation. Factors associated with 20-year survival include recipient age 25-35 (OR 0.48-0.51), donor cause of death by head trauma (OR 0.70), female to female donor-recipient gender match (OR 0.74), diagnosis of COPD or Emphysema (OR 1.57), single lung transplant (OR 2.20), and recipient age 55-65 (OR 3.22). Cox regression risk factor analysis showed that patients with 1 or more protective factors were more likely (HR 0.88) to live to 20 years than patients with 1 or more risk factors (HR 1.30).
Conclusions: The factors that lead to 20-year survival following LTx are different than those classically associated with shorter-term survival. Understanding the longer-term outcomes following LTx is important for all aspects of lung transplantation management, from pre- and post-operative management to donor allocation.



20-Year Survival - Significant Factors on Multivariate Regression			
	Odds Ratio	P value	Confidence Interval
Recipient Age 25-35	0.48	0.000	0.32-0.72
Recipient Age 35-45	0.51	0.000	0.36-0.72
Recipient Age 55-65	3.22	0.000	1.88-5.51
COPD/Emphysema	1.57	0.022	1.07-2.30
Donor Head Trauma	0.70	0.005	0.54-0.90
Femaleto FemaleGenderMatch	0.74	0.030	0.56-0.97
Single Lung Transplant	2.30	0.000	1.55-3.10

CITATION INFORMATION: Reul, Jr R., Barrett S., Alnajar A., Dunson J., Garcha P., Loor G., Goss J., Rana A. 20 Year Survival Following Lung Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: R.M. Reul, Jr: None. **S. Barrett:** None. **A. Alnajar:** None. **J. Dunson:** None. **P.S. Garcha:** None. **G. Loor:** None. **J.A. Goss:** None. **A.A. Rana:** None.

Abstract# 434

Basiliximab versus Alemtuzumab: The Association Between Induction Agent and Airway Complications Following Lung Transplantation

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Purpose: Controversy still exist regarding the best induction strategy for lung transplantation. At our institution, induction is defined based on donor recipient CMV match. While less steroids are used following alemtuzumab induction, basiliximab requires a longer taper in the immediate postoperative period. We investigated the association between the type of induction and airway dehiscence following lung transplantation.

Methods: We retrospectively reviewed 556 consecutive LT performed at our institution (6/2013 - 6/2020). Only 2 patients received thymoglobulin induction and were excluded. Airway dehiscence was confirmed by bronchoscopy and grade by ISHLT recommendations. Categorical variables were analyzed with chi-square and continuous variables were analyzed with Mann-Whitney U tests. Multivariable logistic regression was used to identify predictors of airway dehiscence.

Results: Mean age of our cohort was 55 years old (range 20-76). There was an even distribution of alemtuzumab and basiliximab as the induction agent (278 vs 276 cases). Airway dehiscence was bronchoscopically diagnosed in 27 patients (4.9%). Variables associated with airway dehiscence included basiliximab induction (p=0.03), open chest after surgery (p=0.01), return to OR for major procedure (p=.001), and postoperative hepatic dysfunction (p=0.003). Patients who experienced airway dehiscence required longer mechanical ventilatory support (23 vs 5 days, p<0.001) and ICU stay (3 vs 2 days, p=0.048). There was no significant difference in overall survival between patients with and without bronchial dehiscence (p = 0.17). Multivariate analysis further identified only the use of basiliximab for induction as an independent predictive factor of postoperative airway dehiscence (p=0.018).

Conclusions: Based on our analysis, patients that received basiliximab induction for lung transplantation experienced a higher risk of postoperative airway complications when compared with patient who receive alemtuzumab induction. We believe this may be associated with a higher steroid use in this population. Additional studies are necessary to further characterize the relationship between induction agents and airway complications following transplantation.

Variable	No Dehiscence	Dehiscence	Odds Ratio (95% CI)	P value
	n = 527	n = 27		
Age	59.37 (18.3)	60.37 (22.6)		0.51
Sex				
female	231 (43.8)	10 (37.0)	1.33 (0.60-2.95)	0.49
male	296 (56.2)	17 (63.0)		
Diagnosis				0.038
COPD/Emphysema/BO	180 (34.2)	4 (14.8)		0.036
Occupational	18 (3.4)	2 (7.4)		0.27
Other	7 (1.3)	1 (3.7)		0.32
Pulmonary Fibrosis	185 (35.1)	13 (48.1)		0.16
Pulmonary Hypertension	12 (2.3)	2 (7.4)		0.09
Scleroderma	39 (7.4)	4 (14.8)		0.16
Suppurative	86 (16.3)	1 (3.7)		0.07
LAS	45.29 (32.9)	49.34 (28.2)		0.11
BMI	24.96 (8)	25.22 (7)		0.65
Induction				
Basiliximab	257 (48.8)	19 (70.4)	2.5 (1.07-5.8)	0.029
Alemtuzumab	270 (51.2)	8 (29.6)		
Hepatic Preop Disease				
None	507 (96.4)	26 (96.3)		0.79
Minor	13 (2.5)	1 (3.7)		
Moderate/Severe	6 (1.1)	0 (0.0)		
Open Chest	174 (33.0)	13 (48.1)	1.88 (0.87-4.10)	0.011
RTOR for major procedure	97 (18.4)	12 (44.4)	3.55 (0.87-4.10)	0.001
Postop Hepatic Dysfunction	69 (13.1)	9 (33.3)	3.32 (0.87-4.10)	0.003
Hemothorax	51 (10.8)	6 (23.1)	2.47 (0.87-4.10)	0.056
Total ICU stay (days)	2 (8)	3 (29)		0.048
Total vent duration (days)	5 (10)	23 (25)		< 0.001
Received steroid treatment for ACR (0-6 months)	281 (53.3)	14 (51.9)	0.94 (0.87-4.10)	0.88
Received steroid treatment (7-12 months)	134 (27.8)	11 (45.8)	2.2 (0.87-4.10)	0.057

CITATION INFORMATION: Furukawa M., Chan E., Harano T., Ryan J., Rivosecchi R., Morrell M., Sanchez P. Basiliximab versus Alemtuzumab: The Association Between Induction Agent and Airway Complications Following Lung Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Furukawa: None. **E.G. Chan:** None. **T. Harano:** None. **J. Ryan:** None. **R. Rivosecchi:** None. **M.R. Morrell:** None. **P.G. Sanchez:** None.

Abstract# 435

Sensitized Lung Candidates Experience Reduced Access to Donor Organs

K. Lindblad[1], R. Goff[2], D. Stewart[2], *[1]UNOS, Richmond, VA, [2]UNOS, Richmnd, VA*

Purpose: Most studies of sensitization in transplant candidates have focused on kidney candidates, and unacceptable antigens (UAs) for non-kidney candidates are believed to be underreported. In this study we examine sensitization in lung candidates, the frequency of reporting, and sensitization's effect on offer rates.

Methods: We used OPTN data to analyze the number of offers received by adult lung-alone registrations ever waiting 1/1/10-6/30/20. Bypass offers and offers from

match runs where no organ was placed were excluded. We used the UNOS CPRA API to determine calculated panel reactive antibody (CPRA) values for all registrations at every time point where UAs were entered.

Results: Of 29,586 registrations, 5,607 (19.0%) had at least one UA in their most recent waiting list record. Among sensitized candidates, the CPRA distribution across all centers was similar to the distributions at centers reporting UAs for ≥ 15% of their candidates or ≥ 25% of candidates (Fig 1). As expected, offer rates declined steadily as CPRA increased, and registrations with a CPRA ≥ 90% had an offer rate an order of magnitude lower than registrations with a mild to moderate level of sensitization (Fig 2).

Fig 1: Distribution of CPRA for Sensitized Lung Candidates

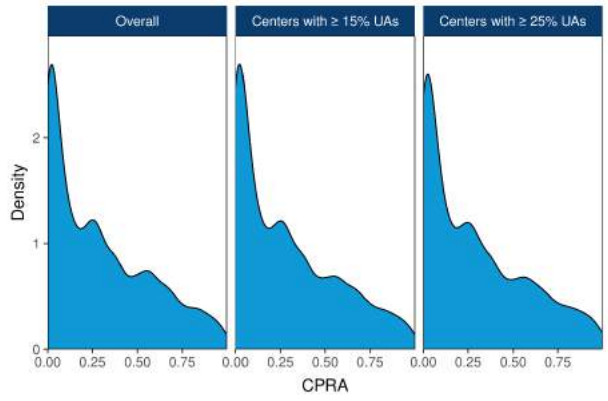


Fig 2: Offers per Active Year Waiting by CPRA Group

Conclusions: The distribution of CPRA for sensitized lung registrations is remarkably similar for all registrations vs registrations at centers entering the most complete sensitization data. This suggests that the overall CPRA distribution reflects the true distribution of CPRA for sensitized candidates, despite potential underreporting of UAs. The offer rate also decreases as CPRA increases, indicating that sensitized candidates have reduced access to donor lungs. These data support the inclusion of CPRA as an attribute in a points-based, "continuous distribution" policy for lungs.

CITATION INFORMATION: Lindblad K., Goff R., Stewart D. Sensitized Lung Candidates Experience Reduced Access to Donor Organs *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Lindblad: None. **R. Goff:** None. **D. Stewart:** None.

Abstract# 436

Lung Transplant Recipients with Severe Acute Respiratory Syndrome-Coronavirus 2 Infection and Asymptomatic Carriers Waiting for Lung Transplantation Induce Circulating Exosomes with Severe Acute Respiratory Syndrome-Coronavirus 2 Spike Protein S2

S. Bansal, S. Tokman, T. Fleming, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Purpose: Exosomes are vesicles released by cells into body fluids. We demonstrated increased circulating exosomes with lung self-antigens (Collagen V, Kα1 Tubulin) and viral antigens in lung transplant recipients (LTxRs) undergoing rejection. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), an important risk factor for LTxRs in immunosuppression and patients with diseased lungs waiting for transplantation. Our goal is to determine that exosomes from LTxRs with SARS-CoV2 infection carry SARS-CoV2 spike protein.

Methods: We analyzed 30 patients waiting for LTx with no clinical symptoms and 7 LTxRs with SARS-CoV2 infection and symptoms. Exosomes were isolated from plasma by precipitation kit, 0.2 micron filtration and size determination by Nanosight300. Eluted protein from gel was analyzed by mass spectrometry and peptides were aligned with SARS-CoV2. Transmission electron microscopy of exosomes was performed for spike and nucleocapsid antigen. Exosomes were also characterized by western blot for immune and molecular markers. Serum cytokines were analyzed using 25 Plex on Luminex.

Results: Exosomes from symptomatic (7/7) and 7/30 (23.3%) asymptomatic LTxRs contained SARS-CoV2 spike protein S2 and increased levels of SARS-CoV2 RNA. SARS-CoV2 spike protein in exosomes was confirmed by mass spectroscopy. Transmission electron microscopy from symptomatic and asymptomatic LTxRs revealed spike protein and nucleocapsid antigen on exosomes. Exosomes contained macrophage stimulating factor 1, GRAnzyme B and angiotensin type II receptor 1 proteins. Increased levels of CXCL10 in sera were detected in SARS-CoV2 positive symptomatic patients, agreeing with the reports that CXCL10 levels correlate with disease severity.

Conclusions: SARS-CoV2 infected LTxRs symptomatic and asymptomatic induced circulating exosomes having spike protein, nucleic acid and antigens related to viral entry (angiotensin type II receptor), infection (macrophage stimulating factor 1) and cytotoxic molecule (GRAnzyme B) suggesting that the exosomes induced by SARS-CoV2 will have functional consequences. Exosomes also contained increased levels of viral RNA and antigens suggesting that circulating exosomes may provide a noninvasive tool for detection of SARS-CoV2 infection.

CITATION INFORMATION: Bansal S., Tokman S., Fleming T., Smith M., Bremner R., Mohanakumar T. Lung Transplant Recipients with Severe Acute Respiratory Syndrome-Coronavirus 2 Infection and Asymptomatic Carriers Waiting for Lung Transplantation Induce Circulating Exosomes with Severe Acute Respiratory Syndrome-Coronavirus 2 Spike Protein S2 *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Bansal: None. **S. Tokman:** None. **T. Fleming:** None. **M. Smith:** None. **R. Bremner:** None. **T. Mohanakumar:** Grant/Research Support; Name of Commercial Interest; NIH. Grant/Research Support; Nature of Relationship; PI.

All Topics

Plenary 3

Abstract# 197

Overall Survival by Best Overall Response with Tabelecleucel in Patients with Epstein-Barr Virus-Driven Post-Transplant Lymphoproliferative Disease After Solid Organ Transplant

S. Prockop[1], L. Gamelin[2], R. Dinavahi[2], Y. Sun[2], N. Guzman-Becerra[2], H. Parmar[2], *[1]Memorial Sloan Kettering Cancer Center, New York, NY, [2]Atara Biotherapeutics, South San Francisco, CA*

Purpose: Tabelecleucel is an investigational, off-the-shelf, allogeneic Epstein-Barr virus (EBV)-specific T-cell immunotherapy being studied in patients (pts) with serious EBV-driven diseases, including post-transplant lymphoproliferative disease (EBV$^+$ PTLD). Pts with EBV$^+$ PTLD after solid organ transplant (SOT) who relapsed with rituximab and did not respond to or did not receive additional chemotherapy (CT) had a median overall survival (OS) of <3 months (Zimmermann EHA 2019), demonstrating a substantial unmet need in relapsed/refractory (R/R) EBV$^+$ PTLD after SOT. We have previously shown that pts with EBV$^+$ PTLD after SOT who responded (complete response [CR] or partial response [PR]) to tabelecleucel have clinical benefit, including 100% 2-year survival rates (Prockop ASH 2019 and JCI 2019). Here, we report aggregate OS in patients with EBV$^+$ PTLD after SOT with CR or PR with tabelecleucel treatment.

Methods: Treatment response and OS were assessed in three studies (NCT00002663, NCT01498484 and NCT02822495). All pts received tabelecleucel at ≈2 x 10^6 cells/kg on Days 1, 8 and 15 in a 35-day treatment cycle. Pts received a median (range) of 2 (1-9) cycles.

Results: Twenty-six SOT recipients with EBV$^+$ PTLD R/R to rituximab (SOT1 n=7) or rituximab+CT (SOT2 n=19) were treated. The objective response rate (PR+CR) was 65% (17/26) overall, 86% (6/7) in SOT1, and 58% (11/19) in SOT2. Similar survival rates were observed across pts with best overall response (BOR) of CR or PR, including in the SOT1 and SOT2 subgroups (Table 1, Figure 1). Treatment was well tolerated with no confirmed evidence for graft vs host disease, cytokine release syndrome or neurotoxicity in relation to tabelecleucel in these very sick, treatment refractory, and immunocompromised pts.

Conclusions: These data show that not only pts with complete responses, but also pts with partial responses to tabelecleucel, may obtain longer-term clinical benefit, demonstrating a favorable risk–benefit profile in this high-risk population for whom there are no approved alternative therapies.

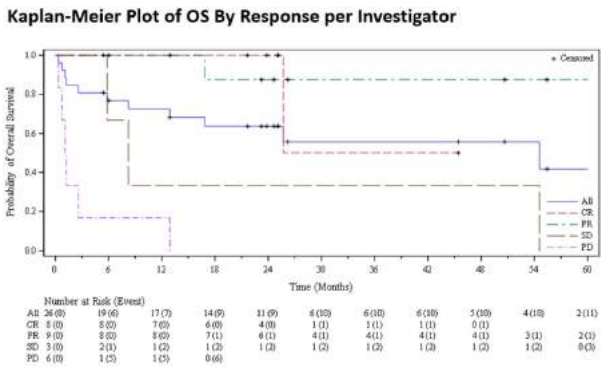


Table 1. OS by BOR

BOR	CR (n=8)	PR (n=9)	CR (n=4)	PR (n=2)	CR (n=4)	PR (n=7)
1-year OS rate	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
2-year OS rate (95% CI)	**100%**	**87.5%** (38.7, 98.1)	**100%**	**100%**	**100%**	**83.3%** (27.3, 97.5)
Median follow-up (min, max) months	**24.5** (6.0, 45.4)	**26.2** (5.4, 115.0)	**22.8** (12.9, 25.7)	**38.4** (26.2, 50.7)	**25.1** (6.0, 45.4)	**24.6** (5.4, 115.0)

CITATION INFORMATION: Prockop S., Gamelin L., Dinavahi R., Sun Y., Guzman-Becerra N., Parmar H. Overall Survival by Best Overall Response with Tabelecleucel in Patients with Epstein-Barr Virus-Driven Post-Transplant Lymphoproliferative Disease After Solid Organ Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Prockop: ; Mesoblast. **L. Gamelin:** Salary; Name of Commercial Interest; Atara Biotherapuetics. Salary; Nature of Relationship; Employee. **R. Dinavahi:** Salary; Name of Commercial Interest; Atara Biotherapuetics. Salary; Nature of Relationship; Employee. **Y. Sun:** Salary; Name of Commercial Interest; Atara Biotherapuetics. Salary; Nature of Relationship; Employee. **N. Guzman-Becerra:** Salary; Name of Commercial Interest; Atara Biotherapuetics. Salary; Nature of Relationship; Employee. **H. Parmar:** Salary; Name of Commercial Interest; Atara Biotherapuetics. Salary; Nature of Relationship; Employee.

Abstract# 198

TIGIT Agonism Improves Immunosuppression of Cd8 T Cells by Ctla-4ig in a Treg Dependent Manner

C. R. Hartigan, D. Liu, M. L. Ford, *Emory University Transplant Center, Emory University, Atlanta, GA*

Purpose: Costimulation blockade therapeutics for immunosuppression in transplant are less toxic than calcineurin inhibitors offering improved graft longevity and patient quality of life, but belatacept-resistant rejection (BRR) has slowed the wide-spread adoption of costimulation blockade therapeutics in the clinic. To overcome BRR we need to target other costimulatory pathways to enhance immunosuppression by belatacept. The purpose of this study is to determine in mice if agonizing TIGIT, a T cell immune receptor with Ig and ITIM domains, will suppress activated or memory T cells responding to allograft and additionally increase the suppressive capacity of Tregs to work in concert with CTLA-4Ig.
Methods: To assess the efficacy of an agonistic anti-TIGIT antibody, we used a minor antigen mismatch model of skin graft with the model antigen OVA in addition to full allogenic mismatch with Balb/C to B6 skin grafts and evaluated graft survival and T cell responses in the graft, draining lymph nodes, and spleens of recipient mice. Mice were given $1e^6$ OT-I and OT-II T cells by adoptive transfer or $10e^6$ donor splenocytes prior to bilateral skin graft and received immunosuppression (or vehicle control) on days 0, 2, 4, and 6 after grafting. Animals were sacrificed at day 10 or monitored long-term for graft survival.
Results: Combination therapy of the TIGIT agonist with CTLA-4Ig improved graft survival compared to individual therapy with either CTLA-4Ig or TIGIT agonist with an MST beyond 80 days, compared to 25 days with CTLA-4Ig alone (p=0.0007). Monitoring OVA-specific cells revealed that this increased survival with dual therapy is accompanied by a reduction of antigen-specific CD8 T cells compared to CTLA-4Ig treatment alone (p= 0.0367 by unpaired t-test). This reduction of activated CD8 T cells was recapitulated in a full allograft model of skin graft with a 16% reduction in central memory CD8+ T cells in combination therapy versus CTLA-4Ig alone (p value = 0.0238). Further we show that the reduction in graft-specific T cells in the presence of CTLA-4Ig + TIGIT agonist compared to the individual therapies is due to an increase in cell death by measuring caspase 3/7 activity, and not changes in proliferative capacity of cytotoxic T cells by measurement of Cell Trace Violet dilutions. Using conditional knock out mice where TIGIT is specifically knocked out only in Foxp3 expressing cells, we show that the decrease in graft-specific CD8 T cell responses is dependent on TIGIT expressing Tregs.
Conclusions: Together, these data show that TIGIT agonism, when combined with CTLA-4Ig, can promote the death of CD8 T cells involved in allograft rejection in a Treg-dependent manner, improving skin graft survival outcomes in mice.
CITATION INFORMATION: Hartigan C., Liu D., Ford M. TIGIT Agonism Improves Immunosuppression of Cd8 T Cells by Ctla-4ig in a Treg Dependent Manner *AJT, Volume 21 Supplement 3*
DISCLOSURES: C.R. Hartigan: None. **D. Liu:** None. **M.L. Ford:** None.

Abstract# 199

Donor-derived Cell-free DNA Distinguishes Acute Rejection from Other Causes of Graft Injury in Liver Transplant Recipients

J. Levitsky[1], M. Miller[2], R. Sinha[2], E. Bixler[2], A. Al-Turck[2], J. Weems[2], M. Altrich[2], S. Kleiboeker[2], M. Abecassis[3], *[1]Gastroenterology & Hepatology; Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]Viracor Eurofins, Lees Summit, MO, [3]University of Arizona College of Medicine Tucson, Tucson, AZ*

Purpose: The donor derived cell-free DNA (ddcfDNA) has emerged as strong biomarker for allograft injury, where the fraction of ddcfDNA is reported to increase in allograft rejection. Compared to other organ transplants, the fraction of donor-derived cell-free DNA (dd-cfDNA) in blood has not been tested robustly as an acute rejection (AR) biomarker in liver transplant recipients (LTR). Our aim was to evaluate the ability of dd-cfDNA to distinguish AR from other causes (ADNR - acute dysfunction no rejection) at the time of graft dysfunction.
Methods: Plasma tubes collected and stored from two LT biorepository cohorts (Northwestern University (NU); multicenter NIAID CTOT-14) were analyzed for ddcfDNA quantification. Patient phenotypes included AR (N=57), ADNR (N=68), control LT recipients with normal graft function (TX; N=94), as well as non-AR (combination of ADNR+TX; N=162). The sample set was randomly divided into discovery (70%, 153 samples) and validation (30%, 66 samples) sets, which were subsequently used to find and validate the optimal ddcfDNA cutoff, respectively.
Results: We have tested and validated the application of ddcfDNA fraction as a biomarker of liver graft injury in clinically relevant comparisons (AR vs. TX, AR vs. non-AR, AR vs. ADNR) (Table)

Clinical Groups	Optimal ddcfDNA in % (discovery)	Sensitivity (discovery)	Specificity (discovery)	AUC (discovery)	Sensitivity (validation)	Specificity (validation)	PPV/NPV (validation)
AR vs. TX	5.3	95 (83-99)	77 (64-86)	0.95 (0.92-0.99)	100 (79-100)	81(63-93)	62/100 (38-86)/ (88-100)
AR vs. non-AR	15.0	76 (66-88)	79 (70-86)	0.85 (0.78-0.91)	88 (62-98)	80(66-90)	59/95 (33-80)/ (83-99)
AR vs. ADNR	20.4	68 (52-82)	67 (52-80)	0.70 (0.61-0.80)	75 (48-93)	60(36-81)	38/88 (17-64)/ (65-99)

Conclusions: dd-cfDNA can distinguish AR from other causes of liver graft dysfunction using optimal cut-off fractions. Given the high NPV ("rule out" AR test), prospective studies are needed to evaluate its utility in clinical practice in reducing invasive liver biopsies performed to exclude rejection.
CITATION INFORMATION: Levitsky J., Miller M., Sinha R., Bixler E., Al-Turck A., Weems J., Altrich M., Kleiboeker S., Abecassis M. Donor-derived Cell-free DNA Distinguishes Acute Rejection from Other Causes of Graft Injury in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Levitsky: Consulting Fee; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc, Mallinckrodt. Consulting Fee; Nature of Relationship; consulting. Grant/Research Support; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc, Novartis. Grant/Research Support; Nature of Relationship; Research support. Honoraria; Name of Commercial Interest; Gilead. Honoraria; Nature of Relationship; Speaker. **M. Miller:** Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **R. Sinha:** Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **E. Bixler:** Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **A. Al-Turck:** Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **J. Weems:** Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **M. Altrich:** Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **S. Kleiboeker:** Ownership Interest; Name of Commercial Interest; Viracor Eurofins. Ownership Interest; Nature of Relationship; Stock option holder. Salary; Name of Commercial Interest; Viracor Eurofins. Salary; Nature of Relationship; Employee. **M. Abecassis:** Consulting Fee; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc. Consulting Fee; Nature of Relationship; consulting. Royalty; Name of Commercial Interest; Eurofins/Viracor/Transplant Genomics Inc. Royalty; Nature of Relationship; Royalty.

Abstract# 200

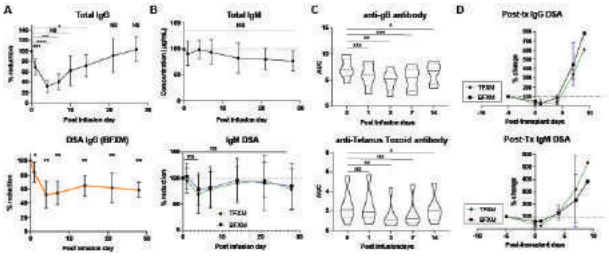
Measuring the Impact of Targeting FcRn-Mediated IgG Recycling on Donor-Specific Alloantibodies in a Sensitized NHP Model

M. Manook[1], W. Flores[2], R. Schmitz[1], Z. Fitch[1], J. Yoon[1], Y. Bae[1], B. I. Shaw[1], M. Harnois[3], S. Permar[3], A. Kirk[1], D. Magnani[2], J. Kwun[1], S. Knechtle[1], *[1]Duke Transplant Center, Duke University Medical Center, Durham, NC, [2]Massbiologics, University of Massachusetts Medical School, Boston, MA, [3]Human Vaccine Institute, Duke University Medical Center, Durham, NC*

Purpose: In transplantation, plasmapheresis and IVIg provide the mainstay of treatment directed at reducing or removing circulating donor specific antibody (DSA), yet both have limitations. We sought to test the efficacy of targeting the IgG recycling mechanism of the neonatal Fc receptor (FcRn) using anti-FcRn mAb therapy in a sensitized non-human primate (NHP) model, as a pharmacological means of lowering DSA.

Methods: Six (6) rhesus macaque monkeys, previously sensitized by skin transplantation, received a single dose of 30mg/kg anti-RhFcRn IV, and effects on total IgG, as well as DSA IgG measured, in addition to IgM and protective immunity. Subsequently, 60mg/kg IV was given in the setting of kidney transplantation from skin graft donors. Kidney transplant recipients received RhATG, and tacrolimus, MMF, and steroid for maintenance immunosuppression.

Results: Circulating total IgG was reduced from a baseline 100% on D0 to 32.0% (mean, SD ± 10.6) on d4 post infusion ($p<0.05$), while using a donor specific antibody (DSA) assay, B-cell FXCM to 52.2±19.3% **(Figure 1A)**. Circulating total IgM and DSA IgM were unaffected by treatment **(Figure 1B)**. Protective immunity (anti-gB and anti-tetanoid toxin IgG) was significantly reduced for 14d post infusion **(Figure 1C)**. Post-transplant, circulating IgG responded to anti-FcRn mAb treatment, but DSA increased rapidly **(Figure 1D)**.



Conclusions: Targeting the FcRn mediated recycling of IgG, is an effective means of lowering circulating donor specific IgG in the sensitized recipient, although in the setting of organ transplantation mechanisms of rapid antibody rise post-transplant remain unaffected.

CITATION INFORMATION: Manook M., Flores W., Schmitz R., Fitch Z., Yoon J., Bae Y., Shaw B., Harnois M., Permar S., Kirk A., Magnani D., Kwun J., Knechtle S. Measuring the Impact of Targeting FcRn-Mediated IgG Recycling on Donor-Specific Alloantibodies in a Sensitized NHP Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Manook: None. **W. Flores:** None. **R. Schmitz:** None. **Z. Fitch:** None. **J. Yoon:** None. **Y. Bae:** None. **B.I. Shaw:** None. **M. Harnois:** None. **S. Permar:** None. **A. Kirk:** None. **D. Magnani:** None. **J. Kwun:** None. **S. Knechtle:** None.

Admin

Quality Assurance and Regulatory Issues

Abstract# 201

Automated Electronic Donor Referrals Have Increased Transplantation

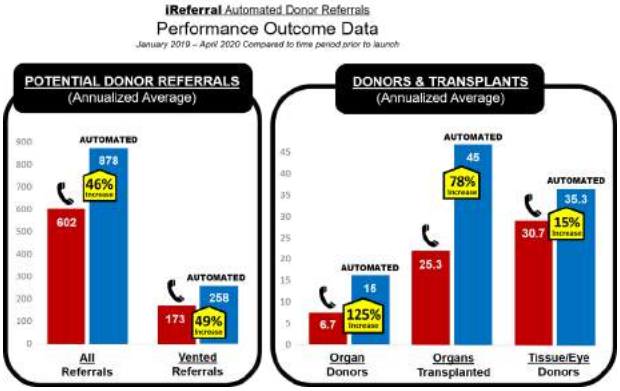
J. Piano, *Transplant Connect, Santa Monica, CA*

Purpose: It is well understood and supported by previous studies that costly inefficiencies exist in the current phone-based process by which hospitals refer potential donors to Organ Procurement Organizations (OPOs). Such costs include delays in notification as well as failures to refer altogether, preventing the donation and transplantation of life-saving organs. To address these challenges, a secure, automated and highly-replicable electronic donor identification and referral interface, known as *iReferral*, was developed and implemented to 1) automate the identification of potential donors by algorithmic referral triggers and 2) automate the hospital-to-OPO referral delivery, thereby eliminating the manual initial referral phone call and liberating hospital nursing resources.

Methods: The multi-disciplinary team collaborated to 1) design algorithmic referral triggers within the Hospital EMR and 2) develop a secure technical interface directly connecting the OPO and Hospital software systems. The referral triggers automatically identify potential donors and deliver electronic referrals from the Hospital EMR to the OPO software system based on hospital staff entry of pre-determined clinical data, alleviating nursing resources and eliminating the risk of missed referrals. The interface also includes a manual referral trigger for cases such as early family mention of donation. Upon receipt of the electronic referral, the OPO is able to retrieve critical donation screening details without disrupting the hospital staff. The first known interface of its kind, the pilot launched in October 2018 and has served as a model for many hospital networks and OPOs that have since implemented this replicable automated referral technology, known as *iReferral*.

Results: The interface led to significant increases in referrals, donations, and organ transplants at the pilot hospital (see figure). There are several case studies of the pilot OPO receiving an automatically triggered donor referral well before the nurse could call, allowing the OPO to mobilize and ultimately recover organs which likely would have otherwise timed out. Automated referrals have been met with near universal enthusiasm from clinical staff.

Conclusions: Continuing successful results have been achieved as a result of 1) defined algorithmic triggers for identifying potential donors and 2) the automated delivery of referrals via the secure Hospital-OPO interface. This project has eliminated costly inefficiencies and reduced burdens on both Hospitals and OPOs and has led to significant increases in the number and timeliness of referrals, directly resulting in increases in donation and transplantation.



CITATION INFORMATION: Piano J. Automated Electronic Donor Referrals Have Increased Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Piano: ; Transplant Connect.

Abstract# 202

The Initial Impact of Covid-19 on Reported Graft Failure Rates and Potential Confounding of Srtr Psrs

A. Wey[1], J. Miller[1], D. Musgrove[1], Y. Ahn[1], M. Valapour[2], N. Salkowski[1], M. Skeans[1], A. Massie[3], R. Hirose[4], D. Segev[3], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Cleveland Clinic, Cleveland, OH, [3]Johns Hopkins, Baltimore, MD, [4]Univ of California, San Francisco, San Francisco, CA*

Purpose: COVID-19 could bias the Scientific Registry of Transplant Recipients (SRTR) program-specific reports (PSRs), especially if its impact varied geographically.

Methods: Recipients who received transplants from January 1, 2000 to April 30, 2020 and had graft function on March 13, 2019 were included. To assess the risk of confounding, we estimated the overall and donation service area (DSA)-specific differences in graft failure rates from March 13, 2019 to March 12, 2020 compared with rates from March 13 to April 30, 2020, after adjusting for recipient and donor characteristics.

Results: Kidney, liver, and heart recipients had higher adjusted graft failure rates after COVID-19 than before (Figure 1). Graft failure rates for kidney and liver recipients who received a transplant in the New York City DSA were significantly higher after COVID-19 than before (Figures 2 and 3, respectively). Lung and heart transplant recipients had significantly less variability across DSAs.

Conclusions: Taken together, these results suggest potential confounding of SRTR PSRs, especially for kidney and liver transplant programs in the New York City DSA. Thus, SRTR is censoring transplant follow-up after March 12, 2020 for PSRs released in January 2021 to minimize potential bias. However, further studies are required to identity long-term solutions for minimizing potential confounding of SRTR PSRs by COVID-19.

Figure 1. The overall adjusted hazard ratios (aHRs) for graft failure after versus before COVID-19, adjusted for recipient and donor characteristics.

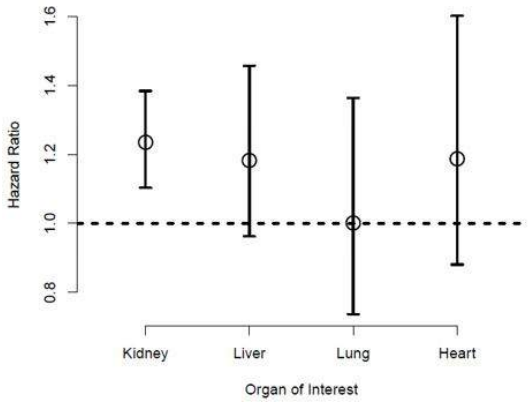


Figure 2. Kidney transplant: DSA-specific relative aHRs for graft failure before and after COVID-19.

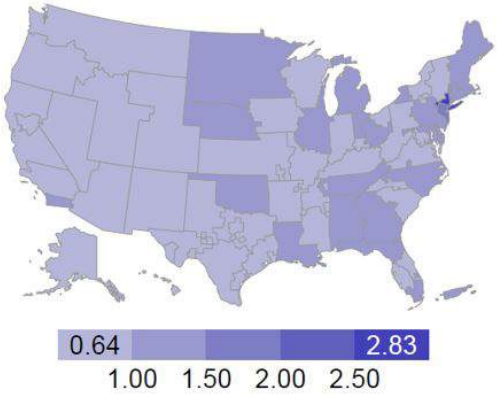
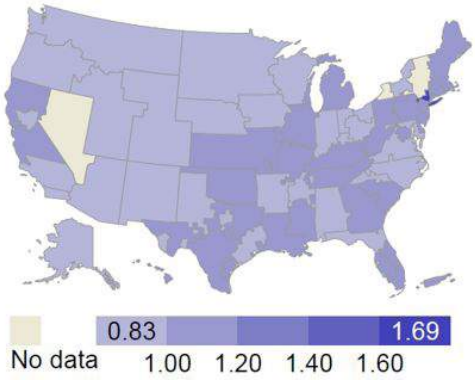


Figure 3. Liver transplant: DSA-specific relative aHRs for graft failure before and after COVID-19.



CITATION INFORMATION: Wey A., Miller J., Musgrove D., Ahn Y., Valapour M., Salkowski N., Skeans M., Massie A., Hirose R., Segev D., Israni A., Snyder J., Kasiske B. The Initial Impact of Covid-19 on Reported Graft Failure Rates and Potential Confounding of Srtr Psrs *AJT, Volume 21 Supplement 3*

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Abstract# 203

The Effect of Covid-19 on Offer Acceptance Rates by Age and Race Groups

A. Wey[1], J. Miller[1], Y. Ahn[1], D. Musgrove[1], A. Hart[1], N. Salkowski[1], M. Skeans[1], R. Hirose[2], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Univ of San Fransico, San Francisco, CA*

Purpose: COVID-19 causes more severe complications in older patients and disproportionately leads to poor outcomes in racial minorities. High offer acceptance rates indicate better access to transplant. Because access to transplant is critical for patients with end-stage organ failure, we investigated the effect of COVID-19 on offer acceptance rates by candidate age and race before and after the national emergency declaration on March 13, 2020 for kidney, liver, lung, and heart transplant.

Methods: We used match run data from March 13, 2019 to August 31, 2020 and included offers that resulted in at least 1 acceptance. Logistic regressions estimated differences in offer acceptance by candidate age and race before and after COVID-19 (i.e., the effects for age and race interacted with an indicator of donors recovered after March 12, 2020), and the regressions adjusted for the location of the offer in the match run and other candidate and donor characteristics.

Results: Overall, offer acceptance rates were lower for kidney, liver, and heart transplant after COVID-19 than before (Table 1). Differences in kidney offer acceptance across candidate age had a dose-response relationship: offer acceptance rates were higher in younger kidney candidates before and after COVID-19 than in older candidates. Offer acceptance rates for Black and Asian candidates decreased more before and after COVID-19 than for White candidates (Table 1). Offer acceptance rates for liver, lung, and heart candidates did not notably differ before and after COVID-19 by candidate age and race.

Conclusions: Thus, COVID-19 inequitably affected kidney offer acceptance rates across candidate age and racial groups.

Table 1. Adjusted offer acceptance rate ratios before and after the COVID-19 national emergency declaration on March 13, 2020 for overall and candidate age and race subgroups. For example, the change in the odds of acceptance before and after COVID-19 for kidney candidates aged 18 to 34 years was 14% higher than the change for kidney candidates aged 35 to 49.

Organ	Overall	Candidate age (Ref. = 35-49)			Candidate race (Ref. = White)		
		18-34	50-64	65+	Black	Asian	Other
Kidney	$_{0.91}0.94_{0.97}$	$_{1.02}1.14_{1.27}$	$_{0.88}0.95_{1.03}$	$_{0.76}0.84_{0.93}$	$_{0.84}0.91_{0.98}$	$_{0.81}0.91_{1.03}$	$_{0.80}1.00_{1.25}$
Liver	$_{0.80}0.84_{0.88}$	$_{0.86}1.05_{1.28}$	$_{0.95}1.07_{1.20}$	$_{0.83}0.98_{1.15}$	$_{0.87}1.05_{1.25}$	$_{0.90}1.13_{1.42}$	$_{0.61}0.89_{1.29}$
Lung	$_{1.08}1.17_{1.26}$	$_{0.49}0.74_{1.13}$	$_{0.72}0.94_{1.22}$	$_{0.64}0.85_{1.14}$	$_{0.68}0.89_{1.16}$	$_{0.58}0.91_{1.44}$	$_{0.44}1.15_{2.98}$
Heart	$_{0.76}0.82_{0.89}$	$_{0.75}0.98_{1.29}$	$_{0.93}1.11_{1.34}$	$_{0.87}1.12_{1.44}$	$_{0.85}1.02_{1.21}$	$_{0.56}0.85_{1.28}$	$_{0.32}0.82_{2.12}$

CITATION INFORMATION: Wey A., Miller J., Ahn Y., Musgrove D., Hart A., Salkowski N., Skeans M., Hirose R., Israni A., Snyder J., Kasiske B. The Effect of Covid-19 on Offer Acceptance Rates by Age and Race Groups *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Wey: None. **J. Miller:** None. **Y. Ahn:** None. **D. Musgrove:** None. **A. Hart:** Grant/Research Support; Name of Commercial Interest; CSL Behring. Grant/Research Support; Nature of Relationship; consultant/advisor. **N. Salkowski:** None. **M. Skeans:** None. **R. Hirose:** None. **A. Israni:** None. **J. Snyder:** None. **B. Kasiske:** None.

Abstract# 204

Covid-19 Impact of the Pandemic Surge on Patients Waiting for Renal Transplantation at a Single New York City Transplant Center

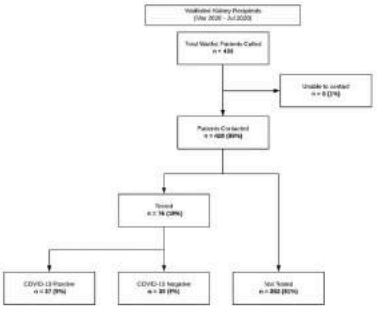
G. Boyd, D. Tsapepas, R. Bonifacio, L. Brinkers, C. Brennan, A. Chang, M. Dalangin, L. Lowe, J. K. Mendoza, J. V. Mendoza, C. McNulty, M. Morris, M. Muttiah, K. Nickason, L. Ratner, *Transplant, NYP - Columbia University Medical Center, New York, NY*

Purpose: There was a critical need to understand the impact that the COVID-19 pandemic had on our patients awaiting transplantation, including infection rates, morbidity, mortality, and wait list (WL) readiness.

Methods: Retrospective single-center study of active kidney and pancreas WL patients. Clinicians called patients using a questionnaire to assess patient status, screen for COVID-19 symptoms and exposures, assess changes to psychosocial demographics, and instruct patients who needed follow-up care.

Results: Active waitlist patients as of 4/2020 were contacted (Figure 1). Patients were stratified into 3 groups based on SARS-CoV2 testing: (1) No Test (NT) (n=357), (2) Test Neg (TNeg) (n=39), and (3) Test Pos (TPos) (n=30). Groups were similar at baseline, but differed with respect to ethnicity and diabetes status (Table 1). Black patients had a disproportionately higher rate of testing positive at 40% (n=12), even though as a group they represented 32% of our waitlist. Hispanic patients comprised 26% of the total WL patients, 43% of the COVID-19 positive patients were Hispanic. Diabetics had the highest rate of SARS CoV2 infection (p=0.02). Mortality due to COVID-19 among the WL population was 1.6% (n=7); of note, 2 additional patient deaths were reported to the center before the systematic WL calling process started. Patients who had known exposures to individuals with COVID-19 were more likely to have developed COVID-19 (p=0.001). Of the 30 TPos patients, 53% (n=16) had an exposure to a known COVID-19 infected person. This exposure was shown to be significant (p=0.001) for patients who ultimately tested positive for COVID-19. Symptoms among Tpos patients included fever (86%), body aches (68%), fatigue (64%) and cough (64%). Few patients (1%) reported changes to their social support, transportation access, and insurance coverage.

Conclusions: During the COVID-19 pandemic solid organ transplant candidates on the WL represent a vulnerable population as a result of their end stage organ failure, and co-morbid conditions. Our systematic phone call process of WL patients identified a 7% COVID-19 incidence, 1.6% mortality rate due to COVID-19, and a low number of patients experiencing changes to their readiness for transplant. More research is needed to identify trends among the transplant WL population. It is important to uncover any geographic or socioeconomic differences across transplant centers.



Parameter	Total	NT	T Neg	T Pos	P-value
N (%)	426	357 (84%)	39 (9%)	30 (7%)	
Recipient Characteristics					
Age at Tx ±SD (years)	53 ± 15	53 ± 15	55 ± 13	52 ± 14	0.517
Male (%)	264 (62%)	227 (64%)	16 (41%)	21 (70%)	**0.014**
Race					0.670
Asian	67 (16%)	60 (17%)	5 (13%)	2 (7%)	
Black	136 (32%)	112 (31%)	12 (31%)	12 (40%)	
White	162 (38%)	138 (39%)	13 (33%)	11 (37%)	
Other/Multiracial	45 (11%)	34 (10%)	7 (18%)	4 (13%)	
Declined/Unknown	16 (4%)	13 (4%)	2 (5%)	1 (3%)	
Ethnicity					0.075
Hispanic/Latino/Spanish	106 (25%)	84 (24%)	9 (23%)	13 (43%)	
Non-Hispanic/Latino/Spanish	304 (71%)	258 (72%)	29 (74%)	17 (57%)	
Unknown/Declined	16 (4%)	15 (4%)	1 (3%)	0	
BMI (kg/m^2)					
Diabetic	144 (34%)	108 (30%)	20 (51%)	16 (53%)	**0.002**
Transplant Characteristics					
On dialysis	366 (94%)	305 (93%)	34 (94%)	27 (93%)	0.788
EPTS	48 ± 31	46 ± 30	56 ± 30	52 ± 30	
Median Time on Waitlist (IQR)(years)	3.3 (1.7, 5.1)	3.1 (1.7, 4.9)	4.8 (1.9, 5.5)	4.4 (2.5, 5.4)	**0.032**
COVID Related Characteristics					
Known Exposure	31 (7%)	11 (3%)	4 (10%)	16 (53%)	**<0.001**
Currently Employed					0.080
Not Working Because of COVID-19	39 (9%)	36 (10%)	2 (5%)	1 (3%)	
Not Working Before COVID-19	283 (67%)	235 (66%)	27 (69%)	21 (70%)	
Yes, Working at Home	65 (15%)	59 (17%)	3 (8%)	3 (10%)	
Yes, Working at Office	38 (9%)	26 (7%)	7 (18%)	5 (17%)	

CITATION INFORMATION: Boyd G., Tsapepas D., Bonifacio R., Brinkers L., Brennan C., Chang A., Dalangin M., Lowe L., Mendoza J., Mendoza J., McNulty C., Morris M., Muttiah M., Nickason K., Ratner L. Covid-19 Impact of the Pandemic Surge on Patients Waiting for Renal Transplantation at a Single New York City Transplant Center *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Boyd: None. **D. Tsapepas:** None. **R. Bonifacio:** None. **L. Brinkers:** None. **C. Brennan:** None. **A. Chang:** None. **M. Dalangin:** None. **L. Lowe:** None. **J.K. Mendoza:** None. **J.V. Mendoza:** None. **C. McNulty:** None. **M. Morris:** None. **M. Muttiah:** None. **K. Nickason:** None. **L. Ratner:** None.

Abstract# 205

Impact of Lung Allocation Score Cohort Update

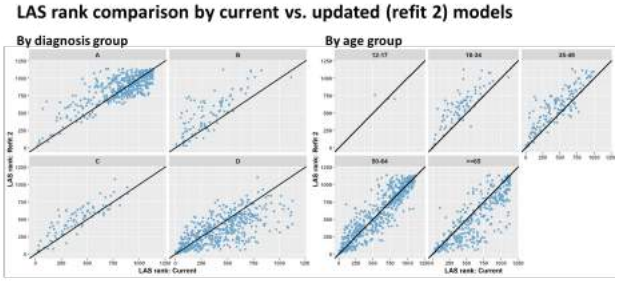
M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH*

Purpose: The lung allocation score (LAS) was last revised in February, 2015, based on waitlist (WL) and posttransplant (PT) survival model cohorts from 2006-2008 and 2005-2008, respectively. The US policy goal of changing lung allocation to a continuous distribution framework precipitated the LAS cohort update.

Methods: Updated LAS WL and PT survival models used patients, March 1, 2015-March 31, 2018. Each population was followed for 1 year. Cox proportional hazards models were fit using the covariates of the current LAS. We fit 2 sets of models: (1) all current LAS covariates, and (2) those remaining after removing unstable and non-predictive covariates. We computed LAS from each set of models for a snapshot of 1136 waitlist patients aged ≥12 years, January 1, 2019. We compared their rank ordering under current and updated LAS.

Results: Updated models generated lower numbered ranks (increased access to transplant), for diagnosis group D and older candidates. In the updated cohort, adjusted risk of waitlist death was 4-fold higher for group D compared with group A, vs. 1.9-folder higher risk in the current model. The effect of age in the updated cohort was stronger than in the current cohort. Few patients aged <50 years had improved access with the updated LAS; most with improved access were aged ≥65 years (Figure). By diagnosis, only group D candidates experienced meaningfully improved access. Change in rank was examined for each removed covariate to determine if changes in transplant access changed due to newly excluded LAS variables. Removing diabetes status, cardiac index, central venous pressure, forced vital capacity, and functional status from the models had minimal impact on ranking. In our snapshot, <10 patients had obliterative bronchiolitis, serum creatinine increase of 150%, or bilirubin increase of 50%; impacts on these patients could not be generalized.

Conclusions: Since 2008, the proportion of older and group D patients on the lung transplant waiting list has increased. This is reflected in the changes in predictors of WL and PT survival. Updating models with recent cohorts provided increased access to transplant for these more acutely ill patients.



Dots below the 45 degree line represent candidates with increased access in updated (refit 2) vs. current models.

CITATION INFORMATION: Skeans M., Wey A., Lease E., Lehr C., Valapour M. Impact of Lung Allocation Score Cohort Update *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Skeans: None. **A. Wey:** None. **E. Lease:** None. **C. Lehr:** None. **M. Valapour:** Grant/Research Support; Name of Commercial Interest; NIH, Cystic Fibrosis Foundation. Grant/Research Support; Nature of Relationship; Research Support.

Abstract# 206

Effective Patient Throughput on the Transplant Surgery Service

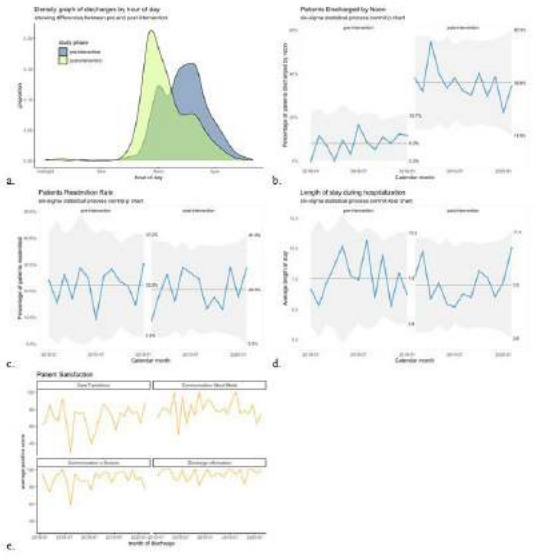
E. M. Thomas[1], P. K. Shah[1], S. Beasley[2], A. Saad[1], M. Rani[1], F. Cigarroa[1], *[1]UT Health San Antonio, San Antonio, TX, [2]University Health, San Antonio, TX*

Purpose: Hospital bed capacity and patient throughput are persistent challenges for medical centers. One established strategy for increasing patient throughput and decompressing Emergency Departments is via discharge by noon (DBN) initiatives. However, hospitals are expected to both improve DBN without compromising readmission rates, length of stay (LOS) or patient experience. Additionally, services with complex patients and discharge planning are often considered incapable of success with such hospital metrics. In this study, we demonstrate how a transplant surgery service achieved this goal.

Methods: In February 2019, we implemented the "Power Through" initiative in the Transplant Surgery Service. Tools employed to improve DBN included weekday disposition meeting, weekday afternoon multidisciplinary patient discussion, all level education, leadership support and team buy-in. We compared the rate of DBN, readmission rate, LOS and patient satisfaction data pre-intervention (January 2018-January 2019) to post-intervention (February 2019-February 2020).

Results: We found that during pre-intervention phase 8.2% cases (42 of 513 cases) and post-intervention 35.8% cases (237 of 662 cases) achieved DB. This was a significant improvement (p-value < 0.001) with the post-intervention relative risk of discharge-by-noon being 4.37 times that of pre-intervention. The statistical process control charts showed a clear attributable variation associated with the intervention (fig b). Further, there was a significant (p-value < 0.001) shift in the density plot (fig a) showing early discharges. Our readmission rate decreased marginally from 22.2% to 20.5% with neither chi-square test nor statistical process control charts showing any significant difference. The overall mean LOS decreased from 7.54 to 6.98 while the LOS in the DBN cases increased from 4.98 to 5.20 days, both of which were insignificant (fig c and d). Lastly, the key domains of the HCAHPS survey pertaining to discharge information and communication showed regular month to month variation and no changes were attributed to the intervention (fig e).

Conclusions: With definitive, multi-level, multi-disciplinary and consistent efforts, we achieved significant improvement in DBN is our surgical service with complex patients who have complicated discharge needs. This improvement was sustained over a year and without harm or compromise to patient care. This achievement improved hospital throughput and cost savings.



CITATION INFORMATION: Thomas E., Shah P., Beasley S., Saad A., Rani M., Cigarroa F. Effective Patient Throughput on the Transplant Surgery Service *AJT, Volume 21 Supplement 3*
DISCLOSURES: E.M. Thomas: None. **P.K. Shah:** None. **S. Beasley:** None. **A. Saad:** None. **M. Rani:** None. **F. Cigarroa:** None.

Abstract# 207

The Learning Curve Associated with De Novo Tacrolimus XR Use in a Racially Diverse Kidney Transplant Population

F. Bartlett, T. Carcella, N. Patel, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

Purpose: Tacrolimus XR (LCP-Tac) was approved for de novo dosing in kidney transplant recipients in 2018. In 2020, our center was challenged with a nationwide shortage of tacrolimus IR, warranting implementation of a new de novo LCP-Tac protocol. The purpose of this study is to assess LCP-Tac outcomes with 3 initial dosing strategies in kidney transplant recipients
Methods: This was a retrospective longitudinal study of adult kidney recipients transplanted between May and September 2020. The study population was divided into 3 cohorts based on sequential de novo LCP-Tac dosing strategies: 0.12 mg/kg in all patients (cohort 1), 0.17 mg/kg in all patients (cohort 2), and most recently, 0.12 mg/kg in non-African Americans and 0.15 mg/kg in African Americans. The primary endpoints were days to achieve therapeutic level and time in therapeutic range (TTR) at 1-month post-transplant. Categorical data were analyzed using chi square or fishers exact. Continuous data were analyzed using Kruskal-Wallis.
Results: A total of 122 patients were included. Baseline characteristics were similar between cohorts. Cohorts 2 and 3 achieved a therapeutic level in roughly 3-4 days, compared to 6 days in cohort 1 ($p<0.01$) and 38% of cohort 1 did not achieve a therapeutic level by day 7 vs. 16-18% in cohorts 2 and 3 ($p=0.03$). TTR was slightly higher in cohort 3 (68%), as compared to cohorts 1 and 2 ((62-65%); $p=0.46$). There were more held doses in cohort 2 (60%). Other peri-operative outcomes were similar between cohorts, as were acute rejection rates and graft loss.
Conclusions: Using a stratified de novo LCP-Tac dosing strategy based on African-American race appears to strike the best balance between achieving therapeutic levels quickly after transplant while preventing giving too high of an initial dose. Studies determining the impact of CYP3A5 genotyping are ongoing and may help further clarify this dosing strategy.

	Cohort 1 N=39	Cohort 2 N=45	Cohort 3 N=38	P
TTR in month 1 (%), mean ± SD	62.1 ± 21.5	64.8 ± 22.4	68.3 ± 21.8	0.46
POD of first therapeutic level, median (IQR)	6 (4,9)	3 (3,5)	4.5 (3,7)	<0.01
>7 days to therapeutic level, N (%)	15 (38.5)	7 (15.6)	7 (18.4)	0.03
Not at stable therapeutic level by POD 30, N (%)	6 (15.4)	6 (13.3)	6 (15.8)	0.94
Stable mg/kg LCP-Tac dose, mean ± SD	0.16 ± 0.064	0.14 ± 0.057	0.12 ± 0.051	0.01
POD of stable therapeutic level, median (IQR)	13 (8,28.5)	14 (6,27)	12.5 (9,28.75)	0.79
Dose changes in month 1, mean ± SD	2.77 ± 1.09	3.47 ± 1.53	3.18 ± 1.63	0.09
Held doses, N (%)	13 (33.3)	27 (60)	16 (42.1)	0.04

CITATION INFORMATION: Bartlett F., Carcella T., Patel N., Rohan V., Taber D. The Learning Curve Associated with De Novo Tacrolimus XR Use in a Racially Diverse Kidney Transplant Population *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Bartlett: None. **T. Carcella:** None. **N. Patel:** None. **V. Rohan:** None. **D. Taber:** None.

Abstract# 208

Early Stent Removal in Kidney Transplant Recipients - A Quality Improvement Project

V. Rohan, N. Pilch, M. Altiti, S. Nadig, A. Lin, D. DuBay, P. Baliga, *Surgery, Medical University of South Carolina, Charleston, SC*

Purpose: Ureteric Stent placement is a is common practice at the time of kidney transplantation to reduce the incidence and severity of Major Urological Complications (MUC). The exact time required for the stent to be in place to prevent MUC is unknown. However, longer duration of stent placement is associated with urinary tract infections (UTI), hematuria and other irritative bladder symptoms. The **aim** of this process improvement project was to determine if earlier stent removal would decrease UTI rates without the increased risk of anastomotic complications.
Methods: In August 2019, timing of stent removal was moved from 6-8 weeks (Late) post-transplant to 3-4 weeks (Early). A retrospective review of adult, solitary kidney transplant recipients was performed. Urinary tract infections (UTI) occurring within the first 60 days post-transplant and readmissions secondary to UTI were collected. Urinary complications tracked included urine leak, ureteral stenosis or stricture requiring intervention and urinomas. Data were compared using descriptive statistics and were analyzed using SPSS v25.
Results: A total of 188 patients were transplanted between 8/16/19 and 3/25/20, 10 multi-organ recipients were excluded. Baseline demographics were similar between groups. **Only 3% (3/91) of patients with early stent removal (<30 days) experienced a UTIs prior versus 11% (10/86) in the late group (p=0.044).** These early UTIs required readmission in 6% (5/86) patients in the late group versus 1% (1/91) in the early group (p=0.198). There was no difference in urologic complications between early and late stent removal.
Conclusions: Early stent removal decreases UTIs and UTI related readmissions without increasing the rate of urologic complications

Table 1A: Baseline Patient and Transplant Demographics

	Early (n=91)	Late (n=86)	p-value
Pre-transplant on dialysis	71% (65)	82% (71)	0.11
Living donor	21% (19)	10% (9)	0.07
First week dialysis	26% (24)	27% (23)	0.545
Previous transplant	8% (7)	9% (8)	0.79
Female	48% (44)	58% (50)	0.45
Age (average±SD)	50±12	51±15	0.91

Table 1B: Outcomes

	Early (n=91)	Late (n=86)	p-value
Urologic complications	7% (6)	6% (5)	1.00
Stricture	5% (5)	3% (3)	0.72
Urine Leak	0% (0)	0% (0)	1.00
Takeback to the OR < 90 days	5% (5)	12% (10)	0.18
Takeback to OR >90 days	2% (2)	1% (1)	1.00
Takeback to OR for Urological issue	2% (2)	2% (2)	1.00
CT Guided Drain of Fluid Collection	9% (8)	2% (2)	0.10

CITATION INFORMATION: Rohan V., Pilch N., Altiti M., Nadig S., Lin A., DuBay D., Baliga P. Early Stent Removal in Kidney Transplant Recipients - A Quality Improvement Project *AJT, Volume 21 Supplement 3*
DISCLOSURES: V. Rohan: None. **N. Pilch:** None. **M. Altiti:** None. **S. Nadig:** None. **A. Lin:** None. **D. DuBay:** None. **P. Baliga:** None.

Basic

B cell/Antibody and Histocompatibility

Abstract# 209

The Role of Notch2 in Antibody-mediated Alloimmune Response

R. Benedetti Gassen[1], N. Murakami[2], T. J Borges[1], A. Al Jurdi[1], A. Alessandrini[1], L. V Riella[1], *[1]Center of Transplantation Science, Massachusetts General Hospital, Boston, MA, [2]Brigham and Women's Hospital, Boston, MA*

Purpose: Antibody mediated rejection is the leading cause of chronic allograft rejection. Developing a novel therapeutic target to inhibit chronic rejection is an urgent need in the transplant field. Marginal zone (MZ) B cells are a B cell subset that play important roles in the immune response by the rapid generation of antibodies against blood borne pathogens but its roles in allograft humoral response is not fully

understood. Notch2 is a transmembrane receptor crucial for MZ B cell development. We hypothesized that anti-Notch2 treatment attenuates alloantibody response and increase graft survival through the modulation of MZ B cells and T follicular cells.
Methods: To investigate this hypothesis, we used a combination of models including: NP-OVA immunization in B6 mice, a BALB/c into B6 mice heart transplant model, and a sensitized skin transplant model. 5mg/kg of anti-Notch2 antibody or control IgG were administered i.p. every 2 days.
Results: In the NP-OVA immunization model, Notch2 blockade quickly depleted MZ B cells while increasing follicular regulatory T cells (Tfr), leading to a significant reduction in the generation of anti-NP IgG antibodies (Fig. 1 A, B). In a full MHC-mismatched cardiac transplant model, anti-Notch2 treatment was able to mitigate rejection and prolong graft survival (Fig 1. C, D), while decreasing allo-specific antibody production. Lastly, Notch2 blockade successfully impaired the recall of the humoral response after skin transplant in sensitized mice (Fig. 1 E, F).
Conclusions: Notch2 blockade is a promising approach to reduce alloantibody responses by inhibiting MZ B cells and expanding Tfr cells. Further elucidating the role of the Notch2 blockade in the prevention of antibody-mediated rejection will be a first step in the development of novel therapeutic strategies to more selectively target B cells and inhibit chronic antibody-mediated rejection.

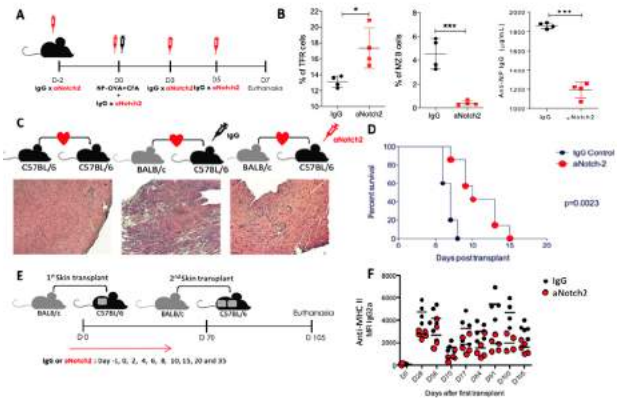


Figure 1. Anti-Notch2 treatment reduce MZ B cells numbers, antigen-specific antibody production and increase graft survival.

CITATION INFORMATION: Benedetti Gassen R., Murakami N., J Borges T., Al Jurdi A., Alessandrini A., V Riella L. The Role of Notch2 in Antibody-mediated Alloimmune Response *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Benedetti Gassen: None. **N. Murakami:** None. **T. J Borges:** None. **A. Al Jurdi:** None. **A. Alessandrini:** None. **L. V Riella:** None.

Abstract# 210

Marginal Zone B Cells Support Donor-Specific Alloantibody Responses to Heart Allografts

V. Gorbacheva, R. Fan, W. Baldwin, R. Fairchild, A. Valujskikh, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

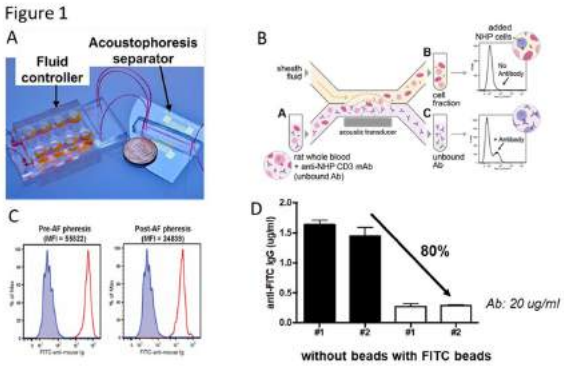
Purpose: Production of high affinity isotype-switched donor specific alloantibodies (DSA) after transplantation is associated with germinal center formation by follicular (FO) B cells whereas the contribution of marginal zone (MZ) B cells is poorly understood. The goal of our study was to test the role of MZ B cells during alloimmune responses.
Methods: To evaluate MZ B cell responses after transplantation, B6.Blimp-1 (H-2^b) reporter mice were transplanted with BALB/c (H-2^d) heart allografts. To test MZ B cells contribution to DSA production we treated B6.WT recipients of BALB/c heart allografts with anti-mCD20 18B12 IgG1 mAb that depletes >95% splenic FO but only 40-60% MZ B cells. Serum levels of class I and class II-reactive IgG and IgM DSA were determined by ELISA. We used S1PR1 signaling inhibitor FTY720 to prevent MZ B cells from returning to MZ area. To specifically test the role of MZ B cells in DSA production we used $CD19^{Cre}Notch2^{fl/fl}$ mice (ΔMZB) with defective development of MZ B cells as heart allograft recipients. In addition, sera collected fromΔMZB recipients and littermate controls on d.14 posttransplant was transferred to $RAG1^{-/-}$ recipients of BALB/c heart allograft
Results: $Blimp1^{+}$ MZ B cells in recipient spleen peaked at d. 7 and declined by d. 14 posttransplant, suggesting their differentiation into early antibody secreting cells. Preferential FO B cell depletion reduced serum IgG DSA levels only at later time points (d. 14 and d. 21), indicating that early IgG DSA are produced by residual MZ B cells. CD4 T cells depletion prior to transplantation showed that these early MZ B cell responses were critically dependent on T cell help. Treatment of heart allograft recipients with FTY720 displaced MZ B cells from spleen MZ area and markedly impaired both class I and class II DSA generation. IgG and IgM DSA generation in ΔMZB recipients was significantly impaired compared to control littermates, even though the priming of donor-reactive IFNγ producing T cells was similar between groups. Transfer of littermate but not ΔMZB sera collected on d.14 posttransplant to $RAG1^{-/-}$ BALB/c heart allograft recipients induced C4d complement deposition, indicating that MZ B cells are required to generate high levels of complement-activating DSA.
Conclusions: Our findings are the first demonstration for the role of MZ B cells in humoral alloimmune responses following solid organ transplantation and identify MZ B cells as a potential therapeutic target for minimizing *de novo* DSA production and antibody-mediated rejection in transplant recipients.
CITATION INFORMATION: Gorbacheva V., Fan R., Baldwin W., Fairchild R., Valujskikh A. Marginal Zone B Cells Support Donor-Specific Alloantibody Responses to Heart Allografts *AJT, Volume 21 Supplement 3*
DISCLOSURES: V. Gorbacheva: None. **R. Fan:** None. **W. Baldwin:** None. **R. Fairchild:** None. **A. Valujskikh:** None.

Abstract# 211

Acoustofluidic Device to Remove Donor Specific Antibody in a Sensitized Animal Model

J. Kwun[1], E. David[2], Y. Gu[3], Z. Ma[3], M. Kuchibhatla[4], G. Arepally[5], T. J. Huang[3], E. T. Chambers[2], *[1]Surgery, Duke University, Durham, NC, [2]Pediatrics, Duke University, Durham, NC, [3]Biomedical Engineering, Duke University, Durham, NC, [4]Biostatistics and Bioinformatics, Duke University, Durham, NC, [5]Internal Medicine, Duke University, Durham, NC*

Purpose: Current therapies for antibody-mediated rejection are neither donor-specific nor are they tailored toward children, resulting in premature allograft loss and increased mortality. Apheresis involves a large machine for antibody removal that has been developed for adults, but its use in children is associated with hypotension, exposure to allergenic filters, and the need for blood transfusions with increasing sensitization risk. To overcome this limitation, we aim to develop a scalable device using acoustic sound waves and incorporation of donor antigen beads for the targeted removal of donor-specific antibody (DSA) in a rodent model with intended translation into children.
Methods: A 4 mm (length) x 0.075 mm (height) x 1 mm (width) acrylic, acoustofluidic (AF) device (Fig 1A) was used to separate unbound anti-rhesus CD3 antibody (Ab) from rat whole blood and DSA from a sensitized mouse at a blood flow rate of 10-20 ul/min, frequency of 19.9 MHz and voltage of 30. Antigen-coated beads were made by affixing FITC to poly-lysine coated carboxylated polystyrene microparticles (10 um) which were added to the AF device with rat plasma containing anti-mouse FITC IgG.
Results: Unbound anti-rhesus CD3 mAb is efficiently removed from rat whole blood using the AF device (Fig 1B). Moreover, DSA (red peak) is reduced by 50% (Fig 1C) after a single AF apheresis treatment in a sensitized mouse model. Additionally, the addition of antigen-coated beads to the AF device is associated with 80% reduction of mouse anti-FITC IgG from rat plasma (Fig 1D).
Conclusions: AF apheresis device using sound waves effectively separates antibody from other cellular components in small extracorporeal volumes (<10 ml) of whole blood and in a sensitized rodent model. Incorporation of antigen coated-beads allows the clearance of antibodies specific for the antigen from plasma through AF apheresis. This AF technology shows promise and can be scalable to large animals and small children.



CITATION INFORMATION: Kwun J., David E., Gu Y., Ma Z., Kuchibhatla M., Arepally G., Huang T., Chambers E. Acoustofluidic Device to Remove Donor Specific Antibody in a Sensitized Animal Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Kwun: None. **E. David:** None. **Y. Gu:** None. **Z. Ma:** None. **M. Kuchibhatla:** None. **G. Arepally:** None. **T.J. Huang:** None. **E.T. Chambers:** None.

BASIC

Abstract# 212

Cd4 T Cells Can Trigger Nk-dependent Chronic Rejection Independent of Antibodies

R. G. Gill[1], B. Mehrad[2], C. M. Lin[2], *[1]Surgery, University of Colorado Denver, Aurora, CO, [2]Medicine, University of Florida, Gainesville, FL*

Purpose: In transplantation, recipient CD4+ T cells have two potential means of MHC class II-restricted donor antigen detection: (1) the direct recognition of allogeneic MHC class II expressed by donor antigen-presenting cells (APCs) and (2) the indirect recognition of donor antigens processed and presented by recipient APCs. Importantly, indirect CD4 T cells are essential helper cells for generating aa donor-specific antibody (DSA) response. DSA in turn can contribute to chronic graft injury. A clear role of direct CD4+ T cells as effector cells has been shown in acute rejection, however, the role of indirect CD4+ T cells in chronic rejection is less clear. The function of NK cells in solid organ transplantation is multifaceted, but they have been implicated in several different animal models of chronic rejection. Our study sought to test the hypothesis that indirect CD4 T cells can contribute to NK-dependent allograft vasculopathy (CAV) even in the absence of DSA.

Methods: We utilized a reductionist mouse model of cardiac transplantation with C57Bl/6 (B6) MHC class II-deficient (C2D) (H-2^b) hearts engrafted into immune-deficient BALB/c *rag1*$^{-/-}$ (H-2^d) recipients (because CD4 T cell cannot acutely reject heart allografts without donor MHC II expression) . Recipients had no functional adaptive immunity but an intact innate immune system. After transplantation, the recipients received purified polyclonal BALB/c CD4+ T cells with or without concurrent administration of an NK cell depleting antibody (anti-Asialo GM1). Donor CAV determined by morphometric analysis of vascular occlusion and cellular recipient spleen composition were subsequently 30 days post CD4 T cell transfer.

Results: Purified B6 CD4 T cells failed to acutely reject MHC class II-deficient heart allografts in BALB*rag1*$^{-/-}$ recipients. Only 1/9 (11%) of allografts from un-reconstituted recipients developed any evidence of CAV while 5/7 (72%) of allografts from recipients receiving purified CD4+ T cels showed significant disease (p less than 0.05). Administration of anti-Asialo GM1 led to near complete elimination of host splenic NK cells and this depletion of NK cells was found to abrogate the development of CAV triggered by CD4+ T cells in 4/4 recipients.

Conclusions: Indirect CD4 T cells are clearly linked to the generation of DSA. Results indicate that such CD4+ T cell reactivity can contribute to NK cell-dependent CAV, even in the absence of CD8+ T cell and B cell responses. As such, this represents an alternate form of CAV that can be antibody independent.

CITATION INFORMATION: Gill R., Mehrad B., Lin C. Cd4 T Cells Can Trigger Nk-dependent Chronic Rejection Independent of Antibodies *AJT, Volume 21 Supplement 3*

DISCLOSURES: R.G. Gill: None. **B. Mehrad:** None. **C.M. Lin:** None.

Abstract# 213

Blood Type A2/a2b to B Renal Transplantation: A Single Center Retrospective Cohort Study

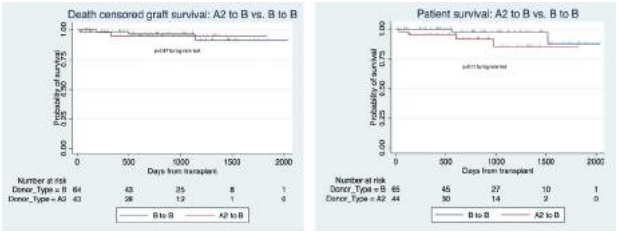
V. S. Tatapudi, N. Alnazari, R. Chand, N. M. Ali, B. E. Lonze, R. A. Montgomery, *NYU Langone Transplant Institute, NYU Langone Health, New York, NY*

Purpose: Blood type B candidates on the deceased donor kidney waitlist have a lower transplantation rate and longer wait time than candidates of other blood types. The new national kidney allocation system (KAS), implemented in December 2014, prioritizes the allocation of kidneys from blood type A2 and A2B deceased donors to blood type B candidates to mitigate this disparity in access to transplantation. We analyzed our center's data to determine whether blood type A2/A2B to B transplantation is clinically feasible without the need for additional immunosuppression.

Methods: We conducted a single-center retrospective cohort study to analyze the utilization and outcomes in A2/A2B to B deceased donor renal transplants. Data on adult, kidney-only recipients were extracted with custom reports from the United Network for Organ transplantation (UNOS) portal. We used multivariable Cox-proportional hazards models to compare graft and patient survival in blood type A2/A2B to B deceased donor renal transplants to survival in blood type B to B transplants. We estimated Kaplan-Meier (KM) graft and patient survival functions.

Results: Since 2015, our center has performed 44 A2/A2B to B and 65 B to B kidney transplants. We followed the patients for a median of 712 days (IQR 343-1143). Recipients of A2/A2B to B and B to B kidney transplants were similar with respect to age, gender, estimated post-transplant survival (EPTS), calculated panel reactive antibody (CPRA), HLA ABDR mismatch, kidney donor profile index (KDPI), and the incidence of delayed graft function (DGF). A higher percentage of A2/A2B to B transplant recipients were Black/African American (22/44, 50%) than B to B transplant recipients (14/65, 21.5%). Blood type A2/A2B to B and B to B transplant recipients had similar 1-year graft (97.7% vs. 93.8%, p=0.34) and 1-year patient survival (97.7% vs. 98.5%, p=0.78) rates. Multivariable models adjusted for race/ethnicity showed that death censored graft survival (adjusted HR=1.45, p=0.70, 95% CI=0.21 to 9.82) and patient survival (4.22, p=0.14, 95% CI=0.64 to 27.92) in A2/A2B to B transplant recipients were similar to the traditionally ABO blood type compatible B to B transplants.

Conclusions: The NYU Langone blood type A2/A2B to B transplantation adds to the body of evidence suggesting that blood type A2/A2B to B transplantation is clinically feasible. This provision of the KAS appears to be having its intended effect of increasing access to transplantation in blood type B candidates with no attendant compromise in overall patient or death censored graft survival.



CITATION INFORMATION: Tatapudi V., Alnazari N., Chand R., Ali N., Lonze B., Montgomery R. Blood Type A2/a2b to B Renal Transplantation: A Single Center Retrospective Cohort Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: V.S. Tatapudi: None. **N. Alnazari:** None. **R. Chand:** None. **N.M. Ali:** None. **B.E. Lonze:** None. **R.A. Montgomery:** Consulting Fee; Name of Commercial Interest; Viela Bio/CTI, CSL Behring, Regeneron, Takeda, RMEI, eGenesis. Consulting Fee; Nature of Relationship; Advisory board. Grant/Research Support; Name of Commercial Interest; HANSA Biopharma. Grant/Research Support; Nature of Relationship; Research funding.

Abstract# 214

Low Immunogenic Donors Improve Kidney Transplant Survival in Sensitized Recipients

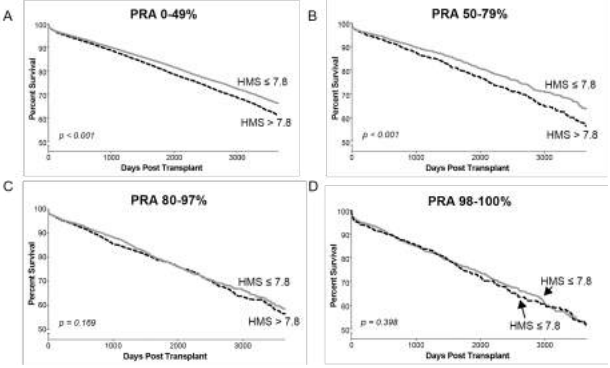
D. Bekbolsynov[1], R. Green[2], B. Mierzejewska[1], M. Rees[1], S. Stepkowski[1], *[1]University of Toledo, Toledo, OH, [2]Bowling Green State University, Bowling Green, OH*

Purpose: Our previous results showed that low immunogenicity (IM) donors improved kidney allograft survival in non-sensitized recipients. Herein, we examined how the level of peak pre-transplant panel reactive antibody (PRA=0-100%) may affect the beneficial impact of low HLA IM.

Methods: The donor/recipient IM was evaluated by the hydrophobic mismatch score (HMS) calculated from the hydrophobic charges of donor/recipient polymorphic amino acids. The 78,865 donor/recipient cohort (SRTR) was converted from 2- to 4-digit HLA-A/B/DR and the HMS calculated by the Cambridge algorithm. The HMS IM on a scale of 0-20 was correlated between four PRA groups (0-49%; 50-79%; 80-94%; and 95-100%) with Kaplan-Meier survival estimates and Cox regression analyses.

Results: Non-sensitized and weakly sensitized (PRA=0-49%) as well as mildly sensitized (PRA=50-79%) recipients showed an improved graft survival at different HMS thresholds, namely HMS=0, HMS≤3.0, and HMS≤7.8. In contrast, highly (PRA=79-97%) and very highly (HMS-98-100%) sensitized recipients had improved graft survivals only at HMS=0 and HMS≤3.0 but not at higher HMS thresholds (Fig. 1). The logistic regression analysis also demonstrated the impact of PRA on IM defined by the HMS thresholds when measured by the incidence of rejection. Lowering HMS threshold also compensated the impact of higher PRA values based on the number of early acute rejection episodes (Table 1). This HMS threshold had significant impact on graft survival at PRA 0-49% (p<0.001), while it became less significant at PRA 50-97% (p<0.05) and became non-significant at PRA 98-100% (p=NS).

Conclusions: Low IM (confirmed by lower HMS thresholds) significantly improved graft survivals and reduced number of rejection episodes in sensitized patients. Thus, the negative PRA effect on graft outcomes may be improved by adjusting the HMS IM thresholds.



Impact of different PRA levels on incidence of acute rejection			
PRA %	p-value in logistic regressoin		
	HMS≤7.8	HMS≤3.0	HMS=0
0-49	0.0001	0.0001	0.0001
50-79	0.0002	0.0001	0.0001
80-97	NS	0.0020	0.0010
98-100	NS	0.0100	0.0500

CITATION INFORMATION: Bekbolsynov D., Green R., Mierzejewska B., Rees M., Stepkowski S. Low Immunogenic Donors Improve Kidney Transplant Survival in Sensitized Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Bekbolsynov: None. **R. Green:** None. **B. Mierzejewska:** None. **M. Rees:** None. **S. Stepkowski:** None.

Abstract# 215

Association Between HLA Class II and TLR4 Regulates HLA-II Stimulated P-selectin Expression and Monocyte Capture to Endothelial Cells

Y. Jin, J. Nevarez-Mejia, E. F. Reed, *Pathology and Laboratory Medicine, University of California Los Angeles, Los Angeles, CA*

Purpose: Antibody-mediated rejection (AMR) is a major obstacle for long-term allograft survival. Donor specific HLA antibodies (DSA) contribute to the process of AMR by binding to HLA molecules on endothelial cells (EC) and triggering intracellular signal networks leading to EC activation and microvascular inflammation. However, the mechanisms underlying how HLA-II Ab elicit intracellular signals causing activation of vascular EC are poorly understood. Although HLA-II molecules lack signaling motifs and kinase activity in their short cytoplasmic tail, previous studies reported that MHC class II molecules interact with TLR4 to promote immune responses. We therefore postulated that HLA-II associates with TLR4 to transduce signals leading to EC activation, P-selectin expression and monocyte recruitment to EC.
Methods: HLA-II molecule expression on primary human aortic EC was induced using recombinant adenovirus pAd/PL-DEST encoding CIITA (Ad-CIITA) an HLA-II transactivator, or pretreated with TNF-α/IFN-γ. HLA-II expression was measured by flow cytometry. HLA-II:TLR4 complex formation was determined by stimulating EC with F(ab')2 fragments of anti-HLA-II mAb, cell lysates were immunoprecipitated with HLA-II Ab and complex formation was detected by Western Blot. Gene silencing was performed by siRNA transfection. P-selectin expression was detected by cell-based ELISA. Monocyte adhesion to EC measured by fluorescence microscopy and analyzed with CellProfiler.
Results: Infection of EC with Ad-CIITA or pretreatment of EC with TNF-α and IFN-γ induced a marked increase in HLA-II antigen expression. Ligation of HLA II on EC with antibody triggered molecular association between HLA II and TLR4, stimulated phosphorylation of key signal molecules in the TLR4 pathway including JNK, P38, ERK, and NF-kB. Knockdown of TLR4 or MyD88 with siRNA in EC, but not TRIF siRNA, abrogated the ability of HLA-II to stimulate phosphorylation of these kinases, P-selectin expression and monocyte recruitment.
Conclusions: These results indicate a mutual dependency between HLA II and TLR4 to stimulate EC P-selectin expression and monocyte recruitment, which may be important in promoting AMR and transplant vasculopathy. Our results provide a novel mechanism for HLA-II Ab-mediated alterations in EC and suggest that disrupting HLA II: TLR4 interactions may be required to achieve optimal efficacy in controlling HLA II Ab-mediated AMR.

CITATION INFORMATION: Jin Y., Nevarez-Mejia J., Reed E. Association Between HLA Class II and TLR4 Regulates HLA-II Stimulated P-selectin Expression and Monocyte Capture to Endothelial Cells *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Jin: None. **J. Nevarez-Mejia:** None. **E.F. Reed:** None.

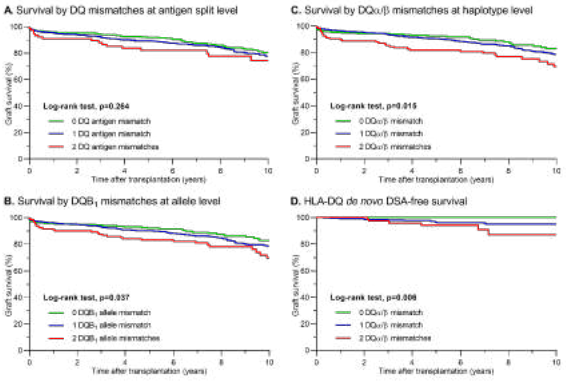
Abstract# 216

Risk Stratification of Kidney Transplant Patients According to the Different Level of HLA-DQ Disparities

A. Senev[1], A. R. Tambur[2], M. Naesens[1], *[1]Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium, [2]Northwestern University, Chicago, IL*

Purpose: It is becoming clear that de novo donor-specific antibodies (*dn*DSA) against HLA-DQ are the most prevalent and the leading cause of chronic antibody-mediated rejection and poor allograft outcome after kidney transplantation. A well-known problem with the most HLA matching approaches is that they don't include systematic genotyping of HLA-DQ locus. Herein we evaluate the role of HLA-DQ matching at antigen, allele and haplotype levels to minimize the generation of HLA-DQ-*dn*DSA and improve graft outcome in kidney transplantation.
Methods: All adult patients who underwent kidney transplantation between 2004 and 2013 at a single center, with available DNA samples were included in this study (N=926). Each transplant pair was retrospectively genotyped at the 2nd field HLA level for HLA-DQA_1 and HLA-DQB_1.
Results: The mean follow-up time of this kidney transplant cohort was 7.62 ± 3.78 years. 152 patients (16.4%) experienced graft failure during this period. HLA-DQ *dn*DSA occurred in 23 of 889 patients with antibody follow-up data within the first ten years. **Figure 1** depicts the 10-year graft survival Kaplan-Meier curves according to the different levels of HLA-DQ MM. The 10-year survival rates were not statistically different between the groups with 0, 1 and 2 DQ antigen MM (80.4%, 77.7% and 74.3% respectively, p=0.27). In contrast, the different degrees of allele mismatches for the DQB_1 locus provided better risk stratification of the patients (82.8% with 0 DQB_1 MM, 78.6% with 1 DQB_1 MM and 70.0% with 2 DQB_1 MM, p=0.04). Next, we calculated the mismatches in the DQα/β pairs by considering DQA_1 at the 1st and DQB_1 at the 2nd field HLA genotyping level. The Kaplan-Meier curves showed that primarily the degree of mismatches for DQα/β haplotypes associated with the risk of graft failure after kidney transplantation (83.0% with 0 DQα/β MM, 78.7% with 1 DQα/β MM and 69.4% with 2 DQα/β MM, p=0.02). Finally, the patients with both matched DQα/β haplotypes had 100% DQ dnDSA-free survival compared to the decreased DQ *dn*DSA-free survival in patients with one (95.1%) or both (87.1%) mismatched DQα/β haplotypes (p=0.006).
Conclusions: By comparing the HLA-DQ mismatches at antigen, allele and haplotype levels, we found that DQα/β haplotype mismatch analysis provides the best risk stratification of the kidney transplant patients. These findings indicate that adding DQα/β haplotype matching to the current antigen HLA-A, -B, or -DR matching algorithm will decrease *de novo* formation of HLA-DQ antibodies and improve graft survival after kidney transplantation.

Figure 1. Kaplan-Meier estimates of 10-year kidney graft outcome according to the different levels of HLA-DQ mismatches.



CITATION INFORMATION: Senev A., R. Tambur A., Naesens M. Risk Stratification of Kidney Transplant Patients According to the Different Level of HLA-DQ Disparities *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Senev: None. **A. R. Tambur:** None. **M. Naesens:** None.

Basic

Biomarkers, Immune Assessment and Clinical Outcomes - III

Abstract# 217

Use of a Novel Bead-based Assay to Measure the Impact of Imlifidase on ABO IgG Antibodies

A. Halpin[1], B. Motyka[2], T. Ellis[2], J. Pearcey[2], T. L. Lowary[3], A. Runström[4], L. Winstedt[4], R. Bockermann[4], S. Järnum[4], A. Robertson[4], L. J. West[5], *[1]Department of Pediatrics and Laboratory Medicine and Pathology, University of Alberta and Alberta Precision Laboratories, Edmonton, AB, Canada, [2]Department of Pediatrics, University of Alberta, Edmonton, AB, Canada, [3]Department of Chemistry, University of Alberta, Edmonton, AB, Canada, [4]Hansa Biopharma, Lund, Sweden, [5]Department of Pediatrics and Laboratory Medicine and Pathology, University of Alberta, Edmonton, AB, Canada*

Purpose: The accurate assessment and measurement of ABO antibodies (ABO-Ab) is a critical component of ABO-incompatible (ABOi) transplantation. ABO-Ab comprise both IgG and IgM, which are not readily distinguished by current hemagglutination (HA) methods and may not respond equally to Ab removal strategies. Imlifidase cleaves IgG, which prevents Fc-mediated effector functions. The majority of HA assays used clinically are not suitable for measuring the impact of imlifidase treatment since most are not Fc-specific and may include antibody-based reagents that can be cleaved by remaining imlifidase in the sample. Our aim was to assess the impact of imlifidase treatment using our novel bead-based assay to measure IgG and IgM ABO-Ab.

BASIC

Methods: Using Luminex single antigen beads, subtype-specific IgG and IgM ABO-Ab, expressed in mean fluorescence intensity (MFI), were measured in adult controls (n=75). ABO-Ab were compared before and after imlifidase treatment in healthy adult sera treated *in vitro* with imlifidase (n=8) and in sera from healthy volunteers treated with imlifidase, 0.25 mg/kg (18-HMedIdeS-15, n=11).
Results: IgG and IgM ABO-Ab quantities vary widely in healthy individuals and include high MFI ABO-Ab (Fig 1A). *In-vitro* and *in-vivo* treatment with imlifidase effectively reduced MFI signal for IgG ABO-Ab (Fig 1B, 1C). IgM ABO-Ab MFI signal was unaffected.
Conclusions: This novel bead-based assay enables measurement of both IgM and IgG ABO-Ab and facilitates evaluation of the role of isotypes in ABOi transplantation. ABO-Ab isotype differentiation may be particularly relevant in the context of plasmapheresis, commonly used in ABOi transplant, which more efficiently removes IgM Ab than IgG. HA has limitations in monitoring the effectiveness of imlifidase treatment but this bead-based antibody assessment adequately measures the effect of imlifidase and may provide a tool to clarify if there is a role for imlifidase in ABOi transplantation in individuals with high levels of ABO IgG Ab. Future studies will explore the use of a C1q-binding ABO assay to detect possible interference of single-cleaved IgG.

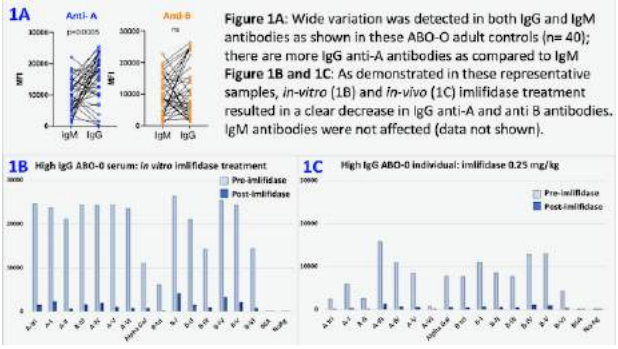


Figure 1A: Wide variation was detected in both IgG and IgM antibodies as shown in these ABO-O adult controls (n= 40); there are more IgG anti-A antibodies as compared to IgM
Figure 1B and 1C: As demonstrated in these representative samples, *in-vitro* (1B) and *in-vivo* (1C) imlifidase treatment resulted in a clear decrease in IgG anti-A and anti B antibodies. IgM antibodies were not affected (data not shown).

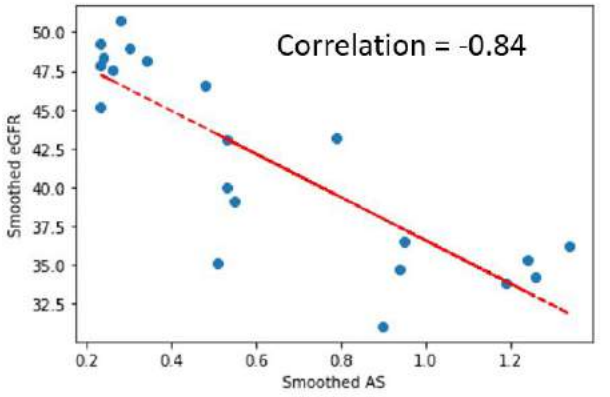
CITATION INFORMATION: Halpin A., Motyka B., Ellis T., Pearcey J., Lowary T., Runström A., Winstedt L., Bockermann R., Järnum S., Robertson A., West L. Use of a Novel Bead-based Assay to Measure the Impact of Imlifidase on ABO IgG Antibodies *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Halpin: None. **B. Motyka:** None. **T. Ellis:** None. **J. Pearcey:** None. **T.L. Lowary:** None. **A. Runström:** Ownership Interest; Name of Commercial Interest; Holder of shares or share warrants in Hansa Biopharma. Salary; Name of Commercial Interest; Employed by Hansa Biopharma. **L. Winstedt:** Ownership Interest; Name of Commercial Interest; Holder of shares or share warrants in Hansa Biopharma. Salary; Name of Commercial Interest; Employed by Hansa Biopharma. **R. Bockermann:** Ownership Interest; Name of Commercial Interest; Holder of shares or share warrants in Hansa Biopharma. Salary; Name of Commercial Interest; Employed by Hansa Biopharma. **S. Järnum:** Ownership Interest; Name of Commercial Interest; Holder of shares or share warrants in Hansa Biopharma. Salary; Name of Commercial Interest; Employed by Hansa Biopharma. **A. Robertson:** Ownership Interest; Name of Commercial Interest; Holder of shares or share warrants in Hansa Biopharma. Salary; Name of Commercial Interest; Employed by Hansa Biopharma. **L.J. West:** None.

Abstract# 218

High Levels of Donor-Derived Cell-Free DNA Predict EGFR Decline After Kidney Transplantation

T. Alhamad[1], V. Bowers[2], E. Stites[3], S. Anand[4], J. S. Bromberg[5], H. Murad[1], G. Gupta[6], I. Moinuddin[6], L. Bu[7], S. Ghosh[8], J. Zeng[8], A. Pai[9], *[1]Washington University in St. Louis, St. Louis, MO, [2]Tampa General Hospital, Tampa, FL, [3]University of Colorado, Aurora, CO, [4]Intermountain Medical Center, Murray, UT, [5]University of Maryland School of Medicine, Baltimore, MD, [6]Virginia Commonwealth University, Richmond, VA, [7]University of Minnesota, Minneapolis, MN, [8]CareDx, Brisbane, CA, [9]University of Texas McGovern Medical School, Houston, TX*
Purpose: Persistent, low-grade inflammation is associated with decline in eGFR. Cross-sectional studies have demonstrated a consistent association between circulating inflammatory markers and kidney function. Our objective was to assess whether donor-derived cell-free DNA (dd-cfDNA) as a marker of injury and inflammation is independently associated with longitudinal kidney transplant (KT) function decline.
Methods: 1092 patients (2873 visits) were examined from the Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219). Patients had dd-cfDNA (AlloSure®; CareDx, Inc.) during post-KT surveillance. Clinical events and Quant- BK PCR were monitored. High dd-cfDNA was defined as >0.5% based on analysis in ADMIRAL. K-means Clustering - an unsupervised machine learning algorithm was used to partition patients into similar clusters using key features such as race, gender, age at transplant, BK, dd-cfDNA, DSA and creatinine; reducing cohort to 219 patients. Intra-cluster noise reduction applied to only include patients with Δdd-cfDNA >60%. Each patient time-line weighted moving average (WMA) was applied to smooth eGFR and dd-cfDNA estimates.
Results: K-means yielded 4 distinct clusters representing mean time post-KT of 4 months, 1, 3 and 10 years; frequency of patient visits ranged from 2-14. Over 1st year post-KT, there was a slight negative correlation for dd-cfDNA and eGFR (R:-0.11); however, there was a more significant decline over the initial 3-years (R:-0.84) (**FIGURE 1**). The 10-year cluster included a single patient, but manifested identical trend (R :-0.69).

FIGURE 1 – eGFR decline over the initial 3-yrs post-KT



Conclusions: Although allograft dysfunction remains multifactorial, a high dd-cfDNA (>0.5%) level is associated with eGFR decline over the initial 3-years post-KT. Persistently elevated dd-cfDNA, a marker of injury and molecular inflammation, may indicate an increased risk of eGFR decline, thereby extending its utility beyond mere detection of acute clinical events. Therefore, dd-cfDNA surveillance after KT may add value to risk-stratify patients when considering long term outcomes and adjunctive therapies.
CITATION INFORMATION: Alhamad T., Bowers V., Stites E., Anand S., Bromberg J., Murad H., Gupta G., Moinuddin I., Bu L., Ghosh S., Zeng J., Pai A. High Levels of Donor-Derived Cell-Free DNA Predict EGFR Decline After Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Alhamad: ; CareDx (consultant/advisory board, speaker's bureau). **V. Bowers:** None. **E. Stites:** Honoraria; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; CareDx (advisory board). **S. Anand:** Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Alexion (speaker). **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. **H. Murad:** None. **G. Gupta:** Grant/Research Support; Name of Commercial Interest; Gilead. Honoraria; Name of Commercial Interest; CareDx, Alexion, Mallinckrodt, Thermo Fisher. Other; Name of Commercial Interest; Alexion (advisory board), Bristol Myers Squibb (advisory board), CareDx (advisory board), Veloxis (advisory board). **I. Moinuddin:** Other; Name of Commercial Interest; CareDx (advisory board). **L. Bu:** None. **S. Ghosh:** Salary; Name of Commercial Interest; CareDx. **J. Zeng:** Salary; Name of Commercial Interest; CareDx. **A. Pai:** None.

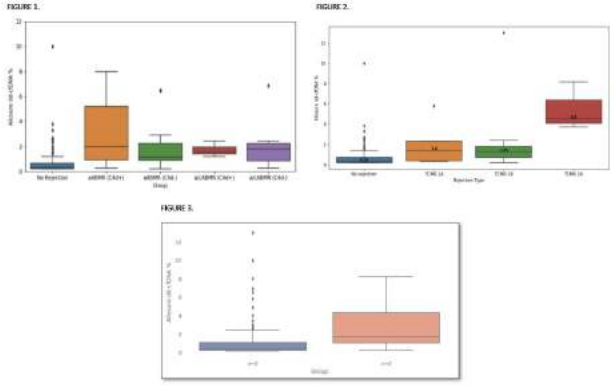
Abstract# 219

Assessment of Donor-Derived Cell-Free DNA Performance Characteristics Across the Spectrum of TCMR and ABMR After Kidney Transplant

L. Bu[1], S. Anand[2], A. Pai[3], J. S. Bromberg[4], T. Alhamad[5], V. Bowers[6], I. Moinuddin[7], S. Ghosh[8], W. Tian[8], E. Stites[9], G. Gupta[7], *[1]University of Minnesota, Minneapolis, MN, [2]Intermountain Medical Center, Murray, UT, [3]University of Texas McGovern Medical School, Houston, TX, [4]University of Maryland School of Medicine, Baltimore, MD, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]Virginia Commonwealth University, Richmond, VA, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*
Purpose: Different donor-derived cell-free DNA (dd-cfDNA) thresholds have been reported in association with varying TCMR, ABMR and "Borderline" diagnoses. Interpretation of dd-cfDNA levels spanning active (aABMR) and active-chronic (a/cABMR) is further complicated by presence *or* absence of C4d staining. We hypothesized that dd-cfDNA levels would complement the pathologic diagnoses.
Methods: Patients from the Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219) were analyzed with a total of 219 biopsies (Bx), centrally

interpreted with Banff Categorical and lesion scores, with paired plasma dd-cfDNA (AlloSure®; CareDx) from 196 patients (110 "for cause", 109 "surveillance"). Samples were considered if Bx performed ≤ 20 days after dd-cfDNA level.

Results: In analyzing ABMR [FIGURE 1], all aABMR and a/cABMR were associated with significant elevation in dd-cfDNA levels compared to Normal Bx (N=111) median dd-cfDNA level of 0.29% ─ aABMR (C4d+) median: 2.0% (N=12; P=4.9e-05), a/cABMR (C4d+): 1.15% (N=16; P=3.3e-05), aABMR (C4d-): 1.6% (N=8; P=3.2e-04), a/cABMR (C4d-): 1.8% (N=11; P=3.3e-04). No dd-cfDNA difference was observed between C4d+ and C4d- ABMR. No difference in dd-cfDNA levels was observed between ABMR with or without transplant glomerulopathy. For TCMR [FIGURE 2], dd-cfDNA levels were significantly elevated, compared to Normal Bx, for Grade 1A: 1.4% (N=5; P=0.04), 1B: 1.25% (N=8; P=0.01) and 2A: 4.5% (N=3; P=0.003). Intimal arteritis (v) [FIGURE 3] was independently associated with elevated dd-cfDNA levels for v(0) median dd-cfDNA: 0.385% (N=240) and v(>0): 1.7% (P=0.0007).



Conclusions: dd-cfDNA levels were elevated across the spectrum of active and active-chronic ABMR, regardless of C4d status. Although a rather small 'N' for active TCMR cohorts by Grade, there were statistically elevated dd-cfDNA levels and 'trend' for correlation for Grade 2A however no difference observed between Grades 1A and 1B. Elevation in dd-cfDNA levels reflected vascular injury in the context of *Intimal arteritis* (v) lesions.

CITATION INFORMATION: Bu L., Anand S., Pai A., Bromberg J., Alhamad T., Bowers V., Moinuddin I., Ghosh S., Tian W., Stites E., Gupta G. Assessment of Donor-Derived Cell-Free DNA Performance Characteristics Across the Spectrum of TCMR and ABMR After Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Bu: Consulting Fee; Name of Commercial Interest; CareDx. **S. Anand:** Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Alexion (speaker). **A. Pai:** None. **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. **T. Alhamad:** Consulting Fee; Name of Commercial Interest; Veloxis (consultant/advisory board, speaker's bureau), Mallinckrodt (consultant/advisory board), CareDx (consultant/advisory board, speaker's bureau), Sanofi (speaker's bureau). Grant/Research Support; Name of Commercial Interest; Mallinckrodt, Angion, Natera, CareDx. **V. Bowers:** None. **I. Moinuddin:** Other; Name of Commercial Interest; CareDx (advisory board). **S. Ghosh:** Salary; Name of Commercial Interest; CareDx (employee). **W. Tian:** Salary; Name of Commercial Interest; CareDx (employee). **E. Stites:** None. **G. Gupta:** Grant/Research Support; Name of Commercial Interest; Gilead. Honoraria; Name of Commercial Interest; CareDx, Alexion, Mallinckrodt, Thermo Fisher. Other; Name of Commercial Interest; Alexion (advisory board), Bristol Myers Squibb (advisory board), CareDx (advisory board), Veloxis (advisory board).

Abstract# 220

Intrarenal B-cell Activating Factor (BAFF) Levels are Increased in Transplant Glomerulopathy

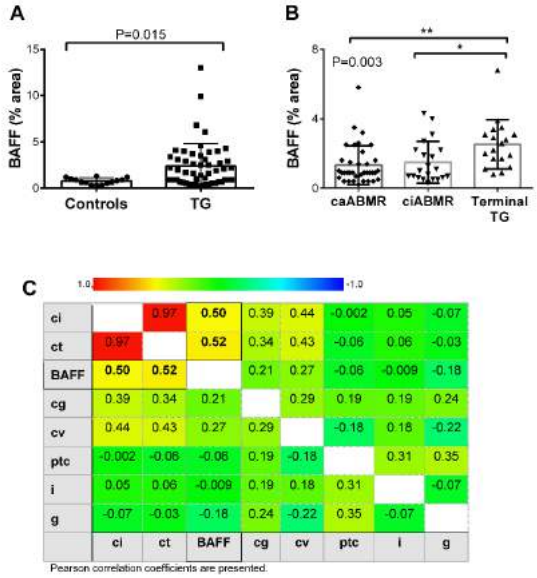
S. Panzer, K. Swanson, G. Pandya, L. Hidalgo, S. Reese, *University of Wisconsin Madison, Madison, WI*

Purpose: Transplant glomerulopathy (TG), a key feature of chronic active antibody-mediated rejection (caABMR), is associated with allograft failure. B-cell activating factor (BAFF) is a cytokine integral to B cell function and survival. In several diseases, such as lupus nephritis, intrarenal BAFF levels correlate with renal disease activity. We hypothesized renal tissue BAFF levels are increased in TG and are associated with allograft failure.

Methods: Kidney transplant recipients that underwent biopsy between 2014-2015 and had a diagnosis of TG (cg score ≥1a) were compared to a group of controls (negative for rejection). The TG cohort was further stratified into 3 subgroups, based on Banff 2019 criteria: caABMR, chronic inactive ABMR (ciABMR), or terminal TG (chronicity score ≥ 8). Tissue BAFF staining was measured by densitometry and reported as percent area. Allograft failure was defined as re-transplant, return to dialysis, or death.

Results: Of the 120 recipients in the study, 82 (68%) had graft failure over a median follow-up of 2.8 years after biopsy. Patients with TG (n=106) versus controls (n=14) had a higher rate of allograft failure (70% vs 32%, P=0.02) and higher intrarenal BAFF levels (2.39 ± 0.34% vs 0.76 ± 0.09%, P=0.015, Figure 1A). At biopsy, the TG group had more proteinuria compared to controls (1.5 ± 1.8 vs 0.2 ± 0.1 g/g, P<0.001), and more DSA, particularly class II DSA (54% vs 16% were positive for class II DSA, P<0.001). There were significant differences in tissue BAFF levels when stratified by TG subgroup: caABMR 1.33 ± 0.33%, ciABMR 1.50 ± 0.33%, and terminal TG 2.53 ± 0.39% (1-way ANOVA P=0.003, Figure 1B). Intrarenal BAFF levels correlated with tubular atrophy (R^2=0.52, P<0.0001) and interstitial fibrosis (R^2=0.50, P<0.0001), but not microvascular inflammation (Figure 1C). On univariate analysis, intrarenal BAFF was not associated with risk of graft failure/death (HR=1.05 (95% CI 0.61-1.79), P=0.8). On multivariate analysis, cg score (aHR 1.44 (95% CI 1.08-1.92), P=0.01), proteinuria (aHR 1.22 (95% CI 1.04-1.43), P=0.01), and serum creatinine at biopsy (aHR 2.18 (95% CI 1.64-2.89), P<0.0001) were associated with graft failure/death.

Conclusions: Tissue BAFF levels are increased in transplant glomerulopathy, but were not associated with allograft failure or death. These findings suggest a role for BAFF in renal injury and TG. As anti-BAFF therapeutics are now clinically available, further studies are needed to evaluate BAFF levels in the circulation and lymphoid tissues in transplant recipients and its impact on B cell populations, DSA, and ABMR.



CITATION INFORMATION: Panzer S., Swanson K., Pandya G., Hidalgo L., Reese S. Intrarenal B-cell Activating Factor (BAFF) Levels are Increased in Transplant Glomerulopathy *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Panzer: None. **K. Swanson:** None. **G. Pandya:** None. **L. Hidalgo:** None. **S. Reese:** None.

Abstract# 221

Utility of Non-Invasive Rejection Biomarkers to Guide Immunomodulation in Kidney Transplant Patients with Active Covid-19 Infection

J. Christensen, G. Gupta, A. Bryson, S. Paluri, R. Thompson, S. Sterling, N. Vissichelli, P. Kimball, D. Kumar, *VCUHealth, Richmond, VA*

Purpose: Treatment of Coronavirus Disease 2019 (COVID-19) infection in organ transplant recipients has involved reduction of immunosuppression (IS). It is plausible that the cytokine release syndrome associated with COVID-19 coupled with reduction in IS may predispose transplant patients to rejection.

Methods: Since March 2020 we initiated a protocol of measuring donor derived cell free DNA (ddcfDNA) (Allosure, CareDx) and HLA DSA at the time of diagnosis of COVID-19 infection (prior to reduction or cessation of antimetabolite). ddcfDNA, HLA DSA and additional clinical markers of allograft function were serially monitored until the point of nasopharyngeal (NP) swab clearance of COVID-19.

Results: Thirty three transplant recipients were included, the majority were kidney only (KT) (31/33; 94%) and the other two were simultaneous liver kidney transplant (SLK) recipients. Most were African American (23/33, 70%) with deceased donor transplants (25/33; 76%) and underwent induction with rabbit anti-thymocyte globulin (31/33, 94%). Baseline IS included mycophenolate in 32/33 (97%) patients. Patients presented with COVID-19 at a median of 57 months (Range: 1-182) post transplant. Antimetabolite was stopped in 20/33 (61%) patients while it was reduced in the others (13/33; 39%). Mean ddcfDNA at diagnosis was 0.45±0.39% in the KT recipients. In the two SLK recipients the values were 4.8% and 6.4% (below the cut off of 10% to detect rejection in liver transplants). Nineteen (58%) patients underwent

repeat ddcfDNA testing at a median follow-up of 20 days (Range 14-127). In these recipients the ddcfDNA did not change from 0.44±0.37% to 0.30±0.36% (p=0.172). At a median NP swab clearance of 41 days (Range: 20-128), the mean eGFR at diagnosis was 57.9±30.5 ml/min/1.73m^2 and remained unchanged at 57.4±29 ml/min/1.73m^2. Three KT recipients had an initial ddcfDNA of greater than 1%, two of these had pre-existing chronic active ABMR. One patient had a value greater than 1%, who then underwent a biopsy for new low grade class II DSA after his NP swab cleared and had early evidence of transplant glomerulopathy without active microvascular inflammation. Twenty-nine patients (88%) did not have any HLA DSA at the time of diagnosis and only one developed de-novo HLA DSA during infection. Four (12%) sensitized patients had pre-formed HLA DSA at the time of diagnosis and during the infection with reduced IS there were no new DSA.

Conclusions: In the setting of active Covid-19 infection, we report the utility of ddcfDNA, a validated biomarker of immunological graft injury as a non-invasive tool to monitor allograft function while allowing for reduction in IS. In the majority of patients, ddcfDNA was low initially and remained low on subsequent testing arguing against allograft injury. In addition despite reduced IS, COVID-19 infection did not stimulate alloimmune responses in the short-term as evidenced by a very low rate of de-novo DSA.

CITATION INFORMATION: Christensen J., Gupta G., Bryson A., Paluri S., Thompson R., Sterling S., Vissichelli N., Kimball P., Kumar D. Utility of Non-Invasive Rejection Biomarkers to Guide Immunomodulation in Kidney Transplant Patients with Active Covid-19 Infection *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Christensen: None. **G. Gupta:** Other; Name of Commercial Interest; CareDx. Other; Nature of Relationship; Advisory Board Member. **A. Bryson:** None. **S. Paluri:** None. **R. Thompson:** None. **S. Sterling:** None. **N. Vissichelli:** None. **P. Kimball:** None. **D. Kumar:** Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; OKRA/KOAR Registries. Other; Name of Commercial Interest; CareDx. Other; Nature of Relationship; Advisory Board Member.

Abstract# 222

The Role of Donor-derived Cell-free DNA to Detect Subclinical Acute Rejection in Kidney Allograft

S. Park[1], K. Guo[2], R. Heilman[3], E. Poggio[4], D. Taber[5], C. Marsh[6], S. Kurian[7], S. Kleiboeker[8], J. Weems[9], J. Holman[10], L. Zhao[2], R. Sinha[8], S. Brietigam[2], C. Rebello[2], M. Abecassis[11], J. Friedewald[1], *[1]Transplant nephrology, Northwestern University, Chicago, IL, [2]Feinberg School of Medicine, Northwestern University, Chicago, IL, [3]Transplant nephrology, Mayo Clinic College of Medicine and Science, Phoenix, AZ, [4]Department of Nephrology and Hypertension, Cleveland Clinic, Cleveland, OH, [5]Division of Transplant Surgery, Medical University of South Carolina, Charleston, SC, [6]Department of Medicine and Surgery, Scripps Clinic and Green Hospital, La Jolla, CA, [7]Scripps Health, La Jolla, CA, [8]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [9]Eurofins US Clinical Diagnostics, Lee's Summit, MO, [10]Transplant Genomics, Inc, Mansfield, MA, [11]University of Arizona College of Medicine, Northwestern University, Tucson, AZ*

Purpose: We hypothesized that donor-derived cell-free DNA (dd-cfDNA) could detect subclinical acute rejection (subAR).

Methods: 429 blood samples paired with surveillance kidney biopsies from 208 patients with stable kidney function were analyzed. We used a commercially available dd-cfDNA assay, which provides a percentage of dd-cfDNA over total cfDNA. More than 0.7% of dd-cfDNA was reported as positive results. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were assessed. 95% confidence interval (CI) was calculated using bootstrapping with 10,000 iterations.

Results: 429 samples consisted of 80.7% (n=346) with Transplant eXcellence (TX, no rejection) and 19.3% (n=83) with subAR. Among 83 subAR, 61.4% (n=51) were borderline, 32.5% (n=27) were antibody-mediated rejection (AMR) and 6% (n=5) Banff 1A rejection. The dd-cfDNA had sensitivity of 41% (95% CI, 0.28-0.54) and specificity of 85% (95% CI, 0.80-0.90). The PPV and NPV were 40% (95% CI, 0.27-0.52) and 86% (95% CI, 0.82-0.90), respectively (Table 1). The median dd-cfDNA in the subAR group (0.43%) was significantly higher than the TX group (0.31%, p<0.001) (Figure 1). The AMR group (2.29%) had significantly higher median than the acute cellular rejection (ACR) group (0.35%, p <0.001) or Tx group (0.31%, p<0.001) (Figure2). The dd-cfDNA was positive among 88.9% (n=24) of 27 AMR samples.

Conclusions: The dd-cfDNA assay was able to detect 88.9% of subclinical AMR cases but was not as discriminatory for subclinical ACR.

Table 1) Dd-cfDNA Performance

N=429	Actual rejection (n=83)	Actual no rejection (n=346)	
Predicted rejection (n=86)	True positive (n=34)	False positive (n=52)	PPV = 0.40 (95% CI, 0.27-0.52) Prevalence-adjusted PPV =0.41 (95% CI, 0.31-0.51)
Predicted no rejection (n=343)	False negative (n=49)	True negative (n=294)	NPV = 0.86 (95% CI, 0.82-0.90) Prevalence-adjusted NPV= 0.85 (95% CI, 0.82-0.88)
	Sensitivity = 0.41 (95% CI, 0.28-0.54)	Specificity = 0.85 (95% CI, 0.80-0.90)	

Figure 1) dd-cfDNA level (%) percentage in the subAR and TX groups

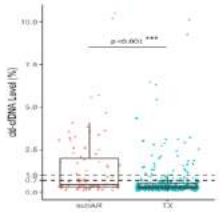
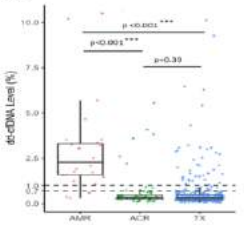


Figure 2) dd-cfDNA level (%) in the AMR, ACR, and TX groups



CITATION INFORMATION: Park S., Guo K., Heilman R., Poggio E., Taber D., Marsh C., Kurian S., Kleiboeker S., Weems J., Holman J., Zhao L., Sinha R., Brietigam S., Rebello C., Abecassis M., Friedewald J. The Role of Donor-derived Cell-free DNA to Detect Subclinical Acute Rejection in Kidney Allograft *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Park: None. **K. Guo:** None. **R. Heilman:** None. **E. Poggio:** Honoraria; Name of Commercial Interest; CareDX. Honoraria; Nature of Relationship; honorarium and served on the Advisory Board. **D. Taber:** Grant/Research Support; Name of Commercial Interest; CareDX, Veloxis, Astellas, Novartis. Grant/Research Support; Nature of Relationship; research grant, research grant, research grant, research grant. Other; Name of Commercial Interest; Sanofi-Aventis. Other; Nature of Relationship; the Advisory Board. **C. Marsh:** None. **S. Kurian:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant. **S. Kleiboeker:** Other; Name of Commercial Interest; Eurofins – Viracor. Other; Nature of Relationship; employed. **J. Weems:** Other; Name of Commercial Interest; Eurofins Transplant Genomics Inc. Other; Nature of Relationship; employed. **J. Holman:** Other; Name of Commercial Interest; Eurofins Transplant Genomics Inc. Other; Nature of Relationship; employed. **L. Zhao:** None. **R. Sinha:** Other; Name of Commercial Interest; Eurofins Transplant Genomics Inc. Other; Nature of Relationship; employed. **S. Brietigam:** None. **C. Rebello:** None. **M. Abecassis:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant. **J. Friedewald:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant.

Abstract# 223

MDR-101-MLK-MERCURY Kidney Transplant Tolerance Study Update

D. Kaufman[1], S. Akkina[2], M. Stegall[3], J. Piper[4], A. O. Gaber[5], E. Marin[6], S. Busque[7], D. Alonso[8], M. De Vera[9], A. Shah[10], A. Patel[11], K. Chavin[12], M. Laftavi[13], S. Collette[14], E. Stites[15], M. Mai[16], M. Cooper[17], D. Brennan[18], *[1]Surgery, UW, Madison, WI, [2]Surgery, Loyola, Chicago, IL, [3]Surgery, Mayo, Rochester, MN, [4]Surgery, Inova, Fairfax, VA, [5]Surgery, Houston Methodist, Houston, TX, [6]Nephrology, Yale, New Haven, CT, [7]Surgery, Stanford, San Francisco, CA, [8]Surgery, Intermountain, Murray, UT, [9]Surgery, Loma Linda, Loma Linda, CA, [10]Surgery, TJU, Philadelphia, PA, [11]Nephrology, St. Barnabas, Livingston, NJ, [12]Surgery, UHH, Cincinnati, OH, [13]Surgery, Upstate, Syracuse, NY, [14]Surgery, CIUSSS, Montreal, ON, Canada, [15]Nephrology, UC Denver, Denver, CO, [16]Nephrology, Mayo - FL, Jacksonville, FL, [17]Surgery, Georgetown, Washington, DC, [18]Medeor, San Francisco, CA*

Purpose: We report interim results of the Phase 3 MERCURY tolerance study, which produces mixed chimerism and ultimately generates operational tolerance allowing for the elimination of all IS therapy. The randomized, multi-center study evaluated the functional immune tolerance in MDR-101 recipients of HLA-matched living donor (LD) kidney transplants as compared to standard of care (SOC) (NCT03363945).

Methods: Eligible adult, donor/recipient (D/R) pairs of a first kidney allograft from an HLA-identical LD were enrolled and randomized 2:1 to either the Investigational Arm (IA; n=20) or Control Arm (CA; n=10). Donors in the IA received G-CSF for 5 days before undergoing apheresis. The donor peripheral CD34+ and CD3+ cells were processed to produce the MDR product. IA recipients were transplanted and then received ATG conditioning (7.5mg/kg total) and total lymphoid irradiation (TLI)

over 10 days, and IS followed by an infusion of MDR-101 on D11. After 180 days of mixed chimerism, IA recipients initiated a 6-month taper of CNI, and were withdrawn from all IS on D365. CA recipients received continuous IS per institutional SOC.
Results: To date, 30 D/R pairs have been enrolled: 20 pairs randomized to the IA and 10 pairs to the CA. MDR-101 infusion was completed in 16 IA recipients. All 16 IA recipients developed chimerism; 10 IA recipients reached the D365 milestone and completed withdrawal of all IS. Five of 10 recipients later lost chimerism but remain off IS with good graft function without evidence of rejection. There have been no events of GvHD, biopsy-proven acute rejection, dnDSA, opportunistic infection or PTLD. There have been no graft losses or deaths in either group. The median eGFR and SCr at D365 in the IA group were 68.22 mL/min and 1.27 mg/dL, and in the CA group were 61.51 mL/min and SCr 1.31 mg/dL, respectively.
Conclusions: Of the 16 recipients in the IA, 10 recipients have reached D365 and were successfully withdrawn from IS without subsequent episodes or evidence of rejection. This is the first-ever multicenter study to induce operational tolerance in kidney transplant recipients. Study follow-up continues through two-years post IS withdrawal.
CITATION INFORMATION: Kaufman D., Akkina S., Stegall M., Piper J., Gaber A., Marin E., Busque S., Alonso D., De Vera M., Shah A., Patel A., Chavin K., Laftavi M., Collette S., Stites E., Mai M., Cooper M., Brennan D. MDR-101-MLK-MERCURY Kidney Transplant Tolerance Study Update *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Kaufman: None. **S. Akkina:** None. **M. Stegall:** None. **J. Piper:** None. **A.O. Gaber:** None. **E. Marin:** None. **S. Busque:** None. **D. Alonso:** None. **M. De Vera:** None. **A. Shah:** None. **A. Patel:** None. **K. Chavin:** None. **M. Laftavi:** None. **S. Collette:** None. **E. Stites:** None. **M. Mai:** None. **M. Cooper:** None. **D. Brennan:** Consulting Fee; Name of Commercial Interest; Medeor. Consulting Fee; Nature of Relationship; Consultant.

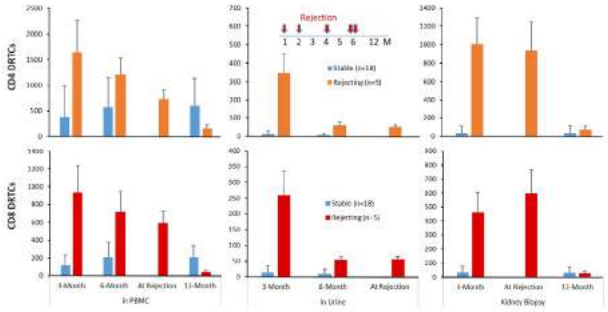
Abstract# 224

Kidney Transplant Rejection Can Be Diagnosed or Even Predicted by Tracking Donor Reactive T Cell Clones in Post-transplant Samples

Y. Sambandam[1], M. Kandpal[1], J. He[1], X. Huang[1], T. S. Taylor[1], A. A. Shetty[2], J. M. Mathew[1], J. R. Leventhal[1], *[1]Surgery-Comprehensive Transplant Center, Northwestern University Feinberg School of Medicine, Chicago, IL, [2]Medicine, Nephrology Division, Northwestern University Feinberg School of Medicine, Chicago, IL*

Purpose: To test if kidney transplant (**KTx**) rejection can be diagnosed by monitoring for donor reactive T-cell (**DRTC**) clones in post-transplant (**post-tx**) biopsy and non-invasively in blood and urine samples.
Methods: From a pre-tx anti-donor MLR assay, the CFSE-diluting CD4 and CD8 DRTCs were flow-sorted and the TcR clonal sequences were identified in them by immunoSEQ® Assay (collectively called **TcR-AlloSEQ**). The assumption was that TcR-AlloSEQ would identify recipient's anti-donor T-cell repertoire. Then, in the post-tx period, the presence and abundance of the pre-identified DRTCs were monitored serially in KTx biopsies (3, 12 months and for-cause), blood and urine (3, 6, 12 months and for-cause), again by immunoSEQ.
Results: This is an interim report on the first 30/80 Standard of Care KTx subjects in a single-center non-randomized prospective study - patients were grouped into stable (**n=18**), rejecting (**n=5**) and other causes (n=7) cases. Clones were identified as donor reactive in both CD4 and CD8 subsets from pre-tx MLRs; the DTRCs were mostly from low-frequency clones in the recipient PBMC. DRTCs of both subsets could be detected variably in all post-tx samples. Stable recipients had low DRTCs and rejecting recipients had significantly ($p<0.002$) elevated DRTCs at months 3 and 6, as well as at rejection, in blood, urine and biopsy (Figure 1). DRTCs increase in each rejecting biopsy suggested that it can be used to diagnose acute rejection. Similar DRTCs increases in blood and urine indicated that rejection diagnosis can also be made non-invasively. Increase in DRTCs observed at 3 months post-Tx predicted biopsy-proven acute rejection that occurred after 3 months in 3/5 patients. Dosage changes of TAC, MMF and prednisone along with the IVIg or belatacept treatment resolved the rejection which also resulted the marked decrease in the presence of DRTCs in the 12-month follow-up samples.
Conclusions: These interim results suggested that monitoring for DRTCs can diagnose an ongoing rejection and can even predict an upcoming rejection and that this can be achieved non-invasively in blood or urine. Completion of the whole study is expected to provide more insights.

Fig.1. Increase in DRTCs diagnoses or even predicts rejection



CITATION INFORMATION: Sambandam Y., Kandpal M., He J., Huang X., Taylor T., Shetty A., Mathew J., Leventhal J. Kidney Transplant Rejection Can Be Diagnosed or Even Predicted by Tracking Donor Reactive T Cell Clones in Post-transplant Samples *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Sambandam: None. **M. Kandpal:** None. **J. He:** None. **X. Huang:** None. **T.S. Taylor:** None. **A.A. Shetty:** None. **J.M. Mathew:** None. **J.R. Leventhal:** None.

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Infectious Disease Poutpouri

Abstract# 225

Molecular Epidemiology of Extended-Spectrum Cephalosporin-Resistant Enterobacterales Bloodstream Infections Among Solid Organ Transplant Recipients

J. A. Anesi[1], E. Lautenbach[1], P. D. Tamma[2], K. A. Thom[3], K. Alby[4], E. A. Blumberg[1], W. Bilker[1], J. Omorogbe[1], P. Tolomeo[1], A. Werzen[3], J. Han[5], *[1]University of Pennsylvania, Philadelphia, PA, [2]Johns Hopkins University, Baltimore, MD, [3]University of Maryland, Baltimore, MD, [4]University of North Carolina, Chapel Hill, NC, [5]GlaxoSmithKline, Rockville, MD*

Purpose: Solid organ transplant recipients (SOTR) have been significantly impacted by the emergence of multidrug-resistant bacteria, including extended-spectrum cephalosporin-resistant (ESC-R) Enterobacterales (EB). We determined the molecular epidemiology of ESC-R EB bloodstream infections (BSI) among SOTR.
Methods: A retrospective cohort study was conducted at the Hospital of the University of Pennsylvania, the University of Maryland Medical Center, and The Johns Hopkins Hospital. All SOTR presenting with an ESC-R EB BSI, defined by ceftriaxone minimum inhibitory concentrations ≥1 µg/mL, between 1/1/2010 and 7/1/2018 were included. Real-time polymerase chain reaction was performed to detect beta-lactamase genes among these EB isolates. Multivariable logistic regression was performed to identify risk factors for CTX-M-mediated resistance.
Results: A total of 286 SOTR with ESC-R EB BSI were included, of which 108 (38%) were in the first-year post-transplant, and of which 175 (61%) were kidney, 71 (25%) were liver, 28 (10%) were heart, 23 (8%) were lung, and 9 (3%) were pancreas recipients. Among the ESC-R EB isolates, 144 (50%) were found to harbor a CTX-M gene, 128 (45%) a SHV gene, 45 (16%) a TEM gene, and 5 (2%) a CMY gene (not mutually exclusive). There were 110 (38%) EB isolates that had more than one beta-lactamase gene identified, while 88 (31%) had no beta-lactamase genes detected. On multivariable analysis, CTX-M-mediated resistance was significantly more likely among those SOTR with a history of chronic kidney disease (aOR 3.28, 95% CI 1.20-8.99, P=0.02), but was significantly less likely to be observed among those on chronic sirolimus immunosuppression (aOR 0.35, 95% CI 0.13-0.94, P=0.04) and those with a history of prior EB colonization or infection of the respiratory tract (aOR 0.33, 95% CI 0.14-0.79, P=0.01). There were no significant differences in the beta-lactamase genes observed based on other baseline factors, including organ transplant type, prior antibiotic exposures, or year of BSI.
Conclusions: Fifty percent of ESC-R EB causing BSI among SOTR harbored CTX-M beta-lactamase genes. SOTR with a history of chronic kidney disease were particularly likely to have CTX-M-mediated resistance. Future studies are needed to evaluate the performance of rapid diagnostics aimed at detecting CTX-M genes among SOTR with EB BSI.
CITATION INFORMATION: Anesi J., Lautenbach E., Tamma P., Thom K., Alby K., Blumberg E., Bilker W., Omorogbe J., Tolomeo P., Werzen A., Han J. Molecular Epidemiology of Extended-Spectrum Cephalosporin-Resistant Enterobacterales Bloodstream Infections Among Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: J.A. Anesi: None. **E. Lautenbach:** Other; Name of Commercial Interest; Merck, Paratek, Shionogi. Other; Nature of Relationship; Member of Data and Safety Monitoring Board, Member of Scientific Advisory Committee. **P.D. Tamma:** None. **K.A. Thom:** None. **K. Alby:** Other; Name of Commercial Interest;

Becton Dickinson. Other; Nature of Relationship; Member of Scientific Advisory Board. **E.A. Blumberg:** Grant/Research Support; Name of Commercial Interest; Merck, Takeda, Hologic. Grant/Research Support; Nature of Relationship; Receives research support. Other; Name of Commercial Interest; Amplyx, Takeda, Merck. Other; Nature of Relationship; Member of Data and Safety Monitoring Board, Member of the Scientific Advisory Committee. **W. Bilker:** None. **J. Omorogbe:** None. **P. Tolomeo:** None. **A. Werzen:** None. **J. Han:** Salary; Name of Commercial Interest; GlaxoSmithKline. Salary; Nature of Relationship; Employee. Salary; If "Other" Please Explain; Jennifer Han was affiliated with the University of Pennsylvania during the conduct of this research and is now employed by GlaxoSmithKline..

Abstract# 226

Cytomegalovirus (CMV) D+/R- Serostatus is Independently Associated with Mortality and Graft Loss After Liver Transplantation (LTx)

P. Vutien, J. Perkins, S. Biggins, J. Reyes, A. Limaye, *Internal Medicine, University of Washington Medical Center, Seattle, WA*

Purpose: It is unknown if donor or recipient (D/R) CMV serostatus, in the era of CMV prophylactic and pre-emptive strategies, remains associated with clinical outcomes in liver transplant (LTx) recipients. We assessed the associations between D/R CMV serostatus on graft loss and mortality in LTx recipients.

Methods: We analyzed all adult U.S. recipients undergoing LTx from 1/1/2010 to 3/14/2020 in the OPTN database. We used univariable and multivariable mixed Cox proportional hazards regression to analyze the associations between D/R CMV serostatus and graft loss or mortality.

Results: Patients were grouped by CMV pairings: D-/R- (n = 7,251), D-/R+ (n = 12,194), D+/R- (n = 11,903), and D+/R+ (n = 22,730). During a mean follow-up of 3.3 ± 2.7 years after LTx, 8,712 (16.1%) of recipients died and 9,703 (17.9%) had graft loss. Recipient survival at 8 years after transplant was 70.1% for D+/R-, 69.8% for D+/R+, 73.5% for D-/R+, and 73.8% for D-/R-. On multivariable regression, compared to D-/R- recipients, D+/R- recipients had significantly higher risks of mortality (adjusted HR 1.13, 95% CI 1.04 - 1.22) and graft loss (adjusted HR 1.11, 95% CI 1.04-1.2). There were no significant associations between CMV D+/R+ and D-/R+ serostatus and mortality or graft loss on multivariable analysis.

Conclusions: Even in the era of CMV prophylactic and pre-emptive strategies, CMV D+/R- serostatus remains independently associated with decreased survival and graft loss in LTx recipients. Studies are needed to define the mechanisms underlying this association.

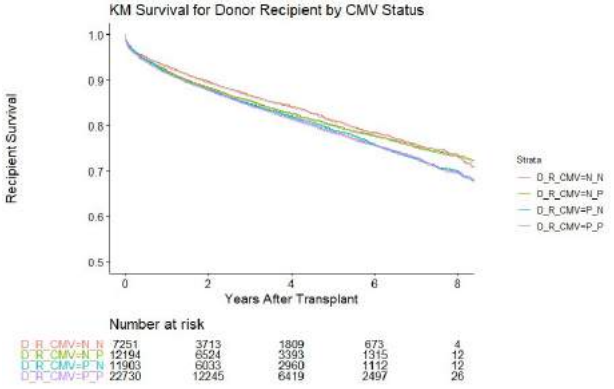

Table. Association between CMV donor and recipient serostatus and mortality

CMV serostatus	Mortality Rate (per 100 P-Y)	Hazard ratio	Adjusted hazard ratio†
D-/R- (n = 7,202)	4.37	1	1
D-/R+ (n = 12,117)	4.62	1.07 (0.99 – 1.15)	1.01 (0.93 – 1.08)
D+/R- (n = 11,819)	5.05	1.15 (1.07 – 1.24)	1.13 (1.04 – 1.22)
D+/R+ (n = 22,578)	5.06	1.17 (1.09 – 1.25)	1.07 (0.99 – 1.15)

†Adjusted for recipient, donor, and transplant covariates including donation after circulatory death, cold ischemia time, indication for liver transplant, SHARE status, etiology of liver disease, and others

CITATION INFORMATION: Vutien P., Perkins J., Biggins S., Reyes J., Limaye A. Cytomegalovirus (CMV) D+/R- Serostatus is Independently Associated with Mortality and Graft Loss After Liver Transplantation (LTx) *AJT, Volume 21 Supplement 3*

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Abstract# 227

Cmv Specific Cellmediated Immune Reconstitution During Letermovir Prophylaxis in High Risk Hematopoietic Cell Transplant Recipients

M. Abidi[1], J. Gutman[2], A. Weinberg[2], *[1]University of Colorado Denver/ Anschutz Medical Campus, Aurora, CO, [2]University of Colorado Denver, Denver, CO*

Purpose: Patients who are cytomegalovirus (CMV) seropositive (R+) prior to hematopoietic cell transplant (HCT), have a 30% incidence of clinically significant CMV reactivation in the absence of prophylaxis. At our institution, letermovir prophylaxis through approximately Day 100 is used in CMV R+ high-risk (HR) (cord blood, haplocord, haploidentical) HCT recipients. We hypothesized that clinically nonsignificant CMV reactivation during letermovir prophylaxis may lead to the reconstitution of CMV specific cell-mediated immunity (CMV CMI), which may protect the host against CMV disease after letermovir discontinuation.

Methods: Blood samples from CMV R+ HR HCT recipients on letermovir were tested by dual color CMV specific IL2/IFNg FLUOROSpot pre-transplant and on Days 100, 182 and 360 post-transplant. Clinical and virologic information were obtained from medical records.

Results: Among 41 participants enrolled to date, 26 were eligible for this analysis, which included participants with CMV CMI defined as ≥20 spot-forming cells/10^6 PBMC pre or post HCT and follow up ≥80 days post-HCT. The median age was 55.5 years (range 23-75), 14 were women, 15 were white non-Hispanic, nine were Hispanic, 2 Asian and the most common underlying malignancy was acute myeloid leukemia (n=13). Twenty participants had CMV CMI reconstitution at Day 100; including 6 with and 14 without low-level CMV DNAemia, defined as ≤5000 international units/ml in whole blood quantitative polymerase chain reaction assay, while on letermovir prophylaxis. Among the 20 participants, 14 remained free of clinically significant CMV reactivation for a median (range) of 180 (80;180) days post-letermovir discontinuation, while 6 developed acute graft vs host disease (aGvHD) followed by clinically significant CMV reactivation. 6 participants did not reconstitute CMV CMI at Day 100, one of them had DNAemia while on letermovir. 1 of 6 participants without CMV CMI reconstitution or aGvHD developed CMV disease after letermovir discontinuation. Of the 41 participants, 11 participants had negative CMV CMI <20 spot-forming cells/10^6 PBMC pre-HCT and remained CMV CMI negative at Days 80 and 180 and did not develop CMV infection.

Conclusions: High-risk patient populations can reconstitute CMV CMI while on letermovir. 4.5% of CMV R+ participants had no CMV CMI response pre-HCT, consistently lacked CMV CMI response post-HCT and did not reactivate CMV, indicating that patients may be falsely characterized by CMV antibody assay. CMV CMI assays rather than CMV serologies pre-HCT may be a useful tool to guide risk stratification for CMV monitoring and letermovir usage.

CITATION INFORMATION: Abidi M., Gutman J., Weinberg A. Cmv Specific Cellmediated Immune Reconstitution During Letermovir Prophylaxis in High Risk Hematopoietic Cell Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Abidi: Grant/Research Support; Name of Commercial Interest; Merck. **J. Gutman:** Grant/Research Support; Name of Commercial Interest; Merck. **A. Weinberg:** Grant/Research Support; Name of Commercial Interest; Merck.

Abstract# 228

Impact of a Cmv Cell Mediated Immunity Based Protocol on Guiding Cmv Prophylaxis Following Pediatric Liver Transplantation - A Single Center Experience

G. Kalkan[1], S. Ball[2], L. McConnell[2], D. M. Desai[3], A. Aqul[3], P. K. Sue[1], *[1]Infectious Disease, University of Texas Southwestern Medical Center, Dallas, TX, [2]Solid Organ Transplant Program, Children's Health, Dallas, TX, [3]Solid Organ Transplant Program, University of Texas Southwestern Medical Center, Dallas, TX*

Purpose: Cytomegalovirus (CMV) is an important cause of morbidity following pediatric orthotopic liver transplantation (OLT), especially among high risk (HR) CMV D+/R- recipients. In 2019, our institution adopted a Cell Mediated Immunity (CMI) based hybrid approach to guide CMV prophylaxis following pediatric OLT. We report our experience using this approach and its implication on the rate of CMV infection, rejection, and valganciclovir (VGC) adverse reactions and cost in our patient population.

Methods: Initial protocol required patients to remain on prophylactic VGC until a CMV IgG is detected (cohort 1). Modified protocol (cohort 2) stratified patients into 3 risk groups; Low (LR) remains on VGC until 6 months post-transplant, intermediate (IR), and high (HR) utilizes CMV CMI to guide VGC prophylaxis duration. Retrospective review of pediatric OLT recipients between January 2017 - December 2018 (cohort 1) and January 2019 - November 2020 (cohort 2). Patients characteristics, CMV infection, CMV disease, rejection, duration of valganciclovir (VGC) prophylaxis, cost of VGC, and drug attributable adverse events were compared between the two cohorts. Fischer's exact test and student T-Test were used to assess differences in categorical and ordinal outcomes between the two cohorts, respectively.

Results: 41 children (21 in cohort 1, 20 in cohort 2), Eight (19.5%) were considered HR (D+/R-), 21 (51.2%) were intermediate (IR) (D+/R+), and 12 (29.2%) were low (D-/R-) risk for CMV infection. All received VGC prophylaxis. Cohort 2 demonstrated no increase in the incidence of CMV infection or disease and decreased episodes of rejection compared to cohort 1. Mean duration of antiviral treatment was decreased by 41%, and associated with a decrease in cost of antivirals by 52%. Adverse events associated with VGC were similar in both groups 19 vs 15%.
Conclusions: Implementation of a CMV CMI based protocol decreased the cost and total days of antiviral prophylaxis following pediatric OLT, and was not associated with increased risk of breakthrough viremia or CMV disease. Incorporating CMV specific CMI may be a useful tool to guide post-transplant CMV prophylaxis and reduce unnecessary antiviral use.

	Pre Protocol (N=21)	Post Protocol (N=20)	p-value
CMV Infection, %	4/21(19.1)	1/20(5)	0.34
CMV Disease, (%)	0/21(0)	0/19(0)	NA
Rejection Events, (%)	11/21(52.4)	4/20(20)	0.05
Total Days Antiviral Therapy, Mean (SD)	403.5(192.2)	266.7(98.5)	<.001
Total Cost of Antiviral Therapy in USD, Mean (SD)	27,501(12,174)	16,779(15,438)	.01
Adverse Events Associated with Antiviral Therapy (%)	4/21(19)	3/20(15)	1

Table: Clinical Outcomes with Implementation of CMV CMI Based Protocol. P-value is based on Fischer's exact test for categorical variables, t test for ordinal variables with normal distribution.

CITATION INFORMATION: Kalkan G., Ball S., McConnell L., Desai D., Aqul A., Sue P. Impact of a Cmv Cell Mediated Immunity Based Protocol on Guiding Cmv Prophylaxis Following Pediatric Liver Transplantation - A Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: G. Kalkan: None. **S. Ball:** None. **L. McConnell:** None. **D.M. Desai:** None. **A. Aqul:** None. **P.K. Sue:** None.

Abstract# 229

Outcomes of Abdominal Transplant Recipients Who Receive Organs from Donors with Positive Cultures

A. Perez Cortes Villalobos, A. Humar, D. Kumar, *University Health Network, Toronto, ON, Canada*

Purpose: Due to limited organ availability, use of donors with positive bacterial cultures is common practice. One of the main concerns is transmission to the transplant recipient, a potentially severe complication, which can be mitigated by peri and post-operative antimicrobials. This study aims to describe outcomes in transplant recipients who received organs from deceased donors with positive bacterial or fungal cultures.
Methods: We conducted a single-center retrospective review of donor cultures in newly transplanted kidney and liver transplant recipients from November 2018 to September 2019. All donors had blood and urine cultures collected prior to procurement. Respiratory cultures (sputum or BAL) were collected if lung donation was considered. CSF was collected if meningitis was suspected. All transplants received 3 doses of cefazolin for perioperative prophylaxis. In addition, one dose of metronidazole was given to liver recipients. All recipients were followed for 90 days post-transplant for bacterial or fungal transmission.
Results: We reviewed 200 transplant recipients from 167 unique transplant donors. The donated organs for transplantation were 154 kidneys, 5 kidney-pancreas, 35 liver and 6 liver-kidney. Of all organ donors, 128 (76.6%) had at least one positive culture with 29/128 (22.7%) bacteremia, 85/115 (73.9%) respiratory, 22/128 (17.2%) urine, and 2/128 (1.6%) CSF. Perioperative antibiotic prophylaxis was modified to cover positive donor cultures in 39/165 (23.6%) of kidney (or combined organ) recipients and 7/35 (20%) of liver recipients. The majority of positive donor urine cultures (17/19) were treated in kidney transplant recipients for a median of 13.8 days (range 7-60) and 25/29 (86.2%) donor bacteremias were treated for a median of 14 days (range 5-43). No transplant recipient had modification of antibiotics to treat positive donor respiratory cultures. During follow up, microbiologically-documented bacterial or fungal infections occurred in 9/200 (4.5%) by day 30 and an additional 5/200 (2.5%) by day 90. No recipient deaths occurred in the first 90 days post-transplant. We identified three episodes (1.5%) of possible donor-derived infections in the first 30 days; two kidney recipients had urine culture positivity in the immediate post-transplant period with the same organism as the donor BAL (*Candida albicans* and *Klebsiella pneumoniae* respectively). The third patient had a positive urine culture with the same organism as isolated in donor urine (*E.coli*). All three infections were treated without complications.
Conclusions: Despite a significant number of positive cultures, no proven donor-derived infections occurred. Therapy for positive donor respiratory cultures is not required in abdominal transplant recipients. Kidneys from donors with bacteremia and bacteriuria can be safely transplanted with appropriate modification of perioperative antibiotics to mitigate the risk of donor derived infection.

CITATION INFORMATION: Perez Cortes Villalobos A., Humar A., Kumar D. Outcomes of Abdominal Transplant Recipients Who Receive Organs from Donors with Positive Cultures *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Perez Cortes Villalobos: None. **A. Humar:** None. **D. Kumar:** None.

Abstract# 230

Evaluating Pneumocystis Jiroveci Pneumonia Prophylaxis in Lung Transplant Recipients

J. Sharkey, K. McMurry, J. Park, C. Carlson, K. Gregg, D. Kaul, D. Lyu, L. Fitzgerald, *Michigan Medicine, Ann Arbor, MI*

Purpose: The incidence of *Pneumocystis jiroveci* pneumonia (PJP) in lung transplant recipients (LTRs) on PJP prophylaxis is not well documented yet reported as high as 28.7%.[1] At this institution, the lifelong prophylaxis regimens for LTRs are overall dosed lower than typical due to concern of toxicity, with sulfamethoxazole/trimethoprim (SMX/TMP) dosed 400/80 mg (SS) three-times weekly (TIW) and dapsone 100 mg TIW. These lower dosing strategies are of particular concern in cystic fibrosis (CF) LTRs as they display altered drug pharmacokinetics, including SMX/TMP. The objective of this study was to evaluate the current PJP prophylaxis protocol for LTRs by assessing the incidence and severity of PJP infection with a focus on LTRs with CF.
Methods: In this single-center, retrospective study, we evaluated 396 patients who received a lung transplant between January 2007 to December 2019. LTRs who died within 30 days of transplant, were multiple organ recipients, or with incomplete data were excluded. The primary outcome was the incidence of PJP infection, defined as warranting treatment. Secondary outcomes included time to PJP infection and severity of PJP infection, defined on outpatient versus inpatient treatment.
Results: 383 LTRs met criteria and 11 positive cases of PJP were identified (2.9%). Four of the 11 cases were on prophylaxis at the time of diagnosis with the remaining 7 cases having stopped prophylaxis before developing PJP. Thus, the overall incidence of PJP in LTRs on prophylaxis was 1.0% and 6.0% in CF LTRs in particular. The average time to infection was 997 days. In the 7 cases who were not on prophylaxis, PJP prophylaxis was held and not restarted in 86% and 14% mistakenly stopped taking prophylaxis. Reasons prophylaxis was held: acute kidney injury (33%), unknown (33%), leukopenia/anemia (34%), hyperkalemia (17%). The average time to PJP infection in these cases was 1325 days, and in 71% a rejection episode and/or a cytomegalovirus (CMV) infection occurred before developing PJP.
Conclusions: The incidence of PJP in LTRs at our institution is lower than reported in the literature, but LTRs with CF represented the majority of PJP cases, suggesting a need for CF specific dosing regimens for prophylaxis. The incidence of PJP in LTRs not on prophylaxis highlights the importance of ensuring lifelong adherence.
Reference: 1. Wojarski J, et al. *Transplant Proc*. Sep 2018;50(7):2053-2058.

Table 1. Characteristics of LTRs on Prophylaxis at Time of PJP Infection

	Patient 1	Patient 2	Patient 3	Patient 4
Prophylaxis Regimen	Dapsone 100mg TIW	SMX/TMP SS TIW	Dapsone 100mg TIW	SMX/TMP SS TIW
Time to PJP Infection (days post-transplant)	388	1095	2391	114
CF Diagnosis (Y/N)	Y	Y	Y	N
Rejection Before PJP (Y/N)	Y	Y	Y	Y
CMV Infection Before PJP (Y/N)	N	Y	Y	N
Treatment Setting	Outpatient	Inpatient	Inpatient	Outpatient

CITATION INFORMATION: Sharkey J., McMurry K., Park J., Carlson C., Gregg K., Kaul D., Lyu D., Fitzgerald L. Evaluating Pneumocystis Jiroveci Pneumonia Prophylaxis in Lung Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Sharkey: None. **K. McMurry:** None. **J. Park:** None. **C. Carlson:** None. **K. Gregg:** None. **D. Kaul:** None. **D. Lyu:** None. **L. Fitzgerald:** None.

Abstract# 231

Epidemiology and Risk Factors for Invasive Fungal Infection in Pancreas Transplant in the Absence of Fungal Prophylaxis

J. Burkey[1], J. M. Chen[2], A. A. Sharfuddin[2], M. S. Yaqub[2], A. J. Lutz[2], J. A. Powelson[2], J. A. Fridell[2], N. Barros[2], *[1]Butler University College of Pharmacy and Health Sciences, Indianapolis, IN, [2]Indiana University Health, Indianapolis, IN*

Purpose: Invasive fungal infections (IFI) remain a rare yet dreaded complication following pancreas transplantation. Current guidelines recommend antifungal prophylaxis in patients with 1 or more risk factors (enteric drainage, vascular thrombosis, and post-perfusion pancreatitis). These recommendations are based

on a single-center study from 1996. In our center, we provide a single dose of antifungal prophylaxis in the OR but none subsequently, regardless of risk factors. Here we evaluate the 1-year cumulative incidence and risk factors associated with the development of invasive fungal infections

Methods: We performed a retrospective, single-center cohort study of adult patients who underwent pancreas transplant alone (PTA) or simultaneous kidney-pancreas transplant (SPKT) at Indiana University from January 1, 2009 through December 31,2018. The electronic health records were manually reviewed, and cases were adjudicated using consensus definitions. Only proven and probable cases were included in the analysis. The 1-year cumulative incidence and mortality and risk factors were analyzed by Kaplan-Meier method and differences between patient populations were assessed with Chi-square

Results: 382 patients were reviewed and analyzed. 215 patients received either a SPKT or pancreas after prior kidney transplant and 167 patients received a PTA. All pancreas allografts are implanted with systemic venous and enteric drainage and patients receive induction with rATG and steroid free maintenance immunosuppression. We identified 14 IFIs. IFI included: Invasive candidiasis (64%), Histoplasmosis (14%) and Aspergillosis (14%). Intrabdominal infections accounted for most IFIs (6/14), bloodstream infections (3/14), disseminated disease (3/14), pulmonary disease (1/14) and invasive fungal sinusitis (1/14). Median time to IFI was 64 days [IQR: 30-234 days]. 1-year cumulative incidence was 3.66%. There were no significant differences between patients with or without IFD regarding type of pancreas transplant (p=0.4), post-transplant renal replacement therapy (p=0.3), rejection (p=0.5), CMV serostatus (p=0.8), or graft-loss (p=0.2). The 1-year mortality in IFI patients was 21% vs 1.4% in non-IFI patients (p<0.0001). Attributable mortality to IFI was 33%

Conclusions: Our study suggests that the avoidance of fungal prophylaxis following pancreas transplantation does not result in high incidence of IFI. Furthermore, there are no specific risk factors that are associated with the development of invasive fungal infections

CITATION INFORMATION: Burkey J., Chen J., Sharfuddin A., Yaqub M., Lutz A., Powelson J., Fridell J., Barros N. Epidemiology and Risk Factors for Invasive Fungal Infection in Pancreas Transplant in the Absence of Fungal Prophylaxis *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Burkey: None. **J.M. Chen:** None. **A.A. Sharfuddin:** None. **M.S. Yaqub:** None. **A.J. Lutz:** None. **J.A. Powelson:** None. **J.A. Fridell:** None. **N. Barros:** None.

Abstract# 232

Impact of a Pharmacist-driven Immunization Clinic on Vaccination Rates in Pre-liver Transplant Patients

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Purpose: Infectious diseases are a leading cause of morbidity and mortality among patients with end-stage liver disease (ESLD). Vaccination data of ESLD patients pre- and post-transplantation is scarce. This study was created to evaluate the impact of pharmacist intervention on vaccination rates within the ESLD population.

Methods: This study was a retrospective, quasi-experiment evaluating the impact of a pharmacist driven immunization clinic at a large academic medical center established in February 2018. Patients listed for liver transplant between August 2016 and July 2019 were separated into pre- and post-implementation cohorts based on timing of immunization clinic implementation. All patients in the post-implementation group were evaluated by pharmacist for need of hepatitis A, hepatitis B, and pneumococcal conjugate and polysaccharide vaccines according to Advisory Committee on Immunization Practices recommendations; if needed, vaccines were offered at future visits.

Results: A total of 240 patients were included with 120 in each group. Demographics are reported in table 1. Vaccine series initiation rate prior to transplantation was higher in the post-implementation group: 54.9% vs. 15.6%; p<0.001. When evaluating each vaccine series separately, significantly more patients received hepatitis B (41.7 vs. 12.6%, p<0.001) and pneumococcal conjugate vaccination (26.9 vs. 14.4%, p=0.046) in the post-implementation group as compared to the pre-implementation group. The percentage of patients receiving hepatitis A (27.8 vs. 17.1%) and pneumococcal polysaccharide vaccination (30.6 vs. 18.9%) were higher in the post-implementation group, but not statistically significant. Additionally, a higher percentage of patients in the post-implementation group were considered to be up-to-date on their vaccines at end of follow up (31.4 vs. 9%, p<0.001).

Conclusions: The pharmacist-driven immunization clinic significantly increased the incidence of vaccine series initiation in ESLD patients, as well as more patients were considered up-to-date at end of follow up. With appropriate vaccination, these patients are at a decreased risk of vaccine-preventable infections.

Table 1. Baseline Demographics			
Pre-implementation (N=120)	Post-implementation (N=120)	P value	
Mean age, year (range)	58 (25-95)	58 (27-71)	0.612
Male sex, n (%)	72 (60)	72 (60)	1.0
Caucasian, n (%)	79 (66)	78 (65)	0.244
Updated vaccines OR documented immunity, n (%)	79 (66)	12 (10)	0.649

CITATION INFORMATION: Poparad-Stezar A., Summers B., Fitzmaurice M., Hakamiun K., Sulejmani N., Jantz A. Impact of a Pharmacist-driven Immunization Clinic on Vaccination Rates in Pre-liver Transplant Patients *AJT, Volume 21 Supplement 3*

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Kidney: Acute Cellular Rejection

Abstract# 233

Belatacept Exposure Not Associated With Rejection. Can Doses be Lowered without Compromising Efficacy?

M. McGowan[1], A. Bickenbach[1], B. Miyagawa[2], A. Christianson[1], T. Mizuno[2], P. West-Thielke[3], J. Leone[4], E. Woodle[1], D. Kaufman[5], A. Wiseman[6], A. Matas[7], A. Vinks[2], R. Alloway[1], *[1]U Cincinnati, Cincinnati, OH, [2]Cincinnati Children's Med Center, Cincinnati, OH, [3]U Illinois, Chicago, IL, [4]Tampa Gen, Tampa, FL, [5]U Wisconsin, Madison, OH, [6]Centura Transplant, Denver, CO, [7]U Minnesota, Minneapolis, MN*

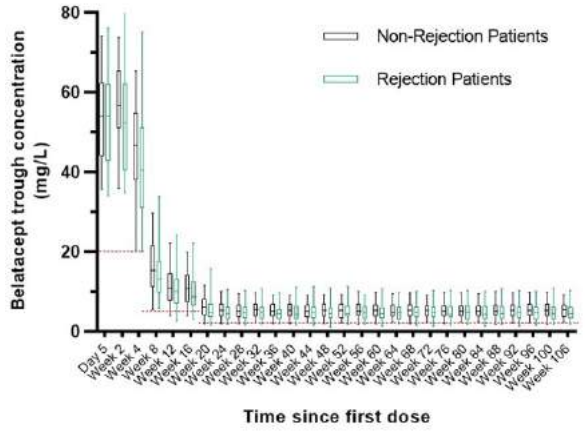
Purpose: Phase 1 and 2 belatacept(BELA) pharmacokinetic(PK) studies informed dosing in phase 3 studies. PK data from these studies revealed higher BELA troughs on Day 5 were associated with lower acute rejection (AR) at 1mo, but no other relationship between PK and AR was observed. AR results were similar in **B**ELA-based **E**arly **S**teroid-withdrawal **T**rial (BEST). BEST samples explored associations between BELA PK and AR under depleting induction.

Methods: Prospectively collected samples were used to retrospectively analyze BELA troughs via a validated quantitative enzyme-linked immunoassay. BELA clearance (Cl) was estimated using Bayesian estimation with published population PK model as the Bayesian prior(Zhou et al) with the clinical software MWPharm+(Mediware). Allometric scaling accounted for weight differences. Individual patient profiles estimated troughs, cumulative area under the curve(AUC) and average concentration(Cavg) during BELA dosing. PK parameters and Cavg at time of AR were analyzed for AR and recurrent AR.

Results: 876 BELA troughs in 191 patients(pts) were modeled. Results showed agreement between observed troughs and both population model-predicted and Bayesian estimated concentrations (R^2=0.84 and 0.88). BELA exposure was no different in rejecting or non rejecting pts(Fig1). No differences in BELA PK parameters were observed based on induction. Inter-individual variability in Cl was low (CV=22%), and closely matched reported Cl. 46(24%) pts had AR and 10(5.2%) pts had recurrent AR. Mean time to AR was 174 (±149) days with 63% of AR prior to 6mo and 26% between 6-12mo. There were no significant differences between allometrically standardized Cl in pts with AR or recurrent AR compared to those without. Cavg and AUC with AR were not significantly different at any time points except for significantly lower Cavg and AUC at 6-12mo in AR. The cumulative Cavg(Fig2) or AUC at time of AR event was influenced by time post transplant.

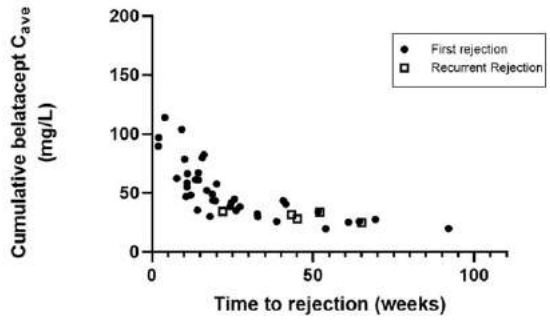
Conclusions: At labeled BELA doses, Cl, Cavg, and AUC do not appear to correlate with AR. The Cavg observed were significantly higher than threshold and observed concentrations previously reported, especially during the induction phase. Data suggests that higher BELA exposure does not improve AR rates and alternative dosing strategies may be explored.

Figure 1. BEST Belatacept Model Predicted Trough Concentrations in Rejection and Non-Rejection Patients



*Horizontal red line represents suggested threshold concentrations

Figure 2: Belatacept Cummulatative Average Concentration at the time of First or Recurrent Rejection



CITATION INFORMATION: McGowan M., Bickenbach A., Miyagawa B., Christianson A., Mizuno T., West-Thielke P., Leone J., Woodle E., Kaufman D., Wiseman A., Matas A., Vinks A., Alloway R. Belatacept Exposure Not Associated With Rejection. Can Doses be Lowered without Compromising Efficacy? *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. McGowan: None. **A. Bickenbach:** None. **B. Miyagawa:** None. **A. Christianson:** None. **T. Mizuno:** None. **P. West-Thielke:** None. **J. Leone:** None. **E. Woodle:** None. **D. Kaufman:** None. **A. Wiseman:** None. **A. Matas:** None. **A. Vinks:** None. **R. Alloway:** None.

Abstract# 234

The Effect of the Different Donor-Derived HLA T-Cell Epitope Targets on the Development of T Cell-Mediated Rejection After Kidney Transplantation

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Purpose: Many kidney allografts fail due to rejections caused by the donor and recipient HLA incompatibility. Recent studies have shown that HLA-DR and DQ mismatches are particularly harmful by inducing donor-specific HLA antibodies and causing antibody-mediated rejection. However, due to the absence of HLA-specific biomarkers, it remains unknown which HLA mismatches contribute the most to the development of T-cell mediated rejection (TCMR). In this study, we aimed to investigate the associations of the different donor-HLA-derived T-cell epitope targets, PIRCHE-II scores, and the occurrence of TCMR after kidney transplantation.

Methods: Patients who underwent kidney transplantation between 2004-2013 were included in this study (N=926 with 3515 biopsies, both indication and protocol biopsies). These patients and donors were genotyped at the 2nd field high-resolution HLA level. We used the PIRCHE-II algorithm to calculate the different donor-HLA-derived T-cell epitope scores for all HLA loci.

Results: The median PIRCHE-II score of our cohort was 311.5 (IQR 205-453), and highest in HLA-DQA_1B_1 molecule (76.5; IQR 7-162). 277 patients (29.9%) developed TCMR and 134 (14.5%) developed only borderline changes on at least one allograft biopsy. In a multivariable analysis adjusted for confounders (**Figure 1**), the total PIRCHE-II score was independently associated with an increased risk for developing TCMR (per 10, HR=1.007; 95%CI 1.001-1.013; p=0.03), mainly explained by the PIRCHE-II scores for HLA-DRB_1 (HR=1.071; 95%CI 1.028-1.116; p=0.001) and HLA-DQA_1B_1 molecules (HR=1.013; 95%CI 1.002-1.025; p=0.02). The same associations with PIRCHE-II scores for HLA-DRB_1 and DQA_1B_1 were found when borderline changes are counted as TCMR. In a sensitivity analysis restricted to HLA-DSA negative patients, again, only the T-cell epitope targets originating from the donor's HLA-DRB_1 and HLA-DQA_1B_1 molecules were associated with TCMR. Finally, the same PIRCHE-II scores for HLA-DRB_1 (HR=1.042; 95%CI 1.005-1.081; p=0.02) and HLA-DQA_1B_1 molecules (HR=1.015; 95%CI 1.005-1.026; p=0.0035) were risk factors for all-cause graft failure, independent of HLA-DSA antibodies.

Conclusions: PIRCHE-II scores for HLA-DRB_1 and HLA-DQA_1B_1 are independent predictors for TCMR development and independent risk factors for all-cause graft failure after kidney transplantation, and could be used for improved risk stratification.

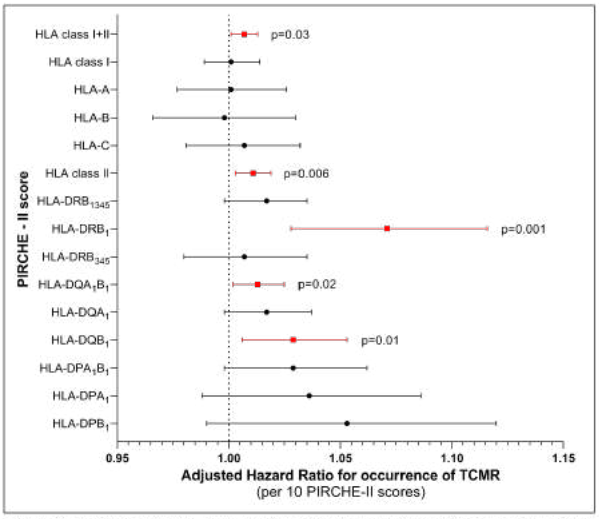

Figure 1. Multivariable Cox hazard ratios for the occurrence of TCMR after kidney transplantation stratified by the different PIRCHE-II scores. Each multivariable Cox model was corrected for donor and recipient age, donor type, cold ischemia time, repeat transplantation, and presence of pretransplant anti-HLA antibodies.

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DISCLOSURES: A. Senev: None. **E. Van Loon:** None. **M. Emonds:** None. **M. Naesens:** None.

Abstract# 235

Reducing Rejection in Pediatric Kidney Transplantation: The Improving Renal Outcomes Collaborative (iroc)

C. Varnell[1], A. Warmin[1], G. Barletta[2], C. Belsha[3], L. Harshman[4], D. Kershaw[5], C. Pruette[6], S. Ranabothu[7], M. Seifert[8], P. Singer[9], M. Yanik[10], K. Rich[1], A. Modi[1], D. Hooper[1], *[1]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [2]Phoenix Children's Hospital, University of Arizona, Phoenix, AZ, [3]SSM Health Cardinal Glennon Children's Hospital, St Louis, MO, [4]University of Iowa Stead Family Children's Hospital, Iowa City, IA, [5]C.S. Mott Children's Hospital, Ann Arbor, MI, [6]Johns Hopkins University School of Medicine, Baltimore, MD, [7]Arkansas Children's Hospital, Little Rock, AR, [8]University of Alabama at Birmingham, Children's of Alabama, Birmingham, AL, [9]Cohen Children's Hospital, Brooklyn, NY, [10]Levine Children's Hospital, Charlotte, NC*

Purpose: To study the effect of implementing a Medication Adherence Promotion System (MAPS) on acute rejection (AR) rates in 9 pediatric kidney transplant (KT) programs.

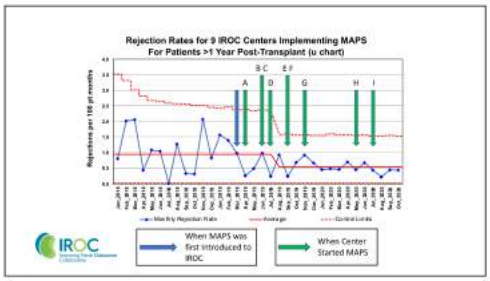
Methods: Time series analysis of AR and biopsy rates across 9 IROC centers who have begun clinical implementation of MAPS: a bundle of evidence-based strategies to identify patients at risk for rejection and address patient/caregiver identified immunosuppression adherence barriers. AR and biopsy rates for all pts > 1-yr post-KT (n=558, 64% male, median age 15y) were analyzed from 1/2018 through 10/2020 using statistical process control u-charts. Centerline and 3 standard deviation control limits were calculated from baseline data and adjusted when special cause was met according to established standards. Charts were annotated with the date each center started bundle interventions.

Results: 130/266 (49%) pts identified at least 1 adherence barrier - most commonly: forgetting to take the medication, hate the taste, and side effects. Baseline rejection rate in the nine centers was 0.94 per 100 patient months, special cause was first noted 8/2019 - the rejection rate decreased to 0.53 rejections per 100 patient months. Baseline biopsy rate in the centers was 6.39 biopsies per 100 patient months, special cause was first noted 8/2019 - the biopsy rate decreased to 3.03 biopsies per 100 patient months. Whereas rejection and biopsy rates both decreased by about 50%,

there was no change in the percentage of biopsies with rejection, suggesting the decrease in rejection rate was not due to ascertainment bias (i.e. simply performing less biopsies).

Conclusions: The spread of a clinical system to identify and address adherence barriers across diverse clinical settings is preliminarily associated with decreased rates of acute rejection and biopsies.

12/4/20



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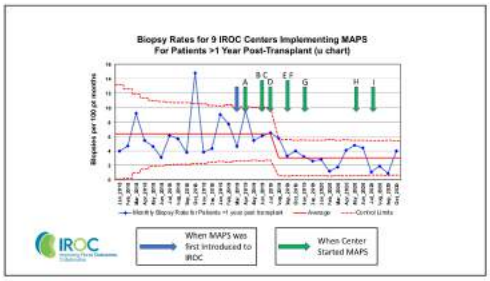

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CITATION INFORMATION: Varnell C., Warmin A., Barletta G., Belsha C., Harshman L., Kershaw D., Pruette C., Ranabothu S., Seifert M., Singer P., Yanik M., Rich K., Modi A., Hooper D. Reducing Rejection in Pediatric Kidney Transplantation: The Improving Renal Outcomes Collaborative (iroc) *AJT, Volume 21 Supplement 3*

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Abstract# 236

Reassessing TCMR in Kidney Transplant Indication Biopsies: Emerging Evidence for Partial Exhaustion in Late TCMR

P. Halloran[1], J. Reeve[1], &. the INTERCOMEX Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]., ., AB, Canada*

Purpose: We rederived the MMDx rejection archetypes in an expanded set of 1679 kidney transplant biopsies to add power and potentially define heterogeneity in TCMR. We repeated the same analysis in 1716 other biopsies to examine the stability of the classification in an independent set. We were particularly interested in whether T cell exhaustion impacted the TCMR phenotype with increasing time post-transplant.

Methods: We analyzed rejection in microarray results from 1679 kidney transplant indication biopsies using seven machine learning derived rejection classifiers following the same strategies used previously (Am J Transplant. 2019;19:2719).

Results: The scores assigned each biopsy a position in data space when distributed by principal component analysis (PCA) as 4 PCs (**Figure 1A**). Archetype analysis assigned six rejection archetypes (clusters) for both populations, which were very similar: 1: No rejection; 2: early TCMR (ETCMR): 3: late TCMR (LTCMR); 4: early stage ABMR (EABMR); 5: fully-developed ABMR (FABMR); and 6: late-stage ABMR (LABMR).

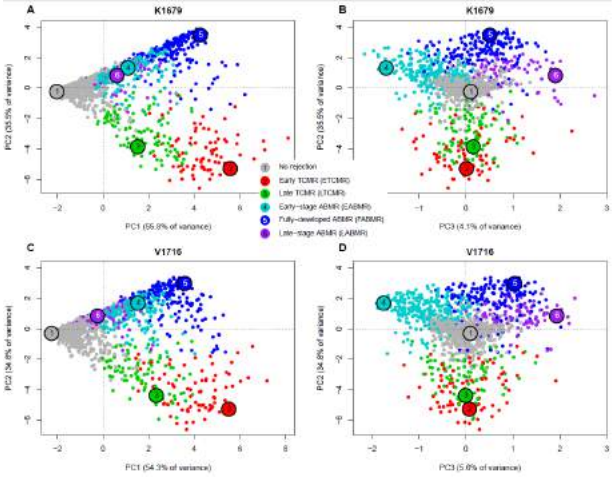
The principal components of variation in rejection-ness were PC1: no rejection vs. rejection; PC2: ABMR+ vs TCMR -ve; PC3: stages of ABMR (EABMR, FABMR, LABMR); and PC4: stages of TCMR: ETCMR and LTCMR. (PC4 cannot be visualized.) Mixed rejection had varying components of ABMR and TCMR.

The assignment of archetype groups was validated in an independent set of 1716 biopsies, indicating high conservation of the new rejection classification (**Figure 1C,D)**.

The new LTCMR class differed from ETCMR in being later post-transplant (median 506 vs. 258 days), with lower PC1 scores and more histologic and molecular atrophy-fibrosis. Compared to ETCMR, LTCMR had less intense activation signals (e.g. CCL5) and T cell receptor expression. In 24 BK nephropathy with TCMR, 21 were LTCMR. Failures were increased by both ETCMR and LTCMR.

The principal feature that separated ETCMR and LTCMR was principal component 4 (PC4): ETCMR +0.63; LTCMR -0.67. PC4 distinguished a reciprocal relationship between TCMR activity features (e.g. CCL5 correlation -0.387) and a major checkpoint, PD1 (PDCD1): correlation +0.104. All five PD1 probesets anti-correlated with TCMR activity features, suggesting that LTCMR has more T cell exhaustion than ETCMR.

Conclusions: An expanded PCA and archetype analysis recognizes a new class of late TCMR that separates in PC4 from early TCMR and has more fibrosis, less activity, and a reciprocal relationship between checkpoint PD1 and TCMR activity, suggesting a time-dependent increase in T cell exhaustion.



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DISCLOSURES: P. Halloran: Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **J. Reeve:** None. **&. the INTERCOMEX Study Group:** None.

Abstract# 237

Development of Diagnosis Method of Acute Graft Rejection After Kidney Transplantation Using Metabolome Analysis by Liquid Biopsy Approach

H. Iwamoto[1], M. Sugimoto[2], O. Konno[1], I. Akashi[3], M. Okihara[1], Y. Kihara[1], T. Ueno[1], *[1]Kidney Transplantation Surgery, Tokyo Medical University, Hachioji Medical Center, Tokyo, Japan, [2]Research and Development Center for Minimally Invasive and Preemptive Medicine, Institute of Medi, Tokyo Medical University, Tokyo, Japan, [3]Kidney transplantation Surgery, Tokyo Medical University, Hachioji Medical Center, Tokyo, Japan*

Purpose: Presently, a definitive diagnosis of organ dysfunction after transplantation (such as acute rejection) is dependent on conventional histopathological evaluation using an invasive biopsy procedure because blood or imaging studies cannot conclusively diagnose such conditions. Recently, the usefulness of liquid biopsy has been highlighted. This technique involves a minimally invasive approach to collect samples, such as saliva, urine, or blood, which can be evaluated frequently without over-burdening the patient. Metabolomics is one of the omics technologies which enable simultaneous identification and quantifications of hundreds of metabolites. This method has been employed to find these biomarker discoveries using biofluid samples. Here, we utilized metabolomics technologies to discover new biomarkers of acute kidney rejection after transplantation.

Methods: Kidney transplant patients followed up at our hospital were grouped into 3 groups as follows; kidney transplant donors (healthy subjects, n=9), subjects with normal kidney function after kidney transplantation (n=19), and subjects with

impaired kidney function after kidney transplantation (n=32). Pathological diagnosis of this group included T cell-mediated acute rejection (AR) (n=10), antibody-mediated rejection (n=8), calcineurin inhibitor nephropathy (n=3), and the other causes of graft function (n=8). Metabolome analysis was performed on 60 blood, urine and saliva specimens from the subjects. The results of the metabolome analysis were compared with the definitive diagnoses made by using kidney graft biopsy.

Results: In the group of subjects with impaired kidney function after kidney transplantation, 8 substances in blood (asymmetrical dimethylarginine [ADMA], diethanolamine, glycerophosphorylcholine, isocitrate, phenylalanine, symmetrical dimethylarginine [SDMA], serotonin, and valine) and 3 substances in urine (3-indoxy sulfate, ADMA, and *N*-acetylhistidine) and 7 substances in saliva (2-hydroxyglutarate, adipate, ethanolamine phosphate, fumalate, glycolate, proline, sedoheptulose 7-phosphate) that were significantly different ($p<0.001$) from those in the control group, the normal kidney function after kidney transplantation, and the group of kidney transplant donors.

Conclusions: The Salivary test has significant advantages compared to the blood-based test, which can be performed frequently due to its non-invasiveness. Such AR diagnosis methods would be useful as a clinical application.

CITATION INFORMATION: Iwamoto H., Sugimoto M., Konno O., Akashi I., Okihara M., Kihara Y., Ueno T. Development of Diagnosis Method of Acute Graft Rejection After Kidney Transplantation Using Metabolome Analysis by Liquid Biopsy Approach *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Iwamoto: None. **M. Sugimoto:** None. **O. Konno:** None. **I. Akashi:** None. **M. Okihara:** None. **Y. Kihara:** None. **T. Ueno:** None.

Abstract# 238

Inflammation in Scarred Cortex (i-IFTA) is Significantly Associated with T Cell-mediated Rejection (TCMR), but Not Antibody-mediated Rejection (ABMR), in Renal Allograft Biopsies (Bx)

H. Zhang, *Transplant Immunology Laboratory, Cedars-Sinai Medical Center, Los Angeles, CA*

Purpose: I-IFTA in renal allograft Bx has been found to be associated with decreased death-censored graft survival. Moderate to severe i-IFTA (2 or 3) is required for chronic active TCMR diagnosis by current Banff classification, although multiple recent studies have suggested that i-IFTA has no specificity to either TCMR or ABMR. Here we conducted an analysis on i-IFTA's association with TCMR or ABMR activity in Bx from patients in our center.

Methods: After excluding Bx with non-rejection causes of inflammation (glomerulonephritis, bacterial or viral infection), 361 Bx from 202 grafts were included and had Banff scores determined. Among them, 131 Bx from 131 unique grafts had definitive rejection diagnoses (52 ABMR, 21 ABMR+TCMR, 23 TCMR) or no rejection (n=35), and their i-IFTA scores were compared. Additionally, 101 pairs of consecutive Bx from 93 grafts were evaluated for possible changes of i-IFTA. Of these, 38 pairs of Bx from 38 grafts showed i-IFTA increasing from 0-1 to 2-3 (Bx intervals all <36 months [12.4±8.9]) and were analyzed for rejection diagnoses. 17 Bx pairs had only ABMR in both Bx (interval: 12.6±8.3 months) and 14 Bx pairs had only TCMR in both Bx (interval: 7.8±6.4 months), each pair from a different graft.

Results: Among 131 Bx with definitive rejection diagnosis, i-IFTA score was significantly higher in both TCMR and ABMR+TCMR groups vs. ABMR and no rejection groups with no significant difference between the latter 2 groups (Table 1). In the 38 pairs of Bx with increased i-IFTA, significant increase of TCMR activity ($p=0.02$) in the 2nd Bx was found by paired comparison, while ABMR activity did not change. 14 pairs of ABMR-free TCMR Bx showed high i-IFTA score in the 1st Bx of each pair, and the high score tended to further increase in the 2nd Bx (from 1.9±1.4 to 2.5±0.9, $p=0.16$), while 17 pairs of TCMR-free ABMR Bx showed minimal i-IFTA in both the 1st and 2nd Bx with no change (from 0.2±0.8 to 0.4±1.0, $p=0.47$).

Table 1. i-IFTA in 131 Bx with definitive rejection diagnosis

	ABMR	ABMR+TCMR	TCMR	No Rejection
i-IFTA	0.8±1.2	1.7±1.4	2.0±1.4	0.7±1.2
p (vs. ABMR)		0.02	<0.01	0.70
p (vs. ABMR+TCMR)			0.56	0.02
p (vs. TCMR)				<0.01

Conclusions: Significant i-IFTA in Bx appeared to be primarily associated with TCMR, but not ABMR activity, in our patients. The i-IFTA increase in consecutive Bx from the same patients with TCMR, but not ABMR activity, further supports this finding. More study is required to determine if this finding is specific to our patient cohort or more widely applicable.

CITATION INFORMATION: Zhang H. Inflammation in Scarred Cortex (i-IFTA) is Significantly Associated with T Cell-mediated Rejection (TCMR), but Not Antibody-mediated Rejection (ABMR), in Renal Allograft Biopsies (Bx) *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Zhang: None.

Abstract# 239

Late Subclinical Rejection and Borderline Rejection in Kidney Transplant Patients is Associated with Increased Incidence of Subsequent Clinical Rejections

V. Viswanathan[1], I. Melgarejo[2], C. Puttarajappa[2], P. Sood[2], M. Molinari[2], S. Hariharan[2], C. Wu[2], A. Sharma[2], N. Shah[2], R. Mehta[2], *[1]Department of Medicine, Renal-Electrolyte Division, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Surgery, Thomas E. Starzl Transplantation Institute, University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: The outcomes of inflammatory changes noted in late surveillance biopsies (1 year) is unclear.

Methods: Patients transplanted (live donor and deceased donor) at our center between Jan 2013 through Dec 2017 were considered for this study if they underwent a late biopsy (at 1 year). Out of 1000 patients, a total of 410 patients were eligible and were divided into 1. NI (n=184; t=0 and i=0); 2. BLR (n=127; t>0 and i>0 but not meeting criteria for Banff IA rejection); and 3. SC-TCMR (n=99; i2t2 or higher on surveillance biopsy). The NI group was used as a negative comparator. TCMR and AMR was treated per institution protocol. We followed all groups for subsequent clinical rejections for a maximum duration of 7 years and median of 4 years. Induction regimen included thymoglobulin (>95% of pts). Maintenance regimen comprised of tacrolimus and mycophenolate mofetil.

Results: There were no significant differences in age, sex, race, HLA mismatch, PRA or other demographics between the groups. Odds Ratio for subsequent clinical rejection was 4.1 (95% CI 1.7-10.7; $p<0.001$) for the BLR group; 5.6 (95% CI 2.3-14.4; $p<0.001$) for the SC-TCMR group.

Conclusions: 1. The odds of having subsequent clinical rejection was 4 times higher in patients with borderline rejection and more than 5 times higher in patients with subclinical rejection noted on late surveillance biopsies. 2. It is important to identify these cohorts of patients with inflammatory lesions noted on late surveillance biopsies in order to closely monitor and treat subsequent rejections while optimizing immunosuppression.

Table 1

Group	Number(n)	Number of pts with subsequent rejection over 7y f/u	Proportion of patients with subsequent rejections	P value (compared to NI)
NI	184	7	3.8%	
BLR	127	20	15.7%	<0.001
SC-TCMR	99	21	21.2%	<0.001
Total	410	48		

CITATION INFORMATION: Viswanathan V., Melgarejo I., Puttarajappa C., Sood P., Molinari M., Hariharan S., Wu C., Sharma A., Shah N., Mehta R. Late Subclinical Rejection and Borderline Rejection in Kidney Transplant Patients is Associated with Increased Incidence of Subsequent Clinical Rejections *AJT, Volume 21 Supplement 3*

DISCLOSURES: V. Viswanathan: None. **I. Melgarejo:** None. **C. Puttarajappa:** None. **P. Sood:** None. **M. Molinari:** None. **S. Hariharan:** None. **C. Wu:** None. **A. Sharma:** None. **N. Shah:** None. **R. Mehta:** None.

Abstract# 240

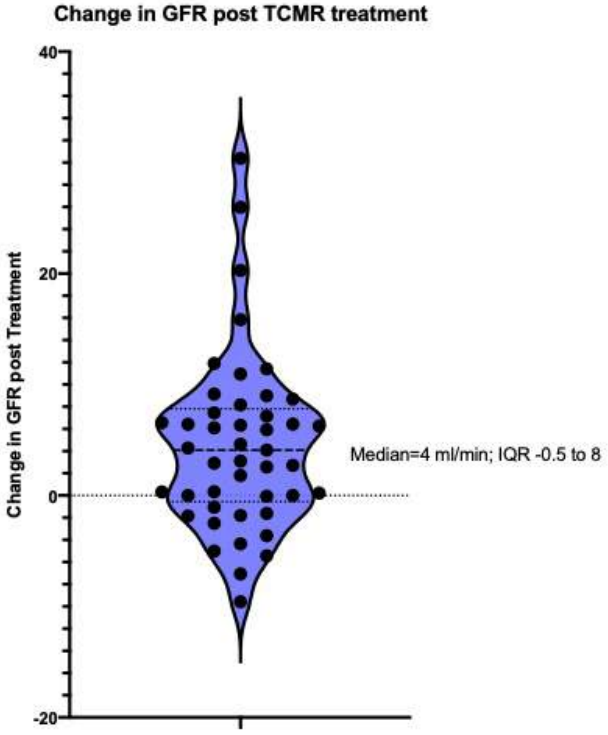
Therapeutic Response of Late Clinical Cell Mediated Rejection is Modeled by Chronicity Changes

I. Melgarejo[1], V. Visnawathan[2], A. Sharma[1], P. Sood[1], C. Puttarajappa[1], C. Wu[1], N. Shah[1], M. Molinari[1], S. Hariharan[1], R. Mehta[1], *[1]Starzl Transplant Institute, University of Pittsburgh Medical Center, Pittsburgh, PA, [2]Department of Medicine, Renal-Electrolyte Division, University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: Although there is a tendency to treat late clinical TCMR, the responsiveness to steroids is unclear.

Methods: Among kidney transplant recipients, transplanted between Jan 2013 and December 2017, we followed clinical rejections (beyond 6months) in a cohort of patients who had undergone a 3 month surveillance biopsy and no episodes of clinical rejection. Of the 62 patients who had a late rejection, 45 had pure TCMR (Banff IA/IB in severity). The majority of the patients (>95%) were induced with thymoglobulin at the time of transplant. Those who were diagnosed to have TCMR were treated with steroids 250 mg iv for a total of 3 doses. We compared baseline GFR, GFR at time of biopsy and the best GFR within 3 months of rejection treatment in the TCMR group. Based on the GFR response, the patients were divided into those that continued to have worsening GFR post treatment (n=12) and those where GFR stabilized or improved post treatment (n=33). Based on the binary variable of response to treatment, a multivariable logistic regression was performed taking into consideration recipient age, sex, race, sensitization, DGF and DSA. We used the total i score to account for inflammation in the scarred areas.

Results: The median change in GFR among all clinical TCMR was 4 ml/min (IQR -0.5 to 7.8). Multivariable analysis revealed IFTA score>2 (p=0.017; OR 7.6, CI 1.4-40) was associated with lack of improvement post treatment.
Conclusions: 1. Therapeutic response of pure late T cell mediated rejection to steroids is modest at best, with a median change in GFR of only 4 ml/min. 2. IFTA score of greater than 2 was associated with a poor therapeutic response in pure TCMR. 3. Factors impacting response to late TCMR should be analyzed in larger studies given poor responsiveness to treatment.



CITATION INFORMATION: Melgarejo I., Visnawathan V., Sharma A., Sood P., Puttarajappa C., Wu C., Shah N., Molinari M., Hariharan S., Mehta R. Therapeutic Response of Late Clinical Cell Mediated Rejection is Modeled by Chronicity Changes *AJT, Volume 21 Supplement 3*
DISCLOSURES: I. Melgarejo: None. **V. Visnawathan:** None. **A. Sharma:** None. **P. Sood:** None. **C. Puttarajappa:** None. **C. Wu:** None. **N. Shah:** None. **M. Molinari:** None. **S. Hariharan:** None. **R. Mehta:** None.

Liver

Liver Recipient Selection

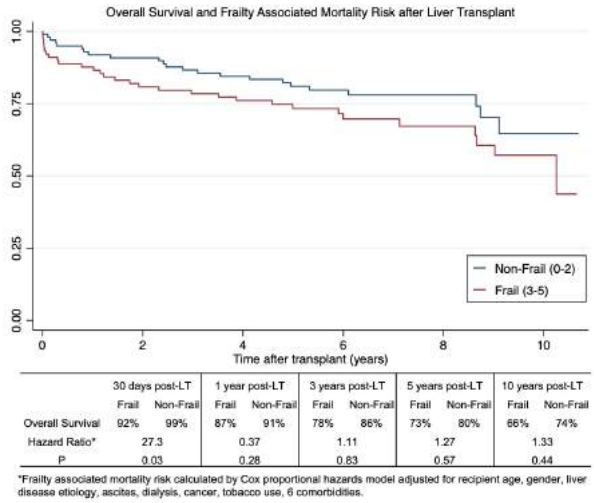
Abstract# 241

Pre-Transplant Frailty is Associated with 30-Day Mortality but Not Long-Term Survival After Liver Transplantation

M. Anderson, V. Valbuena, M. Englesbe, C. Sonnenday, *Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

Purpose: Frailty predicts waitlist death in liver transplant (LT) candidates, but the impact of frailty on mortality after LT is unknown. We investigated the association between pre-transplant frailty and survival after LT.
Methods: We analyzed post-transplant outcomes in 224 LT recipients enrolled in a prospective study of frailty in LT candidates at our institution from 07/2009-01/2016. Patients with a frailty assessment in the year prior to LT were included. Patients with assessments more than one year from LT (n=47) or incomplete data (n=1) were excluded. Frailty was assessed by the 5-item Fried frailty instrument measuring gait speed, grip strength, unintentional weight loss, self-reported exhaustion, and physical activity. Demographic and clinical data at the time of frailty assessment and post-LT outcomes were collected. Frailty was defined as a Fried frailty score ≥ 3. The primary outcome was post-transplant survival, analyzed by Kaplan-Meier and Cox proportional hazards models. Inspection of Kaplan-Meier curves showed significantly higher mortality in the first 30 days. To account for non-proportional hazards, survival was examined in two time intervals: ≤30 days and >30 days after LT.
Results: 176 patients met inclusion criteria, of which 49% (n=86) were frail. Frail patients had higher baseline MELD, greater frequency of ascites, and lower frequency of cancer. There was no difference in demographics or other comorbidities by frailty (Table 1). Overall post-transplant survival was 69.9% with median follow up time of 5.8 years. Frailty was associated with a significantly higher risk of death in the first 30 days after LT (HR=27.3, p=0.03). There was no significant difference in 1-year, 3-year, 5-year, or 10-year adjusted post-transplant survival between frail and non-frail patients. Unadjusted Kaplan-Meier curves stratified by frailty and adjusted Cox proportional hazard ratios are shown in Figure 1.
Conclusions: Frailty was associated with early mortality, but not associated with decreased long term survival after LT. Given the well-established association between frailty and waitlist mortality, frail patients may benefit from expedited allocation and prehabilitation.

Selected Baseline Characteristics Stratified by Frailty			
	Non-Frail (n=90)	Frail (n=86)	P
Age (median(IQR))	54.9(45.9-61.4)	57.7(50.7-61.1)	0.090
Female %(n)	24.4(22)	27.9(24)	0.549
BMI (mean(SD))	29.7(6.0)	29.3(6.3)	0.646
Diabetes %(n)	25.6(23)	33.7(29)	0.251
Any cancer %(n)	53.3(48)	23.3(20)	**<0.001**
Ascites %(n)	31.1(28)	59.3(51)	**<0.001**
Lab MELD (mean(SD))	16(6.4)	19(6.9)	**<0.001**



	30 days post-LT		1 year post-LT		3 years post-LT		5 years post-LT		10 years post-LT	
	Frail	Non-Frail	Frail	Non-Frail	Frail	Non-Frail	Frail	Non-Frail	Frail	Non-Frail
Overall Survival	92%	99%	87%	91%	78%	86%	73%	80%	66%	74%
Hazard Ratio*	27.3		0.37		1.11		1.27		1.33	
P	0.03		0.28		0.83		0.57		0.44	

*Frailty associated mortality risk calculated by Cox proportional hazards model adjusted for recipient age, gender, liver disease etiology, ascites, dialysis, cancer, tobacco use, 6 comorbidities.

CITATION INFORMATION: Anderson M., Valbuena V., Englesbe M., Sonnenday C. Pre-Transplant Frailty is Associated with 30-Day Mortality but Not Long-Term Survival After Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Anderson: None. **V. Valbuena:** None. **M. Englesbe:** None. **C. Sonnenday:** None.

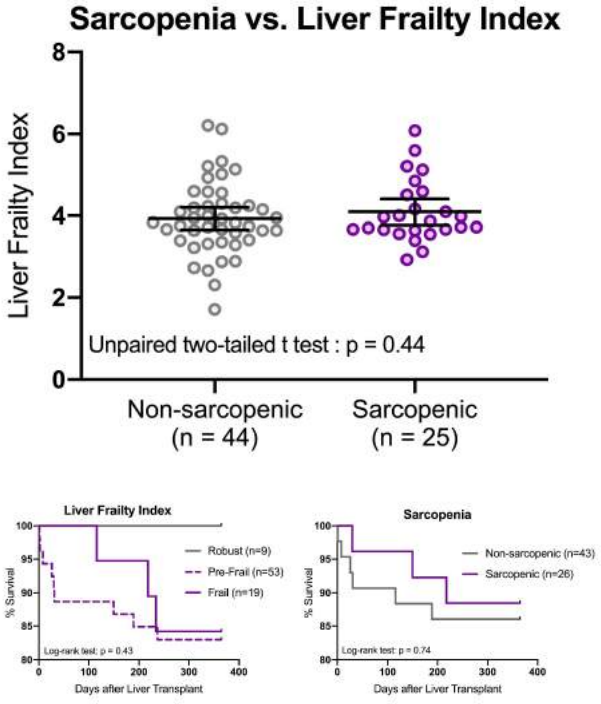
Abstract# 242

Relationship of Functional Frailty and Radiographic Sarcopenia to Outcomes After Liver Transplant

S. L. Olson, P. Polineni, W. Schwartz, O. Siddiqui, L. Zhao, D. Ganger, D. P. Ladner, *Comprehensive Transplant Center, Northwestern University, Chicago, IL*

Purpose: Frailty and sarcopenia are associated with increased risk of hospitalization and mortality in end stage liver disease patients. Frailty can be measured clinically using functional scales such as the Liver Frailty Index (LFI), whereas sarcopenia is measured by quantifying muscle mass on imaging. The purpose of this study is to examine the correlation between LFI and sarcopenia, and their relative efficacy in predicting clinical outcomes after liver transplant.
Methods: Patients who underwent LFI testing, abdominal imaging, and liver transplant between 2018-2019 were included in this study. Grip strength, timed chair stands, balance testing, and sex were factored into LFI scores that were rated as frail, pre-frail, and robust. Sarcopenia was assessed by total psoas area at the L3 cross-section on CT or MR and divided by patient height squared. Sex-specific thresholds were used to categorize patients as sarcopenic or non-sarcopenic.
Results: 81 patients were included in this preliminary analysis: 60% male, 77% white, median age at transplant 62, median days on waitlist 48. 69 (85%) of these patients had imaging done near LFI evaluation and were assessed for sarcopenia. 32% of patients were sarcopenic; LFI scores were not significantly different based on sarcopenia status (Fig 1). Frail patients had significantly higher MELD-Na scores than robust patients (21.82 vs. 14.80, p=.05); sarcopenic patients had significantly

higher MELD-Na scores than non-sarcopenic patients (23.46 vs. 17.43, p<.001). Length of post-transplant hospital stay and number of readmissions within 1 year were not significantly different between frailty nor sarcopenia categories. Pre-frail and frail patients had lower survival 1 year post transplant compared to robust patients, whereas sarcopenia was not associated with reduced 1 year survival (Fig 2).
Conclusions: LFI quantified frailty and psoas-derived sarcopenia are both associated with higher MELD-Na scores. LFI is a better predictor of mortality after transplant than sarcopenia. LFI and sarcopenia are poorly correlated, requiring further analysis to determine which risk screening tools should guide pre-transplant frailty interventions.



CITATION INFORMATION: Olson S., Polineni P., Schwartz W., Siddiqui O., Zhao L., Ganger D., Ladner D. Relationship of Functional Frailty and Radiographic Sarcopenia to Outcomes After Liver Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.L. Olson: None. **P. Polineni:** None. **W. Schwartz:** None. **O. Siddiqui:** None. **L. Zhao:** None. **D. Ganger:** None. **D.P. Ladner:** Grant/Research Support; Name of Commercial Interest; National Institute on Aging.

Abstract# 243

Comorbidity Burden is Associated with Increased Waitlist Mortality Among NASH Patients

J. R. Montgomery[1], M. J. Englesbe[1], C. Connelly[2], *[1]Michigan Medicine, Ann Arbor, MI, [2]General Surgery, Oregon Health & Science University, Portland, OR*

Purpose: Nonalcoholic steatotic hepatitis (NASH) is an increasing and common indication for liver transplantation. The association between increased comorbidity burden and risk of death on the waitlist remains unknown.
Methods: Adult patients listed for liver transplant from 2004-2018 were identified from the UNOS-STAR file. NASH patients were identified by primary diagnosis code and compared with non-NASH patients. Patients who received exception points were excluded. Kaplan Meier estimates of waitlist survival and transplantation within 1 year of listing adjusting for listing MELD-Na score were compared among NASH and non-NASH patients. Subhazard ratios (SHR) were reported separately for days 0-60 and days 61-365 due to nonproportional hazards between cohorts over time. Iterative adjustment was performed for listing MELD-Na score, then patient characteristics and comorbidities (age, sex, BMI, diabetes, and kidney disease).
Results: 61,859 patients were included, of which 12,689 (20.5%) had NASH. NASH patients were more likely to be older, female sex, with a higher burden of comorbidities, but lower MELD-Na scores at listing (Table). NASH patients had lower unadjusted risk of death within 60-days of listing (SHR 0.93, 95%CI 0.89-0.97) but higher risk of death between days 61-365 (SHR 1.12, 95%CI 1.08-1.17). Lower listing MELD-Na score among NASH patients explained the decreased risk of death between days 0-60 (aSHR 1.08, 95%CI 0.99-1.17) but not days 61-365 (aSHR 1.13, 95%CI 1.09-1.18). This is shown graphically in Figure. Further adjustment for patient characteristics and comorbidities resulted in similar risk of death between days 0-60 (aSHR 0.92, 95%CI 0.84-1.02) and lower risk between days 61-365 (aSHR 0.92, 95%CI 0.88-0.96).
Conclusions: NASH patients are listed at lower MELD-Na scores than non-NASH patients. Despite lower listing MELD-Na, NASH patients demonstrated a higher risk of waitlist mortality from days 61-365, associated with higher comorbid disease burden. These data suggest that NASH patients have shorter window to transplantation. Careful assessment and management of comorbidities are particularly important in NASH patients.

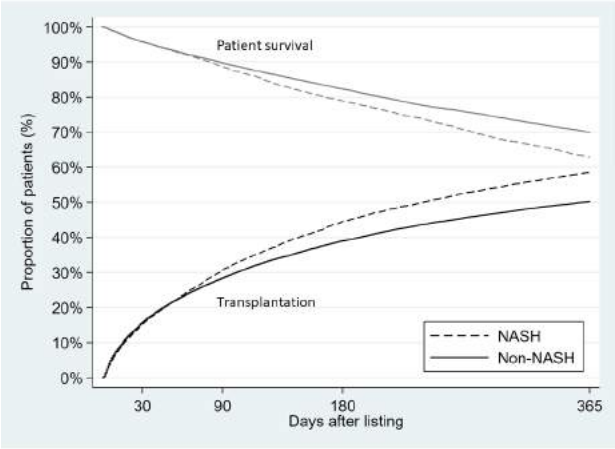


Table (all comparisons P<.001)			
		NASH	Non-NASH
Age	median (IQR)	60 (54, 65)	55 (48, 61)
Female sex	%	50.4	37.1
BMI	median (IQR)	32 (29, 37)	27 (24, 31)
Listing MELD-Na score	median (IQR)	20 (15, 27)	21 (15, 29)
Diabetes	%	55.0	20.3
Dialysis	At listing	8.3%	8.6%
	At list removal	20.1%	18.8%

CITATION INFORMATION: Montgomery J., Englesbe M., Connelly C. Comorbidity Burden is Associated with Increased Waitlist Mortality Among NASH Patients *AJT, Volume 21 Supplement 3*
DISCLOSURES: J.R. Montgomery: None. **M.J. Englesbe:** None. **C. Connelly:** None.

Abstract# 244

Coronary Computed Tomography Angiography for Pre-Liver Transplant Cardiovascular Risk Assessment: A Single Center Experience

J. Rice[1], T. Genders[2], D. Groves[2], J. R. Burton[1], J. Moloo[2], R. Quaife[2], D. Vargas[3], M. Kriss[1], *[1]Division of Gastroenterology and Hepatology, University of Colorado, Aurora, CO, [2]Division of Cardiology, University of Colorado, Aurora, CO, [3]Division of Radiology, University of Colorado, Aurora, CO*

Purpose: Coronary computed tomography angiography (CCTA) is an established non-invasive imaging modality for diagnosing coronary artery disease (CAD), though its use for cardiovascular disease (CVD) risk assessment prior to liver transplant (LT) remains limited. Our center has incorporated routine CCTA into our pre-LT CVD risk assessment protocol and the purpose of this study is to examine the efficacy and safety of the protocol.
Methods: We retrospectively reviewed all patients undergoing LT evaluation at our center from 7/1/18 to 6/30/20. Patients evaluated for acute liver failure or re-transplant were excluded. Coronary artery calcium (CAC) scores, CAD reporting and data system (CAD-RADS) scores, medication administration, and adverse outcomes were collected on all patients. Patients with pre-existing CAD underwent invasive coronary angiography (ICA). Patients age >50 or age 40-50 with longstanding diabetes or >10 pack-year smoking history underwent CCTA if GFR >40 cc/min. Patients with contraindications to CCTA underwent stress echocardiogram or ICA based on CVD risk factors. CAD was defined as the presence of any atherosclerotic coronary disease. All patients with obstructive CAD, defined as any vessel >70% stenosis (or left main >50%) or lesions with positive (< 0.8) fractional flow reserve computed tomography (FFR-CT), underwent ICA.
Results: A total of 605 patients were evaluated for LT with 278 completing CCTA, however 8 completed only CAC score due to high calcium burden. CCTA results are shown in Table 1. CAD was diagnosed in 63.8% of patients, of whom 8.5% had obstructive CAD. Median CAC scores were higher for obstructive CAD versus

nonobstructive (537 [IQR 123-1300] vs 74 [IQR 13-263], p=0.019). FFR-CT was performed in 32 patients with 46.9% having a flow limiting lesion. Metoprolol was administered in 69.2% of patients to achieve adequate heart rate (<70 bpm) and nitroglycerine in 69.2% to achieve coronary hyperemia. Only 2 patient required escalation of care for hypotension. A total of 42 patients (15.2%) required ICA after CCTA.

Conclusions: CCTA is a promising non-invasive imaging modality for detecting CAD during pre-liver transplant CVD risk assessment with a high technical success rate and low complication rates.

Table 1: CCTA Results

CAD-RADS Score	N (%)
0 (No plaque or stenosis)	56 (20.7%)
1 (1-24% stenosis)	80 (29.6%)
2 (25-49% stenosis)	58 (21.5%)
3 (50-69% stenosis)	23 (8.5%)
4 (70-99% stenosis or >50% left main stenosis)	14 (5.2%)
5 (100% occlusion)	1 (0.4%)
N (Non-diagnostic)	38 (14.1%)

CITATION INFORMATION: Rice J., Genders T., Groves D., Burton J., Moloo J., Quaife R., Vargas D., Kriss M. Coronary Computed Tomography Angiography for Pre-Liver Transplant Cardiovascular Risk Assessment: A Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Rice: None. **T. Genders:** None. **D. Groves:** None. **J.R. Burton:** None. **J. Moloo:** None. **R. Quaife:** None. **D. Vargas:** None. **M. Kriss:** None.

Abstract# 245

Recipient Selector for Donation After Cardiac Death Allografts

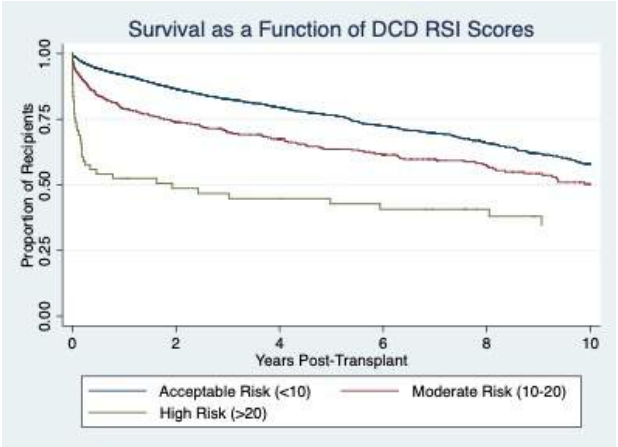
G. Handing[1], S. Ganni[2], S. Barrett[1], N. Galvan[2], C. O'Mahony[2], J. Goss[2], R. Cotton[2], A. Rana[2], *[1]School of Medicine, Baylor College of Medicine, Houston, TX, [2]Michael E DeBakey Department of Surgery, Division of Abdominal Transplant, Houston, TX*

Purpose: Donation after cardiac death (DCD) allografts might represent one of the largest untapped sources of liver allografts. Our aim was to identify independent donor and recipient risk factors that predict mortality in DCD allograft recipients to select optimal candidates for successful transplants.

Methods: Using the Organ Procurement and Transplantation Network database, we performed a univariate and multivariate retrospective analysis on 4,228 DCD liver allograft recipients.

Results: We identified 11 significant factors and incorporated them into the weighted recipient selector index (RSI) to successfully predict 3-month survival following DCD liver transplantation with a C-statistic of 0.7040. MELD score components were included as individual predictors; thus, the novel DCD RSI (DCD Recipient Selector Index) can predict survival independently of MELD. The most significant recipient risk factors were recipient serum sodium levels greater than 150 mEq/L at transplant, donor age of 60-70 years, recipient albumin less than 2.0 g/dL at transplant and recipient INR of 3-3.5 at transplant. Donor risk index was not found to be a significant predictor.

Conclusions: The DCD RSI can help quantify survival benefit for recipients and increase utilization of DCD donor allografts by matching the allograft to the recipient with the highest chance of success.



CITATION INFORMATION: Handing G., Ganni S., Barrett S., Galvan N., O'Mahony C., Goss J., Cotton R., Rana A. Recipient Selector for Donation After Cardiac Death Allografts *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Handing: None. **S. Ganni:** None. **S. Barrett:** None. **N. Galvan:** None. **C. O'Mahony:** None. **J. Goss:** None. **R. Cotton:** None. **A. Rana:** None.

Abstract# 246

Cardiac Risk Assessment in Liver Transplant Candidates: Survey of National Practice Patterns

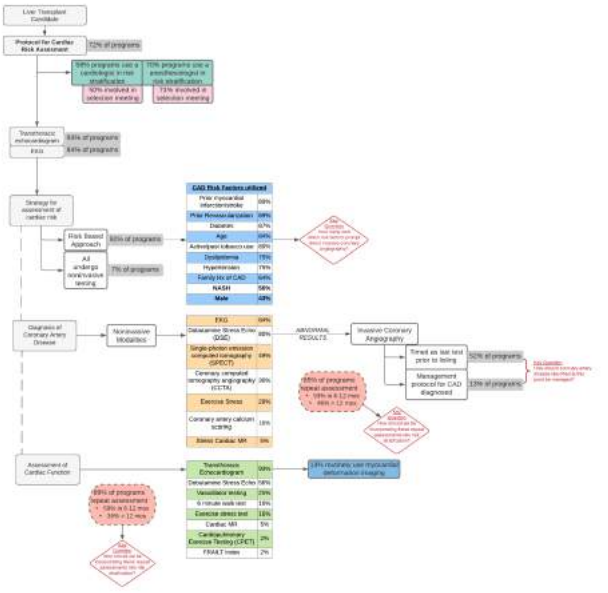
P. Barman[1], R. Chadha[2], L. VanWagner[3], *[1]Div. of GI/Hepatology, University of California, San Diego, San Diego, CA, [2]Anesthesiology, Mayo Clinic, Jacksonville, FL, [3]Div. of GI/Hepatology, Northwestern University, Chicago, IL*

Purpose: Cardiac disease is a leading cause of morbidity and mortality in the first year after liver transplantation (LT) and pre-transplant identification is vital to post-transplant outcomes. However, clear evidence-based practice guidance for cardiac risk assessment in LT candidates is lacking. We sought to characterize current practice patterns across transplant centers.

Methods: We surveyed 117 LT programs across the United States using Research Electronic Database Capture (REDCap). The survey addressed personnel involved, protocols utilized, and specific modalities used in risk assessment and diagnosis of coronary artery disease (CAD) and cardiac function.

Results: Of 61 responses, the majority (72%) of programs had a written protocol for risk assessment. 36 programs utilized a dedicated cardiologist for risk stratification, and 50% were involved in selection meeting. Most (70%) programs involved an anesthesiologist in risk stratification; 73% of these were involved in selection meeting. For assessment of cardiac risk, 92% of programs utilized a risk-based approach. The most commonly used risk factors were prior MI/stroke (89%), revascularization (89%), diabetes (87%), age (84%), and smoking (80%); only 56% used NASH as a risk factor. The age threshold to trigger additional testing ranged from 30-70 years old with caveats based on specific risk factors. For non-invasive testing in CAD, most programs used EKG (84%) and dobutamine stress echocardiography (80%). Less than half (49%) used single-photon emission computed tomography and only 30% routinely used coronary computed tomography angiography. Over half (52%) deferred invasive coronary angiography as the last test prior to listing, however only 8 (13%) programs had a specific protocol for management of identified CAD. For cardiac function, nearly all programs (93%) obtained an echocardiogram, though only 8 (13%) programs routinely utilized myocardial deformation imaging; 56% specifically used DSE for this indication. Finally, most programs repeated assessment for both CAD and cardiac function (85% and 89%, respectively) though time interval varied from < 6 months to > 2 years.

Conclusions: Practice patterns for cardiac risk assessment in LT candidates are heterogeneous across the country and do not reflect current evidence-based recommendations (Figure). This represents an area ripe for standardization to improve identification of cardiac disease and optimize risk for cardiac events after transplant.



CITATION INFORMATION: Barman P., Chadha R., VanWagner L. Cardiac Risk Assessment in Liver Transplant Candidates: Survey of National Practice Patterns *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Barman: None. **R. Chadha:** None. **L. VanWagner:** None.

Abstract# 247

Outcomes After Liver Transplantation With Steatotic Grafts: Redefining Acceptable Cutoffs for Moderately Steatotic Grafts

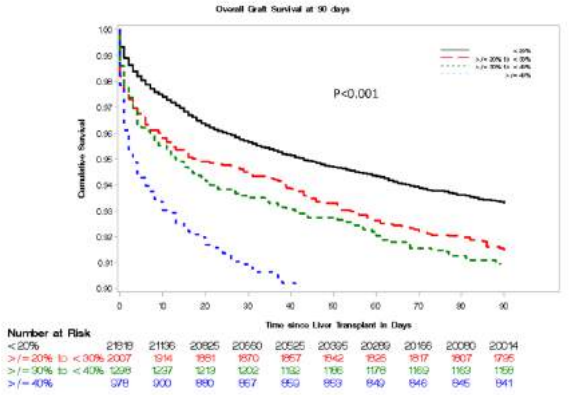
B. L. Da[1], J. Satiya[2], R. P. Heda[3], Y. Jiang[4], L. Lau[5], A. Fahmy[1], A. Winnick[1], N. Roth[1], E. Grodstein[1], P. J. Thuluvath[6], A. K. Singal[7], T. D. Schiano[8], L. W. Teperman[1], S. K. Satapathy[1], *[1]Liver Disease, Northwell Health, Manhasset, NY, [2]Beth Israel Deaconess Medical Center, Boston, MA, [3]Tulane Medical Center, Memphis, TN, [4]The University of Memphis, Memphis, TN, [5]Northwell Health, Manhasset, NY, [6]University of Maryland School of Medicine, Baltimore, MD, [7]Liver Disease, Avera McKenna University Health Center and Transplant Institute, Manhasset, NY, [8]Icahn School of Medicine at Mount Sinai, New York City, NY*

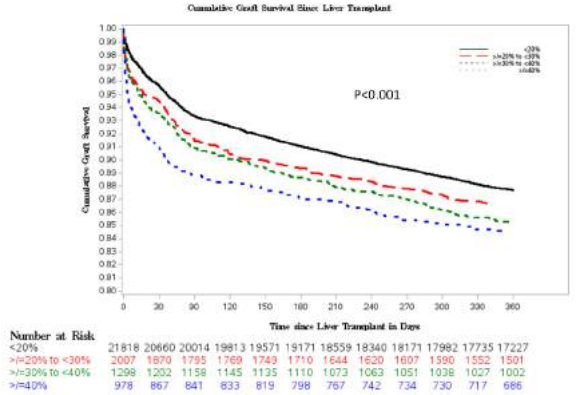
Purpose: Graft macro-steatosis can predispose to worse graft survival. Our objective was to redefine acceptable cutoffs for graft steatosis using the national database.

Methods: Data of 26,103 donors who underwent LT between January 2004 to December 2018 from the United Network for Organ Sharing-Standard Transplant Analysis and Research (UNOS-STAR) database were utilized. A high-risk steatotic (HRS) and low-risk steatotic (LRS) graft was defined as ≥20% and <20% macro-steatosis, respectively. HRS grafts was further classified as grafts with 20-29% (G1S grafts), 30-39% (G2S grafts), and ≥40% steatosis (G3S grafts). Outcomes between groups were compared using Kaplan-Meier curves and multivariate Cox proportional regression analysis.

Results: Recipients of LRS grafts had a graft (93.3% and 87.7%) and overall survival (95.4% and 90.5%) at 90 days and 1-year. Compared to LRS grafts, G1S, G2S, and G3S grafts had worse graft and overall survival at 90 days and 1-year (P < 0.001). However, there was no difference in graft or overall survival at 90 days or 1-year when G2S grafts were compared to G1S or G3S grafts. After adjusting for significant predictors of graft loss, higher steatosis grades were associated with an increased risk of graft loss. Relative to LRS grafts, G3S grafts had the highest risk of graft loss - aHR 1.38 [1.16-1.63], P < 0.001.

Conclusions: Although HRS grafts are associated with worse post-LT outcomes compared to LRS grafts, excellent outcomes are seen in the United States due to proper recipient to donor matching. Increasing steatosis grades among HRS grafts is associated with worse graft survival after accounting for other significant predictors of graft loss.





CITATION INFORMATION: Da B., Satiya J., Heda R., Jiang Y., Lau L., Fahmy A., Winnick A., Roth N., Grodstein E., Thuluvath P., Singal A., Schiano T., Teperman L., Satapathy S. Outcomes After Liver Transplantation With Steatotic Grafts: Redefining Acceptable Cutoffs for Moderately Steatotic Grafts *AJT, Volume 21 Supplement 3*

DISCLOSURES: B.L. Da: None. **J. Satiya:** None. **R.P. Heda:** None. **Y. Jiang:** None. **L. Lau:** None. **A. Fahmy:** None. **A. Winnick:** None. **N. Roth:** None. **E. Grodstein:** None. **P.J. Thuluvath:** None. **A.K. Singal:** None. **T.D. Schiano:** None. **L.W. Teperman:** None. **S.K. Satapathy:** None.

Abstract# 248

The Utility of PET/ CT Testing in Cardiac Risk Stratification of Adult Liver Transplant Candidates

M. A. Tincopa[1], R. Weinberg[1], S. Sengupta[1], J. Slivnick[2], J. Corbett[1], C. Sonnenday[1], R. Fontana[1], P. Sharma[1], *[1]Internal Medicine, University of Michigan, Ann Arbor, MI, [2]Internal Medicine, Ohio State University, Columbus, OH*

Purpose: Optimal cardiovascular (CV) risk stratification in liver transplant (LT) candidates remains unclear. The aim of this study was to assess concordance and utility of findings between dobutamine stress echo (DSE), positron emission tomography/computed tomography myocardial perfusion imaging (PET/CT MPI) and left heart catheterization (LHC) in LT candidates. Secondary aims were to evaluate CV testing results in relationship to 6-month post LT CV outcomes.

Methods: Data on 234 consecutive adult LT candidates evaluated between February 2015 thru June 2018 with PET/CT MPI was reviewed. CV outcomes were adjudicated by a board certified cardiologist.

Results: Median age was 60.8, 61% were male, 87% white, 54% had diabetes, median MELD-Na 14, and body mass index (BMI) 30.2 kg/m^2. 37% had NASH and 29% alcoholic liver disease. 65% of patients had a DSE, with 41% non-diagnostic. No factors were independently associated with likelihood of having a non-diagnostic DSE. The median global myocardial flow reserve (MFR) was 1.8 ml/min and correlated positively with hemoglobin and negatively with MELD-Na, age, ejection fraction and BMI. 32 (13%) patients had moderate/high risk MPI results and associations with these findings are shown in **Table 1**. Older age and a history of CV disease were independently associated with moderate/high risk MPI findings. In patients with 2 testing modalities, findings were concordant in 80% (**Table 2**). 53 patients underwent LT and 11 had a CV complication. No factors were independently associated with risk of outcomes.

Conclusions: Cardiac risk stratification was concordant across modalities the majority of the time in LT candidates. PET/CT MPI may be the initial CV risk stratification modality of choice in older patients and those with a history of CV disease.

Table 1. Associations with Moderate/High Risk PET/CT Findings

	Moderate/High Risk N=32	Low Risk N=202	P value	Multivariate
	Median (IQR) or N(%)			OR (95% CI), P value
Age	63.5 (59.6-66.5)	60.3 (54.0-65.5)	**0.009**	1.06 (1.00-1.13), **0.04**
CAD	20 (62.5)	35 (17.3)	**<0.001**	5.74 (2.37-13.88), **<0.001**
HTN	25 (78.1)	101 (50)	**0.003**	
CHF	4 (12.5)	7 (3.4)	**0.04**	
Hyperlipidemia	18 (56.2)	52 (25.7)	**<0.001**	1.67 (0.68-4.08), 0.25
Hemoglobin	10.6 (8.8-11.8)	11.5 (9.7-13.1)	**0.02**	
DSE			0.23	
Low risk	11 (34.4)	74 (36.6)		
Moderate/High risk	2 (6.3)	3 (1.4)		
Non-diagnostic	6 (18.7)	56 (27.7)		
Left Heart Cath			**<0.001**	
Not done	11 (34.4)	182 (90.1)		
Low risk	12 (37.5)	15 (7.4)		
Moderate/High risk	9 (28.1)	5 (2.4)		

	LHC Normal coronaries/ non-obstructive CAD			LHC cardiac intervention recommended			LHC not performed			
	DSE			DSE			DSE			
	No inducible Ischemia	Non-diagnostic	Not done	No inducible Ischemia	Non-diagnostic	Not done	No inducible Ischemia	Inducible Ischemia	Non-diagnostic	Not done
PET/CT Low Risk	6	2	7	1		4	67	3	54	58
PET/CT Mod/High Risk	7	1	4	1	4	4	3	2	1	5

*Concordant results bolded

CITATION INFORMATION: Tincopa M., Weinberg R., Sengupta S., Slivnick J., Corbett J., Sonnenday C., Fontana R., Sharma P. The Utility of PET/ CT Testing in Cardiac Risk Stratification of Adult Liver Transplant Candidates *AJT, Volume 21 Supplement 3*

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Late-Breaking: COVID-19

Abstract# LB 1

Safety of Sars-cov-2 Mrna Vaccines in Solid Organ Transplant Recipients

M. Ou, B. Boyarsky, J. Motter, R. Greenberg, A. Teles, J. Ruddy, M. Krach, W. Werbel, R. Avery, A. Massie, D. Segev, J. Garonzik-Wang, *Johns Hopkins School of Medicine, Baltimore, MD*

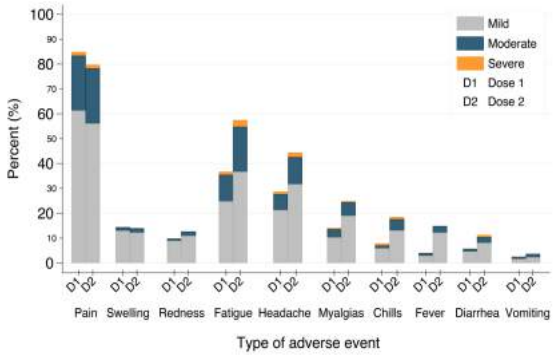
Purpose: The safety of SARS-CoV-2 mRNA vaccines in solid organ transplant recipients (SOTRs) remains unknown. We investigated adverse events in SOTRs who received these mRNA vaccines.

Methods: We studied SOTRs between 12/16/2020 - 2/10/2021 who received at least one dose of a vaccine. Vaccine reactogenicity within one week following the first or second dose was self-reported via an interactive, online platform.

Results: A total of 790 SOTRs received either the Pfizer/BioNTech (49%) or Moderna (51%) vaccine. Most participants have, thus far, received only one dose, but 211 (27%) received both doses. The median (IQR) age was 58 (43-68), with 57% female, 90% White, and 81% college educated. Organs transplanted include kidney (56%), liver (20%), and heart (16%), with a median (IQR) of 6 (3-13) years since transplantation. There were no reports of new COVID-19 infection, acute rejection, anaphylaxis requiring epinephrine, or new neurological conditions such as Guillain-Barré or Bell's palsy. Overall, moderate to severe local and systemic adverse reactions remained low (Figure 1). Comparison between the first and second dose showed that moderate to severe systemic adverse reactions, while uncommon, were higher after the second dose, including fatigue (22% vs 12%, p<0.001), headache (14% vs. 8%, p<0.01), chills (6% vs. 2%, p<0.01), and fever (3% vs. 1%, p<0.001)(Table 1).

Conclusions: In our observational cohort, there were no reports of new COVID-19 infection, acute rejection, anaphylaxis requiring epinephrine, or new neurological conditions following SARS-CoV-2 mRNA vaccination. While uncommon, moderate to severe systemic adverse reactions were higher after the second dose. Thus far, there are no large safety concerns for SARS-CoV-2 mRNA vaccines in SOTRs.

Figure 1. Total adverse events after the first and second dose of a SARS-CoV-2 mRNA vaccine



Note: dose 1, n = 790
dose 2, n = 211

Table 1. Comparison of symptom severity among SOTRs who received both the first and second dose of a SARS-CoV-2 mRNA vaccine

Dosage	Dose 1*			Dose 2*			
Symptom Severity	*Mild*[1]	*Moderate*[2]	*Severe*[3]	*Mild*[1]	*Moderate*[2]	*Severe*[3]	p-value
Local site reaction							
Pain, %	62	22	2	56	22	1	0.8
Swelling, %	14	2	0	13	2	0	0.9
Redness, %	9	1	0	10	2	0	0.7
Systemic adverse event							
Fatigue, %	25	11	1	37	19	3	<0.001
Headache, %	22	7	1	32	12	2	<0.01
Myalgias, %	10	4	1	19	5	1	0.2
Chills, %	6	1	1	13	5	1	<0.01
Fever, %	3	1	0	12	3	0	<0.001
Diarrhea, %	5	1	0	9	2	1	0.049
Vomiting, %	2	1	0	2	2	0	0.06

* n = 211 (27%) participants who received both doses
[1] Mild: does not interfere with activity
[2] Moderate: some interference with activity
[3] Severe: prevents daily activity

CITATION INFORMATION: Ou M., Boyarsky B., Motter J., Greenberg R., Teles A., Ruddy J., Krach M., Werbel W., Avery R., Massie A., Segev D., Garonzik-Wang J. Safety of Sars-cov-2 Mrna Vaccines in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Ou: None. **B. Boyarsky:** None. **J. Motter:** None. **R. Greenberg:** None. **A. Teles:** None. **J. Ruddy:** None. **M. Krach:** None. **W. Werbel:** None. **R. Avery:** None. **A. Massie:** None. **D. Segev:** None. **J. Garonzik-Wang:** None.

Abstract# LB 2

A Mechanistic Evaluation to Guide the Optimal Immunosuppression Adjustment Strategy in Transplant Patients with COVID-19

V. Hall, V. Ferreira, D. Kumar, A. Humar, *UHN, Toronto, ON, Canada*

Purpose: The optimal management of immunosuppression in transplant patients infected with COVID-19 is unknown. Reduction in calcineurin inhibitors or antimetabolite doses is often performed in order to enhance immune responses, but there are minimal data to guide decisions. We performed an *in vitro* study to determine the effect of individual immunosuppressive agents and doses on SARS-CoV-2 specific T-cell cytokine expression.

Methods: Peripheral blood mononuclear cells (PBMCs) were isolated from nine non-immunosuppressed patients diagnosed with COVID-19 at least 14 days prior. Cells were pre-incubated for four hours with clinically relevant, differing concentrations of immunosuppressive drugs (tacrolimus (TAC), mycophenolate (MPA), sirolimus, prednisone). PBMCs were then stimulated with SARS-CoV-2 spike and nucleoprotein peptide pools for 24 hours with appropriate positive and negative controls. Supernatants collected were analyzed by a 14-plex high sensitivity T-cell cytokine array (Eve Technologies).

Results: PBMCs stimulation with SARS-CoV-2 peptides resulted in broad cytokine responses. In the presence of TAC at medium (6ng/ml) and high concentrations (24ng/ml) (both are commonly achieved trough/peak clinical concentrations respectively), there were significantly reduced levels of IL-2 (p=0.0078 for both), and at high concentrations, lower amounts of IFN-γ (p= 0.0391) in response to peptide stimulation. TAC (24ng/ml) also resulted in a skewing of the response from a TH1 to a TH2 phenotype as indicated by lower IFN-γ: IL-13 ratio (p=0.0273), and IFN-γ: IL-4 ratio (p=0.0234). In contrast, differing clinically relevant concentrations of MPA and prednisone did not appear to influence the cytokine response post-peptide stimulation. Interestingly, Sirolimus at medium (4ng/ml) and high (16ng/ml) concentrations was found to be significantly associated with pro-inflammatory cytokine release in response to SARS-CoV-2 peptides; TNF-α (p=0.0078 for both), IL-6 (p=0.0234 for both) and IL-1β (p=0.0156 and p=0.0078, respectively). When expressed as a pro- vs. anti-inflammatory ratio (with IL-10 as the anti-inflammatory cytokine), this finding remained consistent.

Conclusions: These in-vitro results could help guide clinical decisions. Greater concentrations of TAC led to an inhibition of Th1 responses, whereas sirolimus led to an unexpected proinflammatory response, and MPA was neutral. This suggests that for transplant patients with COVID-19, a reduction of TAC may be of greater benefit than MPA. For those on sirolimus, reduction should be considered if evidence of an inflammatory phase.

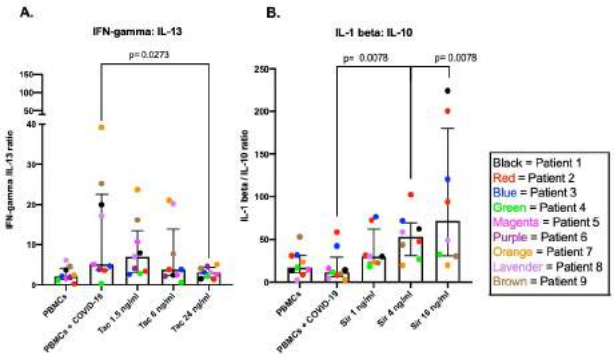


Figure 1 A) Inhibition of Th 1 response at high concentration of tacrolimus (24ng/ml) indicated by reduced IFNγ:IL-13 ratio compared to the negative control **B)** Pro-inflammatory cytokine release with increased IL-1 beta: IL-10 ratio in the presence of medium (4ng/ml) and high concentrations (16ng/ml) of sirolimus compared to the negative control.

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DISCLOSURES: V. Hall: None. **V. Ferreira:** None. **D. Kumar:** Consulting Fee; Name of Commercial Interest; Roche. Consulting Fee; Nature of Relationship; Advisory Board. Grant/Research Support; Name of Commercial Interest; Roche. Grant/Research Support; Nature of Relationship; Clinical Trials Grant. **A. Humar:** None.

Abstract# LB 3

Monoclonal Antibody Therapy for COVID-19 in Solid Organ Transplant Recipients

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Purpose: Bamlanivimab and casirivimab-imdevimab are authorized for emergency use treatment of mild-to-moderate COVID-19 in patients at high-risk for progression to severe disease or hospitalization. For various reasons, their use has been limited in the clinical setting. Moreover, their safety or efficacy has not been evaluated in solid organ transplant (SOT) recipients.

Methods: The Mayo Monoclonal Antibody (MAB) Program was established on 11/07/2020. We retrospectively reviewed SOT recipients who received MAB for COVID-19 at Mayo Clinic in AZ, FL, or MN through 01/23/2021. Data included demographics, transplant type, and adverse effects attributed to MAB. Outcomes included emergency department (ED) visit, hospitalization, intensive care unit (ICU) admission, mortality, and allograft rejection at 28 days.

Results: Seventy-three patients were treated. Median age was 59 years, 46 (63%) were male, and median Charlson comorbidity index was 5. Transplants included 41 kidney (56.2%), 13 liver (17.8%), 11 heart (15.1%), 4 kidney-pancreas (5.5%), 2 lung (2.7%), 1 heart-liver, and 1 pancreas recipient. Fifty-six patients had complete 28-day follow-up. Nine patients were hospitalized, including 7 attributed to COVID-19, for median of 4 days. No patient died, required mechanical ventilation, or had allograft rejection. Ten adverse effects were reported, most commonly fever, without any report of anaphylaxis. Median time to MAB from symptom onset was 6 days for hospitalized patients vs. 4 days among non-hospitalized patients (p=.03). Hospitalization was associated with hypertension (p=.02). Outcomes are presented in table 1.

Conclusions: Hospitalizations and ED visits remain common after MAB for COVID-19 in SOT recipients. However, only one patient required ICU admission, and there was no death or rejection. Earlier MAB infusion appears to be more efficacious. Updated data from our expanding MAB Program will be presented at the ATC meeting.

Outcomes at Differing Time-Points from Monoclonal Antibody Administration			
	14 Days (n=69)	21 Days (n=63)	28 Days (n=56)
ED Visit, n (%)	8 (11.6%)	10 (15.9%)	11 (19.6 %)
Hospital Admission, n (%)	7 (10.1%)	8 (12.7%)	9 (16.1%)
ICU Admission, n (%)	1 (1.4%)	1 (1.6%)	1 (1.8%)

CITATION INFORMATION: Yetmar Z., Beam E., O'Horo J., Ganesh R., Bierle D., Brumble L., Seville M., Razonable R. Monoclonal Antibody Therapy for COVID-19 in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: Z.A. Yetmar: None. **E. Beam:** None. **J.C. O'Horo:** None. **R. Ganesh:** None. **D.M. Bierle:** None. **L. Brumble:** None. **M.T. Seville:** None. **R.R. Razonable:** None.

Abstract# LB 4

Reduction in Hospitalizations and Deaths in Covid-19 Positive Abdominal Organ Transplant Recipients Following Implementation of A Protocol for Early Treatment with Bamlanivimab

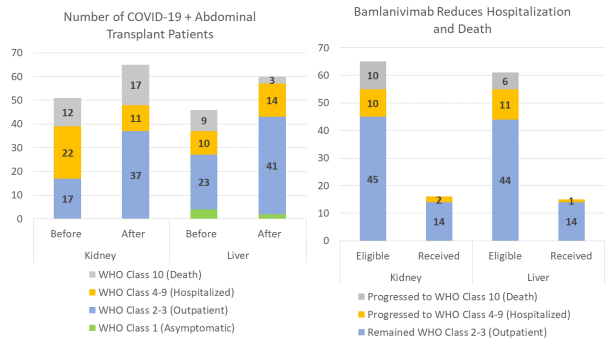
A. Ahearn, T. Maw, J. Emamaullee, J. Kim, E. Blodget, J. Kahn, C. Goldbeck, L. Sher, Y. Genyk, *Abdominal Transplantation, Keck Medical Center of USC, Los Angeles, CA*

Purpose: In December of 2020, our program was identifying up to twenty COVID-19 positive abdominal transplant recipients per week. After seeing our high hospitalization and mortality rate, we implemented a programmatic response, that included Bamlanivimab administration to all eligible patients. The purpose of this abstract is to review the outcomes of COVID-19 infection in our patients, evaluate the efficacy of our program's response, and determine if outpatient monoclonal antibody therapy impacted hospitalization and death rates.

Methods: A database was created to track the outcomes of all liver and kidney transplant recipients who had a confirmed COVID-19 infection via PCR testing. On December 21, 2020, we implemented the following protocol for all symptomatic patients who did not meet hospital admission criteria (WHO Class 2 or 3): 1) Staff and patient education for communications regarding patient's symptom progression; 2) home monitoring using Pulse Oximetry; and 3) outpatient Bamlanivimab administration to all patients who were identified within 10 days of a positive test.

Results: As of February 2021, we have identified 105 liver transplant recipients and 116 kidney transplant recipients who have tested positive for COVID-19. These patients were between 27 days and 18.8 years after transplant (Median 1007 days). The case counts and disease severity before and after the protocol was implemented are shown in Figure 1. Concerningly, hospitalized recipients had a 31% and 46% mortality for liver and kidney respectively. To study outpatient Balanivimab therapy, we excluded all patients who presented as inpatient admissions. 86 liver and 91 kidney patients were initially identified as WHO Class 2 or 3. Of these patients, 15 Liver and 16 Kidney patients were treated with Bamlivamab. When comparing those patients who could have potentially been treated to those who received Bamlivamab, we reduced our rates of hospitalization from 29% to 10% and death from 13% to zero. Chi-squared analysis comparing the association between disease progression and antibody administration was significant (p=.04).

Conclusions: Our findings show the severity of morbidity and mortality of COVID-19 in abdominal transplant patients. Our early experience suggests that outpatient bamlanivimab therapy can reduce disease progression and prevent hospitalization. All eligible patients should be offered this therapy and we will continue to accumulate data in this regard.



CITATION INFORMATION: Ahearn A., Maw T., Emamaullee J., Kim J., Blodget E., Kahn J., Goldbeck C., Sher L., Genyk Y. Reduction in Hospitalizations and Deaths in Covid-19 Positive Abdominal Organ Transplant Recipients Following Implementation of A Protocol for Early Treatment with Bamlanivimab *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Ahearn: None. **T. Maw:** None. **J. Emamaullee:** None. **J. Kim:** None. **E. Blodget:** None. **J. Kahn:** None. **C. Goldbeck:** None. **L. Sher:** None. **Y. Genyk:** None.

Abstract# LB 5

Mortality in Organ Transplant Recipients with Covid-19 Compared to Non-transplant or Waitlisted Patients: A Meta-analysis

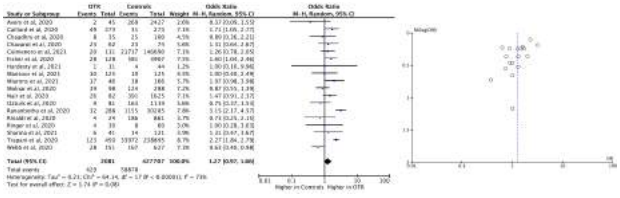
A. H. Lerner, E. Klein, D. Farmakiotis, *Rhode Island Hospital/Brown University, Providence, RI*

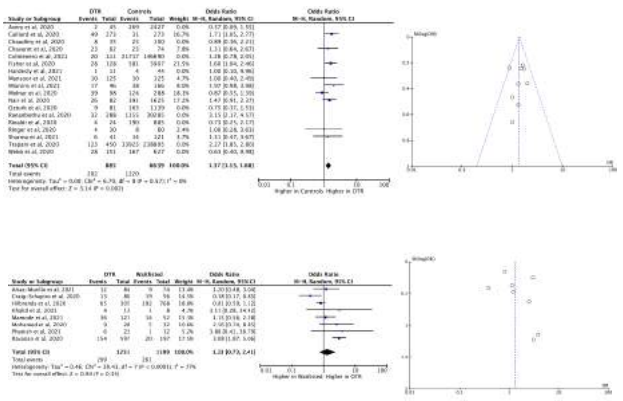
Purpose: Organ transplant recipients (OTR) are considered at high risk for adverse outcomes from COVID-19. However, mortality rates range from <5% to >30%. Some studies found that OTR have comparable outcomes with non-transplant patients, whereas other investigators reported higher mortality rates. To our knowledge, there are no published meta-analyses comparing outcomes between OTR and non-transplant patients with COVID-19.

Methods: Two independent abstractors conducted a systematic search of PUBMED and EMBASE databases, references of articles retrieved, and major transplantation journals. We included studies published between 12/1/19 and 2/11/21, and performed a study-level random-effects meta-analysis with pooling of all-cause mortality, comparing separately OTR with non-transplant and waitlisted patients.

Results: We included 26 studies with a total of 3,331 OTR. 83% were kidney, 8% liver, 6% heart and 3% lung transplant recipients. 66.3% were men. OTR had higher mortality compared to controls, however the difference did not reach statistical significance, and heterogeneity was high (Fig. 1). When analyzing studies evaluating OTR and controls that were matched for potential confounders, the difference in mortality was statistically significant, with a marked decrease in heterogeneity and risk of publication bias (Fig. 2). OTR did not have significantly higher mortality compared to waitlisted patients, but, again, heterogeneity was high (Fig. 3).

Conclusions: OTR with COVID-19 seem to have higher mortality rates compared to immunocompetent individuals, but not waitlisted patients. OTR should be considered a high priority group for preventive and therapeutic interventions.





CITATION INFORMATION: Lerner A., Klein E., Farmakiotis D. Mortality in Organ Transplant Recipients with Covid-19 Compared to Non-transplant or Wait-listed Patients: A Meta-analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.H. Lerner: Grant/Research Support; Name of Commercial Interest; This research was supported in part by NIH/NIAID R25AI140490. **E. Klein:** None. **D. Farmakiotis:** Consulting Fee; Name of Commercial Interest; Viracor-Eurofins. Grant/Research Support; Name of Commercial Interest; Merck, Astellas, Viracor-Eurofins.

Abstract# LB 6

Effect of HLA Class II Polymorphism on Predicted Cellular Immunity Against SARS-CoV-2 at the Individual Level and Within Twenty Five Race/ethnic Groups

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Purpose: Development of adaptive immunity after COVID-19 and after vaccination against SARS-CoV-2 is predicated on recognition of viral peptides, presented on HLA class II molecules, by CD4+ T-cells. The aim of this study was to investigate the role of HLA polymorphism on SARS-CoV-2 immunogenicity at the population and the individual level.

Methods: We capitalised on extensive high-resolution HLA data from 8.9 million donors in the NMDP/BeTheMatch registry to estimate HLA Class II haplotype frequency distributions for twenty five human race/ethnic populations. This information was used to generate multi-locus HLA class II genotypes for each population group (ten random samples of 10,000 individuals for each population). NetMHCIIpan4.0 was used to assess peptide presentation from the entire SARS-CoV-2 Proteome.

Results: Within populations, we found wide inter-individual variability in predicted CD4+ T-cell reactivity against structural, non-structural and accessory SARS-CoV-2 proteins, according to individual HLA genotype. This was particularly pronounced for Nucleocapsid and specific non-structural proteins, whereas robust reactivity against Spike, the main vaccination target, was predicted despite significant variation in Spike-derived peptide presentation by individual HLA genotypes (Figure 1). Notably, we found similar potential for anti-SARS-CoV-2 cellular immunity at the population level suggesting that HLA polymorphism is unlikely to account for observed disparities in clinical outcomes after COVID-19 among different race/ethnic groups.

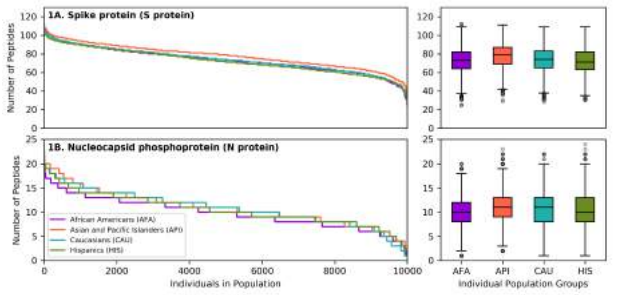


Figure 1. Panels depict the number of SARS-CoV-2 peptides presented by individual HLA class II genotypes in simulated populations of 10,000 individuals for four broad population groups (African Americans, Asian and Pacific Islanders, Caucasians and Hispanics) for 1A. Spike Glycoprotein, 1B. Nucleocapsid phosphoprotein.

Conclusions: Our findings provide important insight on the potential role of HLA polymorphism on development of protective immunity after SARS-CoV-2 infection and after vaccination and a firm basis for further experimental studies in this field.

CITATION INFORMATION: Copley H., Gragert L., Leach A., Kosmoliaptsis V. Effect of HLA Class II Polymorphism on Predicted Cellular Immunity Against SARS-CoV-2 at the Individual Level and Within Twenty Five Race/ethnic Groups *AJT, Volume 21 Supplement 3*

DISCLOSURES: H.C. Copley: None. **L. Gragert:** None. **A.R. Leach:** None. **V. Kosmoliaptsis:** None.

Abstract# LB 7

Limited Immunogenicity of a Single Dose of Sars-cov-2 Mrna Vaccine in Solid Organ Transplant Recipients

B. Boyarsky, M. Ou, R. Greenberg, A. Teles, W. Werbel, R. Avery, A. Tobian, A. Massie, D. Segev, J. Garonzik Wang, *Johns Hopkins, Baltimore, MD*

Purpose: Given substantial challenges with vaccine allocation and evidence for short-term vaccine efficacy after a single dose of SARS-CoV-2 mRNA vaccines in clinical trials, some have proposed prioritizing first dose administration to reduce COVID-19 morbidity, potentially resulting in delays of second dose administration, or even purposefully withholding second doses for much longer intervals than evaluated in the clinical trials. However, this evidence is largely based off of the early vaccine trials which largely excluded immunocompromised patients. To better understand the immunogenicity of the available SARS-CoV-2 vaccines in immunocompromised individuals, we quantified the humoral response to the first dose of SARS-CoV-2 vaccine in solid organ transplant recipients (SOTRs).

Methods: SOTRs who underwent SARS-CoV-2 vaccination were recruited to participate in this study. Participants underwent at-home blood sampling with the TAPII™ Blood Collection Device (7SBio, Medford, MA) or venipuncture. TapII™ samples were tested on the EUROIMMUN enzyme immunoassay (EIA) which tests for IgG to SARS-CoV-2 spike protein. Venipuncture samples were tested on the Roche Elecsys® EIA which tests for antibodies against the receptor binding domain of the SARS-CoV-2 spike protein. Both tests are semi-quantitative and consistent correlates of neutralizing immunity.

Results: We studied 279 SOTRs between 12/29/20-2/12/21. None had a prior COVID-19. Median (IQR) age was 51 (40-65) years, 64% were female, 87% were white, and 6% Hispanic/Latino. Median (IQR) time since transplant was 6 (3-13) years; maintenance immunosuppression included tacrolimus (96%), steroids (53%), mycophenolate (74%), azathioprine (9%), sirolimus (4%), everolimus (4%). At a median (IQR) of 20 (15-23) days after the first dose, antibody was detectable in only 16% of participants (binomial exact 95% confidence interval 12-21%). Those not on anti-metabolite maintenance immunosuppression were 5.2 times (95% CI 3.1-8.7, p <0.001) more likely to develop an antibody response.

Conclusions: The vast majority of participants did not mount appreciable antibody responses. However, those not on anti-metabolite maintenance immunosuppression were more likely to develop antibody responses. These results contrast dramatically with the robust early immunogenicity observed in mRNA vaccine trials. These findings are an important reminder that any individual with potential immune compromise should not assume they have achieved an immune response to the SARS-CoV-2 vaccine after a first dose.

Table 1. Demographic and Clinical Characteristics of Study Participants, Stratified by Immune Response to the First Dose of SARS-CoV-2 mRNA Vaccine.

	Overall (n=279)	Detectable antibody+ (n=45)	Undetectable antibody (n=234)	p-value
Age, years median (IQR)	51 (40-65)	45 (33-65)	53 (41-64)	0.08^
Female sex, %	64	59	65	0.5^^
Non-white, %	13	14	13	0.6^^
Type of organ transplant, %				
Kidney	52	47	54	
Liver	16	31	14	
Heart	15	13	16	0.1^^
Lung	11	4	10	
Kidney/Pancreas	3	3	3	
Pancreas	2	2	2	
Other multi-organ	1	0	1	
Years since transplant, median (IQR)	6 (3-13)	9 (5-16)	6 (3-12)	0.02^
Anti-metabolite maintenance immunosuppression*, %	79	42	86	<0.001^^
Testing platform				
EUROIMMUN	30	20	32	0.3^^
Roche Elecsys®	70	80	68	

+Anti-SARS-CoV-2 spike protein antibody (spike protein, or receptor binding domain of spike protein)

* Includes mycophenolate mofetil, mycophenolic acid, and azathioprine

^ Rank-sum test

^^ Fisher's exact test

CITATION INFORMATION: Boyarsky B., Ou M., Greenberg R., Teles A., Werbel W., Avery R., Tobian A., Massie A., Segev D., Garonzik Wang J. Limited Immunogenicity of a Single Dose of Sars-cov-2 Mrna Vaccine in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Boyarsky: None. **M. Ou:** None. **R. Greenberg:** None. **A. Teles:** None. **W. Werbel:** None. **R. Avery:** None. **A. Tobian:** None. **A. Massie:** None. **D. Segev:** None. **J. Garonzik Wang:** None.

Abstract# LB 8

Dd-cfdna Can Guide Safe Reintroduction of Immunosuppression in Kidney Transplant Recipients with Covid-19

J. Miles[1], J. Leonard[2], V. Tatapudi[2], M. Fei[1], R. Montgomery[2], N. M. Ali[2], *[1]CareDx, Brisbane, CA, [2]Transplant Institute, NYU Langone Health, New York, NY*

Purpose: COVID-19 infection is associated with 25% mortality in kidney transplant recipients (KTRs). Reduction of anti-metabolite immunosuppressants during the acute COVID-19 illness is a common approach in managing KTRs. This potentially increases the risk of allograft rejection in the setting of reduced immunosuppression. The optimal timing for safe reintroduction of immunosuppression remains unclear. Here we describe a novel approach of incorporating dd-cfDNA to safely titrate immunosuppression in patients with COVID-19.

Methods: KTRs were monitored prospectively with dd-cfDNA beginning at the time of COVID-19 diagnosis or on discharge from acute care. If dd-cfDNA<1%, antimetabolite dosing was increased by 25% every two weeks. If dd-cfDNA>1% or a rapid relative change from baseline, antimetabolites were reintroduced at full dose provided the patient remained symptom free from COVID-19.

Results: 58 KTRs (including 1 PAK) with COVID-19 infection were monitored with dd-cfDNA at the time of or following this diagnosis from March 2020 to January 2021. Demographics and directed treatments are summarized in Table 1. Median dd-cfDNA levels remained stable during longitudinal surveillance following COVID-19 (Figure 1A). 3/58 patients with COVID-19 and dd-cfDNA results available developed biopsy-proven rejection. One developed rejection at the time of COVID-19 diagnosis with elevated dd-cfDNA. 2/58 developed rejection in the setting of delayed re-introduction of antimetabolites due to clinical concerns (Figure 1B), however one did not have elevated dd-cfDNA. 10% of patients (n=6) had accelerated reintroduction of anti-metabolites due to dd-cfDNA levels>1% or rapid deviation from baseline. None of these patients developed rejection in the following months and dd-cfDNA levels decreased after immunosuppression reintroduction. Standard reintroduction of anti-metabolites with dd-cfDNA <1% was achieved with no associated episodes of rejection.

Conclusions: dd-cfDNA presents a feasible adjunctive biomarker to guide immunosuppression titration in KTRs with confirmed COVID-19 and avoid allograft rejection during a time of increased immunological risk.

Table 1: Patient demographics and directed therapies

Median age (years)	58 (range: 30-72)
Gender	
Male	39 (67%)
Female	19 (33%)
Race	
African American	14 (24%)
White	13 (22.5%)
Asian	13 (22.5%)
Hispanic	1 (2%)
Other	17 (29%)
Median time (months) since transplant to COVID-19 diagnosis	16 (IQR 9-31)
COVID-19 Therapies	
Hydroxychloroquine/Azithromycin	29 (50%)
IL-6 inhibitor	8 (14%)
Remdesivir	7 (12%)
Convalescent plasma	3 (5%)
Bamlanivimab	12 (21%)
Dexamethasone	5 (9%)
Zinc	16 (28%)

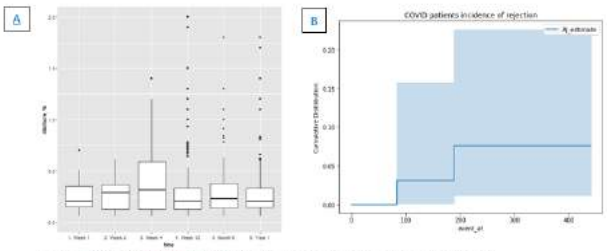


Figure 1A) dd-cfDNA (AlloSure) distribution by time following confirmed COVID-19.
B) Cumulative incidence of graft rejection by time following confirmed COVID-19.

CITATION INFORMATION: Miles J., Leonard J., Tatapudi V., Fei M., Montgomery R., Ali N. Dd-cfdna Can Guide Safe Reintroduction of Immunosuppression in Kidney Transplant Recipients with Covid-19 *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Miles: Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **J. Leonard:** None. **V. Tatapudi:** None. **M. Fei:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **R. Montgomery:** Grant/Research Support; Name of Commercial Interest; Hansa Pharma. Grant/Research Support; Nature of Relationship; clinical research grant. Other; Name of Commercial Interest; Viela Bio/CTI, CSL Behring, eGenesis, RMEI, Takeda, and Regeneron. Other; Nature of Relationship; member of advisory board. **N.M. Ali:** Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; honoraria.

Basic

Rejection, Innate Immunity and Allorecognition

Abstract# 249

Dna-pkcs Regulation of the Allogeneic Immune Response

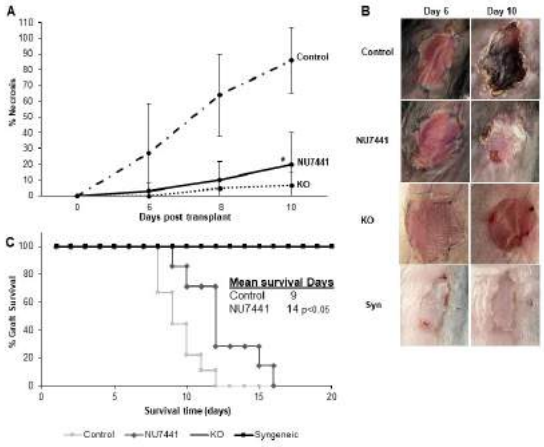
L. Burdine, M. Burdine, Z. Waldrip, D. Harrison, *University of Arkansas, Little Rock, AR*

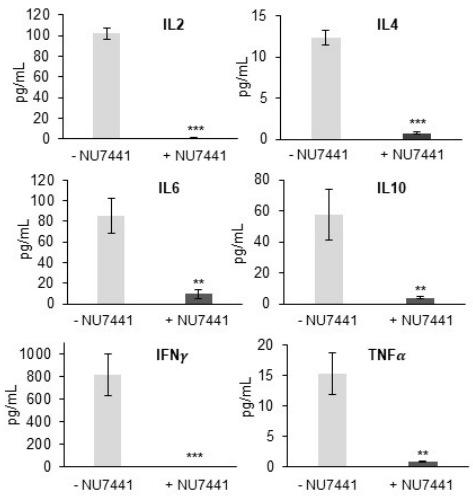
Purpose: Organ transplantation is life-saving and continued investigations into immunological mechanisms that drive organ rejection are needed to improve immunosuppression therapies and prevent graft failure. DNA-dependent protein kinase catalytic subunit, DNA-PKcs, is a critical component of both the cellular and humoral immune responses. In this study, we investigate the contribution of DNA-PKcs to allogeneic skin graft rejection to potentially highlight a novel strategy for inhibiting transplant rejection.

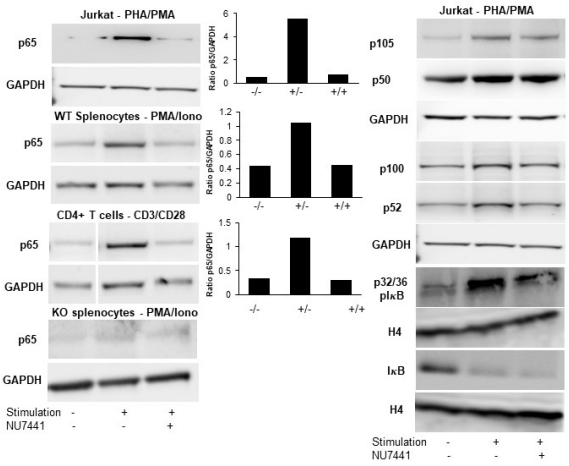
Methods: Fully MHC mismatched murine allogeneic skin graft studies were performed by transplanting skin from BalbC mice to C57bl6 mice and treating with either vehicle or the DNA-PKcs inhibitor NU7441. Graft rejection, cytokine production, immune cell infiltration, and donor-specific antibody (DSA) formation were analyzed.

Results: DNA-PKcs inhibition significantly reduced necrosis and extended graft survival compared to controls (mean survival 14 days vs 9 days respectively). Inhibition reduced the production of the cytokines Interleukin (IL)2, IL4, IL6, IL10, TNFα, and IFNγ and the infiltration of CD3+ lymphocytes into grafts. Furthermore, DNA-PKcs inhibition reduced the number of CD19+ B cells and CD19+ CD138+ plasma cells coinciding with a significant reduction in DSAs. At a molecular level, we determined that the immunosuppressive effects of DNA-PKcs inhibition were mediated, in part, via inhibition of NFκ B signaling through reduced expression of the p65 subunit.

Conclusions: Our data confirm that DNA-PKcs contributes to allogeneic graft rejection and highlight a novel immunological function for DNA-PKcs in the regulation of NFκ B and concomitant cytokine production.







CITATION INFORMATION: Burdine L., Burdine M., Waldrip Z., Harrison D. Dna-pkcs Regulation of the Allogeneic Immune Response *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Burdine: None. **M. Burdine:** None. **Z. Waldrip:** None. **D. Harrison:** None.

Abstract# 250

P40 Homodimers Induce Il-15 to Promote Endogenous Donor-reactive Memory Cd8 T Cell Activation within High-risk Cardiac Allografts

H. Tsuda, A. Valujskikh, R. Fairchild, *Inflammation and Immunity, Cleveland Clinic, Cleveland, OH*

Purpose: Longer cold ischemic storage (CIS) time prior to transplant results in increased proliferation of endogenous donor-reactive memory CD8 T cells within complete MHC-mismatched cardiac allografts at 24 hrs after transplant and in enhanced effector functions to mediate CTLA-4Ig-resistant rejection of the high-risk allografts. This increased memory CD8 T cell proliferation within high-risk allografts requires CD4 T cell help via CD40-CD154 interactions with graft dendritic cell (DC)s to produce IL-12p40 homodimer (p40 HD) that is a key factor for driving the memory CD8 T cell proliferation.

Methods: Here, we investigated how p40HD stimulate endogenous memory CD8 T cell proliferation within high-risk allografts.

Results: When testing the impact of p40HD on cytokine production in the allografts, p40 HD injection into recipients of low-risk allografts induced marked increases in graft IL-15. Consistent with this, the longer CIS time increased mRNA expression of IL2Rα (CD25), IL2Rβ(CD122) and IL15Rα in purified CD8 T cells infiltrating the allografts on day 2 post-transplant and markedly increased IL-15 protein in the allografts. Blocking IL-15 signaling with anti-CD122 mAb inhibited endogenous memory CD8 T cell proliferation within high-risk allografts at 48 hrs after transplant and prolonged allograft survival in CTLA-4Ig conditioned recipients to that observed in CTLA-4Ig conditioned recipients of low-risk allografts. Moreover, anti-CD122 mAb inhibited p40HD induced memory CD8 T cell proliferation within low-risk allografts. To test the source of IL-15, we transplanted diphtheria toxin (DT) receptor-CD11c transgenic mice subjected to 8hr CIS into A/J recipients. Depletion of CD11c+ cells abrogated the p40HD-induced endogenous memory CD8 T cell proliferation and IL-15 production within low-risk allograft. To further test the role of allograft IL-15 signaling, we used B6.IL15Rα$^{-/-}$ as donors. Graft deficiency of IL-15Rα decreased the endogenous memory CD8 T cell proliferation within allografts at 48 hrs post-transplant and extended survival of grafts in CTLA-4Ig conditioned recipients.

Conclusions: These results indicate that p40 HD produced by graft DCs stimulate graft DCs to produce IL-15 that directly drives endogenous donor-reactive memory CD8 T cell proliferation to mediate CTLA-4 resistant rejection. The IL-15 mediated regulation of endogenous memory CD8 T cell may provide a new strategy to attenuate CTLA-4Ig resistant rejection mediated by these donor reactive T cells.

CITATION INFORMATION: Tsuda H., Valujskikh A., Fairchild R. P40 Homodimers Induce Il-15 to Promote Endogenous Donor-reactive Memory Cd8 T Cell Activation within High-risk Cardiac Allografts *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Tsuda: None. **A. Valujskikh:** None. **R. Fairchild:** None.

Abstract# 251

Contribution of T-bet Expressing CD27+ CD21- Activated Memory B Cells Poised for Plasma Cell Differentiation to Antibody-mediated Rejection of Kidney Transplants

K. Louis[1], E. Bailly[1], C. Macedo[1], B. Ramaswami[1], X. Gu[1], G. Chalasani[1], A. Zeevi[1], P. Randhawa[1], H. Singh[2], C. Lefaucheur[3], D. Metes[1], *[1]Surgery, University of Pittsburgh, Pittsburgh, PA, [2]Center for Systems immunology, Department of Immunology, University of Pittsburgh, Pittsburgh, PA, [3]Human Immunology and Immunopathology, INSERM U976, Paris, France*

Purpose: Alloimmunity triggered by donor-specific antibodies (DSAs) and ensuing development of antibody-mediated rejection (ABMR) are detrimental to organ transplants. Yet, the cellular states underlying B cell alloreactive responses and the molecular components controlling them remain unclear.

Methods: We used high dimensional B cell profiling in blood and tissue in a cohort of 96 kidney transplant recipients.

Results: We identified expanded clusters of CD27+CD21- activated memory (AM) and CD27-CD21- tissue-like memory (TLM) B cells that expressed the transcription factor T-bet in blood of patients who developed DSA and progressed to ABMR (DSA+ABMR+, N=20). AM and TLM cells were diminished in DSA+ABMR- (N=28) patients and at baseline levels in DSA- (N=48) patients. Unlike TLM cells that displayed cell exhaustion features, AM cells manifested elevated expression of IRF4 and Blimp1, and upon co-culture with autologous circulating T follicular helper (cTFH) cells differentiated into DSA-producing plasma cells in an IL-21 dependent manner. Comparative RNA-seq analysis of AM with TLM and resting memory B cells in patients undergoing ABMR revealed a distinctive transcriptional state and selective expression of *IGHV* sequences reflective of clonal expansion. The T-bet expressing AM cells preferentially accumulated in patients with severe ABMR and were correlated with increased frequency of activated cTFH cells, skewed generation of DSAs towards IgG3 isotypes and increased vascular lesions in kidney allografts. AM cells and their distinct molecular signatures were also detected within kidney allografts of patients undergoing ABMR.

Conclusions: This study suggests a pivotal role for T-bet expressing AM B cells in directing humoral alloimmune responses against organ transplants leading to ABMR and may represent an important therapeutic target.

CITATION INFORMATION: Louis K., Bailly E., Macedo C., Ramaswami B., Gu X., Chalasani G., Zeevi A., Randhawa P., Singh H., Lefaucheur C., Metes D. Contribution of T-bet Expressing CD27+ CD21- Activated Memory B Cells Poised for Plasma Cell Differentiation to Antibody-mediated Rejection of Kidney Transplants *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Louis: None. **E. Bailly:** None. **C. Macedo:** None. **B. Ramaswami:** None. **X. Gu:** None. **G. Chalasani:** None. **A. Zeevi:** None. **P. Randhawa:** None. **H. Singh:** None. **C. Lefaucheur:** None. **D. Metes:** None.

Abstract# 252

Donor Mhc-independent Islet Rejection in Autoimmune Diabetes: Implications for Stem Cell Therapy

R. G. Gill[1], M. Coulombe[2], K. S. Beard[1], A. L. Burrack[3], *[1]University of Colorado, Aurora, CO, [2]Surgery, University of Colorado, Aurora, CO, [3]Mircrobiology and Immunology, University of Minnesota, Minneapolis, MN*

Purpose: Stem cell technology is an attractive approach for generating insulin-producing cells for transplantation in insulin-dependent diabetes and potentially can be genetically modified. One recent strategy is to eliminate donor MHC expression to avoid direct host T cell recognition of the donor. In this study we set out to determine whether MHC deficiency prevented islet allograft rejection in spontaneously autoimmune non-obese diabetic (NOD) mice.

Methods: Diabetic female NOD mice were grafted beneath the left renal capsule with islets from the following types of islet donors: 1) NOD scid donors (H-2g7),

2) NOD donors deficient in both MHC class I (beta $2m^{-/-}$) and class II ($C2Ta^{-/-}$), 3) wild-type C57Bl/6 (B6; H-2^{d}), and 4) B6 donors deficient in both MHC class I and class II ($I\text{-}A^{b-/-}$). After restoration of euglycemia, rejection was defined as the first of consecutive hyperglycemic readings. In the event of graft rejection, islet grafts were explanted and graft infiltrating cells (GIC) were cultured in 1L-15-containing media for three days and then antigen-stimulated to determine antigen specificity by ELISA (IFNg production).

Results: Syngeneic NOD islets rejected in 12/12 recipients (MTR of 12 days). Rejection was greatly dependent on NOD MHC expression; 9/12 MHC-deficient NOD islets survived more than 100 days. B6 islet allografts showed accelerated rejection; 14/14 B6 islet grafts rejected in less than 10 days. Interestingly, B6 MHC deficient islets *also* rejected in NOD recipients with 15/15 MHC-deficient B6islet rejecting in less than 20 days. B6 MHC deficient islets survived indefinitely in non-autoimmune-prone BALB/c recipients (greater than 100 days) indicating that MHC was required for conventional islet allograft rejection. Interestingly, GIC from rejecting B6 MHC-deficient demonstrated pronounced *alloreactivity* (IFNg production) to B6 MHC-deficient splenic stimulator cells. This alloreactivity required the presence of NOD APCs, suggesting 'indirect' (host APC-dependent) recognition. GIC from rejecting NOD islet grafts did not demonstrate reactivity to either B6 or B6 MHC-deficient splenic APCs, indicating that reactivity was specific to the islet donor.

Conclusions: While both disease recurrence and alloimmunity require islet MHC expression, islet allograft rejection in autoimmune recipients is donor MHC independent. We posit that underlying autoimmunity initiates an especially vigorous 'indirect' T cell alloresponse. As such, results suggest that abrogating donor MHC from allogeneic surrogate beta cell sources may not be sufficient to prevent rejection in autoimmune recipients. Rather, findings suggest that modified autologous stem cell sources may be effective at preventing islet rejection in the setting of autoimmunity.

CITATION INFORMATION: Gill R., Coulombe M., Beard K., Burrack A. Donor Mhc-independent Islet Rejection in Autoimmune Diabetes: Implications for Stem Cell Therapy *AJT, Volume 21 Supplement 3*

DISCLOSURES: R.G. Gill: None. **M. Coulombe:** None. **K.S. Beard:** None. **A.L. Burrack:** None.

Abstract# 253

Accelerated Bronchiolitis Obliterans After Lung Transplant Promoted by an ATG16L1 Mutation is Coupled to Mitochondrial Damage and Metabolic Alterations in Monocyte-derived Antigen Presenting Cells

M. Cano[1], D. Zhou[1], D. Kreisel[1], C. Chen[2], K. Pugh[1], D. Byers[1], R. Hachem[1], A. Gelman[1], *[1]Washington University, Saint Louis, MO, [2]UT Southwestern Medical Center, Dallas, TX*

Purpose: Bronchiolitis obliterans (BOS) remains a major cause of death for lung transplant recipients, and the mechanisms that drive BOS remain poorly understood. It is known that genetically encoded deficiencies in mitophagy, a specialized form of autophagy which targets the removal of damaged mitochondria, promote disease but it is unclear if they play a role in BOS. Prior work has shown that the rs2241880 mutation in ATG16L1, an autophagy related protein, leads to protein instability resulting in deficiency of ATG16L1 in monocyte-derived (Mo-cells) macrophages. We previously observed that human lung recipient carriers of rs2241880 had accelerated BOS. Therefore, we analyzed the effects of ATG16L1 deficiency in Mo-$CD11c^{+}$ cells in a mouse orthotopic lung transplant model of BOS.

Methods: CD11cCre$ATG16L1^{flox/flox}$ ($ATG16L1^{\Delta/\Delta}$) and control CD11cCre recipients received major MHC-mismatched FVB lungs, with immunosuppression to induce acceptance. Following induced epithelial injury, allografts were assessed for obliterative airway lesions for up to 28 days. Intragraft Mo-$CD11c^{+}$ cells were analyzed for bulk RNA sequencing and by FACS for mitochondrial mass and ROS production. Mitophagic flux was visualized by confocal microscopy using Mt-kiema mitophagy reporter mice. Metabolic activity was characterized using a Seahorse XF analyzer. Alloimmunity was examined via T cell proliferation assays and ELISA.

Results: $ATG16L1^{\Delta/\Delta}$ recipients showed severe and accelerated OB compared to controls. RNAseq analysis of $ATG16L1^{\Delta/\Delta}$ deficient intra-graft Mo-derived cells demonstrated a loss of transcripts that encode subunits of mitochondria electron complex I, II and V. Confocal and FACS revealed higher $MHCII^{+}$, attenuated mitophagic flux, high mitochondrial mass and elevated ROS production in $ATG16L1^{\Delta/\Delta}$. In line with these observations were decreased maximal mitochondrial respiratory capacity, lower mitochondrial ATP production and increased utilization of glycolysis; as well as increased T cell proliferation and higher IL1-β suggesting metabolic adaptation of an M1 inflammatory phenotype.

Conclusions: These data reveal a new role for ATG16L1 as a regulator of mitochondrial quality control and alloimmunity with implications for lung recipients that carry the ATG16L1 rs2241880 mutation.

CITATION INFORMATION: Cano M., Zhou D., Kreisel D., Chen C., Pugh K., Byers D., Hachem R., Gelman A. Accelerated Bronchiolitis Obliterans After Lung Transplant Promoted by an ATG16L1 Mutation is Coupled to Mitochondrial Damage and Metabolic Alterations in Monocyte-derived Antigen Presenting Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Cano: None. **D. Zhou:** None. **D. Kreisel:** None. **C. Chen:** None. **K. Pugh:** None. **D. Byers:** None. **R. Hachem:** None. **A. Gelman:** None.

Abstract# 254

Resolution of Endothelial Inflammation is Delayed Following IFNγ, Which Provokes a Long-lasting Pro-adhesive Phenotype Dependent on JAK/STAT Signaling

N. M. Valenzuela, *Pathology and Laboratory Medicine, UCLA, Los Angeles, CA*

Purpose: Although many cytokines are upregulated within allografts undergoing rejection, intragraft transcripts are dominated by IFN-response signatures. Resolution is a key phase of inflammation needed to reduce accumulation of immune cells at local sites, followed by restoration of normal function. Failure to attenuate this process leads to a detrimental, chronic response and maladaptive immunity that underlies many inflammatory diseases, including chronic allograft rejection. Blood endothelial cells (EC) actively regulate access of leukocytes to peripheral tissues and regulate egress in response to inflammatory insult. Much has been studied on the initiation of inflammation during endothelial activation, but less is known about the kinetics and mechanisms necessary for the return to a non-inflamed state.

Methods: We examined the profile, kinetics and contraction of type II endothelial activation by NFκB-driven TNFα and JAK/STAT-mediated IFNγ. Endothelial pro-adhesive phenotypes were compared under chronic cytokine stimulation (1-48hr), and upon short-term cytokine priming (3hr) followed by withdrawal (up to 48hr). We tested HMEC-1 and primary human endothelial cells from 6 different vascular beds. Endothelial activation was measured at the mRNA and protein levels by Nanostring, flow cytometry, ELISA and multiplex Luminex assays. JAK1/2 was inhibited with ruxolitinib (20nM-2μM).

Results: TNFα promoted early expression of E-selectin, VCAM-1, ICAM-1, and broad biphasic induction of chemokines. IFNγ upregulated ICAM-1, BST2 and a restricted set of CXCL chemokines. The dynamics of endothelial adhesive phenotype changes after withdrawal were also distinct. A small proportion of TNFα-induced endothelial phenotype changes persisted, but most other effects required continuous TNFα exposure for reinforcement. In contrast, the consequences of even short exposure (3hr) to IFNγ were long-lasting and broad, with sustained elevation of adhesion molecules and chemokines 48hr later. NFκB genes and target transcriptional changes were quickly down-regulated in the absence of TNFα, while JAK, STAT and IRF gene expression was durable, dependent on new transcription but independent of continuous IFNγ exposure. Finally, intact persistent JAK signaling in the endothelium was required to maintain a pro-adhesive phenotype after IFNγ withdrawal, which could be prevented by the JAK1/2 inhibitor ruxolitinib.

Conclusions: Our results reveal a sustained perturbation of endothelial function and pro-adhesive phenotype after exposure to IFNγ, mediated by JAK and dependent on new transcription. The resolution of endothelial-controlled inflammation may therefore be impaired or delayed under JAK conditions, but quiescence more readily re-established when perturbation was dependent on NFκB. JAK antagonism may therefore represent a novel therapeutic approach to dampening intragraft inflammation.

CITATION INFORMATION: Valenzuela N. Resolution of Endothelial Inflammation is Delayed Following IFNγ, Which Provokes a Long-lasting Pro-adhesive Phenotype Dependent on JAK/STAT Signaling *AJT, Volume 21 Supplement 3*

DISCLOSURES: N.M. Valenzuela: None.

Abstract# 255

PD-1/PD-L1 Selectively Regulates Treg Lymphatic Migration

W. Piao[1], L. Li[1], C. Paluskievicz[1], Y. Zhang[2], V. Saxena[3], K. Hippen[2], B. Blazar[2], L. Riella[4], J. Bromberg[1], *[1]Surgery, U Maryland, Baltimore, MD, [2]U Minnesota, Minneapolis, MN, [3]U Maryland, Baltimore, MD, [4]Harvard U, Boston, MA*

Purpose: The molecules that regulate Treg migration are incompletely identified. Programmed death-1 (PD-1) and its ligand PD-L1 are immune checkpoint proteins which regulate immune cell responses. However, little is known about their functions in T cell migration. Activated Tregs express high levels of PD-1, and its ligand PD-L1 is highly expressed on lymphatic endothelial cells (LEC). Yet how Treg interact with LEC via PD-L1 has not been previously investigated. We tested the hypothesis that Treg PD-1 signals to LEC PD-L1 to regulate lymphatic transendothelial migration (TEM).

Methods: Human and murine dermal LECs were used in analyses of PD-L1 signaling. Purified human and murine naïve, activated, and regulatory CD4 T cells were migrated across LEC in vitro and lymphatic vessels in vivo. Recombinant PD-1 fused with IgG1 (PD-1 Fc) were used to induce PD-L1 signaling. Signaling was blocked with specific anti-PD-1 or anti-PD-L1 mAbs.

Results: Human and mouse Tregs had the highest PD-1 expression among T cell subsets. LEC expressed high levels of PD-L1. PD-1 deficiency or blocking PD-1 on Tregs with mAb inhibited in vitro and in vivo lymphatic migration but not non-Treg effector CD4 T cell migration. Treg migration to CCL19 was enhanced by PD-L1 Fc. Crosslinking LEC PD-L1 with PD-1 Fc induced phosphorylation of classical NFκB-p65, PI3K/Akt threonine 308 and extracellular signal-regulated kinase (ERK). Ligation of LEC PD-L1 with PD-1-Fc augmented VCAM-1 expression, which was inhibited by blocking NFκB-p65 but not ERK or PI3K/Akt signaling. Similar changes to LEC junctions were observed when PD-1-high expressing Treg migrated across LEC layers. Tregs also rapidly induced NFκB p65 translocation into the LEC nucleus. PD-1 Fc ligation of LEC PD-L1 also decreased VE-cadherin

expression, which was restored by blocking ERK and PI3K/Akt but not NFκB-p65 signaling. Blockade of LEC PD-L1 with anti-PD-L1 mAb inhibited Treg TEM. Importantly, Treg infiltration into melanoma was reduced by treating mice with anti-PD-1 blocking mAb.

Conclusions: Treg use PD-1/PD-L1 to regulate lymphatic transmigration. Treg PD-1 signals through ERKs and PI3K/Akt pathways to modulate VE-cadherin, and through classical NFκB p65 to regulate VCAM-1 expression on LEC. The modulated LEC structures uniquely affect only Treg but not non-Treg effector CD4 T cell TEM. These data demonstrate a novel role for Treg PD-1 and LEC PD-L1 in regulation of lymphatic migration and ultimately Treg suppressive function.

CITATION INFORMATION: Piao W., Li L., Paluskievicz C., Zhang Y., Saxena V., Hippen K., Blazar B., Riella L., Bromberg J. PD-1/PD-L1 Selectively Regulates Treg Lymphatic Migration *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Piao: None. **L. Li:** None. **C. Paluskievicz:** None. **Y. Zhang:** None. **V. Saxena:** None. **K. Hippen:** None. **B. Blazar:** None. **L. Riella:** None. **J. Bromberg:** None.

Abstract# 256

Ikaros-SIRT1 Signaling Axis Regulates Macrophage Polarization and Ischemia Reperfusion Injury in Mouse and Human Liver Transplantation

K. Kadono[1], H. Hirao[1], H. Kojima[1], K. J. Dery[1], X. Li[2], J. W. Kupiec-Weglinski[1], *[1]The Dumont-UCLA Transplant Center, Los Angeles, CA, [2]NIEHS, Durham, NC*

Purpose: Although Ikaros is a well-established transcriptional regulator of lymphopoiesis and differentiation of leukocyte lineage, its role in myeloid cells and ischemia reperfusion injury remain unclear. We have reported that the SIRT1 promotes homeostasis and hepatic rejuvenation in mouse and human liver transplantation. Whether SIRT1 signaling is essential in myeloid cell polarization remains uncertain, while the molecular communication between Ikaros and SIRT1 has not been studied.

Methods: To interrogate the significance of myeloid Ikaros-SIRT1 axis in the context of innate immune activation, comprehensive molecular and functional studies encompassing primary mouse macrophage cultures (siRNA-targeted under LPS/IL4 stimulation), in vivo mouse models of hepatic inflammation (liver warm ischemia-reperfusion injury in WT, myeloid-specific SIRT1-KO, and CD11b-DTR mouse systems), and analyses of human liver transplant patients (fifty-five clinical cases) were undertaken.

Results: Human LT biopsies were divided into two groups based on Ikaros gene levels (RT-PCR). As compared with the "low" expression group, the "high" Ikaros expressing LTs showed significantly higher sALT at POD1-4, gene expression of M1 markers but lower SIRT1 protein levels in post-transplant livers (n=55, $p<0.05$). Then, we employed mouse macrophage cultures to assess Ikaros function in innate-immune activation. Ikaros silencing (siRNA) in BMM decreased M1 but increased M2 markers, coinciding with enhanced SIRT1 activation. In contrast, Ikaros overexpression in BMM cultures increased M1 markers and diminished SIRT1, while macrophage-specific SIRT1 deficiency increased M1 but decreased M2 activation markers. mSIRT1-KO mice experienced exacerbated hepatic IRI, accompanied by up-regulated M1 markers (n=7, $p<0.05$). Depletion of CD11b+ cells suppressed Ikaros expression in IR-stressed livers while BMM reconstitution restored Ikaros levels, implying recruited macrophages were instrumental for hepatic Ikaros expression. Interestingly, reconstitution of CD11b-deficient mice with siRNA-Ikaros BMM ameliorated hepatic IRI with increased levels of SIRT1 and M2 markers as compared with siRNA-control BMM (n=6, $p<0.05$).

Conclusions: Our results identify Ikaros as a novel M1 macrophage activation marker and document the Ikaros - SIRT1 signaling axis as a mechanistic biomarker and putative checkpoint regulator of M1/M2 macrophage polarization, with divergent innate phenotypic signatures in sterile inflammation response in liver transplantation.

CITATION INFORMATION: Kadono K., Hirao H., Kojima H., Dery K., Li X., Kupiec-Weglinski J. Ikaros-SIRT1 Signaling Axis Regulates Macrophage Polarization and Ischemia Reperfusion Injury in Mouse and Human Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Kadono: None. **H. Hirao:** None. **H. Kojima:** None. **K.J. Dery:** None. **X. Li:** None. **J.W. Kupiec-Weglinski:** None.

Lymphocyte Biology and Tolerance

Abstract# 257

Sequential Analysis of Renal Allograft Rejection at Single Cell Resolution

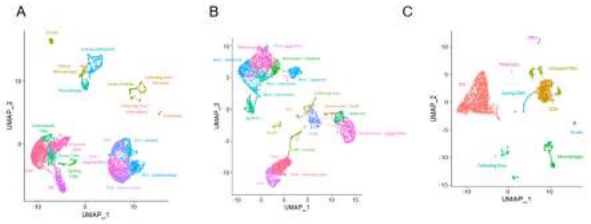
T. Shi[1], C. Castro-Rojas[1], A. Burg[1], K. Roskin[1], J. Rush[2], B. Haraldsson[2], A. Shields[3], R. Alloway[3], E. Woodle[3], D. Hildeman[1], *[1]Immunobiology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [2]Novartis Pharmaceuticals AG, Basel, Switzerland, [3]University of Cincinnati Medical Center, Cincinnati, OH*

Purpose: Renal allograft anti-rejection therapies (corticosteroids (CCS) and anti-lymphocyte globulin) have been the primary treatment modalities for over six decades, yet little is known about their effects on graft infiltrating immune cells. Similarly, the understanding of rejection biology occurring under CNIs or new biologics is lacking. Here, we defined the transcriptomic profiles of kidney tissue and infiltrating immune cells and paired urine samples at the time of rejection and after anti-rejection therapy (RejTx).

Methods: Renal allograft recipients enrolled in a clinical trial of iscalimab, an anti-CD40 mAb, were followed longitudinally if they had rejection. Renal allograft biopsies and paired urine samples were collected at the initial rejection and after RejTx. 5' single cell RNA sequencing was performed with linked TCR sequencing and clonal analyses.

Results: One patient with a Banff 1B rejection underwent RejTx (CCS, CNI, MMF) and failed to resolve rejection, a process captured across 4 biopsies. Throughout the course of rejection, inflammatory signals in multiple cell types in the graft and urine were observed. The top 7 expanded CD8+ T cell clones persisted for weeks but were eventually displaced by a new set of expanded clones, even in the presence of ongoing rejection. In contrast, another patient followed over 2 biopsies experienced a Banff 1A rejection characterized by a similar inflammatory gene expression across multiple cell types and several expanded CD8+ T cell clones. In this patient, the top 7 expanded clones were all similarly diminished after RejTx. Thus, rejection reversal was associated with a decrease in inflammatory gene expression, but not a rapid change in expanded T cell clones in the graft. Ongoing work will further characterize differential gene expression across multiple cell types in ongoing rejection compared to resolving rejection.

Figure 1: UMAP of patient 1 biopsy (A) and urine (B) and patient 2 biopsy (C), integrated across timepoints.



Conclusions: 1) Refractory rejection under iscalimab is associated with failure to eliminate dominant TCR clones in the allograft and an emergence of new T cell clones, 2) urine and renal allograft biopsies display similar cell populations, including clonally dominant CD8+ T cells, 3) rejection reversal is associated with decreased inflammatory gene expression in kidney tissue and infiltrating immune cells.

CITATION INFORMATION: Shi T., Castro-Rojas C., Burg A., Roskin K., Rush J., Haraldsson B., Shields A., Alloway R., Woodle E., Hildeman D. Sequential Analysis of Renal Allograft Rejection at Single Cell Resolution *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Shi: None. **C. Castro-Rojas:** None. **A. Burg:** None. **K. Roskin:** None. **J. Rush:** Ownership Interest; Name of Commercial Interest; Novartis Pharmaceuticals AG. Ownership Interest; Nature of Relationship; Shareholder. Salary; Name of Commercial Interest; Novartis Pharmaceuticals AG. Salary; Nature of Relationship; Employee. **B. Haraldsson:** Ownership Interest; Name of Commercial Interest; Novartis Pharmaceuticals AG. Ownership Interest; Nature of Relationship; Shareholder. Salary; Name of Commercial Interest; Novartis Pharmaceuticals AG. Salary; Nature of Relationship; Employee. **A. Shields:** None. **R. Alloway:** None. **E. Woodle:** Grant/Research Support; Name of Commercial Interest; Novartis Pharmaceuticals AG, Bristol Meyers Squibb. Grant/Research Support; Nature of Relationship; Grant PI. Honoraria; Name of Commercial Interest; Novartis Pharmaceuticals AG. **D. Hildeman:** Consulting Fee; Name of Commercial Interest; Kezar Biosciences. Consulting Fee; Nature of Relationship; Advisory Board Member. Grant/Research Support; Name of Commercial Interest; Novartis Pharmaceuticals AG, Bristol Meyers Squibb. Grant/Research Support; Nature of Relationship; Grant PI.

Abstract# 258

LTβR Engagement Regulates Treg Migration, Stability and Suppressor Function

V. Saxena[1], W. Piao[1], L. Li[1], Y. Xiong[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

Purpose: Regulatory T cell (Treg) lymphatic migration and maintenance of transcription factor Foxp3 expression are required for suppressor function and allograft protection. Treg stimulate lymphotoxin beta receptor (LTβR) on lymphatic endothelial cells (LEC). We tested the hypothesis that Treg-LEC engagement is necessary for Treg migration, sustaining Foxp3 expression, and suppressor function.

Methods: Treg stability, migration and function were analyzed in vivo in an islet allograft model, and in vitro in a transwell based LEC migration assay. Mice with deletion of lymphotoxin alpha ($LT\alpha^{-/-}$), $LT\beta R^{-/-}$, and $Prox1\text{-}Cre\text{-}ER^{T2+/-}LT\beta R^{fl/fl}$ (KO^{fl}) in which LTβR is depleted in LEC by tamoxifen treatment, were used.

Results: Treg differentiation and execution of suppressor function required sequential migration from the target tissue to the draining LN. Treg use LTα1β2 to stimulate LTβR on LEC for migration to LN via afferent lymphatics. Disruption of LTα1β2-LTβR interactions between Treg and LEC resulted in impaired islet allograft survival from 25d to 13d in KO^{fl} mice ($p<.03$), to 15d in $LT\beta R^{-/-}$ mice ($p<.03$), and to 13d in mice receiving $LT\alpha^{-/-}$ Treg ($p<.03$). Conditional or germline depletion of LTβR on LEC, or deletion of LTα on Treg, led to Treg retention in the graft and poor migration from tissues to the dLN. Non-migrating Tregs lost Foxp3 and CD25 expression to become exTreg. In a transwell based Treg-LEC co-culture assay, the non-migrating Treg became exTreg and lost Foxp3, CD25, CD39, GITR, and LTαβ expression while maintaining CD49b, CD73, and CTLA4 expression. Conversion to exTreg was accompanied by methylation at the Foxp3 locus and decreased suppressor function. Since LTβR stimulates the NFκB classical pathway to secrete IL-6, blockade of NFκB or neutralization of IL-6 prevented exTreg conversion. CD39 catalyzes adenosine production, and supplementation with adenosine also prevented exTreg conversion in an adenosine receptor 2A (A2AR) dependent manner.

Conclusions: Treg-LEC LTα-LTβR interactions are important for Treg migration, stability and suppressor function. Disruption of the interactions results in poor migration, increased retention in graft, loss of Foxp3 expression, and thereby the ability to protect the allograft. The exTreg have the potential to become T effector cells and cause allograft rejection. ExTreg conversion can be prevented therapeutically by inhibiting IL-6 or LTβR NFκB, or by stimulating A2AR.

CITATION INFORMATION: Saxena V., Piao W., Li L., Xiong Y., Shirkey M., Iyyathurai J., Lakhan R., Abdi R., Bromberg J. LTβR Engagement Regulates Treg Migration, Stability and Suppressor Function *AJT, Volume 21 Supplement 3*

DISCLOSURES: V. Saxena: None. **W. Piao:** None. **L. Li:** None. **Y. Xiong:** None. **M.W. Shirkey:** None. **J. Iyyathurai:** None. **R. Lakhan:** None. **R. Abdi:** None. **J. Bromberg:** None.

Abstract# 259

CEACAM1 Signaling is Essential to Elicit Tim-3 Inhibitory Regulation in Liver Transplantation

H. Kojima, H. Hirao, T. Ito, K. Kadono, K. J. Dery, F. M. Kaldas, J. W. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

Purpose: T cell immunoglobulin domain and mucin domain-3 (TIM-3) has been reported to induce T cell exhaustion. By alleviating hepatic ischemia-reperfusion injury, we have explored whether activation of TIM-3 function may be explored as a novel therapeutic target in orthotopic liver transplantation (OLT). Although carcinoembryonic antigen cell adhesion molecule 1 (CEACAM1) was recently discovered as a novel cellular TIM-3 ligand, whether and how CEACAM1/TIM-3 signaling axis can affect OLT outcomes remains unknown. We have generated TIM-3 transgenic/CEACAM1 knockout (TIM-3Tg/CC1KO) double-mutant mice to investigate the role of CEACAM1/TIM-3 axis on host CED4+ T cells in OLT.

Methods: In a clinically-relevant mouse OLT model, wild-type (WT; C57BL/6) livers, subjected to the extended cold storage (4°C/18h) in UW solution, were transplanted to groups of: WT, TIM-3 Tg, TIM-3 Tg/CC1 KO, and CC1 KO mouse recipients. Liver graft and serum samples were collected at 6h post-reperfusion. Mouse splenocytes from these animals groups were probed in standard cell activation culture systems. Human liver graft biopsies (2h post-reperfusion), collected from 55 adult OLT patients, were analyzed for immunological status by Western blots/RT-PCR.

Results: CEACAM1 signaling, reduced hepatocellular injury in TIM-3 Tg recipient mice, compared to WT hosts, as evidenced by serum ALT/AST levels, and Suzuki's histological grading of WT-OLT (n=8/group, p<0.01). In contrast, in the absence of recipient CEACAM1, the alleviation of WT-OLT injury in TIM-3 proficient recipients of double-mutants was curtailed (TIM-3 Tg/CC1 KO versus WT: n=7/8, p=0.737; TIM-3 Tg/CC1 KO versus CC1 KO: n=7 per group, p=0.11), suggesting CEACAM1 was essential to elicit TIM-3 inhibitory regulation in OLT. In agreement with our in vivo findings, RT-PCR analysis revealed that splenocytes from TIM-3Tg/CC1KO mice were highly susceptible to CD3 stimulation, while TIM-3 proficient T cells were immune suppressive. In the clinical arm, the expression of TIM-3 gene was significantly and negatively correlated with mRNA levels coding for TLR4, CD68, CD80, CD86, CXCL10, and cathepsin G in human OLT liver samples.

Conclusions: CEACAM1 serves as a critical ligand for TIM-3 to suppress T cell activation, leading to alleviation of liver innate immune-driven injury in the peri-transplant period.

CITATION INFORMATION: Kojima H., Hirao H., Ito T., Kadono K., Dery K., Kaldas F., Kupiec-Weglinski J. CEACAM1 Signaling is Essential to Elicit Tim-3 Inhibitory Regulation in Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Kojima: None. **H. Hirao:** None. **T. Ito:** None. **K. Kadono:** None. **K.J. Dery:** None. **F.M. Kaldas:** None. **J.W. Kupiec-Weglinski:** None.

Abstract# 260

Laminins Differentially Regulate Adaptive Alloimmune Responses

L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[1], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MA*

Purpose: Lymph node (LN) stromal cell expressed laminin α4 (Lama4) and laminin α5 (Lama5) fibers are associated with tolerance and immunity, respectively. They regulate cell trafficking within the LN. We hypothesized that stromal Lama4 and Lama5 differentially regulate specific alloimmune responses.

Methods: LN stromal Lama5 conditional KO and Lama4 conditional KO mice on a C57BL/6 background were established. Littermate control (WT) and Lama5 KO mice received BALB/c donor-specific splenocytes (DST), or DST plus anti-CD40L mAb for immune and tolerance induction, respectively. T cell receptor transgenic CD4 TEa cells recognizing alloantigen were adoptively transferred into recipients. TEa cell migration, distribution, activation, and differentiation were analyzed. BALB/c donor hearts were transplanted into Lama4, Lama5 KO and WT mice and graft survival measured.

Results: Alloantigen specific TEa cell activation to $CD44^{hi}CD69^{+}$ effector cells were lower in Lama5 KO LN compared to WT, indicating that depletion of Lama5 prevented T cell activation. Under tolerance conditions, activation induced cell death of TEa cells in LN was lower in Lama5 KO than WT, showing that inhibition of T cell activation preserved antigen specific T cells. Under both tolerance and immune conditions, TEa cell differentiation to Foxp3+ Treg and IL-17+ Th17 was altered, making the Foxp3:Th17 ratio higher in Lama5 KO than in WT. Low dose tacrolimus (2 mg/kg/d) treated Lama5 KO cardiac recipients had significantly prolonged allograft survival (mean survival time (MST) 89 days vs 27.5 days in WT, p<.002). Low dose anti-CD40L mAb treated Lama5 KO recipients also had prolonged allograft survival (MST 155 vs 91 days in WT, p=0.07). In contrast, tacrolimus treated Lama4 KO recipients had significantly shorter allograft survival (MST 11.5 days vs 18 days in WT, p<.002). Lama4 KO recipients receiving a single dose of anti-CD40L displayed a trend for decreased survival (MST 42.5 vs 60 days, p<0.01).

Conclusions: Depleting stromal Lama5 suppressed T cell activation, and channeled alloantigen specific T cell differentiation from inflammatory to suppressive regulatory phenotypes. Depleting stromal Lama5 also promoted Treg induction and inhibited Th17 differentiation, creating a tolerogenic niche to enhance cardiac allograft survival. LN stromal Lama4 is necessary for allograft tolerance. Targeting laminins on LN stromal cells could be efficient to modulate adaptive immune responses.

CITATION INFORMATION: Li L., Shirkey M., Piao W., Xiong Y., Saxena V., Zhang T., Iyyathurai J., Lakhan R., Abdi R., Bromberg J. Laminins Differentially Regulate Adaptive Alloimmune Responses *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Li: None. **M. Shirkey:** None. **W. Piao:** None. **Y. Xiong:** None. **V. Saxena:** None. **T. Zhang:** None. **J. Iyyathurai:** None. **R. Lakhan:** None. **R. Abdi:** None. **J. Bromberg:** None.

Abstract# 261

TIGIT Identifies Polyfunctional Donor-Specific CD4+ T Cells Lost After Kidney Transplantation

A. C. van der List, N. H. Litjens, M. G. Betjes, M. Klepper, *Nephrology and Transplantation, Erasmus MC, Rotterdam, Netherlands*

Purpose: Development of T-cell hyporesponsiveness to donor antigen may explain the substantial decrease in the risk for acute rejection in the years following kidney transplantation. The underlying mechanisms of donor-specific hyporesponsiveness (DSH) are largely unknown but may allow for lowering of immunosuppressive medication. This study aimed to test the hypothesis that donor-specific recipient T cells become hyporesponsive due to exhaustion from continuous stimulation by donor antigen.

Methods: Peripheral blood mononuclear cells (PBMCs) of stable kidney transplant recipients (N=17) before and 3-5 years after kidney transplantation were stimulated with CD3-negative donor cells for 18-24 hours. Donor-specific T lymphocytes were identified at the single-cell level by CD137 (marker for antigen-specific T cells) and characterized for exhaustion marker expression by multi-parameter flow cytometry. Analysis was performed through unsupervised and unbiased clustering using Flow Self-Organizing Map (FlowSOM), a dimensionality reduction technique. The FlowSOM clusters containing cells of a particular expression profile with significant differential abundance after transplantation were identified using the statistical method, edgeR, via diffcyt.

Results: Unexpectedly, our results do not demonstrate an increase in exhausted donor antigen-specific T cells post transplantation. Instead, the study shows a significant decrease in donor antigen-specific CD4+ T cells expressing T cell

immunoglobulin and ITIM domain (TIGIT) long after transplantation. Further analysis at earlier timepoints indicated that this decrease is already present at six months post transplantation. Although TIGIT is often thought of as a marker for exhausted T cells, characterization of CD4+ T cells expressing TIGIT revealed these cells to have a predominantly central and effector memory T cell phenotype and a highly polyfunctional cytokine expression profile.

Conclusions: This study has identified TIGIT as a marker for a previously undescribed polyfunctional donor-specific CD4+ T cell population whose decline after kidney transplantation may underlie the phenomenon of DSH. Prospective clinical studies could help determine whether a low frequency of donor-specific TIGIT-expressing CD4+ T cells could guide lowering of immunosuppressive drugs.

CITATION INFORMATION: van der List A., Litjens N., Betjes M., Klepper M. TIGIT Identifies Polyfunctional Donor-Specific CD4+ T Cells Lost After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.C. van der List: None. **N.H. Litjens:** None. **M.G. Betjes:** None. **M. Klepper:** None.

Abstract# 262

TOLS are Novel Regulatory TLOs with A B Cell Signature

I. Rosales[1], Q. Yuan[1], C. Yang[1], P. Russell[1], J. Madsen[1], A. Alessandrini[1], R. Colvin[1], -. AA and RC[2], *[1]Massachusetts General Hospital, Boston, MA, [2]Co-Senior Authors, Boston, MA*

Purpose: Our previous studies suggest that a DBA/2 kidney graft is accepted by a MHC-fully mis-matched C57/BL6 recipient. Accepted renal allografts exhibited lymphoid like structures containing numerus Foxp3+ T cells within 2 weeks of transplant, referred to as Treg-rich Organized Lymphoid Structures (TOLS). We have previously shown that depletion of Tregs results in the dissolution of TOLS and the rejection of the kidney allograft by day 6.The aim of this study is to do an in-depth analysis of the TOLS - investigating the time-course change of infiltrated cells in accepted mouse kidney allografts, which immune cells could be involved in the formation of lymphoid like structures, and the role CCR7 plays in the formation of TOLS.

Methods: DBA/2 donor kidneys were transplanted into C57/BL6 or CCR7 KO recipients that have undergone bilateral nephrectomy. Transplanted animals were sacrificed at week 1, 2, 3, and 6 post-transplant, kidney allografts were examined by H&E, immunohistochemistry staining, and Nanostring RNA analysis. Some renal allografts were digested by collagenase and mononuclear cells were isolated by density centrifugation subsequently, flow cytometry was then used to quantify the percentage of various immune cells.

Results: H&E staining showed widespread infiltration of immunes cells in the cortex of renal allografts at week 1, and the formation of TOLS can be observed by week 2, localized to small arteries. By week 6, these structures are highly defined, showing the appearance of lymphoid structures. IHC staining showed these structures contain mixtures of CD4+ and CD8+ T cells, Tregs, dendritic cells, B cells, and plasma cells. FACS data suggest 18.8% ± 4.4 of T cells in the TOLS at week 6 were Foxp3+ cells. IHC staining also showed TOLS are PDPN+ (podoplanin), LYVE-1+, and PROX-1+, demonstrating its lymphatic characteristics. TOLS are MECA79-, lacking high endothelial venules that are specific to inflammatory tertiary lymphoid organs. We observed decreased survival of CCR7 KO recipients transplanted with DBA/2 allo-kidneys. TOLS were smaller in kidney allografts from CCR7 KO versus WT recipients (0.40 ± 0.17 mm^2 vs 1.73 ± 0.39 mm^2, respectively, $p < 0.001$) with a decrease number of B cells when compared to allografts procured from B6 WT recipients (48% vs 75% B220+ cells, respectively, $p < 0.001$). Nanostring RNA analysis confirmed a B cell signature associated with accepted kidney allografts which was significantly reduced in CCR7 KO recipients.

Conclusions: TOLS seem to be unique structures in tolerized kidney allografts and their formation is dependent on the CCR7 pathway. They represent novel regulatory tertiary lymphoid organs, different from inflammatory TLOs. Nanostring analysis reveals an increased B cell signature associated with TOLS. How infiltrating immune cells are organized into TOLS and how these structures contribute to tolerance induction need to be further studied.

CITATION INFORMATION: Rosales I., Yuan Q., Yang C., Russell P., Madsen J., Alessandrini A., Colvin R., AA and RC TOLS are Novel Regulatory TLOs with A B Cell Signature *AJT, Volume 21 Supplement 3*

DISCLOSURES: I. Rosales: None. **Q. Yuan:** None. **C. Yang:** None. **P. Russell:** None. **J. Madsen:** None. **A. Alessandrini:** None. **R. Colvin:** None. **-. AA and RC:** None.

Abstract# 263

Successful Induction of Hematopoietic Chimerism by Dual Inhibition of Mcl-1 and Bcl-2 Without Myeloablative Treatments in Nonhuman Primates

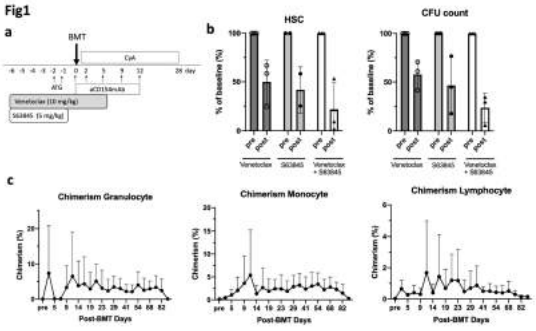
T. Hirose, D. Ma, G. Lassiter, T. Kawai, *Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA*

Purpose: Induction of hematopoietic chimerism by donor bone marrow transplantation (BMT) is essential for achievement of allograft tolerance in clinical HLA mismatched kidney transplantation, while myelosuppressive toxicity of the radiation is yet to be solved. We have recently found that chimerism can be achieved with minimal total body irradiation in nonhuman primates (NHPs) by inhibiting Bcl-2 (anti-apoptotic protein) with Venetoclax (ABT-199). However, a minimal dose of TBI was still required for chimerism induction. Since Mcl-1, another member of the Bcl-2 family proteins, is highly expressed in hematopoietic stem cells (HSC) in bone marrow (BM), we hypothesized that Mcl-1 inhibition might delete the host HSC niche, thus facilitating donor bone marrow engraftment without TBI requirement.

Methods: HSC (CD34+CD90+CD45RA-) counts and Colony Forming Units (CFU) of BM aspirates were measured after treatment with ABT-199 (10mg/kg X11) alone (n=3), Mcl-1 inhibitor (S63845, 5mg/kg X 5) alone (n=3), or combination of both (n=3). In three recipients treated with the combination of S63845 and ABT-199, BMT from the MHC mismatched donor was performed. All BMT recipients were also treated with ATG (3 doses pre-transplant) and anti-CD154 and a 28 day-course of cyclosporine (CyA), all of which were included in our standard BM conditioning for NHPs (Fig. 1a). One NHP underwent skin transplantation after BMT.

Results: Monotherapy of ABT-199 or S63845 depleted CD34+ BM cells to 50 ± 13% and to 42±17% of pre-treatment levels, respectively. CFUs were also suppressed to 58 ± 8.6% and to 46 ± 17%, respectively. Combining ABT-199 with S63845 depleted more HSCs (22 ± 11%) with near complete depletion in two animals. CFUs were also effectively suppressed to 23 ± 8%(Fig. 1b). Since dual inhibition of both Mcl-1 and Bcl-2 most effectively depleted HSCs, BMT was perfomred using the combination of S63845 and ABT-199 (Fig. 1a). After conditioning, all recipients successfully developed multilineage chimerism, which lasted for 3 months (Fig. 1c) despite discontinuation of CyA at one month. Transplanted donor skin was engrafted, while two grafts from different third-party were rejected.

Conclusions: Dual inhibition of Mcl-1 and Bcl-2 effectively depleted BM HSC, leading to successful hematopoietic chimerism induction without myeloablative treatments and donor-specific tolerance. This approach may set the path for the development of a novel and clinically applicable protocol for induction of hematopoietic chimerism without myeloablative treatments.



CITATION INFORMATION: Hirose T., Ma D., Lassiter G., Kawai T. Successful Induction of Hematopoietic Chimerism by Dual Inhibition of Mcl-1 and Bcl-2 Without Myeloablative Treatments in Nonhuman Primates *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Hirose: None. **D. Ma:** None. **G. Lassiter:** None. **T. Kawai:** None.

Abstract# 264

Increased T Cell Cross-dressing in Accepted Kidney Allografts

Q. Yuan[1], S. Hong[2], E. Szuter[2], I. Rosales[2], Y. Zhao[2], B. Gonzalez-Nolasco[2], G. Benichou[2], P. Russell[2], J. Madsen[2], R. Colvin[2], A. Alessandrini[2], *[1]Massachusetts General Hospital/Chinese PLA General Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

Purpose: Kidney allografts transplanted across certain mouse strain combinations (e.g. DBA/2 to B6) develop tolerance while other combinations do not (e.g. B6 to DBA/2). We have recently shown that a subset of infiltrating conventional and plasmacytoid dendritic cells in the accepted DBA/2 kidney allografts are cross-dressed. In certain tumor models, cross-dressing is observed in T cells and these cells are immunoregulatory. In this study, we looked at the frequency of recipient T cells cross-dressed with donor MHC in accepted kidney allografts.

Methods: DBA/2 donor kidneys were transplanted into C57/BL6 recipients. Recipients were sacrificed at several timepoints post-transplant, kidney allografts were examined by H&E and immunohistochemistry staining. Some renal allografts were enzymatically digested and mononuclear cells were isolated by density centrifugation; flow cytometry and image flow cytometry was then used to quantify the percentage of H-2K^b+H-2K^d cross-dressed T cells. Preliminary Nanostring RNA analysis was performed on sorted cross-dressed (XD) and non-crossed (nXD) CD4+ and CD8+ T cells.

Results: Transplantation of DBA/2J kidneys into B6 recipients resulted in the presence of cross-dressed T cells within the allograft as early as 6 days and persisting until 46 days post-transplantation shown by flow cytometry (Fig. 1) and further characterized by image flow cytometry (Fig. 2). Preliminary RNA Nanostring data show that XD CD4+ T cells contain exosomal transcripts (CD63, CD81, Lamp1,

Lamp2), as well as specific endothelial and epithelial transcripts, while XD CD8+ T cells do not, suggesting that XD CD8+ T cells may have undergone cross-dressing via trogocytosis. Cross-dressing was not appreciatively observed in rejecting allografts.
Conclusions: Our data suggest that cross-dressing of infiltrating recipients T cells correlates with kidney graft acceptance in a model of spontaneous tolerance.

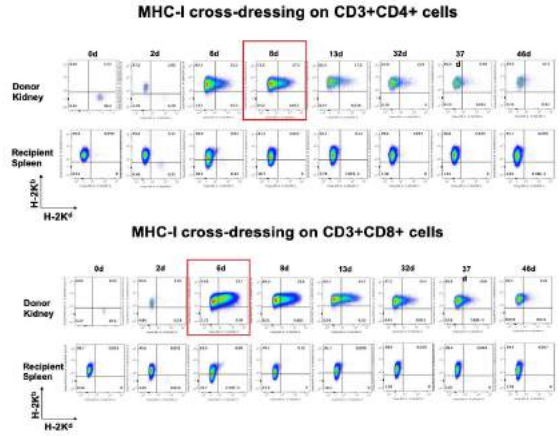


Figure 1

Figure 2

CITATION INFORMATION: Yuan Q., Hong S., Szuter E., Rosales I., Zhao Y., Gonzalez-Nolasco B., Benichou G., Russell P., Madsen J., Colvin R., Alessandrini A. Increased T Cell Cross-dressing in Accepted Kidney Allografts *AJT, Volume 21 Supplement 3*
DISCLOSURES: Q. Yuan: None. **S. Hong:** None. **E. Szuter:** None. **I. Rosales:** None. **Y. Zhao:** None. **B. Gonzalez-Nolasco:** None. **G. Benichou:** None. **P. Russell:** None. **J. Madsen:** None. **R. Colvin:** None. **A. Alessandrini:** None.

ID

BK virus in Kidney Recipients

Abstract# 265

VP2 MRNA Distinguishes the Direct Injury and Inflammation Effects of Polyoma Virus (BK) Infection from the Cognate TCMR Response That Follows Immunosuppressive Minimization

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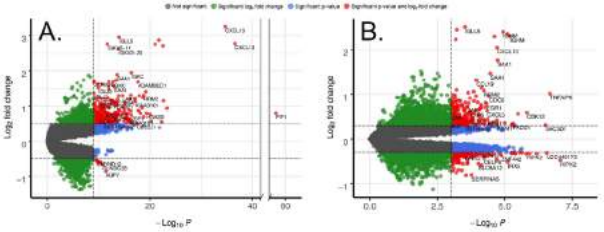
Purpose: BK virus nephropathy (BKN) and T cell-mediated rejection (TCMR) are difficult to distinguish by histology but often coexist due to the necessity for immunosuppression minimization. We sought to use molecular changes to distinguish direct virus damage from cognate T cell activity.
Methods: We used microarrays to study molecular changes associated with histologically defined BKN in kidney transplant biopsies in the INTERCOMEX study. Molecular classifiers estimated parenchymal injury, inflammation, and TCMR in 1679 biopsies (55 with BKN). In a subset of 102 biopsies (50 BKN/52 no BKN, 26 TCMR/26 other abnormalities), we measured expression of BK capsid protein VP2 mRNA by RT-PCR to quantify viral activity.
Results: Top transcripts associated with BKN (Fig. 1A) reflected inflammation (e.g. CXCL13) and atrophy-fibrosis (e.g. IGKC immunoglobulin gene). Gene Ontology (GO) analysis revealed terms related to DNA replication.
VP2 mRNA identified BKN with AUC=0.94. VP2 expression was positive in 45/50 histologic BKN biopsies and negative in 46/52 control biopsies. GO analysis of VP2-associated transcripts (Fig. 1B) represented injury, atrophy-fibrosis, inflammation, with terms associated with mitosis and DNA repair, many shared with the BKN analysis in Fig. 1A.
Transcripts correlating with VP2 activity correlated with the BKN classifier but not the TCMR classifier, distinguishing BKN from TCMR (Fig. 1C). BKN/VP2 mRNA positive biopsies with molecular TCMR had severe tubulitis compared to BKN/VP2 positive biopsies with no TCMR, plus increased injury and atrophy-fibrosis (Fig. 1C). In 5 sets of serial biopsies, molecular TCMR scores increased as VP2 decreased, indicating distinct dynamics for direct virus injury vs. cognate T cell activity.
Conclusions: VP2 mRNA expression in BKN parallels virus-induced parenchymal injury and innate immunity, while molecular TCMR develops independently as an adaptive immune response. Heavy tubulitis in BKN indicates emergence of TCMR. Whether BK-specific adaptive immunity produces a molecular TCMR phenotype without alloimmunity requires further study. VP2 mRNA measurement could guide clinical management when BKN and TCMR coexist.



C. Relationships between histologic findings, molecular measurements and VP2 mRNA - positive status.

Mean histologic score	Histologic BKN positive and VP2 mRNA positive >0.388% of HPRT1		Histologic BKN negative and VP2 mRNA negative <0.388 of HPRT1	
	No rejection (N=11)	TCMR (N=28)	No rejection (N=23)	TCMR (N=23)
Interstitial inflammation (i score) (0.10 – 0.20)^	0.55	1.89	1.05	2.45
Tubulitis (t score) (0.04 – 0.11)^	0.30	2.1	1.40	2.65
Fibrosis (ci score) (0.73 – 0.90)^	0.80	1.96	1.43	1.20
Atrophy (ct score) (0.63 – 0.79)^	1.0	1.92	1.27	1.13
Mean molecular score	**No rejection (N=11)**	**TCMR (N=28)**	**No rejection (N=23)**	**TCMR (N=23)**
Mean VP2 mRNA score	9,908	24,000	0.06	0.06
TCMR classifier ($TCMR_{prob}$) (0.03 – 0.04)^	0.03	0.26	0.03	0.40
Acute injury score (IRRAT) (0.01 – 0.12)^	0.39	1.23	0.04	1.01
Fibrosis classifier (ci_{molec}) (0.25 – 0.30)^	0.31	0.60	0.32	0.37
Atrophy classifier (ct_{molec}) (0.18 – 0.22)^	0.23	0.54	0.24	0.35

^ 95% confidence interval in biopsies with no major abnormalities from the 1679 cohort

CITATION INFORMATION: Halloran P., Famulski K., Madill-Thomsen K., Böhmig G., Gupta G., Myślak M., Viklicky O., the INTERCOMEX Study Group VP2 MRNA Distinguishes the Direct Injury and Inflammation Effects of Polyoma Virus (BK) Infection from the Cognate TCMR Response That Follows Immunosuppressive Minimization *AJT, Volume 21 Supplement 3*
DISCLOSURES: P.F. Halloran: Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **K. Famulski:** None. **K.S. Madill-Thomsen:** None. **G. Böhmig:** None. **G. Gupta:** None. **M. Myślak:** None. **O. Viklicky:** None. **&. the INTERCOMEX Study Group:** None.

Abstract# 266

Coexistence of BKPyV Lytic Infection and Viral Integration in the Development of BKPyV Diseases After Renal Transplantation

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Purpose: To understand the role of BK Polyomavirus (BKPyV) infection and integration in the pathogenesis of BKPyV-associated diseases.
Methods: Sixteen patients with BKPyV-associated diseases were included, 3 with BKPyV-viruria, 3 with BKPyV-viremia, 5 with BKPyV-associated nephropathy (BKVAN), and 5 with BKV-related urothelial carcinoma (Table 1). Viral copy numbers and virome capture sequencing were conducted in the samples of allograft, tumor, blood and urine.
Results: BKPyV integration was detected in all 16 patients (Table 1), including 5 of 5 biopsies of BKVAN allograft (1 of them also had viral integration in blood and urine), 5 of 5 tumor samples of BKPyV-associated urothelial carcinoma, in both urine and blood samples of 3 of 3 patients with viremia and 1 of 3 with viruria, and in urine samples of 2 of 3 patients with viruria. There is a significant difference in the average supporting reads of viral integration sites among the above samples (Fig. 1A). Similarly, increased microhomology-mediated end joining (MMEJ) patterns at

the integration sites were also observed in the tumor and BKVAN samples (Fig. 1B-C). Renal allografts from BKVAN recipients showed SV40-LTAg-positive cells by immunohistochemistry (Fig. 1D-E) and a large number of viral inclusions detected in renal tubular epithelial cells by electron microscope, indicating an active BKPyV lytic infection (Fig. 1F). Well-amplified integration sites (supporting reads > 300) were detected in the BKVAN allograft tissues, indicating a significant BKPyV integration.

Conclusions: We report in the study, for the first time to our knowledge, viral integration in patients with BKPyV-associated non-cancer diseases, including BKPyV viruria, BKPyV viremia, and BKVAN. In BKPyV-affected non-cancerous tissues, lytic infection and viral integration can co-exist. The increase of viral integration sites, likely affecting more key cellular genes, and the increased proportion of MMEJ integration pattern likely may contribute to the pathogenesis of the BKPyV-associated diseases.

Table 1. Viral load and integration in the patient cohort

Case	Stage	Samples used in the study			Urine BKPyV Load Median copies/mL(Range)	Blood BKPyV Load Median copies/mL(Range)	Average number of integration sites		
		Urine	Blood	Allograft/Tumor			Urine	Blood	Allograft/Primary tumor (metastasis)
1	Carcinoma T2	N	N	Y	N/A	N/A	N/A	N/A	280.0
2	Carcinoma T1	N	N	Y	N/A	N/A	N/A	N/A	7.0
3	Carcinoma T4	Y	Y	Y (with metastasis)	3.18E+09(1.09E+07-1.17E+11)	1.69E+05(1.20E+05-2.18E+05)	N/A	N/A	5.0 (6.0)
4	Carcinoma T4	N	N	Y (with metastasis)	N/A	N/A	N/A	N/A	100.0 (42.0)
5	Carcinoma T4	N	N	Y (with metastasis)	N/A	N/A	N/A	N/A	174.0 (5.0)
6	BKVAN	Y	Y	Y	1.22E+10(4.70E+08-1.12E+12)	1.94E+05(1.50E+04-3.42E+06)	10.8	9.3	2.0
7	BKVAN	N	N	Y	N/A	N/A	N/A	N/A	5.0
8	BKVAN	N	N	Y	N/A	N/A	N/A	N/A	17.0
9	BKVAN	N	N	Y	N/A	N/A	N/A	N/A	8.0
10	BKVAN	N	N	Y	N/A	N/A	N/A	N/A	3.0
11	Viremia	Y	Y	NA	1.21E+10(2.15E+08-1.02E+14)	4.62E+05(1.37E+04-9.69E+06)	2.0	1.0	NA
12	Viremia	Y	Y	NA	3.33E+10(5.96E+08-3.93E+11)	8.39E+04(8.54E+03-3.92E+05)	1.0	8.0	NA
13	Viremia	Y	Y	NA	7.62E+08(1.42E+04-8.47E+20)	3.12E+05(3.12E+05-3.12E+05)	10.0	5.0	NA
14	Viruria	Y	Y	NA	1.17E+06(5.98E+04-3.81E+07)	<1.00E+03	3.5	3.0	NA
15	Viruria	Y	Y	NA	7.31E+08(9.48E+03-9.97E+09)	<1.00E+03	2.5	0	NA
16	Viruria	Y	Y	NA	7.67E+09(1.50E+08-8.25E+10)	<1.00E+03	13.3	0	NA

*BKPyV: BK Polyomavirus; BKVAN: BKPyV-associated nephropathy; N/A: not available; NA: not applicable; Y, yes; N, no.

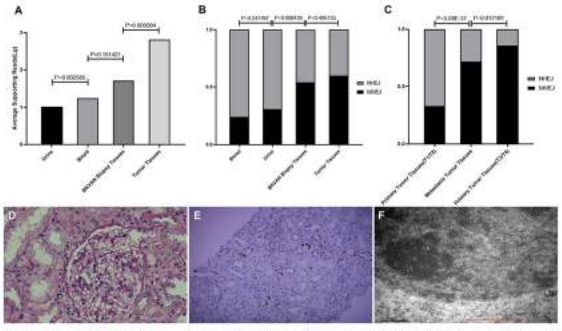

Figure 1. BKPyV lytic infection and virus integration in BKPyV-associated disease processes. (A) The average supporting reads of BKPyV integration sites differ in the four types of samples, suggesting that the role of viral integration becomes more significant along the disease progression. (B-C) The proportion of MMEJ integration increased with the progression of the disease. (D-F) The pathological findings of the renal allograft of Case 6. (D) light microscopy showed typical characteristics of BKPyV-associated nephropathy (hematoxylin and eosin staining, 400×): nuclear enlargement of a few renal tubular epithelial cells; basophilic viral inclusions were found in the nucleus; focal tubular atrophy, interstitial edema and multifocal infiltration of lymphocytes and plasma cells could be seen. (E) Immunohistochemistry showed SV40-TAg-positive cells in renal allograft tissue (100×); (F) electron microscopy showed a large number of intracellular viral inclusions(25000×). MMEJ, microhomology-mediated end joining; NHEJ, nonhomology-mediated end joining.

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Abstract# 267

Duration and Magnitude of BK Viremia Do Not Predict Outcome in Patients After Kidney Transplantation

E. A. Farkash[1], J. T. Rajagopal[2], M. Vincent[2], M. D. Doshi[3], *[1]Dept of Pathology, Michigan Medicine, Ann Arbor, MI, [2]University of Michigan, Ann Arbor, MI, [3]Dept of Nephrology, Michigan Medicine, Ann Arbor, MI*

Purpose: BK viremia was a major cause of kidney transplant failure in the early 2000's and remains a risk factor for subsequent rejection. The standard of care at our large transplant center now includes frequent testing for BK viremia and early reduction in immunosuppression. What are the features and outcomes of BK infection in the setting of aggressive monitoring and treatment?

Methods: We retrospectively analyzed the demographics and outcomes of 401 renal transplant recipients with BK viremia from 2/2006 to 8/2017. Demographic data, transplant type and outcome, biopsy reports, and BK viremia tests were collected from electronic medical records and laboratory information systems. Demographic data was analyzed by chi-squared and Fisher exact tests, and survival data was analyzed by effect likelihood ratio. (JMP v15, SAS).

Results: During the study period, there were roughly 2550 kidney transplants, corresponding to a 15.6% rate of BK viremia. Patients with BK viremia were of similar gender (253/401, 63.1% male) compared to the overall transplant population (62.2% male; p=0.74 by Fisher exact). 127 patients (31.7%) with BK viremia were non-white (97 African-American, 10 Asian, 20 Native American and other), similar to regional demographics. The proportion of living related (15.2%), living unrelated (23.9%), and deceased donor (60.8%) transplants were also similar to the overall transplant population (17.8%, 23.6%, and 58.6%; p=0.43 by chi-squared). In patients with BK viremia, there was no association between peak BK titer and risk of graft failure (p=0.93, likelihood ratio) or combined failure/death (p=0.98). Duration of BK infection correlated with better outcome (p=0.019 and 0.032), likely due to length bias. Graft half-life was similar for patients with BK viremia and nationally reported graft survival (deceased ~13 years, living ~16 years).

Conclusions: Kidney transplant recipients with BK viremia are demographically similar to the overall transplant population. In comparison to historical reports, BK infection does not affect graft failure and overall survival in a modern, aggressively managed cohort. Within the cohort of patients with BK viremia, severe or persistent infections also do not predispose to poor outcome. There were 734 biopsies on 348 of the patients in the study during active BK viremia or within 6 months after viral clearance, and future studies will examine the influence of histologic features during and after infection on graft survival.

CITATION INFORMATION: Farkash E., Rajagopal J., Vincent M., Doshi M. Duration and Magnitude of BK Viremia Do Not Predict Outcome in Patients After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: E.A. Farkash: Consulting Fee; Name of Commercial Interest; Novartis. **J.T. Rajagopal:** None. **M. Vincent:** None. **M.D. Doshi:** None.

Abstract# 268

Donor-Derived Cell-Free DNA Levels Risk-Stratify Polyoma BK Viremia and Associated Clinical Events After Kidney Transplantation - Preliminary Results from ADMIRAL Study

A. Pai[1], L. Bu[2], J. S. Bromberg[3], G. Gupta[4], I. Moinuddin[4], T. Alhamad[5], V. Bowers[6], S. Ghosh[7], W. Tian[7], E. Stites[8], S. Anand[9], *[1]University of Texas McGovern Medical School, Houston, TX, [2]University of Minnesota, Minneapolis, MN, [3]University of Maryland School of Medicine, Baltimore, MD, [4]Virginia Commonwealth University, Richmond, VA, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]CareDx, Brisbane, CA, [8]University of Colorado, Aurora, CO, [9]Intermountain Medical Center, Murray, UT*

Purpose: The threshold of 10,000 copies for blood Quant BK PCR has been used as a surrogate for BK nephropathy (BKN) in kidney transplant recipients (KTR) and affects treatment decisions. We hypothesized that patients with BK viremia are heterogeneous in terms of clinical outcomes and may be optimally stratified when also assessing donor-derived cell-free DNA (dd-cfDNA) levels.

Methods: 883 visits from 246 patients were examined from the Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219). All patients had dd-cfDNA (AlloSure®; CareDx) with standard post-transplant surveillance. All clinical events and BK Quant PCR were assessed. A high dd-cfDNA level was defined as >0.5% based on previous injury analysis in the ADMIRAL cohort.

Results: The distribution of BK PCR viral load demonstrated that majority of KTR were assessed as *asymptomatic.* In ADMIRAL (**FIGURE 1**), 96.5% of viremia KTR had Quant PCR < 10,000 copies and 3.5% >10,000 copies. No significant association was observed between dd-cfDNA and the PCR-based dichotomized BK classes (Kruskal-Wallis p-value:0.4237). No significant correlation was observed between dd-cfDNA levels and PCR copies (R:0.0088). However within this cohort of <10,000 copies, patients with elevated dd-cfDNA (>0.5%) levels had increased incidences for DSA (HLA) and allograft rejection (ABMR and TCMR) based on histopathology results (**FIGURE2**).

FIGURE 1:

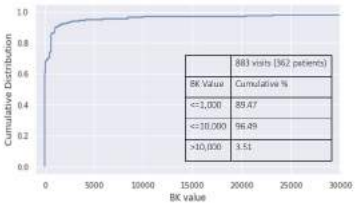

FIGURE 2:

BK PCR <10,000	AS >= 0.5	AS < 0.5	Chi-square; P value
Count	176	666	
DSA positive	17.05%	4.95%	4.10e-211
ABMR	14.20%	1.50%	1.95e-91
TCMR	6.82%	1.35%	1.17e-82
No rejection	11.36%	11.56%	

Conclusions: The utility of dd-cfDNA as a decision supporting tool, when modulating immunosuppression in response to the BK PCR magnitude, may provide benefit for detecting rejection. Higher levels of dd-cfDNA in the context of BK viremia are associated with increases of other adverse events, suggesting that BK PCR copies alone are insufficient to risk-stratify the severity of BKV graft injury. dd-cfDNA does not correlate with BK PCR copies and so provides additive information to interpretation.

CITATION INFORMATION: Pai A., Bu L., Bromberg J., Gupta G., Moinuddin I., Alhamad T., Bowers V., Ghosh S., Tian W., Stites E., Anand S. Donor-Derived Cell-Free DNA Levels Risk-Stratify Polyoma BK Viremia and Associated Clinical Events After Kidney Transplantation - Preliminary Results from ADMIRAL Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Pai: None. **L. Bu:** Consulting Fee; Name of Commercial Interest; CareDx. **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. **G. Gupta:** Grant/Research Support; Name of Commercial Interest; Gilead. Honoraria; Name of Commercial Interest; CareDx, Alexion, Mallinckrodt, Thermo Fisher. Other; Name of Commercial Interest; Alexion (advisory board), Bristol Myers Squibb (advisory board), CareDx (advisory board), Veloxis (advisory board). **I. Moinuddin:** Other; Name of Commercial Interest; CareDx (advisory board). **T. Alhamad:** Consulting Fee; Name of Commercial Interest; Veloxis (consultant/advisory board, speaker's bureau), Mallinckrodt (consultant/advisory board), CareDx (consultant/advisory board, speaker's bureau), Sanofi (speaker's bureau). Grant/Research Support; Name of Commercial Interest; Mallinckrodt, Angion, Natera, CareDx. **V. Bowers:** None. **S. Ghosh:** Salary; Name of Commercial Interest; CareDx (employee). **W. Tian:** None. **E. Stites:** Honoraria; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; CareDx (advisory board). **S. Anand:** Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Alexion (speaker).

Abstract# 269

Characterization of Retransplantation Following Graft Failure Due to Bkvn

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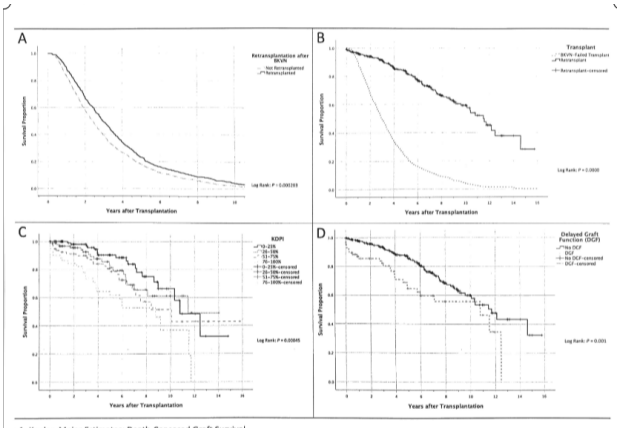
Purpose: Immunosuppression following kidney transplantation allows for the reactivation of BK polyomavirus (BKV)- frequently implicated in graft dysfunction and failure. Although BKV Nephropathy (BKVN) was first described nearly fifty years ago, there is still inadequate understanding of the disease and a lack of specific therapies. For patients whose grafts fail due to BKVN, re-transplantation is a viable option that has not been extensively studied. This study further characterizes BKVN and subsequent re-transplantation in the most expansive population studied to date, geographically, temporally, and in magnitude.

Methods: The OPTN/UNOS database was used to identify patients who received kidney or kidney-pancreas transplantations between October 1, 1987 and December 31, 2018 that resulted in renal allograft failure attributed to BKVN (n=1587). This population was further divided into those who underwent kidney re-transplantation (n=495) and those who did not (n=1092). Subject characteristics were summarized using means and standard deviations or frequencies and percentages, as applicable. Significance between groups was determined by independent samples t-tests and χ^2 tests ($\alpha = 0.05$.). Death-censored graft survival for various subgroups was estimated using Kaplan-Meier with Log-Rank to assess significance. All analysis was completed using SPSS Statistics 26

Results: The cohort that was re-transplanted after BKVN failure was significantly younger and had fewer prior kidney transplants, lower EPTS scores at failure, lower rates of delayed graft function, and a greater proportion of living donors when compared to those who were not re-transplanted. Allograft lifespan prior to BKVN failure was significantly greater in the population that was re-transplanted than the population that was not. Among re-transplants, delayed graft function or high KDPI significantly decreased allograft lifespan. The re-transplanted allografts lasted significantly longer than the original grafts that had failed due to BKVN. Use of steroids for induction was found to have no significant impact on graft survival when compared to a steroid-free regiment.

Conclusions: Trends in and characteristics of successful re-transplantation after BKVN-associated graft failure, using the largest population of this type to date affirms viability of treatment of patients who lose grafts to BKVN and of re-transplantation following BKVN-associated graft failure.



1. Kaplan-Meier Estimates: Death-Censored Graft Survival
BKVN-attributed graft failures: Subsequently retransplanted vs. not retransplanted. B: Retransplanted patients: Original BKVN-failed transplant vs. retransplantation after BKVN: KDPI groups. D: Retransplantation after BKVN: Those who experienced DGF vs. those who did not

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DISCLOSURES: K. Nguyen: None. **H. Curtis:** None. **J. Panichella:** None. **H. Resweber:** None. **A. Di Carlo:** None. **S. Karhadkar:** None.

Abstract# 270

Transcriptomics and Proteomics Profiling of Complement Pathway (cp) Proteins in Biopsies With Polyomavirus Bk Nephropathy (bkvn)

P. Randhawa[1], F. Fei[2], Y. Huang[1], G. Tseng[3], K. Xiao[4], *[1]Departments of Pathology, Pittsburgh, PA, [2]Pharmacology and Chemical Biology, Pittsburgh, PA, [3]Biostatistics, Pittsburgh, PA, [4]Pharmacology and Chemical Biology, University of Pittsburgh, Pittsburgh, PA*

Purpose: Late stage BKVN can show C4d as well as classic immune complex deposits in the tubular basement membranes (Bracamonte et al. Am J Transplant 2007: 7: 152: Batal et al. Modern Pathology 2012: 43: 69). A comprehensive study of the role of complement in the pathogenesis of BKVN has not been performed.

Methods: RNA-seq, Tandem mass tag (TMT) isobaric labeling and label free quantitative profiling were used to interrogate a set of 15 allograft biopsies with equal representation of stable graft function (STA), healthy kidney (HKD), and BKVN. Data analysis consisted of reporter ion intensity relative quantification, log transformation, quantile normalization, and differential expression (DE) analysis by the R package "limma".

Results: In RNAseq data, 6201 genes were differentially expressed between BKVN and stable biopsies ($p<0.05$). This dataset was intersected with 326 human complement related genes downloaded from the European Bioinformatics Institute (EBI) website. This resulted in the identification of 44 genes associated with positive regulation of classical pathway (IGHM, IGHG1, IGHA1) or alternate pathway (CFD, a C3 proactivator convertase), and negative regulation of both the classical and lectin pathways (SERPING1 or C1-inhibitor). To date, 5 genes in the RNA-seq data have been validated by TMT or label free proteomics analysis. Immunoglobulin gene expression provides evidence for antibody-antigen complex driven activation of the classical complement pathways. Complement factor D (CFD) cleaves factor B to a noncatalytic chain Ba and a catalytic chain Bb. The active subunit Bb associates with C3b to form the alternative pathway C3 convertase. C1-inhibitor irreversibly binds to and inactivates C1r and C1s proteases in the C1 complex of classical pathway, as well as the MASP-1 and MASP-2 proteases in the MBL complexes of the lectin pathway.

Conclusions: Complement proteins play a role in the pathogenesis of virus mediated tissue injury in BKVN. This observation opens up the possibility of exploring anti-complement therapies in a subset of patients with C4d staining or immune complex deposits in the tubular basemen.

CITATION INFORMATION: Randhawa P., Fei F., Huang Y., Tseng G., Xiao K. Transcriptomics and Proteomics Profiling of Complement Pathway (cp) Proteins in Biopsies With Polyomavirus Bk Nephropathy (bkvn) *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Randhawa: None. **F. Fei:** None. **Y. Huang:** None. **G. Tseng:** None. **K. Xiao:** None.

Abstract# 271

Efficacy of MAU868, a Novel BKV Neutralizing Monoclonal Antibody (mAb), for the Treatment of Severe BK Virus Nephropathy (BKVN) After Kidney Transplant

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Purpose: BKV reactivation leading to nephropathy and allograft loss in kidney transplant (KT) recipients remains a clinical significant concern. No specific or effective anti-BKV therapies exist. Clinical management involves reduction of immunosuppression (IS), which increases the risk of acute graft rejection. MAU868 is a novel, human mAb (IgG) directed against the major BK viral capsid protein, VP1. In vitro, MAU868 potently neutralizes all 4 major BKV genotypes, has a high barrier-to-resistance and a long half-life (range 23-30 days). Data are presented from the first 2 patients with BKVN treated with MAU868, under separate single patient expanded access programs.

Methods: Patient 1 is a 31 YO female with ESRD due to SLE and on HD for 3 yrs, underwent A2→B pediatric en-bloc DDKT. Patient 2 is a 67 YO male with history of idiopathic pulmonary fibrosis who underwent his second KT after the first was lost to BKVN. BK viremia developed in both patients and persisted despite IS reduction and treatment with IVIG. Patient 1 had biopsy-confirmed BKVN.

Results: Patient 1 initially received 3 IV doses of MAU868 20 mg/kg monthly. The sCr and BK viremia decreased from 2.4 to 1.6 mg/dl and by 1.0 log10 copies/ml, respectively. Biopsy also showed improvement in BKVN. Eight additional doses of 20 mg/kg were administered biweekly with no further improvements. More than 2 yrs PT, BK viremia remained $<10^4$ log10 copies/mL, sCr was 3.0 mg/dl and dialysis has not been required. Patient 2 received 5 IV doses of MAU868 20 mg/kg monthly with sCr and eGFR remaining stable (~60 ml/min/1.73m^2). BK viremia decreased by 1.0 log10 copies/ml and is $<10^3$ log10 copies/ml 4 months after the last dose. MAU868 was safe and well-tolerated in both patients.

Conclusions: MAU868 treatment of 2 patients with active BKVN was associated with viral load reductions and improvement or stabilization of renal function. The clinical utility of MAU868 for the prevention and/or treatment of BKV disease warrants further clinical investigation in randomized, controlled clinical trials because the medical need for a specific anti-BKV therapy remains unmet and the experiences reported here suggest benefit is possible.

CITATION INFORMATION: Jordan S., Ammerman N., Toyoda M., Lim K., Abend J., Patick A., Hodges M., Vo A., Kovacs S. Efficacy of MAU868, a Novel BKV Neutralizing Monoclonal Antibody (mAb), for the Treatment of Severe BK Virus Nephropathy (BKVN) After Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.C. Jordan: Grant/Research Support; Name of Commercial Interest; Amplyx Pharmaceuticals. **N. Ammerman:** None. **M. Toyoda:** None. **K. Lim:** None. **J.R. Abend:** Salary; Name of Commercial Interest; Novartis. **A. Patick:** Consulting Fee; Name of Commercial Interest; Amplyx Pharmaceuticals. **M.R. Hodges:** Salary; Name of Commercial Interest; Amplyx Pharmaceuticals. **A. Vo:** Consulting Fee; Name of Commercial Interest; CareDx. **S.J. Kovacs:** Salary; Name of Commercial Interest; Novartis.

Abstract# 272

Immunosuppression Reduction Strategies for Polyoma BK Viremia in Kidney Transplant Patients on Belatacept-Based Immunosuppression

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Purpose: The mainstay of treatment for BK infection is immunosuppression (IS) reduction, however limited literature provides guidance for treatment of patients with a belatacept-based IS regimen. Our center primarily utilizes a belatacept-based regimen coupled with an 11-month tacrolimus overlap period, mycophenolate (MMF), and prednisone. We assessed BK viremia clearance using different IS reduction strategies in patients on a belatacept-based regimen.

Methods: This single-center, retrospective review included kidney transplant recipients on a belatacept-based regimen who developed BK viremia (BK DNA PCR of > 4 log 10 copies/mL) within one-year post-transplant between March 1, 2015 and January 1, 2019. Patients were placed into two cohorts based upon whether MMF or tacrolimus was reduced first after BK viremia diagnosis. BK viremia clearance was defined as BK DNA PCR of < 3 log 10 copies/mL at one year follow up. Secondary outcomes included biopsy confirmed BK virus associated nephropathy (BKVN) or rejection, graft loss with positive BK viremia, and time until viremia clearance. The primary outcome was compared using the Chi-square test and secondary outcomes with either Fischer's Exact test or Student's t-test.

Results: 88 patients were included for analysis: 70 patients with tacrolimus reduction first and 18 patients with MMF. Both groups were similar in demographics. Overall patient age was 51.3 ± 13.1 years at time of transplant and 71.4% (n=50) were African American. Patients developed BK viremia (4.58 ± 0.51 log 10 copies/mL) 121 days (IQR 71.5, 175) post-transplant (p=0.131, p=0.102). There was no statistically significant difference in BK viremia clearance between groups, although the time to viremia clearance was shorter in the MMF group [6 months Vs. 4.5 months (p=0.172)]. The percentage of patients with biopsy proven rejection trended higher in the tacrolimus reduction group [37% Vs. 17%, p=0.159].

Conclusions: Choice of initial IS reduction did not affect BK viremia clearance however more acute rejection with early tacrolimus reduction suggests this may be a suboptimal approach. Additional studies with larger sample sizes may help further elucidate the optimal IS reduction strategy in this population.

Primary and Secondary Outcome Results			
	Tacrolimus first (n=70)	MMF first (n=18)	p-value
BK viremia clearance	54.3% (n=38)	50% (n=9)	p=0.745
Time to clearance (months)	6 (IQR 2.8, 8.8)	4.5 (IQR 4.2, 7.2)	p=0.172
Biopsy confirmed BKVN	24.3% (n=17)	16.7% (n=3)	p=0.753
Biopsy confirmed rejection	37.1% (n=26)	16.7% (n=3)	p=0.159
Graft loss with BK viremia	0% (n=0)	0% (n=0)	p=1

CITATION INFORMATION: Roe O., Meredith E., Reid A., Basu A. Immunosuppression Reduction Strategies for Polyoma BK Viremia in Kidney Transplant Patients on Belatacept-Based Immunosuppression *AJT, Volume 21 Supplement 3*

DISCLOSURES: O. Roe: None. **E. Meredith:** None. **A. Reid:** None. **A. Basu:** Grant/Research Support; Name of Commercial Interest; UNOS Kidney Transplantation Committee. Grant/Research Support; Nature of Relationship; Region 3 Representative. Honoraria; Name of Commercial Interest; Care Dx. Honoraria; Nature of Relationship; Advisory Board Member.

Kidney

Kidney Immunosuppression

Abstract# 273

A Phase 1 Study to Evaluate the Safety, Tolerability and Pharmacokinetics of At-1501

S. Perrin[1], A. Gill[2], C. Gill[2], P. Gustafson[1], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

Purpose: Execute a phase 1 study of AT-1501 to assess safety, pharmacokinetics, and functional activity.

Methods: The study employed a placebo-controlled, sequential, dose-escalation design. 28 healthy subjects and 4 adults with ALS were enrolled. Five sequential ascending doses of AT1501 (0.5, 1, 2, 4, or 8 mg/kg) or placebo were administered by IV infusion. The primary endpoint was the safety and tolerability of AT-1501. The secondary endpoint was to determine plasma pharmacokinetics (PK) and anti-drug antibody (ADA) responses to AT-1501. An exploratory endpoint was to examine the ability of AT-1501 to block an immune challenge in subjects who received a Keyhole Limpet Hemocyanin (KLH) challenge.

Results: Dose proportionality was achieved over the AT-1501 dose range of 0.5 to 8 mg/kg for C_{max} and AUC_{0-t}. AT-1501 plasma concentrations decreased over time at all dose levels and were measurable out to 42 days post dose. The mean AT-1501 $t_{1/2}$ in healthy volunteers was 18 to 26 days. The PK parameters in ALS were consistent with those from healthy volunteers at the 1 mg/kg dose level.AT-1501 had a safety profile comparable to placebo and was well tolerated in healthy subjects and subjects with ALS. 54% of subjects treated with AT-1501 had at least 1 TEAE and 62% of subjects treated with placebo had at least 1 TEAE. TEAEs ranged from 33% to 66.7% across groups and did not appear to be dose proportional. No subject had a Grade 2 or higher TEAE. The most commonly reported TEAEs overall were headache, somnolence, and upper respiratory tract infection. There were no meaningful laboratory abnormalities, vital sign assessments, ECG assessments, or physical examination findings.Positive ADA responses to AT-1501 were observed in 6 of 30 subjects in the study. There was no dose dependence with respect to the incidence of positive ADA titers. ADA did not appear to affect AT-1501 plasma PK profiles or parameters suggesting they were not neutralizing.8 mg/kg AT-1501 successfully blocked an immune response to KLH challenge in 2 of the 3 subjects tested.

Conclusions: Our results support further clinical development of AT-1501 for transplantation and autoimmune indications.

CITATION INFORMATION: Perrin S., Gill A., Gill C., Gustafson P. A Phase 1 Study to Evaluate the Safety, Tolerability and Pharmacokinetics of At-1501 *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Perrin: Ownership Interest; Name of Commercial Interest; Novus Therapeutics. Ownership Interest; Nature of Relationship; stock options. Salary; Name of Commercial Interest; Novus Therapeutics. Salary; Nature of

Relationship; Employee. **A. Gill:** None. **C. Gill:** None. **P. Gustafson:** Ownership Interest; Name of Commercial Interest; Novus Therapeutics. Ownership Interest; Nature of Relationship; stock options. Salary; Name of Commercial Interest; Novus Therapeutics. Salary; Nature of Relationship; Employee.

Abstract# 274

Evaluation of a Weight-Based Mycophenolate Mofetil Dosing Protocol for Kidney Transplant Maintenance Immunosuppression

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Purpose: To evaluate the safety and efficacy of a weight-based mycophenolate mofetil (MMF) dosing protocol in adult kidney transplant recipients (KTR).

Methods: This single-center retrospective study of adult KTR compared biopsy proven acute rejection (BPAR), any infections, hospitalizations, granulocyte colony-stimulating factor (G-CSF) use, and MMF dose changes within one year of transplant pre- and post-implementation of a weight-based MMF dosing protocol. Adult patients who received a kidney transplant at University Transplant Center between 12/15/16 and 12/1/19 were reviewed for inclusion. Patients in the weight-based MMF group received 1000 mg twice daily by first clinic visit if ≥ 80 kg, 750 mg twice daily if 50-79 kg, and 500 mg twice daily if < 50 kg. Patients in the fixed-dose MMF group received MMF 1000 mg twice daily. Goal tacrolimus trough was 8-12 ng/mL and prednisone was tapered to 5 mg PO daily by POD5.

Patients who received basiliximab induction immunosuppression, previous renal transplant, experienced delayed or slow graft function (defined by 24-hour urine output ≤500 mL by post-operative day 2), or were African American were excluded.

Results: A total of 140 KTR (51% ≥ 80 kg, 45% 50-79 kg, 4% <50 kg) were included. Baseline characteristics were similar between groups. The majority of patients were middle-aged (median 50 years) Hispanic (62%) males (63%) and received rabbit anti-thymocyte globulin (57%). BPAR and infection rates were similar between both groups. The weight-based MMF group had fewer hospitalizations associated with non-infectious nausea, vomiting, or diarrhea (2.9% vs 12.9%; p = 0.03). Additional outcomes at 1 year are presented in Table 1.

Conclusions: Weight-based MMF dosing was associated with fewer hospitalizations related to non-infectious GI adverse events compared to fixed-dose MMF. BAPR rates and other MMF-related adverse events assessed were similar between groups. Weight-based MMF dosing in standard immunologic risk adult KTR results in similar rates of BPAR and significantly fewer hospitalizations for non-infectious GI adverse events.

Table 1: Rates of Identified Outcomes at 1 Year

	Fixed-Dose MMF n (%) (n=70)	Weight-Based MMF Dose, n (%) (n=70)	p-value
BPAR	8 (11.4)	10 (14.3)	0.80
Any Infection	57 (81.4)	61 (87.1)	0.49
G-CSF use	19 (27.1)	13 (18.6)	0.31
MMF dose change	61 (87.1)	55 (78.6)	0.26
Hospitalization associated with neutropenia	3 (4.3)	2 (2.9)	1
Hospitalization associated with any infection	26 (37.1)	27 (38.9)	1
Hospitalization associated with nausea, vomiting, or diarrhea	9 (12.9)	2 (2.9)	**0.03**

CITATION INFORMATION: Mahoney M., Kincaide E., Nelson J., Klein K., Hall R., Bhayana S. Evaluation of a Weight-Based Mycophenolate Mofetil Dosing Protocol for Kidney Transplant Maintenance Immunosuppression *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Mahoney: None. **E. Kincaide:** Other; Name of Commercial Interest; CareDx. Other; If "Other" Please Explain; Received funding for investigator initiated research. **J. Nelson:** Other; Name of Commercial Interest; CareDx. Other; If "Other" Please Explain; Received funding for investigator initiated research. **K. Klein:** Other; Name of Commercial Interest; CareDx. Other; If "Other" Please Explain; Received funding for investigator initiated research. **R. Hall:** Other; Name of Commercial Interest; CareDx. Other; If "Other" Please Explain; Received funding for investigator initiated research. **S. Bhayana:** Other; Name of Commercial Interest; CareDx. Other; If "Other" Please Explain; Received funding for investigator initiated research.

Abstract# 275

The Clinical Validation of a Dried Blood Spot Method for Simultaneous Tacrolimus and Creatinine Measurement

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Purpose: Monitoring tacrolimus concentrations and kidney function after transplantation is important to avoid tacrolimus under- and overexposure and its clinical consequences, including acute nephrotoxicity. Using dried blood spot (DBS) instead of a venipuncture for blood sampling has several advantages: it allows blood sampling at home and it makes it easier to draw blood samples at a specific or at multiple time points (e.g. for an AUC measurement).

Methods: In this study, a DBS sampling method for tacrolimus and creatinine concentration measurement in blood was clinically validated, by comparing pre-dose whole-blood and serum concentrations (for tacrolimus and creatinine, respectively) obtained by a venipuncture to concentrations measured via DBS. The need for a DBS correction factor and hematocrit correction using near infrared spectroscopy was evaluated. Deming regression was used for validation and potential bias was evaluated with a Bland-Altman analysis.

Results: A total of 50 solid organ transplant recipients was included in the analysis. We calculated the following conversion formula for tacrolimus: $[\text{Tacrolimus}]_{DBS}+1.49)/1.788$, with a Deming intercept of 0.272 (95%-CI -0.53 to 1.08) and a slope of 0.960 (95%-CI 0.84 to 1.07). Using this conversion formula, 92% of the tacrolimus measurements were within the 20% limits of agreement (LOA) and 76% of the tacrolimus measurements were within the 15% LOA (Figure 1). We calculated the following conversion formula for creatinine: $[\text{Creatinine}]_{DBS}+0.8069)/0.9077$, with a Deming intercept of -0.5261 (95%-CI -12.73 to 11.68) and a slope of 1.004 (95% CI 0.92 to 1.08), respectively. Using this conversion formula, 94% of the creatinine measurements were within the 15% LOA. For both tacrolimus and creatinine, no additional correction for hematocrit was required.

Conclusions: DBS sampling was clinically validated and can be used in clinical practice for simultaneous measurement of tacrolimus and creatinine with the use of a conversion formula. An additional correction for hematocrit was not required.

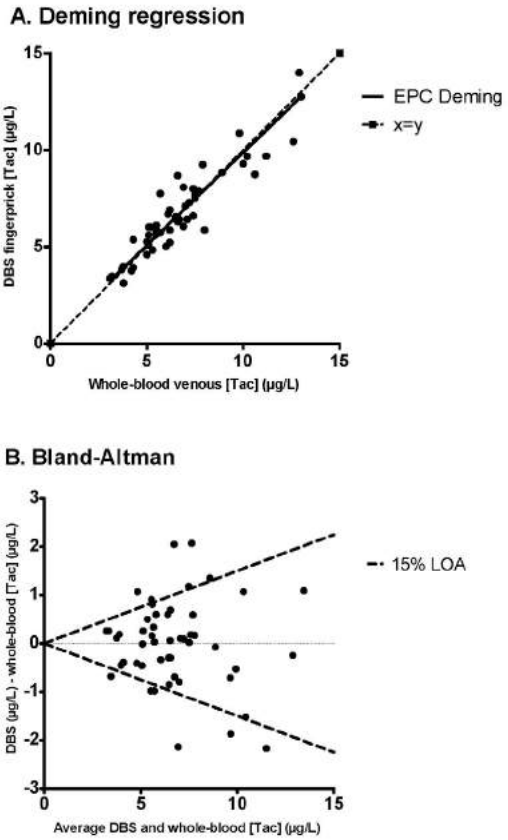

Figure 1. Deming regression (A) and Bland-Altman plot (B). [Tac]: Tacrolimus concentration; LOA: Limits of agreement

CITATION INFORMATION: Francke M., Bouarfa S., van Domburg B., van de Velde D., Hellemons M., Manintveld O., Last-Koopmans S., Mulder M., Hesselink D., de Winter B. The Clinical Validation of a Dried Blood Spot Method for Simultaneous Tacrolimus and Creatinine Measurement *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.I. Francke: None. **S. Bouarfa:** None. **B. van Domburg:** None. **D. van de Velde:** None. **M.E. Hellemons:** None. **O.C. Manintveld:** None. **S.M. Last-Koopmans:** None. **M.B. Mulder:** None. **D.A. Hesselink:** Consulting Fee; Name of Commercial Interest; Astellas Pharma, Chiesi Farmaceutici SpA, Novartis Pharma, Vifor Pharma. Grant/Research Support; Name of Commercial Interest; Astellas Pharma, Chiesi Farmaceutici SpA, Bristol Myers-Squibb. **B.C. de Winter:** None.

Abstract# 276

CD40 Blockade by the Fc-Silent Immunosuppressive Antibody Iscalimab Results in Diminished B Cell Activation and Differentiation and is Paralleled by Whole Blood Gene Expression Data

R. Kraaijeveld[1], M. W. van den Hoogen[1], A. E. de Weerd[1], E. Ferroro[2], G. Robert[2], U. Laessing[2], B. Haraldsson[2], J. S. Rush[2], C. C. Baan[1], *[1]Erasmus MC, Rotterdam, Netherlands, [2]Novartis Pharmaceuticals AG, Basel, Switzerland*

Purpose: Blockade of costimulatory molecule CD40 by the Fc-silent immunosuppressive drug Iscalimab has shown to inhibit acute alloreactivity in non-human primates and is currently being investigated for prevention of rejection in a CNI-free regimen in transplant patients. Interaction of CD40 on B cells with its ligand on T cells serves as the co-stimulatory factor for B cell activation, proliferation and differentiation, and we were interested in exploring how Iscalimab affected B cell activation in the context of kidney transplantation.

Methods: We measured the number and composition of B cells in kidney transplant recipients who enrolled into the CFZ533X2201 study in the first year after transplantation. Recipients received Iscalimab (n=3) or tacrolimus (n=3) in combination with mycophenolate mofetil and steroids. Additionally, we examined the functional effects of Iscalimab on B cell functions from healthy donors. We also performed RNA-seq profiling of blood samples from CFZ533X2201 collected at baseline before transplant and nine and forty-one weeks post-transplant.

Results: Serial flow cytometric monitoring of samples from Iscalimab-treated patients demonstrated that this agent does not affect the numbers of circulating B cells. In these 3 subjects a complete saturation was found of the CD40-Iscalimab epitope, while a different epitope (HB14) of CD40 was detectable. CD40 occupancy by Iscalimab lead to a 2-fold decrease in memory B cells in the Iscalimab group: 15-26% (range) vs range: 34-65% (range) tacrolimus group. To investigate the effect of CD40 blockade on B cell functions, co-cultures of alloantigen-stimulated B cells with induced follicular T helper cells in the presence of Iscalimab were performed. Proliferation of these allo-activated B cells and their subsequent differentiation towards memory class switched B cells and plasma blasts was significantly inhibited. Activation of these B cells was also inhibited, as shown by the diminished expression of co-stimulatory molecules CD86 and CD40-(HB14). At the transcriptomic level, analyses of biological pathways in whole blood RNAseq data showed evidence of reduced B cell activation in Iscalimab treated patients in comparison to allograft recipients on tacrolimus.

Conclusions: Our sub-study shows that blockade of the Iscalimab-specific CD40 epitope inhibits T cell dependent B cell activation resulting in reduced B cell differentiation *in vitro* and *in vivo* after kidney transplantation. These results were consistent with reduction in a transcriptomic signature associated with B cell activation in patients treated with Iscalimab but not tacrolimus. Collectively our results suggests that one of the mechanisms of action of Iscalimab in kidney transplantation is suppression of B cell activation.

CITATION INFORMATION: Kraaijeveld R., van den Hoogen M., de Weerd A., Ferroro E., Robert G., Laessing U., Haraldsson B., Rush J., Baan C. CD40 Blockade by the Fc-Silent Immunosuppressive Antibody Iscalimab Results in Diminished B Cell Activation and Differentiation and is Paralleled by Whole Blood Gene Expression Data *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Kraaijeveld: None. **M.W. van den Hoogen:** None. **A.E. de Weerd:** None. **E. Ferroro:** Salary; Name of Commercial Interest; Novartis. Salary; Nature of Relationship; employee. **G. Robert:** Salary; Name of Commercial Interest; Novartis. Salary; Nature of Relationship; employee. **U. Laessing:** Salary; Name of Commercial Interest; Novaris. Salary; Nature of Relationship; employee. **B. Haraldsson:** Salary; Name of Commercial Interest; Novartis. Salary; Nature of Relationship; employee. **J.S. Rush:** Salary; Name of Commercial Interest; Novartis. Salary; Nature of Relationship; employee. **C.C. Baan:** None.

Abstract# 277

Conversion to Belatacept Based Immunosuppression Regimen in Kidney Transplant Patients: Lessons Learned

R. Saidi, N. Huang, C. Yang, I. Movileanu, K. Ecal, A. Senay, O. Pankewycz, R. Dvorai, R. Shahbazov, M. Laftavi, *SUNY Upstate, Syracuse, NY*

Purpose: The costimulatory inhibitor, belatacept (Bela) has been shown to be an effective alternative in several clinical situations including calcineurin toxicity, de novo alloantibody formation and thrombotic microscopic angiopathy. In order to further explore the usefulness of Bela under various clinical scenarios, we performed a retrospective analysis of a prospective database of all recipients who were converted to betatacept maintenance immunosuppression regimen after kidney transplantation.

Methods: This single center study reviewed the electronic records of all patients who received a KT between 2016 and 2020. A total of 57 patients were converted to Bela. Of these recipients, 25 (43.8%) converted within the first 6 months and 32 (56.2%) converted after 6 months. The indications for conversion were: calcineurin inhibitor (CNI) toxicity (26.3%), thrombotic microangiopathy (8.8%), de novo DSA (36.8%), chronic antibody rejection (AMR) with or without significant fibrosis (IFTA) (28.1%).

Results: Early conversion significantly improved GFR at 3, 6- and 12-months post-conversion. However, late conversion has no effect on GFR . Thirty four (59.63%) patients were converted Bela, mycophenolate and steroids and 23 (40.4%) converted to Bela, low dose CNI and steroids. Only 6 patients (10.5%) developed rejection after conversion, 5 (83.4%) in early conversion group. Five patients (83.4%) had T cell mediated cellular rejection and one patient (16.6%) had acute antibody mediated rejection. The rejection rate was 14.7% in group of belatacept without CNI compared to 4.3% in the group on belatacept with low dose CNI ($p<0.001$). All patients with chronic AMR±IFTA were in late conversion group (59.2%) which led to stabilization in their GFR (32 vs 30 mL/min) at 1 year post conversion. Out of 21 patients who were converted to belatacept due to de-novoDSA, 9 (42.9%) patients had complete or partial resolution of DSA. Interestingly, in early conversion group 80% responded vs (31.2%) in late conversion group ($P<0.001$)

Conclusions: The conversion to belatacept was effective, especially when performed early after kidney transplantation. Late conversion to belatacept was beneficiary for a subgroup of patients with chronic changes.

CITATION INFORMATION: Saidi R., Huang N., Yang C., Movileanu I., Ecal K., Senay A., Pankewycz O., Dvorai R., Shahbazov R., Laftavi M. Conversion to Belatacept Based Immunosuppression Regimen in Kidney Transplant Patients: Lessons Learned *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Saidi: None. **N. Huang:** None. **C. Yang:** None. **I. Movileanu:** None. **K. Ecal:** None. **A. Senay:** None. **O. Pankewycz:** None. **R. Dvorai:** None. **R. Shahbazov:** None. **M. Laftavi:** None.

Abstract# 278

Immunosuppression and Cancer Risk in Kidney Transplant Recipients: A Retrospective Cohort Study

R. Sapir-Pichhadze[1], C. Laprise[1], X. Zhang[1], M. Abrahamowicz[1], M. Beauchamp[2], A. Della Vecchia[1], L. Azoulay[1], E. Franco[1], B. Nicolau[1], *[1]McGill University, Montreal, QC, Canada, [2]McGill University Health Centre, Montreal, QC, Canada*

Purpose: Kidney transplant recipients (KTR) have an elevated risk of cancer. We sought to estimate to what extent does the immunosuppression regimen increase KTRs' susceptibility to cancer, and if this risk is modified by age and sex.

Methods: We reconstructed a retrospective 20-year Quebec province-wide cohort including first time kidney only transplant recipients by linking two provincial administrative healthcare databases. Immunosuppression prescription data (date, form, dose, and duration) along with pertinent effect modifiers and confounders were obtained from the *Régie de l'assurance maladie du Québec*. Incident cancer cases were identified in Quebec's clinical and administrative database (Med-ECHO) using the World Health Organization International Disease Classification ICD-10 codes. We computed hazard ratios and 95% confidence intervals [HR (95%CI)] for the associations between risk of cancer and time-varying unweighted cumulative doses of prednisone, MMF and tacrolimus administered over the last 8 years. Exposure to immunosuppression agents was lagged by 2 years as very recent exposure is unlikely to affect the immediate risk of cancer. In addition, we assessed the recency-Weighted Cumulative Exposure (WCE) for the same immunosuppression agents in multivariable models adjusted for sex, age at transplant, era, and the unweighted cumulative doses of the other two immunosuppression agents. Interactions between the main exposures and age, using a 50-year threshold, and sex, were also assessed.

Results: A total of 3,112 KTR experienced 423 cancer events. Cumulative prednisone dose (5mg per day over 8 years, the median follow-up) was associated with an increased risk of cancer [HR 1.28 (95% CI, 1.01-1.64)] while MMF (1000mg per day over 8-years) and tacrolimus (2mg per day over 8-years) were not [0.94 (0.74-1.21) and 0.96 (0.82-1.12), respectively]. We observed a significant interaction between cumulative prednisone dose and age ($p<0.01$), with a higher risk of cancer observed among recipients >50 years of age [1.51 (1.15-1.97)]. We also observed a statistically significant interaction between the cumulative dose of MMF and age ($p=0.03$) with patients ≤50 years experiencing a lower risk [0.67 (0.44-1.01)]. No significant interaction was observed between the cumulative dose of tacrolimus and age or between the cumulative dose of prednisone, MMF or tacrolimus and sex. A similar trend was observed in WCE models for prednisone, MMF and tacrolimus use over an 8-year period vs. non-use with HRs 1.26; 0.91; and 0.95, respectively.

Conclusions: An increased risk of cancer was observed the higher the cumulative dose of prednisone. The cancer risk by cumulative prednisone dose was further accentuated in older KTR. Whether lower intensity regimens may help mitigate risk of cancer warrants further study.

CITATION INFORMATION: Sapir-Pichhadze R., Laprise C., Zhang X., Abrahamowicz M., Beauchamp M., Della Vecchia A., Azoulay L., Franco E., Nicolau B. Immunosuppression and Cancer Risk in Kidney Transplant Recipients: A Retrospective Cohort Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Sapir-Pichhadze: None. **C. Laprise:** None. **X. Zhang:** None. **M. Abrahamowicz:** None. **M. Beauchamp:** None. **A. Della Vecchia:** None. **L. Azoulay:** None. **E. Franco:** None. **B. Nicolau:** None.

Abstract# 279

Clinical Outcomes Associated with Induction Therapy Regimens for Kidney Transplantation in Children: A NAPRTCS and PHIS Collaborative Report

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Purpose: Choice of induction agent at the time of pediatric kidney transplant (KTx) is often based upon patient characteristics and center practice. There are limited large scale comparisons of induction agents used for pediatric KTx. We evaluated clinical outcomes and costs based on induction therapy among children in the North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) registry and the Pediatric Health Information System (PHIS) database.

Methods: Retrospective study of merged data from the NAPRTCS registry and PHIS database between 1999-2019. Participants were grouped by induction agent: no induction, IL2 RB only, rATG/ALG, alemtuzumab. Unadjusted outcomes included graft failure, estimated GFR (eGFR) at 1, 3, and 5-year post-KTx and index hospitalization cost (IHC). Subgroup analysis evaluated graft failure and eGFR at 1, 3, and 5-year post-KTx for deceased donor kidney transplant (DDKT) vs. living donor kidney transplant (LDKT) between 2009-2019. Categorical outcomes were compared across induction therapy groups using a chi-square test for association; continuous variables were compared using a Kruskal-Wallis test.

Results: 2410 KTx with data in both NAPRTCS and PHIS were included in the analysis. 340 subjects (14.1%) received no induction, 960 (39.8%) received IL2 RB only, 943 (39.1%) received rATG/ALG (164 of these also received IL2 RB), and 176 (7.3%) received alemtuzumab. Table 1 highlights the graft failure rate, eGFR, and IHC for those transplanted between 1999-2019. Subset analysis of graft failure and eGFR in those who received DDKT vs. LDKT between 2009-2019 are shown in Table 2 (3.8% no induction, 30.9% IL2 RB, 49.8% rATG/ALG, 15.5% alemtuzumab).

Conclusions: Over the last two decades IL2 RB and rATG/ALG are the more frequently used induction agents at the time of pediatric KTx, however, there is no difference in graft survival at 1, 3, and 5-years post-KTx based on the induction agent used. Alemtuzumab appears to be associated with higher eGFR at the same time points and appears to be associated with lower IHC. Among DDKT performed between 2009-2019, it appears those without induction had higher rates of graft failure, while eGFR was similar among the induction groups at all three time points. Among LDKT, graft failure was similar but recipients with alemtuzumab induction had higher eGFR across all time points.

Table 1: Outcomes Based on Induction Agent (1999-2019)

	Total (n = 2410)	No Induction (n = 340)	IL2 RB Only (n = 960)	rATG/ALG (n = 934)	Alemtuzumab (n = 176)	*p*-value
Graft failure, n (%)						
1 year	89 (3.7)	10 (2.9)	33 (3.4)	40 (4.3)	6 (3.4)	0.644
3 year	147 (6.1)	17 (5.0)	53 (5.5)	67 (7.2)	10 (5.7)	0.360
5 year	186 (7.7)	19 (5.6)	74 (7.7)	82 (8.8)	11 (6.3)	0.243
eGFR, median (IQR)						
1 year	66 (52, 86)	60 (48, 76)	67 (52, 86)	65 (51, 84)	83 (64,117)	< 0.001
3 year	62 (48, 79)	58 (46, 73)	62 (47, 77)	63 (48, 80)	75 (56, 94)	< 0.001
5 year	60 (45, 77)	57 (43, 71)	59 (44, 75)	61 (45, 77)	70 (53, 89)	< 0.001
Index Hospitalization Cost, median (IQR)						
	$106,362 ($78,297, $152,055)	$95,564 ($73,888, $141,228)	$115,417 ($83,689, $151,863)	$108,147 ($77,769, $168,807)	$82,642 ($70,604, $100,513)	< 0.001

Table 2: Graft failure and eGFR Based Induction and Transplant Type (2009-2019)

	Total	No Induction	IL2 RB Only	rATG/ALG	Alemtuzumab	*p*-value
DDKT						
Graft failure, n (%)						
1 year	21 (4.3)	3 (15.0)	1 (0.8)	12 (4.4)	5 (7.6)	0.012
3 year	33 (6.8)	4 (20.0)	2 (1.6)	20 (7.4)	7 (10.6)	0.006
5 year	40 (8.3)	4 (20.0)	4 (3.1)	24 (8.9)	8 (12.1)	0.024
eGFR, median (IQR)						
1 year	78 (61, 95)	71 (66, 80)	79 (60, 95)	75 (60, 93)	84 (68, 110)	0.069
3 year	71 (58, 89)	69 (62, 80)	72 (58, 86)	71 (57, 93)	69 (60, 87)	0.974
5 year	69 (54, 87)	69 (62, 80)	70 (52, 84)	68 (53, 90)	68 (55, 81)	0.866
LDKT						
Graft failure, n (%)						
1 year	2 (0.6)	0 (0.0)	0 (0.0)	2 (1.6)	0 (0.0)	0.312
3 year	8 (2.3)	0 (0.0)	2 (1.6)	4 (3.3)	2 (2.4)	0.796
5 year	11 (3.2)	0 (0.0)	4 (3.3)	5 (4.1)	2 (2.4)	0.828
eGFR, median (IQR)						
1 year	81 (60, 106)	79 (60, 84)	83 (61, 111)	72 (56, 94)	87 (66, 130)	0.003
3 year	71 (56, 94)	79 (60, 84)	73 (58, 95)	65 (53, 80)	80 (62, 108)	0.006
5 year	67 (51, 88)	79 (60, 84)	69 (51, 93)	63 (49, 76)	78 (56, 106)	0.010

CITATION INFORMATION: Pizzo H., Levy Erez D., Rodig N., Richardson T., Somers M. Clinical Outcomes Associated with Induction Therapy Regimens for Kidney Transplantation in Children: A NAPRTCS and PHIS Collaborative Report *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Pizzo: None. **D. Levy Erez:** None. **N.M. Rodig:** None. **T. Richardson:** None. **M. Somers:** None.

Abstract# 280

Single-Dose Basiliximab Induction Therapy in Low-Immunologic Risk Kidney Transplant Recipients

A. Hutchins, J. Schoen, J. S. McMullen, *Pharmacy, Nebraska Medicine, Omaha, NE*

Purpose: The purpose of this study is to examine the outcomes associated with single-dose basiliximab in low-immunologic risk kidney transplant recipients following a revision to the kidney transplant induction protocol at our institution.

Methods: A retrospective, single-center, observational chart review was conducted on kidney transplant recipients ≥19 years old who received single-dose basiliximab induction therapy from June 2019 to May 2020 based on the institution's kidney transplant induction protocol (Table 1). All patients received a standard initial steroid taper and three-drug maintenance immunosuppression with tacrolimus, mycophenolate, and prednisone. Patients were excluded if they received lytic induction after receiving basiliximab or experienced graft loss prior to POD4. Patients who received single-dose basiliximab were assessed for incidence of biopsy proven acute cellular rejection (BPAR), antibody mediated rejection (AMR), graft loss, death, BK viremia, and cytomegalovirus (CMV) infection. Data on outcomes were collected for at least 6 months up to 12 months following transplantation.

Results: There were 57 patients who received single-dose basiliximab during the review period. The incidence of BPAR was 3.5% with one patient experiencing Banff Grade III rejection resulting in graft loss. The incidence of AMR was 1.7% with one patient experiencing graft loss. Overall graft survival at the end of the study period was 96.5% and patient survival was 100%. CMV infection was observed in 24.5% of patients and 22.8% of patients had BK viremia.

Conclusions: In this retrospective review, we observed low rates of BPAR, AMR, graft loss, and death in our low immunologic-risk kidney transplant recipients who

received single-dose basiliximab for induction therapy. Single-dose basiliximab appears to be a safe and effective induction therapy regimen in appropriately selected low-immunologic risk kidney transplant recipients. Further study is needed to confirm the findings in this descriptive review.

Table 1 Kidney transplant induction protocol

Points	Risk Factors		
1 Point	Repeat Transplant African American Recipient 6 Antigen Mismatch (HLA A, B, DR) Systemic Lupus Erythematosus Donation After Cardiac Death*		
2 Points	PRA >20% ABO Incompatibility		
Immunologic Risk	Low (0 Points)	Moderate (1-2 Points)	High (>2 Points)
Induction Therapy	Single-Dose Basiliximab	Conventional-Dose Basiliximab	Alemtuzumab

*Point assigned at the discretion of transplant team dependent on donor ischemic time

CITATION INFORMATION: Hutchins A., Schoen J., McMullen J. Single-Dose Basiliximab Induction Therapy in Low-Immunologic Risk Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Hutchins: None. **J. Schoen:** None. **J.S. McMullen:** None.

All Organs

Disparities in Access and Outcomes in Kidney Transplantation

Abstract# 281

Initial Kidney Transplant Evaluations with Telehealth: Is it a Pandemic Only Practice?

A. Govil[1], E. Tims[2], C. Siemer[2], J. Harris[2], C. King[2], S. Shah[1], C. Thakar[1], *[1]Univ of Cincinnati, Cincinnati, OH, [2]UC Health, Cincinnati, OH*

Purpose: COVID -19 pandemic presented an unprecedented challenge to health care systems. It disrupted the transplant processes including evaluations, especially in rural or other geographically challenged areas in terms of access to transplant care (outreach locations). Prompt utilization of telehealth may change how healthcare is delivered beyond pandemic.

Methods: By April 2020, the healthcare disruption by the pandemic was evident; COVID-19 lockdowns were in full swing with a nationwide shortage of personal protective equipment, most staff working remotely, no in-person clinics, and all evaluation testing/elective surgeries on hold. We promptly converted all our transplant outreach clinics to telehealth based in April. The goal was to continue to connect, communicate, consent, educate, and evaluate our transplant referrals.

Results: The telehealth platform provided safe care for the patients and providers (minimal physical exposure) with the least intrusive means of evaluation. Patients and their families were more open to communicating. It lessened the patient's initial commitment burden towards a visit to the center and helped with their time off from work, transportation, opportunity costs, and provided easy access to health care from their home with almost zero no-show rate. We were able to filter an increasing number of referrals to identify the need for support plans/transportation/weight issues/living donor education at a much earlier stage and continued to move patients through the transplant evaluation process. The challenges noted were: 1) Patient barriers which included access to technology adeptness, system issues, ability to seek technical support, or asking for help. 2) Healthcare system & Provider barriers included a steep learning curve, lack of physical exam/assessment, time-consuming process, missing "personal rapport", lack of state licensure reciprocity across state lines, lower reimbursements/ work credits, and high technology costs. Figures 1 and 2 show trends in referrals, listings, and transplants in 2019 and 2020; despite the challenges in the pandemic, telehealth was able to achieve an increase in all activities in outreach locations.

Conclusions: Pandemic and beyond, telehealth could be a viable standard option for increasing transplant referrals, screening, and initial evaluation. It adds value to transplant outreach clinics and increases patients' access to transplant centers. Licensure reciprocity, improvement in reimbursements, and utilizing more patient-centric platforms are needed to make such models sustainable.

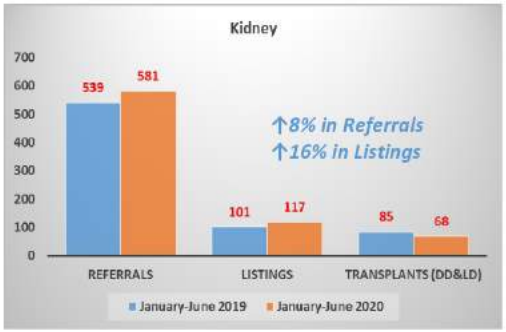


Figure 1: Kidney transplant: Referrals, listings and deceased donor (DD) & living donor (LD) transplants

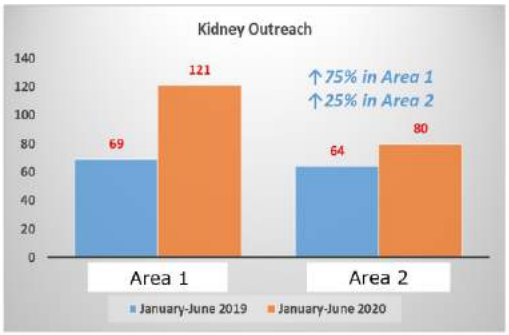


Figure 2: Kidney transplant outreach clinic visits

CITATION INFORMATION: Govil A., Tims E., Siemer C., Harris J., King C., Shah S., Thakar C. Initial Kidney Transplant Evaluations with Telehealth: Is it a Pandemic Only Practice? *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Govil: Honoraria; Name of Commercial Interest; Mallinckrodt Pharma, CareDx, Natera. Honoraria; Nature of Relationship; Speaker's Bureau, Advisory Board Meetings, Speaker's Bureau. **E. Tims:** None. **C. Siemer:** None. **J. Harris:** None. **C. King:** None. **S. Shah:** None. **C. Thakar:** None.

Abstract# 282

Low Socio-economic Status is Associated with Lower Kidney Graft Survival and Increased Risk of Graft Failure Due to Acute Rejection

W. Xie[1], G. Vrakas[1], S. H. Gray[1], A. Haririan[2], J. R. Scalea[1], J. S. Bromberg[1], D. G. Maluf[1], R. P. Meier[1], *[1]Department of Surgery, University of Maryland School of Medicine, Baltimore, MD, [2]Department of Medicine, University of Maryland School of Medicine, Baltimore, MD*

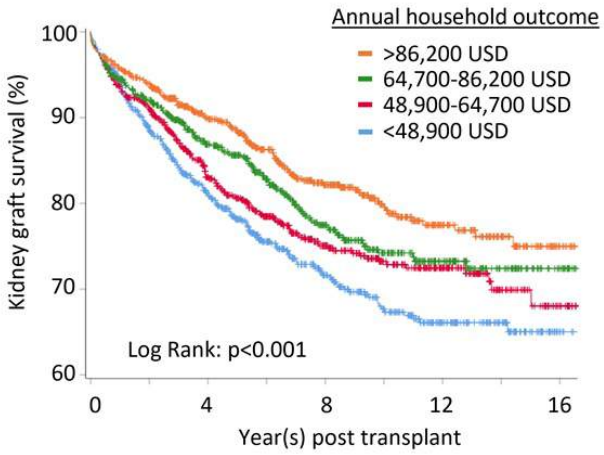
Purpose: Low socio-economic status (SES) has been shown to be associated with poor kidney graft outcomes. We aimed to characterize differences in high and low SES kidney recipients and identify interventions to improve graft survival.

Methods: Kidney transplants performed at the University of Maryland Medical Center between January 1994-June 2020 were evaluated. Income was estimated from recipient's zip code using income tax statistics from the IRS. Primary outcome studied was graft survival. Kaplan-Meier survival analysis, univariate and multivariate Cox regressions were performed.

Results: There were 3131 kidney recipients available for analysis. Income quartile (IQ) cutoff at 25%, 50% and 75% were $48,851, $64,602, and $86,306 USD respectively. Demographics were heterogeneous between IQ except for gender. Recipients in the lowest IQ were more likely to be younger, have higher BMI, have achieved a high school degree at transplant, and self-identified their race as Black. The worst graft survivals were experienced by those in the lowest IQ (Fig 1). Cox regression analysis showed that those in the lower two IQs had a 1.7-fold (95%CI, 1.4-2.1) and 1.4-fold (95%CI, 1.1-1.8) increased risk of graft loss, respectively, compared to those in the highest IQ. Graft failure due to acute rejection was more frequent in the lower IQ. Mixed and Black race were associated with an increased risk of graft loss by 2.9-fold (95%CI, 1.8-4.5) and 2.1-fold (95%CI, 1.9-2.4), respectively, compared to White race. Older recipient age and lower levels of education also negatively impacted graft survival. In multivariate analysis, lower SES, Black race, and older age were all independently associated with poor graft survival.

Conclusions: Low SES negatively impacts kidney graft survival along with race, education and age. Identifying increased rate of graft failure due to acute rejection in low SES groups transforms SES to a modifiable variable. Special attention from

at-risk programs to address systemic barriers to healthcare access, provide close surveillance and improve adherence to immunosuppression must be given to renal transplant recipients with low SES.



CITATION INFORMATION: Xie W., Vrakas G., Gray S., Haririan A., Scalea J., Bromberg J., Maluf D., Meier R. Low Socio-economic Status is Associated with Lower Kidney Graft Survival and Increased Risk of Graft Failure Due to Acute Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: W. Xie: None. **G. Vrakas:** None. **S.H. Gray:** None. **A. Haririan:** None. **J.R. Scalea:** None. **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Research Grant Recipient. **D.G. Maluf:** None. **R.P. Meier:** None.

Abstract# 283

Geospatial Analysis of Organ Procurement Organizations and Its Impact on Organ Donation Rates

D. Chyou[1], K. Ross-Driscoll[2], R. Lynch[2], D. S. Goldberg[1], *[1]University of Miami, Miami, FL, [2]Emory University School of Medicine, Atlanta, GA*

Purpose: For the majority of organ procurement organizations (OPOs), OPO staff travel to donor hospitals to obtain consent and manage donors, while OPO headquarters (HQ) are the primary site for donor laboratory testing. We hypothesized that donation rates decrease with increased travel time from OPO HQ to donor hospital.
Methods: Retrospective cohort study from 2011-2018 using two data sources: organ donors per hospital per year, aggregated by county, from the Scientific Registry for Transplant Recipients, and potential donors using data from CDC WONDER of inpatient deaths ≤75 years of age from causes consistent with donation (CALC deaths). We aggregated data into two 4-year periods, 2011-2014 and 2015-2018, as these are periods when OPOs underwent review for re-certification by the Center for Medicare and Medicaid Services. OPOs in the contiguous US were included. We used ArcGIS to calculate driving time from the OPO HQ to each county's geographic centroid within the donor service area, accounting for traffic. Counties were aggregated into three bands of driving time (≤30, 31-120, and ≥121 minutes). We calculated the donation rate per 100 CALC deaths for each band. Multivariable mixed-effects linear regression models and post-estimation marginal means were used to calculate and compare donation rates adjusted for factors associated with donation rate.
Results: In adjusted mixed-effects linear models, increased driving time from OPO HQ was associated with decreased donation rates (p<0.001). Nationally, there was a stepwise decrease in donation rates between the three travel time bands during both 2011-2014 and 2015-2018 (Fig. 1). The magnitude of the association between driving time and donation rates varied across OPOs. However, all 56 OPOs analyzed in this study had a decrease in donation rate from the ≤30 to 31-120 minute band, and 55 OPOs had a further drop in donation from the 31-120 to ≥121 minute band (Fig. 2).
Conclusions: Nationally and within almost every OPO, donation rate decreases as driving time from OPO HQ increases in a dose-response relationship. This suggests that increased travel time to candidate donor may be a barrier to successful organ recovery.

Figure 1: National adjusted donation rates by period and driving time band

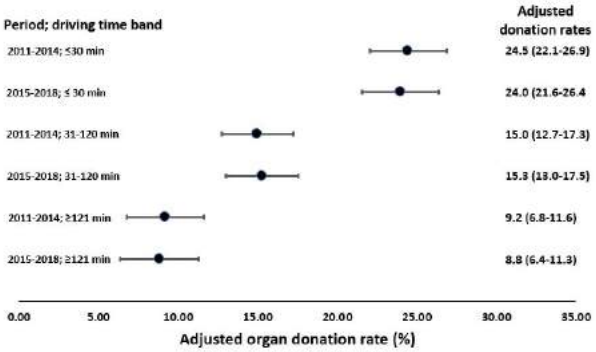
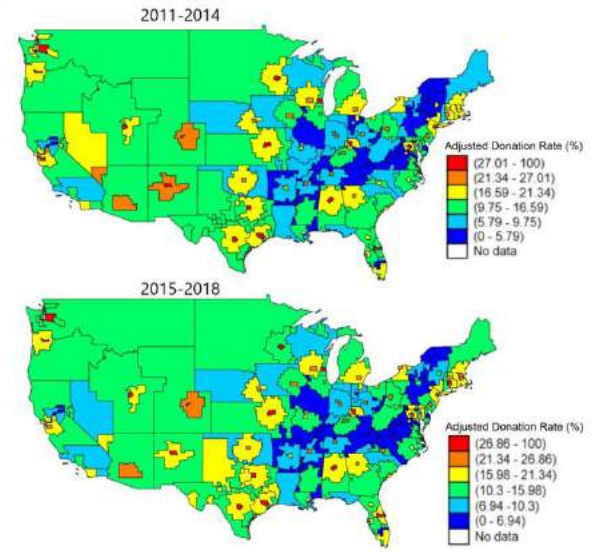


Figure 2: Map of the adjusted donation rates in driving time bands outside of each OPO HQ



CITATION INFORMATION: Chyou D., Ross-Driscoll K., Lynch R., Goldberg D. Geospatial Analysis of Organ Procurement Organizations and Its Impact on Organ Donation Rates *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Chyou: None. **K. Ross-Driscoll:** None. **R. Lynch:** None. **D.S. Goldberg:** None.

Abstract# 284

Obesity is Associated with Greater Gender Disparity in Access to Kidney Transplantation

S. S. Sheikh, B. Orandi, P. MacLennan, H. Qu, R. M. Cannon, D. Anderson, M. Hanaway, S. Mehta, V. Kumar, R. Reed, J. Locke, *Surgery, University of Alabama at Birmingham, Birmingham, AL*

Purpose: Obesity and female gender have been associated with decreased access to kidney transplant. We sought to use contemporary data to examine the likelihood of waitlisting and transplant for obese women with end stage renal disease (ESRD).
Methods: We performed a retrospective cohort study with long-term follow up, using the U.S. Renal Data System, of incident ESRD patients from 2012-2014 who had no contraindication to transplant and were not waitlisted within 90 days at the time of first dialysis service date. We used Cox proportional hazards regression to investigate the likelihood of waitlisting and subsequently transplant for women, stratified by BMI.
Results: We identified 217,320 waitlist-eligible ESRD patients. Of this cohort, men comprised 58.3% and women 41.7%. Women were found to be less likely to be placed on the wait-list compared to men across all BMI categories>18.5 kg/m^2, with the disparity growing more pronounced at higher BMI; BMI 18.5-34.9 aHR 0.86 (95%CI 0.84-0.88), BMI 35.0-39.9 aHR 0.71 (95%CI 0.67-0.75), BMI 40.0-44.9 aHR 0.68 (95%CI 0.62-0.75), BMI 45+ aHR 0.55 (95%CI 0.48-0.62). Once wait-listed, the likelihood for achieving transplantation was not significantly different between genders across the BMI categories; BMI 18.5-34.9 aHR 1.07 (95%CI 1.03-1.11), BMI 35.0-39.9 aHR 0.94 (95%CI 0.85-1.05), BMI 40.0-44.9 aHR 1.11 (95%CI 0.95-1.3), BMI 45+ aHR 1.07 (95%CI 0.86-1.33).
Conclusions: Women, especially with obesity, are less likely to be placed on the deceased donor kidney transplant waitlist compared to men. However, once

waitlisted, the opportunity for subsequent transplant appears comparable to men of the same BMI category. Further research should focus on identification of barriers to referral and evaluation of obese, female patients with ESRD.

Table 1:

Characteristics of waitlist-eligible end-stage renal disease patients (n=217,320) by Sex			
	Men (n=126,744) 58.3%	Women (n=90,576) 41.7%	p-value[1]
BMI Group			<0.0001
<18.5	2,954 (2.3)	2,970 (3.3)	
18.5-34.9	97,133 (76.6)	59,332 (65.5)	
35.0-39.9	14,150 (11.2)	12,509 (13.8)	
40.0-44.9	6,741 (5.3)	7,740 (8.6)	
45+	5,766 (4.6)	8,025 (8.9)	
Age Group			<0.0001
18-29	3,503 (2.8)	3,042 (3.4)	
30-44	15,555 (12.3)	9,901 (10.9)	
45-59	45,390 (35.8)	29,256 (32.3)	
60-74	62,296 (49.2)	48,377 (53.4)	
Race			<0.0001
White	81,776 (64.5)	54,386 (60.0)	
Black	37,686 (29.7)	30,615 (33.8)	
Asian	4,372 (3.5)	3,049 (3.4)	
Native American	1,337 (1.1)	1,188 (1.3)	
Pacific	1,340 (1.1)	1,138 (1.3)	
Other/Unknown	233 (0.2)	200 (0.2)	
Death before waitlist, N (%)	60,962 (48.1)	44,792 (49.5)	<0.0001
Added to Wait List, N (%)	26,818 (21.2)	14,822 (16.4)	<0.0001
Transplant, N (%)	9,661 (36.0)	5,596 (37.8)	0.0005
Donor Type, N (%)			<0.0001
Deceased donor	6,711 (69.5)	4,056 (72.5)	
Living donor	2,950 (30.5)	1,536 (27.5)	

[1] Chi-squared test evaluated statistically significant differences.

Table 2:

Relative risk (aHR) of wait listing and transplantation for women compared to men by BMI Group		
	Wait listing aHR (95% CI)	Transplantation* aHR (95% CI)
BMI Group		
<18.5	1.15 (1.00-1.32)	1.14 (0.92-1.42)
18.5-34.9	0.86 (0.84-0.88)	1.07 (1.03-1.11)
35.0-39.9	0.71 (0.67-0.75)	0.94 (0.85-1.05)
40.0-44.9	0.68 (0.62-0.75)	1.11 (0.95-1.30)
45+	0.55 (0.48-0.62)	1.07 (0.86-1.33)

* Among wait listed ESRD patients; adjusted for age and race.

CITATION INFORMATION: Sheikh S., Orandi B., MacLennan P., Qu H., Cannon R., Anderson D., Hanaway M., Mehta S., Kumar V., Reed R., Locke J. Obesity is Associated with Greater Gender Disparity in Access to Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.S. Sheikh: None. **B. Orandi:** None. **P. MacLennan:** None. **H. Qu:** None. **R.M. Cannon:** None. **D. Anderson:** None. **M. Hanaway:** None. **S. Mehta:** None. **V. Kumar:** None. **R. Reed:** None. **J. Locke:** None.

Abstract# 285

Age and Racial Disparities in Access to Re-kidney Transplantation

S. S. Patole[1], J. Ahn[1], S. Sandal[2], D. Segev[1], M. McAdams Demarco[3], *[1]Department of Transplantation Surgery, Johns Hopkins School of Medicine, Baltimore, MD, [2]McGill University, Montreal, QC, Canada, [3]Department of Epidemiology, Johns Hopkins School of Medicine, Baltimore, MD*

Purpose: Graft failure is likely increasing among kidney transplant (KT) recipients due to improvements in patient survival. While the benefits of re-KT have been well documented, there are likely disparities in access to re-KT; we quantified the trends and disparities in access to re-KT.

Methods: Using USRDS data, we identified 93,014 adult patients whose first KT graft failed between 1995-2017. We examined trends in graft failure over time and outcomes after graft failure by age, sex, and race. We estimated the chance of listing for re-KT, as well as waitlist mortality, and re-KT among those who were listed (n=46,613) by age, sex, and race using the Kaplan Meier method and adjusted Cox proportional hazards models.

Results: The number of graft failures increased from 2,320 in 1995 to 4,988 in 2017. There were substantial increases in the proportion of older (≥65 years) patients with graft failure; 5.7% in 1995 to 27.5% in 2017. The proportion of Black patients remained steady among those with graft failure, 33.5% in 1995 and 31.3% in 2017, while the proportion of women was 41.1% in 1995 and 39.9% in 2017. The chance of listing for re-KT was lower among older patients (adjusted hazard ratio [aHR]=0.37, 95% CI: 0.36-0.39) and Black patients (aHR=0.79, 95% CI: 0.77-0.81). Only, older patients had a higher risk of waitlist mortality (aHR=2.59, 95% CI: 2.40-2.79). Older patients (aHR=0.92, 95% CI: 0.85-0.99) and Black patients (aHR=0.53, 95% CI: 0.50-0.55) were less likely to receive re-KT. There were no differences in listing, waitlist mortality, or KT by sex.

Conclusions: There are age and racial disparities in access to re-KT. Efforts should be made to improve equitable access to re-KT for older and Black patient with graft failure.

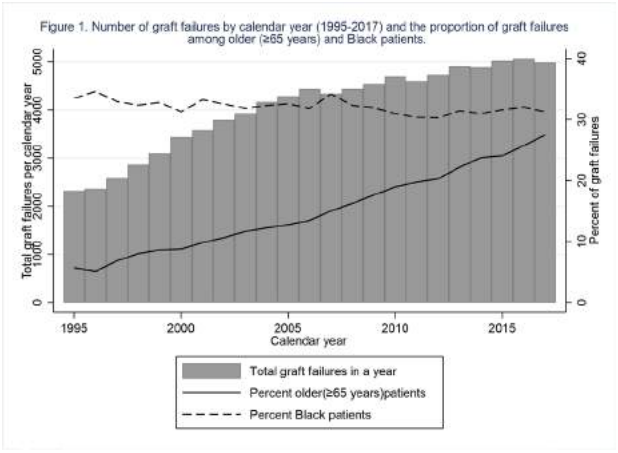


Table 1. Outcomes after kidney transplant graft failure (1995-2017) by age, sex, and race (n=93,014). Mortality and re-transplantation study populations were restricted to patients who were listed after graft failure (n=46,613). All Cox proportional hazard models were adjusted for age, sex and race. Disparities in access to KT were by age and race were observed; there were no disparities by sex.

	Listing (n=93,014) aHR (95% CI)	Mortality (n=46,613) aHR (95% CI)	Re-transplantation (n=46,613) aHR (95% CI)
Age			
<65 years	1 (ref)	1 (ref)	1 (ref)
≥65 years	0.37 (0.36, 0.39)	2.59 (2.40, 2.79)	0.92 (0.85, 0.99)
Sex			
Male	1 (ref)	1 (ref)	1 (ref)
Female	0.99 (0.96, 1.02)	0.98 (0.94, 1.03)	0.99 (0.98, 1.01)
Race			
White	1 (ref)	1 (ref)	1 (ref)
Black	0.79 (0.77, 0.81)	0.83 (0.79, 0.86)	0.53 (0.50, 0.55)
Other	0.93 (0.88, 0.97)	0.77 (0.69, 0.84)	0.66 (0.61, 0.71)

CITATION INFORMATION: Patole S., Ahn J., Sandal S., Segev D., McAdams Demarco M. Age and Racial Disparities in Access to Re-kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.S. Patole: None. **J. Ahn:** None. **S. Sandal:** Grant/Research Support; Name of Commercial Interest; Amgen, Canada. **D. Segev:** None. **M. McAdams Demarco:** None.

Abstract# 286

Impact of a Latinx Kidney Transplant Clinic

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Purpose: To evaluate the impact of a Latinx clinic in our institution. With a growing increase of end stage renal disease (ESRD)in the Latino population we opened a clinic with a focus on providing care to Latino patients and their families. The clinic addresses commonly shared cultural values, beliefs, and misconceptions of this population while simultaneously providing information to meet the clinical needs of ESRD patients along with education and recruitment of potential living kidney donors in order to improve Latino access to transplant-related healthcare. The clinic is staffed by a Spanish speaking team of a nurse coordinator, an administrative assistant/scheduler, a financial advisor, and a transplant surgeon. Interpreters are also present to facilitate communication between the rest of the staff and non-English speaking patients.

Methods: This is a retrospective chart review study to evaluate waitlist data from our own institution. We compared the number of Hispanic/Latino patients in our institution the year prior to opening the Latinx clinic and the year after. Interaction terms and Wald Chi-square tests were used to estimate differences in transplant rate. In all data sources, race/ethnicity was self-reported.

Results: Comparing the number of patients in 2018 prior to the inclusion of the Latinx Clinic to the same group in 2019. The first year after its opening, there was a 125% increase in the number of Latinx referrals for kidney transplant evaluation (28 in 2018 vs 63 in 2019) and a 142% increase in the number of waitlisted Latinx patients (12 in 2018 vs 29 in 2019), there was an increase in kidney transplants of 145% (11 in 2018 vs 27 in 2019). The number of living donor kidney transplants (LDKT) in Latinx patients increased from 1 in 2018 to 4 in 2019.

Conclusions: With the increasing number of patients in the Latino community who are diagnosed with ESRD, there is a direct benefit for a culturally competent program that addresses access to transplantation.

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DISCLOSURES: P. Serrano Rodriguez: None.

Abstract# 287

Disparities in Access to Listing in Rural Populations Post-KAS Implementation

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Purpose: One major goal of the Kidney Allocation System (KAS) was to improve access to transplantation. The impact of KAS on rural populations has been poorly studied; here we assess access to the waitlist for rural populations compared to their urban counterparts.

Methods: Using the Scientific Registry of Transplant Recipients, we assessed changes in demographics of rural and urban patients listed pre-KAS (2010-2013) and post-KAS (2015-2018). Rurality was determined by candidate home address with Rural-Urban Commuting Area Codes. Access to transplant, measured via waitlist composition, being listed pre-dialysis, and dialysis time at registration, was analyzed using multiple regression.

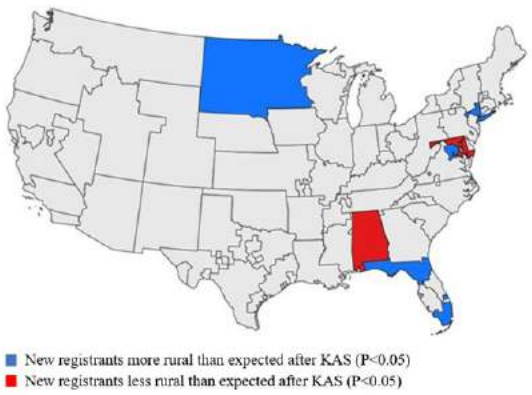
Results: Overall, listings increased by 5,966 patients under KAS. Although rural patients make up 24.3% of the total waitlist registrant cohort, only 12.5% (n=746) of increased listings post-KAS were rural, suggesting they had less benefit from KAS than urban patients (P<0.001, Table). Adjusting for patient demographics, comorbidities, and organ procurement organization (OPO), post-KAS new listings were less likely to be from rural areas than pre-KAS (OR 0.97 [0.94-0.98], P<0.001). 5 OPOs increased rural registrants while 2 decreased (P<0.05, Figure) after KAS. Post-KAS status was associated with a slight increase in days on dialysis (95.3±5.2 days, P<0.001) and being listed preemptively (OR 1.51 [1.47-1.54], P<0.001), but neither were related to rural status (P=0.95).

Conclusions: Although KAS increased overall access to listing by increasing waitlist registration and preemptive listing, it generally disfavors rural versus urban populations. Further efforts are needed to evaluate causes of these disparities and the downstream effects on transplantation.

Table: Demographics

	Pre-KAS (n=106,451)	Post-KAS (n=112,417)	Total (n=218,868)
Population			
Urban	80209 (75.3%)	85429 (76%)	165638 (75.7%)
Rural	26242 (24.7%)	26988 (24%)	53230 (24.3%)
Age at listing (years)	52.6 (18-88)	52.9 (18-89)	52.8 (18-89)
Sex			
Male	65130 (61.2%)	70104 (62.4%)	135234 (61.8%)
Female	41321 (38.8%)	42313 (37.6%)	83634 (38.2%)
Race			
Asian	7351 (6.9%)	8747 (7.8%)	16098 (7.4%)
Black	32084 (30.1%)	32722 (29.1%)	64806 (29.6%)
Multiracial	429 (0.4%)	883 (0.8%)	1312 (0.6%)
Native American	1203 (1.1%)	1125 (1%)	2328 (1.1%)
Pacific Islander	495 (0.5%)	589 (0.5%)	1084 (0.5%)
White	64889 (61%)	68351 (60.8%)	133240 (60.9%)
Insurance			
Private	46560 (43.8%)	48603 (43.3%)	95163 (43.5%)
Public	59364 (55.9%)	63568 (56.6%)	122932 (56.2%)
Self	119 (0.1%)	73 (0.1%)	192 (0.1%)
Other	241 (0.2%)	87 (0.1%)	328 (0.2%)

Figure: OPO Variation in Likelihood of Being Rural After KAS Implementation



CITATION INFORMATION: Nguyen S., Redfield R., Neidlinger N., Foley D., Kaufman D., Adler J. Disparities in Access to Listing in Rural Populations Post-KAS Implementation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.H. Nguyen: None. **R.R. Redfield:** None. **N. Neidlinger:** None. **D.P. Foley:** None. **D.B. Kaufman:** None. **J.T. Adler:** None.

Abstract# 288

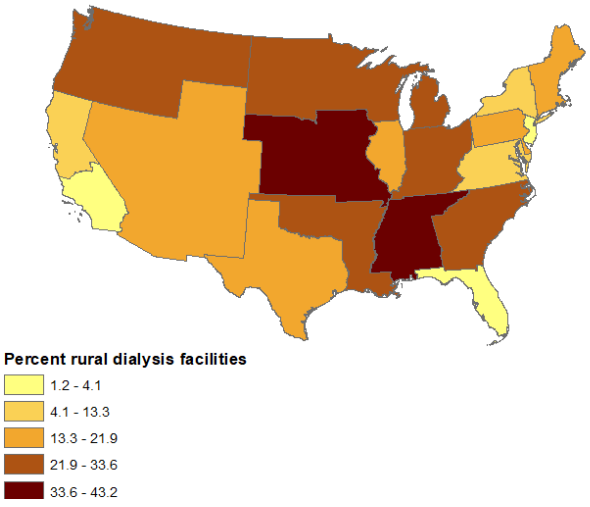
Rural Dialysis Facilities are Associated with Better Dialysis Quality but Less Home Dialysis Use

J. T. Adler[1], L. Xiang[1], S. S. Waikar[2], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Medicine, Boston Medical Center, Boston, MA*

Purpose: Dialysis facility quality is associated with patient outcomes. The 60 million rural dwellers across the United States are older, more likely to live in poverty, and more likely to be either underinsured or uninsured compared to their urban counterparts. 240,000 of these rural dwellers have ESKD; it is unknown if differences in dialysis facility size and quality exist between urban and rural settings.

Methods: Using the 2017 United States Renal Data System Facility File and Medicare Dialysis Facility Compare, we identified 1,472 (19.7%) rural and 6,008 (80.3%) urban dialysis facilities as classified by Rural Urban Commuting Area codes. Differences in characteristics, resources, and patient outcomes were assessed between rural and urban facilities.

Results: There was significant variability in the proportion of rural dialysis facilities across the ESRD Networks (Figure, P<0.001). Rural dialysis facilities were more likely to be non-profit (19.7 vs. 11.9%, P<0.001). Rural facilities were smaller (median dialysis stations 13 vs. 18, P<0.001), but had more support staff: fewer patients per social worker (41 vs 65, P<0.001) and patients per nurse (12 vs. 15, P<0.001). Rural facilities had fewer patients on home dialysis (median 7.4 vs 13.7%, P<0.001). In terms of quality metrics, there was no association with mean standardized mortality (1.01 vs. 1.02, P=0.08) or transfusion ratios (1.02 vs. 1.00, P=0.18), but the mean standardized hospitalization ratio (0.86 vs. 1.04, P<0.001) and 90-day catheter infection rates (10.2 vs. 10.6%, P=0.01) were lower for rural facilities.



Conclusions: Facility size and quality metrics vary among rural and urban dialysis facilities. Rural facilities had more staffing resources and better ESKD quality

metrics, but surprisingly had fewer patients on home dialysis. Further work is needed to assess impact of dialysis facility quality on long-term rural ESKD outcomes, as well as to improve the number of patients on home dialysis.

CITATION INFORMATION: Adler J., Xiang L., Waikar S. Rural Dialysis Facilities are Associated with Better Dialysis Quality but Less Home Dialysis Use *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.T. Adler: None. **L. Xiang:** None. **S.S. Waikar:** None.

Liver

Liver Pediatrics

Abstract# 289

Pediatric Donation During COVID-19 Pandemic

M. MacConmara, B. Wang, L. de Gregorio, J. Shah, D. Desai, S. Hanish, P. Vagefi, C. S. Hwang, *Surgery, UT Southwestern Medical Center, Dallas, TX*

Purpose: The COVID-19 pandemic led to a decrease in transplantation throughout the United States. We examined the impact of the pandemic in regards to the volume of pediatric donors from which livers were successfully transplanted and donor characteristics during this time.

Methods: The UNOS database was examined between 3/1/2019 - 8/1/2019 (non-COVID era) and 3/1/2020 - 8/1/2020 (COVID era). The numbers of potential pediatric donors and those who donated livers were determined. Donor demographic data was obtained. STATA software was used to perform statistical analysis. A p-value of <0.05 was considered to be significant.

Results: There was a 12% decrease in referral numbers of pediatric liver donors between the non-COVID period (n=440) and the COVID period (n=389). Additionally, overall (25% vs. 27%) and intraoperative (10% vs. 11%) discard rates were higher resulting in a 14% reduction in livers for transplant between non-COVID and COVID periods. Patterns were not uniform across the country. Region 5 had an increase in donors from the non-COVID to COVID era (6.25%), while region 10 had the greatest decrease in donors (15%). Analysis of donor data did not show differences in age (10.9 vs. 11.1 y), BMI (21.7 vs. 21.2 kg/m^2), AST (94 vs. 101 U/L), ALT (107 vs. 84 U/L), whole organ use (94.7% vs. 96.7%), DCD status (7.8% vs. 7.3%), or IRD status (14.8% vs. 13.0%) between COVID and non-COVID periods. Macrosteatosis (3.7% vs. 12.6%) was lower in the COVID period although few livers underwent biopsy. Interestingly, the DRI was significantly higher in the COVID period (1.77 vs. 1.60, p = 0.001) with a greater proportion of higher risk donors (DRI>2) used during COVID (24%) compared to non-COVID (20%).

Conclusions: During the COVID period there was a large decrease in pediatric donor referral. It appears that this promoted utilization of livers with higher overall donor risk by liver transplant centers.

CITATION INFORMATION: MacConmara M., Wang B., de Gregorio L., Shah J., Desai D., Hanish S., Vagefi P., Hwang C. Pediatric Donation During COVID-19 Pandemic *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. MacConmara: None. **B. Wang:** None. **L. de Gregorio:** None. **J. Shah:** None. **D. Desai:** None. **S. Hanish:** None. **P. Vagefi:** None. **C.S. Hwang:** None.

Abstract# 290

The Pediatric National Liver Review Board: What Happens to Waitlist Registrations with Denied Exception Forms?

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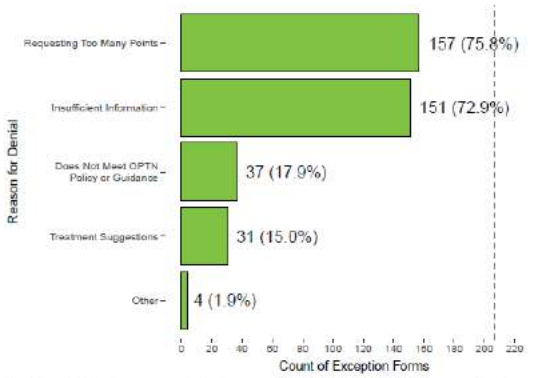
Purpose: On 5/14/19, the exceptions review process for pediatric liver transplant (LT) candidates was changed from 11 Regional Review Boards to one National Pediatric Liver Review Board (NLRB). We categorized reasons for denials for pediatric exceptions submitted to the NLRB and followed waitlist registrations with denied exception forms over time.

Methods: Reviewer comments for pediatric liver exception requests submitted to the NLRB 5/14/2019-3/31/2020 and subsequently denied were summarized. Exception requests denied for requesting too many points and/or not submitting enough information were followed from 5/14/2019-7/2/2020 at the waitlist registration level to determine action taken after denial. Consecutive exception narratives were programmatically analyzed using Natural Language Processing.

Results: Since NLRB implementation, 799 pediatric exception forms were submitted; 207 (26%) were denied. Nearly all (97%) were denied for requesting too many exception points and/or not submitting sufficient information (Figure). Of the 128 waitlist registrations that accounted for all 200 of these denied requests, 64 (50%) submitted an appeal, 38 (30%) submitted a new exception request without first submitting an appeal, and 26 (20%) submitted no appeal or new exception. Appeals or ART appeals were often approved (69%, n=44), as well as new cases (84%, n=32). Both appeals and new cases most commonly requested fewer points. In 12 cases no new narrative information was added, 10 of which lowered the amount of points requested. Among the 128 children, 89 (70%) received a transplant, 28 (22%) were still waiting, 3 (2%) were removed for death or too sick, and 8 (6%) were removed for other reasons.

Conclusions: Nearly all denied exception requests to the Pediatric NLRB were denied for requesting too many points and/or not submitting sufficient information. Adding additional guidance for providers submitting to the Pediatric NLRB could improve efficiency and support children's access to LT.

Figure. Denied Exception Forms by Reasons for Denial, Pediatric NLRB (5/14/2019-3/31/2020)



Note: Reasons for denial are not mutually exclusive; each denial can have more than one reason. The denominator used to calculate the percentages in this figure is the 207 denied exception forms submitted to the Pediatric NLRB from May 14, 2019 - March 31, 2020 and is represented by the dashed line.

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DISCLOSURES: J. Foutz: None. **C. Martinez:** None. **A. Henderson:** None. **E.K. Hsu:** None. **E.R. Perito:** None. **J. Heimbach:** None.

Abstract# 291

The Confluence of Race, Socioeconomic Deprivation, and Waitlist Mortality for Children Awaiting Liver Transplant

S. Wadhwani[1], J. Ge[1], L. Gottlieb[1], C. Lyles[1], A. F. Beck[2], J. Bucuvalas[3], U. Kotagal[2], J. C. Lai[1], *[1]University of California San Francisco, San Francisco, CA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [3]Icahn School of Medicine at Mount Sinai, New York, NY*

Purpose: Social determinants like racism, ethnocentrism, and neighborhood socioeconomic deprivation are associated with poor outcomes for children after liver transplant. We studied the relationship between race, ethnicity, and waitlist mortality, and whether this relationship is mediated by neighborhood deprivation.

Methods: We used SRTR data for children<18 yr listed for liver transplant 2005-2015 (N=8536). Primary exposures were race, ethnicity, and a neighborhood socioeconomic deprivation index (NDI) linked to home ZIP codes (range [0,1]; higher values indicate increased deprivation). Primary outcome was waitlist mortality, defined as death or delisting for 'being too sick'. We used competing risk analyses to associate race, ethnicity, NDI, and death with transplant as the competing risk.

Results: There were N=7716 children-17% identified as Black and 24% as Hispanic. Median NDI was 0.38 (IQR 0.30, 0.46). Compared to White children, Black and Hispanic children had higher NDIs. In univariate analysis, Black and Hispanic children had increased hazard of waitlist mortality (sHR: 1.23; 95%CI: 1.01, 1.49 and sHR: 1.28; 95%CI: 1.08, 1.51, respectively). Each 0.1 increase in the NDI was associated with increased hazard of waitlist mortality (sHR: 1.08, 95%CI: 1.01, 1.15). In bivariate analysis combining race and NDI, each 0.1 increase in NDI was associated with increased hazard of waitlist mortality (sHR: 1.08, 95%CI: 1.02, 1.40), however, Black race was no longer significant (sHR: 1.17 95%CI: 0.96, 1.43). In multivariable analysis combining race, NDI, and initial lab PELD/MELD, race and NDI were no longer significant.

In bivariate analysis combining ethnicity and NDI, Hispanicity was associated with increased hazard of waitlist mortality (sHR: 1.22; 95%CI: 1.02, 1.46), however, NDI was no longer significant. In multivariable analysis combining ethnicity, NDI, and initial lab PELD/MELD, Hispanicity remained associated with increased hazard of waitlist mortality (sHR: 1.20; 95%CI: 1.00, 1.43).

Conclusions: Black race is associated with increased waitlist mortality. This risk may be mediated by neighborhood deprivation; which, in turn, may be mediated by disease severity. Hispanic ethnicity conferred increased risk of waitlist mortality after adjusting for deprivation and initial lab PELD/MELD—suggesting that other social determinants (e.g. ethnocentrism) may lead to these disparities.

	Univariable Models		Race Model 1		Race Model 2		Ethnicity Model 1		Ethnicity Model 2	
Variable	HR (95% CI)	p-value	HR (95% CI)	p-value	HR (95% CI)	p-value	HR (95% CI)	p-value	HR (95% CI)	p-value
Race										
White	REF		REF		REF		---		---	
Black	1.23 (1.01, 1.49)		0.04 1.17 (0.96, 1.43)		0.12 1.05 (0.86, 1.29)	0.64	---		---	
Other	1.28 (1.00, 1.64)		0.05 1.30 (1.01, 1.67)		0.04 1.22 (0.95, 1.58)	0.12	---		---	
Ethnicity										
Non-Hispanic	REF		---		---		REF			
Hispanic	1.28 (1.08, 1.51)	0.005	---		---		1.22 (1.02, 1.46)	0.03	1.20 (1.00, 1.43)	0.049
Neighborhood Deprivation	1.08 (1.01, 1.15)		0.02 1.08 (1.01, 1.15)		0.03 1.06 (0.99, 1.13)		0.11 1.06 (0.97, 1.46)		0.12 1.04 (0.97, 1.11)	0.29
Initial Lab PELD/MELD	1.06 (1.05, 1.06)	<0.001	---		1.06 (1.05, 1.06)	<0.001	---		1.06 (1.05, 1.06)	<0.001

CITATION INFORMATION: Wadhwani S., Ge J., Gottlieb L., Lyles C., Beck A., Bucuvalas J., Kotagal U., Lai J. The Confluence of Race, Socioeconomic Deprivation, and Waitlist Mortality for Children Awaiting Liver Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Wadhwani: Honoraria; Name of Commercial Interest; Fletcher-Spaught International, inThought. Honoraria; Nature of Relationship; Consultant, Consultant. **J. Ge:** None. **L. Gottlieb:** None. **C. Lyles:** None. **A.F. Beck:** None. **J. Bucuvalas:** None. **U. Kotagal:** None. **J.C. Lai:** None.

Abstract# 292

Clinical Value of Surveillance Biopsies in Pediatric Liver Transplantation: A Single Center Experience with >800 Biopsies

B. Rocque[1], A. Zaldana[1], C. Weaver[2], J. Huang[1], A. Barbetta[1], V. Shakhin[2], C. Goldbeck[1], G. Yanni[2], R. Kohli[2], Y. Genyk[1], J. Emamaullee[1], *[1]Surgery, University of Southern California Keck School of Medicine, Los Angeles, CA, [2]Pediatrics, Children's Hospital-Los Angeles, Los Angeles, CA*

Purpose: While pediatric liver transplantation (LT) results in excellent long-term outcomes, a high incidence of early acute cellular rejection (ACR) and late graft fibrosis persists. Routine liver function tests may not reliably detect rejection episodes or identify patients who are candidates for reduced/modified immunosuppression (IS). Surveillance biopsies (SB) can provide valuable information in this regard, but their role in pediatric LT continues to be controversial.

Methods: A retrospective cohort of 232 pediatric LT recipients who underwent biopsy between 2003-2019 was studied to characterize the potential risks and benefits of SB vs 'for cause' biopsies. At our center, SB was performed ≥5 years post-LT with stable graft function or 1-year post biopsy-proven ACR.

Results: Among 816 biopsies obtained from 232 patients, 150 (18%) were SB. Only 6 (0.7%) of patients in the entire cohort had a biopsy-related complication, and none were observed in the SB subset. Liver function tests did not predict rejection severity on biopsy (ALT AUROC 0.65 (very poor prediction), Bilirubin AUROC 0.58 (no prediction), GGT AUROC 0.56 (no prediction)). SB identified a subclinical rejection episode in 18.6% of biopsies. When obtained within 24 months of LT, 7.7% of SB led to changes in IS, when obtained >24 months post-LT 18.7% prompted IS change including reduction. SB obtained <10-years post-LT trended toward higher incidence of ACR (Fig. 1A), with reversal at >10 years, although this was not significant (p=0.24). Graft survival and patient survival did not differ between SB and 'for cause' groups (Fig. 1B and C). 63% of SB had some evidence of fibrosis.

Conclusions: In our experience, SB in pediatric LT have a good safety profile and provide valuable information about subclinical rejection episodes, leading to changes in management of IS. Further multi-center studies are needed to examine the role for SB on long-term outcomes in pediatric LT.

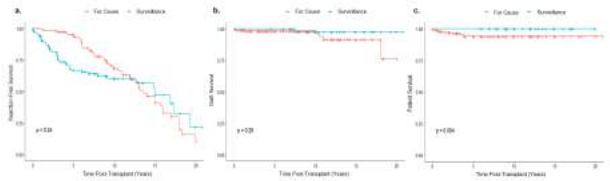


Figure 1: Pediatric LT recipient outcomes based on having biopsy 'For Cause' or for 'Surveillance'

CITATION INFORMATION: Rocque B., Zaldana A., Weaver C., Huang J., Barbetta A., Shakhin V., Goldbeck C., Yanni G., Kohli R., Genyk Y., Emamaullee J. Clinical Value of Surveillance Biopsies in Pediatric Liver Transplantation: A Single Center Experience with >800 Biopsies *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Rocque: None. **A. Zaldana:** None. **C. Weaver:** None. **J. Huang:** None. **A. Barbetta:** None. **V. Shakhin:** None. **C. Goldbeck:** None. **G. Yanni:** None. **R. Kohli:** None. **Y. Genyk:** None. **J. Emamaullee:** None.

Abstract# 293

Degree of T Cell Infiltration Predicts Treatment Response in Pediatric Liver Late Acute Cellular Rejection

M. Rogers, G. Begum, Q. Sun, A. Peters, *Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

Purpose: Late acute cellular rejection (ACR) occurs >6mo post-liver transplant and is associated with chronic rejection and allograft loss. Currently, no diagnostic features predict ACR treatment response. ACR is primarily T cell mediated, yet B cells and plasma cells (PC) also infiltrate the portal areas during late ACR. To test the hypothesis that the inflammatory milieu is associated with delayed response to rejection therapy, we performed a single center retrospective case-control study of pediatric late liver ACR using immunofluorescence for T cell, B cell, and PC markers.

Methods: Pediatric liver-only transplant recipients transplanted at <17 years of age and treated for biopsy-proven late ACR between Jan 2014-Jan 2019 were stratified into rapid responders (RR) and delayed responders (DR) based on ALT normalization <30d (RR) or >30d (DR). All patients received IV methylprednisolone as initial rejection treatment. Anti-thymocyte globulin was used for treatment of steroid-refractory rejections exclusively in the DR category. No rejections led to graft loss. Banff score, medication level variation index (MLVI), and autoantibodies were analyzed for each ACR episode. We performed multiparameter immunofluorescence for CD4, CD8, CD20, and CD138 in FFPE liver biopsy tissue at the time of ACR diagnosis, and used logistic regression to determine if each cell count/hpf was associated with increased risk of DR compared to RR.

Results: 60 liver biopsies in 54 patients were included in the analysis. 33 (55%) were DR, the average age at rejection was 10.8 years, the average time between rejection and transplant was 5.4 years, and the majority were transplanted due to biliary atresia (55%). Only one rejection episode occurred in a patient transplanted for autoimmune hepatitis. Based on univariate logistic regression analysis, treatment response was independent of Banff score and a lower MLVI was associated with decreased risk of DR (Table 1). However, a 10-fold increase in CD8 or CD4 count was associated with 2.9-fold and 2.05-fold the odds of DR compared to RR, respectively. Similarly, presence of ANA and ASMA autoantibodies at titers >1:80 were associated with 9-fold increased risk of DR (OR 9.136)

Conclusions: Increased CD4 and CD8 counts in late ACR portal infiltrates may be early predictors of delayed response to anti-rejection treatment. While a larger sample size is required for validation, these results may point towards the benefit of early use of T-cell directed therapies for late ACR in high risk patients.

Table 1: Risk factors for delayed response to treatment in late liver ACR

Risk Factor	Delayed Response OR	Delayed Response CI
MLVI	0.597	0.346-1.031
CD4	2.053	0.409-10.304
CD8	2.897	0.397-21.142
CD20	1.159	0.391-3.433
CD138	1.069	0.462-2.477
Auto-Antibodies	9.136	0.876-95.288
Banff score	0.953	0.657-1.381

CITATION INFORMATION: Rogers M., Begum G., Sun Q., Peters A. Degree of T Cell Infiltration Predicts Treatment Response in Pediatric Liver Late Acute Cellular Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Rogers: None. **G. Begum:** None. **Q. Sun:** None. **A. Peters:** None.

Abstract# 294

Are All DSA's the Same? Are We Ready for Precision Medicine in Pediatric LT?

S. E. Shin[1], M. Lee[1], N. Yazigi[2], K. Khan[2], S. Kaufman[2], J. Ahn[3], O. Timofeeva[4], U. Ekong[2], *[1]Georgetown University School of Medicine, Washington, DC, [2]Medstar Georgetown Transplant Institute, Medstar Georgetown University Hospital, Washington, DC, [3]Biostatistics, Bioinformatics, & Biomathematics, Georgetown University, Washington, DC, [4]Histocompatibility Laboratory, Dept. of Pathology & Laboratory Medicine, Georgetown University, Washington, DC*

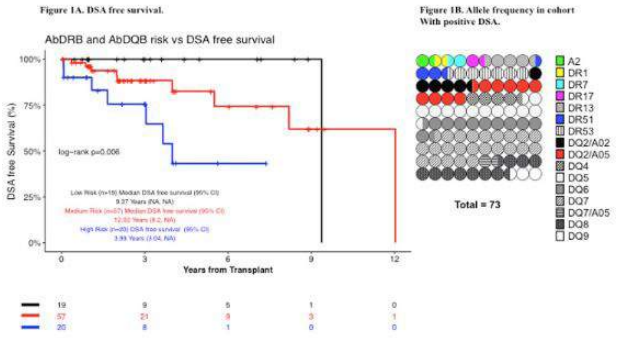
Purpose: Donor-specific antibodies (DSA) play an uncertain role in rejection after liver transplantation (LT). We hypothesized that evaluation of epitope differences in HLA-DR/DQ mismatching can improve identification of alloimmune sensitization risk.

Methods: Retrospective review of pediatric LTs performed in our center between January 2003 and November 2019 with at least 1 DSA measurement using Luminex® Single Antigen bead platform (positive cutoff 1000 MFI). HLAMatchmaker™ 3.1 was used to determine the number of mismatched DRB1/DQB1 eplets for each donor-recipient pair. ROC analysis was used to identify optimal cutoff of eplet mismatch load for *de novo* DSA (*dn*DSA). Chi-squared tests and ANOVA were used to compare demographic and clinical parameters including development of *dn*DSA & acute rejection (AR) across the three risk groups. Log-rank tests & Cox proportional were used to evaluate the association between the three risk groups & *dn*DSA-free survival, & AR.

Results: Out of 244 pediatric LT, DSA testing in 172 detected *dn*DSA in 73 (42%). ROC determined an eplet mismatch load of 6 & 2 for antibody-verified DRB1 & DQB1 *dn*DSA (AbDRB / AbDQB), respectively, with AUC of 0.68 & 0.60 respectively. High-risk patients had significant shorter *dn*DSA-free survival vs. low risk patients (log-rank $p < 0.01$) (Figure 1A). There was no significant age, or race difference in *dn*DSA-free survival, and anti-DQ2 did not predominate (Figure

1B). AR frequency was 19%. AR-free survival did not differ between high-risk vs. low-risk patients with Ab-verified *dn*DSA (log-rank p = 0.05) or between DSA pos vs. DSA neg patients.

Conclusions: Mismatched epitope load can predict DSA-free survival in pediatric LT recipients. Although previous reports found that DQ2 *dn*DSA was associated with an increased likelihood of AR, we found no significant association, possibly due in part to low frequency using eplet mismatch methodology.



CITATION INFORMATION: Shin S., Lee M., Yazigi N., Khan K., Kaufman S., Ahn J., Timofeeva O., Ekong U. Are All DSA's the Same? Are We Ready for Precision Medicine in Pediatric LT? *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.E. Shin: None. **M. Lee:** None. **N. Yazigi:** None. **K. Khan:** None. **S. Kaufman:** None. **J. Ahn:** None. **O. Timofeeva:** None. **U. Ekong:** None.

Abstract# 295

Center Use of Technical Variant Grafts Impacts Pediatric Liver Transplant Waitlist and Recipient Outcomes in the United States

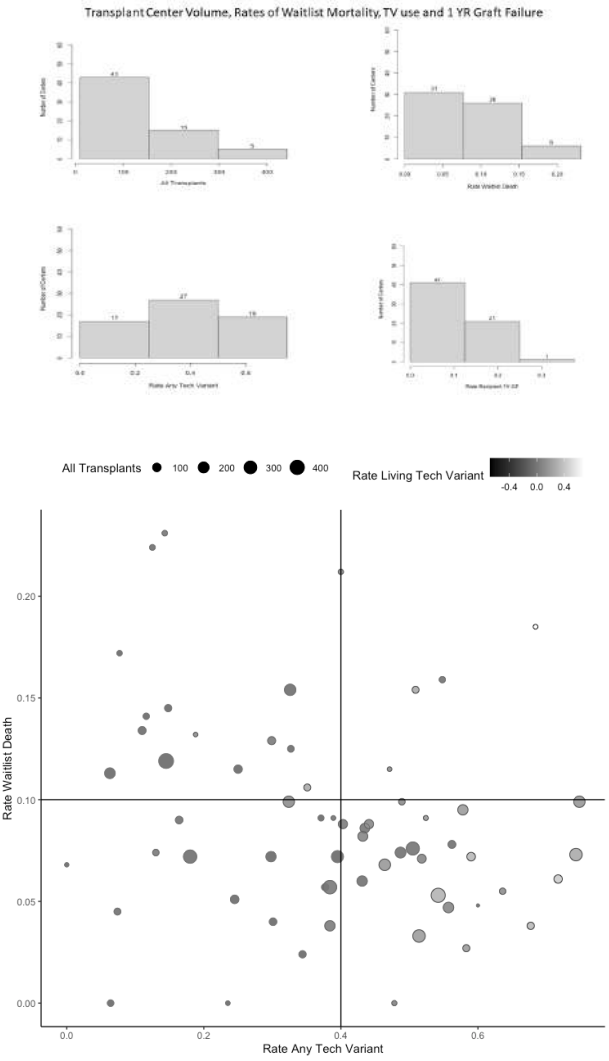
G. Mazariegos[1], E. R. Perito[2], J. Squires[1], K. Soltys[1], A. Griesemer[3], S. A. Taylor[4], E. Pahl[5], *[1]Childrens Hosp of Pittsburgh, Pittsburgh, PA, [2]UCSF, San Francisco, CA, [3]Columbia University Irving Medical Center, New York, NY, [4]Lurie Children's Hospital of Chicago, Chicago, IL, [5]Omnilife, Lexington, KY*

Purpose: Assessing composite outcome measures are critical when evaluating graft type selection in pediatric liver transplantation (LT).

Methods: OPTN data on children listed for first-time LT or liver-kidney transplant from 11/2004- 9/2020 was analyzed and grouped by center code. Centers performing < 10 LT or with < 5 children waitlisted over the study period were excluded. Variance was plotted in terciles spanning the min and max of center metrics: LT volume, waitlist mortality, and rate of technical variants (TV, deceased and living donor), and of graft and recipient death within 1yr post-TX. Center metrics were analyzed for their association with center waitlist mortality and patient survival with univariate linear and Cox proportional hazard regressions.

Results: From 2004-20, 63 centers performed 7563 LT; 935 children died on the waitlist. Waitlist mortality by center ranged from 0-22% (p < .00) and center TX volume, and graft outcomes by terciles are shown in Figure 1. Centers with higher waitlist mortality have significantly lower rates of TV graft use and lower rates of recipient and graft survival for children that reach LT. Survival from waitlisting to death was significantly higher with increased center usage of any TV graft among other center-specific metrics. Rate of TV use varied widely across pediatric LT centers, but overall those with TV usage rates in the lower 50% accounted for the majority of centers with higher waitlist mortality (Figure 2).

Conclusions: Waitlist death rate and TV usage varies dramatically among pediatric LT centers in the US; > 10% of children continue to die awaiting LT. Centers with increased TV graft usage have significantly lower waitlist mortality and higher patient survival. Evaluating graft selection practices of high performing centers can better inform training and center practices and help develop organ graft type decision support tools in pediatric LT.



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DISCLOSURES: G. Mazariegos: None. **E.R. Perito:** None. **J. Squires:** None. **K. Soltys:** None. **A. Griesemer:** None. **S.A. Taylor:** None. **E. Pahl:** None.

Abstract# 296

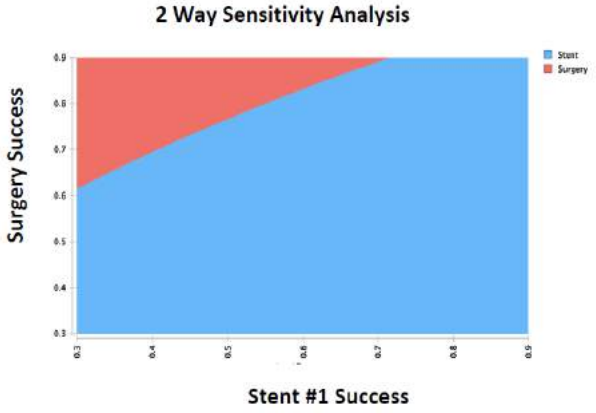
Cost Effectiveness Analysis Comparing Treatments of Biliary Strictures in Pediatric Liver Transplant Patients

B. Whitehead[1], C. Lemoine[2], R. Superina[2], J. Green[3], S. Mohammad[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [2]Division of Transplant Surgery, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [3]Division of Interventional Radiology, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL*

Purpose: Biliary strictures are associated with significant morbidity after pediatric liver transplantation. There are two main treatment options which are percutaneous transhepatic cholangiography (PTC) and stent placement or surgical revision. The optimal approach is still debated. We performed a cost effectiveness analysis comparing both therapies.

Methods: We designed a Markov decision analysis model using TreeAgePro to simulate a cohort of patients treated for post liver transplant biliary strictures with 5 years of follow up. Transition probabilities were based on review of published literature on outcomes of pediatric patients with biliary complications. Treatment success was defined as absence of stricture recurrence for 12 months following intervention. Health utilities were estimated based on published literature and expert opinion. Cost variables defined using billing data from our institution. Willingness to

pay (WTP) was set at $100,000/QALY. For each intervention we calculated cost and quality adjusted life years (QALYs), which were used to determine the incremental cost effectiveness ratio (ICER).
Results: Stenting of biliary strictures provided 4.47 QALY over 5 years at a cost of $49,148 compared to surgical revision, which provided 4.56 QALY at the cost of $278,805 with an ICER of $655,500/QALY, which is well above our willingness to pay. Cost effectiveness estimates were most sensitive to changes in cost of surgery, success of stenting and health utility for surgery and stenting. Sensitivity analysis showed stent placement remained cost effective even when stent success rate was as low as 30%.
Conclusions: Both stent placement and surgical revision result in similar QALYs but there are large cost differences. The current approach of treating biliary strictures first with stent placement by interventional radiology is cost effective compared to surgical revision using a WTP of $100,000.



CITATION INFORMATION: Whitehead B., Lemoine C., Superina R., Green J., Mohammad S. Cost Effectiveness Analysis Comparing Treatments of Biliary Strictures in Pediatric Liver Transplant Patients *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Whitehead: None. **C. Lemoine:** None. **R. Superina:** None. **J. Green:** None. **S. Mohammad:** None.

Basic: ID

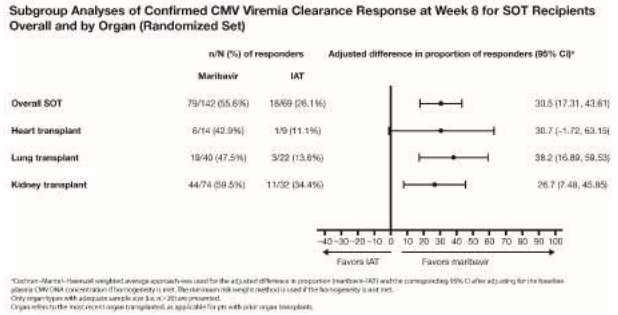
Late Breaking: Basic & ID

Abstract# LB 9

Randomized Phase 3 Open-label Study of Maribavir vs Investigator-assigned Therapy for Refractory/resistant Cytomegalovirus Infection in Transplant Recipients: Subgroup Analyses of Efficacy by Organ

R. K. Avery[1], E. A. Blumberg[2], D. Florescu[3], N. Kamar[4], D. Kumar[5], J. Wu[6], A. Sundberg[6], *[1]Johns Hopkins Hospital, Baltimore, MD, [2]University of Pennsylvania, Philadelphia, PA, [3]University of Nebraska School of Medicine, Omaha, NE, [4]Hôpital de Rangueil, Toulouse, France, [5]University Health Network, Toronto, ON, Canada, [6]Shire Human Genetic Therapies, Inc., a Takeda company, Lexington, KY*

Purpose: Therapeutic options for refractory, with/without resistance (R/R), CMV infections are limited. We report organ type subgroup analyses from a large multicenter trial that studied the efficacy of maribavir (MBV) vs investigator-assigned therapy (IAT) in pts with R/R CMV infection.
Methods: Transplant recipients aged ≥12 yrs, with CMV infection (viral load [VL] ≥2730 IU/mL/≥910 IU/mL CMV DNA [blood/plasma]) refractory to recent Tx (failure to achieve >1 $\log_{10}$ decrease in CMV DNA after ≥14 days) were eligible (NCT02931539). Pts were stratified (HCT/SOT + screening CMV VL) and randomized 2:1 to MBV 400 mg BID or IAT (val/ganciclovir, foscarnet, cidofovir, foscarnet+val/ganciclovir) for 8 wks + 12 wks follow-up. Primary endpoint: confirmed CMV clearance (plasma CMV DNA <137 IU/mL in 2 consecutive tests ≥5 days apart) at end of Wk 8. Key secondary endpoint: CMV clearance and symptom control at end of Wk 8 and maintained through Wk 16. Group differences, adjusted for baseline CMV DNA level <9100/≥9100 IU/mL, and SOT/HCT were compared (Cochran-Mantel-Haenszel tests). Subgroup analyses by SOT type were conducted.
Results: 352 pts were randomized (235 MBV, 117 IAT; age range 19-79 years). Significantly more pts (MBV vs IAT) achieved the primary (55.7% vs 23.9%; difference, 95% CI: 32.8%, 22.8-42.7; p<0.001) and key secondary endpoint (18.7% vs 10.3%; difference, 95% CI: 9.5%, 2.0-16.9; p=0.013). 211 pts (59.9%) were SOT recipients (kidney, 50.2%; lung, 29.4%; heart, 10.9%; liver, 3.3%; pancreas, 0.9%; intestine, 0.5%; multiple, 4.7%). A benefit trend for MBV vs IAT in kidney, lung, and heart transplants was seen (**Fig**). No SOT pts lost grafts. Tx-emergent AEs (TEAEs) with MBV vs IAT (overall % pts): 97.4% and 91.4%. Acute kidney injury with MBV vs foscarnet was lower: 8.5% vs 21.3% (TEAE) and 1.7% vs 19.1% (Tx-related TEAE). Neutropenia with MBV vs val/ganciclovir was lower: 9.4% vs 33.9% (TEAE) and 1.7% vs 25.0% (Tx-related TEAE). Overall, 2 Tx-related serious TEAEs led to death (1 pt per arm).
Conclusions: MBV showed superior efficacy vs IAT in clearing CMV in transplant recipients with R/R CMV infection, with consistent trends across organ types and lower rates of Tx limiting toxicities common with IAT.



CITATION INFORMATION: Avery R., Blumberg E., Florescu D., Kamar N., Kumar D., Wu J., Sundberg A. Randomized Phase 3 Open-label Study of Maribavir vs Investigator-assigned Therapy for Refractory/resistant Cytomegalovirus Infection in Transplant Recipients: Subgroup Analyses of Efficacy by Organ *AJT, Volume 21 Supplement 3*
DISCLOSURES: R.K. Avery: Grant/Research Support; Name of Commercial Interest; Aicuris, Astellas, Chimerix, Merck, Oxford Immunotec, Qiagen, Takeda/Shire. Grant/Research Support; Nature of Relationship; Study grant support. **E.A. Blumberg:** Other; Name of Commercial Interest; Merck, Takeda, Hologic, Merck, Amplyx. Other; If "Other" Please Explain; Research support to institution, Unpaid scientific medical advisor, Data and safety monitoring board. **D. Florescu:** Grant/Research Support; Name of Commercial Interest; Astellas, Nobelpharma, Novavax, Shire, Merck. Grant/Research Support; Nature of Relationship; Investigator. Other; Name of Commercial Interest; Amplyx. Other; If "Other" Please Explain; Data safety monitoring board. **N. Kamar:** Honoraria; Name of Commercial Interest; Astellas, Biotest, CSL Behring, Chiesi, Merck Sharp and Dohme, Neovii, Novartis Pharma, Sanofi, Sandoz, Shire, Takeda. Honoraria; Nature of Relationship; Advisory board and speaker fees. **D. Kumar:** Consulting Fee; Name of Commercial Interest; Roche, Takeda. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; Name of Commercial Interest; Roche, Qiagen, Takeda, Merck. Grant/Research Support; Nature of Relationship; Clinical trials grants. **J. Wu:** Ownership Interest; Name of Commercial Interest; Takeda. Ownership Interest; Nature of Relationship; Stock options. Salary; Name of Commercial Interest; Shire, a Takeda company. Salary; Nature of Relationship; Employee. **A. Sundberg:** Ownership Interest; Name of Commercial Interest; Takeda. Ownership Interest; Nature of Relationship; Stock options. Salary; Name of Commercial Interest; Shire, a Takeda company. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; This study was funded by Shire ViroPharma, a Takeda company.

Abstract# LB 10

Life-supporting Multi-gene Cardiac Xenografts From Swine Demonstrate Survival >8 Months and Preclinical Efficacy for Human Clinical Trials

C. Goerlich[1], B. Griffith[1], A. Singh[1], T. Zhang[1], I. Tatarov[1], B. Lewis[1], F. Sentz[1], A. Hershfeld[1], P. Odonkor[1], B. Williams[1], E. Strauss[1], A. Tabatabai[2], A. Bhutta[3], D. Ayares[4], D. Kaczorowski[1], M. Mohiuddin[1], *[1]Surgery, University of Maryland School of Medicine, Baltimore, MD, [2]Department of Medicine, Division of Pulmonary and Critical Care Medicine, University of Maryland School of Medicine, Baltimore, MD, [3]Pediatrics, Pediatric Critical Care Medicine, University of Maryland School of Medicine, Baltimore, MD, [4]Revivicor, Inc., Blacksburg, VA*

Purpose: Cardiac xenotransplantation has been proposed to bridge the gap in organ shortage for those in end-stage heart failure without the opportunity to receive a heart. Recently, it has been shown that survival of a non-human primate recipient with a genetically engineered (GE) porcine- cardiac xenograft can be achieved up to 6 months in the orthotopic position with the addition of temsirolimus, blood pressure and heart rate control. We investigate an alternative means to achieve long-term survival, without the use of these adjuncts. We used "Multi-gene" edited pigs as xenograft donors with the addition of multiple human transgenes for complement regulation, thromboregulation, anti-inflammation and growth.
Methods: Baboons weighing 15-30 kg were used as recipients for life supporting cardiac xenografts. Weight-matched swine with multi-gene constructs were used as donors (table 1). Cardiac preservation was performed using an XVIVO© Perfusion system with XHS blood cardioplegia induction. Recipient blood pressure and heart rate were not controlled and temsirolimus was not administered after transplantation.

Results: Group 1 xenografts functioned well between 84-95 days, but ultimately succumbed to antibody mediated rejection and diastolic heart failure. Group 2 xenografts functioned well over 6 months. One was electively euthanized on post-transplant day #182 for histologic examination. The second recipient underwent an endomyocardial biopsy on post-transplant day #220, with survival ongoing greater than 240 days exhibiting excellent graft function. Both demonstrated normal histology without evidence of rejection.

Conclusions: Xenografts with multiple transgenes and knockouts produce durable long-term survival and demonstrate pre-clinical efficacy to pursue the first human clinical trials. Consideration should be those with CMAHKO and GHRKO.

	1	2	3	4	5	6	7	8	9	10
	Carbohydrate Enzyme		Knockout	Thromboregulatory		Complement Regulation		Anti-inflammatory		Other
Group 1	α1,3-GT	β1,4-GT	CMAH	TBM	EPCR	CD46	DAF	CD47	HO1	
	α1,3-GT	β1,4-GT	CMAH	TBM	EPCR	CD46	DAF	CD47	HO1	
	α1,3-GT	β1,4-GT	CMAH	TBM	EPCR	CD46	DAF	CD47	HO1	
Group 2	α1,3-GT	β1,4-GT		TBM	EPCR	CD46		CD47		[illegible]
	α1,3-GT	β1,4-GT		TBM	EPCR	CD46		CD47		[illegible]

Table 1: Human transgenes are categorized by thromboregulatory, complement regulation and anti-inflammatory proteins. α1,3-GT= α1,3-galactosyltransferase, β1,4-GT=β1,4-N-acetylgalactosyltransferase, CMAH= CMP-N-acetylneuraminic acid hydroxylase, TBM=thrombomodulin, EPCR=endothelial protein C receptor, DAF=decay accelerating factor, HO1=hemeoxygenase, GHRKO=growth hormone receptor knockout.

CITATION INFORMATION: Goerlich C., Griffith B., Singh A., Zhang T., Tatarov I., Lewis B., Sentz F., Hershfeld A., Odonkor P., Williams B., Strauss E., Tabatabai A., Bhutta A., Ayares D., Kaczorowski D., Mohiuddin M. Life-supporting Multi-gene Cardiac Xenografts From Swine Demonstrate Survival >8 Months and Preclinical Efficacy for Human Clinical Trials *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Goerlich: None. **B. Griffith:** None. **A. Singh:** None. **T. Zhang:** None. **I. Tatarov:** None. **B. Lewis:** None. **F. Sentz:** None. **A. Hershfeld:** None. **P. Odonkor:** None. **B. Williams:** None. **E. Strauss:** None. **A. Tabatabai:** None. **A. Bhutta:** None. **D. Ayares:** Other; If "Other" Please Explain; Employee of Revivicor, Inc.. **D. Kaczorowski:** None. **M. Mohiuddin:** None.

Abstract# LB 11

Immunologic Endotypes of Ischemia-reperfusion Injury in Human Liver Transplantation

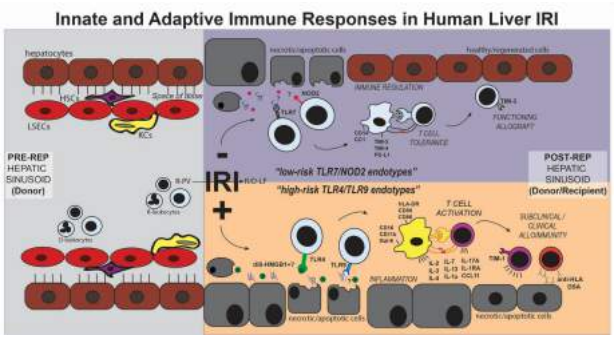
R. A. Sosa, A. Q. Terry, F. M. Kaldas, B. V. Naini, T. Ito, R. W. Busuttil, D. W. Gjertson, J. W. Kupiec-Weglinski, E. F. Reed, *UCLA, Los Angeles, CA*

Purpose: Ischemia-reperfusion injury (IRI) is a major risk factor for allograft rejection in orthotopic liver transplantation (OLT), involving complex interactions between innate and adaptive immune systems. However, no clinical therapeutics or patient-specific diagnostics are currently available. Etiologies leading to OLT are heterogeneous, and only ~50% of OLT recipients experience IRI despite similar immunosuppression regimens. Genetic susceptibility to IRI is unknown, and rates of progression differ markedly, as do post-transplant liver function and patient and allograft outcomes. Therefore, we sought to identify associations between inflammatory endotypes and clinical presentations in OLT-IRI.

Methods: We enrolled 164 OLT recipients in our IRB-approved study. We investigated evolving patient immune status via longitudinal single-antigen bead HLA antibody assay, histopathology and RNAseq of pre- and post-reperfusion biopsies, soluble cytokines, chemokines and growth factors via 38-plex Luminex, and immune cell functional phenotypes via 14-color flow cytometry, PRR activation screening and ELISA. We collected clinical parameters from medical and surgical records and examined whether there were any associations between endotype and clinical features.

Results: Our studies suggest four clinically actionable human endotypes associated with biopsy-proven IRI centered on the involvement of specific DAMP-PRR signaling pathways: 1) disulfide-HMGB1/TLR4/TNFa, 2) cfDNA/HMGB1/RAGE/TLR9, 3) ssRNA/TLR7 and 4) PGN/NOD2. High-risk IRI endotypes 1 and 2 are associated with increased myeloid activation/infiltration, circulating IL-2, IL-3, IL-4, IL-7, IL-13, IL-1a, IL-17A, IL-1RA, CCL11 and de novo HLA donor-specific antibodies, as well as poorer outcomes, including ACR, AMR and death. Low-risk IRI endotypes 3 and 4 are associated with increased tolerance induction in myeloid and T cells leading to improved outcomes and extended allograft/patient survival. Importantly, we identified female Hispanics with NASH as primarily having high-risk IRI endotype 1. Additionally, high-risk IRI endotype 2 is seen in patients with non-active hepatocellular carcinoma (HCC) at the time of transplant, whereas those with active HCC frequently have low-risk IRI endotypes 3/4.

Conclusions: Clinical presentations are directly associated with inflammatory endotypes in OLT-IRI. Accurate endotyping of patients according to their specific pathogenesis will allow more precise and personalized therapeutic strategies to reduce the influence of IRI on OLT outcomes.



CITATION INFORMATION: Sosa R., Terry A., Kaldas F., Naini B., Ito T., Busuttil R., Gjertson D., Kupiec-Weglinski J., Reed E. Immunologic Endotypes of Ischemia-reperfusion Injury in Human Liver Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# LB 12

One-year Outcomes of a Multicenter Trial of Transplantation of Hcv Viremic Kidney Donors into Hcv Uninfected Recipients

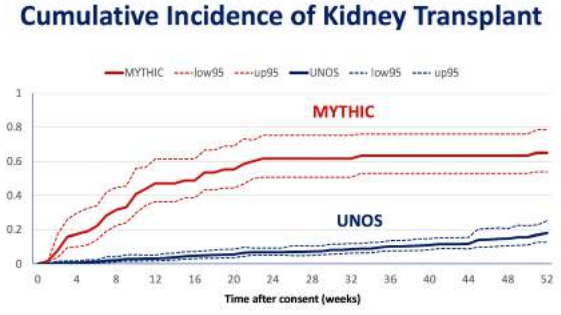
M. Sise[1], D. Goldberg[2], D. Schaubel[3], J. Kort[4], R. Alloway[5], J. Friedewald[6], R. Fontana[7], S. Sultan[8], N. Desai[9], R. Chung[1], P. Reese[10], *[1]Mass General Hospital, Boston, MA, [2]U-Miami, Miami, FL, [3]U. Pennsylvania, Philadelphia, PA, [4]Abbvie, Chicago, IL, [5]U Cincinnati, Cincinnati, OH, [6]Northwestern U., Evanston, IL, [7]U. Michigan, Ann Arbor, MI, [8]Cornell, New York City, NY, [9]Johns Hopkins, Baltimore, MD, [10]U. Pennslyvania, Philadelpha, PA*

Purpose: As interest in transplantation of Hepatitis C virus (HCV)-viremic kidneys into HCV-uninfected (HCV^+ to HCV^- KT) recipients increases, understanding clinical outcomes beyond HCV clearance with direct-acting antivirals is important. We report the one-year outcomes of the seven-center MYTHIC (Multi-center studY to Transplant Hepatitis-C InfeCted Kidneys) trial.

Methods: Donors were HCV RNA positive, had any HCV genotype, with KDPI < 85. The 30 KT recipients were treated with Glecaprevir-pibrentasvir (G/P) for 8 weeks, starting 2-5 days post-KT. We assessed the following 1 year post transplant: HCV virologic status, Cytomegaloviurs (CMV), and polyoma virus (BK) infection, transplant rejection, graft function, and patient survival. We performed a comparison of time-to-transplant with recipients of non-HCV infected kidneys derived from UNOS and matched based on a multivariate risk score.

Results: Seventy-six patients were consented for evaluation, 12 were excluded, and of 64 eligible patients, 30 underwent kidney transplant from HCV-viremic donors after a median of 6.3 weeks (IQR, 1.9-10.1). Patients enrolled in the MYTHIC trial were significantly more likely to receive a kidney transplant compared to risk-score matched UNOS comparators (N=642) **(Figure)**. All 30 participants achieved durable HCV clearance and no patient developed clinically significant liver disease. There were 9 cases of detectable CMV viremia in the first year post-transplant, with 4 cases having > 1000 IU/mL. There were 4 cases of BK viremia > 1000 IU/mL. One year survival was 93%; there were two deaths after HCV cure (*Staph aureus* bacteremia and unexplained death at home). There were 3 cases of biopsy-confirmed acute rejection. One year graft function among the 28 surviving patients was excellent (mean serum creatinine 1.27mg/dL, SD 0.41).

Conclusions: One year findings from the first multicenter standardized trial of pre-emptive G/P after HCV+ to HCV- KT demonstrate that this approach is highly effective, with excellent patient outcomes and shortened waitlist time to transplant.



CITATION INFORMATION: Sise M., Goldberg D., Schaubel D., Kort J., Alloway R., Friedewald J., Fontana R., Sultan S., Desai N., Chung R., Reese P. One-year Outcomes of a Multicenter Trial of Transplantation of Hcv Viremic Kidney Donors into Hcv Uninfected Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Sise: Grant/Research Support; Name of Commercial Interest; Gilead, Abbvie, Merck, EMD-Serono. **D. Goldberg:** Grant/Research Support; Name of Commercial Interest; Gilead, Abbvie. **D. Schaubel:** None. **J. Kort:** Intellectual Property Rights; Name of Commercial Interest; "Methods Treating HCV" Patent. Salary; Name of Commercial Interest; Abbvie. Other; Name of Commercial Interest; May hold Abbvie Stocks. **R. Alloway:** Consulting Fee; Name of Commercial Interest; Genzyme/Sanofi and Veloxis. Consulting Fee; Nature of Relationship; advisor and speakers bureau. Grant/Research Support; Name of Commercial Interest; BMS, Hookipa Biotech GMBH, and Novartis. Honoraria; Name of Commercial Interest; Genzyme/Sanofi and Veloxis. Honoraria; Nature of Relationship; advisor and speakers bureau. **J. Friedewald:** Consulting Fee; Name of Commercial Interest; Transplant Genomics, Inc.; Novartis,. Grant/Research Support; Name of Commercial Interest; Veloxis, Abbvie, Vitaeris, Hansa, Viela Biopharma, Eurofins – Viracor. Honoraria; Name of Commercial Interest; Novartis, Sanofi. Honoraria; Nature of Relationship; Speakers Bureau. Ownership Interest; Name of Commercial Interest; Transplant Genomics, Inc. **R. Fontana:** Consulting Fee; Name of Commercial Interest; Sanofi. Grant/Research Support; Name of Commercial Interest; Gilead and Abbvie. **S. Sultan:** None. **N. Desai:** Consulting Fee; Name of Commercial Interest; Merck. Consulting Fee; Nature of Relationship; consulting and speaker fee. Grant/Research Support; Name of Commercial Interest; Merck. **R. Chung:** Grant/Research Support; Name of Commercial Interest; Abbvie, Gilead, Merck, BMS, Janssen, Boehringer, Roche. **P. Reese:** Consulting Fee; Name of Commercial Interest; VALHealth. Consulting Fee; Nature of Relationship; ocus: recognition of chronic kidney disease. Grant/Research Support; Name of Commercial Interest; Merck, Abbvie, CVS Caremark. Grant/Research Support; Nature of Relationship; Investigator Initiated Grants. Other; Name of Commercial Interest; Am J Kid Dis. Other; Nature of Relationship; Associate Editor.

Abstract# LB 13

Comprehensive Utilization of HCV Viremic and Non-Viremic Donor Livers and Kidneys into HCV-negative Patients

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Purpose: We report our experience on virologic and graft outcomes of HCV-negative patients transplanted with HCV NAT+ (viremic) and HCV Ab+/NAT- (non-viremic) livers and kidneys from 2017 to 2020.

Methods: All recipients were HCV RNA- pretransplant. HCV Ab and RNA testing was done 1-, 3-, and 12-months post-transplant. Non-viremic organs were routinely offered to patients after informed consent. Patients transplanted viremic organs were enrolled in IRB-approved studies, and after confirmation of HCV RNA positivity were treated for 12 weeks (kidney patients with Epclusa, liver patients with Mavyret or Harvoni).

Results: Kidney and liver recipients received thymoglobulin and Basilixumab, respectively. Immunosuppression consisted of tacrolimus and steroids ± MMF. *HCV Ab+/NAT- (non-viremic) donor organs*: 91 kidney and 19 liver patients have been transplanted (Table). 40 (44%) kidney and 7 (37%) liver recipients seroconverted, becoming HCV Ab+ post-transplant. However, no HCV transmission occurred in kidney transplant patients (100% HCV RNA negative with follow-up post-transplant of 25.1±13.5 months) and only 1 (5%) liver patient became HCV RNA positive but achieved SVR with treatment (follow-up post liver transplant, 21.4±10.3 months). *HCV NAT+ (viremic) donors*: 8 kidney and 7 liver patients have been transplanted; all were HCV RNA- prior to transplant. 13 patients were Genotype 1a and 2 were Genotype 3 (1 liver, 1 kidney). No patients were denied HCV treatment; insurance authorization was 100%. Mean follow-up post kidney transplant was 5±1.7 months. Patients started treatment 3.9 ± 0.9 weeks post-transplant. Seven of 8 kidney transplant patients are HCV RNA negative; 6 achieved SVR and the other patient was HCV RNA negative but died while on 10 weeks of treatment. The 8th patient recently started treatment. Mean follow-up post liver transplant was 14.1±7.1 months. Patients initiated treatment at 11.6±7.4 weeks post-transplant. All 7 (100%) liver recipients have achieved SVR. Side effects were minimal to none. *Graft outcomes*. One-and 3-year kidney graft survival is 95% and 88%, respectively. One- and 3-year liver graft survival is both 95%.

Demographics		
	Kidney pts (99)	Liver pts (26)
Recipient age	57 ± 11	56±11
Recipient gender M:F	59:40	15:11
Donor age	43±13	44±15
Median KDPI	73.5	NA
MELD at Tx	NA	31±12
PHS-increased risk donor	55 (56%)	13 (50%)

Conclusions: Transplantation of HCV Ab+/NAT- liver and kidneys to HCV-negative recipients is safe; incidence of HCV transmission was 1/110 (0.9%). 100% of HCV-negative patients transplanted with HCV NAT+ organs achieved SVR. We propose that transplantation of HCV viremic and non-viremic liver and kidneys into HCV-negative patients become standard of care.

CITATION INFORMATION: de Vera M., Woloszyn J., Sterris J., Robinson M., Evans R., Blais S., Elhazin B., Amador C., Berk c., Volk M., Villicana R. Comprehensive Utilization of HCV Viremic and Non-Viremic Donor Livers and Kidneys into HCV-negative Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.E. de Vera: None. **J. Woloszyn:** None. **J. Sterris:** None. **M. Robinson:** None. **R. Evans:** None. **S. Blais:** None. **B. Elhazin:** None. **C. Amador:** None. **C. Berk:** None. **M. Volk:** None. **R. Villicana:** None.

Abstract# LB 14

Detection of SARS-CoV-2 Specific Functional T Cells Using a Seven Color Flow Cytometry Assay

L. Flebbe-Rehwaldt, J. Hayden, K. Mickey, S. Manley, S. Kleiboeker, *Eurofins-Viracor, Lees Summit, MO*

Purpose: The need to evaluate SARS-CoV-2 immune responses is an important clinical research focus. Detecting neutralizing antibodies is one measure of immune response, but the ability to evaluate CD4 and CD8 T cell responses specific to SARS-CoV-2 is also an important measure of immune status. The role these two arms of the immune system play in protection is currently unknown.

Methods: We developed a whole blood flow cytometry assay that detects functional CD4 and CD8 responses to stimulation by peptide antigen pools encompassing the spike (S1 - receptor binding domain (RBD) and S2) and nucleocapsid (N) proteins to address this need. Activated T cells were defined as CD4 or CD8 T cells co-expressing the CD69 activation marker with IFN-γ, TNF-α or IL-2. Polyfunctional T cells, expressing multiple cytokines, were also identified. This assay was validated using whole blood from SARS-CoV-2 recovered volunteers and apparently normal donors who self-reported as uninfected by SARS-CoV-2.

Results: The range in responses varied by donor and was not correlated with the reported severity of their disease. A positive response was defined as a 3-fold increase in the number of activated T cells over the unstimulated control. Of the 32 SARS-CoV-2 recovered donors tested, 25 responded to two or three of the peptide pools and five did not respond to any SARS-CoV-2 peptides. Responses ranged from 0.03% up to 1.23% of the CD4 or CD8 population. The responding T cells were predominantly CD4, but when CD8 T cells responded they tended to recognize the nucleocapsid peptides most strongly. Data from one individual with a robust response are shown below.

Table 1. Percent responding T Cells				
Cell populations	**No stim**	**S1 (RBD)**	**S2**	**N**
CD4+CD69+IFNγ+	0.00	0.46	0. 20	0.16
CD4+CD69+ TNFα+	0.03	0.78	0.32	0.35
CD4+CD69+IL-2	0.01	0.71	0.27	0.34
CD4+CD69+IFNγ+TNFα+IL-2+	0.0	0.40	0.16	0.14
CD8+CD69+IFNγ+	0.03	0.03	0.02	0.12
CD8+CD69+ TNFα+	0.03	0.05	0.02	0.08
CD8+CD69+IL-2	0.01	0.01	0.00	0.02
CD8+CD69+IFNγ+TNFα+	0.00	0.01	0.00	0.06

For uninfected donors, five of 21 showed a low, but detectable response to stimulation with at least one peptide pool. These responses could be attributed to an asymptomatic infection, or to cross-reactive T cells specific to one of the seasonal respiratory coronaviruses.

Conclusions: In summary, we developed a sensitive assay to detect SARS-CoV-2 spike- and nucleocapsid-specific T cell responses in whole blood samples. This assay will be valuable in monitoring SARS-CoV-2 T cell response and duration in infected individuals. Measuring the T cell responses to SARS-CoV-2 vaccinated individuals is currently under investigation.

CITATION INFORMATION: Flebbe-Rehwaldt L., Hayden J., Mickey K., Manley S., Kleiboeker S. Detection of SARS-CoV-2 Specific Functional T Cells Using a Seven Color Flow Cytometry Assay *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Flebbe-Rehwaldt: Salary; Name of Commercial Interest; Eurofins-Viracor. Salary; Nature of Relationship; employee. **J. Hayden:** Salary; Name of Commercial Interest; Eurofins-Viracor. Salary; Nature of Relationship;

employee. **K. Mickey:** Salary; Name of Commercial Interest; Eurofins-Viracor. Salary; Nature of Relationship; employee. **S. Manley:** Salary; Name of Commercial Interest; Eurofins-Viracor. Salary; Nature of Relationship; employee. **S. Kleiboeker:** Salary; Name of Commercial Interest; Eurofins-Viracor. Salary; Nature of Relationship; employee.

Abstract# LB 15

Impaired Antibody Responses to Spike Protein Antigens of Sars-cov-2 in Solid Organ Transplant (sot) Recipients

C. Ashokkumar[1], S. Nadig[2], V. Rohan[2], A. Kroemer[3], H. Dhani[3], S. Rao[4], R. Sindhi[5], *[1]Plexision, pittsburgh, PA, [2]Medical University of South Carolina, Charleston, SC, [3]MedStar Georgetown Transplant Institute, Georgetown, DC, [4]DHR Health Institute for Research and Development, Texas, TX, [5]University of Pittsburgh, Pittsburgh, PA*

Purpose: Chronic immunosuppression can impair antibody responses after natural infection and vaccination in SOT recipients. It is not known whether antibody responses are impaired in SOT compared with non-SOT patients with COVID-19

Methods: We evaluated IgG responses to the spike (S) and receptor binding domain (RBD) antigenic sequences of SARS-CoV-2 after COVID-19-infection in SOT and non-SOT patients using enzyme-linked immunosorbent assay (ELISA). The S protein consists of a conserved C-terminal and less conserved N-terminal S1 sequence which contains the RBD. An optical density (OD) at 490 nm of 0.45 or greater, or < 0.45 was read as positive and negative ELISA result based on pre-clinical validation in 148 subjects. S1-reactive, S2-reactive and S-reactive CD4 cells that expressed CD154 were measured with flow cytometry after overnight stimulation with respective peptide mixtures for these antigens.

Results: 204 total study subjects, mean+/-SD age 47.5+/-21 years, were sampled at mean 12.6 (range 0-94) days after diagnosis. Subjects included 107 males, 74 SOT (liver-48, kidney-26) and 130 non-SOT. Among them, 103 patients with COVID-19 included 32 SOT and 71 non-SOT. Antibody measurements were performed in 74 COVID-19 patients. Fifty one of 74 patients received convalescent plasma. Anti-spike and anti-RBD IgG were present in 49 of 51 (96%) and 47 of 51 (92%) patients, respectively. Among the remaining 23 patients who did not receive plasma, anti-spike IgG and anti-RBD IgG were present in 21 (91%) and 16 (69.5%) patients, respectively. The incidence of anti-RBD IgG was significantly lower in SOT, 2 of 7 or 29%, compared with non-transplant patients, 14 of 16 or 88% (p=0.011). Between-group differences in the incidence of anti-spike IgG were not significant (5/7 or 71% SOT vs 16/16 or 100% SOT, p=NS). One of 23 patients, an SOT recipient died and showed no IgG to S or RBD antigens. Antibody titers reflected in OD490 readings were lower in SOT compared with non-SOT for anti-spike IgG (mean 2.2+/-0.6 vs 1.4+/-1.2, p=0.16, NS) and anti-RBD IgG (1.8+/-0.9 vs 0.54+/-0.7, p=0.004). Subjects without and with anti-RBD antibody did not differ in timing of the sample from diagnosis (mean+/-SD 18+/-12.5 vs 12+/-12, p=0.258, NS, respectively), frequencies of S-, S1 or S2-reactive T-cells (mean 3.1+/-2.4% vs 1.8+/2%, p=0.225, NS, respectively), or proportions of patients requiring intubation (2/7 or 29% vs 4/16 or 25%, p=1.00, NS, respectively).

Conclusions: Chronically immunosuppressed liver and kidney transplant recipients demonstrated impaired antibody responses to SARS-CoV-2 spike antigens, especially to less conserved RBD-containing viral sequence. This finding may portend impaired vaccine efficacy in transplant recipients.

CITATION INFORMATION: Ashokkumar C., Nadig S., Rohan V., Kroemer A., Dhani H., Rao S., Sindhi R. Impaired Antibody Responses to Spike Protein Antigens of Sars-cov-2 in Solid Organ Transplant (sot) Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Ashokkumar: Intellectual Property Rights; Name of Commercial Interest; Patent. **S. Nadig:** None. **V. Rohan:** None. **A. Kroemer:** None. **H. Dhani:** None. **S. Rao:** None. **R. Sindhi:** Intellectual Property Rights; Name of Commercial Interest; Patent.

Abstract# LB 16

Precision Medicine in Renal Transplantation: Structural Biology of HLA Defines Allelic Binding of Cardinal Pathogenic Viruses in Transplantation

K. R. Sherwood[1], A. Nguyen[2], J. Tran[1], O. Gunther[3], A. Nellore[2], R. Thompson[2], J. Lan[1], L. Allan[1], P. A. Keown[1], *[1]Vancouver General Hospital, Vancouver, BC, Canada, [2]Biomedical Engineering, Oregon Health & Science University, Portland, OR, [3]Gunther Analytics, Vancouver, BC, Canada*

Purpose: The incidence, clearance and clinical expression of viremia post-Tx are heterogeneous, complicating prediction, prognosis and therapy. We postulated that variation viral presentation related to HLA type may inform understanding, and we used in silico methods to assess the MHC-peptide binding affinity for three important phylogenetically distinct viruses (SARS-CoV-2, CMV and BKV).

Methods: Carrier frequencies for 11 HLA genes (HLA-A, B, C; DRB1, DRB3/4/5, DQA1, DQB1, DPA1, DPB1) were determined by NGS in 1150 renal transplant recipients. All FASTA-formatted viral protein sequence data from the NCBI RefSeq database were kmerized into 8-12 mers. Using netMHCpan, MHC-peptide binding affinities were predicted and affinity scores <500nM were included in the HLA allele rankings

Results: A total of 206 Class I HLA alleles identified in 1150 patients exhibited population frequencies ranging from 0.09% to 30%. Within this repertoire, peptide binding varied dramatically identifying low- and high-affinity alleles for each of the three viral proteomes. Alleles with lowest binding propensity were specific to each virus (e.g. HLA-B*46:01 for SARS-CoV-2, HLA-B*51:05 for CMV and HLA-B*15:08 for BKV). In contrast, alleles with the highest binding propensity were remarkably uniform for all 3 viruses (e.g. HLA-A*02:11 top for all three virus proteomes). Sequence signatures for HLA isoforms in the same allele group defined high or low binding characteristics, the difference being conferred by as little as a single amino acid within the peptide binding region (e.g. HLA-B*15:08 vs B*15:03). Carrier rates for predicted SARS-CoV-2 susceptibility/resistance genes in the transplant population were observed to be similar to global population carrier rates (Fig 1).

Conclusions: Evaluation of peptide binding provides a unique insight into viral recognition. If confirmed in our current proof-of-principle study comparing sequence and outcome in a large Canadian population, this data may offer a vital biomarker to define risk and treatment within conventional virological patient strata following transplant.

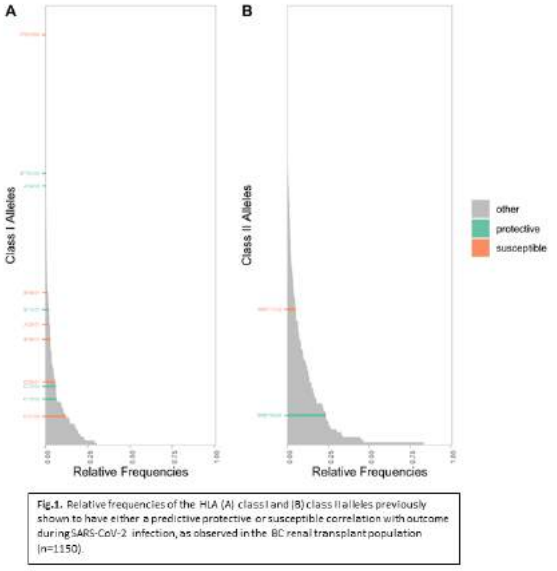


Fig.1. Relative frequencies of the HLA (A) class I and (B) class II alleles previously shown to have either a predictive protective or susceptible correlation with outcome during SARS-CoV-2 infection, as observed in the BC renal transplant population (n=1150).

CITATION INFORMATION: Sherwood K., Nguyen A., Tran J., Gunther O., Nellore A., Thompson R., Lan J., Allan L., Keown P. Precision Medicine in Renal Transplantation: Structural Biology of HLA Defines Allelic Binding of Cardinal Pathogenic Viruses in Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.R. Sherwood: None. **A. Nguyen:** None. **J. Tran:** None. **O. Gunther:** None. **A. Nellore:** None. **R. Thompson:** None. **J. Lan:** None. **L. Allan:** None. **P.A. Keown:** None.

Admin

Quality Assurance Process Improvement & Regulatory Issues

Abstract# 437

Results of the APP Practice Survey: Do APPs Practice at the Top of Their Scope of Practice?

H. Domingo[1], D. Krieger[2], B. Muth[3], A. Frank[4], A. Borth[5], H. McDade[5], K. Paolini[6], A. Mayfield[5], M. Siegfried[7], J. Yoo[8], H. Hoy[9], N. McCormick[10], *[1]Northwestern University, Chicago, IL, [2]University of California-San Francisco, San Francisco, CA, [3]University of Wisconsin, Madison, WI, [4]Medstar Georgetown University, Annandale, VA, [5]University of Maryland, Baltimore, MD, [6]Erie County Medical Center, Grand Island, NY, [7]Swedish Organ Transplant, Seattle, WA, [8]Rush University, Chicago, IL, [9]University of Alabama - Huntsville, Huntsville, AL, [10]University of Colorado-Denver, Denver, CO*

Purpose: Transplant centers employ Advance Practice Providers (APPs) in response to physician trainee work hour restrictions and to increase patient access to transplant care. APPs have completed advance training and certification in order to manage medical conditions in inpatient and outpatient settings.

Methods: Questions to determine if APPs are practicing at the top of their scope of practice were included in the AST APP Practice survey. Top of scope of practice is defined as delivering healthcare to the fullest extent of the APP license as allowed by state laws and regulations.

Results: APPs (n-253) from 32 states and DC completed the survey. 26.2% of APPs were not working at the top of their scope of practice. Reasons include inability to perform procedures, inadequate training, restrictive hospital protocols. 8.6% function as a scribe, 29.7% were expected to function as a coordinator. Though 92.9% of inpatient APPs worked with transplant coordinators, they schedule follow up appointments (56.8%), arrange home health care (50.5%), obtain prior authorizations (40.6%). 95.5% of outpatient APPs worked with transplant coordinators, but still schedule tests and procedures (49.9%), obtain prior authorizations (31.9%), deal with insurance issues (34.5%), and facilitate medication assistance programs for patients (29.5%). 87.7% of outpatient APPs conduct independent clinic visits, 47.2% write clinic notes for physician review or cosign as part of their job. 17.8% run specialized APP clinics like transplant urgent care and delayed graft function clinics. APP duties are in table 1.

Inpatient APP Duties		Outpatient APP Duties	
Enter Orders	176 (91.7%)	Enter Orders (tests, labs, medications, imaging)	140 (85.9%)
Daily Rounds	173 (90.1%)	Wound Care	100 (61.4%)
Write Progress Notes	172 (89.6%)	Write Clinic Notes for Independent Clinic Visit	143 (87.7%)
Consults	137 (71.4%)	Write Clinic Notes for Physician Review or Cosign	77 (47.2%)
Admissions/Discharges	156 (81.3%)	Admit Patients from Clinic (Direct admission)	129 (79.1%)
Donor run/organ procurement	22 (11.5%)	Respond to Electronic Patient Messages	118 (72.4%)
Schedule Followup Appointments	109 (56.8%)	Schedule Tests, Procedures, Imaging	81 (49.9%)
Arrange Home Health Care	97 (50.5%)	Home Care Orders	68 (41.7%)
Order Durable Medical Equipment	102 (53.1%)	Adjust Medications	141 (86.5%)
Obtain Consents	133 (69.3%)	Obtain Consents	73 (44.8%)
Perform procedures	89 (46.4%)	Perform Office Procedures	76 (46.3%)
Patient Education	91 (47.4%)	Post-Transplant Education (or new transplant recipients)	96 (58.9%)
Obtain Prior Authorizations	78 (40.6%)	Obtain Prior Authorizations	52 (31.9%)
Assist in the OR	30 (15.6%)	Order Infusion Therapies	108 (66.3%)
Leadership/Management Responsibilities	74 (38.5%)	Leadership/Management Responsibilities	72 (44.2%)
		Lab Review	147 (90.2%)
		Facilitate Medication Assistance Programs for Patients	48 (29.5%)
		Deal with Insurance Issues	56 (34.5)
		Coverage for other Providers (Lab Review, Patient Concerns)	116 (71.2%)
		Triage Phone Calls from Patients	89 (54.6%)
		Run APP Specialized Clinic (ie: DGF, Urgent Care, etc)	29 (17.8%)

Conclusions: With the increasing burden of healthcare costs, every team member should practice to their full potential. With appropriate training and experience, APPs can manage highly complex patients and perform a wide range of procedures. A significant percentage currently perform duties more appropriately delegated to nurse coordinators or case managers. By optimizing APPs' role, time spent performing these tasks can be allocated to seeing more patients, thus improving patient access to health care as well as APP job satisfaction and retention.

CITATION INFORMATION: Domingo H., Krieger D., Muth B., Frank A., Borth A., McDade H., Paolini K., Mayfield A., Siegfried M., Yoo J., Hoy H., McCormick N. Results of the APP Practice Survey: Do APPs Practice at the Top of Their Scope of Practice? *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Domingo: None. **D. Krieger:** None. **B. Muth:** None. **A. Frank:** None. **A. Borth:** None. **H. McDade:** None. **K. Paolini:** None. **A. Mayfield:** None. **M. Siegfried:** None. **J. Yoo:** None. **H. Hoy:** None. **N. McCormick:** None.

Abstract# 438

Covid-19 Incidence Was Initially Associated with Posttransplant Kidney Graft Failure

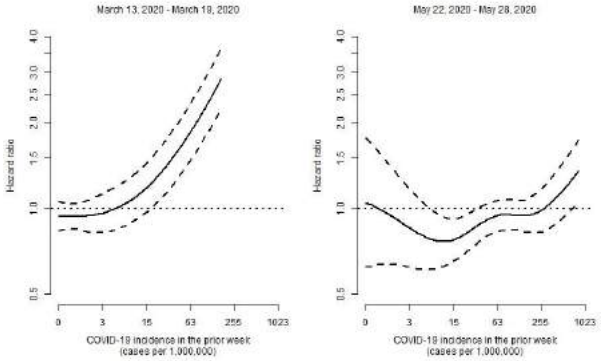
A. Wey[1], J. Miller[1], D. Musgrove[1], N. Salkowski[1], M. Tabaka[1], R. Hirose[2], A. Massie[3], D. Segev[3], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]Univ of San Francisco, San Francisco, CA, [3]Johns Hopkins, Baltimore, MD*

Purpose: To better understand the effect of COVID-19 on kidney posttransplant outcomes, we estimated the association of county-level COVID-19 incidence with kidney posttransplant graft failure.

Methods: The study used a period-prevalent cohort of kidney recipients from March 13, 2019 to July 31, 2020 who received a transplant on or after January 1, 2000. The county-level incidence of COVID-19 for each kidney transplant program was determined from the *New York Times* database and aggregated into cases per 1,000,000 for each week before and after the national emergency declaration for COVID-19.

Results: For each week, recipients were given the county-level incidence of the transplant program during the previous week. A two-dimensional spline estimated the effect of COVID-19 across calendar time and incidence.

Conclusions: The effect of COVID-19 incidence had a nonlinear relationship with kidney graft failure, and the effect changed over the course of the pandemic. At the time of the national emergency declaration (March 13 to 19, 2020), the incidence of COVID-19 had a nonlinear effect (Figure 1, left panel): relatively flat up to an incidence of about 16, then the effect rapidly increased to a hazard ratio of about 3, for an incidence of 1024. This nonlinear effect attenuated during the weeks after the declaration of a national emergency. Roughly 10 weeks after the emergency declaration (May 22 to 28, 2020), the incidence of COVID-19 had a less dramatic effect on posttransplant graft failure rates (Figure 1, right panel). Thus, the emergence of COVID-19 coincided with a significantly higher rate of kidney graft failure, potentially from COVID-19 infection or patients not seeking for-cause medical care. However, after the initial disruption, kidney graft failure rates were less strongly associated with COVID-19 incidence, suggesting that kidney recipients and/or transplant programs may have adapted to the new conditions imposed by COVID-19.



CITATION INFORMATION: Wey A., Miller J., Musgrove D., Salkowski N., Tabaka M., Hirose R., Massie A., Segev D., Israni A., Snyder J., Kasiske B. Covid-19 Incidence Was Initially Associated with Posttransplant Kidney Graft Failure *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Wey: None. **J. Miller:** None. **D. Musgrove:** None. **N. Salkowski:** None. **M. Tabaka:** None. **R. Hirose:** None. **A. Massie:** None. **D. Segev:** None. **A. Israni:** None. **J. Snyder:** None. **B. Kasiske:** None.

Abstract# 439

Centre Variation in Emergency Hospital Readmissions Following Renal Transplantation in England

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Purpose: Emergency hospital readmissions (EHR) following surgery are associated with significant patient distress, morbidity and costs to healthcare providers. In this study we aim to describe and compare, for the first time, EHR following adult renal transplantation across England.

Methods: We undertook a retrospective analysis of linked English '*Hospital Episodes Statistics*' and '*UK Renal Registry'* datasets to identify EHR within 120 days of initial discharge for adult renal transplant recipients, across 19 centres (2012-2016). All elective and day case admissions were excluded. Logistic regression was

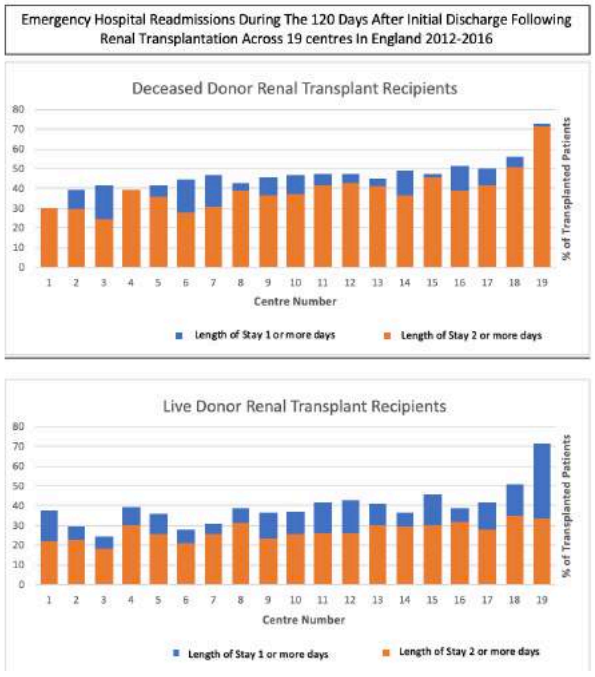
used to calculate odds ratios for readmission associated with age, sex, ethnicity, deprivation, transplant type (live donor LD or deceased donor DD) and length of stay (LOS) at time of surgery. Coded primary diagnoses were also explored in an attempt to try and characterise the main reasons for readmissions.

Results: 12156 adult renal transplants were performed in England between 2012-2016 (8299 DD and 3857 LD). 44% of patients had an EHR within 120 days of their initial discharge, varying between 30-72% across centres. Median LOS for EHRs was 3 days (IQR 2-7 days). 25% of EHRs had LOS=1 day however and variation in EHRs requiring longer hospital stays were therefore explored separately (Figure 1). Risk factors for readmission included advancing age, female sex, DD kidney and longer LOS following initial surgery. The proportion of readmitted patients with commonly coded primary diagnoses are shown in Table 1.

Conclusions: We found high rates of EHR for adult renal transplant recipients. There was a clear centre effect noted and patient/transplant level factors will need to be explored further, alongside individual transplant unit care pathways and outpatient follow-up intensity to allow better understanding of reasons underlying this variation and how services might be best tailored to address it.

Table 1: Coded Primary Diagnosis Groupings for patients with 120 day Emergency Readmissions

Primary Diagnosis Grouping	% of readmitted patients with associated codes	Centre Variation (%)
Renal Impairment	24.4	15-48
Urinary tract infections	9.4	4-18
Gastrointestinal symptoms	8.6	3-14
Unspecified Complications of kidney transplant	7.4	2-14
Surgical Complications (including those related to wound/haematoma/surgical site infections)	7.0	3-12
Other infections (sepsis/chest)	4.8	2-8
Obstructive Uropathy	3.4	1-10



CITATION INFORMATION: Peracha J., Pitcher D., Steenkamp R., Medcalf J., Lipkin G., Nitsch D., McKane W. Centre Variation in Emergency Hospital Readmissions Following Renal Transplantation in England *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Peracha: None. **D. Pitcher:** None. **R. Steenkamp:** None. **J. Medcalf:** None. **G. Lipkin:** None. **D. Nitsch:** None. **W. McKane:** None.

Abstract# 440

Results of the Transplant Advance Practice Provider Survey: Opportunities for APPs to Contribute to Academic Pursuits

B. Muth[1], D. Krieger[2], N. McCormick[3], M. Siegfried[4], H. Domingo[5], J. Yoo[6], A. Frank[7], K. Paolini[8], A. Mayfield[9], H. McDade[9], A. Borth[9], H. Hoy[10], *[1]University of Wisconsin, Madison, WI, [2]UCSF, San Francisco, CA, [3]University of Colorado, Denver, CO, [4]Swedish Organ Transplant, Seattle, WA, [5]Northwestern, Chicago, IL, [6]Rush, Chicago, IL, [7]Medstar Georgetown University, Annandale, VA, [8]Erie County Medical Center, Grand Island, NY, [9]University of Maryland, Baltimore, MD, [10]University of Alabama - Huntsville, Huntsville, AL*

Purpose: The pillars of academic medicine are research, education and patient care. While transplant Advance Practice Providers (APPs) are primarily recruited for clinical roles, many are interested in the academic pursuits of education and research.

Methods: Questions about APP research and teaching opportunities were included in the AST APP Practice survey, a 58-item electronic questionnaire. Questions were non-sequential, therefore, participants were not required to answer all questions. The survey was distributed via a link posted on the APP COP Hub, emailed to members of the AST APP community of practice and to ASTS APPs (n=307), and sent out on twitter. Recipients were encouraged to share the link with colleagues. We received 253 responses from 32 states and the District of Columbia, and represent all 11 UNOS regions.

Results: 147 (58.8%) of APPs participate in academic or leadership activities at their institution: 105 (41.7%) have published abstracts, papers, editorials or book chapters, 84 (33.2%) have presented at regional or national meetings and 165 (65.2%) have attended a National transplant meeting (ATC, ASTS, CEOT). Notably, 189 (77.1%) of respondents would like to increase their participation in research, however, the biggest obstacles are lack of time (49%), lack of opportunity (32%), lack of experience (5%).

228 (90.8%) of APPs have the opportunity to teach in some capacity: 175 (69.1%) train physician trainees and 216 (86.4%) precept other APPs. 89 (35.1%). Respondents would like to teach or mentor at some level, whether to APP peers or physician trainees, however, the barriers to teaching are time (28%), opportunity (14%), lack of experience (10.5%) and unsupported activity by their institution (9%). Academic demographics of respondents are in table 1

Table 1: Transplant Advance Practice Provider Academic Demographics

APP Academic Activities	
• Published (abstract, paper, editorial or book chapter)	105 (41.67%)
• Invited Speaker	109 (74.15%)
• Give Grand Rounds	30 (20.41%)
• Leadership Role in Department or APP group	88 (59.88%)
• Teach/Precept (APPs, physician trainees)	228 (90.8%)
• Presented at a National Transplant Meeting	84 (33.2%)
• Participate on an APP Advisory Board at Local Institution	40 (27.21%)
Years of Practice in Transplant	
• < 5 years	132 (52.38%)
• 6-10 years	70 (27.78%)
• 11-15 years	30 (11.90%)
• 16-20 years	13 (5.15%)
• > 21 years	7 (2.78%)
Practice at Academic Center	246 (97.23%)
Transplant Center Location	
• Northeast	68 (27.2%)
• Midwest	71 (28.4%)
• Southeast	37 (14.8%)
• West	49 (19.6%)
• Southwest	25 (10%)
Estimated Transplant Center Volume for Organ Type APP Practices in	
• <50/year	38 (15.26%)
• 51-100/year	43 (17.27%)
• 101-200/year	65 (26.10%)
• 201-300/year	33 (13.25%)
• 301-400/year	38 (15.26%)
• >400/year	32 (12.85%)

Conclusions: Because of their predominantly clinical role, APPs find similar barriers to research and teaching. As practitioners of evidence based medicine, transplant APPs are uniquely positioned to generate practice-based evidence. We encourage our physician colleagues and transplant teams to partner with APPs to cultivate a favorable atmosphere for clinical research and education.

CITATION INFORMATION: Muth B., Krieger D., McCormick N., Siegfried M., Domingo H., Yoo J., Frank A., Paolini K., Mayfield A., McDade H., Borth A., Hoy H. Results of the Transplant Advance Practice Provider Survey: Opportunities for APPs to Contribute to Academic Pursuits *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Muth: None. **D. Krieger:** None. **N. McCormick:** None. **M. Siegfried:** None. **H. Domingo:** None. **J. Yoo:** None. **A. Frank:** None. **K. Paolini:** None. **A. Mayfield:** None. **H. McDade:** None. **A. Borth:** None. **H. Hoy:** None.

Abstract# 441

A Comparison of Pediatric Intestine Transplant Between the Current Era (2015-2019) and the Peak Period (2002-2006)

S. Horslen[1], T. Weaver[2], M. Skeans[2], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN*

Purpose: Demand for intestine transplants in children grew from its clinical inception in the late 1980s to a peak in 2007 of 111 small bowel-containing transplants. This was driven by improved posttransplant survival and high pretransplant mortality due to complications of life on total parenteral nutrition, mostly sepsis, loss of central venous access, and progressive liver disease. With the establishment of dedicated intestinal failure programs promoting coordinated medical, nutritional, and surgical care, the pretransplant mortality rates declined as did the referral and listing of infants and children for intestine transplant. This study aims to detail the differences between recipient cohorts in 2 5-year eras around the 2007 peak: January 2002-December 2006 and January 2015-December 2019.

Methods: All intestine transplant recipients younger than 18 years at listing are included. For the 2 eras, we present summary statistics of recipient characteristics at transplant and Kaplan-Meier estimates of posttransplant survival.

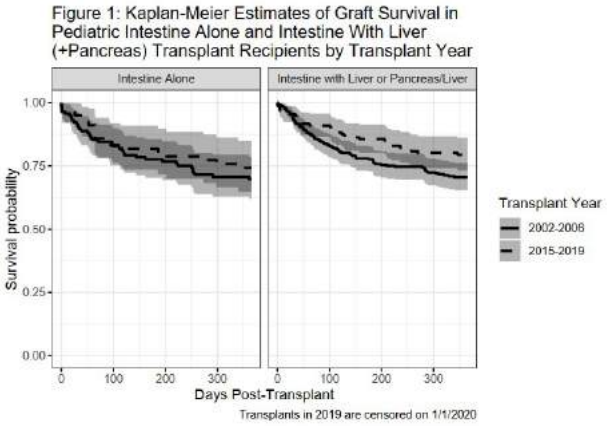
Results: The number of intestine-containing pediatric transplants fell from 420 in the first era to 245 in the second (Table 1). Median age at transplant increased from 2 to 5 years (mean, 4.2 vs 6.5); the most noticeable change being a reduction in recipients <2 years old, from 56.7% in the first era to 22.4% more recently, and a reciprocal increase in the 2- to 10-year age group (30.5% vs 60.0%). The fraction of retransplant (any previous transplant) more than doubled, from 9.3% in the first era to 22.9% in the second. Short bowel syndrome was the predominant cause of intestinal failure in both cohorts. Patients also waited longer from listing until transplant.

Conclusions: Advances in intestinal failure management resulted in the need for fewer transplants at older ages, with no detriment in posttransplant survival.

Table 1: Transplant Characteristics of Pediatric Intestine Transplant Recipients by Transplant Year

	Total	2002-2006	2015-2019
Characteristic	N (%)*	N (%)*	N (%)*
All			
Total	665	420	245
Age At Transplant (Years)			
Median (Q1,Q3)	2.5 (1.2,7.7)	1.7 (1.0,5.6)	4.8 (2.2,9.1)
Mean (SD)	5.0 (5.2)	4.2 (4.9)	6.5 (5.4)
Minimum	0.2	0.3	0.2
Maximum	25.0	19.3	25.0
0-1 years	293 (44.1%)	238 (56.7%)	55 (22.4%)
2-10 years	275 (41.4%)	128 (30.5%)	147 (60.0%)
11 years and older	97 (14.6%)	54 (12.9%)	43 (17.6%)
Any Previous Transplants			
No	570 (85.7%)	381 (90.7%)	189 (77.1%)
Yes	95 (14.3%)	39 (9.3%)	56 (22.9%)
Waiting Time			
Median (Q1,Q3) Days	121.0 (44.0,256.0)	116.0 (42.8,234.0)	131.0 (47.0,383.0)
Mean (SD) Days	271.1 (475.7)	206.6 (331.2)	381.8 (638.8)
Minimum Days	0.0	0.0	1.0
Maximum Days	4015.0	3624.0	4015.0
[0,90] Days	273 (41.1%)	178 (42.4%)	95 (38.8%)
(90,180] Days	142 (21.4%)	92 (21.9%)	50 (20.4%)
(180,270] Days	91 (13.7%)	64 (15.2%)	27 (11.0%)
(270,365] Days	36 (5.4%)	27 (6.4%)	9 (3.7%)
(1,2] Years	68 (10.2%)	40 (9.5%)	28 (11.4%)
(2,5] Years	41 (6.2%)	16 (3.8%)	25 (10.2%)
>5 Years	14 (2.1%)	3 (0.7%)	11 (4.5%)
Organs Transplanted Along With Intestine			
Pancreas/Liver	332 (49.9%)	179 (42.6%)	153 (62.4%)
Intestine Alone	195 (29.3%)	116 (27.6%)	79 (32.2%)
Liver	95 (14.3%)	93 (22.1%)	2 (0.8%)
Pancreas	24 (3.6%)	20 (4.8%)	4 (1.6%)
Pancreas/Liver/Kidney	15 (2.3%)	9 (2.1%)	6 (2.4%)
Pancreas/Kidney	2 (0.3%)	2 (0.5%)	0
Kidney	1 (0.2%)	1 (0.2%)	0
Liver/Kidney	1 (0.2%)	0	1 (0.4%)

Note:
Pediatric recipients were 18 years old and younger at the time of listing.
*N(%), except as indicated in row label.



CITATION INFORMATION: Horslen S., Weaver T., Skeans M. A Comparison of Pediatric Intestine Transplant Between the Current Era (2015-2019) and the Peak Period (2002-2006) *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Horslen: Consulting Fee; Name of Commercial Interest; Alberio. Consulting Fee; Nature of Relationship; Advisory Committee. Grant/Research Support; Name of Commercial Interest; Mirum, Alberio, Gilead, Takeda. Grant/Research Support; Nature of Relationship; consultant/advisor. **T. Weaver:** None. **M. Skeans:** None.

Basic

Basic 1

Abstract# 442

Atg16l-Dependent Autophagy Attenuates Procession of Renal Interstitial Fibrosis in Chronic Renal Graft Dysfunction via Regulating Tumor Necrosis Factor Alpha (tnf-α) Induced Endmt

Z. Gui, Z. Wang, Z. Han, J. Tao, X. Ju, R. Tan, M. Gu, *The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

Purpose: Chronic renal graft dysfunction is characterized by inflammation, tubular injury, and interstitial fibrosis. We have confirmed that endothelial-mesenchymal transition (EndMT) was one of important sources to allograft interstitial fibrosis. However, whether and how autophagy contributes to renal allograft fibrosis remains unclear. ATG16L is a critical autophagy-related gene (ARG) for autophagosome formation.

Methods: The GEO database was searched and data was retreived. 60 allograft tissues were collected from renal transplant recipients with chronic allograft dysfunction (CAD) to explore the autophagy in kidney transplantation. Moreover, cell culture was performed and human umbilical artery endothelial cells (HUAECs) and human renal glomerular endothelial cells (HRGECs) were induced by TNF-α. Autophagy in endothelial cells was examined and signaling pathway was tested.

Results: Here, we observed ATG16L, as one significant differential ARG, was lower expression in chronic allograft dysfunction (CAD) group compared with non-rejecting by analyzing data sets from Gene Expression Omnibus (GEO). The same results were obtained in 60 kidney transplanted patients with CAD that there are less autophagosome and autolysosome in transplated kidneys, and downregulation of autophagy related to poor prognosis. In addition, we found that TNF-α could induce EndMT in human umbilical artery endothelial cells (HUAECs) and human renal glomerular endothelial cells (HRGECs), and knockdown of ATG16L facilitated this process. In vivo, we demonstrated abundance of ATG16L related to the dynamic autophagic flux change along different stages of kidney transplantation and autophagy activation alleviated the progression of EndMT, interstitial extracellular matrix deposition and inflammatory cell infiltration by increasing ATG16L expression. Mechanistically, loss of ATG16L specifically in endothelial cells reduced SQSTM1/p62-dependent autophagic degradation of NF-κB and resulted in production of TNF-α.

Conclusions: ATG16L-dependent autophagy served as a negative regulator of TNF-α-induced inflammation, EndMT and the development of renal graft fibrosis, therefore, autophagy could be used as a potential therapeutic target for chronic renal graft rejection.

CITATION INFORMATION: Gui Z., Wang Z., Han Z., Tao J., Ju X., Tan R., Gu M. Atg16l-Dependent Autophagy Attenuates Procession of Renal Interstitial Fibrosis in Chronic Renal Graft Dysfunction via Regulating Tumor Necrosis Factor Alpha (tnf-α) Induced Endmt *AJT, Volume 21 Supplement 3*

DISCLOSURES: Z. Gui: None. **Z. Wang:** None. **Z. Han:** None. **J. Tao:** None. **X. Ju:** None. **R. Tan:** None. **M. Gu:** None.

BASIC

Abstract# 443

Single-Cell RNA-seq Identifies Intra-Graft Population Heterogeneity in Acute Heart Allograft Rejection in the Mouse

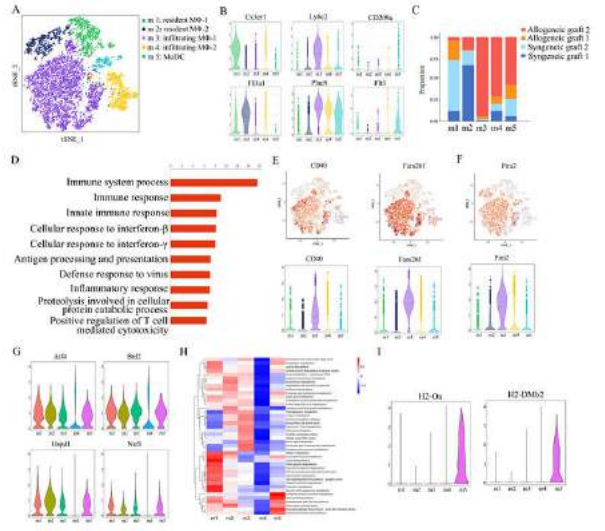
C. Wu[1], Y. Tang[1], X. Shi[1], X. He[1], X. Li[2], *[1]The First Affiliated Hospital,Sun Yat-sen University, Guangzhou, China, [2]Immunobiology & Transplant Sciences Houston Methodist Hospital, Houston, TX*

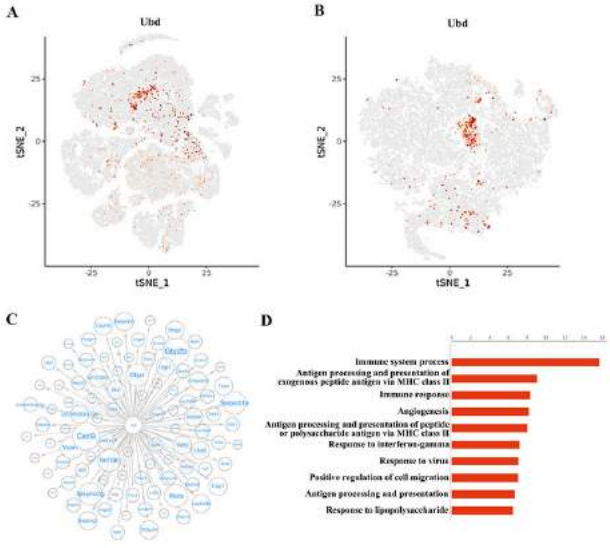
Purpose: Transplant rejection remains a major barrier to graft survival and involves a diversity of cell types. But the heterogeneity in a given cell type in graft rejection remains poorly defined.

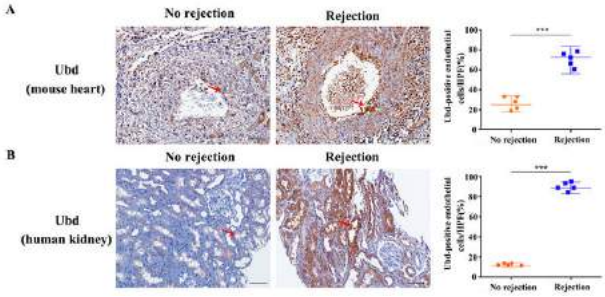
Methods: In the present study, we used single-cell RNA sequencing (scRNA-seq) technology, which is a powerful tool in identifying population heterogeneity, to examine changes in graft infiltrating cells during acute heart allograft rejection.

Results: Here we focused on innate cells and performed the first comprehensive analysis of transcriptional heterogeneity in the mouse. In dimensionality reduction and unsupervised cell clustering analysis, we identified 21 distinct cell populations in the allografts. We showed that macrophages can be divided into five subclusters and revealed a new subset of macrophages highly associated with graft rejection; they upregulated CD40, Fam26f and Pira2. Furthermore, we confirmed the heterogeneity of graft endothelial cells in rejection, which showed five subclusters (EC1~EC5) and the EC5 can function as antigen presenting cells during transplant rejection. We further identified Ubiquitin D (Ubd) in EC5 cluster as a key marker of rejection, which was validated by immunohistochemistry staining in mouse cardiac samples and human kidney biopsy specimens.

Conclusions: our findings revealed the population heterogeneity of cell types in acute allograft rejection and identified novel markers in rejection.







CITATION INFORMATION: Wu C., Tang Y., Shi X., He X., Li X. Single-Cell RNA-seq Identifies Intra-Graft Population Heterogeneity in Acute Heart Allograft Rejection in the Mouse *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Wu: None. **Y. Tang:** None. **X. Shi:** None. **X. He:** None. **X. Li:** None.

Abstract# 444

Extracellular Matrix Injury of Kidney Allografts in Antibody-mediated Rejection

S. Clotet Freixas[1], C. McEvoy[1], I. Batruch[2], C. Pastrello[3], M. Kotlyar[3], J. Van[1], M. Arambewela[1], A. Boshart[1], S. Farkona[1], Y. Niu[3], Y. Li[1], O. Famure[1], A. Bozovic[4], V. Kulasingam[4], P. Chen[1], J. S. Kim[1], E. Chan[5], S. Moshkelgosha[1], S. A. Rahman[6], J. Das[6], T. Martinu[1], S. Juvet[1], I. Jurisica[3], A. Chruscinski[1], R. John[1], A. Konvalinka[1], *[1]Toronto General Hospital Research Institute, University Health Network, Toronto, ON, Canada, [2]Department of Laboratory Medicine and Pathobiology, Lunenfeld-Tanenbaum Research Institute, Mount Sinai Hospital, Toronto, ON, Canada, [3]Krembil Research Institute, University Health Network, Toronto, ON, Canada, [4]Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, ON, Canada, [5]Department of Medicine, Division of Nephrology, University Health Network, Toronto, ON, Canada, [6]Center for Systems Immunology, University of Pittsburgh School of Medicine, Pittsburgh, PA*

Purpose: Antibody-mediated rejection (AMR) accounts for >50% of kidney graft losses. AMR is caused by donor-specific antibodies (DSA) against HLA and non-HLA antigens in glomeruli and tubulointerstitium, which together with cytokines such as tumor necrosis factor alpha (TNFα), trigger graft injury. The mechanisms governing cell-specific injury in AMR remain unclear.

Methods: We studied 30 for-cause kidney biopsies with early AMR, acute cellular rejection (ACR) or acute tubular necrosis (ATN). We laser-captured and microdissected glomeruli and tubulointerstitium and subjected them to unbiased proteome analysis.

Results: Machine learning revealed that the intensities of all quantified proteins (>2000 per compartment) accurately discriminated AMR from ACR and from ATN ($P<0.05$). In each compartment, >200 proteins were significantly dysregulated in AMR, compared to ACR and/or ATN ($P<0.05$). Basement membrane and extracellular matrix (ECM) proteins were significantly decreased in AMR. We verified decreased glomerular and tubulointerstitial LAMC1 expression, and decreased glomerular NPHS1 and PTPRO expression in AMR. Cathepsin-V (CTSV) was predicted to cleave ECM-proteins in the AMR glomeruli. We identified galectin-1, an immunomodulatory protein upregulated in the AMR glomeruli and linked to the ECM. Anti-HLA class-I antibodies significantly increased CTSV expression, and galectin-1 expression and secretion, in human glomerular endothelial cells. Glutathione S-transferase omega-1, an ECM-modifying enzyme, was significantly increased in the AMR tubulointerstitium, and in TNFα-treated proximal tubular epithelial cells.

Conclusions: Basement membranes are often remodeled in chronic AMR. We demonstrated that this remodeling begins early in glomeruli tubulointerstitium. Targeting ECM-remodeling in AMR may represent a new therapeutic opportunity.

CITATION INFORMATION: Clotet Freixas S., McEvoy C., Batruch I., Pastrello C., Kotlyar M., Van J., Arambewela M., Boshart A., Farkona S., Niu Y., Li Y., Famure O., Bozovic A., Kulasingam V., Chen P., Kim J., Chan E., Moshkelgosha S., Rahman S., Das J., Martinu T., Juvet S., Jurisica I., Chruscinski A., John R., Konvalinka A. Extracellular Matrix Injury of Kidney Allografts in Antibody-mediated Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Clotet Freixas: None. **C. McEvoy:** None. **I. Batruch:** None. **C. Pastrello:** None. **M. Kotlyar:** None. **J. Van:** None. **M. Arambewela:** None. **A. Boshart:** None. **S. Farkona:** None. **Y. Niu:** None. **Y. Li:** None. **O. Famure:** None. **A. Bozovic:** None. **V. Kulasingam:** None. **P. Chen:** None. **J.S. Kim:** None. **E. Chan:** None. **S. Moshkelgosha:** None. **S.A. Rahman:** None. **J. Das:** None. **T. Martinu:** None. **S. Juvet:** None. **I. Jurisica:** Other; Name of Com-

mercial Interest; personal fees from Canadian Rheumatology Association, grants and nonfinancial support from IBM, and personal fees from Novartis. **A. Chruscinski:** None. **R. John:** None. **A. Konvalinka:** None.

Abstract# 445

Laminin Alpha 4 and Alpha5 Differentially Regulate Lymph Node Tolerogenic Structure

L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[1], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MD*

Purpose: Lymph node (LN) stromal laminins α4 (Lama4) and α5 (Lama5) are associated with tolerance and immunity, respectively. We hypothesized that stromal Lama4 and Lama5 regulates lymph node (LN) structure to channel T cell distribution and functions.

Methods: LN stromal cell Lama5 conditional KO (Pdgfrb-Cre$^{+/-}$ x Lama5$^{fl/fl}$), and Lama4 KO (Pdgfrb-Cre$^{+/-}$ x Lama4$^{fl/fl}$) mice were created. High endothelial venules (HEV), Treg distribution, chemokines, and cell adhesion molecules in the LNs analyzed by immunohistochemistry and qRT-PCR. Mice received cardiac allografts and monitored for survival.

Results: Compared to wild type (WT) controls, depleting Lama5 created a tolerogenic niche in LN. The Lama5 KO LNs were characterized by greater HEV size and numbers, increased numbers of Treg and dendritic cells (DC), increased chemokine CCL19, CCL21 and CXCL12, upregulated cytokine IL-33, and more adhesion molecules ICAM-1 and VCAM-1 in CR and around HEVs. In contrast, depletion of Lama4 gave rise to a relatively inflammatory microenvironment. Compared to WT, the Lama4 KO LNs had fewer HEVs, less Treg, DCs, CCL19, CCL21 and CXCL12, downregulated IL-33, and less adhesion molecules in CR and around HEVs. BALB/c hearts were transplanted into Lama5 KO recipients and treated with low dose tacrolimus had significantly longer allograft survival (mean survival time (MST) 89 days versus MST 27.5 days in WT, (p<.002). Lama5 KO recipients receiving a single dose of anti-CD40L displayed a trend for increased survival (MST 155 vs 91 days, p=0.07). Tacrolimus treated Lama4 KO recipients had significantly shorter allograft survival (MST 11.5 days versus MST 18 days in WT (p<.002). Lama4 KO recipients receiving a single dose of anti-CD40L displayed a trend for decreased survival (MST 42.5 vs 60 days, p<0.01).

Conclusions: Depletion of Lama5 upregulated chemokines, adhesion molecules, DC and Treg in the T cell zones, CR, and around HEV, while depletion of Lama4 down-regulated those same cells and molecules in same areas. Lama5 deficient mice have a tolerant LN niche, while Lama4 deficient mice have a relatively immune LN niche. These results suggest targeting laminins are efficient approaches to modulate immune outcomes in transplantation.

CITATION INFORMATION: Li L., Shirkey M., Piao W., Xiong Y., Saxena V., Zhang T., Iyyathurai J., Lakhan R., Abdi R., Bromberg J. Laminin Alpha 4 and Alpha5 Differentially Regulate Lymph Node Tolerogenic Structure *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Li: None. **M. Shirkey:** None. **W. Piao:** None. **Y. Xiong:** None. **V. Saxena:** None. **T. Zhang:** None. **J. Iyyathurai:** None. **R. Lakhan:** None. **R. Abdi:** None. **J. Bromberg:** None.

Abstract# 446

Short-term Therapy with Anti-icam-1 Monoclonal Antibody Induced Long-term Liver Allograft Survival in Non-human Primates

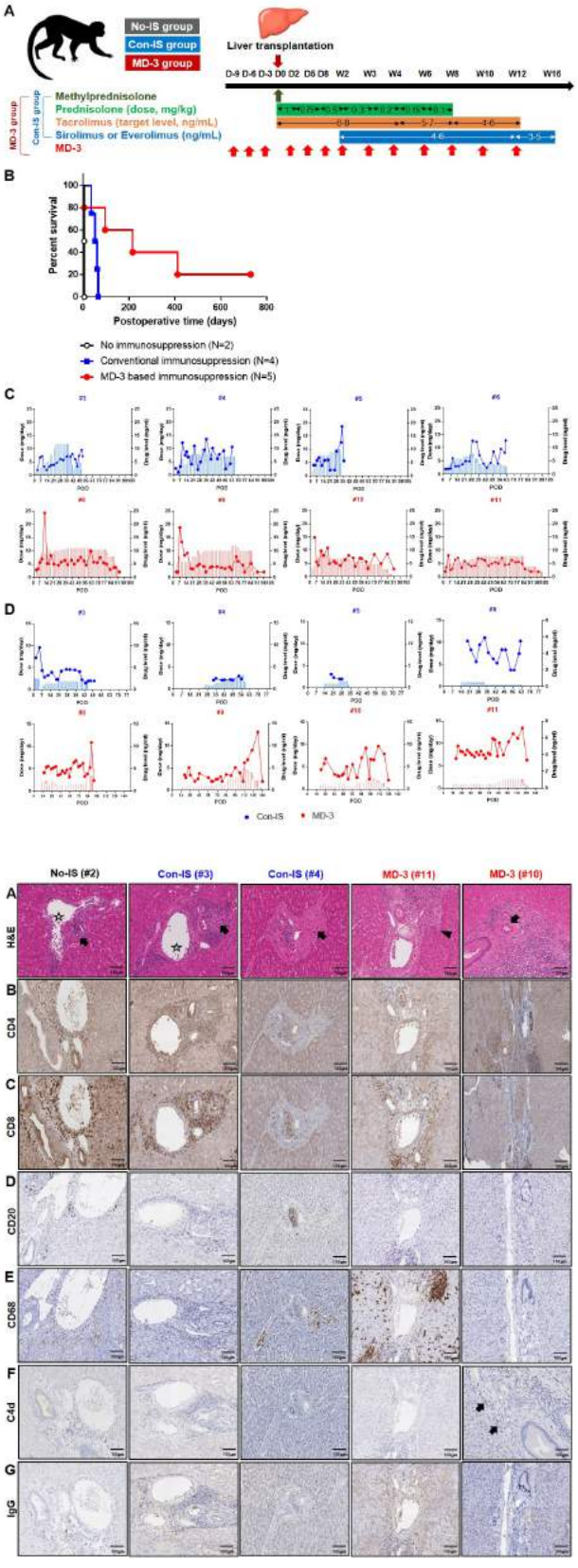
S. Hong[1], D. Han[2], S. Lee[2], J. Kim[3], E. Hwang[3], H. Kim[4], J. Lee[5], K. Hong[1], E. Han[1], J. Cho[1], J. Lee[1], Y. Choi[1], K. Lee[1], N. Yi[1], J. Yang[1], K. Suh[1], *[1]Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of, [2]Biomedical Research Institute, Seoul National University College of Medicine, Seoul, Korea, Republic of, [3]Microbiology and Immunology, Seoul National University College of Medicine, Seoul, Korea, Republic of, [4]Pathology, Seoul National University College of Medicine, Seoul, Korea, Republic of, [5]Medicine, Seoul National University College of Medicine, Seoul, Korea, Republic of*

Purpose: Tolerance induction remains challenging following liver transplantation and the long-term use of immunosuppressants, especially calcineurin inhibitors, leads to serious complications. We aimed to test an alternative immunosuppressant, a chimeric anti-ICAM-1 monoclonal antibody, MD-3, for improving outcomes of liver transplantation.

Methods: We used a rhesus macaques liver transplantation model and monkeys were divided into three groups: no immunosuppression (n=2), conventional immunosuppression (n=4), and MD-3 (n=5).

Results: Without immunosuppression, liver allografts failed within a week by acute rejection. Sixteen-week-long conventional immunosuppression that consisted of prednisolone, tacrolimus, and an mTOR inhibitor, prolonged liver allograft survival; however, recipients died of acute T cell-mediated rejection (day 52), chronic rejection (day 62, 66) or adverse effects of mTOR inhibitor (day 32). In contrast, 12 weeks-long MD-3 therapy with transient conventional immunosuppression in the MD-3 group significantly prolonged the survival of liver allograft recipients (5, 96, 216, 412, 730 days; $P = 0.0483$). MD-3 effectively suppressed intragraft inflammatory cell infiltration, anti-donor T cell responses and donor-specific antibody with intact anti-cytomegalovirus antibody responses. However, this regimen ended in chronic rejection.

Conclusions: In conclusion, short-term therapy with MD-3 markedly improved liver allograft survival to 2 years without maintenance of immunosuppressant. MD-3 is therefore a promising immune modulating agent for liver transplantation.



CITATION INFORMATION: Hong S., Han D., Lee S., Kim J., Hwang E., Kim H., Lee J., Hong K., Han E., Cho J., Lee J., Choi Y., Lee K., Yi N., Yang J., Suh K. Short-term Therapy with Anti-icam-1 Monoclonal Antibody Induced Long-term Liver Allograft Survival in Non-human Primates *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Hong: None. **D. Han:** None. **S. Lee:** None. **J. Kim:** None. **E. Hwang:** None. **H. Kim:** None. **J. Lee:** None. **K. Hong:** None. **E. Han:** None. **J. Cho:** None. **J. Lee:** None. **Y. Choi:** None. **K. Lee:** None. **N. Yi:** None. **J. Yang:** None. **K. Suh:** None.

Kidney

Kidney Alloimmune Responses

Abstract# 450

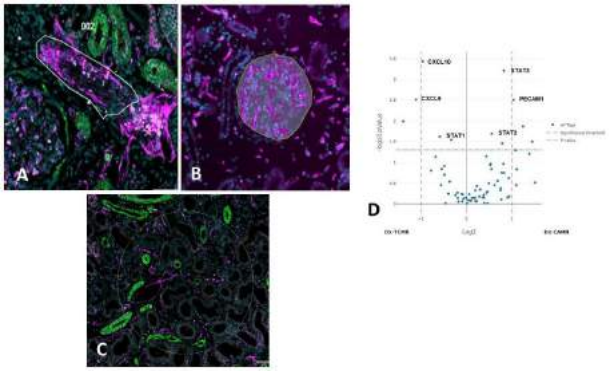
Digital Spatial Mrna Profiling Reveals Distinct Endothelial Transcripts in Dsa+ and Dsa- Endarteritis in Kidney Allografts

K. Tomaszewski[1], M. Araujo Medina[1], A. Bruce[1], P. Divakar[2], R. Smith[1], T. Kawai[3], R. Colvin[1], I. Rosales[1], *[1]Department of Pathology, Massachusetts General Hospital, Boston, MA, [2]NanoString Technologies, Inc., Seattle, WA, [3]Department of Surgery, Massachusetts General Hospital, Boston, MA*

Purpose: Renal allograft biopsy transcript analysis is typically performed by microarray, which lacks spatial resolution. We initiated a systematic program using the NanoString GeoMx® Digital Spatial Profiler (DSP) to map mRNA expression in cells or regions of interest (ROIs) in formalin-fixed paraffin-embedded tissue (FFPE). Here we explore differences in endothelial transcripts in samples with endarteritis in DSA+ chronic antibody mediated rejection/CAMR and DSA- T cell mediated rejection/TCMR in nonhuman primate (NHP) kidney allografts.

Methods: RNAse-free 5um FFPE sections of 2 DSA+ CAMR and 2 DSA- TCMR allograft nephrectomies with endarteritis from Cynomolgus NHPs (Smith 2018) were mounted on slides, hybridized with an 84-gene Immuno-Oncology probe set coupled to photocleavable oligonucleotide tags, and stained with fluorophore-labeled antibodies (DNA, pan-CK, CD45 and CD31). The slides were scanned to the GeoMx® DSP and discrete glomerular, arterial, and tubulointerstitial ROIs (n=48) were defined (Fig 1A-C) and segmented by CD31 expression. ROI tags were quantified on the nCounter® MAX analysis system and analyzed using GeoMx® DSP analysis software.

Results: Differential expression analysis of TCMR arterial endothelial transcripts shows CXCL9 (p=0.003), CXCL10 (p=0.0004), and STAT1 (p=0.02) enrichment, while CAMR arterial endothelial transcripts show higher STAT2 (p=0.02), STAT3 (p=0.0006), and PECAM1 (p=0.003) expression, suggesting DSA-related differences in endothelial response (Fig 1D). Combined glomerular and peritubular capillary (PTC) endothelial transcripts in CAMR show higher ICAM1 (p=0.0006), IFNG (p=0.02), IL6 (p=0.03), and MKI67 (p=0.009). In CAMR, PTC endothelium shows higher HLADQ (p=0.001), HLADRB (p=0.001), CD74 (p=0.004) and BCL2 (p=0.02) than in glomeruli. The CD3/PECAM1 ratio (0.09) demonstrates CD31+ cell-derived transcript selectivity.



Conclusions: Our data reveal endothelial transcript differences in endarteritis related to DSA and diversity of endothelial responses in kidney microvasculature. The GeoMx® DSP allows cell-specific transcript analysis in FFPE and is expected to reveal more insights in the pathogenesis of rejection.

CITATION INFORMATION: Tomaszewski K., Araujo Medina M., Bruce A., Divakar P., Smith R., Kawai T., Colvin R., Rosales I. Digital Spatial Mrna Profiling Reveals Distinct Endothelial Transcripts in Dsa+ and Dsa- Endarteritis in Kidney Allografts *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Tomaszewski: Grant/Research Support; If "Other" Please Explain; NIH Grant Award Number 2T32AI007529-21A1. **M. Araujo Medina:** None. **A. Bruce:** None. **P. Divakar:** Other; Name of Commercial Interest; NanoString Technologies. Other; Nature of Relationship; Employee, shareholder. **R. Smith:** None. **T. Kawai:** None. **R. Colvin:** Other; Name of Commercial Interest; eGenesis, Takeda, CSL Behring. Other; Nature of Relationship; Consultant. **I. Rosales:** Other; Name of Commercial Interest; eGenesis. Other; Nature of Relationship; Consultant (no fees).

Abstract# 451

Endothelial-to-Myofibroblast Transition (en-mt) and Low Expression of Capillary Vegf Enhance the Development of Interstitial Fibrosis and Glomerulosclerosis Induced by Microvascular Destruction in Antibody-Mediated Rejection (abmr) Patients

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Purpose: Interstitial fibrosis (IF) and glomerulosclerosis (GS) are the most important cause of graft loss. Although the rate of microvascular destruction (MVD) is similar in recipients with ABMR, some develop higher IF and GS during follow-up. The exact mechanism of this process is unknown. We aimed to understand why some patients compared to others show higher rates of IF and GS, although they have similar MVD due to ABMR.

Methods: A total of 102 patients with ABMR studied. Biopsies highlighted with CD31 and HLA-DR to determine the mean number of glomerular capillaries (GCs) and peritubular capillaries (PTCs). VEGF expression of GCs and PTCs examined. Capillary expression of α-SMA and F-actin was studied to show the development of En-MT. Follow-up biopsies analyzed for the development of IF and GS.

Results: The mean capillary numbers were 43,4±11,8 and 30,3±8,7 for GCs and PTCs, respectively. The number of PTCs correlated significantly with PTC inflammation (r= -0,56, P<.001), PTC-VEGF expression (r=0,41, P<0,001), En-MT (r= -0,45, P<0.001), proteinuria (r= -0,34, P=.001), the development of IF (r= -0,56, P<0.001), and graft loss (r= -0,57, P<.001). The glomerular capillary loss was also significantly associated with GC inflammation (r= -0,64, P<.001), GC-VEGF expression (r=0,89, P<.001), En-MT (r= -0,61, P<.001), proteinuria (r= -0,89, P<.001), the development of GS (r= -0,70, P<.001), and graft loss (r= -0,44, P<.001). The incidence of proteinuria, the development of IF, the development of GS, and graft loss increased with decreasing PTC and GC VEGF expression and increasing En-MT ratio (p<.001). Although the mean number of PTCs and GCs in some cases was higher than the cutoff point, it was observed that patients with high En-MT and low capillary VEGF expression showed a higher incidence of IF and GS development and, as a result, increased graft loss.

Conclusions: Our findings indicate that monitoring PTC and GC numbers with the presence or absence of En-MT and capillary VEGF expression may become a valuable predictive marker for graft loss. The preservation of capillary endothelium by higher capillary VEGF and lower En-MT can play an essential role in preserving graft survival. Thus the usage of angiogenic factors may become a new approach in the treatment of renal transplantation.

CITATION INFORMATION: Ozdemir B., Akcay E., Ok Atilgan A., Haberal M. Endothelial-to-Myofibroblast Transition (en-mt) and Low Expression of Capillary Vegf Enhance the Development of Interstitial Fibrosis and Glomerulosclerosis Induced by Microvascular Destruction in Antibody-Mediated Rejection (abmr) Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Ozdemir: None. **E. Akcay:** None. **A. Ok Atilgan:** None. **M. Haberal:** None.

Abstract# 452

Adenovirus-Specific T Cells for Steering of Immunosuppression After Pediatric Kidney Transplantation in the Randomized Controlled Ivist Trial

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Purpose: Pharmacokinetic monitoring alone is insufficient to estimate the intensity of immunosuppression after pediatric kidney transplantation (Tx). Levels of virus-specific T cells (Tvis) have been shown to identify over-immunosuppression. Our IVIST trial has demonstrated that the additional steering of immunosuppressive therapy by Tvis levels is safe and reduces exposure to immunosuppressive drugs with significantly lower trough levels without increasing the risk of acute rejections.

Methods: In our multicenter, randomized controlled IVIST trial, 64 pediatric kidney recipients (10.8±4.2 years) were randomized 1:1 to a control group with trough level monitoring of immunosuppressants or to an intervention group with additional steering by CD4 Tvis levels against adenovirus (ADV), cytomegalovirus (CMV) and

herpes simplex virus (HSV). CD4 Tvis were quantified by cytokine flow cytometry in 20 visits during the two-year study period. We have analyzed the CD4 Tvis levels and the number of Tvis-based dose adjustments of the immunosuppressive drugs.
Results: At time of Tx ADV-Tvis were detectable in 30/31 patients of the intervention group, CMV-Tvis and HSV-Tvis only in 12/31. No significant ADV DNAemia was found, whereas five primary CMV infections with excessive boost of CMV-Tvis were observed. The mean level of ADV-CD4 Tvis was 1.63 (SD 1.25), 2.03 (SD 1.8), 2.18 (SD 2.51) and 1.97 cells/µl (SD 1.34) 1, 6, 12 and 24 months after Tx. The median number of dose reductions of immunosuppressants based on Tvis <2 cells/µl was 4 (range 0-10) per patient. In the intervention group a total of 125 Tvis-based dose reductions was performed in 28/31 children. 42.4% of the dose reductions were done in the first 6 months, 35.2% between month 7 and 12 and 22.4% in the second year after transplantation.
Conclusions: Under the intensified immunosuppression during the initial post-Tx period low CD4 Tvis levels were observed with subsequent increase after dose reductions of the immunosuppressive therapy. ADV-Tvis are most suitable for immune monitoring considering their high prevalence (even in a pediatric cohort) and stability because of the absence of post-Tx ADV infections. Routine monitoring of CD4 Tvis is predominantly recommendable in the first post-Tx year to prematurely identify over-immunosuppression.
CITATION INFORMATION: Ahlenstiel-Grunow T., Liu X., Schild R., Oh J., Taylan C., Weber L., Staude H., Verboom M., Schröder C., Sabau R., Großhennig A., Pape L. Adenovirus-Specific T Cells for Steering of Immunosuppression After Pediatric Kidney Transplantation in the Randomized Controlled Ivist Trial *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Ahlenstiel-Grunow: None. **X. Liu:** None. **R. Schild:** None. **J. Oh:** None. **C. Taylan:** None. **L.T. Weber:** None. **H. Staude:** None. **M. Verboom:** None. **C. Schröder:** None. **R. Sabau:** None. **A. Großhennig:** None. **L. Pape:** Grant/ Research Support; Name of Commercial Interest; Novartis.

Abstract# 453

A Comparison of Plasmapheresis Methods in the Treatment of Late Antibody Mediated Rejection

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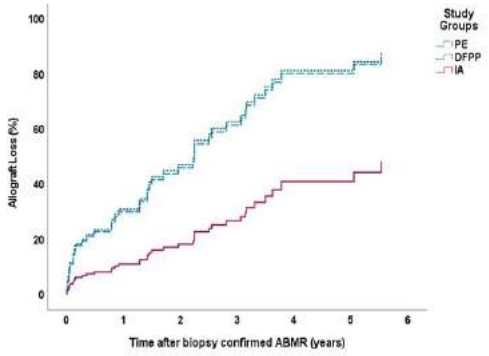
Purpose: Effective management to prevent allograft loss after late antibody mediated rejection (ABMR) in kidney transplant (KTx) recipients remains a vexing clinical challenge. While plasma exchange (PE) with IVIG has been proposed as a useful treatment, alternatives such as double filtration plasmapheresis (DFPP) and immunoadsorption (IA) represent promising strategies for antibody depletion. We compared graft outcomes associated with use of PE, DFPP and IA in the treatment of late ABMR.
Methods: We performed a retrospective cohort study of 69 KTx recipients [living donor (n=54, 79%), deceased donor (n=14, 21%)] who were diagnosed with biopsy-confirmed "late" (>1 year post-KTx) ABMR at one center and underwent therapeutic plasmapheresis. ABMR was identified at a median of 7.9 (IQR, 3-13) years after KTx. Therapeutic plasmapheresis modalities included: PE (n=31), DFPP (n=22) or IA with protein A (n=16). The primary outcome was allograft loss, defined as return to dialysis or re-transplantation. Multivariate Cox proportional survival analysis was conducted with covariate adjustments to identify predictors of allograft loss.
Results: The study groups were similar regarding age, gender, donor type, donor age and gender, eGFR at ABMR diagnosis and time from KTx to ABMR. Donor specific antibody (DSA) was positive in 84% of PE, 91% of DPFF and 94% of IA groups (p=0.55), and C4d staining in peritubular capillaries was negative in 36%, 23% and 56% (p=0.001) of study groups, respectively. Patients received a total dose of 2 g/kg IVIG with (75%) or without (25%) rituximab (375 mg/m^2). There were no differences regarding IVIG alone or IVIG with rituximab treatment rates in all groups (p=0.16). Adjusted Cox proportional survival analysis with potential confounding factors including age, gender, donor type and C4d staining showed that IA was significantly associated with 67% reduced risk of allograft loss (adjusted hazard ratio $_{0.12}0.33_{0.87}$)(p=0.02). (Fig 1)
Conclusions: While limited by small sample size, this pilot study suggests the efficacy of IA in the treatment of late ABMR. Future prospective and controlled studies should examine the robustness of this observation.

Figure 1. Adjusted Cox proportional survival analysis plots of study groups with potential confounding factors including age, gender, donor type and C4d staining (p=0.02).



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DISCLOSURES: Y. Caliskan: None. **H. Yazici:** None. **A.B. Dirim:** None. **E. Aksoy:** None. **S. Safak:** None. **N. Garayeva:** None. **S. Mirioglu:** None. **O. Yegit:** None. **O.A. Oto:** None. **Y. Ozluk:** None. **S. Besisik:** None. **A. Turkmen:** None. **K. Lentine:** None.

Abstract# 454

Investigating the HLA Alloimmune Background of the Histological Changes Suggestive of Antibody-mediated Injury in the Absence of Donor-specific Anti-HLA Antibodies

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Purpose: The histology of antibody-mediated rejection is observed frequently after kidney transplantation, but a significant percentage of the patients do not have detectable donor-specific HLA antibodies ($DSA_{neg}ABMR_h$). Although part of these cases could be related to the presence of non-HLA antibodies, until now, none of the previously suggested non-HLA antibodies are routinely tested in clinical practice for the diagnosis of ABMR. While there is an active interest in non-HLA antibodies' role to $DSA_{neg}ABMR_h$, it remains crucial to exclude the possible contribution of the HLA incompatibility to this phenotype. We aimed to investigate the associations between the HLA molecular mismatches and the occurrence of the $DSA_{neg}ABMR_h$ phenotype.
Methods: All consecutive kidney recipients transplanted at a single center between 2004 and 2013 were eligible for this study. The transplant pairs were genotyped at high-resolution for 11 HLA loci. HLAMatchmaker, PIRCHE-II and HLA-EMMA tools were used to determine the number of HLA molecular mismatches (MM).
Results: Patients with pretransplant donor-specific HLA antibodies were excluded from this study. Of the remaining 798 kidney transplant recipients with available biopsy follow-up, 123 (15.4%) developed $ABMR_h$ in the absence of *de novo* HLA-DSA. In adjusted multivariable Cox analysis, HLA antigen (HR=1.30 per 1; 95%CI 1.15-1.46; p<.0001), HLA allele (HR=1.10 per 1; 95%CI 1.03-1.16; p=0.002) and HLA amino acid mismatches (HR=1.09 per 10; 95%CI 1.03-1.15; p=0.002) were identified as risk factors for developing $DSA_{neg}ABMR_h$. Similarly, all the different HLA molecular mismatches, HLA-EMMA (HR=1.11 per 10; 95%CI 1.04-1.20; p=0.003), eplet MM (HR=1.24 per 10; 95%CI 1.08-1.41; p=0.002) and PIRCHE-II (HR=1.15 per 100; 95%CI 1.05-1.25; p=0.002) associated with $DSA_{neg}ABMR_h$. The subsequent multivariate Cox model, censored for cases with $DSA_{neg}ABMR_h$ and C4d deposition (ABMR according to Banff 2019), confirmed that HLA incompatibility is a risk factor for developing $DSA_{neg}ABMR_h$. Finally, in a sensitivity analysis restricted to anti-HLA antibody-negative patients (n=660), again, all different levels of HLA mismatches were independently associated with the $DSA_{neg}ABMR_h$ rejection phenotype.
Conclusions: HLA mismatches associate with $DSA_{neg}ABMR_h$, also in patients without any sign of circulating HLA antibodies. This indicates that the donor-recipient HLA-incompatibility at least partially explains the development of the histological features of ABMR, in an HLA antibody-independent process.

Table 1. ***Multivariable Cox analysis in patients without*** **HLA-DSA (N=798).**

HLA mismatch approach	*Events*	*Cox models*		
		HR	*95% CI*	*p-value*
$DSA_{neg}ABMR_h$ (censored for dnDSA)				
ABDRDQ antigen MM (per 1)	123	1.30	1.15 – 1.46	**<.0001**
HLA allele MM (per 1)	123	1.10	1.03 – 1.16	**0.002**
HLA amino acids MM (per 10)	123	1.09	1.03 – 1.15	**0.002**
HLA-EMMA (per 10)	123	1.11	1.04 – 1.20	**0.003**
HLA eplet MM v3.1 (per 10)	123	1.24	1.08 – 1.41	**0.002**
PIRCHE-II score (per 100)	123	1.15	1.05 – 1.25	**0.002**
$DSA_{neg}ABMR_h$ (censored for dnDSA and $DSA_{neg}ABMR_hC4d+$)				
ABDRDQ antigen MM (per 1)	101	1.27	1.12 – 1.44	**0.0002**
HLA allele MM (per 1)	101	1.09	1.03 – 1.17	**0.007**
HLA amino acids MM (per 10)	101	1.08	1.02 – 1.15	**0.01**
HLA-EMMA (per 10)	101	1.10	1.01 – 1.19	**0.02**
HLA eplet MM v3.1 (per 10)	101	1.20	1.04 – 1.40	**0.01**
PIRCHE-II score (per 100)	101	1.14	1.04 – 1.26	**0.007**

Each multivariable analysis per row was corrected for donor and recipient age, donor type, cold ischemia time and repeat transplantation.

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DISCLOSURES: A. Senev: None. **M. Naesens:** None.

All Organs

Organ Inclusive

Abstract# 455

Impact of Machine Perfusion of the Heart on Abdominal Organ Procurement from Donation After Cardiac Death Donors

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Purpose: Superior preservation with normothermic machine perfusion devices has been demonstrated in thoracic and abdominal allografts, especially DCD donation, where clinical utilization of DCD hearts has become feasible with the use of machine perfusion. The addition of heart donation has increased the complexity of DCD donor procurement. In this study, the impact of heart procurement on organ retrieval activities and abdominal organ yield was examined.

Methods: All potential DCD donors between 2015 and 2020 were identified using the UNOS STARfile. Two donor cohorts were generated based on the presence of Machine Perfusion for the Heart (MPH) group (n=99) or its absence, (Control) group (n=3502). Time from withdrawal to circulatory arrest and circulatory arrest to cross-clamp was calculated and compared between groups. Organ utilization was determined and reasons for discard were examined. Further analysis after propensity score matching for donor age, BMI and cause of death was also done.

Results: MPH procurements had shorter total warm ischemia time (27.0 ± 10.0 vs 29.9 ± 14.0, p=0.04) as well as shorter time from cardiac arrest to aortic cross-clamp (10.6 ± 3.6 vs 12.9 ± 6.5, p=0.001). Liver (53% vs 29%), kidney (87% vs 81%), and pancreas allograft (7% vs 1.1%) utilization were greater in the MPH group. Most discarded livers (79%) in the MPH group were due to anatomic abnormalities, poor flush or biopsy findings. 3 livers discarded for excessive warm ischemia time all had shorter than average arrest to cross-clamp times. After propensity score matching similar shorter procurement times (cardiac arrest to aortic cross-clamp 10.6 ± 3.6 min. vs 13.1 ± 6.3 min, p=0.0007) and enhanced organ utilization (51% vs 34%) were found in the MPH group compared to control.

Conclusions: MPH during DCD procurements does not lead to delays in time from cardiac arrest to aortic cross-clamp. Complex multi-organ procurements, incorporating MPH devices, can be done successfully in DCD donors with increased donor organs.

CITATION INFORMATION: Feizpour C., Hwang C., Shubin A., Shah J., DeGregoria L., Hanish S., Vagefi P., MacConmara M. Impact of Machine Perfusion of the Heart on Abdominal Organ Procurement from Donation After Cardiac Death Donors *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Feizpour: None. **C. Hwang:** None. **A. Shubin:** None. **J. Shah:** None. **L. DeGregoria:** None. **S. Hanish:** None. **P. Vagefi:** None. **M. MacConmara:** None.

Abstract# 456

Risk Classification Models for Kidney Graft Failure

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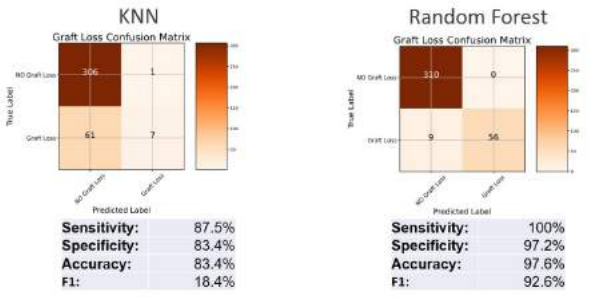
Purpose: Longterm graft survival after kidney transplantation is stagnant over the last decades. An individual risk assessment for graft failure is needed. In our project "TBox", we are developing an end to end data analysis pipeline for that individual risk prediction. Now the focus is on having a set of classification models to detect patients at high risk of graft loss to adapt the follow-up care in our outpatient department.

Methods: All patients transplanted at Charité Mitte between 2000 and 2019 were included. Using raw data (demographics of donor, recipient and transplant) from Charité´s transplant database "TBase" firstly exploratory data analysis was applied continuously to improve data quality and increase insights into the data. Using that curated data two classification models, KNN classification algorithm vs. Random Forest ensemble method for classification were created. The data was split into 75% training 25% test set with averaging the accuracy score and standard deviation for 10 runs in each experiment.

Results: After applying data preprocessing to the selected cohort (N=1570, 62% male recipients, 32% living donation, 51±14years, 18% graft loss), 1483 patients were eligible for data analysis using 84 features (figure 1). The matrices of the models are shown in figure 2. The KNN model achieved an AUC 82.8% (SD 1.7%), with a sensitivity, specificity, accuracy and F1-score of 87.5%, 83.4%, 83.4%, and 18.4%, respectively. The Random Forest model showed an AUC of 97.3% (SD 0.7%) with a sensitivity, specificity, accuracy, and F1-Score are 100%, 96.8%, 97.3%, and 92.6%, respectively.

Conclusions: These first encouraging and promising model results will help to determine graft failure risk and individual decision making for follow-up care after renal transplantation. Next, the data analysis pipeline will be extended for longitudinal and home-monitoring data to create prediction models based on time-aware neural networks to assess the individual risk dynamically, even outside the hospital. Factors to lower the risk for graft loss will be investigated in studies to improve long-term outcomes.

Parameter	Cohort (n=1570)
Recipient	
Female (%)	38.0
Age at transplantation (years)	51.0±14.5
Previous transplant (%)	12.7
Living donation (%)	32.4
Time on dialysis (years)	4.5±3.6
hemodialysis (%)	84.2
Peritonealdialysis (%)	8.8
Preemptive (%)	6.9
Donor	
Age (years)	52.9±14.4
Female (%)	50.5
Transplant	
Delayed graft function (%)	31.4
Cold ischemia time (hours)	8.8±6.1
Outcomes	
Death including graft loss (%)	33.7
Graft loss (%)	17.8
death (%)	24.8



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DISCLOSURES: M.G. Naik: Grant/Research Support; Name of Commercial Interest; Berlin Institute of health. Grant/Research Support; Nature of Relationship; Research Grant Support. **K. Budde:** None. **D. Telmo Neves:** None.

Abstract# 457

Associations of Mammalian Target of Rapamycin Inhibitors with Post-Transplant Malignancies and All-Cause Mortality: Cause-Specific Competing Risks and Composite Outcomes Analyses

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Purpose: We investigated the outcomes of malignancies and mortality associated with mammalian target of rapamycin inhibitor (MTORI) regimens in adult kidney transplant (KT) recipients (KTRs).

Methods: Using year 2000-2018 SRTR data, we compared the risks of non-melanoma skin cancer (**NMSC**), solid-organ malignancy (**SOM**), and lymphoma associated with 1st transplant-yr. exposure to MTORI regimens [sirolimus or everolimus combined with a calcineurin inhibitor (CNI), mycophenolate, or azathioprine) with or without steroids versus non-MTORI regimens (any CNI, mycophenolate, or azathioprine 2-drug combination) with or without steroids in adult-KTRs.

Results: Among 166,256 adult KTRs studied; 13,056 (7.9%) were on MTORI and 153,200 (92.2%) were on non-MTORI. Except for induction, standardized differences of baseline risk factors were not significant between groups. Over a maximum 5 years of follow-up, the adjusted risks of **NMSC**, **SOM, and lymphoma** were *30% (95% CI=24%-36%); 14% (95% CI=7%-20%)*; and 20% (95% CI=3%-34%) *lower* with MTORI than non-MTORI regimens, respectively. However, the adjusted risk of **all-cause death** (as a cause-specific competing event) was *higher* with MTORI than non-MTORI regimens (**Fig. 1**). The adjusted risks of composite **all-cause death (ACD) or NMSC, ACD or SOM, and ACD or lymphoma** were *8% (95% CI=4%-11%); 12% (95% CI=8%-12%)*; and *17%(13%-21%) higher* with MTORI than non-MTORI regimens, respectively (**Fig. 2**).

Conclusions: MTORI regimens are associated with lower risks of malignancies but higher risk of all-cause death than non-MTORI regimens in adult KTRs. The underlying reasons for these findings need further investigation.

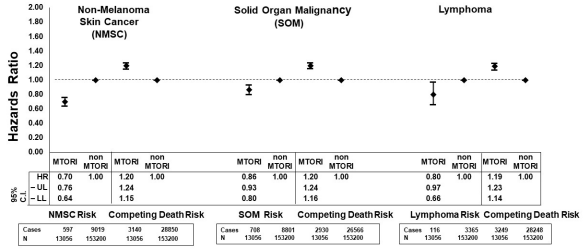

Fig 1. Hazards Ratios of Malignancies and Competing Risk of Death

MTORI: mammalian target of rapamycin inhibitor regimen ; **NMSC**, non-melanoma skin cancer; **SOM**, solid organ malignancy.
Model adjusted for the following covariates: age (18-49, 50-64, or >/-65 years old); sex (male or female); body mass index (<30 kg/m² or >=30 kg/m²); race/ethnicity(Caucasian, African American, Hispanic, or other), primary diagnosis at waitlist enrollment (diabetes mellitus, glomerulonephritis, hypertension, polycystic kidney disease, other or, unknown), duration of pre-transplant dialysis (none, 1-730 days, or >730 days), organ donor type (living, standard deceased donor or, expanded criteria deceased donor), transplant era (2000-2008 or 2009-2018), use of steroids for maintenance immunosuppression (yes or no); re-transplant (yes or no); history of any malignancy pre-transplant (yes or no); and acute rejection from transplant to discharge.

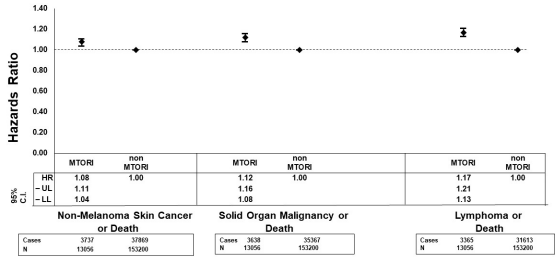

Fig 2. Hazards Ratios, Composite of Malignancy or Death

MTORI: mammalian target of rapamycin inhibitor regimen ; **NMSC**, non-melanoma skin cancer; **SOM**, solid organ malignancy
Model adjusted for the following covariates: age (18-49, 50-64, or >/-65 years old); sex (male or female); body mass index (<30 kg/m² or >=30 kg/m²); race/ethnicity(Caucasian, African American, Hispanic, or other), primary diagnosis at waitlist enrollment (diabetes mellitus, glomerulonephritis, hypertension, polycystic kidney disease, other or, unknown), duration of pre-transplant dialysis (none, 1-730 days, or >730 days), organ donor type (living, standard deceased donor or, expanded criteria deceased donor), transplant era (2000-2008 or 2009-2018), use of steroids for maintenance immunosuppression (yes or no); re-transplant (yes or no); history of any malignancy pre-transplant (yes or no); and acute rejection from transplant to discharge.

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DISCLOSURES: A.H. Santos: None. **E. Bueno:** None. **M.A. Leghrouz:** None. **W. Xuerong:** None.

Abstract# 458

Feasibility of Normothermic Ex Vivo Kidney Perfusion for Human Kidney Transplantation: First North American Results

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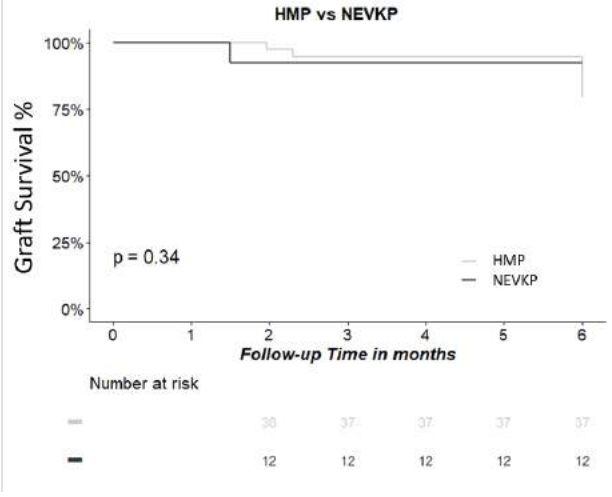
Purpose: Normothermic ex vivo kidney perfusion is a novel preservation technique with promising results in porcine models and initial clinical results in one European center. We report the first North American clinical safety and feasibility study with normothermic ex vivo perfusion (NEVKP) in human kidney transplantation.

Methods: Thirteen human kidneys receiving cold anoxic perfusion, plus 1 to 3 hours of NEVKP prior to transplantation, were matched to 39 patients receiving continuous cold anoxic perfusion as preservation method. Perfusion characteristics during NEVKP, post-transplant graft function and 6-month graft survival were assessed.

Results: NEVKP was performed for 149 minutes (44 to 275 min). During perfusion, renal artery flow improved from 326 to 464 ml/min (mean, p = 0.03) corresponding to a decrease of renal artery resistance from 0.27 to 0.18 (mean, p = 0.035). Similarly, the mean pH increased from 7.05 to 7.40 and the average urine output during NEVKP was 16 ml/hr (0 to 105 ml/hr). Glucose and lactate levels were stable during perfusion. After transplantation, kidneys with NEVKP vs. continuous cold anoxic perfusion had similar delayed graft function (31% vs 46%, p = 0.51), and comparable 6-month mean serum creatinine (107 vs 117 micromol/l, p = 0.84) and estimated glomerular filtration rate (55.3 vs 49.4 ml/min/1.73m², p = 0.96). Six-month graft survival was similar between the NEVKP and the cold stored group (92% vs 95%, p = 0.57).

Conclusions: A short period of normothermic ex vivo kidney perfusion after cold storage is safe and feasible in clinical kidney transplantation. NEVKP was not superior to cold storage in this small pilot trial. Prolonged warm perfusion, with a reduction of cold storage, may be required to improve kidney transplant outcomes with NEVKP.



CITATION INFORMATION: Mazilescu L., Urbanellis P., Kim J., Konvalinka A., Reichman T., Robinson L., Ghanekar A., Selzner M. Feasibility of Normothermic Ex Vivo Kidney Perfusion for Human Kidney Transplantation: First North American Results *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.I. Mazilescu: None. **P. Urbanellis:** None. **J.S. Kim:** None. **A. Konvalinka:** None. **T.W. Reichman:** None. **L.A. Robinson:** None. **A. Ghanekar:** None. **M. Selzner:** None.

Abstract# 459

Change in Deceased Donor Demographics with Drug Intoxication Deaths: 2010 - 2019

D. Musgrove, D. Zaun, A. Israni, J. Snyder, *SRTR, Minneapolis, MN*

Purpose: To understand the demographic change in deceased donor causes of death associated with drug intoxication, we explored trends over the 10-year period ending in 2019.

Methods: Over the period of interest, we analyzed all deceased donors with a mechanism of death reported as "drug intoxication" on the deceased donor registration form. Donors included were those in whom at least one organ was transplanted and those with at least one organ recovered for transplant. Demographics of interest included age and race as well as geo-referenced information obtained from each donor's home ZIP code (Figure 1). Geo-referenced information included ZIP code-level median income, percent of households with income below the poverty threshold, unemployment rate, and population density.

Results: Overall, the number of donors with drug intoxication deaths grew 374% from 2010 to 2019. Donors aged 17 or younger with drug intoxication saw an 89%

increase, while all adult age groups saw a rise in donations, with those aged 50 or older seeing the sharpest increases, at over 500%. All races had an increase in donors with drug intoxication of over 200%, with Black donors having the largest increase, at over 1100%. Turning to geo-referenced information, donors increased across all income levels by at least 250%, with donors from ZIP codes with a median annual income higher than $75,000 seeing the largest increase, at over 500%. Donors from ZIP codes with the lowest unemployment rates and highest poverty rates saw the largest increase. Lastly, donors from metro areas saw the greatest growth, at over 400%, with donors from micropolitan and rural areas seeing lower but still moderate growth.

Conclusions: In all cases, for both demographic and geo-referenced information, the differences in rates from 2010 to 2019 were statistically significant ($P < 0.05$). Thus, donors who died from drug intoxication over the last decade increased, many of them from vulnerable populations.

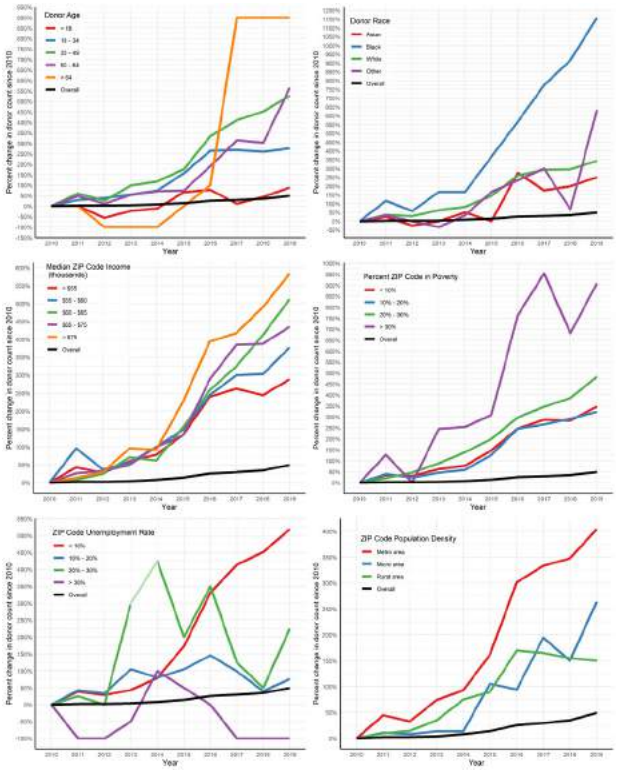


Figure 1. Deceased donor drug intoxication death percent change from 2010 by age, race, and ZIP code median income, percent poverty, unemployment rate, and population density. The black curve denotes the percent change in the overall donor count since 2010.

CITATION INFORMATION: Musgrove D., Zaun D., Israni A., Snyder J. Change in Deceased Donor Demographics with Drug Intoxication Deaths: 2010 - 2019 *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Musgrove: None. **D. Zaun:** None. **A. Israni:** None. **J. Snyder:** None.

ID

Infectious Disease 1

Abstract# 447

T-Cell Exhaustion in EBV DNAemic Solid Organ Transplant Recipients

S. Kothari, T. Ku, D. Kumar, A. Humar, V. H. Ferreira, *Multi-Organ Transplant Program, University Health Network, Toronto, ON, Canada*

Purpose: In transplant recipients, disease severity after infection with Epstein-Barr virus (EBV) may range from asymptomatic DNAemia to PTLD. Host factors likely play a key role in this including the functionality and number of EBV-specific T-cells. Exhaustion markers expressed on T-cells such as PD-1, TIM-3, CTLA-4 and TOX may also be important indicators of overall functionality and may influence clinical parameters. We assessed expression of these T-cell exhaustion markers in patients with EBV DNAemia.

Methods: We prospectively enrolled consecutive adult organ transplant recipients with EBV DNAemia (>10^3 IU/mL). We performed flow cytometry on isolated PBMCs to simultaneously characterize cell-surface expression of T-cell-associated exhaustion markers (PD-1, CTLA-4, TIM-3 and TOX) on CD4 and CD8 T-cells. Functionality was evaluated by measuring EBV-specific cytokine (IFN-γ, IL-2, TNF-α)-producing T-cells following stimulation with an EBV-infected cell lysate at 10 μg/mL. Viral loads were measured clinically as close as possible to PBMC collection.

Results: We enrolled 25 patients with median age 53 years (range 21-74). Types of transplants included liver (36%), heart (28%), kidney (24%), lung (8%), and small bowel (4%). The median time post-transplant to PBMC sampling was 2.0 years (range 0.2-21). Frequencies of T-cells expressing markers of exhaustion varied in the cohort, with PD-1 expression being highest on CD8 (median 6.2%, range 2.0-54%) and CD4 T-cells (median 10%, range 1.9-18%), followed by TOX, TIM-3 and CTLA-4. Patients were categorized according to high or low proportions of PD-1, TIM-3, CTLA-4 or TOX positive T-cells and compared according to the viral load contemporaneous with PBMC collection. Patients with higher proportions of TOX^+ T-cells had comparatively lower viral loads (p=0.02 for CD4, p=0.03 for CD8). No other associations were observed with respect to exhaustion markers and viral load. In relation to EBV-specific T-cells, those with higher proportions of $PD\text{-}1^+$ or TOX^+ CD4 T-cells had higher frequencies of EBV-specific TNF-α producing CD4 T-cells (p=0.004 for both). Furthermore, patients with higher proportions of $TIM\text{-}3^+$ CD8 T-cells had lower frequencies of polyfunctional CD8 T-cells (p=0.02), defined as those producing TNF-α, IL-2 and IFN-γ. Finally, those with higher proportions of $CTLA\text{-}4^+$ T-cells had lower frequencies of EBV-specific polyfunctional CD4 T-cells (p=0.008) and $TNF\text{-}\alpha^+$ CD8 T-cells (p=0.01).

Conclusions: We observed that many patients with EBV DNAemia exhibited markers of T-cell exhaustion. However, exhaustion markers were not necessarily correlated with negative virologic consequences and in some instances were actually associated with lower viral loads and higher EBV-specific T-cell responses. Future studies will assess the role of T-cell exhaustion as a risk for PTLD development.

CITATION INFORMATION: Kothari S., Ku T., Kumar D., Humar A., Ferreira V. T-Cell Exhaustion in EBV DNAemic Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Kothari: None. **T. Ku:** None. **D. Kumar:** Grant/Research Support; Name of Commercial Interest; Atara Bio. Grant/Research Support; Nature of Relationship; Clinical Trials Grant. **A. Humar:** None. **V.H. Ferreira:** None.

Abstract# 448

Development of De Novo Antibody in Renal Transplant Recipients with BK Viremia Managed with Immunosuppression Reduction

R. Hod Dvorai[1], R. Lee[2], P. Muluhngwi[2], M. Raijmakers[3], A. Shetty[2], A. Tambur[2], M. Ison[2], *[1]SUNY Upstate Medical University, Syracuse, NY, [2]Northwestern University, Chicago, IL, [3]University of Santiago, Santiago, Chile*

Purpose: To evaluate development of *de novo* donor specific antibodies (dnDSA) in Renal Transplant Recipients (RTR) with immunosuppression (IS) modulation due to BK viremia (BKV) and the associated risk of antibody mediated rejection (AMR).

Methods: We retrospectively collected data from the NM Enterprise Data Warehouse, primary review of biopsies and HLA antibody testing on all RTR 2007-2017 at our center (n=1911). BK case group included pts who developed BKV >10,000 c/ml or biopsy proven BKV and nephropathy (BKVN), with DSA and biopsy reports through 1 yr post-BK diagnosis. Per protocol, MMF was reduced initially at the direction of the transplant nephrologist. Two controls without BKVN or BKV were matched for each case by gender, donor type and transplant within 1 yr.

Results: 248/1911 RTR (12.9%) had BKV or BKVN. Despite the lower HLA antigen mismatch load (mean=3.5 vs 4.3, p<0.001), the rate of dnDSA was significantly higher in the BK group compared with controls (22.4% vs 12.9%, p=0.004) and the median time from transplant to dnDSA was significantly shorter (298d vs 415d, p<0.001). Interestingly, the incidence of dnDSA was much higher following the diagnosis of BK (16.7% vs 5.7% dnDSA prior to BK diagnosis). There were no significant differences in dnDSA characteristics between BK cases and controls with regards to DSA class, Peak Abs titer, DSA locus etc. AMR was diagnosed in 17/203 (8.4%) biopsied BK and 37/444 (8.3%) biopsied control patients, and the median time from transplant to AMR was lower in the BK group compared with the controls, although the difference did not reach statistical significance (354d vs 463d, p=0.08).

Conclusions: Overall dnDSA rates were higher in BK cases than in control group, with the majority of dnDSA developing following IS reduction for BKVN, and earlier post-transplant. AMR rates were similar between cases and controls, although AMR was more likely to occur earlier post-transplant in the BK cases suggesting a link between IS reduction and the generation of dnDSA.

	RTR Controls (n=443)	BK cases (n=210)	p
dnDSA-, n(%)	357 (80.6)	153 (72.8)	
dnDSA+, n(%)	57 (12.9)	47 (22.4)	0.004
present pre-BK dx	n/a	12 (5.7)	
present only post-BK dx	n/a	35 (16.7)	
Unable to determine dnDSA, n(%)	29 (6.5)	10 (4.8)	
Time from tx to dnDSA (days), Median (range)	415 (93-4068)	298 (93-977)	0.0001
Time from BK dx to dnDSA (days), Median (range)	n/a	171 (19-288)	
	RTR Controls (n=444)	**BK cases (n=203)**	**p**
Total ACR (±AMR), n(%)	58 (13.1)	38 (18.7)	0.073
Total AMR (±ACR), n(%)	37 (8.3)	17 (8.4)	>0.99
Time from tx to AMR (days), Median (range)	463 (6-4068)	354 (78-2408)	0.084
Time from BK dx to AMR (days), Median (range)	n/a	143 (13-329)	

CITATION INFORMATION: Hod Dvorai R., Lee R., Muluhngwi P., Raijmakers M., Shetty A., Tambur A., Ison M. Development of De Novo Antibody in Renal Transplant Recipients with BK Viremia Managed with Immunosuppression Reduction *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Hod Dvorai: None. **R. Lee:** None. **P. Muluhngwi:** None. **M. Raijmakers:** None. **A. Shetty:** None. **A. Tambur:** None. **M. Ison:** Consulting Fee; Name of Commercial Interest; Viracor Eurofins. Consulting Fee; Nature of Relationship; Medical Advisory Board.

Abstract# 449

De Novo Hepatitis B Infection Following Liver Transplant with Hepatitis B Core Antibody Positive Graft

L. J. Myhre[1], K. D. Watt[2], B. A. Aqel[3], *[1]Pharmacy, Mayo Clinic, Rochester, MN, [2]Gastroenterology/Hepatology, Mayo Clinic, Rochester, MN, [3]Gastroenterology/Hepatology, Mayo Clinic, Phoenix, AZ*

Purpose: The risk of de novo HBV infection in liver transplant recipients of Hepatitis B core antibody (HBcAb) positive donor organs is tempered by availability of antiviral therapy that can be utilized for prophylaxis and HBV vaccinations used to promote Hepatitis B surface antibody (HBsAb) positivity and presumed protection against de novo infection. Unfortunately the duration of prophylaxis necessary and durability of HBsAb immunity to prevent de novo HBV infection remain unknown. The aim of this study is to determine the rate of HBV infection after alteration or discontinuation of prophylactic antiviral therapy.

Methods: This retrospective multi-site observational study spanned January 2014 through November 2020. Transplant recipients ≥ age 18 with a negative HBsAg at time of transplant who received an HBcAb positive graft between 1/1/2014 and 12/31/2019 were screened for inclusion. Patients lost to follow-up or deceased within one year of transplant were excluded. Per institutional protocol, patients with positive HBsAb could discontinue antiviral prophylaxis beyond 1 year post transplant.

Results: This study included 65 patients who received antiviral prophylaxis with lamivudine, entecavir, or tenofovir disoproxil fumarate for at least one year. Patients negative for HBsAb one year following liver transplantation or in whom HBsAb was unavailable (n=43, 66%) continued antiviral therapy. One patient developed de novo HBV despite antiviral prophylaxis after entecavir was switched to lamivudine therapy. Of the patients with positive HBsAb assays one year following liver transplantation (n=22, 34%), ten patients (45%) stopped antiviral prophylaxis. Four of these ten patients (40%) developed de novo HBV infection with HBV DNA positivity between 10-27 months post antiviral discontinuation. Table 1 describes characteristics of the five patients with de novo HBV infection from HBcAb positive donor organs.

Conclusions: De novo hepatitis B infection is an ongoing risk for patients receiving a liver transplant with an HBcAb positive graft, regardless of positive HBsAb assay. Lifelong prophylaxis with antiviral therapy should be strongly recommended.

Table 1: Characteristics of patients who developed de novo HBV infection

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
At time of transplant:					
Age (years)	55	66	69	45	65
HBsAb	Unknown	Negative	Negative	Negative	Negative
HBVcAb	Negative	Negative	Negative	Negative	Negative
Antiviral prophylaxis	TDF	ENT	ENT	ENT	ENT
One year post transplant:					
HBsAb 1 year post transplant	Negative	Negative	Positive	Positive	Negative
HBsAb titer (mIU/mL)	< 5.0	< 5.0	8.9	13.8	< 4.23
At time of antiviral prophylaxis discontinuation:					
HBsAb	Unknown	Positive	Indeterminant	Positive	*
HBsAb titer (mIU/mL)	Unknown	20	6.3	13.8	< 4.23
Immunosuppression	tacrolimus	tacrolimus	tacrolimus	tacrolimus mycophenolate	everolimus
Time from transplant to antiviral prophylaxis discontinuation (months)	15	23	24	11	16*
At time of detectable HBV DNA:					
HBV DNA (IU/mL)	7.23E+05	8.81E+07	9.35E+08	5.96E+08	4.43E+08
HBsAb	Unknown	Negative	Negative	Negative	Negative
HBsAg	Positive	Positive	Positive	Positive	Positive
Antiviral treatment	TDF	TDF	TAF	ENT	TDF
Liver biopsy performed (Y/N)	No	No	Yes	Yes	Yes
Liver biopsy results			Results pending	No acute cellular rejection and no significant fibrosis	No fibrosis, significant steatohepatitis
Time from transplant to detectable HBV DNA (months)	25	35	52	24	36
Time from stopping prophylaxis to detectable HBV DNA (months)	10	11	27	13	19*

* prophylaxis changed to lamivudine but not stopped

TDF (tenofovir disoproxil fumarate) TAF (tenofovir alafenamide) ENT (entecavir)

CITATION INFORMATION: Myhre L., Watt K., Aqel B. De Novo Hepatitis B Infection Following Liver Transplant with Hepatitis B Core Antibody Positive Graft *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.J. Myhre: None. **K.D. Watt:** None. **B.A. Aqel:** None.

All Topics

Plenary 4

Abstract# 297

Superior Post-transplant Clinical Outcomes Using Portable Normothermic Perfusion and Assessment with the Organ Care System (ocs) Liver System: 1-year Outcomes of the Ocs Liver Protect Randomized Controlled Trial

J. Markmann[1], M. Abouljoud[2], M. Ghobrial[3], C. Bhati[4], S. Pelletier[5], J. Magliocca[6], T. Pruett[7], A. Lu[8], M. Rizzari[9], S. Ottmann[10], T. Klair[11], C. Eymard[12], G. Roll[13], G. Reyes[14], S. Black[15], S. Florman[16], S. Mirani[17], C. Marsh[18], G. Schnickel[19], M. Kinkhabwala[20], A. Demetris[21], H. Yeh[22], P. Vagefi[23], M. MacConmara[23], *[1]MGH, Boston, MA, [2]Henry Ford, Detroit, MI, [3]Houston Methodist, Houston, TX, [4]Virginia Commonwealth, Richmond, VA, [5]UVA, Charlottesville, VA, [6]Emory, Atlanta, GA, [7]U. Minnesota, Minneapolis, MN, [8]Tampa General, Tampa, FL, [9]Henry Ford, Detriot, MI, [10]Johns Hopkins, Baltimore, MD, [11]University of Texas HSC, San Antonio, TX, [12]University of Tennessee HSC, Memphis, TN, [13]UCSF, San Francisco, CA, [14]U. Washington, Seattle, WA, [15]Ohio State, Columbus, OH, [16]Mt. Sinai, New York, NY, [17]U. Nebraska, Omaha, NE, [18]Scripps Clinic, San Diego, CA, [19]U. San Diego, San Diego, CA, [20]Montefiore, New York, MA, [21]UPMC, Pittsburgh, PA, [22]Massachusetts General Hospital, Boston, MA, [23]UT Southwestern, Dallas, TX*

Purpose: The OCS Liver PROTECT Trial was the first U.S. randomized controlled trial for liver perfusion and was designed to evaluate the impact of portable warm machine perfusion on clinical outcomes and donor liver utilization.

Methods: PROTECT compared outcomes in recipients of livers preserved using the liver Organ Care System (OCS) or ischemic cold storage (ICS Control). Primary effectiveness endpoint was incidence of early allograft dysfunction (EAD). Other clinical endpoints included overall survival and incidence of ischemic biliary complications (IBC) at 6 and 12 months. Primary safety endpoint was average number of liver graft related SAEs (LGRSAEs).

Results: 300 patients were enrolled (153 OCS and 147 Control). OCS use resulted in significant reduction of EAD (OCS 17.3% vs. Control 30.5% p=0.009), attenuation of reperfusion syndrome in the recipient, and reduction in the severity of reperfusion injury on allograft histology. Importantly, the presence of EAD conferred a

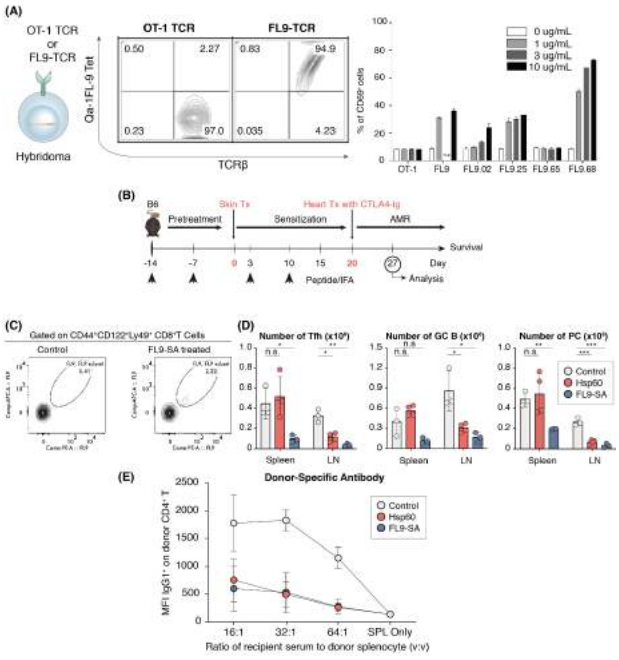
significantly higher risk of graft failure (log-rank 0.0002). OCS was also associated with significant reduction of IBC at 6 and 12-months post-transplant (6 months- OCS 1.3% vs. Control 8.5% p=0.004; 12 months - OCS 2.6% vs Control 9.9 p=0.010). PROTECT's safety endpoint was met with low mean LGRSAEs (OCS 0.046 to Control 0.075, non-inferiority p<0.0001). OCS preservation resulted in significantly higher utilization of DCD donor livers for transplantation (OCS 45.9% vs. Control 24.5% p= 0.020). Overall patient and graft survival were similar between the groups.
Conclusions: To our knowledge, PROTECT results represent the first report of an intervention simultaneously reducing both EAD and IBC post liver transplantation. In addition, OCS resulted in significantly increased utilization of DCD donors. We conclude that OCS Liver preservation is associated with superior post-transplant outcomes and increased donor liver utilization for transplantation.
CITATION INFORMATION: Markmann J., Abouljoud M., Ghobrial M., Bhati C., Pelletier S., Magliocca J., Pruett T., Lu A., Rizzari M., Ottmann S., Klair T., Eymard C., Roll G., Reyes G., Black S., Florman S., Mirani S., Marsh C., Schnickel G., Kinkhabwala M., Demetris A., Yeh H., Vagefi P., MacConmara M. Superior Post-transplant Clinical Outcomes Using Portable Normothermic Perfusion and Assessment with the Organ Care System (ocs) Liver System: 1-year Outcomes of the Ocs Liver Protect Randomized Controlled Trial *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Markmann: None. **M. Abouljoud:** None. **M. Ghobrial:** None. **C. Bhati:** None. **S. Pelletier:** None. **J. Magliocca:** None. **T. Pruett:** None. **A. Lu:** None. **M. Rizzari:** None. **S. Ottmann:** None. **T. Klair:** None. **C. Eymard:** None. **G. Roll:** None. **G. Reyes:** None. **S. Black:** None. **S. Florman:** None. **S. Mirani:** None. **C. Marsh:** None. **G. Schnickel:** None. **M. Kinkhabwala:** None. **A. Demetris:** None. **H. Yeh:** None. **P. Vagefi:** None. **M. MacConmara:** None.

Abstract# 298

Novel Discovery of Super-antigen That Mobilize Regulatory Cd8 T Cells Inhibits Donor-specific Antibody and Protects Heart Allografts from Antibody-mediated Rejection

J. Y. Choi[1], H. Nakagawa[2], Z. Solhjou[1], K. Yatim[1], H. Zhang[3], P. Patel[3], M. Tawfeek Mohammed[3], L. Riella[4], H. Kim[2], H. Cantor[2], J. Azzi[1], *[1]Brigham and Women's Hospital/Harvard Medical School, Boston, MA, [2]Dana Farber Cancer Institute/Harvard Medical School, Boston, MA, [3]Brigham and Women's Hospital, Boston, MA, [4]Massachusetts General Hospital/ Harvard Medical School, Boston, MA*

Purpose: Antibody-mediated rejection (AMR) is a critical barrier to long-term allograft survival. We showed that Qa-1 (HLA-E in humans) restricted $CD8^+$ T cells (CD8 Treg) play an essential role in controlling humoral immunity by killing alloreactive $CD4^+$ T cells, especially follicular helper T cells (Tfh) that upregulate Qa-1 under immunologic stress conditions. We previously showed that interruption of $CD8^+$ T cell receptor (TCR) binding to Qa-1 unleashes Tfh proliferation and leads to severe AMR in murine cardiac transplantation. In this study, we identified stress peptides (SPs) presented by Qa-1, modified one of these peptides to engineer a super-agonist (SA), and tested the efficacy of SPs in mobilizing CD8 Treg. Finally, we examined if SPs subdue allo-sensitization and protect heart grafts from AMR.
Methods: Based on previous mass-spectrometry studies, we selected two SPs - FL9 and Hsp60p216 - that associate with Qa-1 under immunologic stress conditions. We then sorted FL9-Qa-1 tetramer binding CD8 Tregs, sequenced their TCR, and expressed on hybridoma. We also generated a library of modified FL9 sequences and compared their antigenicity using the TCR engineered hybridoma. After selecting FL9-SA, we performed BALB/c to B6 skin transplantation with or without Hsp60p216 and FL9-SA, followed by heart transplantation to induce AMR.
Results: We successfully generated FL9-SA using our TCR engineered hybridoma system. Immunization with SPs significantly expanded SP-Qa-1 tetramer binding CD8 Treg. Compared to the control group, hosts treated with SPs during sensitization showed a significant reduction in Tfh and mature B cells including plasma cells. FL9-SA was substantially more efficacious than Hsp60p216. More importantly, donor-specific antibody (DSA) was significantly decreased in SP-treated groups, resulting in protection of heart allografts.
Conclusions: Eliciting CD8 Treg response with Qa-1-associating SPs subdue germinal center reaction and DSA formation. Especially, the super-agonist that we generated showed superior biological efficacy in mobilizing CD8 Treg. Exploiting the mechanism of CD8 Treg through the study of Qa-1-associating peptides may offer a novel strategy to suppress AMR, which lacks effective therapeutic options.



(A) Generation of FL9 superagnoist. *Left:* Hybridoma was engineered to express T cell receptor (TCR) restricted to FL9-Qa-1 while OT-1 TCR used as a control. FL9-TCR expressing hybridoma but not OT-1-TCR expressing hybridoma binds to FL9-Qa-1 tetramer. *Right:* Library of modified FL9 peptides were generated and tested their capacity to activate (CD69) FL9-TCR hybridoma. FL9-68 was selected as a FL9-super-agnoist (FL9-SA)
(B) Schematics of skin sensitization induced cardiac AMR model.
(C) Representative layouts of FL9-Qa-1 restricted CD8 Treg. Hosts immunized with FL9 show 8-fold expansion of FL9-Qa-1 tetramer binding CD8 Treg (CD44+CD122+Ly49+ CD8+ T)
(D) Immunophenotype of spleen and draining lymph nodes. *Tfh: follicular helper T cells (PD-1+CXCR5+CD4+ T); GC B: Germinal Center B Cells (GL-7+FAS+B220+); PC: Plasma Cells (CD138+B220); *:P<0.05; **:P<0.01; ***:P<0.001; n.s: not significant*
(E) Donor-Specific Antibody Assay. x axis indicates volume-to volume ratio of recipient serum to donor splenocyte diluted in PBS at 10^6 cells/mL.

CITATION INFORMATION: Choi J., Nakagawa H., Solhjou Z., Yatim K., Zhang H., Patel P., Tawfeek Mohammed M., Riella L., Kim H., Cantor H., Azzi J. Novel Discovery of Super-antigen That Mobilize Regulatory Cd8 T Cells Inhibits Donor-specific Antibody and Protects Heart Allografts from Antibody-mediated Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: J.Y. Choi: None. **H. Nakagawa:** None. **Z. Solhjou:** None. **K. Yatim:** None. **H. Zhang:** None. **P. Patel:** None. **M. Tawfeek Mohammed:** None. **L. Riella:** None. **H. Kim:** None. **H. Cantor:** None. **J. Azzi:** None.

Abstract# 299

Extreme Phenotype Sampling and Next Generation Sequencing to Identify Genetic Variants Associated with Tacrolimus Metabolism in African American Kidney Transplant Recipients

C. R. Dorr[1], B. Guo[2], B. Wu[2], J. Abrahante[2], D. Schladt[3], R. Remmel[2], W. Guan[2], A. Muthusamy[3], G. Onyeaghala[3], N. Pankratz[2], A. Matas[2], R. Mannon[4], W. Oetting[2], P. Jacobson[2], A. K. Israni[3], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN, [3]Nephrology, Hennepin Healthcare Research Institute, Minneapolis, MN, [4]University of Nebraska Medical Center, Omaha, NE*

Purpose: Tacrolimus (TAC) pharmacogenomics studies identified common genetic variants that alter TAC troughs suggesting strategic dosing for specific populations. Common variants and clinical factors explain ~50% of TAC trough variability in African American (AA) kidney transplant recipients. We hypothesized low-frequency variants may explain the remaining variability that may lead to improved dosing strategies for AAs.
Methods: We repeated an Extreme Phenotype Sampling (EPS) model and expanded Next Generation Sequencing (NGS) (doi: 10.1038/s41397-018-0063-z) with substantially more samples to identify genetic variants associated with TAC troughs in AAs. AA subjects from the DeKAF Genomics and GEN03 cohorts were combined (n = 695). The study evaluated TAC troughs in the first 6 months post-transplant. EPS included 77 subjects with the highest, and 77 subjects with the lowest, dose-normalized TAC troughs after adjusting for clinical factors and CYP3A5 *3, *6, *7 variants. The NGS spanned 5.3 mB of 63 TAC related metabolism and pharmacodynamics genes, including 20 kB of flanking sequences. Variant call file (VCF) was created, SNPeff was used to assess the VCF data and Variant Effect Predictor (VEP) predicted protein functions by SIFT or Polyphen. Identified single variants were analyzed by single SNP, gene-based and subset analyses association with TAC troughs.
Results: SNPeff identified 41,510 variants classified as 48% intronic, 24% intergenic, 1.3% exonic or 26.7% other. The analysis identified 6 SNPs, mostly in *PPP3CA*, that were associated with TAC troughs when controlling the false discovery rate at

0.05 (Table 1a). SNP set analysis of rare SNPs predicted to be deleterious by SIFT and probably damaging by Polyphen were associated with TAC troughs (p=0.0017, Table 1b). The missense variant rs72557946 in *POR* was also associated with TAC troughs (p=0.008).

Conclusions: We identified novel variants associated with TAC troughs in AAs. Most of variants with TAC association were in *PPP3CA* which activates T-cells via NFATc and interacts with TAC. Functional analysis of these SNPs will be done in cell culture. Identification of additional SNPs which impact TAC troughs may lead to improved treatment strategies for AAs.

Table 1a: SNPs that were associated with TAC troughs in African American Kidney Transplant Recipients

Chromosome: Base location	Rs ID	Reference allele	Alternate allele	Gene	Functional annotation	P-Value	False discovery rate (FDR)	Sequenced subjects in this study	Minor allele Frequency* African	American	European
chr15:85463639	rs147143913	C	T	*SLC28A1*	Intronic	1.73E-06	0.012	0.021	0.02	0.01	0.00
chr4:102016383	rs138497654	C	T	*PPP3CA*	Intronic	1.56E-06	0.012	0.023	0.01	0.01	0.00
chr4:102017423	rs149784417	T	C	*PPP3CA*	Intronic	1.56E-06	0.012	0.023	0.01	0.00	0.00
chr4:102047675	**	CACTTA	CA	*PPP3CA*	Intronic	9.65E-07	0.012	0.027	**	**	**
chr4:102073433	rs139146608	G	T	*PPP3CA*	Intronic	1.53E-06	0.012	0.023	0.01	0.01	0.00
chr4:146051011	**	A	G	*OTUD4*	Intergenic between *OTUD4* and *ABCE1*	6.52E-06	0.038	0.012	**	**	**

*Minor allele frequency for African, American and European determined using HaploReg V2 and Hg19 genome build.
**Data not available in HaploReg V2

Table 1b: SNP set associated (p=0.0017) with TAC troughs that are predicted to be both deleterious by SIFT and probably damaging by Polyphen to protein function

Chromosome: Base location	Allele	Gene	Existing variation	Minor Allele Frequency*	P value
chr1:161203078	A	NR1I3	rs34161743	0.019	0.81
chr10:96480229	T	CYP2C18	rs60181876	0.011	0.695
chr10:96535246	A	CYP2C19	rs17884712,CM024384	0.011	0.765
chr10:101559094	G	ABCC2	rs17222674,CM123151	0.015	0.6
chr11:74800034	C	OR2A74	rs79540606	0.011	0.656
chr15:85486730	C	SLC28A1	rs45584739,CM045807	0.019	0.118
chr17:48761326	A	ABCC3	rs141856639	0.011	0.072
chr9:84629148	T	CYB5R4	rs148851927	0.011	0.122
chr7:75614912	**A**	**POR**	**rs72557946,CM087165**	**0.011**	**0.008**
chr7:99445181	A	CYP3A43	rs78548296	0.011	0.288
chr7:99461160	T	CYP3A43	rs143991326	0.023	0.823
chr9:119170004	T	SLC30A8	rs73317647,COSV69974002	0.015	0.946

*Minor allele frequency is only for the subjects that had genomic DNA sequenced in this study.

CITATION INFORMATION: Dorr C., Guo B., Wu B., Abrahante J., Schladt D., Remmel R., Guan W., Muthusamy A., Onyeaghala G., Pankratz N., Matas A., Mannon R., Oetting W., Jacobson P., Israni A. Extreme Phenotype Sampling and Next Generation Sequencing to Identify Genetic Variants Associated with Tacrolimus Metabolism in African American Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.R. Dorr: None. **B. Guo:** None. **B. Wu:** None. **J. Abrahante:** None. **D. Schladt:** None. **R. Remmel:** None. **W. Guan:** None. **A. Muthusamy:** None. **G. Onyeaghala:** None. **N. Pankratz:** None. **A. Matas:** None. **R. Mannon:** None. **W. Oetting:** None. **P. Jacobson:** None. **A.K. Israni:** None.

Abstract# 300

Role of Ferroptosis Inhibitors in Mitigating Ischemia-Reperfusion Injury in Marginal Livers Using a Novel Protect Model

M. D. Nazzal, J. Van Nispen, A. Armstrong, V. Murali, E. Song, M. Voigt, A. Samaddar, E. Madsen, C. Manithody, J. Krebs, D. Blackall, D. Carpenter, C. Varma, J. Teckman, A. Jain, *Saint Louis University, Saint Louis, MO*

Purpose: The discard rate of deceased donor livers (DDL) remains high at nearly 9% and incudes livers that are steatotic, old in age, and from donation after cardiac death. The major challenge with marginal DDL (MDL) is severe Ischemia reperfusion injury (IRI) which clinically leads to primary non-function or early graft dysfunction with increased recipient morbidity and mortality. We proposed that reduction of ferroptosis, a form of regulated cell death related to an increase in intracytoplasmic iron, would reduce IRI in MDL. We tested our theory using our previously described PROTECT model (Perfusion Regulated Organ Therapeutics with Enhanced Controlled Testing) using normothermic perfusion of 2 split liver lobes simultaneously with one lobe acting as an internal control for the other.

Methods: Discarded MDL were split into right and left lobes and perfused using the PROTECT pump. One lobe was treated with deferoxamine (DM) (0.6mmol/L) and the other acted as an internal control. We compared intracellular iron content, biochemical measures, and pre-ferroptotic genes expression between the lobes.

Results: Both lobes were perfused for 3 hours. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) decreased in the DM treated lobe throughout the experiment, while ALT (U/L) and AST (U/L) rose in the control lobe (ALT DM lobe$_{final\ -\ initial}$ = -405, ALT Control lobe$_{final\ -\ initial}$ = 586; AST DM lobe$_{final\ -\ initial}$ = -380, AST Control lobe$_{final\ -\ initial}$ = 617) (Figure 1A). Similarly pro-ferroptotic genes, including HO-1 (2.74 vs 6.93), HIF1α (2.60 vs 8.67), and RPL8 (0.72 vs 1.52) fold change expressions were all decreased in the DM lobe compared to the control lobe. The expressions of these genes were additionally compared to a sample taken from a healthy liver (Figure 1B). Lastly, Prussian Blue iron staining and intensity quantification showed a marked decrease in iron quantity in the DM lobe compared to the control lobe ($288 \pm 18_E^{-3}$ vs $329 \pm 13_E^{-3}$; p = 0.036) (Figure 1C and D).

Conclusions: By administering DM, we reduced the content of iron within hepatocytes, thus reducing ferroptosis as shown by the decreased expression of pro-ferroptotic genes (HO-1, HIF1α, RPL8). In addition, we observed improvement in ALT and AST in the lobe that was treated with DM. Our data suggests that reducing ferroptosis helps to mitigate IRI. This approach could serve as the basis for a clinical trial using DM to reduce IRI in MDL; thus, increasing the utility of such organs.

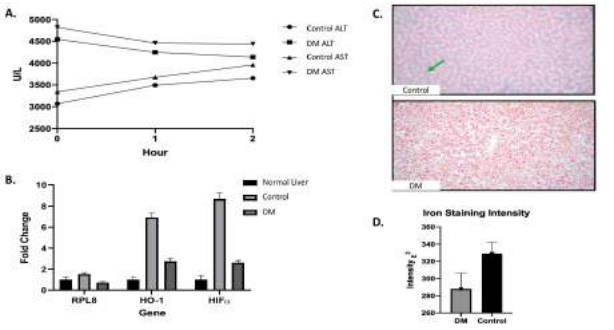


Figure 1: A. Serum ALT (U/L) and AST (U/L) rose throughout the experiment in the control lobe while ALT and AST decreased throughout the experiment in the DM lobe. B. RPL8, HO-1, and HIFα expression was compared between a healthy liver biopsy, the control lobe, and the DM lobe. RPL8, HO-1, and HIFα expression was increased in the control lobe, while the expression of these genes was reduced in the DM lobe. C. Prussian Blue staining was performed to assess for iron in the control lobe and the DM lobe. The green arrow points to a demonstrative accumulation of iron. D. ImageJ intensity quantification revealed that iron accumulation was significantly reduced in the DM lobe compared with the control lobe.

CITATION INFORMATION: Nazzal M., Van Nispen J., Armstrong A., Murali V., Song E., Voigt M., Samaddar A., Madsen E., Manithody C., Krebs J., Blackall D., Carpenter D., Varma C., Teckman J., Jain A. Role of Ferroptosis Inhibitors in Mitigating Ischemia-Reperfusion Injury in Marginal Livers Using a Novel Protect Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.D. Nazzal: None. **J. Van Nispen:** None. **A. Armstrong:** None. **V. Murali:** None. **E. Song:** None. **M. Voigt:** None. **A. Samaddar:** None. **E. Madsen:** None. **C. Manithody:** None. **J. Krebs:** None. **D. Blackall:** None. **D. Carpenter:** None. **C. Varma:** None. **J. Teckman:** None. **A. Jain:** None.

Basic

Biomarkers and Cellular Therapies

Abstract# 301

Lymphotoxin Beta Receptor Regulates Treg Migration and Suppression by Modulating Draining Lymphatic Structure

V. Saxena[1], W. Piao[1], L. Li[1], M. W. Shirkey[1], J. Iyyathurai[1], R. Lakhan[1], R. Abdi[2], J. Bromberg[1], *[1]U Maryland, Baltimore, MD, [2]Harvard U, Boston, MA*

Purpose: Regulatory T cells (Treg) must migrate from tissues via lymphatic vessels (LV) to the draining lymph node (dLN) to induce tolerance. During migration, Treg lymphotoxin alpha (LTα) stimulates lymphotoxin beta-receptor (LTβR) signaling on lymphatic endothelial cells (LEC) lining the LV and dLN. We hypothesized that LEC LTβR regulates Treg migration and suppression by modulating LN structure and function.

Methods: LTβR$^{fl/fl}$ mice were crossed with Prox1-Cre-ER^{T2} mice to generate knock out (KO) mice, which lack LTβR expression in LEC after tamoxifen treatment. Littermate Prox1-Cre-ER$^{T2-/-}$LTβR$^{fl/fl}$ wild type (WT) were used as controls. Using flow cytometry, immunohistochemistry and in vivo and transwell based in vitro migration assays, the effects of LTβR depletion on Treg lymphatic migration and LN structures were analyzed.

Results: In KO 10 days after tamoxifen treatment, LTβR expression was markedly reduced specifically on LEC, yet maintained in fibroblastic reticular cells and blood vessel endothelial cells. This selective inhibition resulted in poor Treg migration in KO mice from tissues to draining LN. These effects were confirmed in an islet allograft model, where Treg transferred into the islet graft migrated poorly to the draining LN in KO mice, resulting in reduced allograft survival from 25d to 13d (p<.03). Migrating Treg maintained high Foxp3 expression, while non-migrating Treg lost Foxp3 and CD25 expression to become exTreg. LTβR depletion did not affect LN architecture, but reduced accumulation of Foxp3+ cells in LN cortical ridge, the LN microdomain important for Treg induction. LTβR depletion modulated expression of selected chemokines important for T cell migration. It decreased expression of CXCL12 and CCL21, while expression of VCAM-1, ICAM-1, and CCL19 remained similar to WT. LTβR depletion also reduced expression of non-canonical NFκB kinase (NIK) and the chemotactic lipid sphingosine-1-phosphate (S1P) in LEC. In a transwell based Treg-LEC co-culture assay, non-migrating Treg became exTreg due to both non-canonical NIK and canonical NFκB LTβR signaling in LEC.

Conclusions: LTβR depletion from LEC inhibited Treg migration from tissues to LN and reduced accumulation of Foxp3+ Treg in the LN. Non-migrating Treg became exTreg via NFκB LTβR signaling in LEC and correlated with poor islet allograft survival. LTβR is identified as a key regulator of Treg migration and subsequently suppressive function for ensuring graft survival.

CITATION INFORMATION: Saxena V., Piao W., Li L., Shirkey M., Iyyathurai J., Lakhan R., Abdi R., Bromberg J. Lymphotoxin Beta Receptor Regulates Treg Migration and Suppression by Modulating Draining Lymphatic Structure *AJT, Volume 21 Supplement 3*

DISCLOSURES: V. Saxena: None. **W. Piao:** None. **L. Li:** None. **M.W. Shirkey:** None. **J. Iyyathurai:** None. **R. Lakhan:** None. **R. Abdi:** None. **J. Bromberg:** None.

BASIC

Abstract# 302

CD47-Mediated Gli1/Notch1 Signaling is a Key Regulator of Mesenchymal Stem Cell Immunomodulation in Liver Inflammatory Injury

D. Xu, M. Sheng, Y. Lin, Y. Tian, Y. Zhan, C. Li, A. J. Coito, R. W. Busuttil, D. G. Farmer, J. W. Kupiec-Weglinski, B. Ke, *Surgery, Dumont - UCLA Transplant Center, Los Angeles, CA*

Purpose: *The* CD47-signal regulatory protein alpha (SIRPα) signaling pathway plays important roles in immune homeostasis and tissue inflammatory response. Gli1, the downstream effector of the Hedgehog pathway has been shown to regulate immune cell activation and inflammatory response. However, it remains unknown as to whether and how the CD47-SIRPα signaling may influence the Hedgehog pathway to control innate immune response in mesenchymal stem cell (MSC)-mediated immune regulation during liver inflammatory injury. This study investigated the roles and molecular mechanisms of MSC CD47-mediated Gli1/Notch1 signaling in ischemia/reperfusion-triggered liver inflammation.

Methods: Myeloid-specific SMO or Notch1 knockout ($SMO^{M\text{-}KO}$ and $Notch1^{M\text{-}KO}$) and floxed SMO or Notch1 ($SMO^{FL/FL}$ and $Notch1^{FL/FL}$) mice (n=6/group) were i.v. injected with bone marrow-derived MSCs or genetically modified MSCs ($1x10^6$ cells in PBS/mouse) 24h prior to surgical procedure, and then subjected to 90 min partial liver warm ischemia followed by 6 h of reperfusion. In parallel *in vitro* study, MSCs were transfected with CRISPR/Cas9-mediated CD47 knockout (KO) or control vector, and then co-cultured with bone marrow-derived macrophages (BMMs) followed by LPS (100 ng/ml) stimulation.

Results: *Adoptive transfer of MSCs* increased CD47 expression and ameliorated liver IRI. However, deletion of CD47 in MSCs exacerbated IR-induced hepatocellular damage, with increased serum ALT levels, macrophage/neutrophil infiltration, and pro-inflammatory mediators. MSC treatment augmented SIRPα, Hedgehog/SMO/Gli1, and Notch1 intracellular domain (NICD) whereas CD47-deficient MSC treatment reduced these gene expressions in IR-stressed livers. Moreover, disruption of myeloid SMO or Notch1 increased IR-triggered liver inflammation with diminished Gli1 and NICD but enhanced NEK7 and NLRP3 activation in MSC-transferred mice. Using MSC/macrophage co-culture system, we found that MSC CD47 and macrophage SIRPα expression were increased after LPS stimulation. The CD47-SIRPα interaction increased macrophage Gli1 and NICD nuclear translocation whereby NICD interacted with Gli1 and regulated its target gene Dvl2, which in turn inhibited NEK7/NLRP3 activity.

Conclusions: The CD47-SIRPα signaling activates the Hedgehog/SMO/Gli1 pathway, which controls NEK7/NLRP3 activity through a direct interaction between Gli1 and NICD. NICD is a novel coactivator of Gli1, and the target gene Dvl2 regulated by the NICD-Gli1 complex is crucial for the modulation of NLRP3-driven inflammatory response in MSC-mediated immune regulation. Our findings provide novel potential therapeutic targets in MSC-based immunotherapy of sterile inflammatory liver injury.

CITATION INFORMATION: Xu D., Sheng M., Lin Y., Tian Y., Zhan Y., Li C., Coito A., Busuttil R., Farmer D., Kupiec-Weglinski J., Ke B. CD47-Mediated Gli1/Notch1 Signaling is a Key Regulator of Mesenchymal Stem Cell Immunomodulation in Liver Inflammatory Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Xu: None. **M. Sheng:** None. **Y. Lin:** None. **Y. Tian:** None. **Y. Zhan:** None. **C. Li:** None. **A.J. Coito:** None. **R.W. Busuttil:** None. **D.G. Farmer:** None. **J.W. Kupiec-Weglinski:** None. **B. Ke:** None.

Abstract# 303

Double Negative T Cells Mediate Cd39-Dependent Protection in Hepatic Ischemia and Reperfusion Injury

H. Jin, M. Li, C. Zhang, G. Sun, D. Zhang, *Beijing Key Laboratory of Tolerance Induction and Organ Protection in Transplantation, Beijing Friendship Hospital, Capital Medical University, Beijing, China*

Purpose: Hepatic ischemia and reperfusion injury (HIRI) is a significant cause of morbidity and mortality following liver transplantation and major hepatic resections. Double negative T cells (DNT) are unique regulatory T cells which are discovered in recent decades.We have demonstrated that DNT significantly inhibit allo- or auto-immune responses mainly through perforin/granzyme B pathway. However, whether other mechanisms are involved in the immune regulation of DNT and the potential application of DNT in HIRI are still unknow.

Methods: WT or CD39 deficient DNT were adoptively transferred before surgery, and then the mouse model of partial (70%) warm HIRI was established. *In vitro*, WT or CD39 deficient DNT were cocultured with neutrophils with or without ATP stimulation. Transcriptome sequencing of ATP treated WT or CD39 deficient DNT were analyzed.

Results: In this study, we found DNT highly expressed CD39, a cell surface enzyme hydrolyzing extracellular ATP. Adoptively transferring with wild type (WT) but not CD39 deficient DNT significantly inhibited TNF-α and IL-1β secretion of liver infiltrated neutrophils, decreased neutrophil extracellular traps (NETs) generation and increased neutrophil apoptosis in warm HIRI in both C57BL/6 and T cell deficient B6.*Rag2/IL2rc* KO mice. Which contributed to markedly alleviated liver injury, as shown by lowered levels of serum ALT and reduced hepatocellular necrosis. Mechanistically, compared with WT DNT, CD39 deficient DNT were unable to hydrolyze extracellular cytotoxic ATP and became apoptotic under ATP stimulation. Transcriptome sequencing analysis suggested that ATP treated CD39 KO DNT had reduced expression of cell activation, proliferation and chemotaxis related genes than WT DNT. However, no differences of *Prf1* or *Gzmb* gene expression were observed between groups. Furthermore, the level of extracellular immunosuppressive molecule, adenosine, was significantly higher in the culture of ATP treated WT DNT compared with that of CD39 deficient DNT. ATP-treated WT DNT but not CD39 deficient DNT significantly increased neutrophil apoptosis and inhibited inflammatory mediators secreted by neutrophils *in vitro*, suggesting that CD39 expressed by DNT might drive a shift from an ATP driven proinflammatory environment to an anti-inflammatory milieu induced by adenosine.

Conclusions: In conclusion, our study reveals a new intrinsic mechanism that CD39 is crucial for DNT homeostasis and immunosuppressive function. These data support the concept and the feasibility of potentially utilizing this novel cell therapy for the prevention of HIRI during liver transplantation or hepatic surgery.

CITATION INFORMATION: Jin H., Li M., Zhang C., Sun G., Zhang D. Double Negative T Cells Mediate Cd39-Dependent Protection in Hepatic Ischemia and Reperfusion Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Jin: None. **M. Li:** None. **C. Zhang:** None. **G. Sun:** None. **D. Zhang:** None.

Abstract# 304

The Gut Microbiotainduces Local and Systemic Immune Modulation

V. Saxena, R. Lakhan, J. Iyyathurai, W. Piao, L. Li, T. Zhang, M. W. Shirkey, B. Ma, E. F. Mongodin, J. Bromberg, *U Maryland, Baltimore, MD*

Purpose: We previously demonstrated that gut microbiome alterations, through fecal microbiota transfer (FMT) or single bacteria transfer, had specific immune effects for cardiac allograft outcome. The present study aimed to characterize immune stimulatory or suppressive effects of gut bacteria on cells and structures of the host immune system.

Methods: Antibiotic-pretreated mice received vascularized cardiac grafts and tacrolimus. Mice were gavaged with *Bifidobacterium pseudolongum* (*Bifido*), a dominant gut member in immuno-suppressed hosts, or *Desulfovibrio desulfuricans* (*Desulfo*), abundant in colitis. Longitudinal characterization of the mouse gut microbiota was performed using 16S rRNA gene sequencing. The effect of shifts in microbiota on immune responses was assessed with immunohistochemistry and flow cytometry of intestinal segments and lymph nodes (LN). Bone marrow derived dendritic cells (BMDC), peritoneal macrophages (MΦ), and B cells were stimulated with bacteria or isolated *Bifido* exopolysaccharides (EPS), and cytokine responses measured by ELISA and activation markers by flow cytometry.

Results: *Bifido* decreased graft inflammation and fibrosis and prolonged allograft survival. *Desulfo* resulted in poor histology and reduced graft survival. *Bifido* significantly (p=0.016) increased LN $Foxp3^+$ CD4 regulatory T cells (Treg) and decreased (p=0.002) LN and spleen activated $CD44^{hi}CD69^+$ CD4 effector T cells (Teff) compared to *Desulfo*. Intestinal segments and mesenteric LN, but not peripheral LN, showed increases in $Foxp3^+$ Treg cells, $F4/80^+$ MΦ and $CD11c^+$ DC early after *Bifido* treatment but not *Desulfo* treatment. These bacteria also profoundly altered the structure of the LN stromal laminin fibers to create suppressive or inflammatory niches, with increased laminin α4:α5 ratios in the *Bifido* group and decreased ratios in the *Desulfo* group. Stimulation of myeloid cells with EPS did not affect expression of CD40, CD80, CD86, or MHC II, but prevented lipopolysaccharide (LPS) induced TNFα and IL-6 expression by BMDC. Stimulation of BMDC with *Bifido* cells or EPS induced the expression of the anti-inflammatory cytokines IL-10 and CCL19, but induced lesser amounts of the pro-inflammatory cytokines TNFα and IL-6. Microbiota characterization using 16S RNA gene sequencing and Principal Coordinate Analysis of Jensen-Shannon divergence showed gut microbiome profiles clustered by study group over time.

Conclusions: These results demonstrate immunomodulatory properties of gut microbiota, selected bacterial strains, and specific bacterial surface structural component. They have specific effects on myeloid cells and LN stromal fibers in different immune compartments. Characterization of the microbiota in organ transplantation provides novel insights into functional pathways involved in modulating inflammation and immunity.

CITATION INFORMATION: Saxena V., Lakhan R., Iyyathurai J., Piao W., Li L., Zhang T., Shirkey M., Ma B., Mongodin E., Bromberg J. The Gut Microbiotainduces Local and Systemic Immune Modulation *AJT, Volume 21 Supplement 3*

DISCLOSURES: V. Saxena: None. **R. Lakhan:** None. **J. Iyyathurai:** None. **W. Piao:** None. **L. Li:** None. **T. Zhang:** None. **M.W. Shirkey:** None. **B. Ma:** None. **E.F. Mongodin:** None. **J. Bromberg:** None.

Abstract# 305

Single Cell Rna-Sequencing of Urinary Cells and Defining the Immune Landscape of Rejection in Human Kidney Allografts

T. Muthukumar[1], H. Yang[1], A. Belkadi[2], G. Thareja[2], C. Li[1], C. Snopkowski[1], K. Chen[1], T. Salinas[1], M. Lubetzky[1], J. Lee[1], D. Dadhania[1], K. Suhre[2], M. Suthanthiran[1], *[1]Nephrology, NY Presbyterian- Weill Cornell Medical College, New York, NY, [2]Physiology and Biophysics, Weill Cornell Medicine-Qatar, Doha, Qatar*

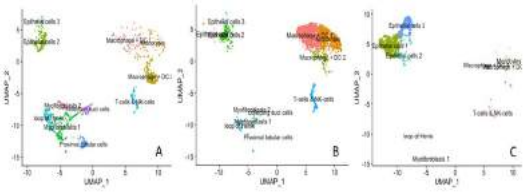
Purpose: Transcriptome-based clustering of urinary cells in kidney transplant recipients may help identify cell-type specific injury and develop cell-type specific biomarkers for the noninvasive assessment of human kidney allografts.

Methods: Single cell RNA-sequencing (scRNA-seq) was performed on urinary cells obtained at the time of allograft biopsy from kidney transplant recipients with biopsies classified as acute T cell mediated rejection [TCMR], chronic active antibody mediated rejection [ABMR], or normal/no rejection [Normal]. Droplet-based 10x Chromium platform (10x Genomics) was used to capture the individual urinary cells in emulsion, followed by cDNA synthesis, sequencing, and data analysis.

Results: We obtained 3947 high quality cellular transcriptomes from the urine samples matched to TCMR biopsy, ABMR biopsy, or Normal biopsy. Cell-type assignment following uniform manifold approximation and projection (UMAP)-based visualization of urinary single cells from the patient with Normal/No-Rejection biopsy (Panel A), acute TCMR biopsy (Panel B), or ABMR biopsy (Panel C) are shown in Figure 1. Urine samples matched to the TCMR biopsy was exemplified by increased macrophages, dendritic cells, T cells, and NK cells whereas renal tubular epithelial cells were dominant in urine matched to normal biopsy. Further resolution of immune cells revealed sub-clusters of dendritic cells (Figure 2).

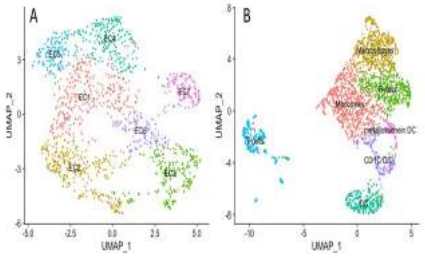
Conclusions: We have demonstrated the feasibility of transcriptome analysis of individual cells in urine samples matched to human kidney allograft biopsies. To our knowledge, this is the first report of urinary cell scRNA-seq in kidney transplant recipients. Our study has deciphered the complex cellular landscape of kidney allograft rejection and provides opportunity to interrogate molecular events at a hitherto unattained level of resolution.

Figure 1: Urinary cell single-cell gene expression atlas of human kidney allografts



Cell-type assignment following UMAP-based visualization of urinary single cells in kidney allograft recipients with (A) Normal/No-Rejection, (B) Acute TCMR, and (C) Chronic Active ABMR.

Figure 2: Clustering of epithelial cells and immune cells in the urine



Clustering analysis of (A) epithelial cells (N=2369) and (B) immune cells (N=1449) in the urine of the three kidney allograft recipients.

CITATION INFORMATION: Muthukumar T., Yang H., Belkadi A., Thareja G., Li C., Snopkowski C., Chen K., Salinas T., Lubetzky M., Lee J., Dadhania D., Suhre K., Suthanthiran M. Single Cell Rna-Sequencing of Urinary Cells and Defining the Immune Landscape of Rejection in Human Kidney Allografts *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Muthukumar: None. **H. Yang:** None. **A. Belkadi:** None. **G. Thareja:** None. **C. Li:** None. **C. Snopkowski:** None. **K. Chen:** None. **T. Salinas:** None. **M. Lubetzky:** None. **J. Lee:** None. **D. Dadhania:** None. **K. Suhre:** None. **M. Suthanthiran:** None.

Abstract# 306

Gm2a: A Novel Regulatory Pathway Controlling Alloimmunity

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Purpose: In recently published studies we discovered that the inhibitory receptor FcγRIIB regulates $CD8^+$ T cell alloimmunity in a cell-autonomous fashion, and that increased expression of *FCGR2B* was associated with freedom from rejection following tacrolimus withdrawal in the CTOT-09 clinical trial. These observations led us to query specific pathways that are upregulated in FcγRIIB$^+$ T cells that promote allograft survival.

Methods: We cross-referenced the list of ~1009 differentially expressed genes (DEG) in FcγRIIB$^+$ vs. Fc RIIB$^-$ $CD8^+$ murine T cells with the list of transcripts that were differentially expressed at baseline (before Tacrolimus withdrawal) in patients who were stable vs. rejected off immunosuppression in the CTOT-09 cohort. In subsequent mechanistic studies, *Gm2a*$^{-/-}$ mice and WT littermate controls received BALB/c skin grafts and alloimmune responses were assessed via flow cytometry.

Results: Analysis of Affymetrix gene array data revealed that 3 genes upregulated in CTOT-09 stable patients (*Gm2a, Cpa3 and Skap2*) were also differentially expressed in RNA-Seq datasets comparing transcript expression in FcγRIIB$^+$ T cells vs. FcγRIIB$^-$ $CD8^+$ T cells. To determine whether these differences were associated with the $CD8^+$ cellular immune response to transplantation, CellCODE deconvolution analysis was performed to identify the cell lineages associated with the differential expression between stable and rejectors. These data revealed that the difference in *Gm2a,* an essential cofactor associated with sphingolipid processing, demonstrated the strongest association with $CD8^+$ T cells. To determine if Gm2a plays a mechanistic role in suppressing alloimmune responses in vivo, we assessed the magnitude and functionality of alloreactive T cell responses in WT vs *Gm2a*$^{-/-}$ mice. While frequencies of $CD44^{hi}$ cells in naïve WT vs. *Gm2a*$^{-/-}$ mice were not different, analysis of splenocytes at day 10 post-transplant revealed a significant increase in the absolute number of $CD44^{hi}$ activated effectors in both the $CD4^+$ and $CD8^+$ T cell compartments in *Gm2a*$^{-/-}$ animals relative to WT littermate controls. Moreover, *Gm2a*$^{-/-}$ mice also demonstrated increased frequencies of TNF-expressing $CD8^+$ T cells, decreased frequencies of IL-2-expressing $CD8^+$ T cells, and fewer NKT cells relative to WT controls.

Conclusions: Taken together, our results from human renal transplant patients and experimental mouse models suggest that *Gm2a* may be a critical, as-yet unrecognized, immunologic mediator of transplant tolerance.

CITATION INFORMATION: Baecher K., Heeger P., Cravedi P., Fribourg M., Ford M. Gm2a: A Novel Regulatory Pathway Controlling Alloimmunity *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.M. Baecher: None. **P.S. Heeger:** None. **P. Cravedi:** None. **M. Fribourg:** None. **M.L. Ford:** None.

Abstract# 307

Nanoparticle Mediated Drug Delivery for Lung Transplantation

P. M. Patel[1], S. Jung[2], C. L. Miller[1], J. M. O[1], T. Costa[1], A. Dehnadi[1], I. Hanekamp[1], X. F. Li[2], L. Jiang[2], H. Ichimura[2], A. Azimzadeh[1], J. C. Madsen[3], R. Abdi[2], *[1]Surgery, Center for Transplantation Sciences, Massachusetts General Hospital/Harvard Medical School, Boston, MA, [2]Medicine, Transplant Research Center, Brigham and Women's Hospital, Boston, MA, [3]Surgery, Center for Transplantation Sciences, Division of Cardiac Surgery, Massachusetts General Hospital/Harvard Medical School, Boston, MA*

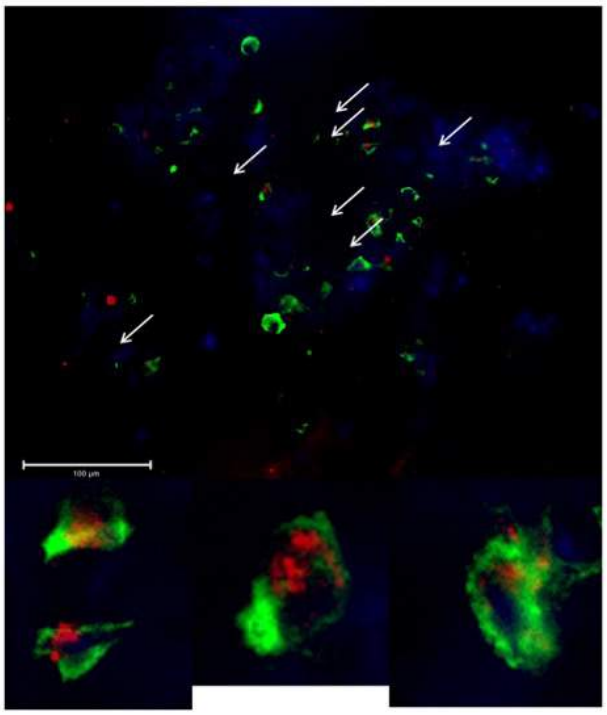
Purpose: Severe primary graft dysfunction (PGD) affects 30% of lung transplant patients. Pulmonary alveolar macrophages play a significant role in lung PGD, but systemic immunotherapy is inadequate in suppressing them. We explored using nanoparticles (NP) as a means of direct allograft immunosuppression delivery.

Methods: We encapsulated Alexa 594 dye and anti-IL6 receptor monoclonal antibody in poly (lactic-co-glycolic acid) NPs via double emulsion (anti-IL6R-Alexa 594 NP). The lung from one cynomolgus macaque was procured then underwent infusion of lung preservation solution mixed with nanoparticles via direct pulmonary artery cannulation. Samples pre- and post-NP infusion were taken and stained using immunofluorescence techniques. Tissues were stained with antibodies against CD163, vWF, CD11b, CDC11c, HLADR$^+$, CD3, and CD20.

Results: Hydrodynamic size of anti-IL6R-Alexa594 NP was 107 ± 14 nm (polydispersity index: 0.25), transmission electron microscopy size was 98 ± 8.1 nm, and zeta-potential was -3.1 ± 1.2 mV. We confirmed loading efficiency of anti-IL6R-mAb in NP as 23.1 ± 3.8% using bicinchoninic assay. Anti-IL6R-Alexa594 NP showed 50% of drug elution by 4.6 days and 75% of drug elution by 13 days **.** Anti-IL6R-Alexa594 NP were found in the lung parenchyma and in the hilar lymph nodes. Immunofluorescence staining assay demonstrated that CD163$^+$, CD11b$^+$, HLADR$^+$, and CD11c$^+$ cells from hilar lymph node internalized NPs. The

same held true for the lung parenchyma tissue with the addition of $CD3^+$ cells also having nanoparticle uptake. Approximately 10% of the lymph node macrophages ($HLADR^+$, $CD11b^+$, $CD163^+$) and 50% of the pulmonary macrophages had NP uptake. Figure 1: Immunofluorescence imaging of lung parenchyma. Blue = DAPI, Green = $HLADR^+$, Red = NP.

Conclusions: In this study, we synthesized bright nanovesicles to track the fate of NPs in the lung. These biocompatible NP produced sustained release of their loaded anti-IL6R over the span of two weeks in physiological condition, offering a way to control immune reactions locally. Despite the short perfusion time, a significant number of lung alveolar macrophages were able to phagocytose NPs. This is a promising new avenue for drug delivery in hopes of reducing incidence and severity of lung PGD.



CITATION INFORMATION: Patel P., Jung S., Miller C., O J., Costa T., Dehnadi A., Hanekamp I., Li X., Jiang L., Ichimura H., Azimzadeh A., Madsen J., Abdi R. Nanoparticle Mediated Drug Delivery for Lung Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: P.M. Patel: None. **S. Jung:** None. **C.L. Miller:** None. **J.M. O:** None. **T. Costa:** None. **A. Dehnadi:** None. **I. Hanekamp:** None. **X.F. Li:** None. **L. Jiang:** None. **H. Ichimura:** None. **A. Azimzadeh:** None. **J.C. Madsen:** None. **R. Abdi:** None.

Abstract# 308

Targeting Calcineurin/nfatc2 Signaling to Restore Pancreatic Beta-cell Function in Islet Transplantation

C. Darden[1], J. Mattke[1], S. Vasu[1], K. Kumano[1], Y. Liu[1], B. Naziruddin[2], M. C. Lawrence[1], *[1]Baylor University Medical Ctr, Dallas, TX, [2]Baylor University Medical Ctr, Allen, TX*

Purpose: Pancreatic beta cells dedifferentiate upon exposure to metabolic and inflammatory stress characterized by loss of beta-cell identity genes, expression of beta-cell disallowed genes, and loss of function. Here we sought to elucidate cell signaling pathways regulating genes during adaptive stress responses to identify cellular targets for restoring and maintaining islet cell function during islet isolation procedures and transplantation.

Methods: Human and mouse islets were isolated form donor pancreases and treated with high glucose (16.7 mM) and cytokine cocktail (IL-1β, TNF-α, and IFN-γ) for 2h and 24h. Transgenic mice harboring $INS1^{CRE/ERT2}$:$NFATc2^{f/f}$ were used for beta-cell knock out (BKO) islets. Gene expression was analyzed by RNA-Seq and QPCR. Western blot analyses used anti-RFX6 and MCT-1 antibodies. Promoter analyses were performed by promoter-reporter and ChIP assay. Ca^{2+} fluorometric imaging quantified intracellular Ca^{2+} changes. ELISA measured glucose-stimulated insulin secretion functional assays on islets.

Results: Both human and mouse islets exposed to acute (2h) metabolic and inflammatory stress showed enhanced upregulation of several beta-cell differentiation genes. In contrast, long-term exposure of islets (>24h) to stress resulted in downregulation of beta-cell differentiation genes and induction of more than twenty disallowed beta-cell genes. Transcriptional changes of several of these key genes including RFX6 and MCT-1 during extended stress exposure were due to downstream ER stress, Ca^{2+} impairment, and loss of CN/NFATc2 signaling. Ca^{2+} and CN/NFATc2 signaling were restored in beta cells by small molecule ISX9, a differentiation inducer. Transgenic BKO islets showed spontaneous beta-cell dedifferentiation, dysregulated insulin secretion, and could not be restored by ISX9.

Conclusions: CN/NFATc2 regulate genes that maintain beta cells in a differentiated state during islet cell stress and are lost upon sustained ER stress and overstimulated intracellular Ca^{2+}. Reactivating Ca^{2+}/CN/NFAT signaling with ISX9 induces redifferentiation of stressed islets and restores them to a functional state. The study suggests that CN/NFATc2 can be targeted to restore and maintain potency of islets during inflammatory stresses imposed throughout procedures of islet transplantation.

CITATION INFORMATION: Darden C., Mattke J., Vasu S., Kumano K., Liu Y., Naziruddin B., Lawrence M. Targeting Calcineurin/nfatc2 Signaling to Restore Pancreatic Beta-cell Function in Islet Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Darden: None. **J. Mattke:** None. **S. Vasu:** None. **K. Kumano:** None. **Y. Liu:** None. **B. Naziruddin:** None. **M.C. Lawrence:** None.

All Organs

Disparities in Access and Machine Learning Outcomes in Solid Organ Transplantation

Abstract# 309

A Fresh Look at Urbanicity and Its Impact on Additions to the Kidney and Liver Transplant Wait Lists

W. R. Johnson, S. A. Rega, I. D. Feurer, S. J. Karp, *General Surgery, Vanderbilt University Medical Center, Nashville, TN*

Purpose: Our aim is to examine the collective effects of social determinants of health (SDH) on kidney and liver wait list additions in the United States.

Methods: Principal components analysis of 127 county-level socioeconomic (SE) and health-related (HR) variables from publicly available American Community Survey, Robert Wood Johnson County Health Rankings, and Institute for Health Metrics and Evaluation datasets was used to identify two SDH composites. Population-weighted composite scores were computed for 50 states and the District of Columbia (analysis N=51). 53,004 adult kidney and 21,701 adult liver waitlist additions in 2017-2018 and listing center density (population-adjusted number of centers per state) were determined using Scientific Registry of Transplant Recipients data. End-stage renal disease incidence and potentially transplantable liver mortality were determined using United States Renal Data System and National Center for Health Statistics data. Multiple linear regression models evaluated the effects of composite scores, listing center density, and whether Medicaid expansion was accepted on disease- and population-adjusted numbers of kidney and liver transplant wait list additions.

Results: Two SDH composites were identified: 1) SE/HR and 2) urbanicity. After adjusting for listing center density and Medicaid expansion (all $p>0.12$), state-level kidney and liver transplant disease- and population-adjusted wait list additions were significantly associated with urbanicity (both $p<0.05$) and not with the SE/HR composite [Table 1].

Conclusions: Listing for kidney and liver transplant in the United States is independently associated with urbanicity; the collective impact of SE/HR was not independently associated with wait list additions in this study. Policy and quality improvement initiatives should be directed towards bridging the gap in wait list access between urban and rural populations. Furthermore, consideration should be given to investigating the collective effects of SDH on all transplant milestones.

Table 1: Multiple Linear Regression Models of Disease Burden-Adjusted Wait List Additions. (N=51 States and the District of Columbia)

Organ	Kidney ($R^2 = 0.15$)		Liver ($R^2 = 0.12$)	
Variables	Standardized Coefficient	*p*-Value	Standardized Coefficient	*p*-Value
SE/HR* Composite Score	-0.01	0.93	0.05	0.75
Urbanicity Composite Score	0.40	**0.01**	0.36	**0.04**
Listing Center Density	-0.23	0.13	-0.02	0.90
Medicaid Expansion	-0.07	0.62	-0.04	0.80

* Socioeconomic/Health-Related

CITATION INFORMATION: Johnson W., Rega S., Feurer I., Karp S. A Fresh Look at Urbanicity and Its Impact on Additions to the Kidney and Liver Transplant Wait Lists *AJT, Volume 21 Supplement 3*

DISCLOSURES: W.R. Johnson: None. **S.A. Rega:** None. **I.D. Feurer:** None. **S.J. Karp:** None.

Abstract# 310

Racial and Sexual Disparities in Solid Organ Transplant Outcomes Since Implementation of the Affordable Care Act Insurance Expansion Across Some States

H. Mohamed[1], C. Conceicao[2], A. Kumar[1], J. Buggs[3], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL*

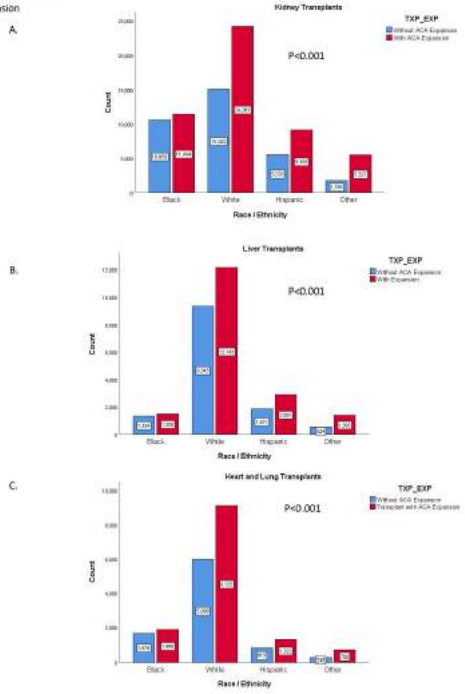
Purpose: Achieving solid organ transplantation traditionally requires access to health insurance. As such, women and people of color have faced barriers to obtaining solid-organ transplants. The Affordable Care Act (ACA) expanded Medicaid eligibility and thus has decreased health disparities among women and minorities. The goal of this project was to determine any differences in transplant outcomes by sex and race in states that have implemented the ACA expansion of healthcare insurance. We hypothesized that there will be an improvement by sex and race in transplant outcomes in states that have implemented the ACA expansion of healthcare insurance.

Methods: We conducted a retrospective cohort study of all consecutive patients in the U.S. undergoing heart, kidney, lung, and liver transplants from Jan. 2010 to Dec. 2019. Patient data was obtained from the United Network for Organ Sharing and the Organ Procurement and Transplantation Network. Pediatric patients and multiorgan recipients were excluded. Variables, including demographics, were examined. There were four racial categories recorded (White, Black, Hispanic, and Other). We looked at the number of transplants before and after the ACA expansion for each organ system and reviewed the results based on sex and race.

Results: There was an increase in the number of transplants for both males and females post-ACA expansion across all organ systems. However, male patients showed a significantly higher increase as compared to female patients with regards to liver transplants (p=0.010). There was an increase in the number of transplants for all races/ethnicities post-ACA expansion across all organ systems (Figure 1). However, the rate of increase was not equal. White patients saw a higher increase in the number of transplants as compared to non-white patients across all organ systems (p<0.001).

Conclusions: Since the implementation of the ACA, which granted greater access to insurance, sexual and racial disparities have decreased. However, these disparities still exist with solid organ transplantation. Explanations associated with these inequalities are multifaceted and need to be further explored to facilitate the development of solutions that advance the system while improving transplant patient outcomes by race and sex.

Figure 1.
Transplants by Organ Before and After ACA Expansion



CITATION INFORMATION: Mohamed H., Conceicao C., Kumar A., Buggs J. Racial and Sexual Disparities in Solid Organ Transplant Outcomes Since Implementation of the Affordable Care Act Insurance Expansion Across Some States *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Mohamed: None. **C. Conceicao:** None. **A. Kumar:** None. **J. Buggs:** None.

Abstract# 311

The Impact of the Covid-19 Pandemic on Measures of Transplant Activity is Higher in Lower-Income Countries: A Multinational Survey Study

S. Sandal[1], B. Boyarsky[2], P. Chiang[2], A. Massie[2], D. Segev[2], M. Cantarovich[1], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

Purpose: The COVID-19 pandemic has affected the field of solid organ transplantation due to the "ramp-down" of activity during the initial months. Impact on transplant activity may vary by baseline health system vulnerabilities. We aimed to analyze this by a country's cumulative COVID-19 incidence (CCI) and income-level.

Methods: From June-September 2020, we conducted a multinational survey of transplant physicians. Of 1,267 physicians contacted, 40.5% from 71 countries participated. Income-level was assigned as per the World Bank Classification. CCI was calculated in person per million population (ppm) from March-July and divide into tertiles for the entire cohort (low: <2031ppm, medium: 2032-5400ppm, high: >5400ppm). Logistic regression was used to conduct a comparative analysis.

Results: Overall, 75.2% of the programs reported a ramp-down phase, 76.8% performed transplants during this time, 69.6% reported fewer deceased donor offers, and 59.6% anticipate transplant volumes will be <75% of the norm in 2020. Compared with low/lower-middle income countries, transplant programs from high-income countries had 69% lower odds of a ramp-down phase and 50% lower odds of reporting fewer deceased donor offers. Also high income countries had higher odds of performing at least one transplant (OR=3.19, 95%CI: 1.55-6.60, p=0.002) and maintaining transplant volumes >75% (OR= 2.34, 95%CI: 1.20-4.58, p=0.01). CCI was not associated with any of these outcomes except fewer deceased donor offers in programs with moderate CCI. As shown in Table 1, kidney/pancreas transplant programs may be disproportionately affected during the pandemic.

Conclusions: We report transplantation has incurred substantial collateral damage from the COVID-19 pandemic and measures of transplant activity during the initial months were significantly associated with the income-level of the country independent of the COVID-19 burden. It will take global effort from transplant leadership to rebuild disrupted transplant services, in particular in, countries that already have vulnerable health systems.

Table 1:The odds ratio for four outcomes of interest	Odds of reporting a ramp-down phase	Odds of performing a transplant/s	Odds of receiving fewer/much fewer deceased donor offers	Odds of maintaining a transplant volume >75% in 2020
Income-level* (Ref: low/lower-middle income)				
Upper-middle	$_{0.16}0.43_{1.19}$	$_{0.40}0.83_{1.73}$	$_{0.61}1.41_{3.25}$	$_{0.61}1.29_{2.75}$
High	$_{\mathbf{0.12}}\mathbf{0.31}_{\mathbf{0.78}}$	$_{\mathbf{1.55}}\mathbf{3.19}_{\mathbf{6.60}}$	$_{\mathbf{0.25}}\mathbf{0.50}_{\mathbf{0.99}}$	$_{\mathbf{1.20}}\mathbf{2.34}_{\mathbf{4.58}}$
Cumulative COVID-19 incidence# (Ref: low)				
Medium	$_{0.90}1.63_{2.94}$	$_{0.30}0.57_{1.07}$	$_{\mathbf{1.41}}\mathbf{2.53}_{\mathbf{4.54}}$	$_{0.53}0.89_{1.49}$
High	$_{0.73}1.34_{2.45}$	$_{0.34}0.67_{1.32}$	$_{0.89}1.56_{2.75}$	$_{0.64}1.10_{1.87}$
Solid organ (Ref: Kidney/pancreas)				
Liver	$_{\mathbf{0.13}}\mathbf{0.24}_{\mathbf{0.42}}$	$_{\mathbf{1.79}}\mathbf{3.63}_{\mathbf{7.35}}$	$_{0.52}0.91_{1.59}$	$_{\mathbf{1.49}}\mathbf{2.43}_{\mathbf{3.99}}$
Heart	$_{\mathbf{0.09}}\mathbf{0.21}_{\mathbf{0.46}}$	$_{\mathbf{2.03}}\mathbf{6.00}_{\mathbf{17.75}}$	$_{0.73}1.84_{4.67}$	$_{0.54}1.14_{2.39}$
Lung	$_{\mathbf{0.07}}\mathbf{0.15}_{\mathbf{0.32}}$	$_{\mathbf{1.32}}\mathbf{4.35}_{\mathbf{14.36}}$	$_{0.47}1.05_{2.33}$	$_{\mathbf{1.00}}\mathbf{2.08}_{\mathbf{4.30}}$
Age group (Ref: Pediatric only)				
Adult only	$_{0.92}1.93_{4.05}$	$_{0.38}0.85_{1.91}$	$_{0.52}1.16_{2.59}$	$_{0.35}0.69_{1.38}$
Baseline transplant volume (Ref: low volume)				
Moderate	$_{0.52}0.94_{1.69}$	$_{\mathbf{2.28}}\mathbf{4.21}_{\mathbf{7.81}}$	$_{0.47}0.85_{1.54}$	$_{0.50}0.83_{1.39}$
High	$_{0.25}0.52_{1.09}$	$_{\mathbf{3.85}}\mathbf{8.40}_{\mathbf{18.14}}$	$_{\mathbf{0.24}}\mathbf{0.48}_{\mathbf{0.95}}$	$_{0.43}0.80_{1.50}$
Health system (Ref: Mixed or private)				
Public	$_{0.19}0.86_{4.21}$	$_{0.06}0.52_{4.81}$	$_{0.32}1.40_{6.19}$	$_{0.29}1.27_{5.64}$

CITATION INFORMATION: Sandal S., Boyarsky B., Chiang P., Massie A., Segev D., Cantarovich M. The Impact of the Covid-19 Pandemic on Measures of Transplant Activity is Higher in Lower-Income Countries: A Multinational Survey Study *AJT, Volume 21 Supplement 3*

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Abstract# 312

Black Patients with Cirrhosis Have Longer Length of Stay and Higher Mortality When Hospitalized

A. Thomas[1], D. Simpson[2], D. P. Ladner[2], R. Berkowitz[2], *[1]ACS Clinical Scholar, Chicago, IL, [2]Transplant Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL*

Purpose: Black patients with cirrhosis have been shown to have higher liver-related mortality compared to White patients. However, little knowledge exists about racial differences related to length of stay and in-hospital mortality at 60 days in patients who are hospitalized for cirrhosis. To this end, we aim to characterize the LOS among hospitalized patients with compensated vs. decompensated cirrhosis stratified by race in the United States.

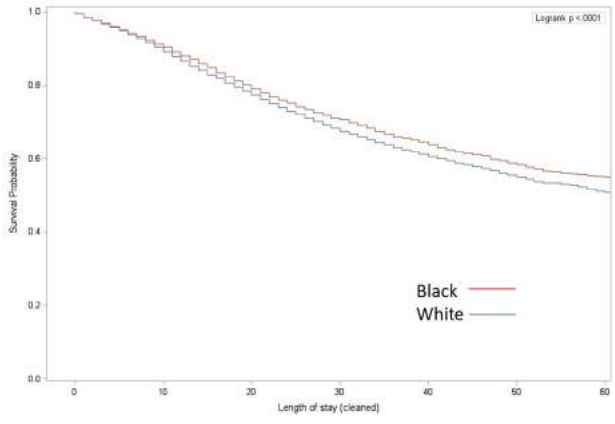
Methods: A retrospective review of adult (>18 yrs) patients with cirrhosis was performed using the Nationwide Inpatient Sample data from 2010-2014. Validated ICD/CPT algorithms were used to identify cirrhosis and related complications (HE,

SBP, ascites, GIB, HRS, HPS). Descriptive analysis and cox regression analysis were performed and dichotomized by race (White vs Black) for outcomes (LOS, In-hospital mortality).

Results: Between 2010-2014, 879,216 hospitalizations were observed in patients with cirrhosis for a total of 5,674,320 total hospitalization days. The mean age was 62±14.8, 42.3% (N=371691) were female, 68.5% were White, 11.7% Black, 13.9% Hispanic, and 5.9% Other. 51.7% were insured with Medicare, 18.1% Medicaid, 19.7% private, 6.1% self-pay (Table 1). Clinically significant differences between Blacks and Whites were observed for HCV (31% vs 19%), Medicaid (15% vs 21%) and Private (15% vs 21%). 434,712 patients (52.8%) had decompensated cirrhosis (31.7% HE, 2.7% SBP, 24.7% ascites, 4.5% GIB, 3.5% HRS) and 3.6% had HCC. Patients with cirrhosis had a mean of 7.0 (3.1) chronic conditions. In-hospital mortality in Whites was 5.9% compared to 6.7% in Blacks (p<0.001). The median LOS was 4 (2-7) days for Whites and 5 (3-9) days for Blacks (p<0.001). Survival in Whites was 8% increased to Blacks (HR 1.08, 1.05-1.18) (Figure 1).

Conclusions: In a national in-patient cohort sample, Black patients with cirrhosis have longer hospitalizations at baseline. Black patients in decompensated cirrhosis have lower survival than White patients.

Characteristics	Black (N=96,286)	White (N=565,844)	P-value
Age (mean)	59.7 (14)	63.2 (14)	< 0.01
Female	244,926(43.3%)	41,112 (42.7%)	<0.01
Etiology			
ETOH	25,861 (27%)	166,347 (29%)	<0.01
HCV	29,386 (31%)	109,983 (19%)	<0.01
PBC	8,658 (1.5%)	715 (0.7%)	<0.01
HBV	8,571 (1.5%)	3,241 (3.4%)	<0.01
Insurance			
Medicare	48,045 (50%)	309,757 (55%)	<0.01
Medicaid	25,118 (26%)	81,116 (14%)	<0.01
Private	14,047 (15%)	119,536 (21%)	<0.01
Self-pay	5,234 (5%)	31,625 (6%)	<0.01
Decompensated	52,465(54%)	292,601(52%)	<0.01
HE	32,754 (34%)	178,353 (31%)	<0.01
Ascites	22,024 (23%)	136,252 (24%)	<0.01
GIB	2,901 (3%)	23,357 (4%)	<0.01
HCC	4,300 (4%)	16,438 (3%)	<0.01
Chronic conditions (N)	7.3 (3)	7.1 (3)	<0.01



CITATION INFORMATION: Thomas A., Simpson D., Ladner D., Berkowitz R. Black Patients with Cirrhosis Have Longer Length of Stay and Higher Mortality When Hospitalized *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Thomas: None. **D. Simpson:** None. **D.P. Ladner:** None. **R. Berkowitz:** None.

Abstract# 313

Prediction of Renal Allograft Tolerance by Machine Learning

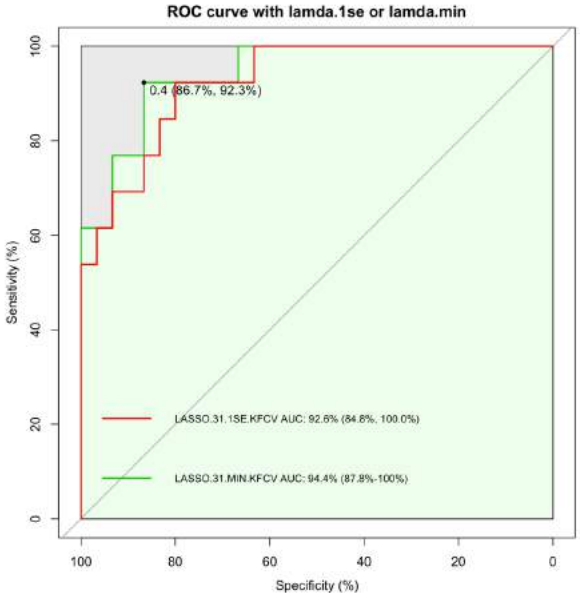
Q. Fu[1], K. Deng[2], H. Yang[1], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA*

Purpose: An ideal goal of transplantation is to withdraw or minimize immunosuppressants via the induction of tolerance to overcome drug toxicity, prolong allograft survival, and improve the quality of patient life. Many efforts have been taken to find the potential biomarkers for tolerance using the limited number of patients due to complicated mechanisms underlying tolerance and the potential risk of rejection after immunosuppressant withdrawal. Through comparing high-dimensional genome-wide expression data with machine learning algorithms potential biomarkers for allograft tolerance can be found.

Methods: Several databases were combined based on the same platform (GPL570), performed, and compared 14 different machine learning models for tolerance prediction using peripheral blood mononuclear cells (PBMCs).

Results: The Ridge regression was the most powerful method with a specificity of 90.0% and a sensitivity of 92.3%. Additionally, we identified an 8-gene feature (TCL1A, IGHG1, VPREB3, Septin9, TUBB2A, CCR2, RBM14, and WASL) using the Lasso model, 3 of which were B-cell-related, obtaining a similarly accurate performance with a specificity of 86.7% and a sensitivity of 92.3%. This 8-gene signature accurately differentiated tolerant patients from stable patients in a second validation group.

Conclusions: The Lasso regression model may provide an indication for clinicians to determine the right time for immunosuppressant withdrawal with a low risk of rejection or immunosuppressant side-effects.



CITATION INFORMATION: Fu Q., Deng K., Yang H., Deng S., Markmann J. Prediction of Renal Allograft Tolerance by Machine Learning *AJT, Volume 21 Supplement 3*

DISCLOSURES: Q. Fu: None. **K. Deng:** None. **H. Yang:** None. **S. Deng:** None. **J.F. Markmann:** None.

Abstract# 314

The Role of Pre-transplant Rectal Screening for Azole-resistant Candida Species in Liver Transplant Candidates

K. K. Patel[1], M. M. Azar[2], A. Koff[3], K. Belfield[4], D. R. Peaper[5], J. Topal[2], M. Malinis[2], *[1]Yale School of Medicine, New Haven, CT, [2]Section of Infectious Diseases, Yale School of Medicine, New Haven, CT, [3]Section of Infectious Diseases, UC Davis, Sacramento, CA, [4]Department of Pharmacy, Yale New Haven Hospital, New Haven, CT, [5]Department of Laboratory Medicine, Yale School of Medicine, New Haven, CT*

Purpose: Azole-resistant *Candida* (ARC) infections have become increasingly common among solid organ transplant recipients. Pre-transplant screening for ARC allows for targeted antifungal prophylaxis, which may reduce the incidence of post-transplant ARC infection. In this study, we describe a single-center experience of routine ARC screening in liver transplant (LT) candidates.

Methods: We performed a retrospective chart review of patients who underwent LT at Yale-New Haven Hospital from April 2019 to November 2020. ARC (*C. glabrata* and *C. krusei*) screening was performed via a rectal swab prior to or at

time of LT. Collected data included patient demographics, ARC screening, antifungal prophylaxis, risk factors associated with *Candida* infection (previously defined by AST ID COP guidelines), and *Candida* infection within 1 month of LT.
Results: Forty patients underwent LT. The median age was 59 years (range 25-70), 27 (68%) were male, and 19 (48%) had a MELD ≥ 30 at time of LT. Of this cohort, 34 (85%) had ARC screening. ARC colonization was present in 7/34 (21%) patients: *C. glabrata* (n=4), *C. krusei* (n=2), and both species (n=1). All 7 patients received antifungal prophylaxis. Echinocandin prophylaxis was given in 4/7 (57%), of whom 1 developed confirmed ARC infection (*C. krusei* and *C. glabrata* fungemia). Three ARC colonized patients received fluconazole but none developed post-LT *Candida* infection. In non-ARC colonized patients on fluconazole prophylaxis, 1 developed *C.krusei* peri-hepatic abscess and 1 had suspected *Candida* subhepatic abscess due to elevated serum β-d-Glucan. The 6 patients without ARC screen did not develop post-LT *Candida* infection.The median time to post-LT *Candida* infection was 25 days (range 24-26). The median number of risk factors among 3 patients with post-LT *Candida* infection was 2 vs. 1 among 31 patients without post-LT *Candida* infection.
Conclusions: Screening for ARC may assist in selecting appropriate antifungal prophylaxis for LT patients but it may not be sufficient to prevent infection in those with multiple risk factors for post-transplant *Candida* infection. Larger studies are required to evaluate further the role of ARC screening in antifungal stewardship in LT.

Figure 1. Pre-transplant Azole-resistant Candida (ARC) Screening in Liver Transplant (LT) Candidates

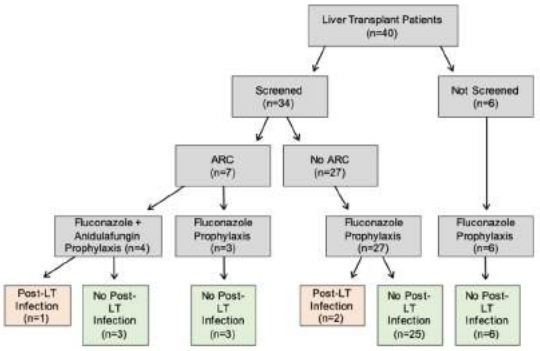


Figure 2. Risk Factors Associated with Candida Infection Post-Liver Transplantation

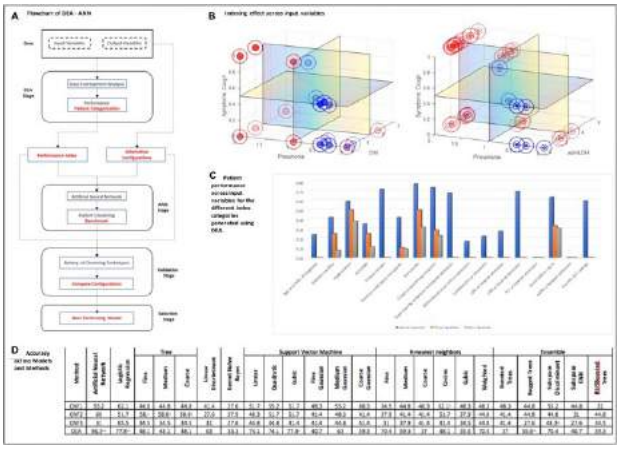
- Prior *Candida* colonization
- Renal replacement therapy
- Intra-abdominal re-operation
- Roux-en-Y anastomosis
- Re-transplantation
- High intra-operative transfusion requirement (>40 units of blood products)

CITATION INFORMATION: Patel K., Azar M., Koff A., Belfield K., Peaper D., Topal J., Malinis M. The Role of Pre-transplant Rectal Screening for Azole-resistant Candida Species in Liver Transplant Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.K. Patel: None. **M.M. Azar:** None. **A. Koff:** None. **K. Belfield:** None. **D.R. Peaper:** None. **J. Topal:** None. **M. Malinis:** None.

Abstract# 315

A Machine Learning-Based Predictive Model for Outcome of Covid-19 in Kidney Transplant Recipients

I. Revuelta[1], F. Santos-Arteaga[2], D. Di Caprio[3], E. Montagud-Marrahi[1], F. Cofan[1], J. Torregrosa[1], M. Bodro[4], A. Moreno[4], P. Ventura-Aguiar[1], D. Cucchiari[1], N. Esforzado[1], G. Piñeiro[1], J. Ugalde-Altamirano[1], J. Campistol[1], A. Alcaraz[5], B. Bayès[1], E. Poch[1], F. Oppenheimer[1], F. Diekmann[1], *[1]Department of Nephrology and Kidney Transplant, Hospital Clinic, Barcelona, Spain, [2]Faculty of Economics and Management, Free University of Bolzano, Bolzano, Italy, [3]Department of Economics and Management, University of Trento, Trento, Italy, [4]Department of Infectious Diseases, Hospital Clinic, Barcelona, Spain, [5]Department of Urology, Hospital Clinic, Barcelona, Spain*
Purpose: Health systems need tools to deal with COVID-19, especially for high-risk population,such as transplant recipients. Predictive models are necessary to improve management of patients and optimize resources.
Methods: A retrospective study of hospitalized transplant patients due to COVID-19 was evaluated(March 3-April 24,2020). Admission data were integrated to develop a prediction model to evaluate a composite-event defined as Intensive Care Unit admission or intensification treatment with antiinflamatory agents. Predictions were made using a Data Envelopment Analysis(DEA)-Artificial Neural Network(ANN) hybrid, whose accuracy relative to several alternative configurations has been validated through a battery of clustering techniques.
Results: Of 1006 recipients with a planned or an unscheduled visit during the observation period, thirty-eight were admitted due to COVID-19. Twenty-five patients(63.2%) exhibited poor clinical course(mortality rate:13.2%), within a mean of 12 days of admission stay. Cough as a presenting symptom(P=0.000), pneumonia(P=0.011), and levels of LDH(P=0.031) were admission factors associated with poor outcomes. The prediction hybrid model working with a set of 17 input variables displays an accuracy of 96.3%, outperforming any competing model, such as logistic regression(65.5%) and Random forest(denoted by Bagged Trees,44.8%). Moreover, the prediction model allows us to categorize the evolution of patients through the values at hospital admission.
Conclusions: The prediction model based in Data Envelopment Analysis-Artificial Neural Network hybrid forecasts the progression towards severe COVID-19 disease with an accuracy of 96.3%, and may help to guide COVID-19 management by identification of key predictors that permit a sustainable distribution of resources in a patient-centered model. Improving efficiency and patient performance in the AAN with DEA, we can get high accurancy even with no-big cohorts.

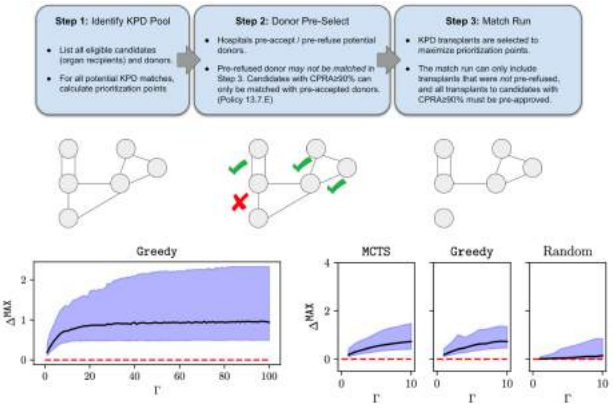


CITATION INFORMATION: Revuelta I., Santos-Arteaga F., Di Caprio D., Montagud-Marrahi E., Cofan F., Torregrosa J., Bodro M., Moreno A., Ventura-Aguiar P., Cucchiari D., Esforzado N., Piñeiro G., Ugalde-Altamirano J., Campistol J., Alcaraz A., Bayès B., Poch E., Oppenheimer F., Diekmann F. A Machine Learning-Based Predictive Model for Outcome of Covid-19 in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: I. Revuelta: None. **F. Santos-Arteaga:** None. **D. Di Caprio:** None. **E. Montagud-Marrahi:** None. **F. Cofan:** None. **J. Torregrosa:** None. **M. Bodro:** None. **A. Moreno:** None. **P. Ventura-Aguiar:** None. **D. Cucchiari:** None. **N. Esforzado:** None. **G. Piñeiro:** None. **J. Ugalde-Altamirano:** None. **J. Campistol:** None. **A. Alcaraz:** None. **B. Bayès:** None. **E. Poch:** None. **F. Oppenheimer:** None. **F. Diekmann:** None.

Abstract# 316

Improving Policy-constrained Kidney Exchange via Pre-screening

D. C. McElfresh[1], M. Curry[2], S. Booker[3], M. Stuart[3], D. Stewart[3], R. Leishman[3], T. Sandholm[4], J. Dickerson[2], *[1]Applied Mathematics, University of Maryland, College Park, MD, [2]University of Maryland, College Park, MD, [3]United Network for Organ Sharing, Richmond, VA, [4]Carnegie Mellon University, Pittsburgh, PA*
Purpose: Many planned kidney exchange transplants do not go to transplantation (they "fail") for a variety of reasons, such as positive crossmatch and logistical difficulties. Failures reduce the number of transplants facilitated by exchanges, and increase patient waiting time. Avoiding failures is a challenge, as exchanges are often constrained by policy and law in how they match patients and donors.



Instead, hospitals can pre-screen potential donors prior to matching. Donors who are not rejected during pre-screening can then be matched in the exchange (Fig. 1-Top). Pre-screening requires clinicians to spend valuable time reviewing potential donors, as well as additional compatibility testing. Since each hospital can have dozens of potential donors to screen, it is important to prioritize those most important to the exchange.

Methods: We study how to select donors for pre-screening, using a theoretical model and computational simulations. In our model each transplant has a probability of being approved/rejected during screening, and a probability of post-match failure. Using this model we estimate the value gained by pre-screening each donor (the total increase OPTN prioritization points). Values help determine which transplants are most important to pre-screen.

Results: Selecting the most valuable donors to pre-screen is computationally hard (see our paper for details), but simple algorithms are effective in simulations. Fig. 1-Bottom shows simulation results on OPTN-KPD exchanges from 2010-2018, using our methods Greedy and MCTS, compared to a Random baseline. Horizontal axis: number of donors pre-screened; vertical axis: relative value improvement over no pre-screening,: 0 = no improvement, 1 = 100% more prioritization points, and so on. Shading shows the range over all exchanges, and solid line shows the median. in most cases, screening only 10 donors with our methods leads to a 50-100% increase in matched prioritization points. Selecting random donors yields a much smaller improvement.

Conclusions: Pre-screenings can prevent pre-transplant failures, but cost valuable time and resources. We develop algorithms for identifying which donors provide the most value to the exchange if pre-screened. Our methods can help hospitals prioritize the most important donors to screen, and to filter out donors which cannot be matched via exchange. We are now working with the OPTN KPD program to implement these methods in a pilot test.

CITATION INFORMATION: McElfresh D., Curry M., Booker S., Stuart M., Stewart D., Leishman R., Sandholm T., Dickerson J. Improving Policy-constrained Kidney Exchange via Pre-screening *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.C. McElfresh: None. **M. Curry:** None. **S. Booker:** None. **M. Stuart:** None. **D. Stewart:** None. **R. Leishman:** None. **T. Sandholm:** None. **J. Dickerson:** None.

Kidney

Kidney Antibody Mediated Rejection

Abstract# 317

DSA Causes Mild Molecular ABMR-like Changes in Many Biopsies Not Diagnosed as Rejection

P. F. Halloran[1], K. S. Madill-Thomsen[1], &. the INTERCOMEX Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]., ., AB, Canada*

Purpose: In the multicenter study INTERCOMEX, we developed a microarray-based system (MMDx) for diagnosing antibody-mediated and T cell-mediated rejection (ABMR, TCMR) in kidney transplant biopsies using an ensemble of machine-learning classifiers. Here we use an expanded set of 1679 biopsies to explore the significance of DSA positivity in kidneys without rejection.

Methods: Machine learning was used as previously described, based on gene expression (*Am J Transplant.* 2019;19:2719). A new DSA classifier (DSAprob) was trained on DSA+ vs DSA- samples, with probabilities assigned in the left-out folds of 10-fold cross-validation. We plotted the biopsy samples' molecular distribution using Uniform Manifold Approximation and Projection (UMAP), a recently developed dimensionality reduction method. The inputs were seven molecular rejection scores, built for predicting TCMR, ABMR, and i-, t-, ptc-, g-, and cg-lesions.

Results: Figure 1A is a UMAP plot colored by MMDx diagnoses, mapping ABMR, TCMR, possible rejection (pABMR, pTCMR), Mixed, and No rejection. Figure 1B is the same distribution colored by DSAprob classifier scores, showing that a gradient of mild ABMR-related changes exists within No Rejection biopsies. There was also a gradient within ABMR correlating with stage (early>late) and in TCMR associated with Mixed rejection.

Within ABMR, DSAprob was higher in DSA+ than DSA- biopsies, but mild DSA-related changes were also detected in biopsies with No Rejection (NR), either by MMDx or histology (Table 1). DSAprob predicted DSA status, indicating the molecular changes detected in NR biopsies were DSA-related. In 738 biopsies with no rejection by MMDx, the 369 with high DSAprob scores (above the median) were more often DSA positive (36%) than those with low DSAprob scores (24%) (chisq pval=0.0004). Thus ABMR-related gene expression changes in No rejection biopsies are associated with DSA positivity.

NR biopsies with high DSAprob scores also had increased scores for other ABMR and NK-related classifiers and gene sets, but not TCMR or injury-related classifiers and gene sets.

Conclusions: A gradient of mild ABMR-related gene expression including NK-related and IFNG-related changes exists in many kidneys currently called no rejection that corresponds to a higher frequency of DSA, indicating that mild molecular ABMR-related changes occur in many more kidneys than currently diagnosed as ABMR by MMDx or by histology. DSA is likely stressing the microcirculation more widely than previously realized. (ClinicalTrials.gov NCT01299168 (kidney).

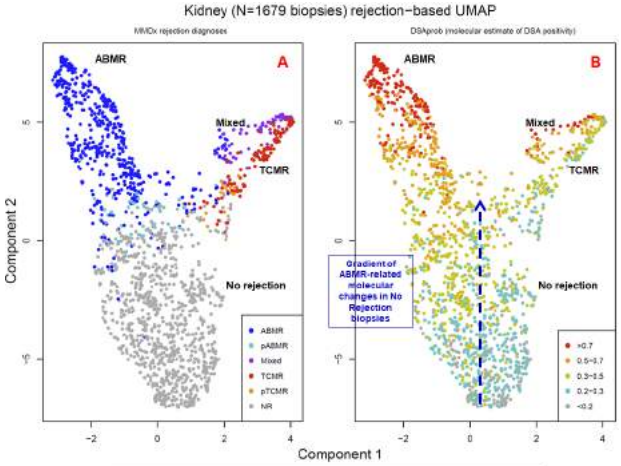


Table 1. Mean DSA probabilities in DSA positive vs negative biopsies across MMDx and histologic categories (Welch's t-test p values)

	DSA positive	DSA negative	p-value
Molecular report sign-out (MMDx)			
No Rejection	0.31	0.28	0.0004
ABMR	0.67	0.59	0.000009
Mixed	0.64	0.55	0.013
pABMR	0.46	0.41	0.16
pTCMR	0.38	0.29	0.09
TCMR	0.40	0.35	0.15
Histology			
No rejection	0.36	0.32	0.0009
ABMR	0.65	0.59	0.03
ABMR suspicious	0.55	0.44	0.02
AKI	0.26	0.27	0.77
Borderline	0.40	0.34	0.11
IFTA	0.38	0.31	0.006
Mixed	0.66	0.58	0.08
Other	0.40	0.33	0.005
TCMR	0.47	0.39	0.04

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DISCLOSURES: P.F. Halloran: Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **K.S. Madill-Thomsen:** None. **&. the INTERCOMEX Study Group:** None.

Abstract# 318

Beyond Microarrays: Insights from Ncounter Transcript Analysis of Routine Archival Kidney Allograft Biopsies

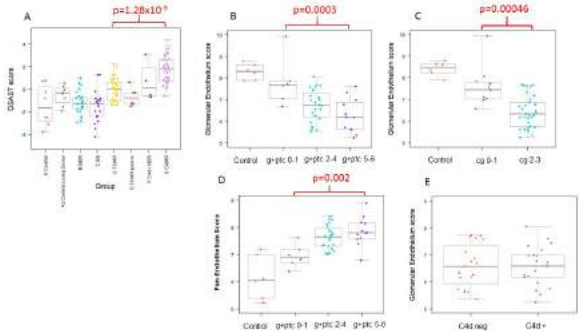
I. Rosales, K. Tomaszewski, A. Milagros, T. Kawai, R. Smith, R. Colvin, *Massachusetts General Hospital, Boston, MA*

Purpose: Microarray mRNA analysis of renal allograft biopsies has discovered important insights, but has limitations as a practical clinical test. Here we evaluate a new technique that quantifies transcripts from routine formalin fixed paraffin embedded (FFPE) tissue.

Methods: Gene expression was measured from 140 renal allograft biopsy samples (2003-2020): 45 chronic, active antibody mediated rejection (CAMR), 38 T cell mediated rejection (TCMR), 26 without evidence of rejection (NER), 19 borderline/suspicious (BS), 4 C4d+ NER, 8 living donor and 8 control native biopsies. RNA was extracted from 3 FFPE 20 µm sections and hybridized with the Banff Human Organ Transplant (B-HOT) 758 gene panel (NanoString) and quantitated (nCounter Max). Data were analyzed using the NanoString software with custom pathways and results correlated with Banff scores from the same biopsy core and outcome at 3 years.

Results: Many gene sets discriminated CAMR from TCMR. The best were DSAST (Hidalgo 2011, $p=1.28x10^{-9}$ Fig 1A, AUC 87.5%) and TCMR (Venner 2014; $p=1.3x10^{-8}$;AUC 84.9%), both derived from microarray studies, and CAMR NHP (Smith 2018; $p=10^{-6}$). TCMR pathway scores were reduced in responsive post-treatment biopsies. C4d+ CAMR had higher levels of AMR, B and T cell pathways than C4d- CAMR. Selective glomerular injury could be detected in CAMR. Biopsies with higher microvascular inflammation (g+ptc, Fig 1B) and transplant glomerulopathy (cg, Figure 1C) had a progressive reduction of glomerular endothelial transcripts (*EHD3, SOST*) and podocyte specific transcripts (*NPHS1, NPHS2*), but these were not affected by C4d deposition. In contrast, pan-endothelial transcripts (e.g., *CAV1, CDH5, PECAM1*) were increased (Fig 1D). Graft loss at 3 years after

TCMR/BS was rare, but those that failed showed higher endothelial scores due to occult AMR. Graft loss at 3 years in CAMR was associated with higher damage pathway scores but was not associated with increased AMR pathways.
Conclusions: Robust transcript data can be obtained from routine archival FFPE clinical biopsies using NanoString technology and the B-HOT panel. Several pathway scores distinguish CAMR and TCMR with reasonable ROC performance. New findings suggest microvascular inflammation, independent of complement activation, causes glomerular injury in CAMR. Damage pathway scores rather than AMR or TCMR pathways predicted CAMR outcomes, but AMR pathways were predictive of rare graft failure in TCMR/BS biopsies.



CITATION INFORMATION: Rosales I., Tomaszewski K., Milagros A., Kawai T., Smith R., Colvin R. Beyond Microarrays: Insights from Ncounter Transcript Analysis of Routine Archival Kidney Allograft Biopsies *AJT, Volume 21 Supplement 3*
DISCLOSURES: I. Rosales: Other; Name of Commercial Interest; eGenesis. Other; Nature of Relationship; consultant. Other; If "Other" Please Explain; no fees. **K. Tomaszewski:** Grant/Research Support; If "Other" Please Explain; Supported by NIHT32 2T32AI007529-21A1. **A. Milagros:** None. **T. Kawai:** None. **R. Smith:** None. **R. Colvin:** Consulting Fee; Name of Commercial Interest; eGenesis, Takeda, CSL Behring.

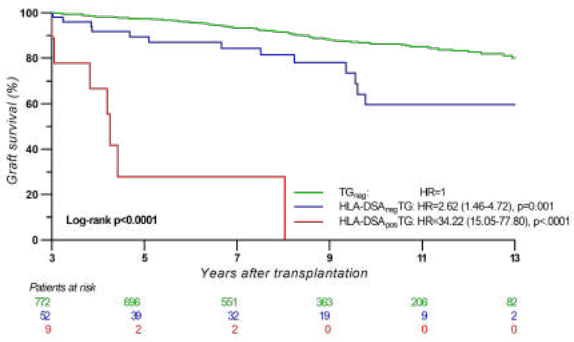
Abstract# 319

Transplant Glomerulopathy in the Absence of Donor-specific HLA Antibodies: Risk Factors, Histopathological Features and Graft Outcome

A. Senev, E. Van Loon, M. Emonds, M. Naesens, *Microbiology, Immunology and Transplantation, KU Leuven, Leuven, Belgium*

Purpose: Transplant glomerulopathy (TG) is established as a hallmark of chronic antibody-mediated rejection in kidney transplant patients with donor-specific HLA antibodies (HLA-DSA). The clinical importance of TG in the absence of HLA-DSA is not well established.
Methods: Patients who underwent kidney transplantation between 2004-2013 were included in this study (N=954 with 3744 biopsies). We investigated the risk factors, histopathological appearance and prognosis of cases with TG in the absence of HLA-DSA, compared to cases of TG with HLA-DSA, and we evaluated the impact of the PIRCHE-II score and eplet mismatches, determined using high-resolution HLA genotyping, on TG development.
Results: In this cohort, 98 patients (10.3%) developed TG, on average at 3.2 years posttransplant. At the time of TG, 23 patients (23.5%) had persistent pretransplant or *de novo* HLA-DSA (HLA-DSA_{pos}TG group), while 75 patients (76.5%) were HLA-DSA negative (HLA-DSA_{neg}TG). Only HLA-DSA were identified as risk factor for TG development; HLA molecular mismatches, eplet mismatches and PIRCHE-II scores did not associate with TG. The HLA-DSA_{neg}TG biopsies had less interstitial inflammation, less glomerulitis and less C4d deposition in peritubular capillaries compared to the HLA-DSA_{pos}TG biopsies. While graft function was comparable between the two groups, HLA-DSA_{pos}TG was associated with a higher risk of graft failure compared to HLA-DSA_{neg}TG (HR=3.84; 95%CI 1.94-7.59; p=0.0001). Landmark analysis at 3-year post-transplant showed that HLA-DSA_{neg}TG patients still had an increased risk of graft failure compared to TG-negative patients (HR=2.62; 95%CI 1.46-4.72; p=0.001).
Conclusions: In conclusion, TG often occurs in the absence of HLA-DSA, independently of HLA molecular mismatches, and represents a different phenotype with less concomitant inflammation and better graft survival compared to TG developed in the presence of HLA-DSA.

Figure 1. Landmark survival analysis of the patients with TG.



CITATION INFORMATION: Senev A., Van Loon E., Emonds M., Naesens M. Transplant Glomerulopathy in the Absence of Donor-specific HLA Antibodies: Risk Factors, Histopathological Features and Graft Outcome *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Senev: None. **E. Van Loon:** None. **M. Emonds:** None. **M. Naesens:** None.

Abstract# 320

High Donor-Derived Cell-Free DNA Levels Predict Development of De Novo HLA Donor-Specific Antibodies After Kidney Transplantation - Data from the ADMIRAL Study

G. Gupta[1], T. Alhamad[2], V. Bowers[3], I. Moinuddin[1], S. Ghosh[4], J. Zeng[4], E. Stites[5], A. Pai[6], J. S. Bromberg[7], S. Anand[8], *[1]Virginia Commonwealth University, Richmond, VA, [2]Washington University in St. Louis, St. Louis, MO, [3]Tampa General Hospital, Tampa, FL, [4]CareDx, Brisbane, CA, [5]University of Colorado, Aurora, CO, [6]University of Texas McGovern Medical School, Houston, TX, [7]University of Maryland School of Medicine, Baltimore, MD, [8]Intermountain Medical Center, Murray, UT*

Purpose: Donor-derived cell-free DNA (dd-cfDNA) as a marker of injury can serve to quantify *subclinical* inflammation and molecular injury. As the release of graft genomic material is ongoing into recipient's circulation, such processes may contribute to recipient immune sensitization. Donor-derived nucleic acids, as reflected in elevated dd-cfDNA levels, may result in leucocyte activation, cytokine release, and *de novo* donor specific antibody (dnDSA) formation. We hypothesized elevated dd-cfDNA levels may predict subsequent HLA dnDSA development after kidney transplant (KT).
Methods: 961 patients from the prospective multicenter Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219) were examined. All patients had dd-cfDNA (AlloSure®; CareDx) levels monitored during standard post-KT surveillance and paired HLA DSA testing, with all clinical events captured. An elevated dd-cfDNA was defined as >0.5% based on the injury analysis performed within ADMIRAL cohort.
Results: Multivariable Cox proportional hazards regression analysis [**FIGURE 1**] supported an effect size of 1.2 (p =0.004), for dd-cfDNA, indicating 20% increased risk of dnDSA for every 1% increase in the dd-cfDNA level. The majority of dnDSA were diagnosed within the 1st year post-KT. The median elevation of dd-cfDNA was 291 days preceding detection of dnDSA, suggesting elevations of dd-cfDNA may happen ahead of DSA formation. By dichotomizing the continuous dd-cfDNA predictor at a threshold 0.5% (low: <0.5%) - case-control numbers shown in **TABLE 1** - a significantly increased hazard ratio (HR) of 2.57 (p=0.003) for development of dnDSA was observed. [**FIGURE 2**].

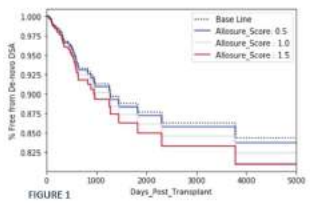


FIGURE 1

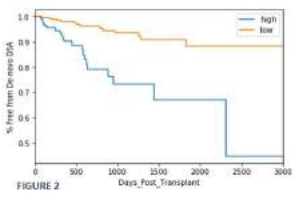


FIGURE 2

# of Cases	0-500 (days post-KT)	500-1000	1000-1500	1500-2000	2000-2500	2500-3000	>3000
Low (≤0.5)	808	207	103	49	27	16	10
High (>0.5)	153	57	23	11	8	2	1

TABLE 1

Conclusions: Higher dd-cfDNA levels appear to precede the development of dnDSA after KT. A potential causal relationship of dd-cfDNA and dnDSA will require further

study. A prospective interventional study, implementing dd-cfDNA monitoring and real-time targeted immunomodulation in response to dd-cfDNA levels, may provide significant value to patient care.

CITATION INFORMATION: Gupta G., Alhamad T., Bowers V., Moinuddin I., Ghosh S., Zeng J., Stites E., Pai A., Bromberg J., Anand S. High Donor-Derived Cell-Free DNA Levels Predict Development of De Novo HLA Donor-Specific Antibodies After Kidney Transplantation - Data from the ADMIRAL Study *AJT, Volume 21 Supplement 3*

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Abstract# 321

Novel Mixed Lymphocyte Reaction Monitoring System That Predicts Chronic Antibody- Mediated Rejection in Kidney Transplant Recipients

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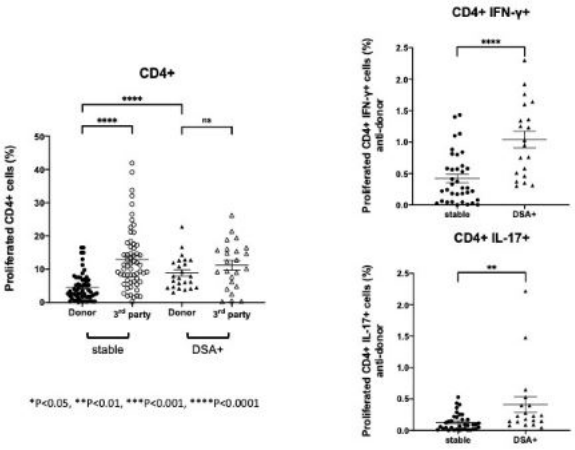
Purpose: Chronic active antibody-mediated rejection (CAAMR) induced by *de novo* donor-specific antibodies (DSA) is the main cause of graft loss in the long-term. Currently, there is no effective treatment or predictive marker for CAAMR exists. Therefore, a reliable immunoresponse monitoring system to identify recipients who will develop CAAMR in the future is required to improve long-term allograft survival. A novel CFSE/MLR assay was developed to evaluate T cell responses in kidney transplant recipients.

Methods: This assay was developed using isolated T cells as responders, which is much more sensitive to detect T cell responses compared with the standard MLR using PBMCs. In this study, 84 kidney transplant recipients were evaluated using this novel assay. The recipients were divided into two groups (stable; n=60, DSA+; n=24) and their T cell responses were compared.

Results: In pathological analyses, all recipients in the stable group experienced any incidents of rejection, whereas 18 DSA+ recipients developed CAAMR and 6 DSA+ recipients still did not develop CAAMR (pre-CAAMR). The MLR assay revealed that the anti-donor $CD4^+$/$CD8^+$ T cell responses were significantly higher in DSA+ recipients than in stable recipients. Interestingly, in stable recipients, the anti-donor $CD4^+$ T cell response was significantly lower than the anti-third-party response, and the donor-specific hyporesponsiveness was also observed in $CD8^+$ T cells. In contrast, donor specific hyporesponsiveness of $CD4^+$ T cells disappeared in DSA+ recipients. To elucidate the underlying mechanisms for DSA production, the levels of INF-γ, IL-4, IL-17 and FOXP3 in responder T cells were evaluated to identify which $CD4^+$ T cell subsets were expanding. Proliferating $CD4^+$ T cells showed a marked increase in the Th1 ($CD4^+INF\text{-}\gamma^+$) and Th17 ($CD4^+IL\text{-}17^+$) response in DSA+ recipients, whereas there was no difference in donor reactive Th2 ($CD4^+IL4^+$) and Treg ($CD4^+FOXP3^+$). Evaluation of the six pre-CAAMR recipients showed a similar $CD4^+$ T cell landscape, suggesting that the novel MLR assay can predict the development of CAAMR.

Conclusions: DSA+ recipients have a greater potential for immune responses against the donor tissue. CFSE/MLR using isolated T cells is a useful immunoresponse monitoring system to predict the development of CAAMR.

Figure: CFSE/MLR in 84 kidney taransplant recipients



CITATION INFORMATION: Iwahara N., Hotta K., Tanabe T., Iwami D., Takada Y., Higuchi H., Sasaki H., Harada H., Shinohara N. Novel Mixed Lymphocyte Reaction Monitoring System That Predicts Chronic Antibody- Mediated Rejection in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

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Abstract# 322

The Trifecta Study: Calibrating Circulating Donor-Derived Cell-Free DNA at the Time of Indication Biopsies Against the Molecular Phenotype of the Biopsy Reveals a Prominent Association with NK Cell Genes

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Purpose: The international, multicenter, prospective Trifecta study was designed to calibrate dd-cfDNA% measurements in blood at the time of indication biopsy against the molecular characteristics of the biopsies using the Molecular Microscope® (MMDx) (*ClinicalTrials.gov NCT04239703).*

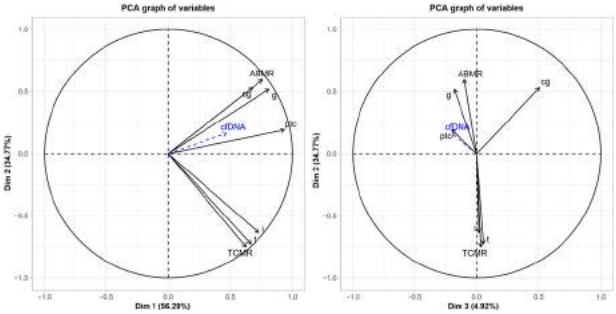
Methods: MMDx was used to assess TCMR, ABMR, acute kidney injury, atrophy-fibrosis, and genome-wide gene expression in the biopsy samples. dd-cfDNA% assays (Prospera) were performed on blood samples by Natera. We analyzed 189 biopsies from 14 centers. By MMDx, the diagnoses were: No rejection 104; ABMR 43; Possible ABMR 16; Mixed 7; TCMR 14 (5 with histologic BK); Possible TCMR 5.

Results: The 20 genes most strongly correlated with dd-cfDNA% are shown in **Table 1**. Most (20/21) were genes annotated as ABMR-rejection associated (ABMR-RATs) from previous studies. Most were expressed in NK cells (GNLY TRDC, CCL4) or represented IFNG effects (PLA1A, LYPD5 (LY6), IDO1, CXCL11). Endothelium-expressed genes were not prominent. By MMDx diagnosis, dd-cfDNA% was strongly related to active early stage- and fully-developed ABMR. In principal component analysis (**Figure 1**) using rejection classifiers as inputs, dd-cfDNA% correlated with ABMR in PC1 and PC2, and with early stage and fully developed ABMR in PC3. The results were less consistent in TCMR, and some biopsies with no MMDx rejection had high %dd-cfDNA scores. Mean scores were somewhat higher in very early biopsies and in late biopsies, increasing with time of biopsy post-transplant, but there were no strong correlations with injury or with atrophy-fibrosis. The AUCs of %dd-cfDNA for rejection were higher for MMDx than histologic rejection.

Conclusions: Results in 189 Trifecta indication biopsy reveal that dd-cfDNA% at time of biopsy is strongly related to the active ABMR processes in the biopsy but particularly NK cell genes and IFNG-induced genes.

Table 1. Top genes correlated with %dd-cfDNA in 189 in kidney biopsies (genes represented in top 30 probesets

Affy	SYMB	Name	PBT	Cell expression	Spearman correlation	p-value
11751857_a_at	GNLY	granulysin	ABMR-RAT	NK cells	0.489	9.4E-13
11761790_x_at	TRDC	T cell receptor delta constant	ABMR-RAT	NK cells	0.473	6.6E-12
11718983_x_at	CCL4	chemokine (C-C motif) ligand 4	ABMR-RAT	NK cells	0.469	1E-11
11727116_a_at	PLA1A	phospholipase A1 member A	ABMR-RAT	IFNG-induced endothelium	0.456	4.3E-11
11744660_s_at	CCL4L1	chemokine (C-C motif) ligand 4-like 1 /// chemokine (C-C motif) ligand 4-like 2	ABMR-RAT	?	0.455	4.6E-11
11735394_s_at	XCL1	chemokine (C motif) ligand 1 /// chemokine (C motif) ligand 2	ABMR-RAT	?	0.452	6.8E-11
11729649_at	PRF1	perforin 1 (pore forming protein)	ABMR-RAT	NK cells	0.451	7.5E-11
11739775_a_at	LYPD5	LY6/PLAUR domain containing 5	ABMR-RAT	IFNG-induced	0.441	2.2E-10
11733353_at	CRTAM	cytotoxic and regulatory T-cell molecule	ABMR-RAT	NK cells	0.439	2.6E-10
11743168_at	IDO1	indoleamine 2,3-dioxygenase 1	ABMR-RAT	IFNG-induced	0.439	2.6E-10
11753534_a_at	KLRD1	killer cell lectin-like receptor subfamily D, member 1	ABMR-RAT	NK cells	0.439	2.6E-10
11752664_a_at	S1PR5	sphingosine-1-phosphate receptor 5	ABMR-RAT	NK cells	0.434	4.5E-10
11726287_a_at	WARS	tryptophanyl-tRNA synthetase	ABMR-RAT	NK cells	0.428	8.4E-10
11725861_a_at	MYBL1	v-myb avian myeloblastosis viral oncogene homolog-like 1	ABMR-RAT	NK cells?	0.425	1.1E-09
11749245_a_at	CXCL11	chemokine (C-X-C motif) ligand 11	ABMR-RAT	IFNG-induced	0.425	1.1E-09
11763447_x_at	TRDC	T cell receptor delta constant	ABMR-RAT	NK cells	0.425	1.1E-09
11755474_a_at	ADAM15	ADAM metallopeptidase domain 15	ABMR-RAT	?	0.422	1.5E-09
11724900_a_at	GZMB	granzyme B	ABMR-RAT	NK cells	0.421	1.7E-09
11735864_a_at	CD160	CD160 molecule	ABMR-RAT	NK cells	0.42	1.8E-09
11725642_at	EFHD2	EF-hand domain family member D2	cIRIT.LivGST_UP	injury	0.418	2.3E-09
11740157_at	SH2D1B	SH2 domain containing 1B	ABMR-RAT	NK cells	0.417	2.4E-09



CITATION INFORMATION: Halloran P., Demko Z., Prewett A., Reeve J., Billings P. The Trifecta Study: Calibrating Circulating Donor-Derived Cell-Free DNA at the Time of Indication Biopsies Against the Molecular Phenotype of the Biopsy Reveals a Prominent Association with NK Cell Genes *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Halloran: Consulting Fee; Name of Commercial Interest; Natera. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **Z. Demko:** Ownership Interest; Name of Commercial Interest; Natera Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **A. Prewett:** Ownership Interest; Name of Commercial Interest; Natera Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **J. Reeve:** None. **P. Billings:** Ownership Interest; Name of Commercial Interest; Natera Inc.. Ownership Interest; Nature of Relationship; employee and equity holder.

Abstract# 323

Prospective Intensive Monitoring for Anamnestic DSA Responses Allows Near Elimination of Early Clinical AMR

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Purpose: Anamnestic donor specific antibody (aDSA) responses can result in severe, graft threatening antibody-mediated rejection (AMR). We hypothesized that intensive DSA monitoring (IDM) for aDSA will allow early detection/treatment thereby limiting graft injury and improving outcomes.

Methods: From May 2016 to Oct 2019 IDM for aDSA was prospectively implemented in high risk patients (pts). High risk for aDSA was defined by:1)previous transplant (txp), 2)female with preexposure to paternal antigen, 3)pretransplant DSA, 4)post-txp oliguric ATN/slow function in pts with previous HLA exposure, 5)current cytotoxic PRA >25%,peak cytotoxic PRA or calculated PRA >50%, 6)positive T or B cell flow crossmatch. IDM was performed on PTD 0,1,2,3,5,7,14,30,90,180,360. Biopsies (Bx) were obtained for aDSA>5000 or renal dysfunction. aDSA was defined as DSA within 14 posttransplant days (PTD). aDSA were treated for MFI>5000 or progressive increases or AMR on Bx.

Results: 120 pts underwent IDM: 57(47.5%) developed aDSA of whom 33/57(57.8 %) resolved without treatment. 24/57 (42%) pts were treated for aDSA. After the first 5 allograft Bx each demonstrated early/mild AMR, Bx were deemed unnecessary. After treatment, 11 (69%) pts without Bx cleared aDSA and 3 (38%) patients with AMR on Bx cleared aDSA (overall treated DSA clearance (14/24pts),57.8%). Amongst treated pts,16/24(66.7%) were treated without Bx and 8/24 (33.3%) patients had Bx meeting AMR criteria. Of treated pts, 15/24 (62.5%) had peak aDSA>5000 MFI. The strongest factor predictive of requirement for treatment was pre-existing DSA (p<0.0001). 4 pts had acute graft dysfunction due to aDSA with highest peak creatinine being 2.48 mg/dl. Overall death-censored graft survival was >98% with mean follow-up>1000 days. Deaths in treated pts were not due to overimmunosuppression. [table1]

Conclusions: 1) 47.5% of high risk pts developed aDSA, in whom 57.8% resolved with observation alone, 2) 42% of aDSA were treated with clearance in over half of pts, 3) IDM allows for early aDSA detection with avoidance of renal dysfunction in 97% of pts, 4) early aDSA detection enables avoidance of early post transplant allograft Bx,4) pretransplant DSA is the strongest predictor for aDSA requiring treatment, and 5) IDM allows early DSA detection/management with overall DCGS >98% at mean follow-up of>1000 days in a high risk population.

Table 1	Treated DSA Patients	Non-Treated Patients	p value
Demographics	N=24	N=96	
Mean Age (yrs)	41.7 ± 1.89	52.8 ± 1.34	<0.0001
African American Race	7 (29%)	23 (24%)	0.5997
Female	16 (67%)	56 (58%)	0.4579
Mean CDC PRA %	20.3 ± 33.2	12.7 ± 26.7	<0.0001
Mean cPRA %	51.6 ± 8.8	47.2 ± 4.3	0.0263
Living Donor Transplant	18 (75%)	46 (48%)	0.0178
High Risk DSA Indication Factors*			
Repeat Paternal Antigen Exposure	3 (13%)	8 (8%)	0.5286
Oliguric ATN or Slow Graft Function with prior HLA exposure/sensitization	0	21 (21.8%)	0.0120
Pre-formed DSA	13 (76%)	8 (8%)	<0.0001
Repeat Transplant	8 (33%)	46 (48%)	0.2009
PRA >50%	13 (54%)	48 (50%)	0.7161
Positive flow cross match	1 (4%)	3 (3%)	0.8001
Long Term Outcomes			
Patient Survival	21 (88%)	94 (98%)	0.0229
Death-censored Graft Survival	21/21 (100%)	92/94 (98%)	0.5020
Mean eGFR (MDRD) at last follow up (ml/min/m2)	54.8 ± 20.3	57 ± 19.1	0.0290
Mean Post-Txp Follow-up (days)	1008 ± 463	1034 ± 327	0.1963

*Patients could have more than 1 indication

CITATION INFORMATION: McGowan M., Bickenbach A., Shields A., Alloway R., Brailey P., Portwood E., Alquist C., Christianson A., Abu Jawdeh B., Cuffy M., Kremer J., Bumb S., Govil A., Anand M., Kaur T., Woodle E. Prospective Intensive Monitoring for Anamnestic DSA Responses Allows Near Elimination of Early Clinical AMR *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. McGowan: None. **A. Bickenbach:** None. **A.R. Shields:** None. **R.R. Alloway:** None. **P. Brailey:** None. **E. Portwood:** None. **C. Alquist:** None. **A. Christianson:** None. **B. Abu Jawdeh:** None. **M. Cuffy:** None. **J. Kremer:** None. **S. Bumb:** None. **A. Govil:** None. **M. Anand:** None. **T. Kaur:** None. **E.S. Woodle:** None.

Abstract# 324

$CD56^{dim}CD16^{bright}$ NK Cells from Kidney Transplant Recipients with Antibody-mediated Rejection Display Increased Proliferation, Type-1 Activation and Cytotoxic Profile

E. Bailly[1], C. Macedo[1], K. Louis[1], B. Ramaswami[1], M. Lucas[1], C. Bentlejewski[1], P. Randhawa[1], A. Zeevi[1], C. Lefaucheur[2], D. Metes[1], *[1]Department of Surgery, Thomas E. Starzl Transplantation Institute, Pittsburgh, PA, [2]INSERM UMR-S976. Endothelium, Inflammation & Alloreactivity, Université de Paris, Paris, France*

Purpose: $CD56^{dim}CD16^{bright}$ NK cells are highly potent for cytotoxicity through cell-mediated cytotoxicity (CMC), antibody-dependent cell-mediated cytotoxicity (ADCC) and INF-γ production. The contribution of NK cells to antibody-mediated rejection (ABMR) injuries have been highlighted through transcriptomic analysis and immunohistochemistry of kidney and heart allograft biopsies. However, description of circulating NK cells profiles during ABMR is lacking.

Methods: Deep phenotypic analysis of circulating $CD56^{dim}$ $CD16^{bright}$ NK cells using 25-color spectral flow cytometry was implemented in 68 kidney transplant (KTx) recipients: (i) 17 donor specific anti-HLA antibody (DSA) free of ABMR, (ii) 17 DSA+ biopsy-proven mixed ABMR (DSA+ABMR+), (iii) 17 stable free of DSA/rejection, (iv) 17 T-cell mediated rejection and 17 healthy controls. Samples were analyzed at the time of rejection, of first DSA occurrence or at a matching time point in stable patients. Functional assays were performed in 8 patients from each group, consisting of 6-hours coculture of PBMC with T2 lymphoblastic cells (TAP-deficient, HLA-A2 expressor) ± anti-HLA-A2+ serum.

Results: $CD56^{dim}CD16^{bright}$ NK cells from DSA+ABMR+ patients, when compared to the other groups, significantly proliferated (Ki67+) and selectively up-regulated IL-2R/-15Rβ chain and IL-21R, suggesting their higher responsiveness to common γc cytokines that support NK cell survival/proliferation and cytotoxicity. Moreover, they co-expressed significant elevated levels of EOMES and T-bet, as well as of CD16A/FcγRIIIA-inducible CD160 and CD161/NK1.1, cytotoxicity markers that reflect their higher Type-1 activation status. Indeed, $CD56^{dim}CD16^{bright}$ NK cells from DSA+ABMR+ patients displayed increased INF-γ and TNF-α/IL-10 ratios in ADCC and CMC assays. CXCR3 overexpression was noted suggesting a higher migration potential towards inflamed tissues.

Conclusions: Significant NK cell phenotypic and functional changes occur during ABMR with potential involvement to allograft injury. Early detection of proliferating, activated, cytotoxic $CD56^{dim}CD16^{bright}$ NK cells in the blood of patients with ABMR could help for timely therapeutic intervention.

CITATION INFORMATION: Bailly E., Macedo C., Louis K., Ramaswami B., Lucas M., Bentlejewski C., Randhawa P., Zeevi A., Lefaucheur C., Metes D. CD-56^{dim}CD16^{bright} NK Cells from Kidney Transplant Recipients with Antibody-mediated Rejection Display Increased Proliferation, Type-1 Activation and Cytotoxic Profile *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Bailly: None. **C. Macedo:** None. **K. Louis:** None. **B. Ramaswami:** None. **M. Lucas:** None. **C. Bentlejewski:** None. **P. Randhawa:** None. **A. Zeevi:** None. **C. Lefaucheur:** None. **D. Metes:** None.

Kidney

Kidney Psychosocial

Abstract# 325

The Relationship Between Health Literacy and Adverse Outcomes After Kidney Transplantation

E. Lorenz, T. Petterson, C. Schinstock, W. Sanchez, K. Yost, *Mayo Clinic, Rochester, MN*

Purpose: Limited health literacy has been associated with a decreased likelihood of listing for transplant and an increased risk of waitlist mortality among kidney transplant candidates. However, little is known about the impact of health literacy on post-transplant outcomes. The objective of this study was to examine the relationship between health literacy and outcomes after kidney transplantation.

Methods: We assessed health literacy in 691 adults undergoing kidney transplant evaluation at our center between 6/2015 and 3/2017 using the 4-item Brief Health Literacy Screening Tool (BRIEF) as part of a pilot educational intervention. Health literacy was defined as limited if the BRIEF score was ≤ 12, marginal if 13-16, and adequate if ≥ 17. Health literacy was examined using Cox proportional hazards regression, logistic regression, and linear regression modeling.

Results: During follow-up, 298 adult patients underwent kidney transplant alone at our center. Mean age was 53 ± 14 years, 60% were men, and 78% received living donor kidney transplants. Overall, 25% of the patients (n=74) had limited or marginal health literacy. Limited or marginal health literacy was associated with diabetes and a history of a high school education or less but not with dialysis dependency, donor type, or donor age. No relationship between patient health literacy and post-transplant hospital length of stay, rehospitalizations, or acute rejection was observed. However, marginal patient health literacy was significantly associated with renal allograft failure and death (HR 5.4, CI 1.8-16.1, p=0.003 and HR 7.2, CI 1.7-29.9, p=0.008, respectively). The relationship between marginal health literacy and renal allograft failure and death appeared to be independent of age, gender, or diabetes. Further analysis of the health literacy questions suggest that self-reported need for help with reading materials from doctors or nurses, such as instructions for medicine, was associated with renal allograft failure and with death.

Conclusions: Limited or marginal health literacy was observed among one quarter of patients receiving kidney transplants at our center. Marginal health literacy, specifically self-reported difficulty reading written materials, appeared to be significantly associated with renal allograft failure and death following kidney transplantation. Efforts to improve post-transplant communication may improve outcomes in kidney transplant recipients with marginal health literacy.

CITATION INFORMATION: Lorenz E., Petterson T., Schinstock C., Sanchez W., Yost K. The Relationship Between Health Literacy and Adverse Outcomes After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Lorenz: None. **T. Petterson:** None. **C. Schinstock:** None. **W. Sanchez:** None. **K. Yost:** None.

Abstract# 326

Evolving Trends in Risk Profiles and Outcomes in Older Adults Undergoing Kidney Re-Transplantation

S. Sandal[1], J. Ahn[2], M. Cantarovich[1], N. Chu[2], D. Segev[2], M. McAdams DeMarco[2], *[1]McGill University, Montreal, QC, Canada, [2]Johns Hopkins University, Baltimore, MD*

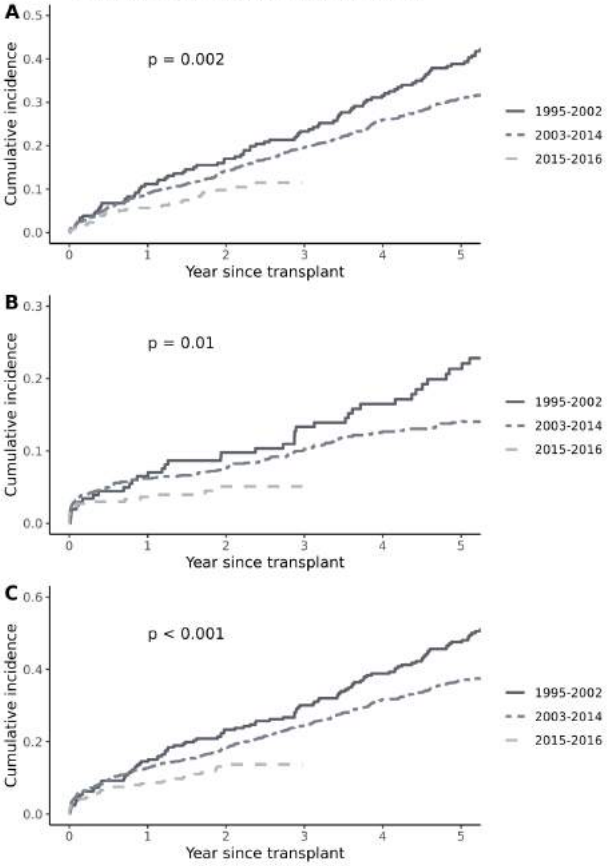
Purpose: The half-life of a kidney transplant (KT) is 8-12 years, and a significant proportion of patients end up with graft loss at age ≥65 years. Indeed, graft loss is one of the leading causes of kidney failure. While there has been a significant increase in older adults receiving their first KT over the past three decades, it is not known if there were parallel trends in re-KT. Thus, we aimed to characterize the trends, changing landscape, and outcomes of re-KTs in older adults.

Methods: Among the 44,149 older kidney-only recipients (1995-2016) in the Scientific Registry of Transplant Recipients, we identified 1,743 who were undergoing re-KT. We analyzed trends by eras (1995-2002, 2003-2014 and 2015-2016) and outcomes (death-censored graft failure (DCGF), all-cause graft failure (ACGF), death) using Kaplan-Meier estimators.

Results: Among all older patient undergoing KT, only 3.9% were re-KT. However, over time this proportion increased significantly (1995-2002: 2.7%, 2003-2014: 4.2%, 2015-2016: 5.7%, p<0.001). The median age at re-KT (1995-2002: 67, 2003-2014: 68, 2015-2016: 68, p=0.04) and the lifetime of the first transplant, i.e. duration of exposure to immunosuppression (1995-2002: 2.7, 2003-2014: 6.5, 2015-2016: 8.6 years, p<0.001) have also increased significantly. Older re-KT patients are more likely to have a PRA of 80-100% (1995-2002: 22.0%, 2003-2014: 32.7%, 2015-2016: 48.7%, p<0.001), spend longer time on dialysis after first graft failure (1995-2002: 1.4 years, 2003-2014: 1.5 years, 2015-2016: 2.2 years, p=0.003), be living with assistance (1995-2002: 9.0%, 2003-2014: 12.6%, 2015-2016: 24.8%, p<0.001), undergo donations after circulatory death (1995-2002: 1.1%, 13.4%, 19.5%, p<0.001), and have an older donor (1995-2002: 40 years, 2003-2014: 43 years, 2015-2016: 43.5 years, p=0.04). Despite this, the 3- and 5-year cumulative incidence of death, DCGF and ACGF have decreased significantly over time (Figure 1).

Conclusions: In older adults with re-KT, the 3-year cumulative incidence for death, DCGF, and ACGF has decreased by >50% in the past two decades despite a widening risk profile. Yet, they represent a small fraction of the total KTs performed. It is encouraging to see that this proportion has doubled over the past two decades, however, there are likely significant barriers to re-KT in older adults. Factors associated with these trends need to be better understood to inform clinical practice and policy.

Figure 1: Cumulative incidence of (a) death, (b) death-censored graft failure, and (c) all-cause graft failure after re-KT, stratified by three eras of interest in re-KT (1995-2002, 2003-2014, and 2015-2016)



CITATION INFORMATION: Sandal S., Ahn J., Cantarovich M., Chu N., Segev D., McAdams DeMarco M. Evolving Trends in Risk Profiles and Outcomes in Older Adults Undergoing Kidney Re-Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Sandal: Grant/Research Support; Name of Commercial Interest; Education grant from Amgen Canada. **J. Ahn:** None. **M. Cantarovich:** None. **N. Chu:** None. **D. Segev:** Honoraria; Name of Commercial Interest; Sanofi and Novartis. **M. McAdams DeMarco:** None.

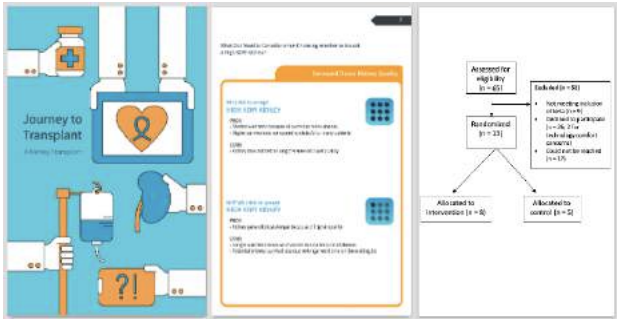
Abstract# 327

Journey to Transplant: A Pilot Feasibility Trial of a Virtual Counseling Intervention for Patients and Their Social Support Networks to Improve Access to Kidney Transplant

A. Hart[1], R. Edpuganti[2], H. D'Cunha[2], S. Kurschner[2], W. T. McKinney[1], A. Matas[1], R. Patzer[1], S. Chu[1], M. Bruin[1], M. Partin[1], *[1]Hennepin Healthcare, University of Minnesota, Minneaplis, MN, [2]Hennepin Healthcare Research Institute, Minneaplis, MN*

Purpose: Home counseling interventions have shown promise in increasing rates of kidney transplant, but are challenging to implement. We piloted a structured but individualized virtual counseling intervention, including a risk calculator for outcomes on the waitlist, for a candidate with their social support network (SSN).

Methods: Transplant candidates, defined as patients moving beyond the initial evaluation, were recruited from 2 centers in Minneapolis. The study was informed by a patient and family advisory committee comprised of 12 kidney transplant candidates, recent recipients, and family members. The 1.5-hour virtual counseling session was designed using Intervention Mapping to incorporate focus group data on patient and SSN needs into an intervention grounded in behavior change theory. The intervention was conducted by a nephrologist and consists of 3 parts: 1) standardized education about transplant options, pros and cons, 2) review of the patient's calculated likely outcomes on the deceased donor waitlist, and 3) addressing barriers and needs specific to that patient.
Results: 8 kidney transplant candidates, along with 19 (1-4 each) of their SSN members, were randomized to the intervention, and 5 candidates to controls. Half of social support network members reported getting all their information from the patient. Both patients and SSN members had knowledge gaps prior to the intervention; e.g. 67% of patients and 57% of SSN members did not know that living donor kidneys usually last longer than deceased donor kidneys. After the intervention, participants reported having a better understanding of options such as increased infectious risk kidneys in light of likely outcomes on the list, and felt more empowered. The outcomes calculator was emotional but well-received by SSN members in particular. SSN members reported better understanding their patient's disease and how to help the patient get transplanted. Participants gave useful feedback on how to improve the intervention.
Conclusions: A virtual group counseling session with patients along with their SSN is feasible in different transplant center settings and well-received by patients and SSN members. Recruitment will begin at a third center in Atlanta, GA to further assess implementation barriers. A future randomized controlled trial will determine whether the intervention increases rates of kidney transplant.



CITATION INFORMATION: Hart A., Edpuganti R., D'Cunha H., Kurschner S., McKinney W., Matas A., Patzer R., Chu S., Bruin M., Partin M. Journey to Transplant: A Pilot Feasibility Trial of a Virtual Counseling Intervention for Patients and Their Social Support Networks to Improve Access to Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Hart: Grant/Research Support; Name of Commercial Interest; CSL Behring. **R. Edpuganti:** None. **H. D'Cunha:** None. **S. Kurschner:** None. **W.T. McKinney:** None. **A. Matas:** None. **R. Patzer:** None. **S. Chu:** None. **M. Bruin:** None. **M. Partin:** None.

Abstract# 328

Understanding Transplant Decision Making Concerns for African, Caribbean and Black Canadian Patients with End-Stage Kidney Disease

N. Singh[1], A. Wasim[1], W. Hajjar[1], K. Mohan[1], N. El-Dassouki[1], H. Habbal[1], L. Angarso[1], A. Dychiao[1], S. Macanovic[1], A. D. Waterman[2], I. Mucsi[1], *[1]University Health Network, Toronto, ON, Canada, [2]David Geffen School of Medicine, UCLA, Los Angeles, CA*
Purpose: Compared to White Canadians, African, Caribbean and Black (ACB) Canadians with end stage kidney disease (ESKD) are less likely to receive a living donor kidney transplant (LDKT). We explored factors associated with kidney transplant (KT) decision-making, specifically the weight patients give to perceived pros and cons for KT decisions.
Methods: Using the Transplant Decisional Balance survey, patients rated the importance of perceived pros and cons to KT decision-making from 1-5 ("not important"-"extremely important"). In a cross-sectional convenience sample of adults with ESKD in Toronto, ethnicity was self-identified. Individual ratings of pro/con items were summed to yield LDKT and deceased donor KT (DDKT) pro/con scores. Individual scale items were also examined: dichotomized (not/slightly/moderately vs very/extremely important) and their independent association with ethnicity analyzed in multivariable logistic regression.
Results: Among the 590 participants (mean[SD] age 57[13] years, 62% male), 24% were ACB, and 42% were White. ACB participants were less likely to have >12 years of education (44% vs 64%, p<0.001) and incomes of >$30K/year (39% vs 71%, p<0.001) compared to White participants. The summed LDKT scores and DDKT pro scores were similar between the groups. However, ACB participants rated perceived DDKT con scores (12[5,16] vs 9[5,13]; p=0.002) higher than Whites. In univariable analysis, ACB participants were more likely to indicate that perceived "trouble paying for medications" (OR, 2.28 [95% CI: 1.44, 3.59), "taking many medications post-transplant" (OR, 2.47 [95% CI: 1.69, 4.42]), "pain from surgery" (OR, 1.83 [95% CI: 1.11, 3.11]) and potential "health problems due to transplant" (OR, 1.83 [95% CI: 1.11, 3.02) were important to their decision about transplant compared to Whites. After adjusting for sociodemographic variables, comorbidity and transplant knowledge at baseline, the importance of "taking many medications post-transplant" (OR, 2.11 [95% CI: 1.27, 3.51) and "trouble paying for medications" (OR, 1.72 [95% CI: 1.02, 2.90) remained associated with ACB ethnicity in the final logistic regression model. However these associations were not significant after adjusting for transplant knowledge for "pain from surgery" (OR, 1.56 [95% CI: 0.89, 2.72]) and "health problems due to transplant" (OR, 1.45 [95% CI: 0.89, 2.36).
Conclusions: Concerns about the quantity of post-transplant medications and anticipated financial strain are associated with KT decisions among ACB Canadians with ESKD compared to Whites. Further qualitative research is needed to better understand the reasons for these ethnicity-specific differences in decision making.
CITATION INFORMATION: Singh N., Wasim A., Hajjar W., Mohan K., El-Dassouki N., Habbal H., Angarso L., Dychiao A., Macanovic S., Waterman A., Mucsi I. Understanding Transplant Decision Making Concerns for African, Caribbean and Black Canadian Patients with End-Stage Kidney Disease *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Singh: None. **A. Wasim:** None. **W. Hajjar:** None. **K. Mohan:** None. **N. El-Dassouki:** None. **H. Habbal:** None. **L. Angarso:** None. **A. Dychiao:** None. **S. Macanovic:** None. **A.D. Waterman:** None. **I. Mucsi:** None.

Abstract# 329

Depressive Symptoms and Listing for Kidney Transplantation

X. Chen, N. Chu, P. Sharma Basyal, W. Vihokrut, D. Crews, D. Brennan, S. Andrews, T. Vannorsdall, D. Segev, M. McAdams DeMarco, *Johns Hopkins University School of Medicine, Baltimore, MD*
Purpose: Among patients with kidney failure, depressive symptoms are common and may be a barrier to completing the complex process of kidney transplantation (KT) evaluation and listing. We sought to explore the burden of depressive symptoms among kidney failure patients being evaluated for KT and the impact of depressive symptom severity on listing for KT.
Methods: In a prospective cohort study of 3,727 adult patients being evaluated for KT (1/2009-3/2020), depressive symptoms were measured using the 20-item Center for Epidemiologic Studies-Depression (CES-D) Scale and the severity of depressive symptoms was categorized as: none:0; minimal:1-15; mild:16-20; moderate:21-25; severe:26-60. Time to listing by depressive symptoms severity was estimated using Cox Proportional Hazards models, adjusting for demographic, socio-economic, and health factors.
Results: Depressive symptoms were reported by 18.4% of patients. Younger patients more frequently reported depressive symptoms (age 18-49:22.8%; 50-64:19.1%; ≥65:11.7%; p<0.001). Patients with severe symptoms were 31% less likely to be listed than those without symptoms (hazard ratio [HR]=0.69, 95% confidence interval [CI]=0.56-0.85); the likelihood of being waitlisted decreased with increasing CES-D score (HR for every 5-point worsening=0.94, 95% CI=0.92-0.97).
Conclusions: Kidney failure patients, particularly younger patients, have a high burden of depressive symptoms at KT evaluation. Regardless of age, patients with depressive symptoms are less likely to be listed for KT. Transplant centers should screen at evaluation to identify patients who would benefit from interventions to reduce depressive symptoms.

Figure: Unadjusted cumulative incidence of kidney transplantation (KT) listing by severity of depressive symptoms among patients being evaluated for KT (n=3,727). CES-D score ranges 0-60 points. Severity of depressive symptoms was categorized as: none, 0 point; minimal, 1-15 points; mild, 16-20 points; moderate, 21-25 points; severe, 26-60 points.

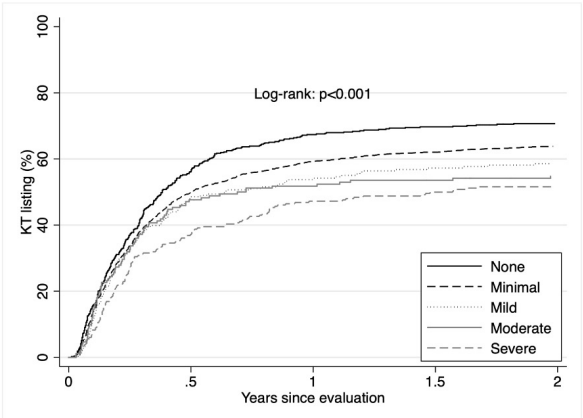


Table: Chance of listing by severity of depressive symptoms among patients being evaluated for kidney transplantation (KT). Adjusted hazard ratios (aHRs) and 95% confidence intervals (CIs) are presented from adjusted Cox Proportional Hazards models. Associations that are statistically significant at p<0.05 are bolded.

	Patient factor adjusted model (n=3,113) aHR (95% CI)	Patient and neighborhood factor adjusted model (n=3,041) aHR (95% CI)
Severity of depressive symptoms		
No symptoms	Reference	Reference
Minimal symptoms	**0.82 (0.73, 0.92)**	**0.85 (0.75, 0.96)**
Mild symptoms	**0.70 (0.57, 0.86)**	**0.74 (0.60, 0.91)**
Moderate symptoms	**0.74 (0.58, 0.94)**	0.79 (0.62, 1.00)
Severe symptoms	**0.62 (0.51, 0.76)**	**0.69 (0.56, 0.85)**
Continuous Score (5 points worse)	**0.94 (0.91, 0.96)**	**0.94 (0.92, 0.97)**

Patient factor adjusted model: Adjusted for age, sex, race, education, time on dialysis, BMI, CCI, and enrollment period.

Patient and neighborhood factor adjusted model: Adjusted for age, sex, race, education, time on dialysis, BMI, CCI, marital status, employment, neighborhood poverty level, and enrollment period.

CITATION INFORMATION: Chen X., Chu N., Sharma Basyal P., Vihokrut W., Crews D., Brennan D., Andrews S., Vannorsdall T., Segev D., McAdams DeMarco M. Depressive Symptoms and Listing for Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: X. Chen: None. **N. Chu:** None. **P. Sharma Basyal:** None. **W. Vihokrut:** None. **D. Crews:** None. **D. Brennan:** None. **S. Andrews:** None. **T. Vannorsdall:** None. **D. Segev:** None. **M. McAdams DeMarco:** None.

Abstract# 330

Multistep Algorithm to Achieve Weight Loss Goal in Advanced Stage Obesity Kidney Transplant Candidates: A Single Center Preliminary Report

A. Shah, J. Galpern, L. Castaldo, P. Touhy, M. Thomas, A. Aaron, M. Fruscione, L. Dageforde, N. Elias, *Transplant Surgery, Massachusetts General Hospital, Boston, MA*

Purpose: Obesity causes and complicates glomerulonephritis and chronic kidney disease (CKD) leading to end stage renal disease (ESRD). Kidney Transplantation (KT) improves ESRD patients' survival and quality of life, but to a lesser extent if obese given increased allograft failure and mortality risks. At our center, obesity is a major basis for inactive status. Obesity management in CKD has not been standardized.

In 2018, counseling and follow up of patients with obesity (BMI>35) yielded minimal change. We have since launched a multistep weight loss intervention algorithm and aim to determine its effectiveness along with identification of major barriers for KT candidates with obesity (KTCwO).

Methods: Since April 2019, newly referred KTCwO (BMI>38) are enrolled with informed consent into IRB approved prospective study-. A structured protocol initiated by registered dietician and transplant surgeon at initial visit with nutrition/motivation/frailty assessments, weight loss education and establishment of goal weight loss >5% over 6-month period to achieve BMI<38, counseling on food regimens, home tracking/app devices, and introduction to weight center with referrals. Follow up consisted of monthly phone calls with intervention checkpoints at 6 and 12 months.

Results: Our initial 2018 support process review yielded 87 KTCwO. 36 of them achieved minimal weight loss while 22 gained weight, with no change in percent of wait list patients inactive due to obesity. Since the multistep algorithm introduction, 28 listed inactive KTCwO enrolled. 11 of them with less than 6-month follow up were excluded from analysis. 7/17 patients have achieved weight loss with >2 follow up encounters since initial evaluation. 3 patients have implemented diet and exercise regimens and 4 patients have been referred to weight center. Of the weight center referrals, one patient is managed with medication and three have been referred for bariatric surgical evaluations.

Conclusions: While in preliminary stages, multidisciplinary intervention initiation with assistance of weight center has resulted in KTCwO benefit. We recognize the limitations of time and power in our data along the ongoing identification of barriers in enrolled patients. Continued follow up with individualized checkpoint interventions and accrual of more patients will yield promising outcomes for KTCwO.

CITATION INFORMATION: Shah A., Galpern J., Castaldo L., Touhy P., Thomas M., Aaron A., Fruscione M., Dageforde L., Elias N. Multistep Algorithm to Achieve Weight Loss Goal in Advanced Stage Obesity Kidney Transplant Candidates: A Single Center Preliminary Report *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Shah: None. **J. Galpern:** None. **L. Castaldo:** None. **P. Touhy:** None. **M. Thomas:** None. **A. Aaron:** None. **M. Fruscione:** None. **L. Dageforde:** None. **N. Elias:** None.

Abstract# 331

Challenges and Stressors of COVID-19 Kidney and Transplant Patients: A Mixed Methods Study

Y. A. Iraheta[1], A. L. Murillo[2], E. H. Wood[1], S. M. Advani[3], R. Pines[4], A. D. Waterman[1], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Terasaki Institute, Los Angeles, CA, [3]National Human Genome Research Institute (NIH), Bethesda, MD, [4]Santa Barbara Cottage Hospital, Santa Barbara, CA*

Purpose: To assess the unique needs of at-risk kidney and transplant patients and their caregivers during COVID-19, we established a telephone Listening Center enabling them to share about challenges seeking care, common stressors, and opportunities for healthcare delivery improvement.

Methods: We conducted a mixed methods study where participants answered open and closed-ended questions about their health, financial, and emotional challenges during COVID-19. Data from open-ended questions were analyzed using thematic analysis. Descriptive statistics were run for quantitative items to explore frequencies of COVID-related stressors.

Results: The 111 participants varied by race/ethnicity [Hispanic (29%), White (24%), Asian (23%), Black (23%), Other (1%)], with most being English-speakers (85%). Many participants experienced health, financial, or emotional COVID-19 related stressors (Table). Patients reported severe limitations due to need for social distancing, inability to go to overcrowded medical settings and public spaces, and difficulty receiving assistance replacing in-home dialysis supplies, childcare support, or help with home repairs. Using the Patient Health Questionnaire (PHQ4), 30% of participants reported feeling depressed and 35% reported feeling anxious on several to most days. Participants sought emotional support from family, friends, and communities of faith using facetime and zoom. Patients wanted a centralized place to receive COVID-19 updates, recommendations for safe activities, flexibility to choose online or in person medical visits, and regular follow up from their kidney/transplant specialists related to COVID-19.

Conclusions: Over 40% of patients reported fear, frustration, loneliness, and postponed medical visits due to COVID-19. Needs-based interventions include mental health resources, education, and support for care transitions may be helpful, particularly as the pandemic continues.

Table. COVID-19 Stressors

Health Stressors	% Yes
Less physically active due to staying at home	52.82%
Postponed medical visit(s)	44.14%
Postponed transplant-related appointments	20.72%
Difficulty obtaining medications	9.91%
Financial Stressors	
Working from home	31.53%
Job loss/reduced work hours	26.19%
Emotional Stressors	
Frustration about the limitations to life due to COVID-19	60.36%
Fear of getting COVID-19	60.36%
Loneliness due to social distancing	39.64%
Lost a family member/friend due to COVID-19	16.82%

CITATION INFORMATION: Iraheta Y., Murillo A., Wood E., Advani S., Pines R., Waterman A. Challenges and Stressors of COVID-19 Kidney and Transplant Patients: A Mixed Methods Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y.A. Iraheta: None. **A.L. Murillo:** None. **E.H. Wood:** None. **S.M. Advani:** None. **R. Pines:** None. **A.D. Waterman:** None.

Abstract# 333

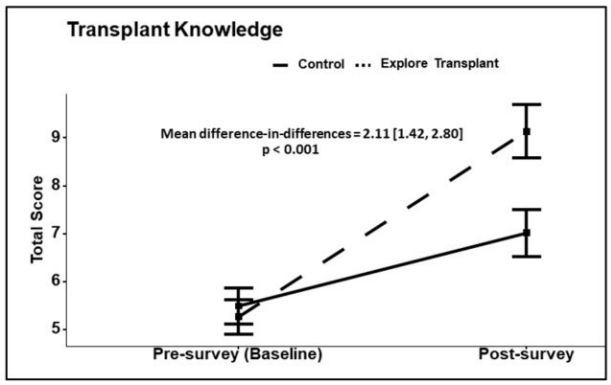
Early Transplant Education Increases CKD 3-5 Patients' Knowledge and Informed Decision-Making About Chronic Kidney Disease and Living Donor Kidney Transplant

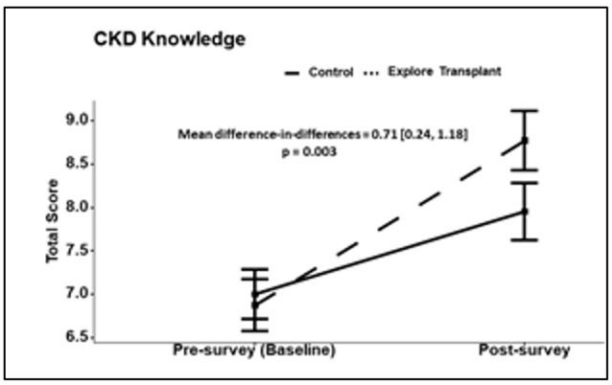
A. D. Waterman[1], S. H. Kawakita[2], B. Dub[3], Y. A. Iraheta[1], A. L. Murillo[2], T. Menser[4], B. Mittman[3], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]Terasaki Institute, Los Angeles, CA, [3]Research and Evaluation, Kaiser Permanente, Pasadena, CA, [4]The Houston Methodist Research Institute, Houston, CA*

Purpose: Early education about chronic kidney disease (CKD) and living donor kidney transplant (LDKT) outside of transplant centers is inconsistent, with patients in CKD 3 and 4 and ethnic/racial minorities even less likely to receive it. Improvements in transplant educational delivery for early-stage CKD patients are needed.

Methods: We conducted a prospective, parallel arm randomized controlled trial (RCT) with 971 patients varying by CKD Stage [3 (41.2%); 4 (34.4%), and 5 (24.4 spoken at Kaiser Permanente Southern California (KPSC). Patients were stratified by Stage, race/ethnicity, and primary language spoken and randomized to: (1) Explore Transplant@Home (ET), a supplementary video-guided, print and text-based education intervention delivered remotely or (2) standard of care KPSC transplant education (SOC). We fitted multilevel random effect models and compared changes in outcomes by condition 6 months post-baseline. Interactions between treatment condition and each stratifying variable were assessed.

Results: CKD patients were diverse [White (22.2%), Black (18.4%), Asian (9.6%); English-speaking Hispanics (21.7 %), Spanish-speaking Hispanics: (28.0 %)]. Compared to SOC, patients receiving ET were twice more likely to make informed decisions about pursuing LDKT than those receiving SOC (1.99 [1.35, 2.92] p<.001). Increases in CKD symptom knowledge and transplant knowledge were also observed for the ET group at 6 months (p < 0.001) (Figures). There were heterogeneity of treatment effects for informed decision-making by CKD Stage (p = 0.067) and for DDKT self-efficacy by primary language spoken (p = 0.059).
Conclusions: With this study showing promise in improving knowledge for earlier stage CKD patients and Spanish-speakers much earlier through ET, interventions to increase preemptive transplantation could utilize these educational methodologies to increase LDKT rates.





CITATION INFORMATION: Waterman A., Kawakita S., Dub B., Iraheta Y., Murillo A., Menser T., Mittman B. Early Transplant Education Increases CKD 3-5 Patients' Knowledge and Informed Decision-Making About Chronic Kidney Disease and Living Donor Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.D. Waterman: None. **S.H. Kawakita:** None. **B. Dub:** None. **Y.A. Iraheta:** None. **A.L. Murillo:** None. **T. Menser:** None. **B. Mittman:** None.

Liver

Post Liver Transplant Management and Complications

Abstract# 334

A Meta-Analysis of Endoscopic Stents in the Treatment of Anastomotic Biliary Strictures After Liver Transplantation

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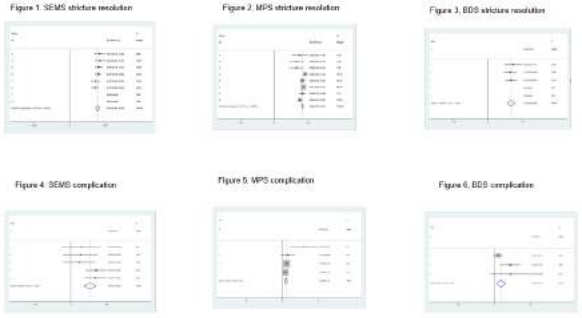
Purpose: Biliary strictures (BS) are common after orthotopic liver transplantation (OLT). The treatment of choice is endoscopic retrograde cholangiopancreatography (ERCP). Multiple plastic stents (MPS) have been widely; covered self-expandable metallic stents (SEMS) have been invented subsequently to reduce the need for stent replacements and to reduce the intervention times. Biodegradable stents (BDS) have been recently introduced. Few studies have included the comparison of all three modalities. This study aims to compare results from the use of MPS and BDS to treat BS after OLT to recent outcomes after BDS.
Methods: PUBMED and EMBASE databases. Search for available RCTs and clinical trials to compare the efficacy and safety of MPS, SEMS and BDS in ABS after orthotopic liver transplantation(OLT). Primary outcomes were the resolution, and the recurrence of BS, while secondary outcomes were adverse events and number of procedures performed. Pooled estimates were calculated using random-effects models.
Results: Seven studies (481 patients) included the comparison between MPS (184 patients) and SEMS (297 patients). There was no significant difference between MPS and SEMS regarding BS resolution (OR=0.97, 95%CI: 0.59-1.58, p=0.91), recurrence (OR=1.17, 95%CI: 0.50-2.74, p=0.73), successful treatment with initial protocol (OR=1.69, 95%CI: 0.85-3.39, p=0.14). SEMS reduced the number of ERCP sessions needed to achieve stricture resolution (p<0.0001). SEMS, however, had significantly higher complications during treatment (OR=2.3,95%CI:1.41-3.75, p=0.0009). Only four descriptive studies were found using BDS on total of 55 patients to treat BS after OLT with no control group. Using Stata software comparison,the stricture resolution rate in BDS seems to be lower compared to both SEMS and MPS groups (Figure1-3), with lower rate of complication compared SEMS and MPS (Figure 4-6).
Conclusions: Compared to MPS,SEMS provides shorter operation time and similar success rate,reducing the number of ERCP session to achieve stricture resolution, but have higher complication rate during treatment. BDS seems to have lower stricture resolution rate and complication rate during treatment than SEMS and MPS.



CITATION INFORMATION: Zhou F., Mieth M., Rupp C., Mehrabi A., Nickkholgh A. A Meta-Analysis of Endoscopic Stents in the Treatment of Anastomotic Biliary Strictures After Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Zhou: None. **M. Mieth:** None. **C. Rupp:** None. **A. Mehrabi:** None. **A. Nickkholgh:** None.

Abstract# 335

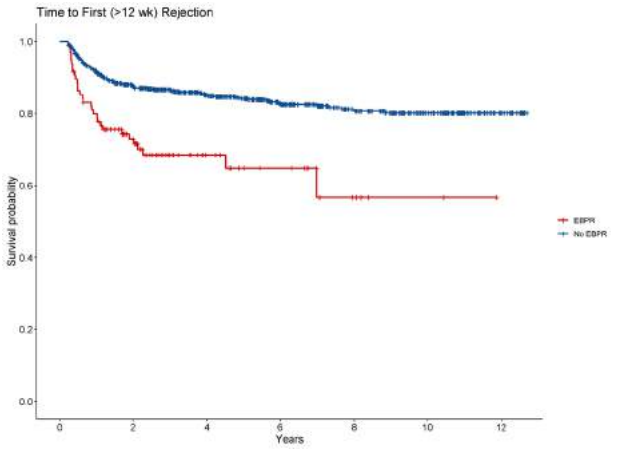
Effect of Early Biopsy-Proven Rejection on Liver Transplant Outcomes

D. D. Aufhauser, N. Marka, L. Stalter, G. Levenson, D. Al-Adra, D. P. Foley, *Surgery, University of Wisconsin, Madison, WI*

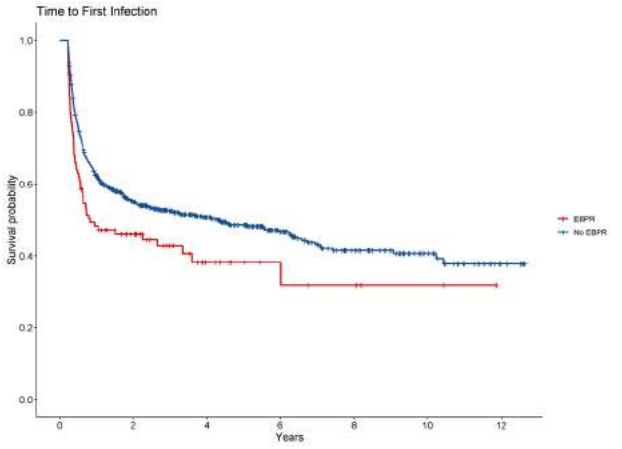
Purpose: Existing literature offers conflicting conclusions about whether early acute cellular rejection influences long-term outcomes in liver transplantation.
Methods: We retrospectively collected donor and recipient data on 813 adult, first-time liver transplants performed at a single center between 2009 and 2019. We divided this population into two cohorts based on the presence of early biopsy-proven acute cellular rejection (EBPR) within the first 12 weeks post-transplant and compared outcomes (overall survival, death censored graft survival (DCGS), infection and long-term rejection rates) between the groups. Kaplan-Meier estimates were used to assess time to first event with p value < 0.05 for significance.
Results: Of the 813 liver transplants, 97 (12%) met inclusion criteria of EBPR. Donor and recipient characteristics did not differ between patients with and without EBPR (Tables 1).

Characteristic	Early biopsy-proven rejection (n=97)	No early rejection (n=716)	p-value
Recipient age	54 (52-57)	55 (55-56)	0.41
Recipient female	28% (27)	30% (231)	0.41
Recipient BMI	31 (29-32)	30 (29-31)	0.36
Use of induction agent	15% (15)	19% (133)	0.57
Donor age	45 (43-48)	45 (44-46)	0.68
Donor female	43% (42)	39% (276)	0.37
Donor BMI	29 (28-31)	28 (28-29)	0.21

Recipients with EBPR had similar overall survival compared to patients without EBPR (p=0.29), but had inferior one year death-censored graft survival (95.8% for EBPR vs. 98.7% for no EBPR, p<0.05). EBPR was also associated with decreased time to first episode of late (>12 weeks post-transplant) rejection (p<0.0001, Fig 1).



Recipients with EBPR had increased rates of bacterial and viral infection (p<0.05, Fig 2).



Conclusions: EBPR after liver transplant is associated with inferior death-censored graft survival, increased susceptibility to late rejections, and increased vulnerability to infection. Identifying strategies to mitigate EBPR may lead to improved long-term outcomes after liver transplantation.

CITATION INFORMATION: Aufhauser D., Marka N., Stalter L., Levenson G., Al-Adra D., Foley D. Effect of Early Biopsy-Proven Rejection on Liver Transplant Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.D. Aufhauser: None. **N. Marka:** None. **L. Stalter:** None. **G. Levenson:** None. **D. Al-Adra:** None. **D.P. Foley:** None.

Abstract# 336

The Predictive Factors of Survival in Re-listed Patients Who Received Initial Liver Transplants Using Donation After Circulatory Death Grafts

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Purpose: The inherent risk of livers from donors after circulatory death (DCD) is well known such as primary non-function (PNF) and increased rates of biliary complications. Due to the high graft dysfunction rate in a relatively early phase after the initial liver transplant (LT), many patients who received DCD organ needs re-transplant and were re-listed. However, the clinical characteristics and prognostic factors of those re-listed patients have not been fully elucidated.

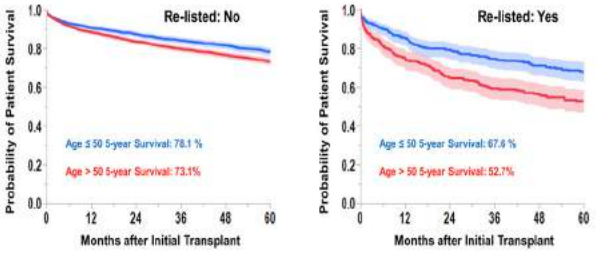
Methods: Adult patients who received DCD LT between 2002 and 2019 were identified from the UNOS database. Predictors of drop out due to too sick/death in re-listed patients were examined using Fine-Gray model. Predictors of overall survival (OS) after re-LT were examined using Cox regression model.

Results: Among 5734 patients, 1332 patients died without re-listing (23.2%) and 712 patients were re-listed after initial LT (12.4%). Among 711 re-listed patients, 480 patients received second LT (8.4%) and 128 patients were removed from list because of too sick/death (2.2%). Among 480 re-LT patients, 187 patients (39.0%) died after re-LT. The median days between first LT and re-listing was 99 days (IQR: 12-331). The distribution of initial graft lost causes/percentage of re-LT patients/median waiting time form re-listing are summarized (Table). In re-listed patients, older recipient (> 50) and graft loss caused by primary non-function or HAT/PVT were predictors of dropout. In re-LT patients, younger recipient (≤50) at first-LT, male, lower MELD at time of second-LT, and younger donor age were favorable factors of patient survival after LT. The OS from first-LT was compared according to recipient age in patients who were re-listed and not re-listed. The 5-years survival rate in younger patients was 5.0% better in patient without re-listing, which was much higher in re-listed patients (14.9%) (Figure).

Conclusions: Nearly 10% of DCD LT patients received re-LT mainly due to complications related to DCD organs. Younger recipient age is an important factor to survive in case patients need re-listing after LT using DCD organ.

Cause of Graft Loss

Median (IQR)	PNF (n=180)	HAT/PVT (n=70)	IC (n=316)	Miscellaneous (n=146)	P
Recipient/Donor Characteristics in First LT					
Recipient age	56 (49-61)	55 (47-61)	55 (48-60)	53 (48-59)	0.03
Recipient gender, male (%)	116 (64.4)	53 (75.7)	230 (72.8)	97 (66.4)	
Lab MELD score at first-LT	18.0 (12.0-25.8)	16.5 (12-23.3)	18.0 (13.0-23)	20.0 (13.0-26.0)	0.36
Donor age	37 (25-46)	36 (21-47)	42 (30-53)	39 (27-49)	< 0.01
Donor warm ischemic time, min	15.0 (9.0-22.0)	15.0 (10.5-24.5)	16.0 (10.0-23.0)	16.0 (10.0-22.0)	0.76
Cold ischemic time, hours	6.8 (5.1-9.0)	6.4 (5.1-8.2)	6.5 (5.4-8.3)	6.2 (5.2-7.8)	0.10
Re-listing					
Time from first-LT to re-listing, days	1 (1-4)	2335 (8.5-3468.9)	158.0 (81.5-385.0)	497.0 (168.8-1496.0)	
Status 1A, yes (%)	121 (67.2)	12 (17.1)	6 (1.9)	1 (0.7)	< 0.01
Initial Listing MELD score	21.0 (23.0-37.0)	19.0 (15.0-27.0)	19.0 (15.0-24.0)	21.0 (15.0-27.0)	< 0.01
Transplanted, yes (%)	108 (60.0)	52 (74.3)	260 (82.3)	60 (41.1)	< 0.01
Re-Transplanted					
Waiting time, days	2 (1-4)	11.5 (4-45.5)	57.5 (20-200)	30.5 (10.3-154.0)	< 0.01
Allocated MELD at second-LT	37.0 (27.0-40.0)	33.0 (26.0-40.0)	29.0 (24.0-35.0)	26.0 (23.3-34.0)	< 0.01
Donor age	42 (26-55)	37 (25-47)	36 (24-49)	39 (27-51)	0.12
1-year patient survival after second-LT	63.1 %	74.7 %	84.2 %	84.0 %	< 0.01
5-year patient survival after second-LT	56.3 %	60.6 %	68.4 %	63.8 %	< 0.01



CITATION INFORMATION: Fouda Y., Moro A., Mcvey J., Firl D., Fujiki M., Teresa D., Aucejo F., Quintini C., Kwon C., Hashimoto K., Eghtesad B., Narayanan Menon K., Miller C., Sasaki K. The Predictive Factors of Survival in Re-listed Patients Who Received Initial Liver Transplants Using Donation After Circulatory Death Grafts *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Fouda: None. **A. Moro:** None. **J. Mcvey:** None. **D. Firl:** None. **M. Fujiki:** None. **D. Teresa:** None. **F. Aucejo:** None. **C. Quintini:** None. **C.H. Kwon:** None. **K. Hashimoto:** None. **B. Eghtesad:** None. **K. Narayanan Menon:** None. **C. Miller:** None. **K. Sasaki:** None.

Abstract# 337

Molecular Assessment of Fibrosis and Steatohepatitis in the INTERLIVER Study

K. S. Madill-Thomsen[1], P. F. Halloran[1], &. the INTERLIVER Study Group[2], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]., ., AB, Canada*

Purpose: We previously reported a molecular system for assessing rejection in liver transplants and recently expanded this system to assess injury. Fibrosis is associated with worse long-term liver graft and patient survival, while steatohepatitis is a leading cause for liver transplantation and frequently recurs post-transplant. We examined the molecular changes associated with these conditions.

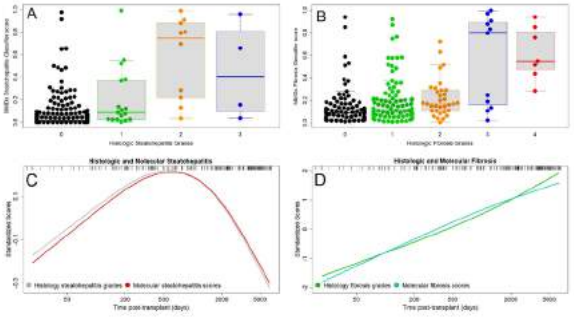
Methods: We used gene expression microarrays to study 337 liver transplant indication biopsies from 13 international centers with standard-of-care (SOC) clinical and histologic data. Molecular classifiers were trained on binary histology-based classes (fibrosis grades <=1 vs >1, steatohepatitis grades 0 vs >0); scores were represented by the median of an ensemble of machine learning estimates. Top transcripts for pathway analysis and volcano plots used the same class comparisons. Splines assessed relationships to time post-transplant. Statistical analyses were done in R.

Results: Steatohepatitis was predicted by a classifier trained on histologic steatohepatitis (AUC=0.83). Fibrosis was predicted by a classifier trained on histologic fibrosis (AUC=0.74). Classifier scores increased with histologic grades (Figure 1A-B). Steatohepatitis grades/scores peaked 2-5 years post-transplant; fibrosis grades/scores increased linearly over time as visualized in splines (Figure 1C-D).

Volcano plots visualized transcripts associated with histologic fibrosis and steatohepatitis. Top transcripts increased and decreased in expression in steatohepatitis biopsies were associated with metabolism e.g. TMEM154 (Figure 1E). In fibrosis, immunoglobulin transcripts were increased e.g. IGK, as were transcripts previously associated with hepatic fibrosis in native livers e.g. stathmin2/STMN2, sodium leak channel/NALCN, papilin/PAPLN (Figure 1F). Pathway terms showed metabolic dysregulation in steatohepatitis, and immune cell activity and matrix structure in fibrosis (Figure 1G).

Though DSA testing was limited, we found no significant relationship between DSA and fibrosis.

Conclusions: Molecular fibrosis was present in 45% of biopsies, and increased over time. Molecular steatohepatitis affected 55% of biopsies, peaking 2-5 years post-transplant before declining. We found no significant relationship between DSA and hepatic fibrosis in this population. Quantitative scores for steatohepatitis and fibrosis from molecular classifiers provide objective measurements with potential to guide management while offering mechanistic insights.



G Top 10 GO Terms from pathway analysis on top 300 unique transcripts (increased and decreased, by p value) associated with histologic steatohepatitis and fibrosis sorted by Spearman correlation coefficient absolute value.

	Steatohepatitis					Fibrosis			
#	ONTOLOGY	GO ID	Pathway Description	P value	#	ONTOLOGY	GO ID	Pathway Description	P value
1	BP	GO:0062012	regulation of small molecule metabolic process	1.49E-08	1	MF	GO:0030021	extracellular matrix structural constituent	3.72E-25
2	BP	GO:0062013	positive regulation of small molecule metabolic process	3.11E-08	2	CC	GO:0062023	collagen-containing extracellular matrix	1.11E-23
3	BP	GO:0006109	regulation of carbohydrate metabolic process	2.33E-07	3	BP	GO:0030198	extracellular matrix organization	4.22E-23
4	BP	GO:0045913	positive regulation of carbohydrate metabolic process	2.33E-07	4	BP	GO:0043062	extracellular structure organization	6.99E-21
5	BP	GO:0045470	regulation of carbohydrate catabolic process	4.51E-07	5	CC	GO:0044420	extracellular matrix component	5.57E-10
6	BP	GO:0009896	positive regulation of catabolic process	5.40E-07	6	MF	GO:0033823	antigen binding	1.02E-11
7	BP	GO:0031331	positive regulation of cellular catabolic process	8.93E-07	7	CC	GO:0098644	complex of collagen trimers	7.84E-11
8	BP	GO:0051196	regulation of coenzyme metabolic process	8.29E-07	8	CC	GO:0005581	collagen trimer	2.03E-10
9	BP	GO:0006140	regulation of nucleotide metabolic process	9.75E-07	9	CC	GO:0005604	basement membrane	6.27E-10
10	BP	GO:0001678	cellular glucose homeostasis	1.30E-06	10	CC	GO:0001991	immunoglobulin complex	6.94E-10

CITATION INFORMATION: Madill-Thomsen K., Halloran P., the INTERLIVER Study Group Molecular Assessment of Fibrosis and Steatohepatitis in the INTERLIVER Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.S. Madill-Thomsen: None. **P.F. Halloran:** Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/ One Lambda. Honoraria; Nature of Relationship; speaker. Ownership Interest; Name of Commercial Interest; Transcriptome Sciences Inc.. Ownership Interest; Nature of Relationship; Owner. **&. the INTERLIVER Study Group:** None.

Abstract# 338

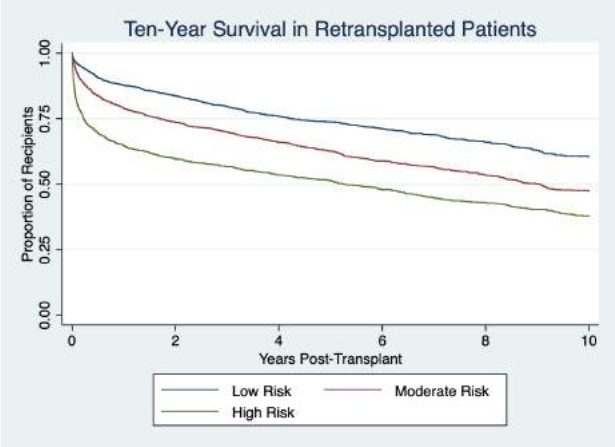
Predictive Index for Liver Retransplantation

C. Christmann, G. Handing, M. McDonald, A. Anand, S. Keeling, N. T. Galván, R. Cotton, C. O'Mahony, J. Goss, A. Rana, *Baylor College of Medicine, Houston, TX*

Purpose: Given the increase in demand for donor livers, it has become more critical than ever to predict mortality in order to identify the best possible use of a donor organ. This is particularly true in cases involving retransplantation, which is increasing in prevalence despite overall poorer outcomes. Our aim was to develop a predictive index for liver retransplantation to predict mortality based on donor and recipient characteristics.

Methods: Using the OPTN database, we performed univariate and multivariate analysis on 5,183 liver retransplantations to identify independent donor and recipient risk and protective factors for post-transplant mortality. This retrospective analysis was used to create a weighted score that can be used to predict post-retransplant mortality.

Results: We found 14 factors to be significant and weighted them according to their odds ratio to generate an r-SOFT (Retransplant Survival Outcomes following Liver Transplantation) score with a C-statistic of 0.705. We then generated a Kaplan-Meier curve to estimate survival at ten years post-retransplant, stratifying patients into low-, moderate-, and high-risk groups by tertile. The most significant risk factors for post-transplant mortality were hemodialysis prior to transplant and poor functional status, while the most significant protective factors were a short cold ischemia time and recipient age below 30.



Conclusions: This scoring system can be used to predict mortality post-transplant for patients who have already received a liver transplant. It uses criteria from both the donor and the recipient in order to aid decision-making for patients requiring a second liver and identify transplant patients at particularly high risk.

CITATION INFORMATION: Christmann C., Handing G., McDonald M., Anand A., Keeling S., Galván N., Cotton R., O'Mahony C., Goss J., Rana A. Predictive Index for Liver Retransplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Christmann: None. **G. Handing:** None. **M. McDonald:** None. **A. Anand:** None. **S. Keeling:** None. **N.T. Galván:** None. **R. Cotton:** None. **C. O'Mahony:** None. **J. Goss:** None. **A. Rana:** None.

Abstract# 339

Is There a Role for Donor-Specific Antibody Testing in Simultaneous Liver-Kidney Transplantation? A Single Center Analysis of Outcomes

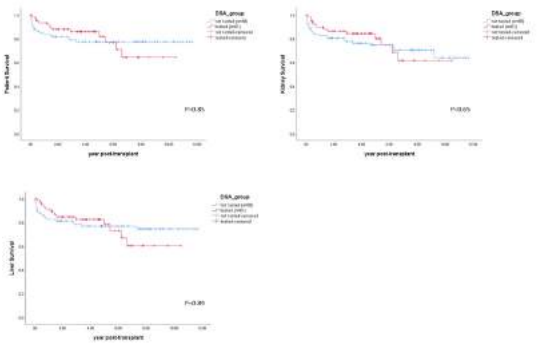
A. Das, A. Barbetta, D. Remulla, C. Goldbeck, T. Maw, J. Kim, *University of Southern California, Los Angeles, CA*

Purpose: Simultaneous liver-kidney transplantation (SLKT) has grown exponentially since its conception in the 1960's. The role for donor specific antibody (DSA) testing in SLKT is unclear. The purpose of this single-center study was to assess the impact of DSA testing on outcomes including rate of rejection, graft survival, and patient survival following SLKT.

Methods: Patients who underwent primary SLKT between 2008-2018 at our center were reviewed retrospectively. DSA testing has only recently been integrated into our protocol. Demographic and clinical characteristics were summarized using mean and standard deviation for continuous variables and counts with percentages for categorical variables. Patient and graft survival were calculated using the Kaplan-Meier method.

Results: A total of 149 patients met inclusion criteria. The mean age at transplant was 55.4 ±10.4 years, 92 (61.7%) were males, and the majority were Hispanic (55.7%). The most common liver diagnosis leading to transplant was alcoholic liver disease (22.1%) followed by viral hepatitis (17.4%). 57 (38.3%) patients experienced at least one episode of acute liver rejection, mostly mild (44.6% RAI=3). However, only 16 patients had kidney rejection, with 3 having at least one episode of antibody mediated rejection. Overall, 61 patients were screened for DSA post-transplant, and 28 (45.9%) had at least one DSA detected. There were 11 patients with both liver and kidney rejection, of whom 6 were DSA positive. At the time of the last follow-up, 79.2% of patients were alive with a mean overall survival of 9.3 years (95% CI 8.5-10). Kidney and liver graft survival were 75.2% (mean overall graft survival 8.7 years, 95% CI 7.9-9.5) and 75.8% (mean overall graft survival 9 years, 95% CI 8.2-9.8) respectively. There was no difference in graft and patient survival when we stratified by either DSA test performed or DSA status (Fig 1).

Conclusions: These data demonstrate that SLKT is associated with excellent long-term patient and allograft survival. Moreover, whether or not DSA was tested or detected, a low rate of kidney rejection was observed. In our experience, testing for DSA does not impact SLKT outcomes.



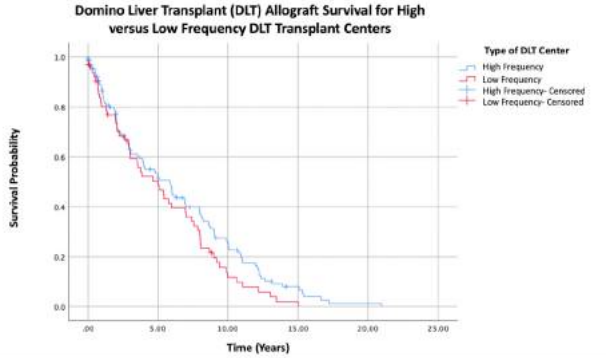
CITATION INFORMATION: Das A., Barbetta A., Remulla D., Goldbeck C., Maw T., Kim J. Is There a Role for Donor-Specific Antibody Testing in Simultaneous Liver-Kidney Transplantation? A Single Center Analysis of Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Das: None. **A. Barbetta:** None. **D. Remulla:** None. **C. Goldbeck:** None. **T. Maw:** None. **J. Kim:** None.

Abstract# 340

High and Low Frequency Domino Liver Transplantation Centers Demonstrate Similar Outcomes

J. Panichella, H. Resweber, H. Curtis, K. Nguyen, A. Di Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

Purpose: For patients with transthyretin (TTR) Amyloidosis, the only disease modifying treatment is an orthotopic liver transplant. However, because of the nature of this disease, the patient's liver can simultaneously be donated to another patient. Current research already demonstrates the success of Domino Liver Transplants (DLTs) and points to the benefit of this procedure in increasing the donor organ pool for those in dire need of a transplant. However, the use of DLTs in many transplant centers has been limited. Trepidation over outcomes and complications in low frequency DLT centers has deterred hospitals from performing this procedure. This study analyzes the performance outcomes (of the DLT recipient) of transplant centers that perform a high number of DLTs to those that perform less DLTs.
Methods: United Network for Organ Sharing (UNOS)/Organ Procurement and Transplantation (OPTN) Standard Transplant Analysis and Research (STAR) database was queried and analyzed with SPSS version 26 IBM. Whole liver domino patients were extracted from the living donor dataset for transplants performed between April of 1996 and January of 2018 (n=193). Quantitative data was recorded as a mean with a standard deviation, while qualitative data is recorded as a frequency and percentage of the population queried. A Kaplan-Meier curve was also performed. High frequency DLT centers were defined as those who have performed more than 5 DLTs — above the 75th percentile for DLTs performed in transplant centers nationally.
Results: Overall outcomes between low and high frequency DLT centers were very similar. There was no difference between types of centers in cardiac, respiratory, or renal failure as a cause of death. There was no difference in functional status at the last follow-up between the two types of centers. The Kaplan-Meier curve shows the allograft survival is similar between the two groups. Graft status at the time of the last follow-up showed 91.7% of grafts functioning in the low frequency centers compared to 86.5% of grafts functioning high frequency centers. Acute rejection (1.5% high frequency versus 1.6% low frequency) and chronic rejection (1.5% high frequency versus 1.6% low frequency) were shown to be a similarly low value between the groups.
Conclusions: The outcomes of low frequency DLT centers are very similar— if not better— than those of the high frequency DLT centers. This encourages hesitant transplant centers to perform more DLTs without the fear of outcomes or complications. Continued analysis to show significance are underway.



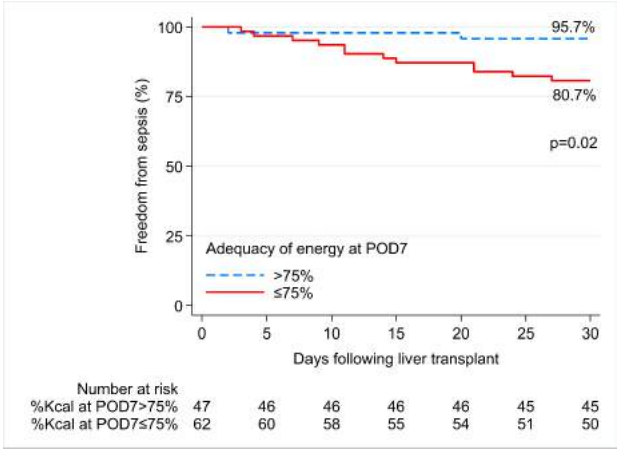
CITATION INFORMATION: Panichella J., Resweber H., Curtis H., Nguyen K., Di Carlo A., Karhadkar S. High and Low Frequency Domino Liver Transplantation Centers Demonstrate Similar Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Panichella: None. **H. Resweber:** None. **H. Curtis:** None. **K. Nguyen:** None. **A. Di Carlo:** None. **S. Karhadkar:** None.

Abstract# 341

Nutritional Inadequacy is an Independent Predictor of Sepsis Post-liver Transplantation

J. V. Nolte Fong, M. Elshawwaf, L. W. Moore, E. A. Graviss, D. T. Nguyen, R. Angell, A. Uosef, T. Hirase, C. M. Mobley, R. Ghobrial, *Houston Methodist Hospital, Houston, TX*

Purpose: Malnutrition is universally prevalent in liver transplant (LT) recipients in the perioperative setting. Malnutrition contributes to post-LT complications, such as sepsis. We aimed to determine the association between perioperative nutritional inadequacy (NI) and sepsis 30-days post-LT.
Methods: Patients who received a LT from Jan 2016-Dec 2017 were included in this single-site, retrospective review. Only patients with complete malnutrition data were analyzed. Patients were grouped according to nutrition inadequacy, with NI defined as meeting ≤75% of estimated energy needs (EEN) at post-operative day 7 (POD7). Those with NI were compared to patients meeting >75% EEN. Patient acuity was based on MELD, pre-LT dialysis, and ventilator dependence. Psoas muscle area (PMA) was obtained by CT/MRI scans at the L3 region within 6 months prior to LT and was a surrogate, objective marker of pre-LT malnutrition. Multivariable Cox regression analysis determined factors associated with sepsis within 30-days post-LT.
Results: Out of 233 LT recipients, only 109 met inclusion criteria and were analyzed. NI occurred in 62 (57%) patients. Nutritional support, either enteral or parenteral, was required in 58 (48%) patients. NI occurred more frequently in patients who did not receive nutritional support (54% vs 32%, p=0.01). Patients with NI had more pre-LT malnutrition indicated by smaller median (IQR) PMA: 7.5 cm^2 (5.8, 9.1) vs 8.3 cm^2 (5.8, 9.6), p=0.27. The NI group had *lower* acuity compared to the >75% EEN group: lower MELD scores, 20 (11, 32) vs 35 (22, 40), p<0.001; less pre-LT dialysis, n=8 (13%) vs n=25 (53%), p<0.001; and less ventilator dependence, n=9 (15%) vs n=21 (46%), p<0.001, respectively. Patients with NI had a significantly higher incidence of sepsis, n=12 (19%) vs n=2 (4%), p=0.02 (Figure 1). After adjustment, patients with NI were 5.14 times more likely to develop sepsis within 30-days of LT compared to those with >75% EEN (HR: 5.14, CI: 1.08, 24.43; p=0.04; Table1).
Conclusions: NI is an independent predictor of sepsis within 30 days of LT. Thus, perioperative nutritional status should be optimized for lower acuity patients who may not require nutritional support.



Characteristics associated with having sepsis within 30 days of liver transplant (C-statistic=0.73)		
Characteristics (N=109)	Adjusted HR (95% CI)	p-value
NI, nutritional inadequacy (energy at POD7)		
>75%	(reference)	
≤75%	5.14 (1.08, 24.43)	0.04
MELD	1.01 (0.96, 1.06)	0.68
Pre-transplant malnutrition (psoas muscle area)	1.07 (0.87, 1.32)	0.50
Donor age (years)	1.02 (0.98, 1.05)	0.36

CITATION INFORMATION: Nolte Fong J., Elshawwaf M., Moore L., Graviss E., Nguyen D., Angell R., Uosef A., Hirase T., Mobley C., Ghobrial R. Nutritional Inadequacy is an Independent Predictor of Sepsis Post-liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.V. Nolte Fong: None. **M. Elshawwaf:** None. **L.W. Moore:** None. **E.A. Graviss:** None. **D.T. Nguyen:** None. **R. Angell:** None. **A. Uosef:** None. **T. Hirase:** None. **C.M. Mobley:** None. **R. Ghobrial:** None.

Basic

Xenotranplantation and Preclinical Studies

Abstract# 342

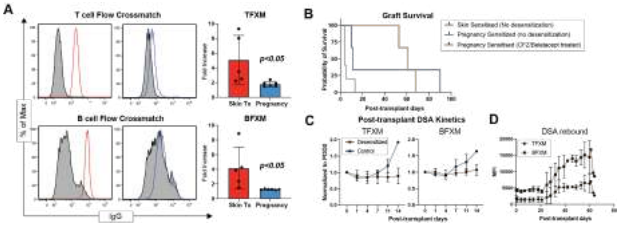
Natural Sensitization by Pregnancy, Testing Desensitization Strategies in Female NHPs Across Repeat Mismatches

M. Manook, J. Yoon, Z. Fitch, R. Schmitz, A. M. Jackson, J. Kwun, S. Knechtle, *Duke Transplant Center, Duke University Medical Center, Durham, NC*

Purpose: Women are disproportionately represented in the highly sensitized patient cohort, and HLA-incompatible transplantation is undertaken predominantly in females. However, nonhuman primate (NHP) models to date have relied on juvenile male animals. Therefore, we sought to examine the dual desensitization strategy using costimulation blockade and proteasome inhibition on naturally sensitized NHPs using multiparous female monkeys.

Methods: 6 multiparous animals were included in the study, 3 as controls, and 3 receiving desensitization. Donors were allocated following screening to ensure greatest flow crossmatch positivity, evidence of repeated mismatch based on offspring MAMU typing and maximal MAMU mismatching. Treated animals received desensitization with weekly carfilzomib (CFZ, 27mg/m^2) and belatacept (20mg/kg) for 4 weeks prior to kidney transplantation, followed by induction with rhesus ATG (RhATG), and maintenance with tacrolimus, mycophenolate mofetil and steroid. Comparison was made with skin sensitized control animals who did not receive desensitization n=5).

Results: Multiparous monkeys had a mean of 843±90.8 days between the last sensitizing event (pregnancy) and kidney transplantation. Compared to skin sensitized animals, naturally sensitized multiparous monkeys showed significantly lower donor-specific antibody (DSA) level on the day of kidney transplant **(Fig 1A)**. In accordance with this, multiparous female controls demonstrate heterogeneously prolonged survival, relative to animals sensitized directly to their donor by skin sensitization (**Fig 1B**). However, multiparous controls demonstrated early onset of DSA rebound compared to multiparous animals treated with carfilzomib and belatacept desensitization (**Fig 1C**). Desensitized multiparous animals showed better control of early post-transplant DSA, but DSA was significantly increased at post-operative day (POD) 42 compared to POD0 (BFXM MFI 13290 ±14 vs. 4477 ± 300, p = 0.016) (**Fig 1D**).



Conclusions: Real life pregnancy-induced MAMU sensitization results in rapid rise of DSA post-transplant, and reduced transplant survival suggesting an intact memory B cell compartment. Desensitization with CFZ and Belatacept prolongs survival, although control of post-transplant humoral response fails after 6 weeks on conventional triple immunosuppressive therapy.

CITATION INFORMATION: Manook M., Yoon J., Fitch Z., Schmitz R., Jackson A., Kwun J., Knechtle S. Natural Sensitization by Pregnancy, Testing Desensitization Strategies in Female NHPs Across Repeat Mismatches *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Manook: None. **J. Yoon:** None. **Z. Fitch:** None. **R. Schmitz:** None. **A.M. Jackson:** None. **J. Kwun:** None. **S. Knechtle:** None.

Abstract# 343

AT-1501, a Novel and Clinically Applicable CD40L Specific Monoclonal Antibody, Promotes Islet Allograft Survival in Nonhuman Primates

D. Berman[1], N. Kenyon[1], M. Willman[1], A. Gill[2], S. Perrin[3], C. Ricordi[1], *[1]University of Miami, Miami, FL, [2]ALS Therapy Development Institute, Cambridge, MA, [3]Novus Therapeutics, Irvine, CA*

Purpose: Immune intervention with a CD40L specific monoclonal antibody (mAb, Hu5c8, Biogen) has previously been shown to safely and effectively prevent islet allograft (IA) rejection in three nonhuman primate (NHP) models. Clinical development for IA was precluded due to occurrence of thromboembolic complications (TE). AT-1501 (Novus Therapeutics) was engineered to preserve immune modulatory potential while avoiding TE and was shown to be safe in NHP. We tested AT-1501 in a diabetic cynomolgus monkey IA model, alone or in combination with additional agents.

Methods: A total of 5 groups (n=2 each, recipients MHC mismatched to the islet donor) received 10,000 or more IEQ/kg into the liver. An AT-1501 monotherapy group, with 25 mg/kg given IV on POD -1, 0, 3, 10, 18, 23 and 28 and every 14 days thereafter, was included to verify the previously observed efficacy of anti-CD40L. The other 4 groups incorporated T cell depletion with thymoglobulin (Thy; 5 peri-transplant doses at 5 mg/kg each), with a standard of care (SOC) group also receiving FK506 and rapamycin (target trough levels 8-12 and 4-6 ng/ml, respectively) plus Enbrel (0.8 mg/kg IV on POD 0 and 0.4 mg/kg SC on POD 3, 7, 10). For the remaining 3 groups, AT-1501 was given as described for monotherapy but with additional doses on POD -2, -1 and 7. One group involved immune suppression as for the SOC group but replacing FK506 with AT-1501.

Results: As compared to recipients in the SOC group, animals in the 4 AT-1501 treated groups had lower fasting blood glucose (FBG, 63 ± 14 vs 97 ± 19 mg/dl; p=0.04) and higher fasting (4.5 ± 0.1 vs 1.7 ± 0.1 ng/mg; p = 0.014) and stimulated (9.0 ± 2.1 vs 2.6 ± 0.4 ng/mg; p = 0.010) C-peptide/FBG. Animals in the AT-1501 groups experienced: greater weight gain, none to minimal CMV viral infection and down-regulation of anti-donor specific CD3/4 and 3/8 central memory T cells (at 2 months post-transplant). No class I or II alloantibody was observed.

Conclusions: AT-1501 appears to be a safe and effective agent to promote islet engraftment and long-term survival and a promising tool for tolerance induction strategies.

CITATION INFORMATION: Berman D., Kenyon N., Willman M., Gill A., Perrin S., Ricordi C. AT-1501, a Novel and Clinically Applicable CD40L Specific Monoclonal Antibody, Promotes Islet Allograft Survival in Nonhuman Primates *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Berman: None. **N. Kenyon:** None. **M. Willman:** None. **A. Gill:** None. **S. Perrin:** None. **C. Ricordi:** None.

Abstract# 344

Interruption of Notch Signaling via Blockade of Delta-Like Ligand 4 Prevents Co-Stimulation Blockade Resistant Allograft Rejection

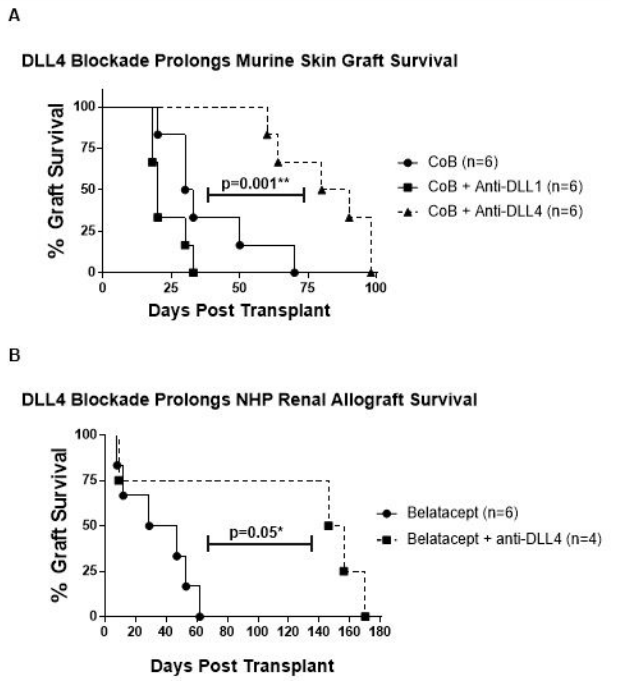
A. J. Matar, B. P. Lovasik, Y. Dong, D. A. Faber, J. Habib, C. Breeden, J. Regenold, A. Ghosh, A. Stephenson, W. H. Kitchens, A. B. Adams, *Emory University Department of Surgery, Atlanta, GA*

Purpose: Co-stimulation blockade (CoB) has emerged as a promising immunosuppression strategy with the advent of Belatacept, a novel CTLA4-Ig fusion protein that blocks CD28-mediated T cell co-stimulation. Compared to traditional calcineurin inhibitor-based immunosuppression, Belatacept confers improved graft survival, graft function, and overall survival in renal transplant recipients. However, it is also associated with increased rates of early acute rejection, termed CoB-resistant rejection (CoBRR). The purpose of this study was to examine the role of NOTCH pathway inhibition on CoBRR.

Methods: Murine and non-human primate (NHP) transplant models were used to investigate the role of NOTCH pathway inhibition via blockade of Delta-like ligand 4 (DLL4) on CoBRR.

Results: In a model of Balb/C to C57BL/6 skin transplantation, combined CoB (CTLA-4Ig + anti-CD154) and anti-DLL4 blockade significantly prolonged skin graft survival compared to CoB alone (MST 85 vs. 32 days, p = 0.001**). Anti-DLL4 blockade inhibited T cell activation and suppressed the formation of anti-donor antibody. Donor-specific T cell responses were also assessed in recipients of mOVA skin grafts following adoptive transfer of Thy1.1+ ovalbumin-specific OT-I T cells. Combined CTLA-4Ig and anti-DLL4 blockade suppressed donor-specific CD8+ T cell effector function via IFN-γ and TNF-α production. We then evaluated the effect of anti-DLL4 blockade in a NHP model of MHC mismatched renal transplantation. REGN421, a fully human IgG1 DLL4 monoclonal antibody, synergized with Belatacept to significantly prolong renal allograft survival compared to Belatacept alone (MST 151 vs. 38 days, p = 0.05*).

Conclusions: These data demonstrate that anti-DLL4 blockade is a promising therapy to suppress co-stimulation resistant alloreactivity and may help facilitate clinical translation of anti-DLL4 therapies in conjunction with Belatacept.



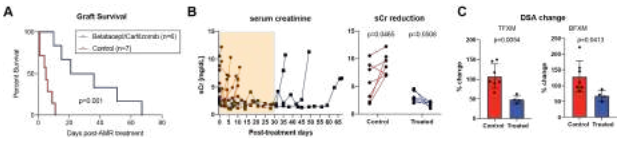
CITATION INFORMATION: Matar A., Lovasik B., Dong Y., Faber D., Habib J., Breeden C., Regenold J., Ghosh A., Stephenson A., Kitchens W., Adams A. Interruption of Notch Signaling via Blockade of Delta-Like Ligand 4 Prevents Co-Stimulation Blockade Resistant Allograft Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.J. Matar: None. **B.P. Lovasik:** None. **Y. Dong:** None. **D.A. Faber:** None. **J. Habib:** None. **C. Breeden:** None. **J. Regenold:** None. **A. Ghosh:** None. **A. Stephenson:** None. **W.H. Kitchens:** None. **A.B. Adams:** None.

Abstract# 345

Belatacept and Carfilzomib-based Treatment of Active Antibody-mediated Rejection in a Sensitized Nonhuman Primate Model

J. Kwun[1], R. Schmitz[1], M. Manook[1], Z. Fitch[1], D. Olaso[1], A. Choi[1], J. Yoon[1], Y. Bae[1], J. Lambris[2], S. Knechtle[1], *[1]Surgery, Duke University, Durham, NC, [2]Pathology & Laboratory Medicine, University of Pennsylvania, Philadelphia, PA*

Purpose: One third of sensitized, HLA-incompatible transplant recipients experience antibody-mediated rejection (AMR) with limited effective treatment options. We tested a novel treatment strategy for AMR consisting of complement inhibition, proteasome inhibition and costimulation blockade in a nonhuman primate model.
Methods: Thirteen rhesus macaques were sensitized to maximally MHC mismatched donors by two sequential skin transplants. Primates subsequently received kidney allografts from their skin donors. All primates received induction therapy with rhesus-specific ATG (rhATG) and were maintained on different immunosuppressive regimens. Primates were monitored postoperatively for signs of AMR, which was defined as worsening kidney function resistant to high dose steroid rescue therapy, a rise in serum donor-specific antibody (DSA) levels, and biopsy evidence of active AMR. AMR treatment consisted of carfilzomib and belatacept for a maximum of 4 weeks.
Results: Treatment with carfilzomib and belatacept was well tolerated and we did not observe any treatment-specific side effects. Once AMR developed, animals without further treatment rejected their graft rapidly. However, animals treated with carfilzomib and belatacept showed prolonged graft survival after the AMR treatment compared to control animals (5d vs. 28.5d, $p < 0.01$; **Figure 1A**). As shown in **figure 1B**, animals without treatment showed significant elevation of serum creatinine (sCr) while profound reduction of sCr was observed in treated animals. After initiation of treatment, we observed a significant reduction of both class I and class II DSA (**Figure 1C**). However, all animals showed rebound of DSA when the treatment was discontinued.
Conclusions: Carfilzomib and belatacept were able to control on-going humoral immune response seen during AMR in a nonhuman primate model. This was associated with improved graft function and prolongation of graft survival. Further studies in optimizing maintenance immunosuppression after carfilzomib and belatacept treatment is warranted to continuously control post-transplant humoral response in the sensitized recipients.



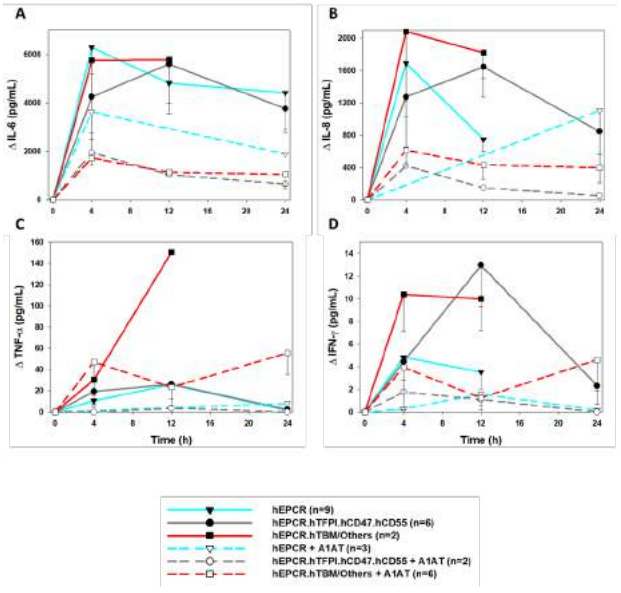
CITATION INFORMATION: Kwun J., Schmitz R., Manook M., Fitch Z., Olaso D., Choi A., Yoon J., Bae Y., Lambris J., Knechtle S. Belatacept and Carfilzomib-based Treatment of Active Antibody-mediated Rejection in a Sensitized Nonhuman Primate Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Kwun: None. **R. Schmitz:** None. **M. Manook:** None. **Z. Fitch:** None. **D. Olaso:** None. **A. Choi:** None. **J. Yoon:** None. **Y. Bae:** None. **J. Lambris:** None. **S. Knechtle:** None.

Abstract# 346

Alpha 1-antitrypsin Reduces Cytokine Elaboration in a Xenogeneic Lung Transplantation Model

L. Burdorf[1], C. Laird[2], T. Zhang[2], M. R. Connolly[1], Z. Habibabady[1], S. Pratts[1], S. Miura[1], F. Pollok[1], W. Eyestone[3], C. J. Phelps[3], D. L. Ayares[3], A. M. Azimzadeh[1], R. N. Pierson III[1], *[1]Surgery, Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Surgery, University of Maryland, Baltimore, MD, [3]Revivicor, Blacksburg, VA*

Purpose: Novel gene editing techniques have facilitated the generation of donor pigs with multiple genetic modifications, used for xenolung transplantation. Several rejection pathways, including antibody binding, complement and coagulation activation, have been identified, leading to inflammation with cytokine release. Here we tested in a rigorous lung transplantation model whether Alpha 1-Antitrypsin (A1AT) treatment reduces cytokine release and improves survival.
Methods: GalTKO.hCD46 porcine lungs, additionally expressing hEPCR or hEPCR.hCD47.hTFPI.hCD55 or hEPCR.hTBM/others were used in 17 single lung transplants into baboons. In 11 further transplantations, recipients were additionally treated with A1AT. All recipients received a "platform drug regimen" including steroids, sC1Inh, thromboxane synthase inhibition, anti-histamine, and αGPIb Fab. Immunosuppression consisted of αCD20, ATG, MMF, αCD40. Donors were treated with Desmopressin to deplete pig endothelial vWF. Quantification of cytokines was done by Luminex assay, using baboon plasma, collected at baseline, 4, 12 and 24 hours after reperfusion.
Results: A1AT treatment was associated with reduced elaboration of IL6, IL8, and IFN-γ for all tested pig genetic cohorts (Fig.1 A, B, D). TNF-α showed lower values in the hEPCR and hEPCR.hCD47.hTFPI.hCD55 groups but not with hEPCR.hTBM lungs at the 4h time point (Fig.1 C). A1AT was also associated with longer recipient survival, including the two longest survivors in the hEPCR.hTBM group (7 and 9 days) in this analysis.
Conclusions: The results of this study demonstrate that xenogeneic lung transplantation leads to a significant inflammatory response with high cytokine release. Within the analyzed lung phenotypes, A1AT treatment was associated with a trend toward attenuated cytokine elaboration and prolonged recipient survival, suggesting that A1AT attenuates proinflammatory pathways critical to xenografts injury. Further mechanism-directed transgenic modifications and drug treatments may facilitate clinical translation.



CITATION INFORMATION: Burdorf L., Laird C., Zhang T., Connolly M., Habibabady Z., Pratts S., Miura S., Pollok F., Eyestone W., Phelps C., Ayares D., Azimzadeh A., Pierson III R. Alpha 1-antitrypsin Reduces Cytokine Elaboration in a Xenogeneic Lung Transplantation Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Burdorf: None. **C. Laird:** None. **T. Zhang:** None. **M.R. Connolly:** None. **Z. Habibabady:** None. **S. Pratts:** None. **S. Miura:** None. **F. Pollok:** None. **W. Eyestone:** Salary; Name of Commercial Interest; Revivicor. **C.J. Phelps:** Salary; Name of Commercial Interest; Revivicor. **D.L. Ayares:** Salary; Name of Commercial Interest; Revivicor. **A.M. Azimzadeh:** None. **R.N. Pierson III:** None.

Abstract# 347

Pig Orthotopic Heart Transplantation (ohtx) in Baboons: Is an Acute Pulmonary Inflammatory Response the Key Problem?

A. Jagdale[1], D. Cleveland[2], M. Bikhet[1], J. Foote[3], G. Walcott[4], H. Iwase[1], T. Yamamoto[1], H. Hara[1], C. Hansens-Estruch[1], D. Ayares[5], S. Litovsky[6], L. Rhodes[2], W. Carlo[7], J. Crawford[2], R. Dabal[2], S. Borasino[2], D. Cooper[1], *[1]Surgery, University of Alabama at Birmingham, Birmingham, AL, [2]Cardiothoracic Surgery, Children's of Alabama, Birmingham, AL, [3]Medicine and Cardiovascular Diseases, University of Alabama at Birmingham, Birmingham, AL, [4]Medicine, University of Alabama at Birmingham, Birmingham, AL, [5]Surgery, Revivicor, Blacksburg, VA, [6]Pathology, University of Alabama at Birmingham, Birmingham, AL, [7]Division of Pediatric Cardiology, Department of Pediatrics, University of Alabama at Birmingham, Children's of Alabama, Birmingham, AL*

Purpose: To investigate the mechanism of early cardio-pulmonary dysfunction after genetically engineered pig OHTx in baboons.

Methods: OHTx from pigs expressing different genetic modifications, α-galactosyltransferase knockout with human CD55 (GTKO/hCD55) [n=2]; α-galactosyltransferase knockout with human CD46 and human thrombomodulin (GTKO/hCD46/hTBM) [n=2] was carried out in 4 baboons. The immunosuppressive regimen included induction with ATG (Thymoglobulin), anti-CD20mAb (Rituximab), and cobra venom factor or a C1-esterase inhibitor, and maintenance with an anti-CD40mAb, rapamycin, and low-dose steroids.

Results: Four baboons (<12 kg) underwent orthotopic cardiac transplant of a genetically engineered pig xenograft. All four successfully emerged from cardio-pulmonary bypass. Two baboons were euthanized a few hours after OHTx while the other 2 baboons survived 3 and 8 months, respectively. Features of pulmonary dysfunction in the early post-operative period (e.g., tachypnea, reduced pO_2, reduced sO_2 etc.), particularly in the 24 hours following weaning from the ventilator, developed in all 4 baboons. The 2 baboons that were euthanized showed very high levels of IL-6, IL-8, and IFN-γ compared to the 2 that survived longer, suggesting a possible association between cytokine storm and acute pulmonary injury. Histopathological examination confirmed inflammatory lung injury in 3 baboons, including the 3-month survivor (that died from a dysrhythmia).

Conclusions: After pig OHTx in baboons, all of our baboons experienced acute pulmonary dysfunction. Because pulmonary dysfunction can lead to impaired cardiac graft function, further research is indicated regarding the role of cytokine storm in acute pulmonary dysfunction particularly since treatment with IL-6 blockade or dexamethsone can attenuate this cytokine response.

CITATION INFORMATION: Jagdale A., Cleveland D., Bikhet M., Foote J., Walcott G., Iwase H., Yamamoto T., Hara H., Hansens-Estruch C., Ayares D., Litovsky S., Rhodes L., Carlo W., Crawford J., Dabal R., Borasino S., Cooper D. Pig Orthotopic Heart Transplantation (ohtx) in Baboons: Is an Acute Pulmonary Inflammatory Response the Key Problem? *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Jagdale: None. **D. Cleveland:** Grant/Research Support; Name of Commercial Interest; part of work supported by grant from Children's of Alabama. **M. Bikhet:** None. **J. Foote:** None. **G. Walcott:** None. **H. Iwase:** None. **T. Yamamoto:** None. **H. Hara:** None. **C. Hansens-Estruch:** None. **D. Ayares:** None. **S. Litovsky:** None. **L. Rhodes:** None. **W. Carlo:** None. **J. Crawford:** None. **R. Dabal:** None. **S. Borasino:** None. **D. Cooper:** Grant/Research Support; Name of Commercial Interest; Work on xenotransplantation at the University of Alabama at Birmingham is supported in part by NIH NIAID U19 grant AI090959, in part by a grant to UAB from United Therapeutics, Silver Spring, MD.

Abstract# 348

Successful Long-Term TMA- and Rejection-Free Survival of a Kidney Xenograft With Triple Xenoantigen Knockout Plus Insertion of Multiple Human Transgenes

T. Hirose[1], D. Ma[1], G. Lassiter[1], H. Sasaki[1], I. Rosales[2], T. Coe[1], C. Rickert[1], R. Matheson[1], R. Colvin[2], W. Qin[3], Y. Kan[3], J. Layer[3], K. Stiede[3], K. Hall[3], M. Youd[3], W. Westlin[3], M. Curtis[3], J. F. Markmann[1], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Pathology, Massachusetts General Hospital, Boston, MA, [3]eGenesis Inc, Cambridge, MA*

Purpose: Pigs with deletion of 3 carbohydrate xenoantigens (triple knock-out, TKO) are expected to be optimal donors for human xenotransplantation. However, anti-porcine natural antibodies of old world monkeys (OWM), such as baboons, cynomolgus or rhesus monkeys, have been shown to have higher bindings to TKO cells with rapid rejection of the renal xenografts in baboons. Therefore, it is crucial to establish a preclinical model that can reliably evaluate xenografts from TKO pigs. Here, we show, for the first time, the long-term TMA- and rejection- free renal xenograft survival from TKO pigs can be achieved using cynomolgus macaques.

Methods: Eight cynomolgus monkeys received kidneys from two different TKO pigs lines with human complement, inflammation, and immune regulatory transgenes (TKO-A, TKO-B). The expression of transgenic human complement related genes (CD46, CD55 and CD59) was low on TKO-A, but high on TKO-B. The recipients were treated with ATG and anti-CD20 mAb as an induction, followed by weekly anti-CD154 mAb, daily MMF with or without 1-2 months course of rapamycin or tacrolimus. The levels of pre-transplant recipient IgG/IgM antibodies against donor porcine endothelial cells were measured by flow cytometry.

Results: Anti-TKO IgG levels of all recipients were comparable to those of pooled human serum except for one recipient (TKO-A2), while anti-TKO IgM levels were consistently higher than those of pooled human serum (Fig. 1). TKO-A1 rejected xenograft rapidly on day 2, while TKO-A2 survived for 61 days, despite high anti-pig IgG and IgM titers. Among 6 recipients of TKO-B, although 2 monkeys (TKO-B1 and 2) rejected with TMA within 3 weeks (15 and 20 days) , 4 recipients (TKO-B3 to 6) achieved long-term survival (71, 135, 265 and 316 days) (Fig. 2). In the 3/4 long-term survivors, rejection or TMA was observed only after reduction of immunosuppression due to infectious complications, leading to rejection and TMA free xenograft survival reached up to 237 days. In this study, there was no significant correlation found between pre-transplant anti-TKO IgG and IgM levels and the transplant outcome.

Conclusions: TKO with multiple human transgenes allowed kidney graft survival up to 316 days with TMA- and rejection-free xenograft survival up to 237 days.

Fig. 1

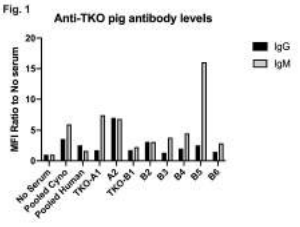
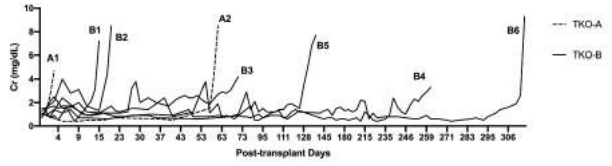


Fig. 2



CITATION INFORMATION: Hirose T., Ma D., Lassiter G., Sasaki H., Rosales I., Coe T., Rickert C., Matheson R., Colvin R., Qin W., Kan Y., Layer J., Stiede K., Hall K., Youd M., Westlin W., Curtis M., Markmann J., Kawai T. Successful Long-Term TMA- and Rejection-Free Survival of a Kidney Xenograft With Triple Xenoantigen Knockout Plus Insertion of Multiple Human Transgenes *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Hirose: None. **D. Ma:** None. **G. Lassiter:** None. **H. Sasaki:** None. **I. Rosales:** None. **T. Coe:** None. **C. Rickert:** None. **R. Matheson:** None. **R. Colvin:** None. **W. Qin:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **Y. Kan:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **J. Layer:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **K. Stiede:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **K. Hall:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **M. Youd:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **W. Westlin:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **M. Curtis:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **J.F. Markmann:** Consulting Fee; Name of Commercial Interest; eGenesis. Consulting Fee; Nature of Relationship; Employee. **T. Kawai:** None.

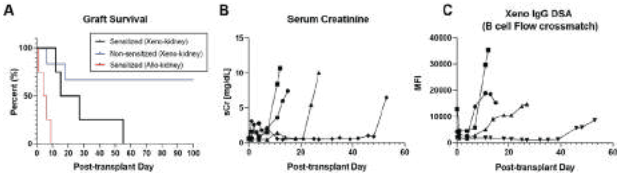
Abstract# 349

Impact of Allosensitization on Xenotransplantation

D. Olaso[1], M. Manook[1], J. Yoon[1], Y. Bae[1], A. Barbas[1], A. Adams[2], S. Knechtle[1], J. Kwun[1], *[1]Department of Surgery, Duke Transplantation Center, Durham, NC, [2]Department of Surgery, University of Minnesota, Minneapolis, MN*

Purpose: Sensitization to human leukocyte antigens (HLA) due to prior exposure to foreign antigens through events such as blood transfusions, previous kidney transplant, or pregnancy is associated with worse post-transplant graft survival and

increased risk of graft loss due to antibody-mediated rejection (AMR). We sought to explore xenotransplantation in the highly sensitized recipient to characterize how allosensitization impacts immunologic rejection after xeno-kidney transplant.
Methods: Four nonhuman primates (NHP) were allosensitized with maximally HLA-mismatched rhesus donor skin grafts. Six to eight weeks after the second skin graft, porcine kidneys from genetically modified knockout a-1,3-galactosyltransferase (GGTA1KO) and human decay accelerating factor transgenic (CD55Tg) pigs were transplanted into the allosensitized NHPs. The immunosuppression regimen consisted of rhesus anti-CD4 and anti-CD8 induction, and anti-CD154 mAb (rh5C8), mycophenolate mofetil, and corticosteroids as maintenance therapy. Both xeno-reactive and allo-specific antibodies were evaluated with flow crossmatch.
Results: All animals tolerated xeno-kidney transplantation well with no cases of hyperacute rejection. NHPs received pulsed corticosteroid per rejection protocol but no rejections reversed. All four animals rejected their grafts at POD 12, 15, 27, and 55 (MST = 27.25d). Xeno-graft survival was greatly prolonged compared to highly sensitized animals with allo-kidney transplants without desensitization (MST=7d). However, compared to previously reported non-sensitized recipients with xeno-kidney transplantation (MST=201.8d), graft survival was significantly reduced by allosensitization (**Figure 1A and 1B**). Interestingly, flow crossmatch revealed elevated xeno-DSA that coincided with rejection (**Figure 1C**), and allosensitization was not boosted by rejection of a xenograft.
Conclusions: This is the first attempt, to our knowledge, to perform xenotransplantation in highly allosensitized NHP recipients. Allosensitization leads to overall decreased xeno-graft survival and increased risk of graft loss due to AMR compared to non-sensitized recipients. Further studies in optimizing desensitization and maintenance immunosuppression therapies are warranted to further characterize the clinical utility of xenotransplantation in the allosensitized recipient.



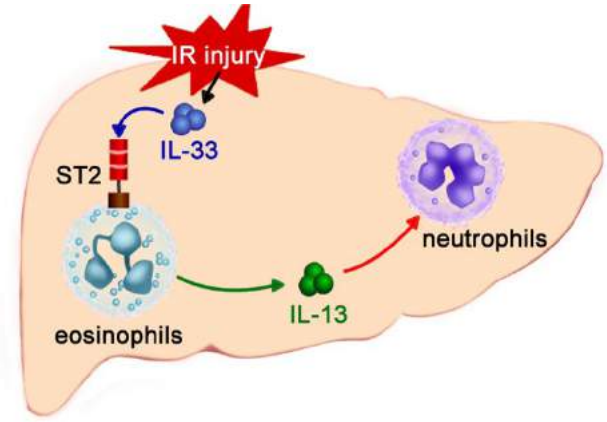
CITATION INFORMATION: Olaso D., Manook M., Yoon J., Bae Y., Barbas A., Adams A., Knechtle S., Kwun J. Impact of Allosensitization on Xenotransplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Olaso: None. **M. Manook:** None. **J. Yoon:** None. **Y. Bae:** None. **A. Barbas:** None. **A. Adams:** None. **S. Knechtle:** None. **J. Kwun:** None.

Basic

Ischemia Reperfusion & Organ Rehabilitation

Abstract# 350
Beneficial Effects of Argon Inhalation on Reducing Lung Ischemia-reperfusion Injury in Miniature Swine
H. Sahara, *Div. Organ Replacement and Xeno Tx, Center for Advanced Biomedical Science and Swine Research, Kagoshima University, Kagoshima, Japan*
Purpose: Noble gases, such as xenon and argon (Ar), are chemically inert but have shown to have cytoprotective effect. In contrast to xenon, Ar is the non-anesthetic and the third most abundant gas in the earth's atmosphere suggesting its higher safety level and economic benefit. The effects of Ar on reducing ischemia-reperfusion injury (IRI) have been reported in a variety of organs in murine models, however, the results from large animal models have been still controversial. In this study, we evaluated the cytoprotective effects of Ar inhalation in in situ porcine lung model of 90-minutes warm IRI.
Methods: Ten CLAWN miniature swine were evenly divided into two groups (Ar-treated and control group). In both groups, warm ischemia was induced for 90 minutes by clamping the left bronchus, pulmonary artery and veins. Animals were inhaled with either 70% Ar (Ar-treated) or 70% nitrogen (control) in 30% oxygen for 360 minutes throughout the procedure. Lung function and structure were serially assessed via the ratio of partial pressure of oxygen to fractional inspired oxygen (pO_2/FiO_2) measured by both arterial blood and pulmonary vein (PV), chest X-ray and lung biopsy.
Results: Ar inhalation dramatically decreased lung injury associated with ischemia and reperfusion without apparent adverse effects. In the control group, 90 minutes of warm ischemia resulted in a significant decrease in pO_2/FiO_2 by arterial blood, from 568 +/-12 mmHg before ischemia to 272 +/-39 mmHg 2 hours after reperfusion ($p<0.05$). In sharp contrast, animals in the Ar-treated group had no significant change in pO_2/FiO_2 by arterial blood despite 90-min ischemia (563 +/-18 mmHg before ischemia to 431 +/-49 mmHg 2 hours after reperfusion). Moreover, pO_2/FiO_2 by PV showed well-maintained lung function in the Ar-treated group (331 +/-40 vs. 186 +/-17 at 2 hours, $p<0.05$; 519 +/-19 vs. 292 +/-33 at 2 days after reperfusion, $p<0.05$). Histologic scores of lung biopsy specimens based on light microscopy which was calculated on the basis of the evaluation of cell infiltration, intra-alveolar edema, fibrin exudation and hemorrhage showed significantly better in the Ar-treated group at both 2 hours and 2 days after reperfusion.
Conclusions: To our knowledge, this is the first demonstration of the beneficial effects of perioperative inhalation of Ar on IRI of the lung in a large animal model. Further studies are required to clarify the exact mechanism of the effect of Ar inhalation including anti-inflammation, anti-apoptotic or anti-oxidation for clinical application of this novel therapy.
CITATION INFORMATION: Sahara H. Beneficial Effects of Argon Inhalation on Reducing Lung Ischemia-reperfusion Injury in Miniature Swine *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Sahara: None.

Abstract# 351
Eosinophils Attenuate Hepatic Ischemia Reperfusion Injury in Mice Through St2-Dependent Il-13 Production
Y. Yang, Y. Wang, M. Wang, J. Jeong, L. Xu, Y. Wen, C. Emontzpohl, W. Dar, C. Ju, *Department of Anesthesiology, McGovern Medical School University of Texas Health Science Center at Houston, Houston, TX*
Purpose: The purpose is to investigate the functional role of eosinophils during hepatic ischemia and reperfusion injury (IRI).
Methods: Mice with antibody-induced eosinophil depletion and two strains of mice with genetic deletion of eosinophils were be used in the studies.
Results: Unexpectedly, we identified a rapid accumulation of eosinophils in human liver grafts following hepatic transplantation. In contrast, no eosinophils were detectable in healthy liver tissues. Studies with genetic models of eosinophil deficiency or antibody-mediated eosinophil depletion revealed exacerbated injury following hepatic ischemia and reperfusion. Adoptive transfer of bone marrow-derived eosinophils normalized liver injury of eosinophil-deficient mice and reduced hepatic ischemia and reperfusion injury in wild-type mice. Mechanistic studies combining genetic and adoptive transfer approaches identified a critical role of suppression of tumorigenicity (ST2)-dependent production of interleukin-13 by eosinophils in the hepatoprotection against ischemia reperfusion-induced injury.
Conclusions: Taken together, the present studies uncovered a previously unrecognized hepatoprotective function of eosinophils and implicated the IL-33/ST2-dependent IL-13 production in mediating the protective effect. The findings support further exploration of eosinophils and IL-33/ST2 signaling as candidate therapeutic targets to improve the outcomes of liver surgery and transplantation.



CITATION INFORMATION: Yang Y., Wang Y., Wang M., Jeong J., Xu L., Wen Y., Emontzpohl C., Dar W., Ju C. Eosinophils Attenuate Hepatic Ischemia Reperfusion Injury in Mice Through St2-Dependent Il-13 Production *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Yang: None. **Y. Wang:** None. **M. Wang:** None. **J. Jeong:** None. **L. Xu:** None. **Y. Wen:** None. **C. Emontzpohl:** None. **W. Dar:** None. **C. Ju:** None.

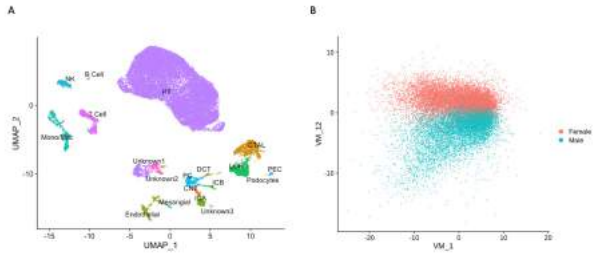
Abstract# 352
Neutrophil Extracellular Trap-induced Thrombotic Microangiopathy in Steatotic Mouse Recipients Impacts Liver Transplant Outcomes
H. Hirao, H. Kojima, K. Kadono, K. J. Dery, D. G. Farmer, F. M. Kaldas, J. W. Kupiec-Weglinski, *UCLA Medical Center, Los Angeles, CA*
Purpose: Nonalcoholic steatohepatitis (NASH) is an emerging global epidemic projected to become the leading indication for liver transplantation (LT). Although recent studies focus on the utilization of steatotic livers as marginal grafts, little is known as to whether and how the recipient steatosis may affect LT outcomes. It was shown that mice with severe hepatic steatosis were highly susceptible to neutrophil

extracellular trap-related cell death (NETosis) and subsequent thrombosis formation. The present study was aimed to assess whether the severity of steatosis in prospective mouse recipients may influence the course of donor LT.
Methods: Four-week old WT mice (C57/BL6) were fed with normal diet (ND) or high fat diet (HFD) for 4 or 12 weeks. Four-week HFD feeding resulted in the development of microvesicular steatosis (<30% lipid droplet), while 12 week HFD feeding led to classic macrovesicular steatosis (>60%). Donor WT livers were then transplanted, after cold storage (4oC/90min), to distinct groups of syngeneic: 1/ ND-WT, 2/ HFD (4w)-WT or 3/ HFD (12W)-WT recipients. LTs samples collected at 6h and 24h were analyzed by qRT-PCR, western blotting and immunohistochemistry.
Results: Mouse recipients in HFD (12w) group had significantly higher post-LT transaminase release/enhanced pro-inflammatory cytokine/chemokine profiles at 6h post-LT, as compared to ND or HFD (4w) groups. Unexpectedly, HFD (12w)-fed recipients failed to survive longer than 2 days post-LT, despite all recipients surviving >14days in ND and HFD (4w)-fed groups. Western blot analysis revealed that the expression of LC3B (autophagy marker) was significantly impaired, while VCAM-1 and CD62P (endothelial damage markers) were significantly upregulated in HFD (12w) group at 24h post-LT. Immunohistochemistry analysis of CD42b, Ly6G, and Histone H3 expression/levels showed NET related platelet thrombosis was profoundly augmented in HFD (12w)-fed recipients. These results indicate that mouse recipients suffering from severe steatosis prior to liver transplantation were highly susceptible to LT-related hepatic IR-stress/injury.
Conclusions: This study documents that severely steatotic mouse recipients even when transplanted with healthy donor livers may experience NETosis-related thrombosis, accompanied by poor post-LT outcomes.
CITATION INFORMATION: Hirao H., Kojima H., Kadono K., Dery K., Farmer D., Kaldas F., Kupiec-Weglinski J. Neutrophil Extracellular Trap-induced Thrombotic Microangiopathy in Steatotic Mouse Recipients Impacts Liver Transplant Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Hirao: None. **H. Kojima:** None. **K. Kadono:** None. **K.J. Dery:** None. **D.G. Farmer:** None. **F.M. Kaldas:** None. **J.W. Kupiec-Weglinski:** None.

Abstract# 353

Single Cell Analysis of Living Donor Kidneys Reveals Sex-based Diversity in Proximal Tubulargene Expression

C. M. McEvoy[1], J. M. Szusz[2], S. Clotet-Freixas[1], J. An[2], S. MacParland[2], G. Bader[3], S. Q. Crome[2], A. Konvalinka[1], *[1]Ajmera Transplant Centre, Toronto General Hospital Research Institute, Toronto, ON, Canada, [2]Immunology and Molecular Genetics, University of Toronto, Toronto General Hospital Research Institute, Toronto, ON, Canada, [3]Donnolly Centre for Cellular and Biomolecular Research, University of Toronto, Toronto, ON, Canada*
Purpose: Males with chronic kidney disease (CKD) experience a more rapid decline in kidney function and progression to end-stage kidney disease than females. *In vitro* studies further support a sexually dimorphic response to kidney injury. The molecular basis for the poor prognosis associated with male sex in CKD remains unclear. Single-cell RNA sequencing enables precise characterization of the transcriptional signature from individual cells. Such sex-specific single cell transcriptional profiles would transform our understanding of the impact of sex on CKD progression.
Methods: We sequenced single-cell suspensions of 19 pre-implantation kidney biopsies from 9 male and 10 female living kidney donors (10X Genomics). 10 biopsies (5 male, 5 female) underwent CD45+ selection to enhance representation of immune cell populations. Mapping and quantification were performed using the Cellranger software package. Ambient RNA contamination was corrected using SoupX, and doublets removed using DoubletFinder. Normalization and clustering were performed using the Seurat pipeline. Sex-based transcriptional differences were identified using varimax rotational analysis.
Results: All expected parenchymal populations from both glomerular and tubulointerstitial compartments featured on our map (Fig1A). Striking sex-specific differences in gene expression were identified in proximal tubular (PT) cells, which contributed ~80% of all cells in these healthy kidneys (Fig1B). Interestingly, X/Y-chromosome encoded genes and phenotypic genes (e.g. LRP2) were among these sex-specific genes altered in PT cells. Genes with higher expression in females were associated with important metabolic processes including detoxification, antioxidant processes and the negative regulation of cell death. In contrast, processes related to nonsense mediated decay and the cellular response to stress were enhanced in males.
Conclusions: We have generated a comprehensive healthy kidney map with novel focus on sex-specific differences in kidney cell populations. Male and female PT epithelial cells display marked changes in genes associated with metabolism and antioxidant activities. These changes might underpin the differences in male and female susceptibility to CKD.



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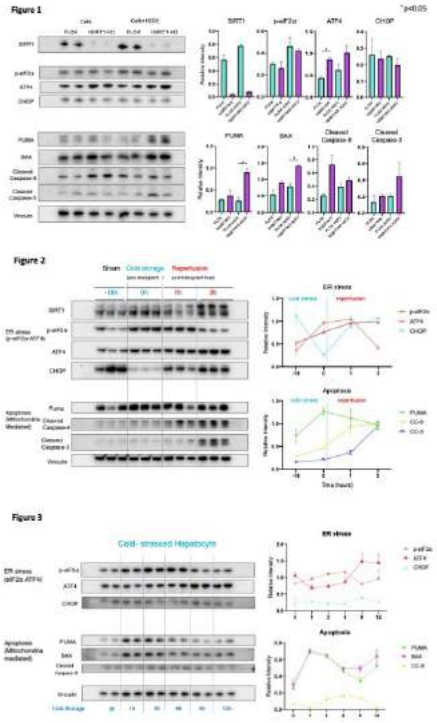
DISCLOSURES: C.M. McEvoy: None. **J.M. Szusz:** None. **S. Clotet-Freixas:** None. **J. An:** None. **S. MacParland:** None. **G. Bader:** None. **S.Q. Crome:** None. **A. Konvalinka:** None.

Abstract# 354

Hepatocyte SIRT1 Suppresses Atf4-mediated Apoptosis Triggered by Cold Stress in Mouse and Human Liver Transplantation

K. Kadono[1], H. Hirao[1], H. Kojima[1], K. J. Dery[1], J. Aziz[1], X. Li[2], J. W. Kupiec-Weglinski[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]NIEHS, Durham, NC*
Purpose: The role of ER-stress or hepatocyte-specific SIRT1 signaling during donor liver cold preservation remains unknown. We employed a mouse OLT model and analyzed clinical liver transplant biopsies (Bx) to determine as to whether and how hepatocyte SIRT1- ER stress (p-eIF2α/ATF4)-apoptosis axis may affect outcomes.
Methods: WT or hepatocyte-specific SIRT1 deficient (hSIRT1-KO) livers (C57/BL6), subjected to extended (18h) cold storage (4C in UW solution), were transplanted to syngeneic WT recipients. Liver/serum samples were collected at 6h post-reperfusion. Human liver Bx collected from 60 OLT patients (after cold storage and 2 hrs after reperfusion) were analyzed by Western blots/RT-PCR.
Results: hSIRT1-KO primary hepatocytes showed increased levels of ATF4 and up-regulation of PUMA/BAX/Cleaved Caspase-9 while levels of p-eIF2α/CHOP remained unchanged as compared to WT counterparts (Figure 1). Furthermore, silencing (siRNA) of ATF4 reduced levels of PUMA/BAX but not of CHOP in hepatocyte cultures. Compared with WT liver grafts (WT>WT), disruption of hepatocyte SIRT1 signaling in the donor liver (hSIRT1-KO>WT) aggravated IRI, as evidenced by: 1/ sALT/sAST levels (ALT: 7321±6104 vs 3875±1869 IU/L, n=12/12, p=0.037; AST: 3671±2678 vs 1853±532 IU/L, n=12/12, p=0.015); 2/ Suzuki's histological grading ($p<0.05$); 3/ frequency of TUNEL+ cells ($p<0.05$); 4/ augmented neutrophil/macrophage infiltration (IHC, $p<0.05$); 5/ increased hepatic ATF4/PUMA/Cleaved Caspase-9/Cleaved Caspase-3 expressions (WB, $p<0.05$); and 6/ impaired survival of IR-stressed OLTs (2-weeks: 11% vs 44%, n=9/9, p=0.036). Cold-stored liver grafts showed up-regulation of p-eIF2α/ATF4 and PUMA/Cleaved Caspase-9 while CHOP levels decreased (Figure 2). Consistently, cold-stressed hepatocytes displayed increased levels of p-eIF2α/ATF4 and PUMA/BAX/Cleaved Caspase-9, with CHOP relatively unchanged (Figure 3). In the clinical arm, pre-reperfusion SIRT1 levels in human liver Bx negatively correlated with protein expression levels of ATF4 (r=-0.313, p=0.056) but positively with Bcl-2 (r=0.4519, p=0.0003), while post-reperfusion hepatic SIRT levels in OLTs negatively correlated with ATF4 (r=-0.2684, p=0.0058) and Cleaved Caspase-3 (r=-0.4213, p=0.0111).
Conclusions: This translational study documents hepatocyte SIRT1 regulates ATF4 mediated apoptosis triggered by cold-stress, providing a novel therapeutic target and putative mechanism of hepatocyte-specific cell death pathway.



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DISCLOSURES: K. Kadono: None. **H. Hirao:** None. **H. Kojima:** None. **K.J. Dery:** None. **J. Aziz:** None. **X. Li:** None. **J.W. Kupiec-Weglinski:** None.

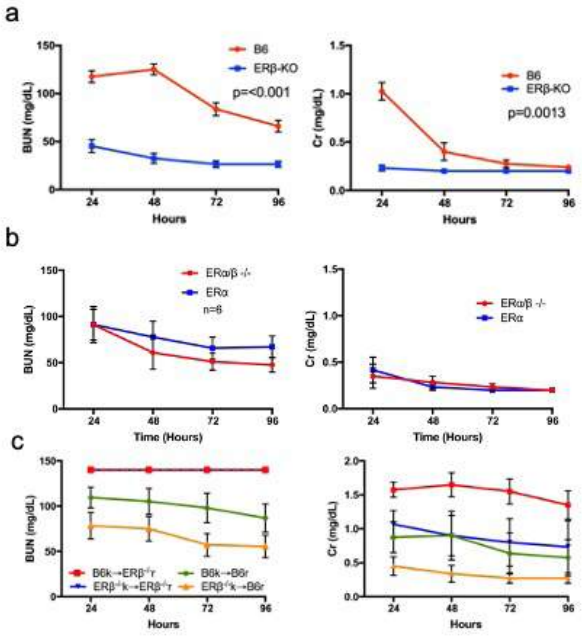
Abstract# 355

Estrogen Receptor Beta Deletion is Protective in Renal Ischemia Reperfusion Injury in a Renal Specific Manner

C. S. O'Brien, P. Hernandez, Z. Wang, G. Ge, W. Hancock, M. H. Levine, *Surgery, University of Pennsylvania, Philadelphia, PA*

Purpose: Renal Ischemia Reperfusion Injury (IRI) is a major contributor to delayed graft function (DGF) in kidney transplantation. Previously, we have shown lower rates of DGF among female renal transplant recipients in the UNOS registry, and using a murine model, we demonstrated improved IRI tolerance with administration of supplemental 17β-estradiol (E2) and selective estrogen receptor modulators (SERM). There are two principal estrogen receptors, estrogen receptor alpha (ERα) and estrogen receptor beta (ERβ), and expression varies by tissue type. We have shown decreased ischemia tolerance in ERα knockout mice (ERα-KO). Given the therapeutic potential of manipulating the estrogen receptors with E2 or SERM, understanding the role of the ERβ in renal IRI is essential.

Methods: Female Erβ-KO mice and ERαβ-KO mice underwent warm renal ischemia along with B6 controls. Renal ischemia was repeated with ERαβ-KO and ERα-KO mice using a shortened ischemic time. Additionally, we transplanted kidneys from C57BL/6(B6) donor mice into B6 recipient mice, ERβKO kidneys into B6 recipients, and B6 kidneys into ERβKO recipients, followed by native nephrectomy. All groups subsequently underwent standardized renal IRI. Blood urea nitrogen (BUN) and serum creatinine (Cr) were measured at 24-, 48-, 72- and 96-hours after IRI.
Results: ERβ-KO mice had significantly lower BUN and Cr compared to B6 mice ($p<0.001$, Figure 1a). 5 of 7 ERαβ-KO mice undergoing standard IRI experienced fatal renal injury, as compared to zero controls, with ERαβ-KO mice having significantly higher BUN (135 +/-14) than B6 controls (104 +/-13, $p=0.003$) at 24 hours. In modified IRI, ERαβ-KO had no difference from ERα-KO mice (Figure 1b). ERβ-KO mice that received B6 kidneys (B6=>ERβKO) had significantly higher BUN and Cr compared to B6 mice that received ERβKO kidneys (ErβKO=>B6) ($p<0.001$) and significantly higher Cr than B6 mice that received B6 kidneys (B6=>B6) ($p<0.05$, Figure 1c).
Conclusions: ERβ-KO is protective against renal IRI, but combined deletion of ERα and ERβ recapitulates the previously shown harmful effects of ERα deletion. The protective effect of ERβ deletion appears to be localized to the kidney. Differential blockade of ERα and Erβ in the kidneys vs. the periphery may provide an avenue to increase the protective effects of estrogen in renal IRI.



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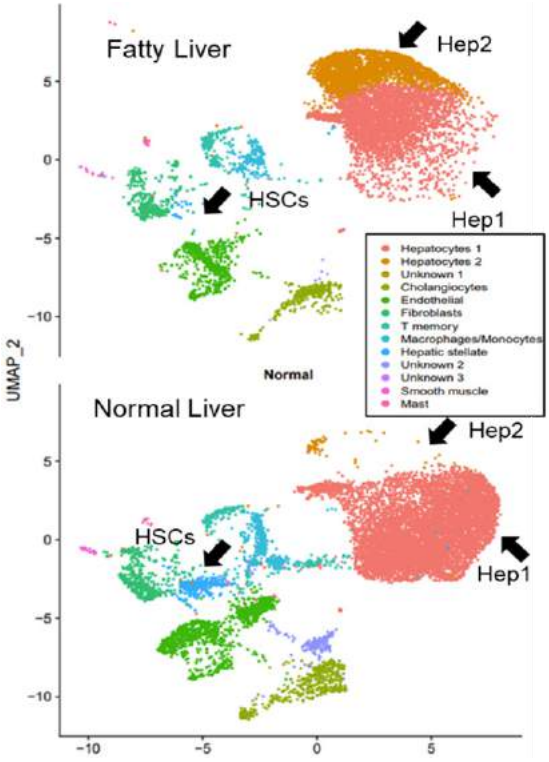
DISCLOSURES: C.S. O'Brien: None. **P. Hernandez:** None. **Z. Wang:** None. **G. Ge:** None. **W. Hancock:** None. **M.H. Levine:** None.

Abstract# 356

Cellular Landscape of Steatotic Livers Revealed by Single-nuclei Rna Sequencing

C. Kuscu[1], C. Kuscu[1], A. Shetty[2], E. Bardhi[3], T. Rousselle[4], J. Eason[1], M. Sraj[5], D. Maluf[6], V. Mas[4], *[1]Surgery, James D Eason Transplant Institute, Memphis, TN, [2]University of Maryland, Institute for Genome Sciences, Baltimore, MD, [3]Program in Transplantation - University of Maryland, Baltimore, MD, [4]Surgery, Division of Surgical Science, Baltimore, MD, [5]Surgery, University of Maryland, Baltimore, MD, [6]Surgery, Program in Transplantation - University of Maryland, Baltimore, MD*

Purpose: Hepatic IRI represents a barrier to the use of available organs for transplant, particularly fatty livers. We aimed to discern the cellular subsets and individual transcriptomics that characterize human steatotic livers
Methods: Single nuclei were isolated from normal (NL) and fatty (FL) (30% macrosteatosis) liver samples (n=4). Liver tissues were matched by age, sex, and gender. > 30,000 nuclei in Gel-Bead V3 were captured by using the droplet-based 10X Genomic Chromium Platform. Data was analyzed in CellRanger 3.1.0. Cell clustering using PCA followed by uniform manifold approximation and projection (UMAP) was done. Distinct clusters of cells based on GE of highly variable genes were identified. GE patterns between clusters were evaluated to find cluster-specific marker genes.
Results: A total of 18 cell clusters were identified from the integration of total nuclei gene markers, which resulted in 13 cell clusters based on gene markers (representation of parenchymal and non-parenchymal liver cells) (**Fig. 1**). Normal to fatty liver comparisons were done and main observations included the identification of two hepatocyte cell subsets, Hep1 and Hep2; with Hep2 cells present predominantly in FL (Hep 2, NL= 87 *vs.* FL= 2390) and a significant decreased number of hepatic stellate cells (HSCs) in FL (NL= 345 vs. FL= 28) and endothelial cells (ECs) (N= 1122 *vs.* FL= 625) in FL. Analyses of DEGs between FL and NL Hep1 cells showed a lower expression of genes related to complement and coagulation components *(CD46, CD55, C8, SERPINA1, fibrin, PLG, KNG1, KLKB1, KNG1*) in FL Hep1. Hep2 cells were characterized by increased expression of genes related to acute phase response signaling, oxidation of lipids, FGF21 signaling, angiogenesis and development of vasculature. HSCs in FL presented an activated phenotype (while a quiescent HSC phenotype was observed in NL HSCs).
Conclusions: These results support the use of single liver cell transcriptomics as a tool to identify specific cells/pathways that may represent targets for IRI therapeutic intervention for expanding the use of fatty liver organs



CITATION INFORMATION: Kuscu C., Kuscu C., Shetty A., Bardhi E., Rousselle T., Eason J., Sraj M., Maluf D., Mas V. Cellular Landscape of Steatotic Livers Revealed by Single-nuclei Rna Sequencing *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Kuscu: None. **C. Kuscu:** None. **A. Shetty:** None. **E. Bardhi:** None. **T. Rousselle:** None. **J. Eason:** None. **M. Sraj:** None. **D. Maluf:** None. **V. Mas:** None.

Abstract# 357

Cross-Circulation for Extracorporeal Liver Support in a Swine Model

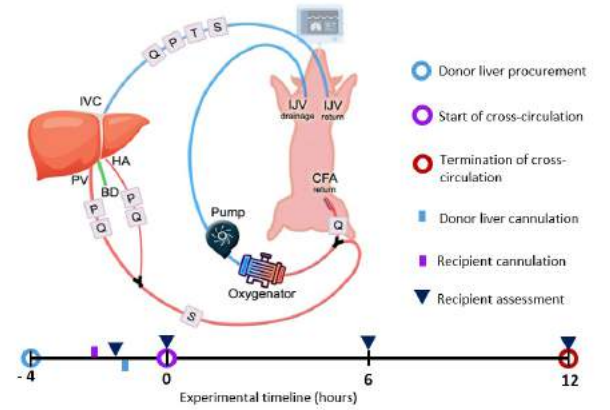
W. K. Wu[1], A. Tumen[1], J. W. Stokes[2], R. Ukita[2], A. E. Hozain[3], C. R. Flynn[2], M. J. Lee[3], J. R. Talackine[2], N. L. Cardwell[2], J. A. Reimer[3], M. Pinezich[3], C. Benson[2], G. Vunjak-Novakovic[3], S. P. Alexopoulos[2], M. Bacchetta[2], *[1]co-first authors, Vanderbilt University Medical Center, Nashville, TN, [2]Vanderbilt University Medical Center, Nashville, TN, [3]Columbia University Medical Center, New York, NY*

Purpose: Although machine perfusion has gained momentum as an organ preservation strategy in liver transplantation, significant organ shortages and waitlist mortality persist, highlighting unmet needs for improved organ salvage. We present a clinically relevant, large animal model of extracorporeal liver support using cross-circulation (XC).

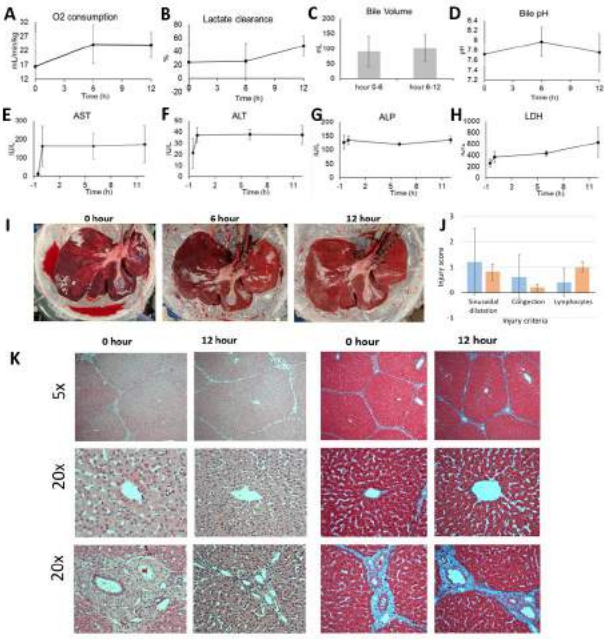
Methods: Livers (n = 4) were procured from donor swine and placed on normothermic veno-arterial-venous (V-AV) XC with swine hosts for 12 hours (**Figure 1**). Longitudinal analyses of the extracorporeal livers (functional assessments, multiscale morphology, injury markers) and host swine (vital signs, blood, and tissue analyses) were performed at 0, 6, and 12 hours following initiation of XC.

Results: Throughout 12 hours of normothermic support, extracorporeal livers demonstrated stable oxygen consumption, lactate clearance, bile production, and alkaline bile composition. (**Figure 2A-D**). There was no significant biochemical or histological evidence of hepatocellular injury (**Figure 2E-K**). Circuit parameters remained physiologic (hepatic artery flow 0.33 ± 0.03 L/min, portal venous flow 0.75 ± 0.03 L/min, hepatic venous pressure gradient 6.8 ± 2.4 mmHg), and recipient swine remained hemodynamically stable.

Conclusions: We demonstrate the feasibility of physiologic extracorporeal liver support using V-AV XC in a swine model. XC has potential application as a translational research platform and as clinical biotechnology for donor organ salvage and recovery.



BD: bile duct. CFA: common femoral artery. HA: hepatic artery. IJV: internal jugular vein. IVC: inferior vena cava. P: pressure transducer. PV: portal vein. Q: flow probe. S: oxygen saturation probe. T: temperature probe.



CITATION INFORMATION: Wu W., Tumen A., Stokes J., Ukita R., Hozain A., Flynn C., Lee M., Talackine J., Cardwell N., Reimer J., Pinezich M., Benson C., Vunjak-Novakovic G., Alexopoulos S., Bacchetta M. Cross-Circulation for Extracorporeal Liver Support in a Swine Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: W.K. Wu: None. **A. Tumen:** None. **J.W. Stokes:** None. **R. Ukita:** None. **A.E. Hozain:** None. **C.R. Flynn:** None. **M.J. Lee:** None. **J.R. Talackine:** None. **N.L. Cardwell:** None. **J.A. Reimer:** None. **M. Pinezich:** None. **C. Benson:** None. **G. Vunjak-Novakovic:** None. **S.P. Alexopoulos:** None. **M. Bacchetta:** None.

Hepatitis C

Abstract# 358

Association of Donor Hepatitis C Virus Infection Status and Risk of Bk Polyomavirus Viremia After Kidney Transplantation

V. S. Potluri[1], D. E. Schaubel[1], M. E. Sise[2], B. P. Concepcion[3], R. C. Forbes[1], E. A. Blumberg[1], D. Goldberg[4], P. P. Reese[1], R. Bloom[1], D. Shaffer[3], R. Chung[2], D. Sawinski[1], I. Strohben[2], N. Elias[2], A. Azhar[5], M. Shah[1], J. Eason[5], L. A. Binari[3], M. Talwar[5], V. Balaraman[5], A. Bhalla[5], B. Besharatian[1], M. Z. Molnar[5], *[1]University of Pennsylvania, Philadelphia, PA, [2]Massachusetts General Hospital, Boston, MA, [3]Vanderbilt University Medical Center, Nashville, TN, [4]University of Miami Miller School of Medicine, Miami, FL, [5]Methodist University Hospital, Memphis, TN*

Purpose: Transplantation of kidneys from deceased donors with hepatitis C virus (HCV) infection into HCV-negative recipients has become more common, but some studies have suggested elevated risks of immunological complications such as BK polyomavirus (BKPV). Prior studies have generally been limited by single-center populations, low granularity data and/or no comparator group.

Methods: We assembled a retrospective cohort of adult HCV-negative recipients of HCV-viremic kidneys and recipients of HCV-aviremic kidneys receiving care at four centers (COAUTHOR consortium: UPenn, MGH, Vanderbilt, Methodist Hospital) with regular screening for BKPV infection. We used optimal matching with variable number of controls, where each HCV-viremic kidney recipient could be matched to at least one and a maximum of five comparators. Recipients were matched on risk factors for BKPV viremia, including induction therapy, as well as allocation KDPI. The primary outcome was BKPV viremia ≥ 1,000 copies/mL or biopsy-proven BKPV nephropathy in the first post-transplant year. Outcomes were analyzed using Cox regression, weighted and stratified by matched set and expressed per 100 patient-years (PY).

Results: The final matched cohort comprised 146 recipients of HCV-viremic kidneys and 453 matched comparators. HCV-viremic kidney transplantation was not associated with an elevated risk of BKPV viremia ≥ 1,000 copies/mL. HCV-viremic kidney transplantation had a non-significant association with the outcome of BKPV viremia ≥ 10,000 copies/mL; many of these infections took place at a center with delayed initiation of direct acting antiviral therapy. No biopsy proven BKPV nephropathy was observed. One year eGFR was clinically similar between groups. Only one HCV-viremic kidney transplant recipient had primary graft loss.

Incidence of BKPV Viremia					
BK >1,000 copies/mL	BKPV Viremia events	Patient-years of follow-up	Rate per 100 PY	Weighted Rate per 100 PY	Hazard Ratio (95% CI)
Donor HCV NAT-	68	381.9	17.8	22.2	1 (ref)
Donor HCV NAT+	33	125.8	26.2	26.2	1.15 (0.82, 1.61) p=0.42
Total	101	507.7	19.9	-	N/A
BK >10,000 copies/mL					
Donor HCV NAT-	41	396.8	10.3	13.3	1 (ref)
Donor HCV NAT+	25	128.6	19.4	19.4	1.48 (0.97, 2.24) p=0.07
Total	66	526.4	12.5	-	N/A

Conclusions: HCV-viremic kidney transplantation was not associated with an elevated risk of BKPV viremia. While the data suggested the possibility that donor HCV conferred a higher risk of BKPV viremia ≥ 10,000 copies/mL associated with HCV, one year graft function outcomes for HCV-viremic recipients were reassuring.

CITATION INFORMATION: Potluri V., Schaubel D., Sise M., Concepcion B., Forbes R., Blumberg E., Goldberg D., Reese P., Bloom R., Shaffer D., Chung R., Sawinski D., Strohben I., Elias N., Azhar A., Shah M., Eason J., Binari L., Talwar M., Balaraman V., Bhalla A., Besharatian B., Molnar M. Association of Donor Hepatitis C Virus Infection Status and Risk of Bk Polyomavirus Viremia After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: V.S. Potluri: None. **D.E. Schaubel:** None. **M.E. Sise:** Consulting Fee; Name of Commercial Interest; AbbVie, Gilead, Bioporto. Consulting Fee; Nature of Relationship; Advisory board: AbbVie, Gilead; Consultant: Bioporto. Grant/Research Support; Name of Commercial Interest; Gilead, AbbVie, Merck. **B.P. Concepcion:** None. **R.C. Forbes:** None. **E.A. Blumberg:** Consulting Fee; Name of Commercial Interest; Merck, Takeda. Consulting Fee; Nature of Relationship; Scientific Advisory Committee. Grant/Research Support; Name of Commercial Interest; Merck, Takeda. **D. Goldberg:** Grant/Research Support; Name of Commercial Interest; Merck, AbbVie. Grant/Research Support; Nature of Relationship; Transplantation of HCV-infected organs into uninfected recipients. **P.P. Reese:** Consulting Fee; Name of Commercial Interest; VAL Health. Consulting Fee; Nature of Relationship; Recognition of CKD. Grant/Research Support; Name of Commercial Interest; Merck, AbbVie, CVS. Grant/Research Support; Nature of Relationship; Merck & AbbVie: Transplantation of HCV-infected organs into uninfected recipients. CVS: Statin adherence. **R. Bloom:** None. **D. Shaffer:** None. **R. Chung:** Grant/Research Support; Name of Commercial Interest; AbbVie, Gilead, Merck, BMS, Janssen, Boehringer, Roche. **D. Sawinski:** Consulting Fee; Name of Commercial Interest; Veloxis, Natera, CareDx. **I. Strohben:** None. **N. Elias:** None. **A. Azhar:** None. **M. Shah:** None. **J. Eason:** None. **L.A. Binari:** None. **M. Talwar:** None. **V. Balaraman:** None. **A. Bhalla:** None. **B. Besharatian:** None. **M.Z. Molnar:** Consulting Fee; Name of Commercial Interest; Merck, AbbVie, CareDx and Natera. Grant/Research Support; Name of Commercial Interest; CareDx and Viracor.

Abstract# 359

Outcomes of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants

G. Gupta, I. Yakubu, P. Kimball, L. Kang, K. Mitchell, M. Shinbashi, D. Kumar, I. Moinuddin, L. Kamal, A. King, C. Bhati, M. Levy, A. Cotterell, A. Sharma, R. Sterling, *Virginia Commonwealth University Health System, Richmond, VA*

Purpose: Trials describing 4-12 week courses of direct-acting anti-viral drugs (DAAs) to treat hepatitis C virus (HCV) transmission from infected donors to uninfected kidney transplant recipients (D+/R- transplants), may be limited in application to the 'real-world' by costs and delayed access to expensive DAAs. We previously reported HCV transmission of 12% among D+/R- transplants (N=52) with 2-4 day pangenotypic sofosbuvir/velpatasvir (SOF/VEL) prophylaxis. Here we report new data on HCV transmission rates with 7-day prophylaxis (N=50) and cumulative outcomes of all D+/R- transplants (N=102) performed at our center so far.

Methods: Eligible D+/R- transplant recipients received escalating duration SOF/VEL over treatment groups (Group 1: 2 or 4 days; Group 2: 7 days) with first dose immediately pre-transplant. The primary outcome was the rate of HCV transmission from donor to recipient defined as a positive qNAT at 90 days post-transplant. Secondary outcomes included sustained virologic response at 12 weeks (SVR-12) after completion of HCV therapy, adverse events related to HCV infection and therapy, and allograft function compared with a contemporary matched cohort of HCV D-/R- transplants

Results: A total of 102 D+/R- transplants (mean age=52) were performed. Nine patients (9/102; 9%; 95%CI: 5%-16%) met the primary outcome of the development of HCV transmission by 90 days post-transplant with a three-fold decline across the two groups: Group 1 (7/52; 13%; 95%CI: 5%-25%) vs Group 2 (2/50; 4%; 95%CI: 0%-13%). All patients with HCV transmission achieved SVR-12 post-full course therapy. There was a higher incidence of peri-operative PPI use (3/9; 33% vs 10/93; 11%; p=0.05) and re-transplant status (2/9; 22% vs 0/93; p=0.007) among those with transmission vs those that did not. A 1:1 matched analysis with contemporary HCV D-/R- transplants (controls) showed that the pre-transplant wait time was shorter for D+/R- compared with D-/R- (mean: 1.8 vs 4.4 years; p<0.001). There were no differences in infections, rejection, development of de-novo donor-specific antibody, or transplant outcomes between controls vs cases up to 6 months of transplant. At the end of 6 months follow-up, two patients each in the D-/R- group and the D+/R- lost their transplant. Similarly, two patients died in the two groups by 6 months post-follow-up. For the D+/R- group, none of the patients with graft loss or death had HCV transmission. In a linear regression model adjusted for covariates, donor HCV status was not significantly associated with estimated GFR at 3- and 6-months post-transplant.

Conclusions: This paper describes extremely low transmission rate with a seven-day peri-operative DAA regimen. Compared with a matched HCV negative kidney transplant recipient cohort, D+/R- transplants had reduced wait times and comparable short-term kidney function outcomes.

CITATION INFORMATION: Gupta G., Yakubu I., Kimball P., Kang L., Mitchell K., Shinbashi M., Kumar D., Moinuddin I., Kamal L., King A., Bhati C., Levy M., Cotterell A., Sharma A., Sterling R. Outcomes of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants *AJT, Volume 21 Supplement 3*

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Abstract# 360

Cost-Effectiveness Analysis of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants

I. Yakubu, Y. Zhang, S. Ijioma, N. V. Carroll, J. Patterson, R. Sterling, G. Gupta, *Virginia Commonwealth University Health System, Richmond, VA*

Purpose: Trials describing 4-12 week courses of direct-acting anti-viral drugs (DAAs) to treat hepatitis C virus (HCV) transmission from infected donors to uninfected kidney transplant recipients (D+/R- transplants), may be limited in application by costs and delayed access to expensive DAAs. A short prophylactic strategy may be safer and cost-effective. We report a cost-effectiveness analysis using the payer perspective to determine the least expensive DAA regimen, using published strategies.

Methods: Cost analyses comparing four strategies: 1) Seven-day DAA prophylaxis using generic Sofusbuvir/Velpatasvir (SOF/VEL) followed by a full course 12-week branded Glecapravir/Pibrentasvir (G/P) for those with HCV transmission (base case HCV infection rate: 4%; sensitivity analysis range: 1% - 13%); 2) Eight-day DAA prophylaxis using branded G/P followed by a full course 12-week branded SOF/VEL/VOX (voxilaprevir) for those with HCV transmission (base case HCV infection rate: 0%; sensitivity analysis range: 0% - 4%); 3) Four-week peri-operative DAA prophylaxis using generic SOF/VEL followed by 12-week branded G/P for those with HCV transmission (base case HCV infection rate: 0%; sensitivity analysis range: 0% - 1%); and 4) 'Transmit-and-treat' strategy with 8-weeks of G/P (assuming 100% transmission rate). The probabilities and costs (base case value and range; costs in 2020 US$) used in the model were estimated using current data from clinical trials and public databases. A decision tree was constructed to compare expected costs of each option, using a 6-month time frame. One-way sensitivity and threshold analyses were performed to account for uncertainty in the variable estimates for the two less expensive treatment options. All modeling and analyses were performed in TreeAge Pro Healthcare 2020.

Results: Cost analyses comparing strategies, showed that in the base case model, Strategy 1 was the least expensive (7-day SOF/VEL prophylaxis) with an expected cost of US $2,962, followed by Strategy 2 (8-day G/P prophylaxis; expected cost: $3,756), Strategy 3 (4-week SOF/VEL prophylaxis; expected cost: $5,538), and then Strategy 4 (8-week G/P treatment; expected cost: $26,294). The threshold value for Strategy 1 and 3 to break-even in expected cost was when the probability of infection with 7-day prophylaxis (SOF/VEL) equals 10.5%, when the daily cost of SOF/VEL equals $75.13, or when the daily cost of G/P equals $1,236.13. The threshold value for Strategy 1 and 2 to break-even in expected cost was when the probability of infection with 7-day prophylaxis (SOF/VEL) equals 6%, when the daily cost of SOF/VEL equals $311.24, or when the daily cost of G/P equals $298.38.

Conclusions: Short duration DAA prophylaxis using either 7 days of SOF/VEL or 8 days of G/P is more cost-effective than 4 weeks of SOF/VEL or 8 weeks of G/P and has the potential of resulting in significant cost-savings in a majority of D+/R- transplants.

CITATION INFORMATION: Yakubu I., Zhang Y., Ijioma S., Carroll N., Patterson J., Sterling R., Gupta G. Cost-Effectiveness Analysis of Short-Duration Anti-Viral Prophylaxis for Hepatitis C Positive Donor Kidney Transplants *AJT, Volume 21 Supplement 3*

DISCLOSURES: I. Yakubu: None. **Y. Zhang:** None. **S. Ijioma:** None. **N.V. Carroll:** None. **J. Patterson:** None. **R. Sterling:** None. **G. Gupta:** None.

Abstract# 361

Are Tacrolimus Concentrations Reduced with Direct-acting Antiviral Administration in Transplant Recipients?

K. Huang, K. Farrow, M. Christian, *Pharmacy, Penn State Health Hershey Medical Center, Hershey, PA*

Purpose: To evaluate the effects of direct-acting antivirals (DAAs) on tacrolimus trough concentrations and clinical outcome and to assess the need for a priori dose adjustments

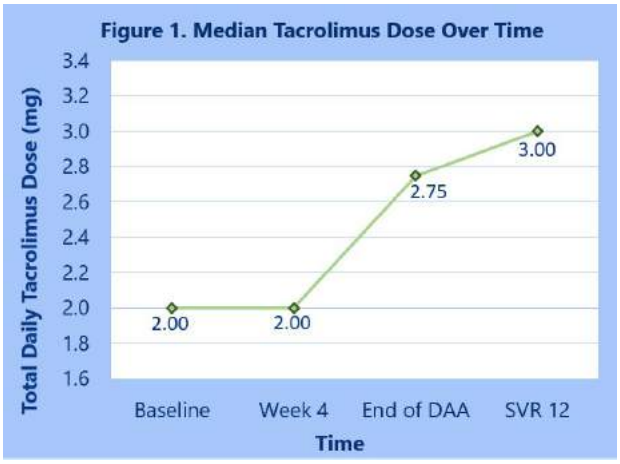
Methods: In this single-center retrospective chart review, 164 liver, kidney, and heart transplant recipients with a diagnosis of hepatitis C virus (HCV) infection between October 1, 2014 and January 1, 2020 were screened. Those who were 18 years of age or older and starting DAA therapy with concomitant tacrolimus post-transplant were included. Patients were excluded if they were on concurrent moderate or strong CYP3A4 inhibitors or inducers; failed to complete DAA therapy; had HCV cure prior to transplant; or had missing labs at any of the following time points, including baseline, week 4 of DAA therapy, end of therapy, or sustained virologic response (SVR) at 12 weeks. The primary outcome was the percent change in tacrolimus trough concentrations at SVR12 compared to baseline. Tacrolimus doses and trough concentrations were examined at all above time points, and incidences of acute rejection, graft loss, and mortality were also reviewed.

Results: 46 patients were included in the final analysis, and regardless of DAA agent used, trough concentrations decreased by a median of 32.2% from an average of 6.99 ± 2.07 ng/mL at baseline to 4.65 ± 1.96 ng/mL at SVR12 ($p < 0.001$). Results of trough concentration differences are summarized in Table 1. Median total daily tacrolimus doses increased from 2.0 mg/day prior to DAA initiation to 3.0 mg/day at SVR12 (Figure 1). 15 patients (32.6%) required dose increases with DAA treatment, and two patients experienced an episode of rejection within this timeframe.

Conclusions: The treatment of HCV infection with DAAs leads to statistically significant reductions in tacrolimus trough concentrations. This is likely due to the improvement in liver enzyme function and metabolism, which seems to supersede anticipated DAA-tacrolimus drug-drug interactions. The clinical significance of these subtherapeutic changes are yet to be determined, but for patients on concurrent tacrolimus and DAA therapy, tacrolimus must be monitored closely, and empiric dose increases should be considered.

Table 1. Difference in Tacrolimus Trough Concentration Compared to Baseline

	Week 4	End of Therapy	SVR 12
Trough Concentration (ng/mL), Mean ± SD	5.24 ± 2.11	4.72 ± 2.30	4.65 ± 1.96
Trough Concentration Decrease (%), Median (IQR)	**23.4 (11.0 – 41.4)**	**35.6 (14.6 – 51.1)**	**32.2 (18.7 – 53.2)**
Paired Trough Concentration Difference (ng/mL), Mean ± SD	1.75 ± 1.95	2.27 ± 2.37	2.34 ± 2.25
95% CI, P-value	1.17 – 2.33, <0.001	1.57 – 2.98, <0.001	1.68 – 3.01, <0.001



CITATION INFORMATION: Huang K., Farrow K., Christian M. Are Tacrolimus Concentrations Reduced with Direct-acting Antiviral Administration in Transplant Recipients? *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Huang: None. **K. Farrow:** None. **M. Christian:** None.

Abstract# 362

Outcomes of Kidney Transplantation from Hepatitis C Virus (HCV) Infected Donors Stratified by Recipient HCV Serostatus: A Mate Kidney Analysis

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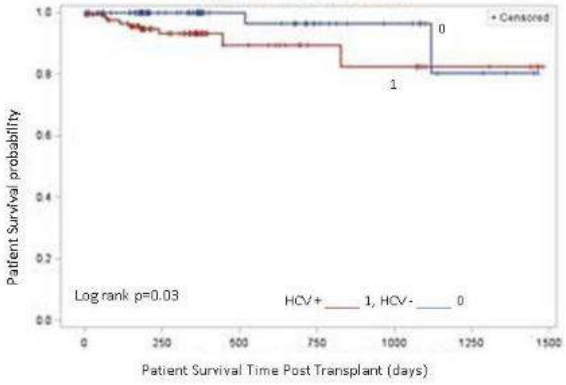
Purpose: Kidneys from donors infected with hepatitis C virus (HCV) are increasingly used for transplantation into HCV positive (+) recipients historically and into HCV negative (-) recipients in recent years with the intention to treat these recipients with highly effective directly acting anti-HCV agents in the post transplant period. The purpose of our study was to compare the outcomes of transplanting HCV + kidneys into HCV + vs. HCV- recipients using a mate kidney model in which one kidney from HCV + donor was transplanted into HCV + recipient and the mate kidney into HCV - recipient.

Methods: Utilizing the OPTN/UNOS database from January 2015 to December 2019, we identified HCV nucleic acid test (NAT) positive deceased donors where one kidney was transplanted into HCV + (antibody+or antibody + and NAT+) recipient and the mate kidney was transplanted into HCV antibody - recipient. The incidence of delayed graft function (DGF, defined as the need for dialysis within the first week of transplant), along with graft survival, death-censored graft survival and patient survival (using Kaplan-Meier method) were compared between the groups.

Results: Median study follow-up was 7 months. We identified 134 eligible HCV NAT+ deceased donors from whom one kidney was transplanted into HCV+ and the mate kidney into HCV- recipients. Proportion of mate kidney transplants increased over the years as follows: 5.2% in 2015, 7.5% in 2016, 10.5% in 2017, 33.6% in 2018 and 43.3% in 2019. DGF developed in 33 HCV+ and 30 HCV- recipients (p=0.7). During the follow up, there were 11 graft losses and 7 patient deaths in HCV+ group while there were 4 graft losses and 2 patient deaths in HCV- group. Kaplan-Meier analysis showed superior patient survival (log-rank p=0.03) in HCV- recipients (figure 1). Graft survival trended superior (log-rank p=0.06) and death-censored graft survival remained similar for HCV- vs.HCV+ recipients.



Conclusions: Our study showed increasing utilization of HCV NAT + donor kidneys for transplantation into HCV naive recipients in recent years. This reflects the availability of highly effective direct acting anti-viral agents to treat HCV infection. Improved patient survival and similar death-censored graft survival following the transplantation of HCV NAT+ kidney into HCV - vs. HCV + recipients indicate fewer death with functioning grafts in HCV- group. Superior patient survival in HCV- group is reflective of the overall better health status of HCV- compared to HCV+ kidney recipients.

CITATION INFORMATION: Sureshkumar K., Chopra B., McGill R. Outcomes of Kidney Transplantation from Hepatitis C Virus (HCV) Infected Donors Stratified by Recipient HCV Serostatus: A Mate Kidney Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.K. Sureshkumar: ; CareDx. **B. Chopra:** Grant/Research Support; Name of Commercial Interest; CareDx. **R.L. McGill:** None.

Abstract# 363

Outcomes of Hepatitis C Nucleic Acid Testing Positive Donors in Aviremic Recipients With Delayed Direct-Acting Antiviral Initiation

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Purpose: The purpose of this study was to assess the clinical impact of utilizing hepatitis C virus (HCV) nucleic acid testing (NAT)+ donors in HCV NAT- solid organ transplant (SOT) recipients in a real-world practice where direct-acting antiviral (DAA) initiation is largely dependent on insurance coverage.

Methods: A single-center, retrospective chart review of HCV NAT- recipients who underwent SOT from a HCV NAT+ donor between 4/1/2019-5/27/2020 was conducted. The main objective of this study was to evaluate the sustained virologic response at 12 weeks (SVR12) after completion of DAA therapy. Secondary objectives were to assess the safety and efficacy of DAA therapy, as well as transplant related outcomes.

Results: Sixty-two HCV NAT- patients underwent SOT with a HCV NAT+ organ, with 59 transplant recipients included for evaluation: 22 kidney (KT), 18 liver (LiT), 10 heart (HT), 9 lung (LuT). HCV transmission occurred in 100% of recipients. Average time to DAA initiation was 46.7 ± 25 days after transplant. SVR12 was achieved in 97.8% (45/46; 13 patients lacked complete SVR12 data for primary endpoint analysis). Treatment failure occurred in 1 LuT patient on glecaprevir/pibrentasvir due to a P32del mutation, requiring alternative therapy with sofosbuvir/velpatasvir/voxilaprevir and ribavirin. 58.5% of KT, HT, and LuT patients experienced post-transplant liver dysfunction. No patients developed fibrosing cholestatic hepatitis. Two patients died, 1 secondary to anastomotic complication (LuT) and 1 due to pulmonary embolism (HT). De novo donor specific antibodies were present in 1 KT, 1 HT, and 2 LuT recipients, developing 402 days, 4 days, and a median of 137.5 (56-219) days post-transplant, respectively. Clinically significant rejection was diagnosed and treated in 1 HT patient (ACR2) and 1 LiT (RAI 5/9). No episodes of KT or LuT rejection were diagnosed. Six patients (10.2%) had documented adverse effects attributed to DAA therapy, including gastrointestinal, fatigue, orthostatic hypotension, and nail discoloration. One LuT required alternative therapy with sofosbuvir/velpatasvir due to intractable vomiting on glecaprevir/pibrentasvir, but successfully obtained SVR12.

Conclusions: This study adds to the paucity of literature describing the delayed start of DAA therapy for donor transmitted HCV in SOT and assuages the concerns of HCV sequelae by demonstrating efficacy via high SVR12 rates and no fibrosing cholestatic cirrhosis. This delay in DAA initiation shifts the financial burden to 3rd party insurances without compromising transplant related outcomes.

Table 1: Baseline Characteristics and Outcomes

Characteristics	Kidney (N=22)	Liver (N=18)	Heart (N=10)	Lung (N=9)
Hepatitis C genotype, n (%)				
1a	16 (72.7)	11 (61.1)	7 (70)	7 (77.8)
1b	0 (0)	0 (0)	0 (0)	2 (22.2)
2	0 (0)	2 (11.1)	1 (10)	0 (0)
3	6 (27.3)	5 (27.8)	2 (20)	0 (0)
Hepatitis C DAA, n[a]				
Glecaprevir/pibrentasvir	15	14	8	6
Sofosbuvir/velpatasvir	7	4	2	3
Sofosbuvir/velpatasvir/voxilaprevir	0	0	0	1
Ribavirin	0	0	0	1
HCV viral load DAA initiation (x10^3 IU/mL), median (IQR)	55.3 (7.9-492.0)	7,161.5 (2,733.7 – 16,514)	161.5 (26.2 - 4,636.5)	33,325.4 (3,611.6 - 109,993.1)
Induction agent, n (%)				
Anti-thymoglobulin	21 (95.5)	0 (0)	3 (30)	0 (0)
Basiliximab	1 (4.5)	7 (38.8)	0 (0)	9 (100)
Steroid monotherapy	21 (95.5)	0 (0)	7 (70)	0 (0)
Outcomes				
Primary Endpoint (N=46)[b]				
SVR12, n (%)	17/17 (100)	13/13 (100)	8/8 (100)	7/8 (87.5)
Secondary Endpoints (N=59)				
Days Post Transplant to DAA initiation, mean ± SD	40.6 ± 13.2	47.9 ± 22.6	61.1 ± 44.6	42.9 ± 18.8
Clinically significant ACR and/or ≥2R rejection within 1 year, n (%)[c]	0 (0)	1 (5.6)	1 (10)	0 (0)
Peak LFTs (U/L), median (IQR)[d]				
AST	61 (41.8-91)	---	143 (115.3-178.5)	88 (82-416)
ALT	74 (50.3-134.3)	---	119 (68.8-223.3)	162 (135-429)
T Bili	0 (0)	---	1 (10)	3 (33.3)
Peak post-transplant Scr, mean ± SD	1.4 ± 0.5	1.9 ± 1.3	2 ± 1.0	1.5 ± 0.7

[a]One LuT (death) did not start DAA therapy. Two LuT patients required DAA change for therapy failure or intractable nausea/vomiting.
[b]Evaluable patients were those that had 12 weeks of follow up from the end of DAA therapy. 13 patients did not have complete SVR12 data for primary endpoint analysis.
[c]Clinically significant rejection defined as biopsy proven grade 2 rejection or greater or clinically significant graft dysfunction with treatment of presumed acute cellular rejection.
[d]LiT patients not assessed in this endpoint due to multitude of confounding factors.

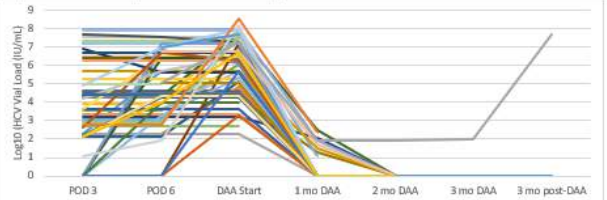

Figure 1: Patient Specific HCV RNA Viral Load Post-Transplant

CITATION INFORMATION: Hudson M., Webb A., Logan A., Silverman A., Brueckner A. Outcomes of Hepatitis C Nucleic Acid Testing Positive Donors in Aviremic Recipients With Delayed Direct-Acting Antiviral Initiation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Hudson: None. **A. Webb:** None. **A. Logan:** None. **A. Silverman:** Consulting Fee; Name of Commercial Interest; Veloxis. Consulting Fee; Nature of Relationship; Advisory Board member. Honoraria; Name of Commercial Interest; Veloxis, Novartis. Honoraria; Nature of Relationship; Speakers Bureau member. **A. Brueckner:** None.

Abstract# 364

Transplanting Hepatitis C Infected Organs Into Uninfected Recipients: A Pharmacy Perspective

M. L. Holt, A. James, K. Gutierrez, T. Sparkman, J. Banbury, D. Jones, *University of Alabama at Birmingham Hospital, Birmingham, AL*

Purpose: Due to direct acting antivirals (DAAs), hepatitis C virus (HCV) positive patients are now resources for organ transplantation in HCV negative recipients. Our institution initiated a HCV donor positive/recipient negative (D+/R-) protocol that utilizes glecaprevir/pibrentasvir (G/P) in recipients of nucleic acid amplification testing (NAT) positive organs for 12 weeks beginning post-operative day three. Per protocol, NAT negative transplant recipients are initiated on treatment only after developing HCV viremia. Pharmacists play an integral role in G/P insurance approval and the medication acquisition process. The aim of this study is to assess antiviral efficacy and identify common barriers to G/P acquisition.

Methods: The current study is a single-center, cohort analysis of recipients of a kidney or liver transplant from a HCV positive donor transplanted November 2019-June 2020. The primary objective is to determine rate of sustained virologic response (SVR12). Secondary objectives are to describe G/P cost and evaluate the prior authorization (PA) process.

Results: Forty patients were included. Most patients were male (73%) African American (40%) renal transplant recipients (63%) who received anti-thymocyte globulin (58%). Thirty-one patients received NAT positive organs and were treated with G/P. The most common genotype was 1a (25%). All patients completed 12 weeks of therapy and achieved end of treatment response. No recipient of a NAT negative organ (n=9) developed viremia within the study period. All treated patients with a full data set available (87%) achieved SVR12. All G/P prescriptions required a PA with most (80%) requiring at least one appeal. The average time to PA approval was 3.35 days (range, 1-12). Pharmacy dispensing data was available for 27 patients indicating most patients required financial assistance (63%). Average copay, per fill, was less than $3.00 with average assistance equaling $1,265, $570 and $397 on each of three fills, respectively (range, $0-$3,892). Amounts rounded to nearest US dollar. Additional data collection is ongoing.

Conclusions: Preliminary results suggest that the HCV donor positive/recipient negative protocol appears to be safe and effective in abdominal transplant recipients. Pharmacy involvement ensured patients were able to obtain DAA treatment to facilitate discharge.
CITATION INFORMATION: Holt M., James A., Gutierrez K., Sparkman T., Banbury J., Jones D. Transplanting Hepatitis C Infected Organs Into Uninfected Recipients: A Pharmacy Perspective *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.L. Holt: None. **A. James:** None. **K. Gutierrez:** None. **T. Sparkman:** None. **J. Banbury:** None. **D. Jones:** None.

Abstract# 365

Use of Donor Blood Expedites HCV Genotyping and Allows Earlier DAA Initiation for Recipients of HCV+ Kidneys

B. Lonze, N. Ali, R. Montgomery, Z. Stewart Lewis, *Tranplant Institute, NYU Langone Health, New York, NY*

Purpose: Utilization of HCV viremic donor kidneys for transplant into HCV naïve recipients has become more widespread, yet best practices governing the initiation, timing or duration of direct acting antiviral (DAA) therapy are lacking. Most published series describe DAA initiation weeks to months after transplant. However, fibrosing cholestatic hepatitis has been reported with delayed DAA initiation. Herein we report our center practice utilizing donor blood for HCV genotyping to expedite DAA insurance approval and minimize the duration of recipient viremia.
Methods: Patients received education and DAA insurance benefits were ensured prior to listing for HCV+ organs. At the time of transplant, donor blood accompanying the kidney was used for HCV genotyping. Results were received within one week of transplant. Recipients were screened for HCV RNA by POD#4, and weekly for 12 weeks. Insurance authorization for DAA coverage was sought after both recipient viremia and donor HCV genotyping resulted. In 3 cases, donor viral load was insufficient for genotyping, and these recipients were genotyped once viremic.
Results: 80 hepatitis C naïve patients received hepatitis C positive donor kidneys between July, 2018 and October, 2020. 17 donors were HCV Ab+/NAT- and 63 donors were HCV Ab+/NAT+. All recipients of NAT+ donor organs became viremic; 89% were genotype 1a or 3. The median time to DAA initiation was 10 days for cases with donor genotyping (IQR 8-13). In contrast, the median time to DAA initiation was 20 days for the 3 cases with recipient genotyping (IQR 18-24). Median time from transplant to clearance of HCV viremia was 38 days (IQR 30-47) (Table 1). SVR12 was achieved in all patients, and no cases of fibrosing cholestatic hepatitis have been observed. There were 2 needlestick exposures of patient family members, though no HCV transmission occurred.
Conclusions: Early HCV genotyping using donor blood results in expedited initiation of DAA therapy for recipients of HCV+ kidneys. Compared to published reports, our patients are clearing viremia at the time that most other centers' patients are initiating DAA therapy. Whether duration of viremia or peak viral load are associated with adverse allograft events such as acute rejection is not known. The advantages to a shortened duration of HCV viremia remain to be characterized, but may include a lower risk of fibrosing cholestatic hepatitis and lower risk of HCV exposure to family members and caregivers. Our practice of expedited genotyping using donor blood is immediately implementable at all centers performing these transplants.

Table 1. Donor HCV Genotyping Expedites DAA Initiation and Viral Clearance

Days from Tx to viremia	3 (2-3)*
Days from Tx to start DAA (donor genotyped, n=60)	10 (8-13)
Days from Tx to start DAA (recipient genotyped, n=3)	20 (18-24)
Days from DAA start to clearance	26 (20-33)
Days from Tx to clearance	38 (30-47)
Days from viremia to clearance	35 (28-44)
Peak measured log viral load	5.01 (3.43-6.21)
Peak measured viral load	101,000 (2,682-1,640,000)

*All values reported as median (IQR)

CITATION INFORMATION: Lonze B., Ali N., Montgomery R., Stewart Lewis Z. Use of Donor Blood Expedites HCV Genotyping and Allows Earlier DAA Initiation for Recipients of HCV+ Kidneys *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Lonze: None. **N. Ali:** Other; Name of Commercial Interest; CareDx. Other; Nature of Relationship; Advisory Board. **R. Montgomery:** Grant/Research Support; Name of Commercial Interest; HANSA Biopharma. Grant/Research Support; Nature of Relationship; Research Funding. Other; Name of Commercial Interest; Viela Bio/CTI, CSL Behrig, eGenesis, RMEI, Takeda, Regeneron. Other; Nature of Relationship; Advisory Board. **Z. Stewart Lewis:** Other; Name of Commercial Interest; CareDx. Other; Nature of Relationship; Advisory Board.

Live Kidney Donation

Abstract# 366

Long Term Outcomes of Kidney Donors with Fibromuscular Dysplasia

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Purpose: Fibromuscular dysplasia (FMD) is not an infrequent finding during kidney donor evaluation. Current guidelines do not provide any recommendations regarding the use of kidneys from donors with FMD and there is a paucity of published data on the outcomes of donors with FMD. This is an important issue in donor selection and long term donor outcomes since FMD can be present in many vascular beds.
Methods: We compared the development of hypertension, cardiovascular disease (CVD), proteinuria and reduced eGFR in 133 donors with FMD to 452 propensity score matched donors without FMD. The multivariable risks of these outcomes were determined by both logistic and Cox regression models. These donations took place between 1963 - 2007. The outcomes studied were ascertainable in 90-100% of the cohort.
Results: Donors with FMD were older (51 vs. 39 years), more likely to be women (80 vs. 56%), and had a higher systolic blood pressure at donation (124.7 vs. 121.3 mmHg), p <0.05 for all. Donors with FMD were less likely to have the left kidney removed (31 vs. 72%), p=.01. After a mean follow-up of 15.5 ± 8.9 years, a similar proportion of donors with and without FMD developed hypertension (22.2 vs. 20.8%), proteinuria (20.6 vs. 15.3%) and CVD (13.3 vs. 12.9%). No donor with FMD developed an eGFR <30 ml/min/1.73 m^2 or ESKD. The multivariable risk of these outcomes in donors with FMD was not elevated.
Conclusions: Donors with FMD were older (51 vs. 39 years), more likely to be women (80 vs. 56%), and had a higher systolic blood pressure at donation (124.7 vs. 121.3 mmHg), p <0.05 for all. Donors with FMD were less likely to have the left kidney removed (31 vs. 72%), p=.01. After a mean follow-up of 15.5 ± 8.9 years, a similar proportion of donors with and without FMD developed hypertension (22.2 vs. 20.8%), proteinuria (20.6 vs. 15.3%) and CVD (13.3 vs. 12.9%). No donor with FMD developed an eGFR <30 ml/min/1.73 m^2 or ESKD. The multivariable risk of these outcomes in donors with FMD was not elevated.

Multivariable risk mortality, cardiovascular disease, hypertension and reduced eGFR in propensity score matched cohort

	Logistic regression model		Cox proportional hazard model	
	Donors with FMD		Donors with FMD	
Outcome	aOR (95% CI)	p-value	aHR (95% CI)	p-value
Death	0.24 (0.05, 1.21)	0.08	0.64 (0.11, 3.65)	0.61
CVD	1.05 (0.53, 2.08)	0.88	1.04 (0.36, 2.97)	0.95
Hypertension	0.78 (0.38, 1.59)	0.49	1.41 (0.74, 2.68	0.30
Proteinuria	1.06 (0.58, 1.93)	0.85	1.04 (0.54, 2.01)	0.91
eGFR <60	1.04 (0.60, 1.80)	0.89	1.16 (0.83, 1.61)	0.38
eGFR <45	0.98 (0.49, 1.96)	0.96	1.26 (0.63, 2.52)	0.51

Covariates included: age, gender, body mass index (per kg/m^2), systolic blood pressure (per mmHg), fasting plasma glucose (per mg/dL), smoking, Center, donation year. Post-donation diabetes and hypertension were included in the Cox proportional hazard models at time-varying covariates.

CITATION INFORMATION: Adrogue H., Evans A., Hebert S., Adrogue H., Nguyen D., Murad D., Graviss E. Long Term Outcomes of Kidney Donors with Fibromuscular Dysplasia *AJT, Volume 21 Supplement 3*
DISCLOSURES: H.N. Adrogue: None. **A. Evans:** None. **S.A. Hebert:** None. **H.E. Adrogue:** None. **D.T. Nguyen:** None. **D. Murad:** None. **E.A. Graviss:** None.

Abstract# 367

Pre- Kidney Donation Pregnancy Complications and Long-Term Outcomes

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Purpose: In general, hypertension (HTN), proteinuria, or diabetes (DM) are exclusion criteria for living kidney donation in young candidates. Exceptions are made for conditions only experienced during pregnancy. In the general population, disorders of pregnancy are associated with increased long-term risk. There is little data on outcomes of women who had these complications and subsequently become donors. In a single-center analysis, we studied whether kidney donors who had pre-donation pregnancy complications (gestational HTN, preeclampsia, or gestational DM) were at increased risk of developing HTN, DM, and cardiovascular disease (CVD).
Methods: Donors with the specified pre-donation complication were matched 1:10 to donors with pre-donation pregnancies without the complication using nearest neighbor propensity score matching. Propensity scores were estimated using logistic regression with covariates for systolic BP, glucose, BMI, age, and creatinine at the

time of donation, donation year, relationship to recipient, and family history of HTN, DM, and heart disease. Incidence of outcomes were compared between groups using proportional hazards models.

Results: Of 1590 donors with pre-donation pregnancies, 47 had preeclampsia, 28 had gestational HTN without preeclampsia, and 36 had gestational DM. Matching led to good balance with SMDs < 0.1. Mean (SD) follow-up of those with pre-donation complications was 20.8 (12.8) years. Gestational HTN was associated with development of HTN (HR: 2.06, 95% CI: 1.25-3.40; p=0.004) and DM (HR: 2.92, 95% CI: 1.25-6.82; p=0.013). Gestational DM was associated with development of DM (HR: 4.17, 95% CI: 1.84-9.46; p=0.001). We did not detect associations between pregnancy complications and development of CVD or between preeclampsia and any of the outcomes.

Conclusions: In our single center study we found that among donors, who met screening criteria at the time of donation, having pre-donation gestational HTN or DM was associated with long-term risk. If confirmed by other centers: a) this data should be part of informed consent and b) accepting such candidates as donors should be done with caution.

Table 1: Association between pregnancy complications and long-term outcomes

		HR (95% CI); p-value for outcome		
Pregnancy complication	N	HTN	DM	CVD
Preeclampsia	47	0.93 (0.55, 1.57); 0.771	1.65 (0.69, 3.90); 0.258	1.60 (0.79, 3.22); 0.190
Gestational HTN	28	2.06 (1.25, 3.40); 0.004	2.92 (1.25, 6.82); 0.013	1.06 (0.48, 2.32); 0.887
Gestational DM	36	1.36 (0.74, 2.48); 0.321	4.17 (1.84, 9.46); 0.001	1.29 (0.39, 4.32); 0.676

CITATION INFORMATION: Helgeson E., Palzer E., Vock D., Matas A. Pre-Kidney Donation Pregnancy Complications and Long-Term Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Helgeson: None. **E.F. Palzer:** None. **D. Vock:** None. **A. Matas:** Consulting Fee; Name of Commercial Interest; CSL Behring, CareDX, Veloxis, Jazz Pharma. Consulting Fee; Nature of Relationship; Advisory Board, Advisory Board, Consultant, Advisory Board.

Abstract# 368

The Risk of Post-donation Kidney Function Impairment for Prospective Living Kidney Donors with Persistent Isolated Microscopic Hematuria

J. v. Weijden[1], M. van Londen[1], I. M. Nolte[2], M. H. De Borst[1], S. P. Berger[1], *[1]Nephrology, University Medical Center Groningen, Groningen, Netherlands, [2]Epidemiology, University Medical Center Groningen, Groningen, Netherlands*

Purpose: According to current guidelines, a kidney biopsy is indicated in prospective living kidney donors who present with persistent isolated microscopic hematuria (PIMH) during evaluation, while post-donation risks of PIMH are unclear. Here, we investigated the risks of pre-donation PIMH on post-donation kidney outcomes.

Methods: We included 858 living kidney donors who underwent at least two urinalyses before donation and had yearly post-donation kidney function (estimated glomerular filtration rate (eGFR), proteinuria (assessed as the protein/creatinine-ratio (PCR)) and systolic blood pressure (SBP) measurements available. The association between pre-donation PIMH (at least two positive measurements with ≥ 1 red blood cell (RBC) per high power field or ≥ 5 RBC per μL) and post-donation kidney function was assessed using generalized linear mixed models.

Results: Mean age was 52 (11) and median [IQR] follow-up time was 36 [12-70] months. Pre-donation PIMH was present in 78 donors of whom 74% were female, versus 48% female in the non-PIMH group (P<0.001). There was no significant difference in post-donation ln(PCR), eGFR or SBP course between pre-donation PIMH and non-PIMH donors (0.01 and 0.03 increase/year for PIMH donors and non-PIMH donors, respectively; difference P=0.34), eGFR (0.41 and 0.33 increase/year for PIMH donors and non-PIMH donors, respectively; difference P=0.41), or SBP (1.24 and 0.93 increase/year for PIMH donors and non-PIMH donors, respectively; difference P=0.70), even after adjusting for pre-donation age, sex, BMI, pre-donation eGFR, SBP, and ACE inhibitor use.

Conclusions: We found no increased risk of post-donation proteinuria, higher blood pressure, or eGFR decline in donors with pre-donation PIMH. The need of a pre-donation kidney biopsy in donors with PIMH without other risk factors for kidney disease should be carefully reconsidered.

CITATION INFORMATION: Weijden J., van Londen M., Nolte I., De Borst M., Berger S. The Risk of Post-donation Kidney Function Impairment for Prospective Living Kidney Donors with Persistent Isolated Microscopic Hematuria *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.V. Weijden: None. **M. van Londen:** None. **I.M. Nolte:** None. **M.H. De Borst:** None. **S.P. Berger:** None.

Abstract# 369

Living Donor Kidney Transplantation Racial Disparities Persist Independent of Social Vulnerability

A. C. Killian[1], M. C. McLeod[1], B. Shelton[1], R. D. Reed[1], P. MacLennan[1], H. Qu[1], B. J. Orandi[1], V. Kumar[1], D. Sawinski[2], R. M. Cannon[1], D. J. Anderson[1], M. J. Hanaway[1], J. E. Locke[1], *[1]University of Alabama at Birmingham Hospital, Birmingham, AL, [2]Hospital of the University of Pennsylvania, Philadelphia, PA*

Purpose: Living donor kidney transplantation (LDKT) confers a significant survival benefit over deceased donor transplantation. Racial disparities in access to LDKT are well recognized, yet they have increased in the last two decades. LDKT inequities have been largely attributed to contextual poverty and socioeconomic variability, however the association between LDKT and comprehensive measures of social vulnerability has not been characterized.

Methods: This retrospective study utilized the Scientific Registry of Transplant Recipients to identify adult, kidney-only transplant recipients between 1/1/2018-12/31/2018. Census tract-level data from the Centers for Disease Control and Prevention's 2018 Social Vulnerability Index (SVI), were linked to recipients by zip code. Logistic regression was utilized to evaluate the association between LDKT and SVI and race, controlling for patient- and community-level characteristics. Average adjusted predicted probabilities of LDKT across SVI were plotted by race.

Results: 20,380 kidney-only transplant recipients were included, of which 30% received LDKT. Higher SVI (e.g., greater social vulnerability) was significantly associated with lower odds of LDKT (adjusted odds ratio (aOR): 0.47, 95% confidence interval (CI): 0.40-0.57, p<0.0001). After controlling for SVI, African Americans (AAs) had 57% lower odds (aOR: 0.43, 95%CI: 0.39-0.48, p<0.0001) and other races had 45% lower odds (aOR: 0.55, 95%CI: 0.48-0.63, p<0.0001) of LDKT compared to their white counterparts. Average marginal effects for LDKT at the lowest SVI were 13% and 9% for AAs and other races, respectively, relative to white recipients (Figure 1).

Conclusions: Greater social vulnerability is significantly associated with lower odds of LDKT. Racial disparities in LDKT persist independent of social vulnerability, suggesting that other factors, such as sociocultural barriers and unconscious biases require greater attention to mitigate inequities.

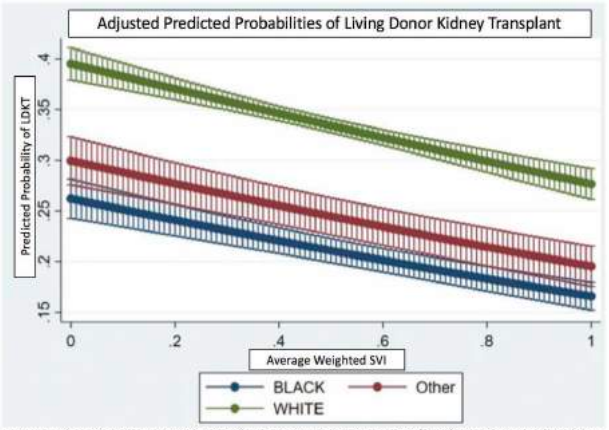

Figure 1. Adjusted Predicted Probabilities of Living Donor Kidney Transplant (LDKT) across Social Vulnerability Index (SVI) by Race

CITATION INFORMATION: Killian A., McLeod M., Shelton B., Reed R., MacLennan P., Qu H., Orandi B., Kumar V., Sawinski D., Cannon R., Anderson D., Hanaway M., Locke J. Living Donor Kidney Transplantation Racial Disparities Persist Independent of Social Vulnerability *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.C. Killian: None. **M.C. McLeod:** None. **B. Shelton:** None. **R.D. Reed:** None. **P. MacLennan:** None. **H. Qu:** None. **B.J. Orandi:** None. **V. Kumar:** None. **D. Sawinski:** Consulting Fee; Name of Commercial Interest; Veloxis, Natera, CareDx. Consulting Fee; Nature of Relationship; advisory board consulting, advisory board consulting, advisory board consulting. **R.M. Cannon:** None. **D.J. Anderson:** None. **M.J. Hanaway:** None. **J.E. Locke:** Consulting Fee; Name of Commercial Interest; Sanofi. Consulting Fee; Nature of Relationship; Consultant.

Abstract# 370

Implications of Trends in Child to Parent Kidney Donation in Whites and African Americans

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Purpose: Racial disparities in access to transplantation referral, wait listing and transplant receipt are well described. African Americans (AA) receive fewer living donor transplants than white (W) recipients. These quantitative differences are also accompanied by qualitative differences. Older single center studies have shown

more common child to parent donation in AA patients, and greater proportion of living unrelated donations in W patients. The purpose of this study was to evaluate whether these findings persist in the modern era and update the characteristics of donor-recipient relationships in the AA and W population using national registry data.
Methods: United Network for Organ Sharing (UNOS) Star files were used to generate a list of all living kidney donors since January 2001, and all of their adult recipients, in order to identify one cohort of living donor-recipient pairs who were AA-to-AA and another who were W-to-W. Donor/recipient age, sex, and relationships were examined. Age difference was calculated as donor age minus recipient age. The cohorts were compared, and differences evaluated with Wilcoxon tests and χ^2 as appropriate.
Results: 61,396 W-to-W and 10,998 AA-to-AA living donor-recipient pairs were identified. Median age difference was -7 years (IQR=22,1) in AA and -4 years (IQR=-19,2) in W (P<0.001). Figure 1 shows the distributions of age difference in AA-to-AA and W-to-W pairs. Unrelated kidney donation was more common in the W-to-W cohort at 46.7% compared to 25.9% in AA-to-AA cohort (P<0.001). Child to parent donation was more common in AA-to-AA cohort at 28.9% compared to 16% in W-to-W cohort (P<0.001). Daughters represented a larger percentage of living donors than sons in both groups: 9.0% vs 7.0% in W, and 15.4% vs 13.6% in AA (P<0.001). Among parental recipients (n=12,989), donation to mother was more common than to father in AA (56.6% vs 43.4%) but donation to father was more common than to mother in W (63.2% vs 36.8%) [P<0.001].
Conclusions: Differences in living donor-recipient relationships exist in AA and W. Given recent data showing increased risk of end stage kidney disease in child to parent donation in AA and the high proportion of children who donate to parents in the AA community, further study of the donation trends is warranted. Better understanding of cultural norms and pre-transplant evaluation strategies are required to explain this finding and its significance.

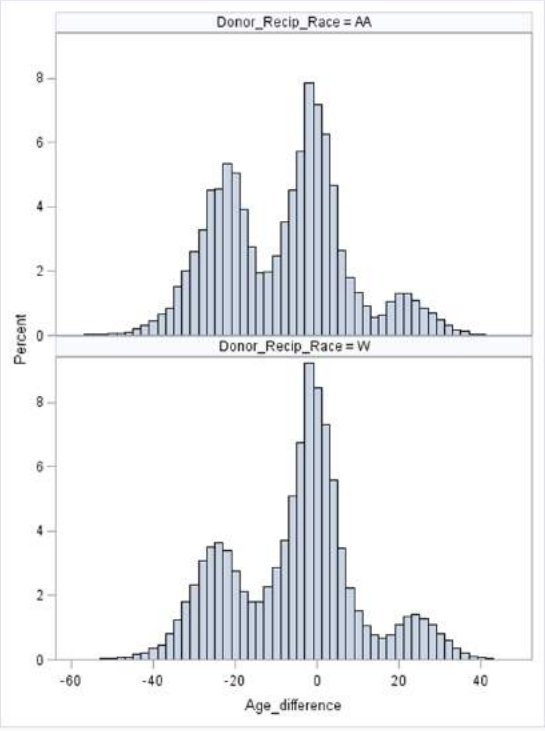


Figure 1. Histogram showing trimodal distribution of donor recipient age difference in both AAs and Ws, with a greater proportion of AA pairs with donors younger than recipients compared to W pairs.

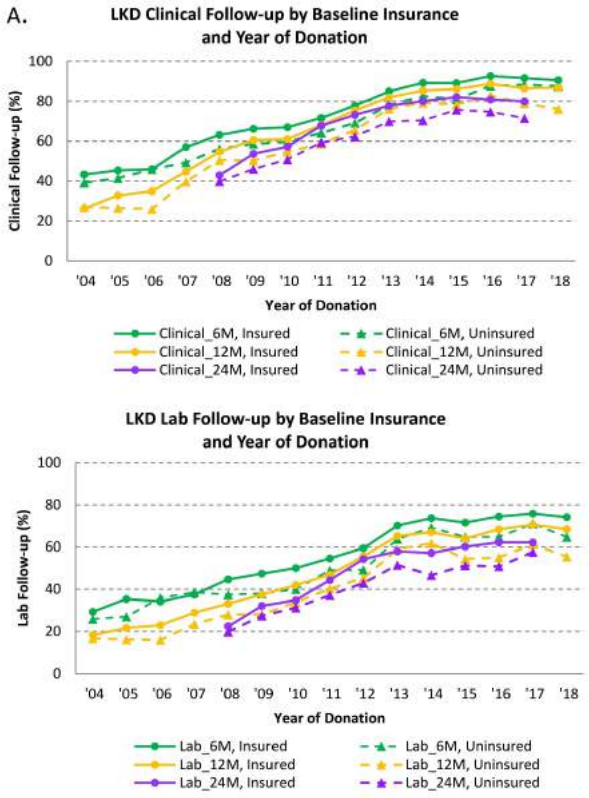
CITATION INFORMATION: Jean N., Krishnamoorthy S., Kyeso Y., Cunningham P., Murthy N., McGill R., Josephson M. Implications of Trends in Child to Parent Kidney Donation in Whites and African Americans *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Jean: None. **S. Krishnamoorthy:** None. **Y. Kyeso:** None. **P. Cunningham:** None. **N. Murthy:** None. **R. McGill:** None. **M. Josephson:** None.

Abstract# 371

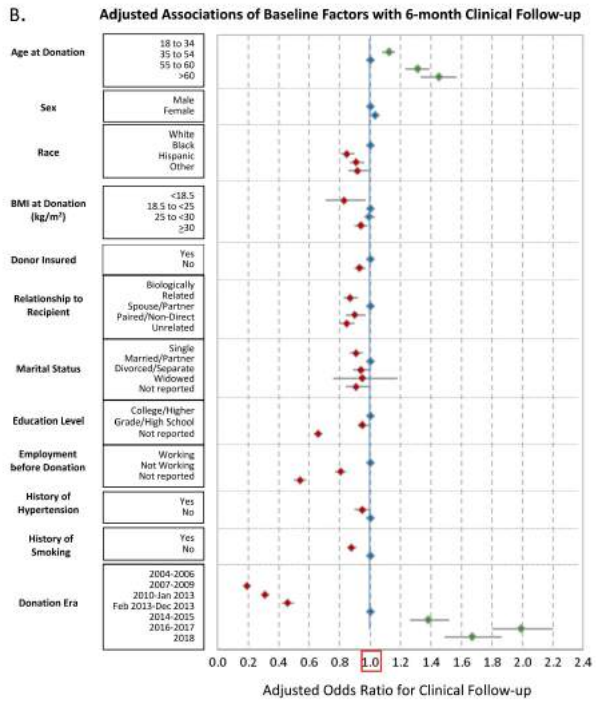
Associations of Lack of Insurance and Other Sociodemographic Traits with Deficiencies in Follow-Up After Living Kidney Donation

K. Lentine[1], R. Hays[2], N. Lam[3], A. Tietjen[4], A. Muiru[5], H. Xiao[1], A. Garg[6], C. Thomas[7], G. McNatt[7], R. Howey[8], U. Lebron-Banks[9], M. Cooper[10], M. Conboy[11], B. Kasiske[11], *[1]Saint Louis Univ, Saint Louis, MO, [2]Univ of Wisconsin, Madison, WI, [3]Univ of Calgary, Calgary, AB, Canada, [4]St. Barnabas, Livingston, NJ, [5]Univ of California, San Francisco, San Francisco, CA, [6]Western Univ, London, ON, Canada, [7]Univ of Iowa, Iowa City, IA, [8]Toyon Associates, Concord, CA, [9]New York Presb Hosp, New York, NY, [10]Medstar-Georgetown, Washington, DC, [11]SRTR, Minneapolis, MN*

Purpose: Follow-up after living kidney donation in the United States has improved with recent policy mandates. We hypothesized that lack of insurance at donation may be a barrier to postdonation follow-up.
Methods: We examined Scientific Registry of Transplant Recipients (SRTR) data for 90.460 living kidney donors (LKD) in 2004-2018 to examine associations (adjusted odds ratio, aOR) of insurance status and other baseline factors with clinical and laboratory follow-up after donation.
Results: Follow-up increased over time, and was especially high in older LKD. Follow-up was lower in uninsured compared to insured LKD over time, including in the era of the Affordable Care Act (**Fig. A**). In 2018, for uninsured vs insured LKD, respectively, clinical follow-up was 87.5% vs 90.4% at 6-months, and 76% vs 86.7% at 12-months, while 12-month lab follow-up was 55.4% vs 68.4%.



In multivariate regression including adjustment for donation year and other baseline factors, uninsured status was associated with 7% lower odds of 6-month clinical follow-up (aOR, 0.93) and 14% lower odd of lab follow-up (aOR, 0.86). Follow-up was also significantly (P<0.05) lower for LKD who were African American (aOR 0.85) or Hispanic (aOR 0.91), unrelated to their recipient (aOR 0.85), not working (aOR 0.81) and with less than college education (**Fig. B**).



Associations were similar for 1-year follow-up.

Conclusions: While follow-up after living kidney donation is improving, uninsured LKD and those who are non-white, unemployed, and with lower education are less likely to receive follow-up. Novel initiatives are needed to provide access to follow-up care for at-risk LKD, including the uninsured and under-insured, to minimize the risk of socioeconomic disparities in long-term postdonation outcomes.

CITATION INFORMATION: Lentine K., Hays R., Lam N., Tietjen A., Muiru A., Xiao H., Garg A., Thomas C., McNatt G., Howey R., Lebron-Banks U., Cooper M., Conboy M., Kasiske B. Associations of Lack of Insurance and Other Sociodemographic Traits with Deficiencies in Follow-Up After Living Kidney Donation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Lentine: Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **R. Hays:** None. **N. Lam:** None. **A. Tietjen:** None. **A. Muiru:** None. **H. Xiao:** None. **A. Garg:** Grant/Research Support; Name of Commercial Interest; Astellas Canada. Grant/Research Support; Nature of Relationship; Research Support. **C. Thomas:** None. **G. McNatt:** None. **R. Howey:** None. **U. Lebron-Banks:** None. **M. Cooper:** None. **M. Conboy:** None. **B. Kasiske:** None.

Abstract# 372

Launching a National Living Donor Registry

J. E. Milton[1], M. Cooper[2], B. Hippen[3], *[1]Transplant Center, University of Texas Health San Antonio, San Antonio, TX, [2]MedStar Georgetown Transplant Institute, Washington, Colombia, [3]Metrolina Nephrology Associates, PA, Charlotte, NC*

Purpose: The National Donate Life Living Donor Registry launching in 2021 will allow 4000 persons a day the opportunity to become a living donor offering education and screening on demand, create a 'call to action' to add to national media stories and events, and provide infrastructure for 'living donor drives' that will not overburden staff at transplant centers.

Methods: A workgroup of donation and transplantation experts was convened to drive the creation of the registry. This group developed research and created education, questions and criteria for screening. The National Donate Life Living Donor Registry will be embedded in the National Donate Life Registry (registerme.org.) Prospects will be given information, complete screening questions and when answers meet predetermined thresholds will be mailed a no cost "test kit" for saliva to screen for blood type and HLA typing. The test results and health information will be linked and uploaded to a secure database completing the potential donor's registration which will be available to the transplant center selected by the prospective donor from a list driven by their geographical preferences.

Results: A nationwide survey of 500 qualifying adults: (Age 21-60, not opposed to organ and tissue donation) included 50% non-Hispanic Caucasian, 25-30% African American, 25-20% Hispanic or Asian and a nationwide sample of 50 previous living donors was conducted on the usability of web pages and to gain insights on design improvements. The results showed the web pages performed well in communicating the intended information and minor suggestions for improvement were received. Testing was completed on 40 saliva samples comparing the results of ABO and HLA saliva testing to serum testing from the same participants at two different labs to assess the use of saliva testing for initial screening. 100% of comparisons have come back as matches. Testing with simulated personal health information uploaded into the registry porta validated authentication procedures, data sharing techniques and ease of use accessing the registry portal, etc.

Conclusions: Each year 1.5 million Americans register as donors via the National Donate Life Registry, registerme.org. If 1 percent expressing additional interest in living donation are ultimately evaluated and cleared, an additional 15,000 living donors per year could occur. Even if only half of those donate 7,500 more lives would be saved. If these donors started a paired donation (KPD) chain (average = 3 transplants) up to 22,500 more lives could be saved. There were 6,867 living-kidney donor transplants in 2019. Use of the preexisting geographically agnostic organ donation registry to be the home of the living donor registry will generate even greater successes than evident in the Israeli model where a community organization has driven growth in altruistic living unrelated donor transplantation.

CITATION INFORMATION: Milton J., Cooper M., Hippen B. Launching a National Living Donor Registry *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.E. Milton: None. **M. Cooper:** None. **B. Hippen:** None.

Abstract# 373

CT-measured Cortical Volume Ratio is an Alternative to Nuclear Medicine Split Scan Ratio Among Living Kidney Donors

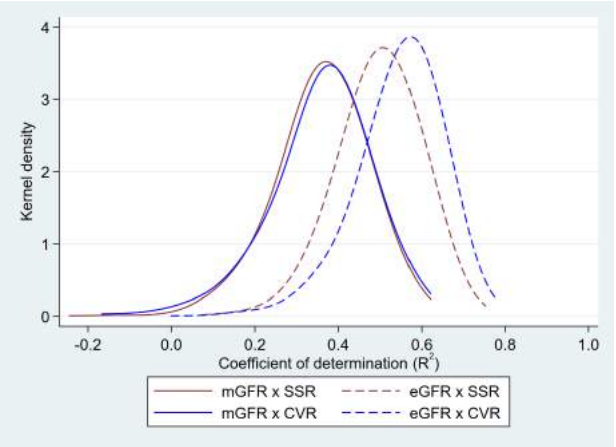
J. Montgomery, C. Brown, A. Zondlak, K. Walsh, J. Kozlowski, A. Pinsky, E. Herriman, J. Sussman, Y. Lu, E. Stein, P. Shankar, R. Sung, K. Woodside, *Michigan Medicine, Ann Arbor, MI*

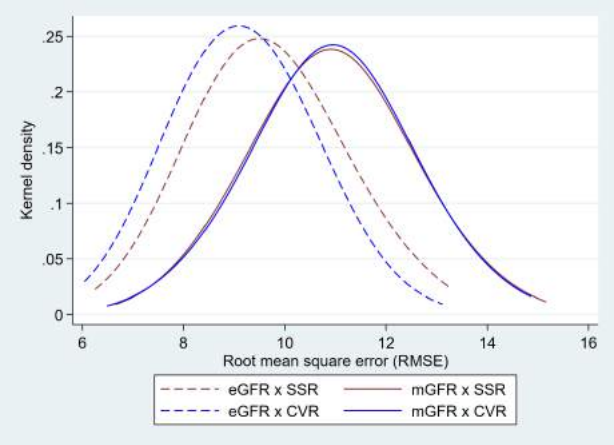
Purpose: The ^{125}I-iothalamate clearance and ^{99m}Tc-DTPA split scan nuclear medicine studies are used among living kidney donor candidates to determine mGFR and split-scan ratio (SSR). The CT-derived cortical-volume ratio (CVR) is a novel measurement of split-kidney function and can be combined with pre-donation eGFR or mGFR to predict post-donation kidney function. Whether pre-donation SSR predict post-donation kidney function better than pre-donation CVR and whether pre-donation mGFR provides additional information beyond pre-donation eGFR is unknown.

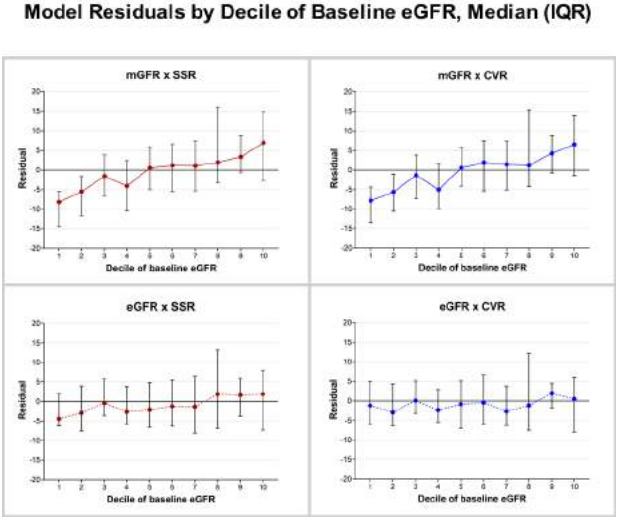
Methods: We performed a single-center retrospective study of 204 patients who underwent kidney donation between 06/2015-03/2019. The primary outcome was 1-year post-donation eGFR. Model bases were created from a measure of pre-donation kidney function (mGFR or eGFR) multiplied by the proportion that each non-donated kidney contributed to pre-donation kidney function (SSR or CVR). Multivariable elastic net regression with 1,000 repetitions was used to determine the mean and 95%CI of R2, root mean square error (RMSE), and proportion overprediction ≥15 mL/min/1.73m^2 between models.

Results: In validation cohorts, eGFR-CVR models performed best (R^2 0.547, RMSE 9.2 mL/min/1.73m^2, proportion overprediction 3.1%) whereas mGFR-SSR models performed worst (R^2 0.360, RMSE 10.9 mL/min/1.73m^2, proportion overprediction 7.2%) (P<.001 for all comparisons). R^2 and RMSE distributions are shown in Figures. The eGFR-CVR models had the smallest residuals among the lowest baseline eGFR decile (Figure).

Conclusions: These findings suggest that pre-donation CVR may serve as an acceptable alternative to SSR during donor evaluation and furthermore that a model based on CVR and pre-donation eGFR may be superior to other methods.







CITATION INFORMATION: Montgomery J., Brown C., Zondlak A., Walsh K., Kozlowski J., Pinsky A., Herriman E., Sussman J., Lu Y., Stein E., Shankar P., Sung R., Woodside K. CT-measured Cortical Volume Ratio is an Alternative to Nuclear Medicine Split Scan Ratio Among Living Kidney Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Montgomery: None. **C. Brown:** None. **A. Zondlak:** None. **K. Walsh:** None. **J. Kozlowski:** None. **A. Pinsky:** None. **E. Herriman:** None. **J. Sussman:** None. **Y. Lu:** None. **E. Stein:** None. **P. Shankar:** None. **R. Sung:** None. **K. Woodside:** None.

All Organs

Surgical Issues and Deceased Donor Management

Abstract# 374

Cleveland Clinic Experience with Cadaveric Uterus Transplant

L. Del Prete[1], C. Quintini[1], K. Hashimoto[1], B. Eghtesad[1], G. D'Amico[1], C. Kwon[1], D. Priebe[1], E. Richards[1], S. Ricci[1], U. Perni[1], C. Ferrando[1], A. Chiesa-Vottero[1], S. Mawhorter[1], N. Yeaney[1], R. Farrell[1], R. Flyckt[2], C. Miller[1], T. Falcone[1], A. Tzakis[1], *[1]Cleveland Clinic, Cleveland, OH, [2]University Hospital, Cleveland, OH*

Purpose: Uterus transplantation (UTx) is the only treatment for women with uterine factor infertility (UFI). The majority of overall experience is from living donation. Little is known about live birth rates after embryo transfer and the long term outcomes of recipients with a uterus from deceased donors. We report here our updated experience with eight uterine transplanted patients from donors after brain death (DBD).

Methods: Recipient inclusion criteria were absolute UFI, BMI<30 kg/m^2, ages 18 to 45 and at least six frozen embryos ready to be implanted. Child-bearing age donors with no uterine abnormalities were considered for donation, prioritizing those who had a previous term pregnancy.

Results: Eight UTx from DBD have been performed since 2016. No injuries to donor's life-saving organs were reported. Mean procurement time was 249 min (158-367), whereas mean operative time was 537 min (334-870). The average cold ischemia time was 300 min (110-434) and mean hospital stay was 11 (5-30) days. All recipients are alive and well. Two patients had graft losses occurring on postoperative day (POD) 12 and 6. Two patients delivered healthy neonates, two patients are pregnant (second trimester) and two patients are undergoing embryo transfers. Reinstitution of menstruation occurred on average on POD 22. Three patients became pregnant with the first attempt. Graft rejection was observed and successfully treated in two patients (Table 1). No severe hypertension or preeclampsia occurred. Creatinine value average was 0.81, 0.89 and 0.92 respectively at 3, 6 and 12 months after UTx.

Conclusions: DBD procurement eliminates the burden of living donor comorbidities. Our findings indicate that UTx from DBD is a safe procedure with no renal impairment within 1-year follow-up. Although it is premature to state that DBD grafts are capable of establishing and carrying a pregnancy as a native organ, we do have encouraging preliminary evidence.

Table 1: Outcomes

	Postoperative Complications	Embryo Transfer Attempts	Pregnancy	Birth of Healthy Neonate
1	Hysterectomy due to arterial mycotic pseudoaneurysm (POD12)	NA	NA	NA
2	Grade 3 rejection	1	Grade 2 rejection; placenta previa and accreta	Yes
3	Reoperation for pelvic hematoma: DVT/PE; hemorrhagic ovarian cyst (POM2)	1	Hypertension; subchorionic hematoma	Yes
4	Biopsy related endocervical hematoma Post-transplant DM and elevated HbA1C	6	Not yet	NA
5	Hysterectomy due to vascular thrombosis (POD6)	NA	NA	NA
6	Re-exploration on POD1 due to poor window US; Grade 3 rejection	2	Ongoing with no complications (third trimester)	Anticipated Jan 2021
7	Incisional hematoma	3	Not yet	NA
8	None	1	Ongoing; abnormal second trimester bleeding	Anticipated March 2021

CITATION INFORMATION: Del Prete L., Quintini C., Hashimoto K., Eghtesad B., D'Amico G., Kwon C., Priebe D., Richards E., Ricci S., Perni U., Ferrando C., Chiesa-Vottero A., Mawhorter S., Yeaney N., Farrell R., Flyckt R., Miller C., Falcone T., Tzakis A. Cleveland Clinic Experience with Cadaveric Uterus Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Del Prete: None. **C. Quintini:** None. **K. Hashimoto:** None. **B. Eghtesad:** None. **G. D'Amico:** None. **C. Kwon:** None. **D. Priebe:** None. **E. Richards:** None. **S. Ricci:** None. **U. Perni:** None. **C. Ferrando:** None. **A. Chiesa-Vottero:** None. **S. Mawhorter:** None. **N. Yeaney:** None. **R. Farrell:** None. **R. Flyckt:** None. **C. Miller:** None. **T. Falcone:** None. **A. Tzakis:** None.

Abstract# 375

Pilot Study for the Use of Shortened Preemptive Therapy with Glecaprevir/pibrentasvir (g/p) and Ezetimibe in Hepatitis C Seronegative Solid Organ Transplant Recipients (Kidney and Heart) of Hepatitis C Viremic Donors

B. Aqel[1], H. Khamash[2], A. Moss[3], D. E. Steidley[4], R. C. Dickson[1], *[1]Gastroenterology and Hepatology, Mayo Clinic, Phoenix, AZ, [2]Nephrology and Hypertension, Mayo Clinic, Phoenix, AZ, [3]Transplant Surgery, Mayo Clinic, Phoenix, AZ, [4]Cardiology, Mayo Clinic, Phoenix, AZ*

Purpose: This prospective study aims to assess the efficacy of preemptive therapy with eight days of a combination of direct-acting antivirals (DAAs) (Mavyret) (Pibrentasvir /Glecaprevir) and Zetia (ezetimibe) in recipients of HCV viremic solid organ transplant (kidney or heart).Background: Zetia (ezetimibe), which is generally used as a lipid-lowering agent, was found to help blocking the cholesterol receptor used by the HCV virus for cell entry. The combination of this drug with DAA's can potentially be more effective in preventing the transmission of hepatitis C infection in recipients of solid organ transplants from donors with active viremia at time of procurement

Methods: This is a prospective open label. internally funded, single center study. Solid organ recipients (kidney, heart) who agreed to accept HCV viremic organs are consented for the study. Once patients are admitted for an HCV viremic organ, HCV pre-emptive therapy with Mavyret and Zetia was initiated upon call to the operative room. Mavyret was the choice in view of highly effective pan genotypic coverage, ability to use in the setting of advanced kidney disease, and low side effect profile. Combination therapy was continued for 7 days after transplant (total of eight doses). HCV RNA was monitored at day 0.1, 3, 7 and then weekly until 13 weeks post-transplant. SVR 12 was defined as undetectable HCV RNA 12 weeks after last dose of therapy (week 13 post-transplant)

Results: Eight patients have enrolled in the study so far (7 kidney transplants, one kidney pancreas transplant). All patients completed 8 days of combination therapy

without interruption. Patients tolerated treatment without and treatment related adverse events. All patients developed transient viremia by day 3 post-transplant with median peak viral load of 129 IU/ml (<15-1030). At day 7 post-transplant: 6/8 patients showed undetectable HCV RNA while 2/8 patients had detectable virus (<15). All patients achieved undetectable viremia at day 14 post-transplant. Two patients had follow up more than 13 weeks and both achieved SVR 12.

Conclusions: Early data confirm that preemptive therapy with shortened course with Pibrentasvir /Glecaprevir and ezetimibe was effective in recipients of non-liver solid organ transplants. Study continues to enroll and we anticipate the final data will be presented at the meeting. This approach may prove to be cost effective and will allow wider use of HCV viremic organs.

CITATION INFORMATION: Aqel B., Khamash H., Moss A., Steidley D., Dickson R. Pilot Study for the Use of Shortened Preemptive Therapy with Glecaprevir/pibrentasvir (g/p) and Ezetimibe in Hepatitis C Seronegative Solid Organ Transplant Recipients (Kidney and Heart) of Hepatitis C Viremic Donors *AJT, Volume 21 Supplement 3*

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Abstract# 376

Donor Service Area Characteristics Impacting Liver and Kidney Deceased Donor Population

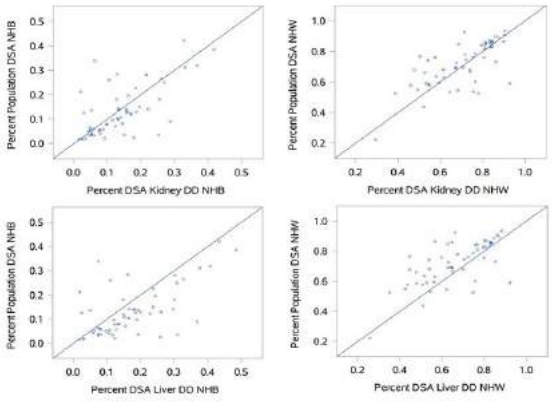
C. O. Warren, A. Zarrinpar, *Surgery, -University of Florida, Gaiinesville, FL*

Purpose: While there is ample evidence of racial and ethnic disparities in access to the waitlist, being transplanted, and post-transplant outcomes in liver and kidney transplantation, there has not been much investigation into the race/ethnicity of deceased donors (DD). Donor service areas (DSA) are tasked with providing access to allografts from their constituent populations. Although there are reports of lower donation rates in non-White populations, DSA specific factors affecting this have not been closely examined.

Methods: DSA specific adult liver and kidney DD data were obtained from the Scientific Registry of Transplant Recipient files between January 2013 and December 2018. Race/ethnicity distributions from each DSA (n=57) were compared to DSA population demographics as calculated from 2017 5-year estimate US Census data. DSA-specific characteristics were correlated with differences for Non-Hispanic White (NHW), Non-Hispanic Black (NHB), and Hispanic populations through logistic regression and scatterplots. Statistical analyses were conducted using SAS 9.4.

Results: NHBs were consistently overrepresented among deceased donors in the vast majority of DSAs when compared to the total population (liver 50/57, 86%) (kidney 38/57, 67%). NHW and Hispanic deceased donors were underrepresented as compared to the respective population of the DSA. Predictors of DSAs overrepresenting NHB liver donors were DSA population poverty (p-value=0.02), under high school education (p-value=0.02), and no insurance (p-value=0.02). No significant predictors were identified for NHBs in kidney donation or for NHWs in either liver or kidney donation.

Conclusions: Comparing donation rates to the total population, as opposed to the deceased population, highlights the overall health disparities in the general population. While further work is essential to fully understanding the underlying causes and potential remedies, the contradictory findings that indicate a lower than expected donation rate from "eligible donors" will need to be examined closely in light of these data. Further analysis is underway to understand additional factors associated with underutilization of donors in each DSA and to find potential ways to mitigate them.



CITATION INFORMATION: Warren C., Zarrinpar A. Donor Service Area Characteristics Impacting Liver and Kidney Deceased Donor Population *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.O. Warren: None. **A. Zarrinpar:** None.

Abstract# 377

Drones and Airplanes: Modeling the Potentially Deleterious Effects of Transportation on Shipped Organs

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Purpose: During the first shipments of human organs by drone, we identified significant differences in pressure and vibration that may adversely affect shipped organs. Liver transplants moved by aircraft have worse 1 year mortality rates than organs moved by ground. Further, 40 percent of primary non-function (PNF) amongst kidney transplants have no identifiable cause. Whereas donor and recipient organ function are monitored minute-to-minute, shipped organs are not monitored or tracked.

Methods: An animal model of MHC disparate heart transplantation was developed. Organ vibration during traditional flight was modeled using a tabletop vortex shaker to study the impact on transplant outcome. Hearts were exposed to vibration prior to transplantation.

Results: We previously reported on the first human transplant of kidney flown 2.8 miles by UAS, and we compared UAS with fixed-wing flight during which UAS demonstrated less vibration by more than 1.5G. Modeling shipment, fully MHC mismatched cardiac transplants were performed in mice. Vibrated hearts failed in 12 vs more than 45 days for controls (p=0.01). Vibrated hearts showed increased Annexin V+ (apoptosis) in the epicardium (3 fold) and myocardium (8-fold; p=0.01). TUNEL-positive cells increased within vibrated hearts 10-fold (p=0.01), suggesting increased cell death.

Conclusions: There is an unmet need to learn what environmental factors during shipment affect organ integrity. Understanding how organs are affected by the environment would allow for innovative solutions for shipment safety, organ allocation, and selection of mode of organ transportation.

CITATION INFORMATION: Lee Y., Bromberg J., Scalea J. Drones and Airplanes: Modeling the Potentially Deleterious Effects of Transportation on Shipped Organs *AJT, Volume 21 Supplement 3*

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Abstract# 378

Primary Uretero-ureterostomy in Renal Transplantation

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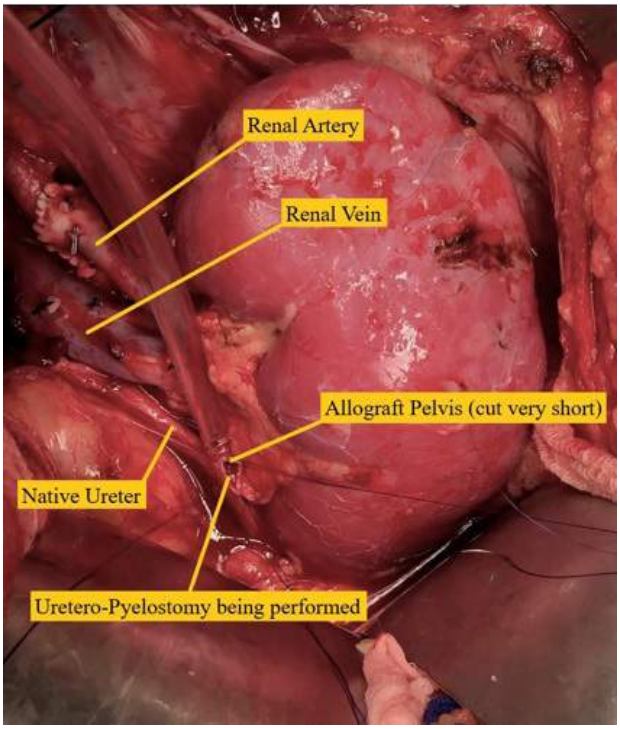
Purpose: Uretero-neocystostomy (UN) is routinely performed in renal transplantation. Few studies of primary uretero-ureterostomy (UU) have been reported, showing its safety and feasibility. If the ureter is inadvertently cut short during procurement, the organ can still be used with UU or uretero-pyelostomy, avoiding discard. We started UU technique in 2016 to avoid the need for secondary UU. The aim of this study was to compare the incidence of urological complications and graft & patient survival between the two techniques.



Methods: From Jan 2009 to Aug 2020, we studied patients with Kidney (KT), Kidney-Pancreas (KPT), and Liver-Kidney (LKT) transplantation. Exclusion criteria included reflux as the cause of ESRD, en-block-KT, patients lost to followup before 5 years, and graft failure within 10 days. Data was collected on patient demographics, peri-operative findings, incidence of urine leak, stricture and fluid collection, and death-censored 5-year graft & patient survival. Categorical variables with Chi-Square test, continuous variables with Student's T-test, and survival analysis with Log Rank test were done using SPSS.
Results: Among 515 patients (KT=405, KPT=91, LKT=19), 190 had UU and 325 had UN. 4 patients were converted to UN intraoperatively due to atrophic ureter. In those who underwent UN, 6 patients required secondary UU. There was no statistically significant difference in incidence of urological complications. Foley catheter was taken out earlier and ureteral stricture developed earlier in UU patients (2.3 ± 1.5 vs 18.0 ± 22.9 months, p-value = 0.03). In KT, OR time was shorter in UU (2:39 vs 2:57, p-value = 0.05), and in KPT, death-censored 5-year graft survival rate was better in UU patients (100% vs 75.5%, p-value = 0.04).

Results						
	Total UU (n=190)	Total UN (n=325)	P-Value	KT UU (n=136)	KT UN (n=269)	P-Value
Age (Y), mean ± SD	48.5 ± 13.2	47.8 ± 0.52	0.52	49.5 ± 13.7	48.5 ± 12.5	0.42
Male, % (n)	61.1 (116)	57.5 (187)	0.43	61.0 (83)	56.9 (153)	0.42
Foley Catheter Duration (d), mean ± SD	4.0 ± 2.4	4.9 ± 2.1	0.01	4.0 ± 2.5	4.5 ± 1.5	0.17
Incidence of Leak, % (n)	1.6 (3)	0.6 (2)	0.28	2.2 (3)	0.7 (2)	0.21
Incidence of Stricture, % (n)	1.6 (3)	2.5 (8)	0.50	0.7 (1)	2.2 (6)	0.28
Incidence of Fluid Collection, % (n)	1.6 (3)	0.3 (1)	0.11	2.2 (3)	0.4 (1)	0.08
5-Year Death-Censored Graft/Patient Survival, %	96.8/ 93.2	89.2/ 92.9	0.49/ 0.06	95.6/ 93.4	91.4/ 92.2	0.46/ 0.23

Conclusions: UU is safe and easy to perform with comparable long-term results and has advantages of shorter OR time, removing Foley catheter earlier, and preventing organ discard and secondary UU.

CITATION INFORMATION: Shokouh-Amiri H., Naseer M., Aultman D., McMillan R., Tandukar S., Siskron F., Singh N., Zibari G. Primary Uretero-ureterostomy in Renal Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Shokouh-Amiri: None. **M.S. Naseer:** None. **D. Aultman:** None. **R. McMillan:** None. **S. Tandukar:** None. **F.T. Siskron:** None. **N. Singh:** Grant/Research Support; Name of Commercial Interest; CareDx, Transplant Genomics. Grant/Research Support; Nature of Relationship; PI on studies. Honoraria; Name of Commercial Interest; CareDx, Transplant Genomics, Viracor, Mallincrokdt, Veloxis. Honoraria; Nature of Relationship; Speaker Bureau. **G. Zibari:** None.

Abstract# 379

Robotic Donor Nephrectomy: Advantages Offered by a Minimally Invasive Approach to Kidney Transplantation

A. Popovic[1], R. Shahbazov[1], A. Hoste[1], S. Loerzel[1], B. Gallay[2], J. Leggat[2], O. Pankewycz[1], R. Saidi[1], R. H. Dvorai[3], M. J. Hanlon[1], S. Narsipur[2], M. R. Laftavi[1], *[1]Surgery, SUNY Upstate Medical University, Syracuse, NY, [2]Medicine, SUNY Upstate Medical University, Syracuse, NY, [3]Pathology, SUNY Upstate Medical University, Syracuse, NY*

Purpose: Our aim was to further explore the difference in results between laparoscopic and robotic assisted techniques of living donor nephrectomies
Methods: This is a retrospective study analyzing the results of 71 consecutive live donor nephrectomies performed from May 2016 to October 2020, consisting of 33 laparoscopic and 38 robotic procedures. The two surgical approaches were compared by collecting information on operative length, intraoperative blood loss, intraoperative fluid administered, PRN opioids administered in hospital, length of stay, GFR and creatinine at discharge, and creatinine at 3, 6, and 12-month intervals
Results: Robotic and Laparoscopic operative techniques were found to have different operative length times (297min vs 263min, p=0.03) and different blood loss (83mL vs 155mL, p=0.025). RDN required significantly less intraoperative fluid replacement than their LDN counterparts (3.18L vs 4.41L p=0.00007). RDN patients also had a significantly increased GFR on day 1 post-operatively (64.5 vs 57.2, p = 0.013) and on day of discharge (68.7 vs 60.2, p = 0.023) but not at 1-month follow-up (64.9 vs 59.3, p = 0.12). There was no statistical difference in creatinine at discharge (1.11 vs 1.38 p=0.22), 3 months post-op (1.17 vs 1.21 p=0.73), 6 months post-op (1.15 vs 1.12, p = 0.79), or 12 months post-op (1.15 vs 1.13, p = 0.60).RDN patients experienced a non-significant 20% decrease in average length of stay (2.73 vs. 3.42 days p=0.78) but also a non-significant increase in Morphine milligram equivalents administered during their stay (1530 vs. 1470 p=0.88)
Conclusions: RDN is a safe and effective alternative surgical approach when compared to LDN. The decreases in blood loss and fluid administration and increased day 1 GFR may reflect the decreased tissue manipulation allowed for by robotic assistance. However, the novelty and learning curve of the technique may have contributed to the longer operative times seen in patients undergoing RDN

CITATION INFORMATION: Popovic A., Shahbazov R., Hoste A., Loerzel S., Gallay B., Leggat J., Pankewycz O., Saidi R., Dvorai R., Hanlon M., Narsipur S., Laftavi M. Robotic Donor Nephrectomy: Advantages Offered by a Minimally Invasive Approach to Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Popovic: None. **R. Shahbazov:** None. **A. Hoste:** None. **S. Loerzel:** None. **B. Gallay:** None. **J. Leggat:** None. **O. Pankewycz:** None. **R. Saidi:** None. **R.H. Dvorai:** None. **M.J. Hanlon:** None. **S. Narsipur:** None. **M.R. Laftavi:** None.

Abstract# 380

Does the NSQIP-Transplant Experience Demonstrate That Obese Kidney Transplant Recipients are Still at Increased Risk for Surgical Site Infections?

H. C. Yaffe[1], A. K. Belli[1], J. R. Parekh[2], D. L. Sudan[3], N. Elias[4], K. D. Conzen[5], D. P. Foley[6], R. Hirose[7], S. M. Greenstein[1], *[1]Surgery, Montefiore-Einstein Center for Transplantation, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY, [2]Surgery, University of California San Diego, San Diego, CA, [3]Surgery, Division of Abdominal Transplant Surgery, Duke University Medical Center, Durham, NC, [4]Surgery, Transplant Surgery Division, Massachusetts General Hospital, Boston, MA, [5]Surgery, Division of Transplant Surgery, University of Colorado Hospital, Aurora, CO, [6]Surgery, University of Wisconsin School of Medicine and Public Health, Madison, WI, [7]Surgery, University of California San Francisco, San Francisco, CA*

Purpose: The National Surgical Quality Improvement Program for Transplant (NSQIP-T) was designed to track surgical outcomes in adult liver and kidney transplants (KTX). The Pilot Beta Phase has captured data between March 1, 2017 and March 31, 2019, at 30 US centers. It is important to investigate how the pilot data informs us on recent outcomes. Increased BMI has historically been identified as a risk factor for SSI following KTX. We examined whether it is a risk factor for SSI in this cohort's KTX recipients.

Methods: Of the 3771 KTX recipients captured in NSQIP-T, 116 experienced at least 1 SSI. We divided the cohort into those who experienced an SSI (N=116) and those who did not (N=3655). We conducted univariate and multivariate log regression analyses to identify risk factors for SSI.

Results: Significant cohort demographic characteristics are listed in Table 1. On multivariate regression, BMI was found to confer increased risk of SSI. Table 2 lists the significant variables on multivariate analysis. The influence of BMI on SSI incidence was investigated by a ROC curve: AUC=0.66 (95%CI=0.61-0.71). The cutoff value was selected from the coordinates of the curve at BMI=27.5 kg/m^2.

Table 1. Significant cohort demographics

Parameter	SSI present (N=116)	SSI absent (N=3655)	P-value
African-American ethnicity	29.2%	21.7%	0.02
Employed	24.1%	36.6%	0.007
Non-private health insurance	69%	60%	0.008
Prior transplant	23.3%	13.9%	0.005
Diabetes mellitus	43%	30%	0.005
BMI	31±5.81 kg/m^2	27+36.7 kg/m^2	<0.001
Albumin	3.7±5.14 g/dL	3.8±5.07 g/dL	0.01
Operative time	200±76.0 min	186±80.8 min	0.02
Length of stay	5±8.11days	4±3.80 days	<0.001

Table 2. Significant risk factors for SSI on multivariate log regression

Parameter	OR	95%CI
African-American ethnicity	0.33	0.15-0.75
Employment	0.55	0.32-0.94
Prior Transplant	1.07	1.04-1.11
BMI	1.11	1.07-1.16
Length of stay	1.07	1.04-1.11

Conclusions: Increasing BMI persists as a risk factor for SSI in this cohort, but most accurately predicts an SSI at a non-obese BMI=27.5 kg/m^2. Therefore, obese and morbidly obese BMI cannot reliably be used in isolation as predictors of SSI in KTX recipients.

CITATION INFORMATION: Yaffe H., Belli A., Parekh J., Sudan D., Elias N., Conzen K., Foley D., Hirose R., Greenstein S. Does the NSQIP-Transplant Experience Demonstrate That Obese Kidney Transplant Recipients are Still at Increased Risk for Surgical Site Infections? *AJT, Volume 21 Supplement 3*

DISCLOSURES: H.C. Yaffe: None. **A.K. Belli:** None. **J.R. Parekh:** None. **D.L. Sudan:** None. **N. Elias:** None. **K.D. Conzen:** None. **D.P. Foley:** None. **R. Hirose:** None. **S.M. Greenstein:** None.

Abstract# 381

Successful Long Term Survival of Vascularized Composite Allografts After Extended Preservation at Subzero Temperatures Using Bioinspired Next Generation Cryoprotectants

M. Kline[1], S. Fidder[2], A. Callegari[1], A. Matoso[2], B. Oh[2], K. Lombardo[2], J. Etra[2], D. Vasilic[3], A. Childs[1], R. Redett[2], G. Brandacher[2], X. Wei[1], *[1]X-Therma Inc., Richmond, CA, [2]Johns Hopkins University School of Medicine, Baltimore, MD, [3]Erasmus MC, Rotterdam, Netherlands*

Purpose: Vascularized composite allotransplantation (VCA) is a viable reconstructive option for patients with devastating tissue defects. However, the field is constrained by short tolerable ischemia times. Extending tolerated ischemia time to days instead of hours would be transformative for VCA with regard to organ matching and exchange as well as allow for innovative protocols for recipient conditioning. We here present first outcomes using a novel organ preservation solution containing peptoids (XT-ViVo) for extended preservation of rat penile grafts for up to 72 hours in a syngeneic transplant model.

Methods: Lewis rats served as donors and recipients of heterotopic penile transplants. Grafts were flushed with heparinized saline and then directly transplanted (control, N=6) or perfused with either 5mL of HTK (control, N=18, stored at 4°C) or 5mL of XT-ViVo (intervention, N=24, stored at -5°C). HTK and XT-ViVo perfused grafts were preserved for 24, 48, or 72 hours prior to transplantation. Grafts were clinically monitored daily until study endpoints of POD3 and 30 and then assessed by histology (H&E) and by IHC (Caspase-3). RNA sequencing was performed to analyze inflammatory gene expression.

Results: All grafts with minimal ischemia showed no signs of clinical necrosis at POD3 or POD30. HTK preserved grafts all experienced distal necrosis at POD3 after preservation for 24, 48 or 72 hours. 5/6 of HTK grafts preserved for 72 hours were fully necrotic by POD30. In contrast, 24h and 48h XT-ViVo perfused grafts had excellent clinical outcomes at POD30; some epidermolysis was present in the grafts in the days before POD7, which subsequently resolved. 4/6 of 72h XT-ViVo perfused grafts showed distal necrosis at POD30 and 2/6 experienced only minimal distal epidermolysis and appeared clinically normal at POD30. In 48/72h distal tissue samples XT-ViVo grafts showed moderate inflammation and minimal necrosis, HTK grafts severe inflammation and major necrosis

Conclusions: We report the first VCA survival after 48-72 hours of preservation at subzero temperature with a peptoid-based cryoprotective solution

CITATION INFORMATION: Kline M., Fidder S., Callegari A., Matoso A., Oh B., Lombardo K., Etra J., Vasilic D., Childs A., Redett R., Brandacher G., Wei X. Successful Long Term Survival of Vascularized Composite Allografts After Extended Preservation at Subzero Temperatures Using Bioinspired Next Generation Cryoprotectants *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Kline: Ownership Interest; Name of Commercial Interest; X-Therma Inc.. Ownership Interest; Nature of Relationship; equity stake/employee. **S. Fidder:** None. **A. Callegari:** Salary; Name of Commercial Interest; X-Therma Inc.. Salary; Nature of Relationship; Employee. **A. Matoso:** None. **B. Oh:** None. **K. Lombardo:** None. **J. Etra:** None. **D. Vasilic:** None. **A. Childs:** None. **R. Redett:** None. **G. Brandacher:** None. **X. Wei:** Ownership Interest; Name of Commercial Interest; X-Therma Inc.. Ownership Interest; Nature of Relationship; Equity stake. Salary; Name of Commercial Interest; X-Therma Inc.. Salary; Nature of Relationship; Employee.

A Penny for Your Thoughts: the Economics and Psychosocial Aspects of Transplant

Abstract# 382

Economic Impact of a Pharmacist-Led Medication Safety Intervention: Report from the Transafe Rx Randomized Controlled Trial

D. Taber, J. Fleming, Z. Su, P. Mauldin, M. Gebregziabher, *Med Univ of South Carolina, Charleston, SC*

Purpose: We have previously demonstrated the efficacy of a pharmacist-led, mHealth intervention on reducing medication errors and adverse events leading to reduce hospitalizations in kidney transplant recipients through an RCT. Here we report the economic impact of the TRANSAFE Rx RCT by assessing the costs and return on investment (ROI).

Methods: This was an a priori planned economic analysis of the TRANSAFE Rx RCT; a 12-month, parallel arm, 1:1 randomized controlled clinical trial in adult KTX 6 to 36 months post-transplant (NCT03247322). All patients received usual post-transplant care, while those randomized to the intervention arm received supplemental clinical pharmacist-led medication therapy monitoring and management, via a smartphone-enabled mHealth app, integrated with risk-based televisits and home-based blood pressure and blood glucose monitoring. The clinical pharmacist conducted weekly risk assessments and recorded both pharmacological and nonpharmacological interventions performed throughout the study. We assessed estimated costs of hospitalizations using total charges multiplied by the 2019 CMS cost-to-charge ratio and assessing the ROI based on the costs saving vs. actual total costs required to deliver the intervention.

Results: 136 patients were enrolled, 68 were randomized into each arm. The mean age was 50.2 years, 51.5% of patients were male and 58.8% were AA. The primary etiologies of ESRD were hypertension (92.6%) and diabetes (27.9%). As previously reported, the intervention led to a 56% absolute reduction in medication errors (p<0.001), a 45% lower incidence risk of grade 3 or higher adverse events (p=0.048) and significantly lower rates of hospitalization (1.08 vs. 0.65 hospitalizations per patient-year; p=0.005); 20 patients in the intervention arm had a total of 38 hospitalizations with 99 hospital days, while 25 patients in the control arm had a total of 62 hospitalizations with 195 hospital days. Costs of hospitalizations were $1,531,071 in the control arm and $667,605 in the intervention arm. Costs to deliver the intervention included pharmacist time (342 hrs; $26,744), $57,012 to build and maintain the mHealth app, $25,709 for smartphone data plans and $1,675 for BP/glucose devices and supplies, totaling $111,140. The ROI for this intervention is estimated to be $7.8 saved for each $1 invested as the intervention had a net hospitalization cost-reduction of $752,326, or $11,063 per patient-year.

Conclusions: A pharmacist-led mHealth based intervention led to significantly fewer medication errors, adverse drug events and hospitalizations. The economic benefit of this intervention on reducing hospitalization costs is estimated to be $750,000, with a ROI of nearly 8 to 1.

CITATION INFORMATION: Taber D., Fleming J., Su Z., Mauldin P., Gebregziabher M. Economic Impact of a Pharmacist-Led Medication Safety Intervention: Report from the Transafe Rx Randomized Controlled Trial *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Taber: Grant/Research Support; Name of Commercial Interest; Novartis, Astellas, Veloxis. Grant/Research Support; Nature of Relationship; Research Support. **J. Fleming:** None. **Z. Su:** None. **P. Mauldin:** None. **M. Gebregziabher:** None.

Abstract# 383

A Cost Benefit Analysis of Different Minimal Access Donor Nephrectomy Techniques Performed at a Busy Transplant Centre

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Purpose: We performed the cost-benefit analyses comparing Total Laparoscopic Retroperitoneoscopic donor nephrectomy (TLTLRPDN) versus Hand-assisted laparoscopic donor nephrectomy (HALDN) operations performed at our centre since 2011. Recently published cost figures of Robotic assisted donor nephrectomy (RADN) were used to compare our results.

Methods: We used a micro-costing approach to estimate the cost from the hospital perspective for N= 173 minimal access donor nephrectomies (N= 137 - TLRPDN; 35 - HALDN). Cost estimates took into account, sterilization costs for multiple-use equipment, costs for purchasing single-use equipment, staff, hospital stay and intraoperative medications and post-op analgesia. Quality-Adjusted Life Year (QALY) was assessed at 1-year post-operatively and then annually.

Results: The donor characteristics were similar in both groups: Median age 52.7 (26-78) years - TLRPDN/ 54 (25-74) years - HALDN, Median BMI 26.5±4 TLRPDN versus 27.2±5 HALDN, Mean PCA time 1.6 days TLRPDN versus 2.4 days HALDN, Mean Hospital stay 3.5 ± 1.2 days TLRPDN versus 4.1± 1.6 days. (p=NS) The average costs for a single non complicated TLRPDN was (total $12,203)- Theatre (Instruments, & Staff) $6,444; Ward-Stay $4968 and Other Costs (tests, drugs & PCA) $791. The average costs for a single non complicated HALDN was (total $13,390)- Theatre (Instruments & Staff) $7,251; Ward-Stay $4,967 and Other Costs (tests, drugs and PCA) $1,172. In comparison, the published data quotes average RADN theatre alone costs at $8913 . The average Quality Adjusted Life Year (QALY) at 1 and 3 years were 0.84/2.54 for TLRPDN and 0.79/ 2.32 for HALDN. The QALY gained with TLRPDN was 0.22, with cost per QALY gained at 3 years was $2,551.

Conclusions: TLRPDN provides cost-benefit compared to HALDN . More costing data needs to be published with regards to RADN.

CITATION INFORMATION: Sharma H., Odougoudar A., Sharma A., Ridgway D., Hammad A., Mehra S. A Cost Benefit Analysis of Different Minimal Access Donor Nephrectomy Techniques Performed at a Busy Transplant Centre *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Sharma: None. **A. Odougoudar:** None. **A. Sharma:** None. **D. Ridgway:** None. **A. Hammad:** None. **S. Mehra:** None.

Abstract# 384

The Use of Hcv Nat+ Organs in Hcv Negative Recipients with On-site Specialty Pharmacy Services: A Win for the Patient, the Transplant Center, and Society?

M. Person, N. Patel, W. Simerlein, H. Meadows, D. DuBay, D. Taber, *Medical University of South Carolina, Charleston, SC*

Purpose: Use of HCV AB positive organs (HCV AB+) with active viremia (NAT+) relies on appropriate and timely use of direct acting antiviral therapies (DAA). These are cost restrictive agents and thus, patient access to DAAs may be improved with the use of specialty pharmacy services (SPS). We hypothesized that on-site SPS improve patient access and adherence by facilitating the completion of prior authorizations and patient assistance while ensuring medication access and generating revenue for the institution.

Methods: This was a single center retrospective analysis performed from 1/1/2019-11/1/2020. Included patients are those who had documented HCV labs 12 weeks from the day of DAA initiation. For display of results, patients were divided by location of fill, either on-site SPS or an outside SPS. Primary outcomes were time to insurance approval and start of therapy, rate of adherence, patient out-of-pocket cost for 12 weeks of therapy, and revenue generated per patient.

Results: Sixty-four patients were included, 40 NAT+, and of those 25 had documented HCV labs at 12 weeks from DAA initiation and are included in these results. Of the patients that used on-site SPS, 25 (100%) required at least 1 prior authorization and 6 (24%) required an appeal for insurance approval. Use of the on-site SPS reduced the time to gain insurance approval by one-third (27 vs 20 days, **p=0.049**) and time to start DAA by roughly half, from 51 to 24 days (**p=0.004**). On average, patients that filled at on-site SPS had a total out-of-pocket cost of $10 for 12 weeks of DAA therapy and had 99.8% adherence to therapy. DAA therapy generated $38,964.45 of net revenue per patient for the institution per each 12 week treatment course. Kidney recipients that received an HCV AB+ organ waited 2.78 years on the transplant list, as compared to the average wait time at our institution of 4.35 (**p<0.01**) during a similar time period. One patient died during this time frame, though this patient received an HCV AB+ NAT- organ and did not require DAA therapy.

Conclusions: Utilizing HCV AB+ organs results in significantly shorter duration of time spent on the transplant waitlist. When NAT + organs are utilized, on-site SPS can facilitate a significantly shorter time to DAA insurance approval and initiation of therapy, while achieving very high adherence rates and generating a significant net revenue option for the institution. This represents the ideal win-win-win scenario.

	On-Site SPS (n=25)	Outside SPS (n= 6)	P Value
Organ Type Transplanted, n (%)			0.002
Kidney	13 (52.0)	0	
Liver	1 (5.2)	4 (66.7)	
Heart	1 (14.3)	2 (33.3)	
HCV Genotype, n (%)			0.558
Unknown	5 (20.3)	0	
1a	5 (25.3)	2 (33.3)	
1b	0	0	
2	3 (15.8)	1 (16.7)	
3	6 (31.5)	3 (50.0)	
4	0	0	
5	0	0	
6	0	0	
Time to Viral Load < 500 IU/mL (days), mean ±SD	26.8 ±37.2	11.5 ±9.1	0.745
Peak Viral Load (IU/mL), median (IQR)	170,892 (4,171-587,941)	296,078 (614-1,133,475)	0.665
DAA Initiated			0.267
Glecaprevir/pibrentasvir	9 (47.4)	3 (50.0)	
Ledipasvir/sofosbuvir	1 (5.3)	2 (33.3)	
Sofosbuvir/velpatasvir	8 (42.1)	1 (16.7)	
Sofosbuvir/velpatasvir/voxilaprevir	1 (5.3)	0	
Time to DAA Initiation (days), mean ±SD	23.7 ±6.1	51.3 ±28.1	0.004
Time to Insurance Approval (days), mean ±SD	19.7 ±7.1	36.3 ±9.8	0.004
Payor Status			<0.001
Private , n (%)	3 (15.8)	6 (100.0)	
Government, n (%)	16 (84.2)	0	
Viral Load Undetectable at 4 weeks, n (%)	7 (26.8)	1 (16.7)	0.356
Viral Load Undetectable at 12 weeks, n (%)	17 (89.5)	6 (100.0)	0.407
Reached 24 Weeks Post DAA Initiation, n SVR at 24 weeks, n (%)	13 13 (100)	5 5 (100.0)	1.0
Treatment Failure, n (%)	1 (5.3)	0	0.568

CITATION INFORMATION: Person M., Patel N., Simerlein W., Meadows H., DuBay D., Taber D. The Use of Hcv Nat+ Organs in Hcv Negative Recipients with On-site Specialty Pharmacy Services: A Win for the Patient, the Transplant Center, and Society? *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Person: None. **N. Patel:** None. **W. Simerlein:** None. **H. Meadows:** None. **D. DuBay:** None. **D. Taber:** None.

Abstract# 385

Addressing a Need in Transplant Clinical Care: Creation of the Organ Transplant Caregiver Toolkit

H. Bruschwein[1], G. Chen[2], A. Ortega[3], W. Balliet[4], T. Coco[5], C. Thomas[6], B. Hansen[5], D. Richardson[7], K. Canavan[8], C. Burch[9], A. Yaldo[10], M. Jesse[11], *[1]University of Virginia School of Medicine, Charlottesville, VA, [2]Memorial Hermann Transplant Center, Houston, TX, [3]Memorial Transplant Institute, Miami, FL, [4]Medical University of South Carolina, Charleston, SC, [5]Mayo Clinic, Pheonix, AZ, [6]Banner Transplant Institute, Pheonix, AZ, [7]Caregiver, Minburn, IA, [8]National Kidney Foundation, New York, NY, [9]Stanford Children's Hospital, Palo Alto, CA, [10]University of Michigan, Ann Arbor, MI, [11]Henry Ford Transplant Institute, Detroit, MI*

Purpose: Lay or informal caregivers are a critical component of pre- and post-operative care in adult organ transplantation and living donation. Caregiving in organ transplantation has its own unique challenges and burdens. Despite the numerous demands placed on caregivers, there is currently no comprehensive educational resource for transplant caregivers. The Organ Transplant Caregiver Initiative held a consensus conference in October 2019, during which development of an educational toolkit for caregivers of adult organ transplant candidates/recipients/donors was discussed. A Caregiver Education Subcommittee was formed and tasked with creation of a toolkit. The goal of the toolkit is to provide essential, accessible, and timely education and resources to transplant caregivers.

Methods: The 11 member Caregiver Education Subcommittee met virtually throughout 2020 to develop content for the transplant caregiver toolkit. The toolkit is comprised of two primary sections as defined during the consensus conference, General content and Organ specific content, and multiple subsections (see Table 1). The Subcommittee assigned members to create a draft of each topic section. Drafts were shared and reviewed by subcommittee members during two virtual review meetings.

Results: A final draft has been reviewed by 14 external psychosocial reviewers and 7 organ transplant caregivers to obtain additional feedback. This process is currently under way and a final version of the toolkit will be sent to the AST Board for review in early 2021.

Conclusions: An accessible educational resource is needed for organ transplant caregivers and development of such a resource is underway.

Table 1. Transplant Caregiver Toolkit Sections

General Content	Organ Specific
• Transplant caregiver role and responsibilities • Legal and financial considerations for caregivers • Caregiver quality of life and self-care • Special considerations with caregiving • Caregiver Resources	• Kidney transplant • Heart transplant and mechanical circulatory support • Lung transplant • Liver transplant • Donor

CITATION INFORMATION: Bruschwein H., Chen G., Ortega A., Balliet W., Coco T., Thomas C., Hansen B., Richardson D., Canavan K., Burch C., Yaldo A., Jesse M. Addressing a Need in Transplant Clinical Care: Creation of the Organ Transplant Caregiver Toolkit *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Bruschwein: None. **G. Chen:** None. **A. Ortega:** None. **W. Balliet:** None. **T. Coco:** None. **C. Thomas:** None. **B. Hansen:** None. **D. Richardson:** None. **K. Canavan:** None. **C. Burch:** None. **A. Yaldo:** None. **M. Jesse:** None.

Abstract# 386

Mhealth Family Self-Management Intervention for Families of Transplanted Children

S. M. Lerret[1], R. White-Traut[2], B. Medoff-Cooper[3], S. I. Ahamed[4], P. Simpson[5], R. Schiffman[6], *[1]Department of Pediatrics, Medical College of Wisconsin, Milwaukee, WI, [2]Children's Wisconsin, Milwaukee, WI, [3]University of Pennsylvania, Philadelphia, PA, [4]Department of Computer Science, Marquette University, Milwaukee, WI, [5]Department of Biostatistics, Medical College of Wisconsin, Milwaukee, WI, [6]University of Wisconsin Milwaukee, Milwaukee, WI*

Purpose: Nearly 2,000 children undergo solid organ transplant in the US annually. In our previous research with transplant families, parents reported difficulty coping with the complex care at home and decreased quality of life after hospital discharge. We evaluated the feasibility, acceptability and efficacy of a family self-management intervention (*myFAMI*) that employed an mHealth approach using an app and nurse response as a strategy for improving discharge transition outcomes.
Methods: In a randomized controlled trial design guided by the Individual and Family Self-Management Theory, we recruited family units (one primary and one secondary family member) of pediatric transplant recipients (standard care $n = 23$, *myFAMI* $n = 23$) at four US transplant centers. The *myFAMI* app promoted daily communication with the family member initiated by an in-app notification for 30-days after hospital discharge. Family members rated their coping, family self-management at home (medications, follow-up), and child symptom management (fever, pain, vomiting, diarrhea, or other illness). Pre-identified critical responses triggered an alert and subsequent nurse response to the family member within 2 hours. Post-discharge coping (Post Discharge Coping Difficulty Scale), self-efficacy (Self-Efficacy items), and quality of life (PedsQL Family Impact Module™) were assessed by telephone at 30-days after discharge. Analysis used descriptive statistics and t-tests.
Results: 44 of 46 enrolled family units completed study related procedures. Most *myFAMI* primary (82%, n = 18/22) and secondary family members (67%, n = 8/12) completed the app at least 80% of the time (24/30 days after discharge). 163 trigger alerts were generated by family members and were responded to by the nurse within 2 hours of receipt (100%). *myFAMI* family members had better outcomes at 30-days than standard care families: less coping difficulty (22 vs 26, p=0.59), improved self-efficacy (9.3 vs 9.0, p=0.08), and improved family quality of life (81.3 vs 75.0, p=0.47).
Conclusions: The *myFAMI* intervention was both feasible and acceptable. Findings from this preliminary study are clinically meaningful with effects in the expected direction that support further evaluation in a larger trial. Results advance knowledge and build the science from which to consider the use of *myFAMI* in post-discharge monitoring for other pediatric chronic illness populations.
CITATION INFORMATION: Lerret S., White-Traut R., Medoff-Cooper B., Ahamed S., Simpson P., Schiffman R. Mhealth Family Self-Management Intervention for Families of Transplanted Children *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.M. Lerret: None. **R. White-Traut:** None. **B. Medoff-Cooper:** None. **S.I. Ahamed:** None. **P. Simpson:** None. **R. Schiffman:** None.

Abstract# 387

Psychosocial Determinants of Regimen Adherence Among Kidney Transplant Recipients

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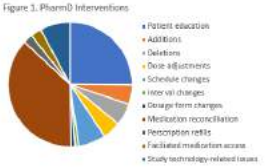
Purpose: There is increasing evidence suggesting a high prevalence of inadequate medication adherence among kidney transplant recipients (KTRs) and its subsequent consequences on health outcomes. We sought to better characterize those individuals more likely to report problems with taking medication by examining associations of adherence with a range of psychosocial factors.
Methods: A cross-sectional analysis was performed using baseline data extracted from an ongoing clinical trial that enrolled 435 KTRs from two large transplant centers in Chicago, IL and Phoenix, AZ. Demographics, clinical characteristics, and social determinants of health (SDOH) that might contribute to any known disparities in medication adherence were assessed. Hierarchical generalized linear models were used to explore associations of key covariates with self-reported medication adherence, as measured by the Adherence Starts with Knowledge 12 (ASK-12) scale.
Results: Among our sample, 52% were non-Hispanic White, 60% male, and 48% employed, and 25% had public insurance coverage (Medicaid, Medicare, or dual Medicaid/Medicare). KTRs who were male, employed, had Medicare coverage alone, had limited health literacy, and reported poorer overall health and higher levels of depression experienced significantly greater problems with medication adherence.
Conclusions: SDOH, including limited health literacy, as well as overall health status and depressive symptoms, were most strongly associated with poorer medication adherence among a diverse sample of KTRs. Supplemental qualitative research will be conducted to further explore these and other factors in relation to medication adherence in greater detail.
CITATION INFORMATION: Balakrishnan A., Bailey S., Mroczek D., Serper M., Ladner D., Wolf M. Psychosocial Determinants of Regimen Adherence Among Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Balakrishnan: None. **S. Bailey:** None. **D. Mroczek:** None. **M. Serper:** None. **D.P. Ladner:** None. **M.S. Wolf:** None.

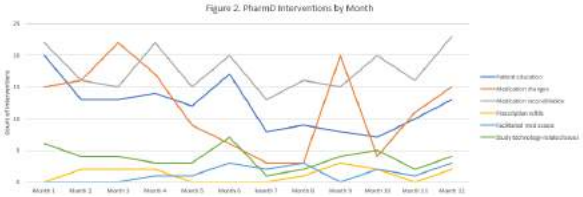
Abstract# 388

Frequency and Types of Pharmacist Interventions and Risk Assessments Occurring During the 12-Month Transafe Rx Randomized Controlled Trial

H. M. Gonzales, J. N. Fleming, D. J. Taber, *MUSC, Charleston, SC*

Purpose: Clinical pharmacists have unique education and training to identify and mitigate medication (med) safety issues in high-risk populations, such as kidney transplant (KTX). The primary aim of the TRANSAFE Rx study was to assess the efficacy of a pharmacist-led, mHealth-based intervention at improving med safety issues in KTX, as compared to usual care.
Methods: This was an a priori planned secondary analysis of detailed interventions and risk assessments that occurred during a 12-month, parallel arm, 1:1 randomized controlled clinical trial in adult KTX 6 to 36 months post-transplant (NCT03247322). This intervention previously demonstrated reduced hospitalizations and adverse drug events. All patients received usual post-transplant care, while those randomized to the intervention arm received supplemental clinical pharmacist-led medication therapy monitoring and management, via a smartphone-enabled mHealth app, integrated with risk-based televisits and home-based blood pressure and blood glucose monitoring. The clinical pharmacist conducted weekly risk assessments and recorded both pharmacological and nonpharmacological interventions performed throughout the study.
Results: 136 patients were enrolled, 68 were randomized in the intervention arm and included in this secondary analysis. The mean age at baseline was 50.2 years, 51.5% of patients were male and 58.8% were black. The primary etiologies of ESRD were hypertension (92.6%) and diabetes (27.9%); 85.3% of patients were on dialysis at time of transplant. During the 12-month follow-up, the most common pharmacist intervention types included medication reconciliation (N=213) and patient education (N=144, Figure 1). Medication alterations, including additions, deletions, dose adjustments, schedule changes, interval changes, and dosage form changes, were also common. Medication reconciliation, study technology-related issues, prescription refills, and facilitating medication access largely remained consistent throughout the 12-month study period, while patient education and medication changes trended downward from Month 1 to Month 12 (Figure 2). From baseline to end-of-study, we observed an approximately 15% decrease in high-risk patients and a corresponding 15% increase in medium or low-risk patients (Figure 3).
Conclusions: A pharmacist-led mHealth based intervention may increase opportunities for both pharmacological and nonpharmacological interventions and reduce the number of high-risk patients in the KTX population.





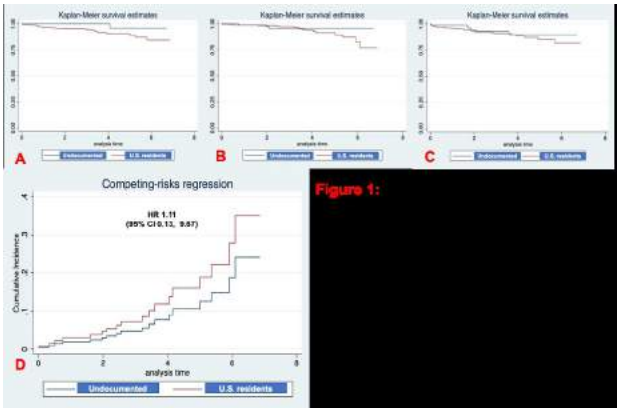
CITATION INFORMATION: Gonzales H., Fleming J., Taber D. Frequency and Types of Pharmacist Interventions and Risk Assessments Occurring During the 12-Month Transafe Rx Randomized Controlled Trial *AJT, Volume 21 Supplement 3*
DISCLOSURES: H.M. Gonzales: None. **J.N. Fleming:** None. **D.J. Taber:** None.

Abstract# 389

Noninferiority Outcomes Among Undocumented Immigrant Kidney Transplant Recipients in California

H. Ichii[1], N. Eguchi[1], E. Tantisattamo[2], U. Reddy[2], A. Ferrey[2], D. Dafoe[1], *[1]Surgery, University of California Irvine, Orange, CA, [2]Medicine, University of California Irvine, Orange, CA*

Purpose: There are over 2 million undocumented immigrants (UI) in California, where currently, all individuals regardless of immigration status have equal access to kidney transplant(KT). There is a medical perception that UI face a higher risk of transplant failure due to language barrier, and lack of access to immunosuppressive medication and healthcare. Whether these characteristics of the minority are associated with poorer transplant outcome In UI compared to those of the US residents(UR) is uncertain.
Methods: A retrospective cohort study was conducted from a single transplant center during a 5-year study period. The study population was divided into UI and UR groups. All-cause mortality between the 2 groups was compared by using multiple Cox proportional hazard regression analysis. Other transplant outcomes including all-cause graft loss and acute rejection were examined by competing risks regressions with mortality and mortality plus graft loss serving as competing risks, respectively.
Results: Of all 306 consecutive kidney transplant recipients (KTR), mean age±SD was 47±13 years old, 173 patients were male (57%) and 73 (24%) were UD. During a median follow-up time of 3.25 years (0.04, 6.84), only 1 UI and up to 19 UR died (incidence rate of 0.023 and 0.004 person-years, respectively). Compared to the UI group, US group had no statistically significant increase in risk of all-cause mortality after adjusted for factors potentially contributing to KT outcomes (adjusted HR 5.33, p 0.153, 95% CI 0.54, 52.90, Figure 1A). The direction of the association between U.S. residential status and graft loss as well as rejection were the same as those of the mortality but the magnitudes were lower and remained non-statistically significant (s-$HR_{graft\ loss}$ 1.42, p 0.60, 95%CI 0.38, 5.33 and s-$HR_{rejection}$ 1.60, p 0.308, 95%CI 0.65, 3.94, Figure 1B&1C). Moreover, among 43 KTR receiving the 2nd KT, the UR group had 11% greater the risk for all-cause graft loss compared to the UI group but no statistical significance (HR 1.11, p 0.925, 95% CI 0.13, 9.67; Figure 1D).
Conclusions: The KT outcomes of the UI are not inferior to those of the UR; however, the UI have long been a minority in KT in the US. Transplant community and involved stakeholders may consider revisiting organ allocation policy to mitigate this disparity.



CITATION INFORMATION: Ichii H., Eguchi N., Tantisattamo E., Reddy U., Ferrey A., Dafoe D. Noninferiority Outcomes Among Undocumented Immigrant Kidney Transplant Recipients in California *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Ichii: None. **N. Eguchi:** None. **E. Tantisattamo:** None. **U. Reddy:** None. **A. Ferrey:** None. **D. Dafoe:** None.

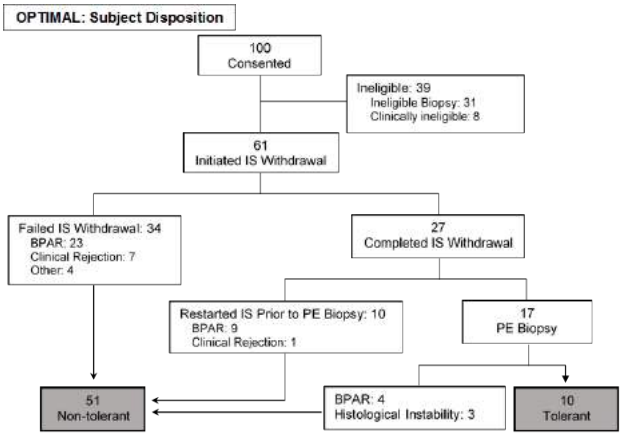
Late Breaking: All Organs

Abstract# LB 17

Primary Outcome of OPTIMAL: A Prospective Multicenter Trial of Immunosuppression Withdrawal (ISW) in Stable Adult Liver Transplant (LT) Recipients

S. Chandran[1], K. Mason[2], L. F. Sun[1], N. Tanimine[3], M. DesMarais[1], B. Burrell[1], J. F. Markmann[3], *[1]ITN, San Francisco, CA, [2]Rho, Inc., Durham, NC, [3]MGH, Boston, MA*

Purpose: To identify clinical & mechanistic correlates of successful ISW and operational tolerance (OT) in a selected cohort of adult LT recipients.
Methods: The Immune Tolerance Network ITN056ST study (OPTIMAL) enrolled non-autoimmune, non-viral adult LT recipients ≥3 years post-transplant with stable graft function on CNI-based IS. Eligible subjects without significant inflammation/fibrosis on a screening biopsy underwent phased ISW over 24-35 weeks. The primary endpoint was OT at 52 weeks following complete ISW, defined as no episodes of acute rejection and a liver biopsy showing histologic stability & absence of rejection by Banff criteria.
Results: Of 92 clinically eligible subjects who underwent screening biopsies, 61 had favorable histology and initiated ISW. Ineligible biopsies had inflammation (n=17) and/or fibrosis (n=9), bile duct damage (n=3), or arteriopathy (n=3). Subjects with favorable biopsies were significantly older at transplant (median age 56 vs. 47 years, p<0.01) and enrollment (median age 64 vs. 54 years, p<0.01), and more likely to have steatohepatitis (50.8% vs. 9.7%, p<0.01). No significant differences were observed in other parameters.
27 subjects completed ISW successfully. Of these, 10 met the primary endpoint (one additional subject did not meet biopsy criteria for OT but remained off IS). 34 subjects failed to complete ISW and 16 subjects restarted IS due to rejection or histologic instability. No significant differences were identified in the baseline clinical characteristics of tolerant and non-tolerant subjects. There were no cases of chronic rejection or graft loss.



Baseline Characteristics of Tolerant and Non-Tolerant Subjects		
	Non-tolerant (n=51)	**Tolerant** (n=10)
Age (yrs)	63 (56-68)	65 (55-69)
Time since transplant (yrs)	7 (5-11)	9 (4-13)
Deceased donor, n (%)	36 (70.6)	8 (80)
Male, n (%)	37 (72.5)	6 (60)
White race, n (%)	43 (84.3)	7 (70)
NASH as cause of liver disease	6 (11.8)	2 (20)
ALT (IU/L)	22 (17-29)	20 (17-25)

Conclusions: One in 3 clinically stable, long term adult LT recipients harbors subclinical allograft inflammation or fibrosis. A minority (16.4%; 95% CI: 8.2%-28.1%) of histologically and clinically stable LT recipients can successfully discontinue and remain off IS. Baseline clinical features do not appear to predict ISW outcome. Analyses are underway to identify histologic & mechanistic predictors of OT which could inform strategies to increase the success of ISW in future ITN studies.

CITATION INFORMATION: Chandran S., Mason K., Sun L., Tanimine N., DesMarais M., Burrell B., Markmann J. Primary Outcome of OPTIMAL: A Prospective Multicenter Trial of Immunosuppression Withdrawal (ISW) in Stable Adult Liver Transplant (LT) Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Chandran: None. **K. Mason:** None. **L.F. Sun:** None. **N. Tanimine:** None. **M. DesMarais:** None. **B. Burrell:** None. **J.F. Markmann:** None.

Abstract# LB 18

Survival After Heart Transplant vs. Simultaneous Heart Kidney Transplant by Degrees of Renal Dysfunction at Engraftment in the United States: A Multivariable Analysis

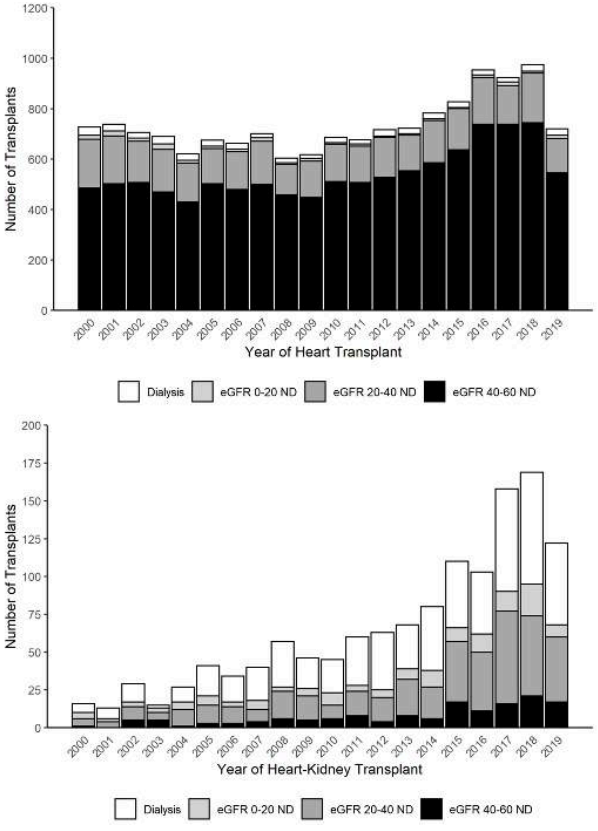
S. M. Riad[1], M. Aljuhani[1], S. Jackson[2], T. Alexy[1], H. Wadie[3], C. Martin[1], R. Kandaswamy[4], *[1]Medicine, University of Minnesota, Eden Prairie, MN, [2]Complex Care Analytics, Fairview Health Services, Minneapolis, MN, [3]Transplant, Mayo Clinic, Jacksonville, FL, [4]Surgery, University of Minnesota, Minneapolis, MN*

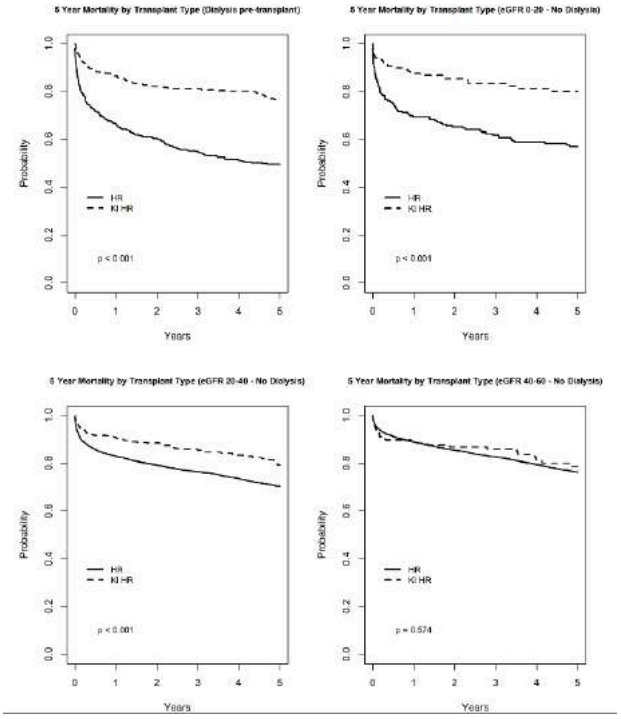
Purpose: There has been a rising trend for utilizing kidneys in heart transplant candidates with different renal dysfunction degrees without established criteria to address this utility.

Methods: We analyzed the SRTR between 1/1/2000 and 9/31/2019. We identified all primary adult heart transplant recipients (HAT) and simultaneous heart kidney transplants (SHK). We sorted the recipients into four groups based on the degree of renal dysfunction at the time of transplantation: dialysis group, eGFR <20, eGFR 20-40 and eGFR>40-60 mL/min. Kaplan-Meier curves were generated to compare mortality by transplant type among the four groups. We analyzed predictors of mortality in each of the four groups separately. We used Cox proportional hazard models adjusted for recipient age, gender, race, diabetes status, heart transplant indication, ICU status, waiting time in weeks, transplant year, donor age, local vs. import organs, heart ischemia time and payor type. Follow-up was censored at five years post-transplant.

Results: Of the recipients with eGFR60 mL/min 14,728 received (HAT) and 1296 received (SHK). The proportion of SHK increased from 3% to 15% of all heart recipients over the study period. The proportion of SHK recipients with reasonably good renal function (>40-60 mL/min) before transplantation was 11.3%. In the multivariable Cox regression model for recipients in the eGFR >40-60 mL/min group, there was no survival benefit to SHK as compared to HAT (LLCI, **aHR,** ULCI) (0.61, **0.92**,1.39).In the lower the GFR groups, compared to HAT, SHK was associated with 35% better survival in the eGFR 20-40 mL/min group (0.49, **0.65**, 0.85), 68% improved survival (0.18, **0.32**,0.57) in the eGFR<20 mL/min group and 55% improved survival (0.34, **0.45**, 0.58) in the dialysis group.

Conclusions: Utilizing kidneys in heart transplant recipients with eGFR > 40 mL/min at the time of transplantation is an unwarranted use of a scarce resource.





CITATION INFORMATION: Riad S., Aljuhani M., Jackson S., Alexy T., Wadie H., Martin C., Kandaswamy R. Survival After Heart Transplant vs. Simultaneous Heart Kidney Transplant by Degrees of Renal Dysfunction at Engraftment in the United States: A Multivariable Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.M. Riad: None. **M. Aljuhani:** None. **S. Jackson:** None. **T. Alexy:** None. **H. Wadie:** None. **C. Martin:** None. **R. Kandaswamy:** None.

Abstract# LB 19

Relationship Between %dd-cfDNA, MMDx Molecular Diagnoses, and Donor-specific Antibody in the Trifecta Study

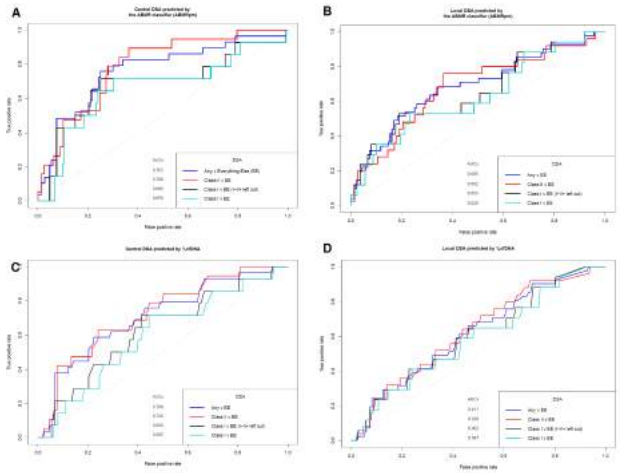
P. F. Halloran[1], L. G. Hildago[2], J. Reeve[1], Z. Demko[3], A. Prewett[3], P. Billings[3], J. Truong[4], P. Vander Horn[4], &. Trifecta Study Group[5], *[1]Alberta Transplant Applied Genomics Centre, Edmonton, AB, Canada, [2]University of Wisconsin, Madison, WI, [3]Natera Inc., San Carlos, CA, [4]One Lambda Inc., West Hills, CA, [5]., ., AB, Canada*

Purpose: The Trifecta Study is a prospective multicenter investigator-initiated trial to evaluate the relationship between %dd-cfDNA and molecular biopsy findings at the time an indication biopsy as well as determining the relationship between %dd-cfDNA and DSA, measured either centrally or by the local center. (ClinicalTrials.gov # NCT04239703).

Methods: The present analysis compared the %dd-cfDNA measurements by Natera to HLA antibody as well as MMDx microarray molecular diagnoses in 176 biopsies: 109 no rejection; 38 ABMR; 4 possible ABMR; 14 TCMR, 3 possible TCMR, and 8 mixed. Central HLA antibody assessment was performed at One Lambda and interpreted by Dr. Luis Hidalgo using local genotyping. Each center also provided local DSA assessment and the histology diagnosis.

Results: The %dd-cfDNA was highly related to rejection in the biopsy (AUC 0.81), particularly active antibody-mediated rejection (ABMR) (AUC 0.82), and agreed more with MMDx ABMR than with histology ABMR (AUC 0.69; p=0.025). The association of %dd-cfDNA with pure T cell-mediated rejection (TCMR) was weaker (AUC 0.58). In 176 biopsies with DSA results recorded, DSA was negative in 136, positive in 30, and suspicious for nonspecific bead reactivity in 10. Molecular ABMR activity was frequently DSA negative, both centrally and locally, consistent with the increased recognition of DSA-negative ABMR. DSA associated with MMDx ABMR was usually class II. Because histologic ABMR requires DSA positivity for diagnosis, histology diagnosed fewer ABMR cases, but in DSA positive ABMR MMDx and histology usually agreed. Molecular ABMR classifiers predicted central DSA with AUC 0.77 (all) and 0.79 (class II) (figure 1A), and predicted central DSA better than local DSA (AUC 0.77 vs. 0.69) (figure 1B). The %dd-cfDNA predicted central DSA with AUCs of 0.71 (any DSA) and 0.73 (class II) (figure 1C). %dd-cfDNA predicted local DSA assessment less well than central DSA assessment (AUC 0.62 vs. 0.71) (figure 1D).

Conclusions: There is a strong relationship between %dd-cfDNA, centrally-measured DSA (particularly class II), and rejection, particularly active ABMR. These relationships are stronger for MMDx than histology diagnoses, and for central rather than local DSA assessments. Many ABMR cases are DSA-negative.



CITATION INFORMATION: Halloran P., Hildago L., Reeve J., Demko Z., Prewett A., Billings P., Truong J., Vander Horn P., Trifecta Study Group Relationship Between %dd-cfDNA, MMDx Molecular Diagnoses, and Donor-specific Antibody in the Trifecta Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: P.F. Halloran: Consulting Fee; Name of Commercial Interest; Natera Inc.. Consulting Fee; Nature of Relationship; consultant and speaker. Honoraria; Name of Commercial Interest; Thermo Fisher/One Lambda, Astellas. Honoraria; Nature of Relationship; honoraria for lectures, honoraria for lectures. **L.G. Hildago:** None. **J. Reeve:** None. **Z. Demko:** Ownership Interest; Name of Commercial Interest; Natera Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **A. Prewett:** Ownership Interest; Name of Commercial Interest; Natera Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **P. Billings:** Ownership Interest; Name of Commercial Interest; Natera Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **J. Truong:** Ownership Interest; Name of Commercial Interest; One Lambda Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **P. Vander Horn:** Ownership Interest; Name of Commercial Interest; One Lambda Inc.. Ownership Interest; Nature of Relationship; employee and equity holder. **&. Trifecta Study Group:** None.

Abstract# LB 20

Disparities in Living Donor Follow-up During the COVID-19 Emergency Suspension of OPTN Follow-up Reporting Requirements

S. E. Booker, A. Henderson, L. A. Cartwright, S. Taranto, D. Klassen, J. L. Wainright, *UNOS, Richmond, VA*

Purpose: The OPTN temporarily suspended follow-up reporting requirements on 4/3/20 (retroactive to 3/13/20) in response to the COVID-19 crisis. We assessed the policy's impact on living donor follow-up form (LDF) and lab data submission for donors who have historically been disadvantaged in the transplant system.

Methods: We analyzed OPTN data as of 1/22/20 for all 6-, 12-, and 24-month LDFs expected between 3/13/20-12/31/20 ("COVID") vs 3/13/19-12/31/19 ("pre-COVID"). We assessed status of COVID forms by donor demographics. We also compared proportions of validated forms with complete lab data by era and donor demographics.

Results: 15.6% of kidney and 10.8% of liver LDFs were in amnesty status, with substantial variation by center. *Kidney:* We found significant differences in form status by race/ethnicity (p<0.001), gender (p=0.007), age group (p<0.001), neighborhood income quartile (p=0.001), and relationship to recipient (p<0.001), with greater proportions of forms in amnesty status for Black (Black: 19.3%; White: 15.6%; Hispanic: 13.7%; Other: 14.6%), male (male: 16.7%; female: 15.0%), younger (age 18-34: 16.9%; 35-49: 16.4%; 50-64: 13.9%; 65+: 13.7%), lower-income (Q1: 18.3%; Q2: 15.6%; Q3: 15.9%; Q4: 14.6%), biologically related and paired donors (biologically related: 16.8%; paired: 17.6%; spousal: 12.1%; unrelated: 14.5%) (Table 1). *Liver:* Younger donors had greater proportions of forms in amnesty status (age 18-34: 12.9%; 35-49: 10.0%; 50-64: 6.4%; p=0.056). Pre-COVID demographic differences in forms with complete lab data persisted during COVID, compounded by amnesty forms (Figure 1).

Conclusions: Centers have voluntarily submitted over 80% of expected LDFs under this emergency policy. However, our finding that a disproportionate number of forms are missing for donors who are Black, male, younger, lower SES, and biological relatives of their recipient is concerning. These groups are at greater risk of long-term complications after donation, and may have limited access to health services during the pandemic and risk being lost to follow-up. Centers should consider targeted follow-up efforts for at-risk groups.

Table 1. Demographic characteristics of living kidney and liver donors with living donor follow-up forms (LDFs) expected March 13 – December 31, 2020 by form status

	Living Kidney Donors			Living Liver Donors		
	LDF Form Status			LDF Form Status		
	Amnesty N (%)	Validated N (%)	p-value	Amnesty N (%)	Validated N (%)	p-value
N	2394	12950		121	1000	
Race/ethnicity			<0.001			0.51
White	1695 (70.8)	9139 (70.6)		98 (81.0)	788 (78.8)	
Black	249 (10.4)	1042 (8.0)		5 (4.1)	34 (3.4)	
Hispanic	308 (12.9)	1939 (15.0)		14 (11.6)	111 (11.1)	
Other	142 (5.9)	830 (6.4)		4 (3.3)	67 (6.7)	
Gender			0.007			1.0
Female	1492 (62.3)	8447 (65.2)		66 (54.5)	543 (54.3)	
Male	902 (37.7)	4503 (34.8)		55 (45.5)	457 (45.7)	
Age Group			<0.001			0.056
18-34	664 (27.7)	3272 (25.3)		63 (52.1)	424 (42.4)	
35-49	979 (40.9)	5006 (38.7)		48 (39.7)	430 (43.0)	
50-64	637 (26.6)	3955 (30.5)		10 (8.3)	146 (14.6)	
65+	114 (4.8)	717 (5.5)		0 (0)	0 (0)	
Neighborhood Income			0.001			0.31
Q1: $2,500 - $46,428	328 (14.2)	1467 (11.7)		16 (13.8)	124 (12.6)	
Q2: $46,429 - $57,499	409 (17.7)	2215 (17.6)		21 (18.1)	163 (16.6)	
Q3: $57,500 - $72,227	559 (24.2)	2960 (23.5)		20 (17.2)	245 (25.0)	
Q4: $72,228 - $243,654	1015 (43.9)	5950 (47.3)		59 (50.9)	449 (45.8)	
Missing (N)	83	358		5	19	
Relationship to Recipient			<0.001			0.36
Biologically related	1016 (42.4)	5014 (38.7)		74 (61.2)	542 (54.2)	
Spouse	227 (9.5)	1648 (12.7)		6 (5.0)	49 (4.9)	
Unrelated	725 (30.3)	4287 (33.1)		39 (32.2)	397 (39.7)	
Paired donor	426 (17.8)	2000 (15.4)		2 (1.7)	12 (1.2)	
Missing (N)	0	1		0	0	

Figure 1. Kidney living donor follow-up form (LDF) status and lab data completeness* by COVID era and donor demographics

CITATION INFORMATION: Booker S., Henderson A., Cartwright L., Taranto S., Klassen D., Wainright J. Disparities in Living Donor Follow-up During the COVID-19 Emergency Suspension of OPTN Follow-up Reporting Requirements *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.E. Booker: None. **A. Henderson:** None. **L.A. Cartwright:** None. **S. Taranto:** None. **D. Klassen:** None. **J.L. Wainright:** None.

Abstract# LB 21

Kidney Programs Can Filter Off a Majority of Their Unwanted Organ Offers without Harming Transplant Volumes

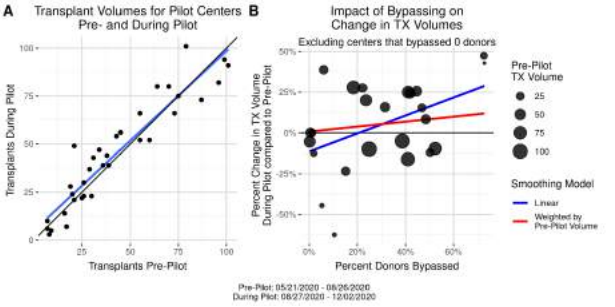
A. Toll, H. McGehee, R. McTier, D. Stewart, *Research, United Network for Organ Sharing, Richmond, VA*

Purpose: Evaluate if multifactorial filters can reduce unwanted kidney offers to centers, thereby reducing administrative burden and getting to the accepting candidate quicker.

Methods: 34 centers participated in the second phase of the OPTN Offer Filters Pilot which ran from August 26, 2020 to December 2, 2020. The OPTN preloaded a set of machine learning-derived recommended filters for each center prior to the start of the pilot. Recommended filters were derived using recursive partitioning trees based on centers' 2018-2019 acceptance practices and included donor profiles for which a center received offers from at least 20 donors with 0 acceptances. Centers were also able to create their own custom multi-factorial filters to reduce unwanted kidney offers. New in this phase, centers could identify specific candidate groups (high CPRA, 0-ABDR mismatch, age limits) who would still receive offers despite the donor profile. Additionally this phase introduced the ability to turn filters "on" to actually avoid receiving (bypassing) offers meeting filter criteria.

Results: 26 of 34 centers participating in the pilot elected to turn one or more filters on for bypassing. OPOs attempted to send 304,245 offers from 2,448 unique donors to these 26 centers. The centers' bypass filters removed 206,933 (68%) offers. Individual center bypasses ranged from 0% to 94% of offers (0% to 73% of

donors) filtered. Despite bypassing a large percentage of offers, pre-pilot transplant volumes closely mirrored those observed during the pilot ($R^2 = 0.88$, Fig 1A). In fact, bypassing more offers was slightly correlated with an increase in transplants during the pilot ($R^2 = 0.21$, Fig 1B). When weighting centers by their pre-pilot volumes, the pilot participants who turned filters on increased their transplant volumes by 5.4%, compared to a 3.1% decrease in non-pilot centers over the same period. Paired t-tests did not reveal a significant change in transplant volumes. Changes in offer acceptance observed to expected ratios before and during the pilot varied among the pilot centers and did not show trends different than the nation, even when broken out by KDRI.
Conclusions: The Offer Filters Pilot demonstrated both the potential of multifactorial filters to reduce unwanted organ offers and the willingness of centers to turn these filters on for bypassing. Despite bypassing a large proportion of offers, transplant volumes were not harmed. Some pilot centers were even able to increase their transplant volumes during the pilot, despite receiving upwards of 75% fewer offers.



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DISCLOSURES: A. Toll: None. **H. McGehee:** None. **R. McTier:** None. **D. Stewart:** None.

Abstract# LB 22

Athena - Effect of Primary Immunosuppression on Development of De Novo Donor Specific Antibodies within First Year After Kidney Transplantation

W. Arns[1], A. Philippe[1], V. Ditt[1], I. A. Hauser[1], F. Thaiss[1], C. Sommerer[1], B. Suwelack[1], A. Finkel[2], C. Schiedel[2], D. Dragun[1], B. Nashan[1], *[1]ATHENA, Study Group, Germany, [2]Novartis Pharma GmbH, Nuremberg, Germany*

Purpose: The ATHENA trial [NCT01843348] investigated safety and efficacy of everolimus combined with cyclosporine A [EVR/CsA] or tacrolimus [EVR/TAC] *vs.* tacrolimus plus mycophenolic acid [MPA/TAC] in *de novo* kidney transplant [KTx] recipients. The herein described post-hoc analysis evaluates the impact of the primary immunosuppressive regimen on the development of *de novo* donor specific antibodies [DSA] and non-HLA antibodies, as well as on the clinical outcome, within the first 12-months [M] after KTx.
Methods: During this 12M randomized, open-label, prospective, controlled clinical trial, a total of 612 patients [pts] were enrolled in Germany and France. Pts were randomized at a 1:1:1 ratio to either EVR/CsA (C_0: 3-8 ng/mL during M1-12 and C_0: 75-125 ng/mL for M1-3; 50-100 ng/mL for M3-12, respectively), EVR/TAC (C_0: 3-8 ng/mL during M1-12 and C_0: 4-8 ng/mL for M1-2; 3-5 ng/mL for M3-12, respectively), or to the control arm MPA/TAC (C_0: 1440-2000 mg/d during M1-12 and 4-8 ng/mL for M1-2; 3-5 ng/mL for M3-12); all with steroids. Here, we report initial results on the development of *de novo* DSA as part of a post-hoc analysis on the per-protocol population [PP] (N=337) within the first 12M after KTx.
Results: The PP was comprised of n=80 pts in EVR/CsA, n=110 pts in EVR/TAC, and n=147 pts in MPA/TAC arm. Within the first 12M after KTx, only 7 pts in PP across all three treatment arms developed *de novo* DSA: n=4 in EVR/CsA, n=1 in EVR/TAC, n=2 in MPA/TAC arm. Further, only 2 of those 7 pts experienced a clinical event (BPAR) during the first 12M: n=1 in EVR/CsA and n=1 in MPA/TAC group; no graft loss or death was observed in this subset.
Conclusions: In this post-hoc analysis of the as to date largest randomized European KTx study ATHENA, initial findings reveal that the primary immunosuppression selected does not seem to have a significant impact on the development of *de novo* DSA. Moreover, development of *de novo* DSA within first 12M does not appear to have a direct effect on the resulting clinical outcome. Further analyses on *de novo* DSA as well as on non-HLA antibody (ET_A & AT_1) development and outcomes are currently ongoing to evaluate these findings in more detail.
In memoriam Duska Dragun, our dear friend and always inspiring colleague, who passed away much too early.
CITATION INFORMATION: Arns W., Philippe A., Ditt V., Hauser I., Thaiss F., Sommerer C., Suwelack B., Finkel A., Schiedel C., Dragun D., Nashan B. Athena - Effect of Primary Immunosuppression on Development of De Novo Donor Specific Antibodies within First Year After Kidney Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# LB 23

Predicted Heart Mass Difference as a Risk Factor for Severe Primary Graft Dysfunction in the Contemporary Era of Heart Transplantation: A Report from the International Consortium on Primary Graft Dysfunction

F. Foroutan[1], L. K. Truby[2], Y. Moayedi[1], J. Han[3], J. Guzman[4], M. Farrero[4], E. Baughan[5], M. Farr[5], H. Zafar[6], J. Felius[6], J. van Zyl[7], D. Law[8], S. Chih[8], P. Angleitner[9], M. Sabatino[10], A. DeVore[2], R. J. Miller[11], L. Potena[10], A. Zuckermann[9], K. K. Khush[3], S. A. Hall[6], H. J. Ross[1], *[1]Ted Rogers Centre for Heart Research, Toronto, ON, Canada, [2]Duke University School of Medicine, Durham, NC, [3]Stanford University, Stanford, CA, [4]Clinic Barcelona Hospital Universitari, Barcelona, Spain, [5]Columbia University Medical Center, New York, NY, [6]Baylor University Medical Center, Dallas, TX, [7]Dallas University Medical Center, Dallas, TX, [8]University of Ottawa Heart Institute, Ottawa, ON, Canada, [9]Medical University of Vienna, Vienna, Austria, [10]Bologna University Hospital, Bologna, Italy, [11]University of Calgary, Calgary, AB, Canada*

Purpose: Primary Graft Dysfunction (PGD) increases early mortality after heart transplant (HT). Predicted heart mass (PHM) difference may be a risk factor for PGD. Lack of granular data in registries limited our ability to validate its role in risk stratification for PGD. We used our recently developed International Consortium on PGD to evaluate PHM difference as a risk factor for PGD.
Methods: Total of 10 centers from Europe, US, and Canada provided data. Using the 2014 ISHLT definition, we identified cases of severe PGD. We calculated PHM for the left (LV) and right ventricle (RV) using the Multi-Ethnic Study of Atherosclerosis (MESA) equations. We calculated the %PHM difference between donors and recipients to investigate the association between PHM difference and severe PGD using a logistic regression model, adjusted for ischemic time and pre-HT LVAD.
Results: Between 2010 to 2020, we included 2,510 recipients, 634 females (25%), mean age of 53.9 ± 12.4 years. 8.4% were supported by IABP, 1.3% on ECMO, and 35% on LVAD pre-HT. Most donors were male (64.3%) with mean age of 36.5±13.0 years and ischemic time of 3.4±1.1 hours. A total of 196 recipients had severe PGD. Donor and recipient hearts were well-matched with a median total PHM difference of 2.1% (IQR -9.7 to 14.4%). The donor RV was typically oversized with a RV PHM difference of 12.7% (IQR 1.4 to 22.5%) and the LV slightly undersized with difference of -3.8% (IQR -16.6 to 9.9%). For every 10% increase in LV undersizing, there was a 16% increase in the odds of severe PGD. We observed no significant association between RV PHM difference and severe PGD.
Conclusions: Our International Consortium on PGD suggests under-sizing of the LV increases the risk of PGD. Future risk prediction models should integrate LV PHM difference as a risk factor for PGD.

Multivariable Logistic Regression Model for Severe Primary Graft Dysfunction		
	OR	95% CI
LV PHM Difference	1.16	1.02 - 1.32
RV PHM Difference	0.98	0.83 - 1.15

CITATION INFORMATION: Foroutan F., Truby L., Moayedi Y., Han J., Guzman J., Farrero M., Baughan E., Farr M., Zafar H., Felius J., van Zyl J., Law D., Chih S., Angleitner P., Sabatino M., DeVore A., Miller R., Potena L., Zuckermann A., Khush K., Hall S., Ross H. Predicted Heart Mass Difference as a Risk Factor for

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Abstract# LB 24

Liver Transplantation for COVID-19-associated Cholangiopathy

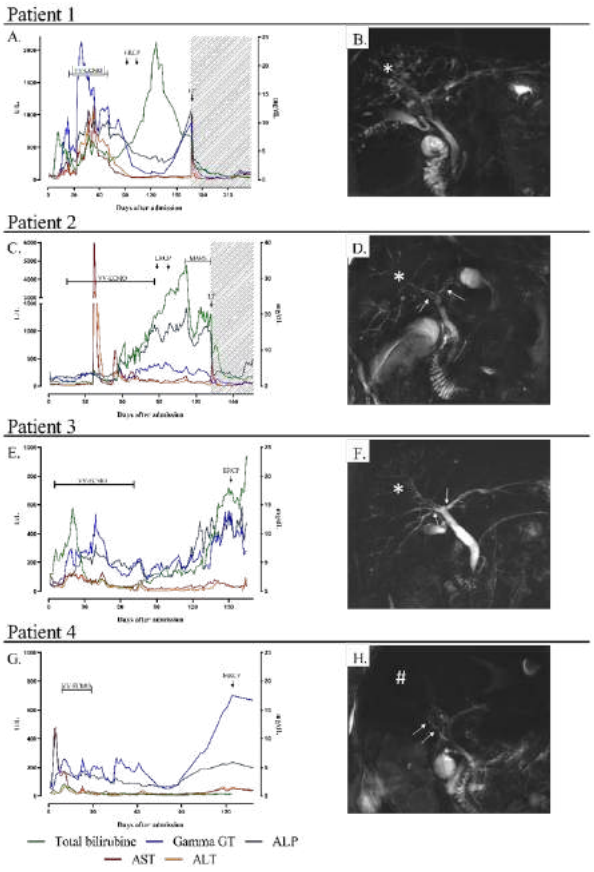
J. Blondeel[1], P. Meersseman[2], N. Gilbo[1], I. Jochmans[1], M. Sainz-Barriga[1], J. Pirenne[1], D. Monbaliu[1], *[1]Abdominal Transplantation Surgery, University Hospitals Leuven, Leuven, Belgium, [2]Medical Intensive Care Unit, University Hospitals Leuven, Leuven, Belgium*

Purpose: The hallmark viral pneumonia of coronavirus-19-disease (COVID-19) is often accompanied by important extra-pulmonary manifestations. Liver dysfunction occurs in up to 45% of COVID-19 patients, predominantly as moderate transaminitis whereas a cholestatic pattern is rare. Additionally, it is often described as inconsequential with negligible clinical impact. We describe the cases of 4 patients with COVID-19 who developed cholestatic liver injury that progressed towards a destructive cholangiopathy requiring liver transplantation in 2 patients.

Methods: Cases of all patients with COVID-19 admitted to our intensive care unit (ICU) between March and June 2020 were retrospectively reviewed for proven cholestatic injury. Additionally, patients referred to our liver transplant unit with a history of COVID-19 were also considered.

Results: Three out of 114 COVID-19 patients admitted to our ICU and one externally referred patient were considered for this case series. All patients suffered severe COVID-19 with need for mechanical ventilation, proning and extracorporeal membrane oxygenation. These patients all developed moderate to severe cholestatic liver injury after resolution of acute respiratory distress syndrome (Figure 1). The clinical presentation, cholangiogram, and histological findings were all typical of the critical care-associated condition 'secondary sclerosing cholangitis in critically ill patients' (SSC-CIP). Two patients ultimately required liver transplantation for refractory cholangitis.

Conclusions: The high incidence of this otherwise rare disease suggests that patients surviving severe COVID-19 are at increased risk of developing SSC-CIP. Several disease- and/or treatment-specific features may predispose to biliary ischemia and damage, while a direct pathogenic role of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) via cholangiocyte angiotensin-converting-enzyme-2 (ACE2) receptors is under investigation. We aim to raise awareness about the potential higher risk for SSC-CIP in patients recovering from severe COVID-19, and encourage early diagnosis and timely consideration of liver transplantation as the sole therapeutic option.



Shown are the temporal evolution of liver enzymes along with critical diagnostic/treatment events (left), a representative MRCP image (right) for each of the 4 patients (rows).

Gamma-glutamyltransferase (Gamma GT), alkaline phosphatase (ALP), aspartate transaminase (AST) and alanine transaminase (ALT) are projected on the left vertical axis and expressed as U/L, total bilirubin is projected on the right vertical axis and is expressed as mg/dl. VV-ECMO: veno-venous extracorporeal membrane oxygenation, ERCP: endoscopic retrograde cholangiopancreatography, MARS: Molecular Absorbent Recirculating System, LT: liver transplantation.

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DISCLOSURES: J. Blondeel: None. **P. Meersseman:** None. **N. Gilbo:** None. **I. Jochmans:** None. **M. Sainz-Barriga:** None. **J. Pirenne:** None. **D. Monbaliu:** None.

Basic

Basic 2

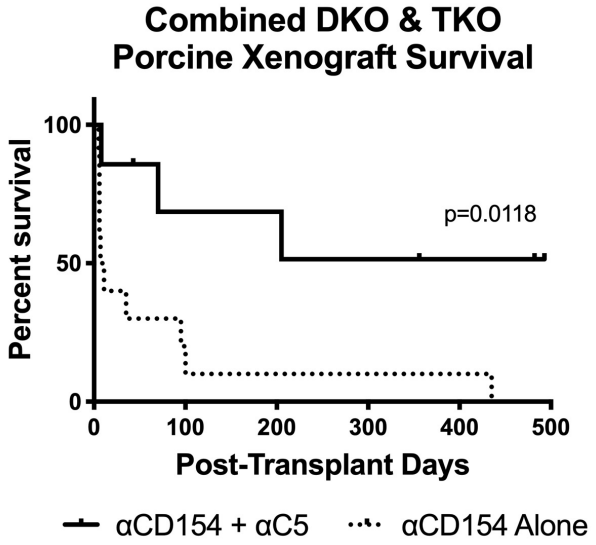
Abstract# 460

Complement Blockade Improves Renal Xenograft Survival in Primates in the Absence of Transgenic Complement Regulatory Proteins

D. A. Faber[1], B. Lovasik[1], A. Matar[1], C. Breeden[1], A. B. Farris[2], M. Tector[3], A. Tector[3], A. Adams[4], *[1]Surgery, Emory University School of Medicine, Atlanta, GA, [2]Pathology, Emory University School of Medicine, Atlanta, GA, [3]Surgery, University of Miami, Miami, FL, [4]Surgery, University of Minnesota, Minneapolis, MN*

Purpose: Complement activation is a major contributor to xenograft rejection. To minimize xenograft injury, complement suppression via insertion of human complement-regulatory transgenes into the donor pig genome has been previously evaluated; however, genome modification is of undefined efficacy and risk. As such, pharmacologic complement regulation is a viable option to suppress complement activity in the absence of transgene insertion in the donor pig. The aim of this study was to assess the efficacy of terminal complement blockade using a novel, clinically relevant anti-C5 mAb (tesidolumab, LFG316) in a pig-to-NHP renal xenotransplant model using non-transgenic pig donors.

Methods: Porcine donors were engineered without GGTA1/B4GALNT2 (DKO) or GGTA1/B4GALNT2/Class I SLA (TKO). In vitro assays were performed combining xenoreactive rhesus macaque serum with porcine peripheral blood mononuclear cells (PBMCs) in the presence of complement and tesidolumab. Kidney xenotransplants were then performed from porcine donors to rhesus macaques (n=17). Recipients received T-cell depletion plus either anti-CD154 (clone 5C8) and tesidolumab (n=7), or anti-CD154 alone (n=10).
Results: Incubation of tesidolumab with porcine PBMCs and xenoreactive NHP serum impaired complement-mediated cytotoxicity in a dose-dependent manner. Anti-C5 therapy significantly prolonged xenograft survival (MST >350 days) compared to treatment with anti-CD154 alone (MST 9 days, p=0.0118). The combination of xenoantigen knockout and treatment with anti-CD154 prevented the formation of de-novo anti-pig antibody.
Conclusions: Transient terminal complement blockade using tesidolumab significantly prolongs graft survival and prevents early antibody-mediated xenograft rejection in a pig-to-NHP renal transplant model using porcine donors without transgenes. Selective knockout of GGTA1/B4Gal/SLA-I xenoreactive antigens on the cell surface allows for long-term graft survival and prevents development of xenoreactive DSA. These data suggest that therapeutic terminal complement blockade permits successful xenotransplantation without the need for multiple complement regulatory transgenes.

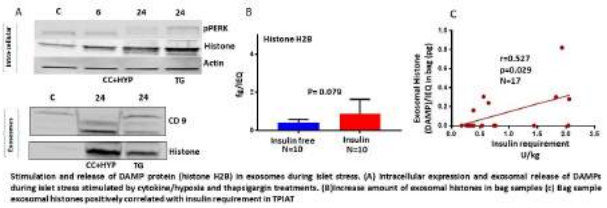


CITATION INFORMATION: Faber D., Lovasik B., Matar A., Breeden C., Farris A., Tector M., Tector A., Adams A. Complement Blockade Improves Renal Xenograft Survival in Primates in the Absence of Transgenic Complement Regulatory Proteins *AJT, Volume 21 Supplement 3*
DISCLOSURES: D.A. Faber: None. **B. Lovasik:** None. **A. Matar:** None. **C. Breeden:** None. **A.B. Farris:** None. **M. Tector:** None. **A. Tector:** None. **A. Adams:** None.

Abstract# 461

Exosomal DAMP Proteins Released During Islet Isolation Affects TPIAT Outcomes

P. Saravanan, J. Kalivarathan, M. Levy, M. Kanak, *Hume Lee Islet Cell Transplantation Lab, Department of Surgery, VCU Health, Richmond, VA*
Purpose: Isolation of islets cause significant stress that results in the release of immunogenic factors called damage-associated molecular patterns (DAMPs) which can induce inflammatory signaling that results in post-transplant islet damage. Here, we sought to identify these DAMPs released by islets via exosomes during islet isolation and also study their effect on TPIAT outcomes.
Methods: Post-transplant stress was mimicked *in vitro* by exposing human islets to hypoxia and cytokines (Cyt+Hyp) simultaneously for 24h. Separately, human islets were also treated with thapsigargin (TG) for 24hrs to induce ER stress. Exosomes were isolated and the differentially expressed proteins were determined by mass spectrometry and western blotting. Exosomes were also isolated from the transplant media (infusion bag) of TPIAT patients to measure DAMP protein levels in them. Patients receiving an islet dose of 4000IEQ/kg were divided into insulin-dependent (ID; n=10) and insulin-independent (IID; n=10) groups. The exosomal DAMP protein levels were correlated with 1-year TPIAT outcomes
Results: The number of exosomes released was significantly elevated in (Cyt+Hyp) treated islets compared to untreated islets. The mass spectrometry analysis has revealed about 17 proteins including DAMP protein histones (H2A, H2B, H4) and Keratins (Type I and II) were differentially expressed. Islets treated with thapsigargin or Cyt+Hyp overexpressed histones and keratins intracellularly through the activation of the PERK/IRE1α pathway. This subsequently led to the increased release of histones and keratins via exosomes during stress (Figure A). Exosomes isolated from transplant media of TPIAT patients showed elevated histone (p=0.0796) (Figure B) and decreased keratin (p=0.072) in ID compared to IID patients. Moreover, high exosomal histone/IEQ correlated with increased insulin requirement (r=0.527, p=0.029 n=17) (Figure: C) and HBA1c%, and lower c-peptide (r=-0.494, p=0.085 n=13) and SUITO index at 1-year POD. In contrast, the exosomal keratin/IEQ showed the opposite effect on 1-year outcomes
Conclusions: The study has identified the exosomal DAMP protein-like histones are produced by the stressed islets during islet isolation which is capable to induce islet inflammation and graft loss in TPIAT. The elevated quantity of such exosomal DAMP proteins in the bag samples correlated with the poor transplant outcomes in TPIAT



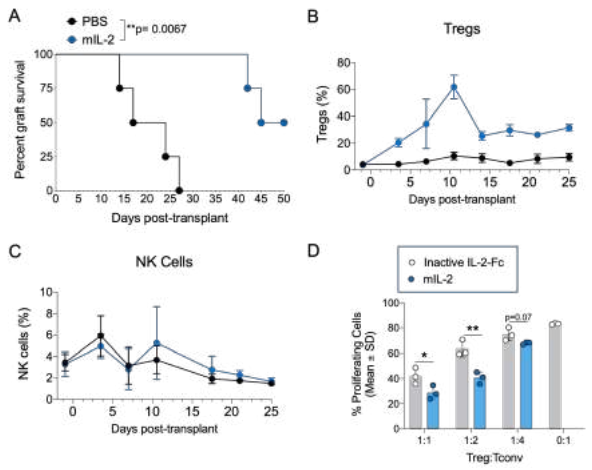
Stimulation and release of DAMP protein (histone H2B) in exosomes during islet stress. (A) Intracellular expression and exosomal release of DAMPs during islet stress stimulated by cytokine/hypoxia and thapsigargin treatments. (B)Increase amount of exosomal histones in bag samples (c) Bag sample exosomal histones positively correlated with insulin requirement in TPIAT

CITATION INFORMATION: Saravanan P., Kalivarathan J., Levy M., Kanak M. Exosomal DAMP Proteins Released During Islet Isolation Affects TPIAT Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Saravanan: None. **J. Kalivarathan:** None. **M. Levy:** None. **M. Kanak:** None.

Abstract# 462

Selective Regulatory T Cell Expansion by a Novel IL-2 Mutein Prolongs Skin Transplant Survival in Mice

T. J. Borges[1], O. Effe[1], R. B. Gassen[1], A. Al Jurdi[1], I. T. Lape[1], G. J. Babcock[2], S. M. Carlson[2], J. C. Madsen[1], L. V. Riella[1], *[1]Center For Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Visterra, Inc., Waltham, MA*
Purpose: Long-term immunosuppression predisposes transplant patients to a greater risk of infection, malignancy and kidney toxicity. Hence, alternative methods to regulate the immune system are needed. Low-dose IL-2 therapy has been reported to expand Tregs *in vivo* but can promote the proliferation of unwanted effector cells such as cytotoxic T cells and natural killer (NK) cells. This led us to develop and test a novel human IL-2 mutein (mIL-2) fused with a human antibody Fc domain (IL-2-Fc), designed to selectively induce Tregs with minimal effects on effector cells. Herein, we investigate the immune regulatory effects of mIL-2 in transplantation.
Methods: We initially performed *in vitro* experiments in which we stimulated mouse splenocytes with the wild-type IL-2-Fc, the mIL-2, or negative control. We next performed a minor-mismatch murine skin transplant model, in which B6 males skins were transplanted into B6 females recipients (n= 4 mice/group). Mice were treated subcutaneously twice weekly with either PBS or 0.5 mg/kg of the mIL-2.
Results: We found that the mIL-2 increased the levels of phosphorylated STAT5 (a downstream molecule of the IL-2 receptor) selectively in Tregs, with minimal effects on NK cells, non-Tregs CD4+ T cells, and CD8+ T cells. We next investigated whether mIL-2 treatment would lead to a sustained Treg expansion and prolongation of skin graft survival. We found that mIL-2 alone significantly prolonged the allograft survival when compared to the PBS group (MST 20.5 vs 47.5, *p= 0.0067*; Fig. 1A). The treatment with mIL-2 led to a significant increase in circulating Tregs, peaking at day 10 post-injection and followed by a stabilization of the Treg frequency at ~25% (Fig. 1B). Importantly, we observed no effect of mIL2 on effector immune cells such as NK cells (Fig. 1C), and CD8 T cells (not shown) when compared to the PBS group. Moreover, mIL-2 increased Tregs suppressive function as observed by an *ex vivo* suppression assay (Fig. 1D). Extending these findings, mIL-2 significantly expanded circulating Tregs with no detectable effects on Teff or NK cells in cynomolgus monkey (not shown). Our data also demonstrated that the mIL-2 has a >10-fold longer half-life than reported for recombinant IL-2.
Conclusions: Overall, our data suggest that mIL-2 prolongs graft survival by the selective and sustained expansion of Tregs while also enhancing Treg function.



CITATION INFORMATION: Borges T., Effe O., Gassen R., Al Jurdi A., Lape I., Babcock G., Carlson S., Madsen J., Riella L. Selective Regulatory T Cell Expansion by a Novel IL-2 Mutein Prolongs Skin Transplant Survival in Mice *AJT, Volume 21 Supplement 3*

DISCLOSURES: T.J. Borges: None. **O. Effe:** None. **R.B. Gassen:** None. **A. Al Jurdi:** None. **I.T. Lape:** None. **G.J. Babcock:** Salary; Name of Commercial Interest; Visterra, Inc. **S.M. Carlson:** Salary; Name of Commercial Interest; Visterra, Inc.. **J.C. Madsen:** None. **L.V. Riella:** Grant/Research Support; Name of Commercial Interest; Visterra, Inc..

Abstract# 463

Allograft Function and Baseline Donor Derived Cell Free DNA in Kidney Transplant Recipients: One Size Doesn't Fit All

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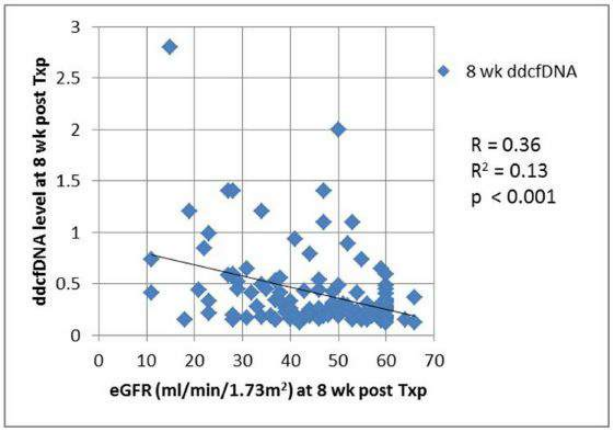
Purpose: Donor derived cell free DNA (dd-cfDNA) is increasingly used to predict acute rejection in kidney allografts . Cell free DNA fragments are constantly released into the circulation through cellular senescence and injury. DNA fragments are cleared from the blood by kidney and liver with a short half-life of around 30 minutes. It is unclear whether reduced estimated glomerular filtration rate (eGFR) in kidney transplant recipients (KTRs) would result in higher baseline dd-cfDNA values. We aimed to explore the variations in baseline dd-cfDNA at differing levels of eGFR in stable KTRs.

Methods: Our center has been doing for-cause and surveillance (high immunologic risk) dd-cfDNA in KTRs using AlloSure (CareDx, Brisbane, CA). We identified patients who underwent kidney transplantation between September 2017 and June 2020 and had dd-cfDNA levels at or around 8 weeks post-transplantation. A dd-cfDNA value ≥ 1% prompted allograft biopsy. KTRs with biopsy evidence for rejection or other injuries were excluded from the analysis. Patients were divided based on GFR estimated with MDRD equation using 8-week serum creatinine (<30, 30-59 and ≥60 ml/min/1.73m^2). Baseline 8-week dd-cfDNA levels were compared between different eGFR groups using t-test.

Results: A total of 156 patients were identified during the study period. We excluded 36 patients with biopsy evidence of rejection from the analysis. The remaining 120 patients (66 males and 54 females) were available for the analysis including 11 with re-transplants. Among the study group, 40 patients had living and 80 had deceased donor kidney transplantation. Patients were stratified based on eGFR as follows: <30 ml/min/1.73m^2 (n=18), 30-59 ml/min/1.73m^2 (n=72), ≥60 ml/min/1.73m^2 (n=30). Baseline 8-week dd-cfDNA values were significantly higher in groups with eGFR <30 vs. ≥60 ml/min/1.73m^2 (0.74±0.65 vs. 0.25±0.12, p=0.005); <30 vs. 30-59 ml/min/1.73m^2 (0.74±0.65 vs. 0.38±0.34, p=0.03) and 30-59 vs. ≥60 ml/min/1.73m^2 (0.38±0.34 vs. 0.25±0.12, p=0.004). There was significant linear correlation between dd-cfDNA levels and eGFR as shown in figure 1.



Conclusions: Our study found a significant correlation between baseline dd-cfDNA levels and decreasing eGFR. Higher levels of ongoing intra-graft inflammation and injury that could be associated with decreasing GFR is a plausible explanation for this finding. Decreased renal clearance of DNA fragments with declining GFR could also be contributory. These observations point towards the possible need for stratifying baseline dd-cfDNA based on the level of allograft function.

CITATION INFORMATION: Sureshkumar K., Grazier A., Chopra B. Allograft Function and Baseline Donor Derived Cell Free DNA in Kidney Transplant Recipients: One Size Doesn't Fit All *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.K. Sureshkumar: Grant/Research Support; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx. **A. Grazier:** None. **B. Chopra:** Grant/Research Support; Name of Commercial Interest; CareDx.

Abstract# 464

Single Cell RNA Sequencing of Tim1- B Cells and Tim1+ Regulatory B Cells

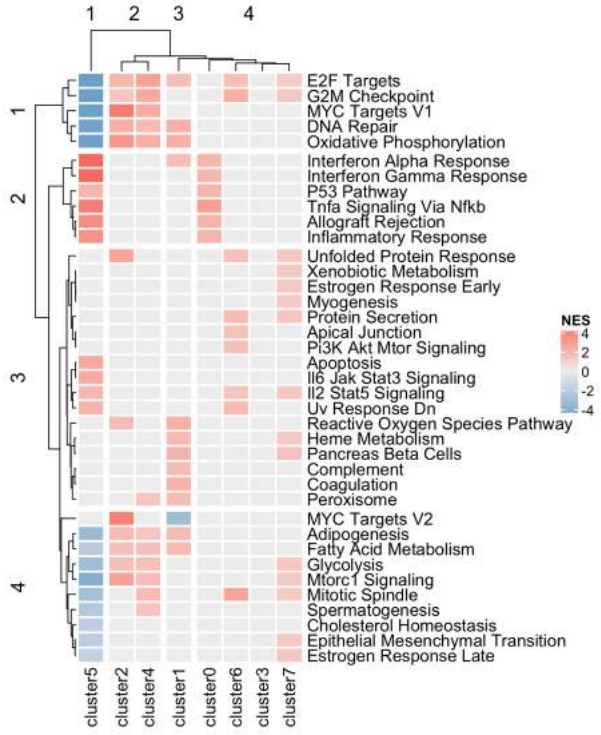
Q. Fu[1], K. Lee[2], K. Deng[2], D. Agarwal[3], P. v. Galen[4], C. G. Rickert[2], G. Huai[2], H. Yang[1], C. LeGuern[2], S. Deng[1], J. F. Markmann[2], *[1]Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Sciences and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, MGH, Boston, MA, [3]Division of Transplantation, Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, [4]Division of Hematology, Brigham and Women's Hospital, Boston, MA*

Purpose: Tim1 signaling has an important role in inducing and maintaining the function of Regulatory B cells. Our previous study showed that Tim1+ Bregs prolong the survival of islets in an allotransplantation model (Balb/c to C57BL/6). Here we examined the potential pathways and Breg subsets underlying TIM1+ Breg mediated regulation by RNA-seq and single-cell RNA-sequencing (scRNA-seq) analysis.

Methods: 30M Balb/c irradiated splenocytes were injected intraperitoneally into C57BL/6 recipients. After 14 days, Tim1- and Tim1+ cells were isolated for 10X Genomics 3' scRNA-seq analysis. The data was analyzed using Cell Ranger (version 3.1.0) and R programming (version: 3.6.3).

Results: Clustering of transcriptionally similar cells identified eight clusters of Tim1+ and Tim1- B cells (Figure 1a). The annotation results showed that Tim1- B cells were mainly included in cluster 0 (Klf2hiIglc1lo B cells), cluster 1 (Klf2hiIglc1hi B cells), and cluster 5 (Ifit3+ B cells). Immunology-relevant pathways were positively enriched in both clusters 0 and 5, suggesting that those cell populations were the main effector clusters of Tim1-B cells, potentially promoting allograft rejection (Figure 1b). Tim1+B cells were mainly included in cluster 2 (Klf2+Mifhi B cells), cluster 3 (Klf2+Cd21hi B cells), cluster 4 (Stmn1+Tim1+ Bregs), and cluster 6 (Cd106+Tim1+ B cells). Pathway enrichment analysis indicated that clusters 2 and 4 had similar enriched pathways, suggesting that clusters 2 and 4 were the primary immunosuppressive subset of Tim1+ Bregs (Figure). Cluster 7, mainly from Tim1+ Bregs, were identified as the plasma cells.

Conclusions: Subsets of Tim1+ and Tim1- B cells differ vastly in their gene expression, correlating with their roles during allogeneic transplantation. The ongoing analysis may illuminate key pathways that regulate the function of Klf2+Mifhi B cells and Stmn1+Tim1+ Bregs.



CITATION INFORMATION: Fu Q., Lee K., Deng K., Agarwal D., Galen P., Rickert C., Huai G., Yang H., LeGuern C., Deng S., Markmann J. Single Cell RNA Sequencing of Tim1- B Cells and Tim1+ Regulatory B Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: Q. Fu: None. **K. Lee:** None. **K. Deng:** None. **D. Agarwal:** None. **P.V. Galen:** None. **C.G. Rickert:** None. **G. Huai:** None. **H. Yang:** None. **C. LeGuern:** None. **S. Deng:** None. **J.F. Markmann:** None.

Kidney

Kidney Living Donor

Abstract# 469

The Australian and New Zealand Living Kidney Donor Profile Index

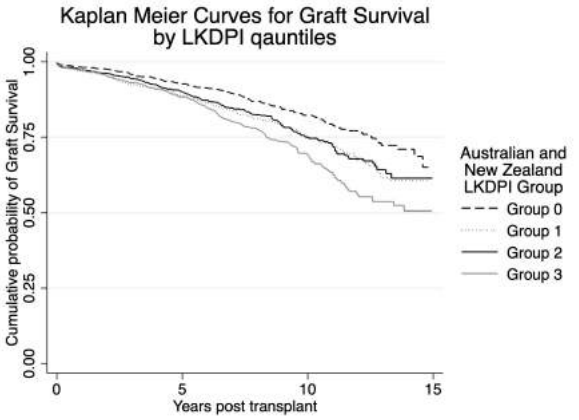
G. L. Irish[1], S. Chadban[1], N. Boudville[2], S. B. Campbell[3], J. Kanellis[4], P. A. Clayton[1], *[1]Australian and New Zealand Dialysis and Transplant Registry, South Australian Health and Medical Research Institute, Adelaide, Australia, [2]Medical School, University of Western Australia, Perth, Australia, [3]Department of Nephrology, Princess Alexandra Hospital, Brisbane, Australia, [4]Department of Nephrology, Monash Health, Melbourne, Australia*

Purpose: Risk scores may aid risk quantification and decision-making in kidney transplantation. The Living Kidney Donor Profile Index (LKDPI) was developed to choose between living donors. The original LKDPI is moderately discriminatory (Harrel's C Statistic=0.59,95% CI 0.55-0.61) but poorly calibrated in Australia/New Zealand. We developed a risk prediction score for overall graft survival in adult recipients of a living kidney donor transplant in an Australian and New Zealand population.

Methods: Using data from the Australia and New Zealand Dialysis and Transplant Registry, we included adult recipients of living kidney donor transplants over 2004-2018. We constructed Cox models for overall graft survival. We refit the original USA variables and then constructed a new model (ANZ LKDPI) considering all available potential covariates. Model performance was validated by assessing discrimination and calibration.

Results: 4049 living donors were included. The C-statistic for the re-fit model was 0.57(95%CI 0.54-0.59). The remodeled score included the new variables history of hypertension and HLA-A mismatches. Variables excluded were donor:recipient weight ratio, HLA-B, both male, and ABO incompatibility. The ANZ LKDPI had similar discrimination (C=0.56,95%CI 0.54-0.58). The model fit and calibration was better.

Conclusions: The ANZ LKDPI had similar discrimination to the original and the refitted LKDPI. The discrimination was low for both scores and so should be used with caution to decide between donors. The new score is better calibrated for our population so could be used to predict individual graft prognosis.



CITATION INFORMATION: Irish G., Chadban S., Boudville N., Campbell S., Kanellis J., Clayton P. The Australian and New Zealand Living Kidney Donor Profile Index *AJT, Volume 21 Supplement 3*

DISCLOSURES: G.L. Irish: None. **S. Chadban:** None. **N. Boudville:** None. **S.B. Campbell:** None. **J. Kanellis:** None. **P.A. Clayton:** None.

Abstract# 470

Recipient and Kidney Allograft Outcomes from Hypertensive Live-Donor in the United States

S. Riad[1], S. Jackson[2], D. Vock[3], A. Matas[4], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Complex Care Analytics, M-Health Fairview, Minneapolis, MN, [3]School of Public Health, University of Minnesota, Minneapolis, MN, [4]Surgery, University of Minnesota, Minneapolis, MN*

Purpose: Controlled hypertension in select prospective kidney donors is no longer an exclusion criterion for donation. We examined the association between pre-donation hypertension (**HTN**) and both mortality and death censored kidney graft survival in recipients.

Methods: Between 2004 and 2019, we identified 2574 donors with **HTN** in the SRTR who had complete data for matching. Hypertensive donors were matched at 1:5 to normotensive donors, within the same transplant center, based on donor and recipient characteristics. Propensity matching was used to balance the cases and controls. All matching variables were evenly balanced between groups with SMD <0.05 (Table 1). 44 donors were not matched. Unweighted Kaplan-Meier curves were generated through 10 years from engraftment for the recipient survival (**RS**) and death-censored graft survival (**DCGS**) by donor hypertension status. Weighted Cox proportional hazard models (with each case-control group as a random effect) were used to examine the association between donor-**HTN** and outcomes of interest. In addition to the matching variables, models were adjusted for induction type, XM-status, HLA-MM, and immunosuppression maintenance. The RS model was stratified by transplant year, and the **DCGS** model was stratified by transplant year and immunosuppression maintenance due to non-proportional hazards.

Results: Hypertensive live-donor kidney utilization increased over time. **DGF** rate did not differ between groups. At 1-year from engraftment, eGFR was 2.3 mL/min lower (p=0.003), and the rejection rate was 1.5% higher (p=0.038) in the recipients of hypertensive donor kidneys. In the unweighted Kaplan-Meier analysis (Figure 1), **RS** did not differ by donor-**HTN** status (log-rank p=0.566). **DCGS** was slightly lower in recipients of hypertensive donor kidneys (log-rank p=0.025). In the multivariable weighted Cox PH models, compared to normotensive donors, kidneys from hypertensive donors were not associated with worse **RS** ($_{95\%LLCL}$ **aHR**$_{,95\%ULCL}$) ($_{0.93,}$**1.06**$_{,1.21}$), or **DCGS** ($_{0.99,}$ **1.16**$_{,1.36}$).

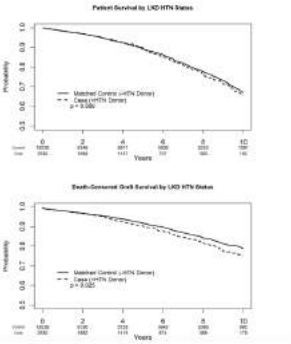
Conclusions: In this large propensity-matched cohort of live kidney donors and their recipients, donor hypertension was not associated with inferior recipient or graft survival after multivariable adjustment. The judicious utilization of kidneys from hypertensive donors in the United States appears safe for recipients. Expanding the donor pool with select hypertensive donors is a viable option.

Table1. Comparison of Matching Variables' Between Hypertensive Donors and Matched Controls

	Normotensive Donors (n=12,030)	Hypertensive Donors (n= 2,030)	SMD*
Donor Characteristics			
Age, [Years]‡	53.83 (9.16)	54.26 (9.39)	0.046
Gender (Male)	4953 (41.1)	1006 (43.3)	0.043
Race			0.034
Black	833 (6.9)	164 (7.3)	
Other	489 (4.1)	118 (4.7)	
White	10718 (89.0)	2228 (88.1)	
BMI [Kg/m²]	28.09 (3.56)	28.24 (3.68)	0.042
eGFR† [mL/min] **	89.19 (14.07)	88.89 (14.44)	0.021
Kidney Laterality (Rt)	1463 (12.2)	315 (12.5)	0.009
Donor Relation (Yes)	6849 (56.9)	1427 (56.4)	0.010
Recipient Characteristics			
Age‡ (years)	52.71 (13.71)	52.68 (14.46)	0.002
Gender (Male)	7991 (63.6)	1621 (64.1)	0.009
Race			0.027
Black	1091 (9.1)	242 (9.6)	
Other	698 (5.6)	151 (6.0)	
White	10262 (85.4)	2137 (84.5)	
ESRD§ Etiology			0.023
Diabetes	3001 (24.9)	612 (24.2)	
Glomerulonephritis	3068 (25.5)	655 (25.9)	
Hypertension	1952 (16.2)	413 (16.3)	
Other	2285 (19.0)	494 (19.5)	
Polycystic Kidney Disease	1733 (14.4)	356 (14.1)	
Dialysis Status (Yes)	7535 (62.6)	1666 (81.5)	0.023

* Matching variables included transplant center (not shown in the table)
* SMD: Standardized Mean Difference
** CKD-EPI estimated glomerular filtration rate
‡ End-Stage Renal Disease
† Matched within two variable-unit
§§ Matched within ten variable-unit

Figure 1. Ten-year Kaplan-Meier Analysis for Recipient and Death Censored Graft Survival



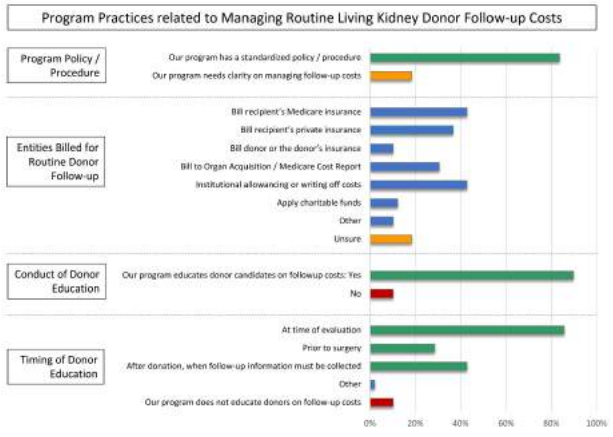
CITATION INFORMATION: Riad S., Jackson S., Vock D., Matas A. Recipient and Kidney Allograft Outcomes from Hypertensive Live-Donor in the United States *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Riad: None. **S. Jackson:** None. **D. Vock:** None. **A. Matas:** None.

Abstract# 471

Managing the Costs of Routine Follow-up Care After Living Kidney Donation: A Survey of Contemporary Experience, Practice & Challenges

K. Lentine[1], G. McNatt[2], R. Howey[3], C. Thomas[2], R. Hays[4], U. Lebron-Banks[5], S. Ainapurapu[1], A. Tietjen[6], *[1]Saint Louis University, Saint Louis, MO, [2]Univ. Iowa, Iowa City, IA, [3]Toyon Associates, Concord, CA, [4]Univ. Wisconsin, Madison, WI, [5]New York-Presbyterian Hosp., New York, NY, [6]St. Barnabas, Livingston, NJ*

Purpose: Organ Procurement and Transplantation Network (OPTN) Policy mandates that living kidney donor (LKD) programs collect and report clinical and laboratory follow-up information for living organ donors at 6 months, 1 year and 2 years postdonation. Handling follow-up costs can pose challenges for programs and donors. To help inform the community and guide discussions of effective strategies for managing follow-up costs, we surveyed US LKD programs on current experiences and practices.
Methods: A brief 4-item survey instrument was designed by a multidisciplinary workgroup of professionals in transplant administration and LKD clinical care to assesses program policies, billing practices and donor candidate/donor education. We distributed the survey to staff at U.S. LKD transplant programs by email and posting to professional society list-servs in Fall 2020, using the Qualtrics survey platform in Fall 2020.
Results: Among 49 programs that participated to date, 84% have a standardized policy and procedure on how to handle the costs of routine follow-up. Mechanisms for recovering or covering the costs of mandated routine postdonation follow-up at responding programs include: billing recipients' Medicare (43%), billing recipients' private insurance (37%), institutional allowancing (43%), billing to organ acquisition or Medicare Cost Report (MCR) (31%), billing donors/donors' insurance (10%), and use of charitable funds (12%) (**Figure**). Although 90% of programs educate donor candidates on the costs and coverage of OPTN mandated follow-up, 10% do not. Provision of donor education most commonly occurs at the time of evaluation (89%), and 42% also educate at the time when follow-up must be conducted. 18% of programs are interested in more clarity on strategies for covering follow-up costs.



Conclusions: Based on a pilot survey of U.S. LKD programs, a variety of approaches are used to cover routine postdonation follow-up, ranging from billing recipients' or donors' insurance, to institutional allowancing or use of charitable funds, to inclusion on the MCR. Notably, although Medicare disallowed including these expenses on the MCR or billing the recipients' Medicare in 2016, these practices remain common, indicating a need for increased guidance. Up-to-date resources on handling the costs of routine donor follow-up will be useful for programs and living donors.
CITATION INFORMATION: Lentine K., McNatt G., Howey R., Thomas C., Hays R., Lebron-Banks U., Ainapurapu S., Tietjen A. Managing the Costs of Routine Follow-up Care After Living Kidney Donation: A Survey of Contemporary Experience, Practice & Challenges *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Lentine: Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **G. McNatt:** None. **R. Howey:** None. **C. Thomas:** None. **R. Hays:** None. **U. Lebron-Banks:** None. **S. Ainapurapu:** None. **A. Tietjen:** Honoraria; Name of Commercial Interest; Novartis, Veloxis. Honoraria; Nature of Relationship; Speaker.

Abstract# 472

Compatible Paired Donation in Paired Kidney Exchange: A Look at the Road Not Taken

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Purpose: Paired kidney exchange (PKE) offers incompatible donor-recipient pairs increased access to transplant. Compatible pairs are increasingly joining the PKE in an effort to find younger, better matched organs and altruistically to facilitate transplants by expanding the PKE pool. We reviewed compatible pairs entered into the National Kidney Registry (NKR) comparing the original donor entered into the exchange to the final donor the recipient received.
Methods: We conducted a retrospective cohort study of 17 compatible pairs transplanted via the NKR between 4/2017 and 11/2020 at a single center. For each pair a living kidney donor profile index (LKDPI) score was calculated. This has been used to characterize expected LD outcomes with a negative number predicting lower risk of allograft failure than any deceased donor organ and a number between 1 and 100 correlating with an expected risk of allograft failure comparable to the equivalent deceased donor KDPI.
Results: Recipients were more likely to be female (65%). Mean age was 43.8 years. All but one recipient was on dialysis at time of transplant. All recipients were ABO compatible with negative crossmatch and negative testing for donor specific antibody with their original donor. The PKE donors were younger (39.2 years) compared to original donors (44.6 years), p= 0.09. Five recipients got PKE donors older than their original donor while 12 received donors that were an average of 14.2 years younger. Mean creatinine clearance was higher for PKE donors (121 mL/min) compared to original donors (108 mL/min), p=0.05. One recipient with a left donor got a right kidney while two who had right donors received left kidneys. Five recipients who had donors with one artery received a donor with two arteries and two recipients with donors with two arteries got a donor with one artery. Average cold ischemia time (CIT) was 8.8 hours in this study vs expected 52 minutes for non-PKE living donor (LD) transplants.

Pair	Living Donor Recipient			Original Donor					PKE Donor					
	ABO	cPRA (%)	Age (yrs)	ABO	Age (yrs)	Lat	Art	LKDPI	ABO	Age (yrs)	Lat	Art	LKDPI	CIT (hrs)
1	A	0	43	O	38	Right	1	-15	A	35	Left	1	17	14
2	A	0	59	A	36	Left	1	35	A	56	Left	2	17	7
3	A	0	66	A	65	Left	1	59	A	49	Left	1	-3	13
4	B	0	35	B	34	Left	1	-9	B	28	Left	1	-4	6
5	O	2	51	O	47	Left	1	18	O	58	Left	2	18	8
6	A	75	43	O	22	Left	2	-11	A	32	Right	2	-9	1
7	O	0	51	O	31	Left	2	24	O	27	Left	1	-11	5
8	O	0	56	O	38	Left	1	26	O	29	Left	1	26	8
9	A	0	23	A	59	Left	1	35	A	37	Left	1	3	5
10	O	0	32	O	65	Left	1	14	O	43	Left	2	-13	8
11	O	100	73	O	38	Left	1	8	O	32	Left	1	1	20
12	O	92	34	O	43	Left	1	0	O	69	Left	1	46	4
13	O	54	46	O	38	Left	1	43	O	49	Left	2	-4	17
14	O	57	38	O	39	Right	1	-12	O	19	Left	1	-12	9
15	B	0	29	O	63	Left	1	45	B	37	Left	1	-19	9
16	O	0	28	O	56	Left	1	32	O	29	Left	2	-35	8
17	O	0	38	O	46	Left	2	6	O	37	Left	1	-2	7

All had immediate graft function. There was 100% graft and patient survival at 1 year. Mean serum creatinine levels were 1.2 mg/dL at 6 months (n=14) and 1.2 mg/dL at 12 months (n=12). LKDPI scores were better for PKE facilitated transplants on average (0.94 ± 19.1) compared to original donor-recipient pairs (17.5 ± 22.4), p=0.02.
Conclusions: Recipients enrolling into the NKR as compatible pairs receive organs from younger donors with better LKDPI scores. Centers can and should set limits on maximum acceptable donor age and prioritize low eplet mismatches for compatible pairs in the NKR to optimize LD recipient outcomes.
CITATION INFORMATION: Vranic G., Gilbert A., Thomas B., Ghasemian S., Cooper M., Verbesey J. Compatible Paired Donation in Paired Kidney Exchange: A Look at the Road Not Taken *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Vranic: None. **A. Gilbert:** None. **B. Thomas:** None. **S. Ghasemian:** None. **M. Cooper:** None. **J. Verbesey:** None.

Abstract# 473

High Interest, Low Payoff: Understanding Opportunities for Intervention for Those Exploring but Not Pursuing Paired Kidney Donation

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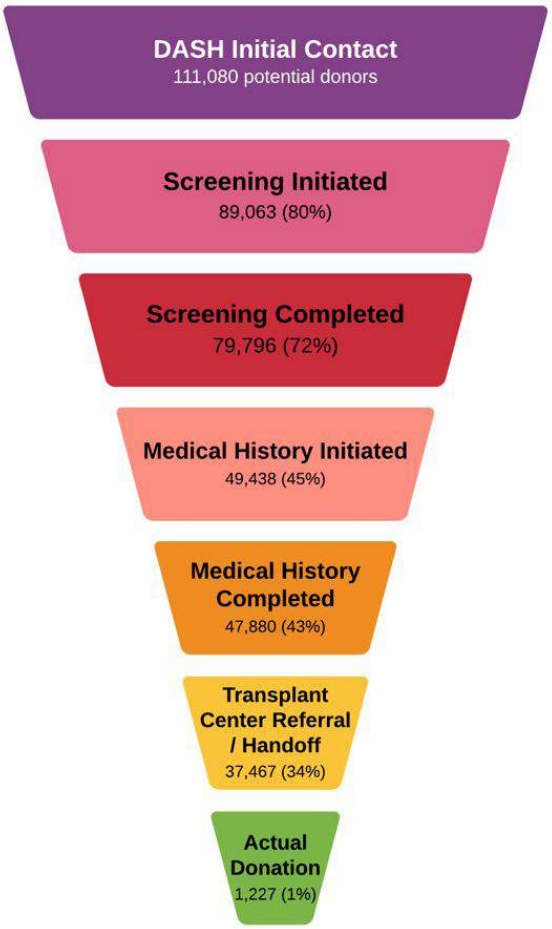
Purpose: In 2016, the National Kidney Registry (NKR) established an online donor screening portal (DASH) to manage and track individuals interested in kidney paired donation (KPD) through different stages of evaluation from indicating initial interest to actual donation. Potential donors generally interested in KPD or formally seeking evaluation through an individual NKR partner center enrolled in DASH. This study aims to describe progress through DASH evaluation stages and predictors of actual donation.

Methods: We included all individuals enrolled in DASH between 10/2016-10/10/2020, tracking their progress through 4 stages: Initial Contact, Clinical Questionnaire Screening, Online Medical History, and Actual Donation. Donors were removed from DASH for failure to proceed to the next stage within a specific time window (expired) or when clinical/psychosocial factors reported determined donor ineligibility (ruled out). We used multivariable logistic regression to identify predictors of donation among those who completed screening.

Results: NKR received 111,080 total contacts during the 4-year study period which translated into only 1,227 (1%) actual PKD donations (Figure). Among those that did donate, the median time from initial contact to actual donation was 206 days (IQR: 136, 307). Predictors positively associated with donation included having at least a college education (aOR 1.8, 95% CI: 1.4-2.3), private health insurance (aOR 2.1, 95% CI: 1.3-3.3), and being a spouse of the recipient (aOR: 1.6, 95% CI: 1.1-2.3). Predictors negatively associated with donation included being of African American race (aOR 0.5, 95% CI: 0.4-0.8), being a friend of the recipient (aOR: 0.3, 95% CI: 0.2-0.4), learning about PKD on social media (aOR: 0.1, 95% CI: 0.1-0.3), or having another relationship with the recipient (aOR: 0.5, 0.3, 0.7), history of high blood pressure, history of high cholesterol, history of obesity, and current tobacco use. The model AUC was 0.734.

Conclusions: While over 100,000 people expressed initial interest in pursuing PKD - enough individuals to solve the entire kidney donor shortage - few actually donated a kidney. With this high level of potential interest, if we can improve education and support of individuals who begin but fail to complete PKD evaluation stages, more PKDs might result.



CITATION INFORMATION: Waterman A., Wood E., Thomas A. High Interest, Low Payoff: Understanding Opportunities for Intervention for Those Exploring but Not Pursuing Paired Kidney Donation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.D. Waterman: None. **E.H. Wood:** None. **A. Thomas:** None.

Liver 2

Abstract# 474

Waitlist Outcomes for Patients with Hepatocellular Carcinoma Following the 2019 Exception Policy Change

K. Young[1], C. Enestvedt[2], W. Naugler[1], E. Maynard[2], A. Mitra[1], M. Wungiranirun[1], J. Jou[1], J. Ahn[1], M. Chang[1], D. Lhewa[1], *[1]Division of Gastroenterology and Hepatology, OHSU, Portland, OR, [2]Division of Abdominal Organ Transplant, OHSU, Portland, OR*

Purpose: We aim to compare waitlist (WL) outcomes for HCC patients after the implementation of the most recent UNOS exception policy change on 5/1/2019.

Methods: All U.S. adults (≥18yrs) listed for LT from 4/30/13-9/4/20 using the UNOS registry were evaluated. Patients were categorized based on date of listing into 3 eras - Era 1: 4/30/13-10/7/15, Era 2: 10/8/15-4/30/19 (6-month delay and a maximum 34 points), and Era 3: 5/1/19-9/4/20 (median MELD at transplant - 3). WL outcomes were evaluated with multivariate competing risk models, adjusted for demographics, UNOS region, ascites, hepatic encephalopathy (HE), biologic MELD, liver disease etiology, era, HCC, and exception status. In analyses stratified by era, follow up time was limited to end of that era.

Results: A total of 79,381 patients were listed for LT during the study period: 24,648 in Era 1, 39,536 in Era 2, and 15,197 in Era 3. The proportion of listed patients with HCC decreased from 25.7% in Era 1, 23.5% in Era 2, to 19.5% in Era 3. The proportion of HCC patients listed with exceptions also decreased from 74.0% in Era 1, 68.8% in Era 2, to 34.6% in Era 3. There was no significant difference in severity of ascites (p=0.06) or severity of HE (p=0.07) among HCC patients throughout the 3 eras. In Era 1, compared to non-HCC patients, HCC patients without exceptions (HR

1.30, p<0.001) and HCC patients with exceptions (HR 2.12, p<0.001) had a higher likelihood of LT. In Era 2, compared to non-HCC patients, HCC patients without exceptions (HR 1.10, p=0.003) and HCC patients with exception (HR 1.35, p<0.001) had a higher likelihood of LT. In Era 3, compared to non-HCC patients, HCC patients without exception had lower likelihood of LT (HR 0.90, p=0.04) while HCC patients with exceptions had a higher likelihood of LT (HR 1.60, p<0.001). In Era 1, HCC patients without exceptions had no significant difference in WL dropout/mortality compared to non-HCC patients, while HCC patients with exception had lower WL dropout/mortality (HR 0.82, p<0.001). In Era 2, HCC patients without exceptions had higher WL dropout/mortality (HR 1.30, p<0.001), while HCC patients with exceptions had no significant difference. In Era 3, HCC patients without exceptions continued to have higher WL dropout/mortality (HR 2.00, p<0.001) while HCC patients with exceptions had lower WL dropout/mortality (HR 0.35, p<0.001).

Conclusions: Patients with HCC MELD exception saw an overall decline in the likelihood of LT after the two most recent policy changes. However, the advantage for HCC patients with MELD exception still remains. There was no significant increase in the dropout/mortality on the WL for the HCC MELD exception patients, instead there was improvement after the 2019 changes which may be due to shorter follow up time. Overall, the changes reflect gradual move towards desired equity.

CITATION INFORMATION: Young K., Enestvedt C., Naugler W., Maynard E., Mitra A., Wungiranirun M., Jou J., Ahn J., Chang M., Lhewa D. Waitlist Outcomes for Patients with Hepatocellular Carcinoma Following the 2019 Exception Policy Change *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Young: None. **C. Enestvedt:** None. **W. Naugler:** None. **E. Maynard:** None. **A. Mitra:** None. **M. Wungiranirun:** None. **J. Jou:** None. **J. Ahn:** None. **M. Chang:** None. **D. Lhewa:** None.

Abstract# 475

Severe Hypoxemia After Liver Transplantation in the Hepatopulmonary Syndrome

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Purpose: Hepato-pulmonary syndrome (HPS) is a complication of liver disease with liver transplantation as the only curative treatment. However these patients can develop severe hypoxemia early after transplantation, defined as a need of 100% oxygen to maintain a saturation of >85 %. The data regarding the predictive factors or treatment for post-transplant severe hypoxemia and its impact on outcome is scarce.

Methods: Retrospective analysis of prospectively maintained database of 1862 patients who had liver transplants in our unit between 2007 and 2020, from which patients with a diagnosis of HPS were identified. Pre transplant variables related to HPS and postoperative oxygen requirement, duration of intubation, ICU stay, postoperative complications and survival data were collected.

Results: 51 (n=51) patients with HPS were identified during the study period. The median pre-transplant PaO2 on room air, diffusing capacity of the lung (DLCO), alveolar-arterial oxygen gradient (AaDo2), and intrapulmonary shunt ratio on radionuclide study were 55.3 mmHg, 49.0%, 59.0 mmHg and 18.0% (2.4 -47.8%), respectively. Postoperative severe hypoxemia occurred in 12 patients (24%). Among 12 patients, 2 patients was treated successfully by using extracorporeal membrane oxygenation (ECMO). Predictors of severe hypoxemia include intrapulmonary shunt ratio >20% and DLCO <40%. ICU stay, readmission rate and medical cost of the hospital stay were significantly higher in patients who developed severe hypoxemia than the others. Overall 1 and 3 years post-transplant survival of HPS patients were 84.3% and 82.4%.

Conclusions: Intrapulmonary shunt and DLCO predict the development of postoperative severe hypoxemia, which is associated with high morbidity and mortality. ECMO could be one of effective treatment for post-transplant severe hypoxia caused by HPS.

CITATION INFORMATION: Doi J., Fujiki M., DAmico G., Sasaki K., Diago T., Aucejo F., Kwon C., Eghtesad B., Hashimoto K., Miller C., Cristiano Q. Severe Hypoxemia After Liver Transplantation in the Hepatopulmonary Syndrome *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Doi: None. **M. Fujiki:** None. **G. DAmico:** None. **K. Sasaki:** None. **T. Diago:** None. **F. Aucejo:** None. **C. Kwon:** None. **B. Eghtesad:** None. **K. Hashimoto:** None. **C. Miller:** None. **Q. Cristiano:** None.

Abstract# 476

Long Term Survival After Liver Transplantation for Advanced, Unresectable Intrahepatic Cholangiocarcinoma

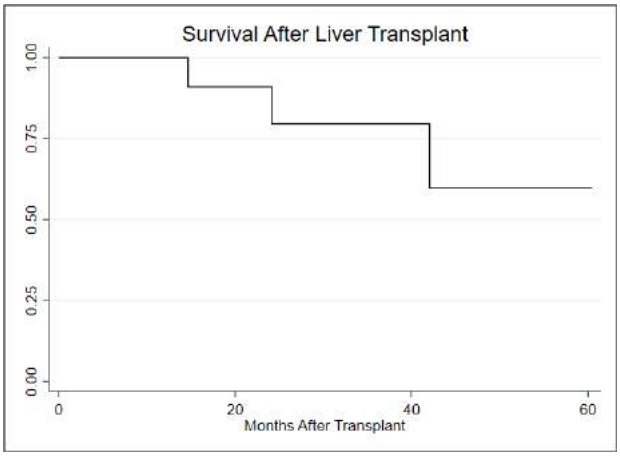
R. R. McMillan[1], S. Kodali[1], M. Javle[2], A. Saharia[1], C. M. Mobley[1], M. J. Hobeika[1], A. Shetty[1], D. W. Victor[1], R. McFadden[1], M. Abdelrahim[1], K. Heyne[1], A. O. Gaber[1], R. M. Ghobrial[1], *[1]Houston Methodist Hospital, Houston, TX, [2]MD Anderson Cancer Center, Houston, TX*

Purpose: Intrahepatic cholangiocarcinoma (ICCA) has traditionally been considered a contraindication to liver transplantation (LT). We previously reported a case series of six patients with large, unresectable ICCA tumors who underwent LT. A total of 17 patients have now undergone LT for ICCA at our institution. This study reports long term outcomes for these patients.

Methods: Retrospective review of a prospectively-maintained database was performed of patients undergoing LT for ICCA under an investigational protocol. Survival analysis was performed using the Kaplan-Meier method to report overall and recurrence-free survival.

Results: Seventeen patients underwent LT for ICCA. All patients had unresectable tumors and no extrahepatic disease. The study group underwent neoadjuvant therapy and maintained disease stability for more than six months. This patient population exhausted all therapeutic options and harbored tumor volume as great as 20 cm. Median follow up was 20.6 months. Five patients had cancer recurrence, and four patients died. Patient survival at 1-, 3- and 5-years was 100%, 80%, 60%. Recurrence-free survival at 1-, 3- and 5-years was 65%, 65%, and 32%. Sites of recurrence include the lung (n=2), bone (n=2), bowel (n=1), omentum (n=1), and brain (n=1). One patient had hepatic artery thrombosis and underwent a second LT.

Conclusions: Median survival for unresectable ICCA treated with systemic chemotherapy is less than 1 year. For patients with unresectable ICCA who undergo neoadjuvant therapy and demonstrate disease stability, LT offers an opportunity for long term survival. Additional research should identify factors prognostic for disease stability to inform patient selection.



CITATION INFORMATION: McMillan R., Kodali S., Javle M., Saharia A., Mobley C., Hobeika M., Shetty A., Victor D., McFadden R., Abdelrahim M., Heyne K., Gaber A., Ghobrial R. Long Term Survival After Liver Transplantation for Advanced, Unresectable Intrahepatic Cholangiocarcinoma *AJT, Volume 21 Supplement 3*

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Abstract# 477

Should We Curtail the Importance of Non-modifiable Risk Factors in Dcd Liver Risk Stratification?

R. Meier[1], Y. Kelly[2], S. Yamaguchi[2], H. Braun[2], T. Lunow-Luke[2], D. Adelmann[2], C. Niemann[2], D. Maluf[1], Z. Dietch[2], P. Stock[2], S. Kang[2], S. Feng[2], A. Posselt[2], J. Gardner[2], C. Freise[2], R. Hirose[2], C. Freise[2], N. Ascher[2], J. Roberts[2], G. Roll[2], *[1]University of Maryland, Baltimore, Baltimore, MD, [2]UCSF, San Francisco, CA*

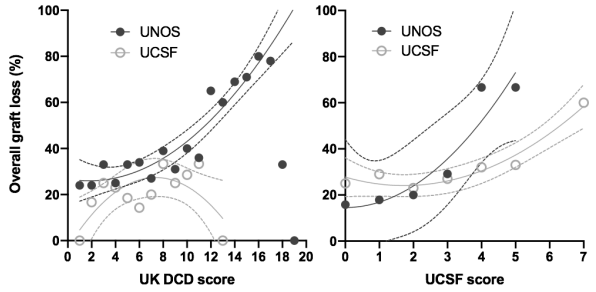
Purpose: Scoring systems have been proposed to select donation after circulatory death (DCD) donors and recipients for liver transplantation (LT). We hypothesized that the generalizability of existing scoring systems is limited by distinct local factors such that conforming to a complex scoring system derived elsewhere may limit transplantation.

Methods: We used the University of California San Francisco (UCSF) data on DCD-LT (n=138) performed between 2003-2019 to calculate a UCSF-DCD risk score. This was validated using the United Network for Organ Sharing database (UNOS) (n=6,371). We compared the ability to predict graft survival of different scoring systems including United Kingdom (UK)-DCD-score, University of California Los Angeles (UCLA)-DCD-score, King's College Hospital score (KCH)-DCD-score and UCSF-DCD-score in both datasets.

Results: The strongest predictors in the UCSF cohort were donor functional warm ischemia time and donor hepatectomy time. A simple UCSF-DCD-score composed of just these two variables was able to stratify graft survival in our cohort and in the UNOS cohort (Figure). UK-, UCLA-, KCH-DCD-scores all successfully stratified graft survival in the UNOS cohort but failed to do so in the UCSF cohort. There was substantial variation in the ability of scoring systems to predict outcomes across UNOS regions. Based on the UK-DCD score, 43.5% of the DCD-LTs in the UCSF cohort were considered high-risk or futile. Specifically, 41.3% of recipients had a Model for End-Stage Liver Disease score>25 and 76.8% of LTs had cold ischemia

time>6h; on the other hand, donor mean age was 31 years old, i.e. 18 years younger than the UK cohort average. UCSF-DCD-score was the only score able to stratify the occurrence of biliary complications in our cohort.

Conclusions: Locally developed DCD scores failed to predict outcomes in our cohort, suggesting that extrapolation of locally derived DCD risk scores to other environments could limit transplantation. Additionally, the importance of non-modifiable factors should be minimized in DCD-scoring systems, and priority given to modifiable factors, such as donor warm ischemia and hepatectomy time.



CITATION INFORMATION: Meier R., Kelly Y., Yamaguchi S., Braun H., Lunow-Luke T., Adelmann D., Niemann C., Maluf D., Dietch Z., Stock P., Kang S., Feng S., Posselt A., Gardner J., Freise C., Hirose R., Freise C., Ascher N., Roberts J., Roll G. Should We Curtail the Importance of Non-modifiable Risk Factors in Dcd Liver Risk Stratification? *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Meier: None. **Y. Kelly:** None. **S. Yamaguchi:** None. **H. Braun:** None. **T. Lunow-Luke:** None. **D. Adelmann:** None. **C. Niemann:** None. **D. Maluf:** None. **Z. Dietch:** None. **P. Stock:** None. **S. Kang:** None. **S. Feng:** None. **A. Posselt:** None. **J. Gardner:** None. **C. Freise:** None. **R. Hirose:** None. **C. Freise:** None. **N. Ascher:** None. **J. Roberts:** None. **G. Roll:** None.

Abstract# 478

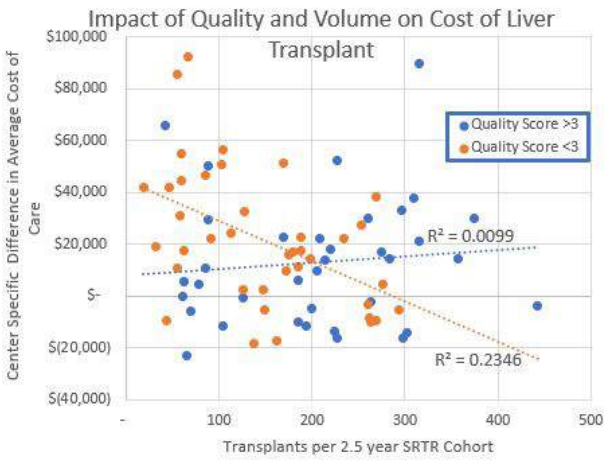
The Intersection of Cost, Quality, and Volume in Liver Transplant

D. Axelrod[1], R. Balakrishnan[1], A. Harris[2], S. Hohmann[2], J. Snyder[3], B. Kasiske[3], M. Schnitzler[4], K. Lentine[4], *[1]Univ of Iowa, Iowa City, IA, [2]Vizient Inc., Irving, TX, [3]SRTR, Minneapolis, MN, [4]Saint Louis Univ, Saint Louis, MO*

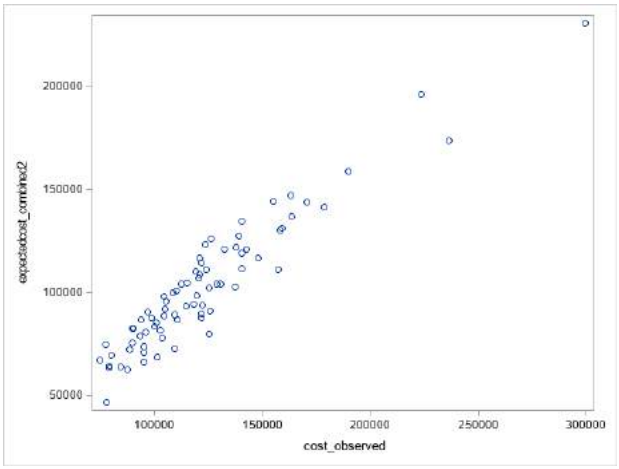
Purpose: As a consequence of changing allocation practices and the ongoing shortage of high-quality organs, the cost of liver transplant (LT) continues to increase throughout the United States. While previous analyses have examined the impact of recipient and donor factors, none have correlated pre- and post-transplant metrics, LT volume, and risk-adjusted cost of care.

Methods: A novel dataset was constructed linking Scientific Registry of Transplant Recipients (SRTR) transplant registry data, Vizient Clinical Data Base/Resource Manager, and program-specific reports. Multivariate fixed-effect linear regression models incorporating blinded center identifiers were used to estimate the risk-adjusted LT center cost differentials (betas). Quality was determined by dichotomizing centers on the basis of the sum of O:E ratios for 1-year patient survival, 1-year graft survival, transplant rate, and waitlist mortality (scale, 0-4).

Results: Clinical and cost data were examined for 7,381 LTs performed at 77 transplant programs from 2015 to 2018. Multivariate modelling was used to compare average observed and expected cost by center, demonstrating excellent correlation (Figure 1).



Centers with a quality score ≥3 were significantly less expensive ($P = 0.06$), without significant variation in cost by volume. Conversely, lower-quality centers were more expensive and revealed a strong inverse correlation between LT volume and average cost (Figure 2).



Conclusions: Accurate risk-adjusted LT costs can be derived combining administrative and registry data. Higher-quality centers are associated with lower risk-adjusted cost. Conversely, the impact of lower quality on cost is mitigated by LT volume. Increases in quality tend to remove the association between risk-adjusted cost and volume, demonstrating the benefit of developing reliable care processes.

CITATION INFORMATION: Axelrod D., Balakrishnan R., Harris A., Hohmann S., Snyder J., Kasiske B., Schnitzler M., Lentine K. The Intersection of Cost, Quality, and Volume in Liver Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Axelrod: Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Other; Name of Commercial Interest; Sanofi. Other; Nature of Relationship; Advisor- Specialist Direct. **R. Balakrishnan:** None. **A. Harris:** None. **S. Hohmann:** None. **J. Snyder:** None. **B. Kasiske:** None. **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker.

ID

Infectious Disease 2

Abstract# 465

Prevalence of Hepatitis E Virus Infection in Solid Organ Transplant Recipients: A Systematic Review and Meta-analysis

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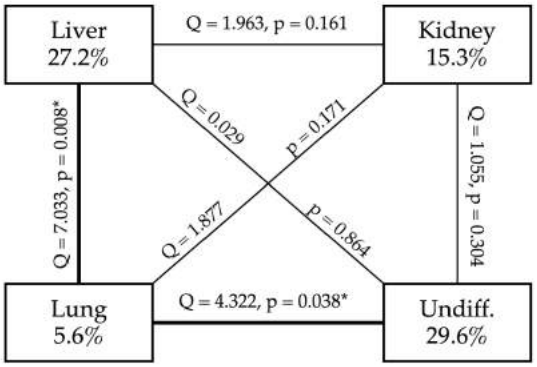
Purpose: Hepatitis E virus (HEV) infection is an underdiagnosed disease due to the use of serological assays with low sensitivity. Although most patients with HEV recover completely, HEV infection among patients with preexisting chronic liver disease and organ-transplant recipients on immunosuppressive therapy can result in in decompensated liver disease and death. The prevalence of HEV infection in solid organ transplant recipients is unknown and varies among organ types.

Methods: We searched Ovid MEDLINE, EMBASE, and the Cochrane Library for eligible articles through October 2020. The inclusion criteria are adult patients with history of solid organ transplantation. HEV infection is confirmed by either HEV-IgG, HEV-IgM, or HEV RNA assay.

Results: Of 563 citations, a total of 22 studies (n = 4,557) were included in the meta-analysis. The pooled estimated prevalence of HEV infection among solid organ transplant patients was 20.2% (95% CI 14.9-26.8). The pooled estimated prevalence of HEV infection in each organ transplant was as followed: liver (27.2%; 95% CI 20.0-35.8), kidney (12.8%; 95% CI 9.3-17.3), heart (12.8%; 95% CI 9.3-17.3), and lung (5.6%; 95% CI 1.6-17.9). The comparison across all organ transplant was statistically significant (Q = 16.721, p = 0.002). There was no statistical significance across subgroup analyses. The pooled estimated prevalence of de novo HEV infection was 5.1% (95% CI 2.6-9.6) and the pooled estimated prevalence of acute HEV infection was 4.3% (95% CI 1.9-9.4).

Conclusions: HEV infection is common in solid organ transplant recipients. The prevalence of HEV infection in lung transplant recipients is considerably less common than other organ transplants. More studies demonstrating the clinical impacts of HEV infection in solid organ transplant recipients, such as graft failure, rejection, and mortality, are warranted.



CITATION INFORMATION: Hansrivijit P., Trongtorsak A., Boonpheng B., Thongprayoon C., Cheungpasitporn W. Prevalence of Hepatitis E Virus Infection in Solid Organ Transplant Recipients: A Systematic Review and Meta-analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Hansrivijit: None. **A. Trongtorsak:** None. **B. Boonpheng:** None. **C. Thongprayoon:** None. **W. Cheungpasitporn:** None.

Abstract# 466

Belatacept for Kidney Transplantation in the Age of Covid19, is it Safe?

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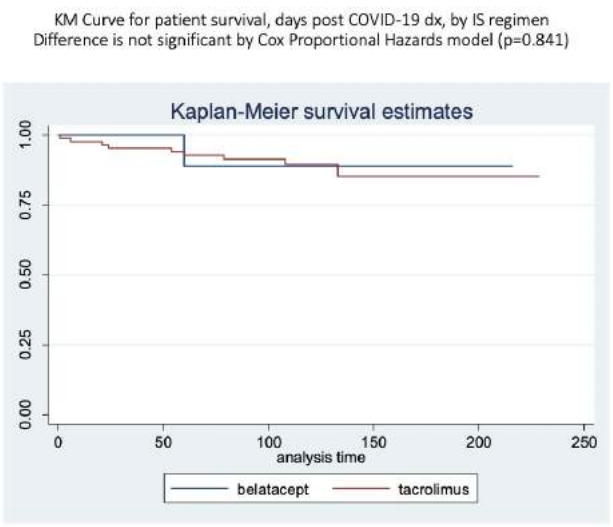
Purpose: The COVID19 pandemic has affected kidney transplant recipients (KTR) with a wide spectrum of clinical severity. Up to this point, we have solely seen reports describing outcomes of patients on calcineurin inhibitor-based regimens but there is a paucity of data regarding the use of belatacept (bela). Given the increased risk of viral infections seen with bela, this population is presumably at a higher risk for incidence and mortality of COVID19.

Methods: This is a single center retrospective study of Sars-Cov-2 PCR positive KTR between April and September 2020 who were on bela based regimens compared with tacrolimus (tacro) based regimens. The primary outcome was death or ICU admission at any time during the COVID19 infection. Secondary outcomes were rate of graft loss and rate of co-infection with bacterial, fungal or other viral pathogens.

Results: We identified 98 KTR who have been infected with Sars-Cov-2 of which 87 (84.4%) were on tacro and 11 (10.7%) were on bela. At our institution, currently there are 127 KTR on bela based maintenance immunosuppression; thus 11/127 (9%) developed COVID19. Mean age and gender was similar in both tacro and bela groups: (51 +/- 14 in tacro vs 57 +/- 12 in bela and 39% female in tacro vs 36% female in bela). Comorbidities (HTN, DM, COPD and HIV) were similar in both groups. Treatment was comparable and provided according to our current treatment protocols. Neither mortality (Figure 1) nor ICU admission was statistically significant between the groups (10% in tacro vs 9% in bela and 26% in tacro vs 27% in bela, respectively). Graft loss occurred in 5 (6%) of tacro patients and 1 (9%) of bela patients, not statistically significant. Co-infection with bacterial, fungal or viral pathogens in the tacro group occurred in 26 (30%), 8 (9%) and 5 (6%) of patients vs. 5 (45%), 1 (9%) and 0 patients in the bela group. These differences were not statistically significant.

Conclusions: Although limited with a small sample size and single center observations, the use of belatacept did not appear to worsen outcomes in terms of mortality, ICU admission, graft failure or rate of co- infections when compared to tacrolimus.



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Abstract# 467

Pre-transplant Lower Urinary Tract Dysfunction in Men is a Risk Factor for Adverse Outcomes Following Renal Transplantation

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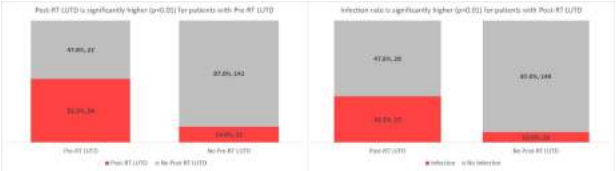
Purpose: The expanding age criteria for candidacy for renal transplantation, in conjunction with prolonged waiting time for deceased donor kidneys has created new challenges for men with benign prostatic hyperplasia (BPH) and lower urinary tract dysfunction (LUTD). The prevalence of LUTD in the end-stage renal disease male population has not been well characterized. Furthermore, it is unclear how pre-transplantation LUTD should be treated and whether there is post-transplant benefit for risk reduction. Thus, the objective of this study is to characterize the prevalence of pre-transplant LUTD in male candidates for renal transplantation and its contribution to post-transplant outcomes.

Methods: A single center retrospective study investigated 208 male kidney recipients. We defined LUTD as meeting at least one of following criteria: frequency/urgency, obstructive symptoms, urinary retention, urinary incontinence or bladder outlet obstruction.

Results: 46 (22.1%) patients had pre-transplant LUTD. Patients with pre-transplant LUTD were four times more likely to experience post-transplant LUTD compared with patients without pre-transplant LUTD (52.2% vs. 13.0%; p<0.01). Patients with post-transplant voiding dysfunction were also over four times more likely to develop a urinary tract infection compared with patients without post-transplant voiding dysfunction (37.8% vs 8.6%; p<0.01). Furthermore, older patients are more likely to have post-transplant LUTD compared to younger patients (p<0.05). Diabetes, anuria/oliguria, and history of previous urinary infection did not significantly predict post-transplant LUTD in univariate analysis.



Conclusions: Pre-transplant LUTD is a significant predictor for development of post-transplant LUTD leading to higher risk of post-transplant urinary tract infection. Further study is warranted to investigate whether interventions to reduce pre-transplant LUTD or peri-transplant LUTD can reduce the incidence of urinary tract infections and complications after transplantation.

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CITATION INFORMATION: Goldstein M., Schleich B., Carrea T., Yushkov Y., Cheng N., Harrison R., Munver R., Fromer D. Pre-transplant Lower Urinary Tract Dysfunction in Men is a Risk Factor for Adverse Outcomes Following Renal Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 468

Impact of SARS-CoV 2 Infection on Graft Function in Kidney Transplant Recipients: An Academic Single Center Experience

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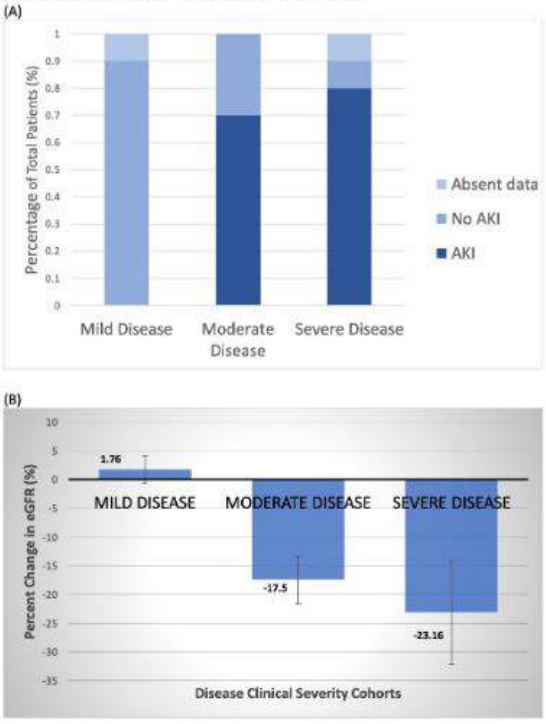
Purpose: Kidney transplant recipients are a unique cohort in regard to SARS-CoV 2 susceptibility and clinical course, owing to their immunosuppressed state and propensity for kidney injury. The purpose of this study is to ascertain if, in kidney transplant recipients, SARS-CoV 2 infection impacts long term renal allograft function. Further, it also aims to identify prognostic indicators that accurately predict any impact on graft function.

Methods: This retrospective, single-center study included kidney transplant recipients with a positive SARS-CoV-2 PCR at Northwestern Memorial Hospital from January 1, 2020 to June 30, 2020. Fifty-three patients met the inclusion criteria. Each patient's clinical disease severity was ranked according to the WHO Ordinal Scale for SARS-CoV-2 Clinical Improvement, and the study population was divided into three groups based on disease severity {mild disease (ordinal scale of 0-2): n=11, moderate disease (ordinal scale of 3-4): n=29, severe disease (ordinal scale of 5-8): n=13). The primary endpoint was change in estimated GFR (eGFR) from baseline kidney function prior to the positive SARS-CoV 2 PCR to 90 days after the positive test. Relevant demographic and clinical data was also collected. A one-way ANOVA test was employed to compare the 3 groups, and a Welch's T-test assessed differences between sets of two cohorts.

Results: Change in eGFR from baseline kidney function prior to infection to 90 days after the first positive SARS-CoV 2 test was +1.76 %, -17.5 % and -23.16 % the mild, moderate and severe disease groups respectively (Figure 1). There was a significant decline in kidney function in the moderate and severe disease cohorts as compared to the mild disease cohort, with respective p values of p=0.0002 and p=0.021. Relative to the mild disease cohort, the moderate and severe disease cohorts also demonstrated significantly increased risk of developing AKI, both with p values of P=0.0001 (Figure 2).

Conclusions: Clinically severe SARS-CoV 2 infection is associated with greater risk of acute kidney injury and greater decline in renal allograft function at 90 days post infection, compared to mild disease. These results highlight the importance of closely monitoring renal allograft function, in kidney transplant patients with SARS-CoV 2 infection. Furthermore, there is a need for additional studies to determine longer term allograft outcomes.

Figure 1. Impact of increasing clinical SARS-CoV-2 disease severity on renal allograft function. (A) Incidence of AKI developed over course of clinical infection in each of the three patient cohorts, represented as a percentage of the cohort total. (B) In each clinical disease severity cohort, percent change in estimated GFR (eGFR) from baseline kidney function prior to the positive SARS-CoV 2 PCR to 90 days after the positive test.



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Admin

Quality Assurance Process Improvement & Regulatory Issues

Abstract# 479

Video Virtual Transplant Evaluation and Listing

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Purpose: Due to the COVID-19 pandemic, many hospitals suspended in person evaluations of kidney transplants during the March-April time period of 2020. State and local agencies accelerated approval for video virtual visits and retroactively approved for reimbursement parity with in person visits.The transplant center at Atrium Health (AH) moved quickly to a virtual platform to move patients along the kidney evaluation process. Providers used the doxy.me platform, and phone visits. The purpose of this QA project is to track access to transplant listing during a global pandemic.

Methods: Beginning on March 3rd, the transplant center at AH began a phased shut down (allowing emergency visits and surgeries only) in response to COVID-19. The re-entry process began in April and was in full effect beginning June 1 and continues in November. The "Covid Safe" kidney evaluation went from a 100% on site evaluation process to a hybrid process to include: virtual teaching, virtual nephrology visits, virtual financial and social worker. The on site component remained for surgical evaluations, and for those patients unable to complete the virtual platform. Evaluation and listing numbers are tracked as part of the ongoing QA process. We look to compare volumes from June-Aug 2019 vs. June-Aug 2020.

Results:

2019 vs. 2019 (July-Sept)		
	2019	2020
Total Nephrology visits	210	232
In person Nephrology visits	210	85
Virtual Nephrology visits	0	147
Referral to listing (days)	230	308
Percentage of ancillary visits Virtually	0	59%
Listed for Transplant	47	29
Transplant volume	33	34

In a short fashion, the transplant clinic was able to list patients evaluated on a virtual platform.

Conclusions: Kidney transplant evaluation can be performed in a hybrid fashion. During the COVID-19 pandemic we were able to continue to evaluate and list patients. We did see a delay in listing time, most likely due to the transition period required for teaching and appointment scheduling. Further follow up will focus on patient safety and outcomes, transplant rates, and patient satisfaction.

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DISCLOSURES: V. Casingal: None. **B. Thrasher:** None. **J. Brown:** None. **C. Fotiadis:** None.

Abstract# 480

Transplant Trainee Education and Recruitment Experiences

D. E. Cassidy[1], A. E. Gomez-Rexode[1], J. R. Santos-Parker[1], M. S. Anderson[2], L. M. McElroy[3], M. E. Byrnes[2], S. A. Waits[2], V. S. Valbuena[2], *[1]University of Michigan Medical School, Ann Arbor, MI, [2]Department of Surgery, University of Michigan Health System, Ann Arbor, MI, [3]Department of Surgery, Duke University Medical Center, Durham, NC*

Purpose: The demand for training in abdominal transplantation has continued to decrease. General surgery residents have less exposure to transplant surgery, creating a need for intentional trainee engagement. There is limited knowledge to inform recruitment practices, thus we aimed to understand the training experiences of the rising transplant surgery workforce.

Methods: A 38 question survey was distributed to 324 trainee members of the ASTS about early exposure to transplant surgery and mentorship. Open-ended questions regarding career goals and recruitment experiences were included. Descriptive statistics were performed. Narrative responses were coded for content and reported thematically.

Results: 94 ASTS trainee members responded to the survey (29% response rate). 57% of participants had exposure to transplant surgery in medical school. This correlated with a higher interest level in the specialty at the beginning of residency (correlation = 1.19, $p<0.05$). Most trainees felt supported by transplant faculty during research time (64%) and their fellowship application cycle (73%). Narrative responses concurred with survey findings and identified three key themes: career aspirations, role models, and positive training experiences. Career aspirations included a desire for academic practice and work-life balance. Participants identified approachability and visible leadership as key attributes of role models. Positive early experiences included faculty mentorship and participation in transplant operations.

Conclusions: Early exposure to transplant surgery can optimize interest and recruitment in the specialty. Positive medical school experiences were common in the training narrative of participants. Participants reported having strong mentorship in the field, highlighting the importance of individual faculty mentorship practices to promote recruitment.

Themes		Theme (# of responses)	Example quotations
Career aspirations	Academic goals and focus on research	31	"Ultimately envision a career as an academic transplant surgeon with an NIH-funded research portfolio. I hope that my clinical activities and research will impact the field and push the field forward."
	Hepatobiliary practice	11	"After training, I envision myself as an academic surgeon who takes care of HPB focused patients by both means of resection and transplantation. Additionally, I see myself continuing as an outcomes researcher and in administrative roles."
	Technical skill	20	"I want to be capable of coping with the most difficult situations in the OR. I want to have a broad repertoire from minimally invasive procedures to open procedures."
	Importance of family and balance	14	"Academic transplant surgeon doing clinical outcomes research in transplant. Involved with ASTS and advancement of the field as a whole. Actively engaged in childcare/ involvement with children's education and activities."
Role models	Approachability and kindness	17	"Yes. There are two people that come to mind. I find them inspirational because although those field is very challenging they come into the OR with a joyful attitude. The nurses and staff are happy and great spirits because the surgeons have that effect."
	Visible leadership and technical skill	24	"Yes, there are a couple of individuals that are very inspiring. Their technical skill, patient centric management and devotion for teaching."
	Personal success at career balance	9	"Lots of people for different reasons. Admittedly I don't think there is one person who exemplifies exactly what I want my future career to be but many great leaders and examples. I very much appreciate people who are able to balance life and work, not that they are ever totally in balance but in a way that allows them to feel accomplished in both facets of their life."
Positive experiences in the specialty as a medical student and junior resident	Intentional mentorship	14	"The head of the department was very attentive towards us younger students, always keen to explain and listen." "All positive elements: direct patient care, mentorship from transplant faculty, research opportunities, sponsorship during residency applications, continued friendship after graduated from medical school."
	Meaningful patient care	9	"Amazing mentorship. Great opportunity to see positive changes in people's lives."
	Feeling part of a team	12	"Having mentors, residents and fellows who encouraged my interest and excitement and invited me to feel like a member of the team (going on donor runs, calling me in to scrub in on overnight cases, supporting medical student interest groups)."
	Opportunity for OR exposure	10	"Our program has a large service staffed with several 5-6 APPs on any given day. The APPs largely take care of the floor patients, and therefore the resident really has no responsibility other than to assist in the OR. For residents interested in transplant, many enjoy this structure."
	Increased level of responsibility	4	"We are given a lot of responsibility as junior residents on the transplant service. It's a difficult, busy service, but not the most work-intensive of our services as interns."

CITATION INFORMATION: Cassidy D., Gomez-Rexode A., Santos-Parker J., Anderson M., McElroy L., Byrnes M., Waits S., Valbuena V. Transplant Trainee Education and Recruitment Experiences *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.E. Cassidy: None. **A.E. Gomez-Rexode:** None. **J.R. Santos-Parker:** None. **M.S. Anderson:** None. **L.M. McElroy:** None. **M.E. Byrnes:** None. **S.A. Waits:** None. **V.S. Valbuena:** None.

Abstract# 481

Assessing the Prevalence of Risk Factors for Osteoporosis and Rate of Screening by Dexa Scan in Patients Referred for Liver Transplant Evaluation

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Purpose: Osteoporosis (OP) and fragility fractures are well-known complications of both chronic liver disease (CLD) and transplant, with a significant increase in the prevalence of fractures in months after liver transplant (LT). The objectives of this quality improvement project were to assess whether patients with CLD are appropriately screened for OP, to determine the prevalence of additional risk factors for bone loss in pre-LT patients and to ascertain whether systematic screening for low bone mineral density (BMD) should be a routine component of LT evaluation.

Methods: A retrospective chart review was performed of patients referred for LT evaluation at a large academic medical center from July 20 - November 5, 2020. Baseline characteristics including etiology of CLD, risk factors for OP, history of fractures and prior screening for low BMD with DEXA scans were reviewed. Assessment of nutritional and lifestyle risk factors was conducted by the transplant dietician.

Results: The median age for our population was 59 years; 48% of the population was female, and the most common reason for liver transplant evaluation referral was alcoholic cirrhosis. Of 84 patients referred for LT evaluation, 17 (20.2%) had a DEXA scan to screen for low BMD. Among the 17 patients with DEXA scans, 5 had osteopenia and 2 had OP. Three of those 7 were prescribed Vitamin D. Seventy-six patients (90%) had at least one risk factor for OP other than CLD. In the 47 patients that had 2 or more risk factors, 13 (28%) had a DEXA scan. The median MELD-Na score was 17. Of the 24 patients with MELD <15, 8 had a DEXA scan compared with 8/48 patients with MELD 15-25 and 1/12 patients with a MELD >25.

Conclusions: The low rate of screening for OP in this high risk population highlights a gap in the care of patients with advanced CLD. Even patients with multiple other risk factors for OP have a low rate of screening. Given the known impact of LT on bone density and the morbidity associated with fragility fractures, there is need for increased education about the risks of low BMD in patients with CLD at the primary care level, and BMD assessment should be a routine part of the transplant evaluation.

Table 1. Prevalence of OP Risk Factors	
Most prevalent risk factors for low BMD	***Number of patients (%)***
Age >50	57 (68%)
Current tobacco use	24 (29%)
BMI <21	12 (14%)
Excessive alcohol consumption	10 (12%)
Glucocorticoid use	7 (8%)
Prior fragility fracture	4 (5%)

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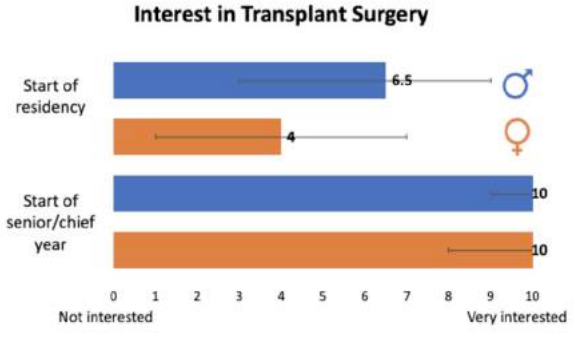
Abstract# 482

Experiences of Women Trainees in Transplant Surgery

A. E. Gomez-Rexrode[1], D. E. Cassidy[1], M. S. Anderson[2], J. R. Santos-Parker[1], L. M. McElroy[3], S. A. Waits[2], V. S. Valbuena[2], *[1]University of Michigan Medical School, Ann Arbor, MI, [2]Department of Surgery, University of Michigan Health System, Ann Arbor, MI, [3]Department of Surgery, Duke University Medical Center, Durham, NC*

Purpose: To assess the unique experiences of women surgical trainees to better understand the recruitment and training strategies needed to ensure meaningful progress toward gender parity in the field of transplantation.
Methods: A 38-question survey was distributed to trainee members of the American Society of Transplant Surgeons (ASTS) to assess medical school and residency training experiences and exposure to transplant surgery, as well as career and academic mentorship received as trainees. Descriptive statistics and Mann-Whitney U tests were performed to determine statistical significance.
Results: Of the 324 ASTS trainee members contacted, 94 (29% response rate) completed the survey and 37% of participants identified as women. At the start of residency training, men rated their interest in transplant surgery significantly higher with a median score of 6.5 (6) compared to women (4.0 [6]) ($p<0.05$) on a rating scale of 1 = not interested, to 10 = very interested. At the start of their senior/chief years of training, both men and women rated their interest in transplant surgery equally (10 [1] and 10 [2] respectively). Most women (53%) and men (57%) senior residents had greater than one month of clinical exposure to transplant surgery at their home program and qualified their operative experience as excellent or good (94%; 76%). Most women and men trainees also felt supported by the transplant faculty at their institutions, both in their dedicated research time (68%; 63%) and during their fellowship application cycle (74%; 78%).
Conclusions: To date, a gender gap persists in transplant surgery. Women trainees report less interest in transplant surgery in their junior years and the survivorship bias from the cross-sectional study design may underestimate the magnitude of this finding. Although this difference is not reported in their senior years compared to their male counterparts, early career engagement of women trainees may provide an avenue to reduce the current gender gap. More organized and targeted mentorship, including supportive relationships with transplant surgeons early in trainees' careers and positive junior transplant surgery experiences, are needed to promote engagement in transplant surgery among women trainees.



CITATION INFORMATION: Gomez-Rexrode A., Cassidy D., Anderson M., Santos-Parker J., McElroy L., Waits S., Valbuena V. Experiences of Women Trainees in Transplant Surgery *AJT, Volume 21 Supplement 3*
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Abstract# 483

Iatrogenic Sodium Exposure in Hospitalized Patients with Liver Disease

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Purpose: Numerous medications administered in the hospital setting may contain hidden/additional amounts of sodium in the drug itself and via intravenous (IV) diluents or admixtures. In patients with liver disease, sodium from these non-dietary sources can worsen ascites/edema, volume overload, diuretic resistance and potentially prolong hospitalization.
Methods: To determine the frequency and extent of iatrogenic sodium overload, we evaluated patients with liver disease (defined as MELD score > 15) who were admitted to the inpatient hepatology service at University of Colorado Hospital with a dietary sodium restriction order between 1/1/18 to 1/1/20. We excluded patients who received normal saline or Lactated Ringers as IV volume expanding therapy or if they had a history of liver transplant. Our primary outcome was the amount of additional daily sodium intake from oral and IV medications and their associated diluents/admixtures during each hospitalization encounter.
Results: A total of 258 encounters from 201 patients were included in the analysis. The median daily sodium content from non-dietary sources was 96 mg (interquartile range, 0-573.85 mg). The most common admitting diagnoses were: alcoholic cirrhosis (15.5%) and hepatic failure with coma (8.1%). The average length of stay was 7 days. There were 111 encounters (43%) where patients received no additional sodium from medications. Of the remaining 147 encounters, patients from 94 encounters (36.4%), 20 encounters (7.8%), and 33 encounters (12.8%) received an additional average daily sodium between 1 mg to 1000 mg, > 1000 mg to 2000 mg, and > 2000 mg, respectively. The primary source of iatrogenic sodium intake was from IV antimicrobials and associated diluents/admixtures. The most common sources of iatrogenic sodium in patients with an average of > 1000 mg/day were IV vancomycin, ceftriaxone, piperacillin/tazobactam, metronidazole, and meropenem.
Conclusions: Our results indicate that iatrogenic sodium overload from medication sources is a frequent occurrence (20.6% of encounters received > 1000 mg of additional sodium from medications) in hospitalized patients with liver disease. Diligence should be taken to minimize use of very high sodium-containing antibiotics when appropriate and use lower sodium-containing infusion solutions. Future research is warranted to evaluate the impact of excess sodium on outcomes of patients on the liver transplant wait list.

CITATION INFORMATION: Klem P., Mbangu Kot Mbau R., Crowther B., Lewis V., Lin S., Patrick E., Nadrash A., Schoeppler K., Kim I. Iatrogenic Sodium Exposure in Hospitalized Patients with Liver Disease *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Klem: None. R. Mbangu Kot Mbau: None. **B. Crowther:** None. **V. Lewis:** None. **S. Lin:** None. **E. Patrick:** None. **A. Nadrash:** None. **K. Schoeppler:** None. **I. Kim:** None.

Abstract# 484

Impact of the Covid-19 Pandemic on Transplant Pharmacist Workforce

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Purpose: Evaluate the impact of the COVID-19 pandemic on the transplant pharmacist workforce.
Methods: A voluntary survey open from August 18, 2020 to September 15, 2020 was sent out to two prominent solid organ transplant pharmacy listservs. Respondents were asked to give background about their transplant institution, patient population and departmental staffing. Respondents were asked to comment on how the COVID-19 pandemic has impacted their ability to perform their transplant related activities for patient care.
Results: A total of 67 transplant pharmacists from 57 centers responded to the survey. The majority (61.2%) of pharmacists surveyed practice primarily in abdominal transplant programs with 29.8% at small, 33.3% at moderate, and 36.8% at large volume centers (<100, 100-300, and >300 total transplants, respectively). Almost all institutions have a living donor kidney transplant program (96.5%) and in response to the COVID-19 pandemic, 55.2% of centers reported stopping non-life saving kidney and liver transplants, most (89.6%) stopped living donor transplants. A majority (73.1%) of pharmacists surveyed were funded by the pharmacy cost center. Due to the pandemic, 40% of centers surveyed stopped performing bedside medication education, and 46.3% no longer allowed caregivers on site for medication education (Figure 1). Consequently, 41.8% of the pharmacists surveyed felt that their confidence in their patients' understanding of medications decreased. Transplant pharmacists reported a perceived mean decrease in resources required for daily work responsibilities of 0.18% (IQR -0.35 - 0), 0.11% (IQR -0.3 - 0), and 0.26% (IQR -0.43 - 0) at

low, moderate, and high volume transplant centers, respectively; however, there was no statistical difference. The perceived mean decrease in resources for pharmacists who are under the pharmacy cost center (0.18%, IQR -0.35 - 0) compared to those who are not (0.12%, IQR -0.3 - 0) was also not significantly different.

Conclusions: There was a reported reduction in transplant pharmacist services due to the COVID-19 pandemic, particularly with patient education, and a perceived reduction in available resources, but no difference based on center volume. While life-saving transplant continued, the impact of patient education on outcomes remains uncertain.

Figure 1: Changes in Resources and Impact due to COVID-19 Pandemic (n = 67)

Resources and Education (n, %)	
Prior to COVID-19, how did you perform transplant medication education?	
Individual teaching sessions with patients and caregivers	65 (97)
Group teaching sessions with patients and caregivers	11 (16.4)
Pre-recorded teaching sessions with follow up	4 (6)
Please indicate how you feel about the amount of time/resources available to you and what is required for your daily work responsibilities (0-10)? mean (IQR)	6.9 (5 - 8)
Since the COVID-19 pandemic, please indicate how you feel about the amount of time/resources available to you and what is required for your daily work responsibilities, mean (IQR)	5.8 (4 - 7)
In response to the COVID-19 pandemic, my program made the following changes:	
Cancelled group teaching	15 (22.4)
Caregivers no longer allowed on site for education	31 (46.3)
Inability to provide in-person education at the bedside (e.g. Zoom, Webex, etc. education only)	27 (40.3)
Bedside pillbox fills no longer performed	11 (16.4)
No changes have been made	20 (29.9)
Other	14 (20.9)
Since implementation of post-transplant medication education changes, my confidence in patient and caregiver's level of understanding their medications has:	
Decreased	28 (41.8)
Not changed	36 (53.7)
Unknown	3 (4.5)
In response to the COVID-19 pandemic, my program made the following changes to transplant pharmacists' ability to see patients in the outpatient setting:	
Pharmacists no longer see patients in the outpatient setting	3 (4.5)
Pharmacists only see patients on an as needed basis in the outpatient setting	32 (47.8)
Pharmacists only conduct telehealth or phone call visits	27 (40.3)
No change	25 (37.3)
Not applicable; I do not work in the outpatient setting	4 (6)
Clinical and Financial Impact (n, %)	
In response to financial impact of the COVID-19 pandemic, my institution implemented the following changes:	
Additional time at work (overtime)	3 (4.5)
Reduction in hours (decrease in FTE)	10 (14.9)
Reduction in compensation	10 (14.9)
Termination of transplant pharmacists	0 (0)
Hiring freeze across the institution	35 (52.2)
No changes have been made	18 (26.9)
Other	23 (34.3)
Mandatory paid time off	5 (7.5)
Furlough	3 (4.5)
In response to the clinical impact of the COVID-19 pandemic, have you been asked to work in a different setting?	
Yes, I have been asked to work in a different clinical practice (e.g. ICU, medicine, etc.)	12 (17.9)
Yes, I have been asked to work in an operational setting	8 (11.9)
No changes	47 (70.1)

CITATION INFORMATION: Lyons J., Khalil K., Teuteberg J., Henricksen E. Impact of the Covid-19 Pandemic on Transplant Pharmacist Workforce *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Lyons: None. **K. Khalil:** None. **J.J. Teuteberg:** None. **E.J. Henricksen:** None.

Abstract# 485

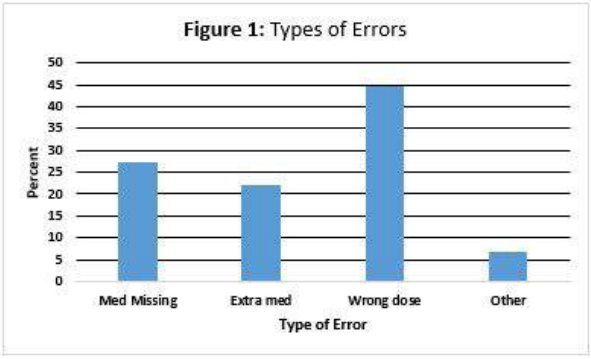
Reduction in Medication Errors at Discharge in the Transplant Population via Use of Novel Pharmacist / Nursing Dual Check System

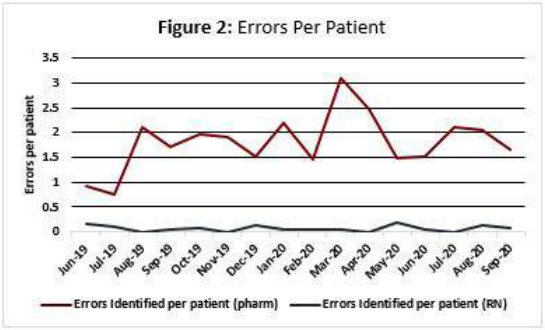
M. Norris, S. Witek, C. Whritenour, K. Sigafus, C. Chiang, C. Sammons, D. Naveiro, A. Paredes, E. Perez-Ngai, M. Kaminski, R. Westmoreland, G. Malat, *Hospital of the University of Pennsylvania, Philadelphia, PA*

Purpose: Medication errors are of great concern due to the risk for patient and allograft injury. The aim of this study was to evaluate the effectiveness of a novel multidisciplinary discharge medication reconciliation process.

Methods: Consecutive transplant recipients were retrospectively analyzed following the implementation of a multidisciplinary, quality improvement project targeting an efficient, effective discharge workflow. This project improved multidisciplinary communication and the discharge medication review process by including transplant pharmacist review prior to specialty pharmacy dispensing and nurse review after medication delivery. Data collected focused on quantifying the impact of the reduction of medication errors at discharge.

Results: Seven-hundred twenty-three total medication errors were captured, among all adult abdominal organ recipients transplanted between Jun 1, 2019 and Sep 1, 2020 (N=389). The majority of errors were identified prior to medication dispensing (96%), with a median of 1.8 errors per patient (IQR 1.5-2.1). Types of error are described in Figure 1. The highest errors per patient identified were in March (3.2) and April (2.5), 2020 (Figure 2). Adherence to novel discharge workflow improved from 59% to 100% throughout the study period by pharmacy and nursing staff.





Conclusions: A novel discharge workflow incorporating transplant pharmacists, nursing, and specialty pharmacy staff was effective in detecting and mitigating medication errors at each step in discharge process, improving discharge efficiency and de novo abdominal transplant recipients transitions of care.

CITATION INFORMATION: Norris M., Witek S., Whritenour C., Sigafus K., Chiang C., Sammons C., Naveiro D., Paredes A., Perez-Ngai E., Kaminski M., Westmoreland R., Malat G. Reduction in Medication Errors at Discharge in the Transplant Population via Use of Novel Pharmacist / Nursing Dual Check System *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Norris: None. **S. Witek:** None. **C. Whritenour:** None. **K. Sigafus:** None. **C. Chiang:** None. **C. Sammons:** Consulting Fee; Name of Commercial Interest; Mallinckrodt Pharmaceuticals. Consulting Fee; Nature of Relationship; Speaker Bureau. **D. Naveiro:** None. **A. Paredes:** None. **E. Perez-Ngai:** None. **M. Kaminski:** None. **R. Westmoreland:** None. **G. Malat:** None.

Abstract# 486

Review of Unos Report of Organ Offers is Supplemented with Documented Real-time Communication Messages

E. S. Pahl[1], N. Patterson[2], *[1]University of Iowa, Iowa City, IA, [2]Iowa Methodist, Des Moines, IA*

Purpose: Use real time group messaging data among procurement and transplant professionals to supplement the review of UNOS Report of Organ Offers (ROO) for declined primary offers when the organ was later transplanted elsewhere at a later sequence.

Methods: UNOS ROO data for offers facilitated by an organ procurement organization (OPO) from July 2017 - December 2020 were connected to group messaging data from a dedicated secure communication mobile app used by participants from the OPO, recovery, and transplant clinical and coordination teams. Critical decision time points in the organ offer, procurement, and transplant processes were reviewed on a monthly basis during a routine monthly meeting among the teams.

Results: Teams reported enhanced quality of their monthly retrospective review of the ROO when supplemented with real time documentation. Administrators reported that they received a detailed, factual account of what transpired during each offer. Teams highlighted that having real time documentation was particularly useful for organ offers that were later transplanted elsewhere at a later sequence. Administrators substantiated the need for centerwide organ acceptance standards and processes. The delineation resulted in increased buyin from clinical teams.

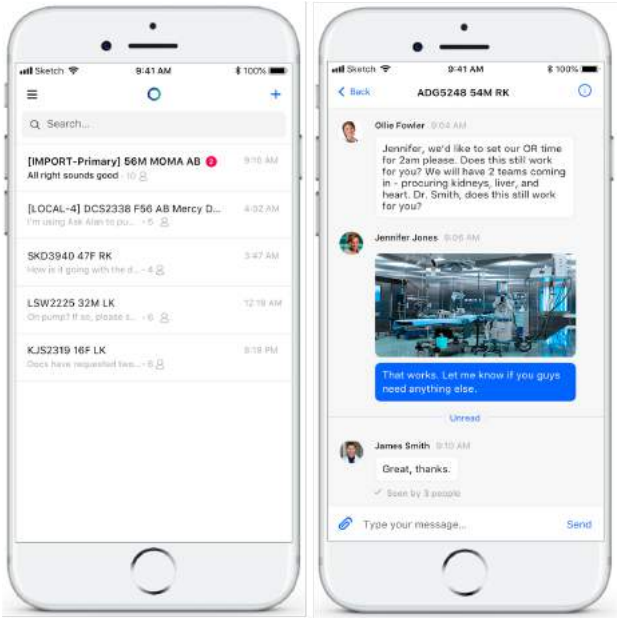
Conclusions: UNOS ROO and other organ utilization tools and data are used to effectively improve offer evaluation processes in organ procurement and transplantation. Mobile apps capture additional contextual data that is helpful when analyzing

offer data and mitigate reimbursement and liability issues. Reviewing insights provides an opportunity for feedback and testing of decision-making strategies and organ offer filters.

Table. Report of Organ Offers with color code Green: transplanted, Gray: never primary, Orange: transplanted someone else same center, and Red: transplanted elsewhere after the decline. Particularly for Red offers, programs look at data captured in the real-time messaging app to reconstruct the case events and timeline.

Figure. An organ case using the mobile application, which automatically records and documents context, coordination, and communication events and is linked to supplement any organ offer from the UNOS report of organ offers.

Organ	Offer Sequence	KDPI	EPTS	Initial Offer Acceptance	Distance	Primary	Transplanted	Declined
KI	54	15	26	Provisional Yes (PY)	PY	Local	N	N	
KI	51	12	26	PY	PY	Local	N	N	
KI	30	85	26	No (N)	N	National	Yes (Y)	Y	Not considered for transplant
KI	45	68	54	N	N	Regional	Y	Y	Recipient too far away for timing purposes.
KI	56	55	30	PY	Y	Local	Y	Y	
KI	16	17	92	PY	PY	Local	N	N	
KI	51	46	92	PY	PY	Local	N	N	
KI	24	68	90	N	N	Regional	Y	Y	Patient ill, unavailable, refused, or temporarily unsuitable
KI	23	55	91	PY	N	Local	Y	Y	Donor size/weight
KI	21	59	90	PY	PY	Local	Y	N	?
KI	45	79	90	PY	N	Local	Y	N	Donor age or quality



CITATION INFORMATION: Pahl E., Patterson N. Review of Unos Report of Organ Offers is Supplemented with Documented Real-time Communication Messages *AJT, Volume 21 Supplement 3*

DISCLOSURES: E.S. Pahl: Ownership Interest; Name of Commercial Interest; OmniLife. Ownership Interest; Nature of Relationship; CoFounder and Officer. **N. Patterson:** None.

Abstract# 487

Tacrolimus Shortage and the Rush to Convert: An Unexpected Burden on the System During the Covid-19 Pandemic?

N. Pilch, L. Johnson, M. Aldoughaim, N. Patel, F. Bartlett, *Medical University of South Carolina, Charleston, SC*

Purpose: A national shortage of immediate release (IR) tacrolimus (FK) fully impacted our center in May 2020. The conversion process was immediately challenging during the peak of the COVID-19 pandemic in our state. The aim of this analysis was to assess the healthcare burden that resulted from a national IRFK shortage.

Methods: This is a retrospective analysis of the conversion from IRFK to tacrolimus XR for all adult kidney recipients transplanted during the 2019 calendar year who had a functioning graft at the start of conversion (May 2020). Pts were divided into converted and not converted cohorts. Health care resource utilization as evidenced by notes in the EHR and encounters for therapeutic drug monitoring (TDM) were captured for 180 days for all pts; for converted pts these data were collected pre and post-conversion. The avg salary for a RN coord is $75K/yr or $38.46/hr. For each EHR encounter the average est cost was 30 mins ($19.23) and TDM was 15 mins ($9.62). Est PharmD costs per 17$/15 mins based on average base salary of $150K and a phone call time was est at 10 mins/call, provider costs estimated on avg base salary $75/hr consider 30 mins, $37.50 required for conversion and education for single post-conversion visit that would not have been required if conversion were not necessary.

Results: 226 pts were transplanted in 2019 with 113 pts included for analysis (Figure 1). Pts without conversion had less EHR encounters during the study period (Table 1). TDM did not differ significantly pre and post-conversion among groups but did between groups. For the converted cohort total provider estimated costs was $3187.50 however if this were expanded to the estimated 2000 patients currently in follow-up the cost of provider time for conversion would be estimated around $75K. PharmD fielded an average of 10-15 calls/day (150 mins/day) for 6 wks following the initial conversion period for all patients. The cost for this time period was estimated at $4500.

Conclusions: Converted pts overall had more healthcare encounters and TDM encounters pre and post-conversion compared to those that were not converted. Additional provider, coordinator and PharmD time were required for conversion efforts.

Table 1: No Conversion versus Conversion Resource Utilization Estimates

	No Conversion n=28	Conversion n=85
Electronic health record encounters 90 days before (#, avg±SD)	6±4	10±8
Cost of electronic health record encounters 90 days before ($, avg±SD)	115±76	201±150
Therapeutic drug monitoring encounters 90 days before (#, avg±SD)	2±2	2±2
Cost of TDMencounters 90 days before ($, avg±SD)	23±15	22±17
Electronic health record encounters 90 days AFTER (#, avg±SD)	7±5	12±6
Cost of electronic health record encounters 90 days AFTER ($, avg±SD)	134±93	222±118
Therapeutic drug monitoring encounters 90 days AFTER (#, avg±SD)	2±3	3±2
Cost of TDMencounters 90 days before ($, avg±SD)	22±26	27±16

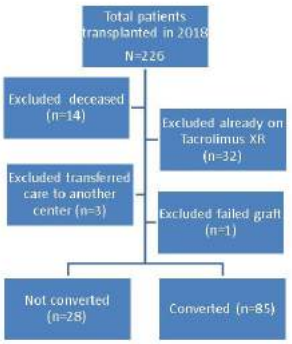


Figure 1: Consort Diagram Patients Included and Excluded from Analysis

CITATION INFORMATION: Pilch N., Johnson L., Aldoughaim M., Patel N., Bartlett F. Tacrolimus Shortage and the Rush to Convert: An Unexpected Burden on the System During the Covid-19 Pandemic? *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Pilch: None. **L. Johnson:** None. **M. Aldoughaim:** None. **N. Patel:** None. **F. Bartlett:** None.

Abstract# 488

Clinical Impact of Transplant Pharmacists on the Care of Solid Organ Transplant Recipients

I. Shah[1], J. Au[1], A. Diamond[1], N. Sifontis[2], C. Ruggia-Check[1], *[1]Temple University Hospital, Philadelphia, PA, [2]Temple School of Pharmacy, Philadelphia, PA*

Purpose: The United Network for Organ Sharing (UNOS) and Centers for Medicare and Medicaid Services (CMS) requires transplant centers to document the participation of a clinical pharmacist on multidisciplinary solid organ transplant (SOT) teams. These pharmacists are integral in providing and supporting evidence-based practices, quality improvement initiatives, medication access, patient education and protocol development. The purpose of this study is to evaluate the impact of SOT pharmacists on the care of SOT recipients.

Methods: This prospective, quality improvement, chart review included all patients who received a SOT and had at least one clinical intervention documented by the transplant pharmacist (3 full-time pharmacists and 1 SOT resident). The primary

objective of the study was to determine the impact of the transplant pharmacy team in identifying and correcting medication errors pertaining to immunosuppression, rejection, and infection (antiviral, antifungal and PJP prophylaxis and treatment). The secondary objectives were to quantify the acceptance rate of the interventions, estimate financial impact of the interventions made, and quantify the time commitment to optimize medication regimens.

Results: A total of 210 patients were included in the study from July 1 to November 9, 2020. Transplant pharmacists documented 1,380 interventions in the three-month period with an acceptance rate of 95%. The most common type of transplant with documented interventions was lung (59%) followed by kidney (16.2%), heart (11.9%), liver (8.1%), heart-kidney (1.9%), kidney-pancreas (1.4%), heart-lung (1%) and liver-kidney (0.5%).The most common intervention categories were dosing issues (69.9%) followed by appropriate therapy (20.1%). A breakdown of types of interventions within these categories is located in the table below. The median number of interventions per patient was four [IQR: 1-9]. The total time spent making clinical interventions was 8,139 minutes. Through the clinical interventions recommended by transplant pharmacists, the estimated cost-avoidance was $319,787.

Key intervention categories		
Intervention type	Immunosuppression	Infection and rejection
Kinetic dose adjustment	539	0
Renal dose adjustment	1	115
Dosing adjustment (other)	119	32
Additional drug required	113	107
Drug-drug interaction	8	5
IV to PO	44	47

Conclusions: Transplant pharmacists play an integral role in SOT multidisciplinary teams to optimize patient care through identification and correction of medication errors related to immunosuppression, infection, and rejection. Interpretation of these results may be limited by inter-pharmacist variability in documentation. Appropriate identification and correction of medication errors is associated with significant cost-avoidance.

CITATION INFORMATION: Shah I., Au J., Diamond A., Sifontis N., Ruggia-Check C. Clinical Impact of Transplant Pharmacists on the Care of Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: I. Shah: None. J. Au: None. **A. Diamond:** None. **N. Sifontis:** None. **C. Ruggia-Check:** None.

Abstract# 489

Proxies of Ischemia Time Do Not Predict 1-Year Posttransplant Survival

M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], J. Alcorn[4], R. Goff[4], D. Stewart[4], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH, [4]UNOS, Richmond, VA*

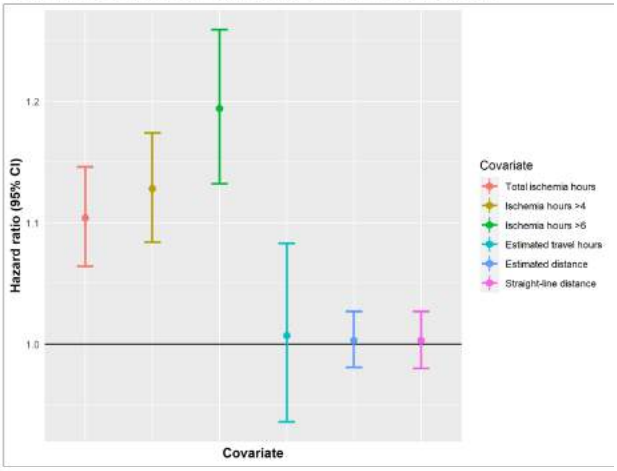
Purpose: A barrier to broader distribution of donor organs is a concern that increased donor-to-recipient (DtR) distances could increase ischemia times and compromise posttransplant (PT) survival. Some experts have recommended using DtR travel distance or time as proxies for ischemia time in a PT survival component of a continuous allocation score.

Methods: We estimated DtR travel time and distance for lung transplant recipients from January 1, 2015 to December 31, 2018, using a Google application programming interface. We fit 6 Cox proportional hazards models to estimate the effects of ischemia time and its proxies (distance and time) on 1-year PT survival. Each model included the same donor and recipient factors, plus one of the following: ischemia time, ischemia time splines with knots at 4 or 6 hours, travel time, travel distance, or straight-line distance. We computed the correlation of ischemia time with its linear proxies.

Results: Ischemia time was a significant predictor of PT survival, but none of its proxies were. Risk of PT death increased 10% for each increased hour of ischemia time. Linear splines resulted in 13% and 19% increases in risk of PT death for each additional hour of ischemia time above 4 and 6 hours, respectively. These estimates were significant at the $P<0.0001$ level. Hazard ratios for the three proxies were no different from 1 (Figure). While the proxies were significantly correlated with ischemia time ($P<0.0001$), the percent of variability explained (the square of the correlation coefficient) ranged from 17.0% for straight-line distance to 19.4% for travel hours. Thus, over 80% of the variability in ischemia time was due to factors other than travel. Clinicians theorized that travel and operating room (OR) logistics, OR complications, difficult donors, and complicated recipients contribute to ischemia time.

Conclusions: Ischemia time was correlated with DtR travel time and distance but not strongly enough to predict outcomes. Non-travel factors may explain the relationship between ischemia time and PT survival.

Figure 1: Effect of ischemia time and proxies on 1-year PT survival



Note: Estimated and straight-line distances are modeled per 100 miles; hazard ratio represents increased risk of 1-year death per 100 mile distance increase.

CITATION INFORMATION: Skeans M., Wey A., Lease E., Lehr C., Alcorn J., Goff R., Stewart D., Valapour M. Proxies of Ischemia Time Do Not Predict 1-Year Posttransplant Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Skeans: None. **A. Wey:** None. **E. Lease:** None. **C. Lehr:** None. **J. Alcorn:** None. **R. Goff:** None. **D. Stewart:** None. **M. Valapour:** Grant/Research Support; Name of Commercial Interest; NIH, Cystic Fibrosis Foundation. Grant/Research Support; Nature of Relationship; Research Support.

Abstract# 490

Aligning Pediatric Waiting List and Post-Transplant Outcomes with the Adult Lung Allocation Score

M. Skeans[1], A. Wey[1], E. Lease[2], C. Lehr[3], J. Alcorn[4], R. Goff[4], D. Stewart[4], M. Valapour[3], *[1]SRTR, Minneapolis, MN, [2]Univ of Washington, Seattle, WA, [3]Cleveland Clinic, Cleveland, OH, [4]UNOS, Richmond, VA*

Purpose: Lung allocation is moving toward a continuous distribution framework (CDF), with components for waitlist (WL) urgency and post-transplant (PT) survival, as computed in LAS. Candidates aged 0-11 years are excluded from LAS models and classified as Priority I (more urgent) or II. We computed expected WL and PT survival in this cohort to be used in the CDF to align with candidates aged ≥12 years who receive a lung allocation score (LAS).

Methods: We estimated predicted number of WL survival days within a year (WLAUC) and predicted number of PT survival days within a year (PTAUC) for Priority I and II candidates. Model cohorts included candidates and recipients aged 0-11 years from September 12, 2010 to January 31, 2019. WL follow-up was censored on the earliest of 1 year after joining the cohort; removal from the WL; January 31, 2020; or the candidate's 12th birthday. Outcome was 1-year WL survival. PT follow-up was censored at 1-year PT. Outcome was 1-year PT survival. We fit Cox proportional hazards models, each with one covariate: Priority I vs. II. Each model generated a baseline survival function and an estimate associated with Priority I. From these, we computed the WLAUC and PTAUC for Priority I and II. We computed LAS(p) as a function of WLAUC and PTAUC, similar to LAS.

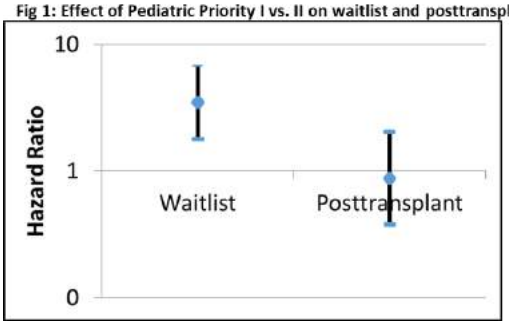
Results: The WL cohort included 271 candidates, 54 (19.9%) of whom died waiting. Among 136 recipients, 51 (18.8%) died within 1 PT year. About half of patients (49.1%) were Priority I at cohort entry, and 58.1% were Priority I at transplant. Priority I was a risk factor for 1-year WL death but not 1-year PT death (Figure). Priority I and II patients were predicted to live 247 and 325 days, respectively, on the WL and 333 and 328 days PT. Priority I and II patients had effective median LAS(p) of 52.0 and 37.3, respectively (Table).

Conclusions: Pediatric Priority can be aligned with LAS to allow pediatric patients to receive points for WL urgency and PT survival in a CDF. Pediatric priority is associated with WL mortality but not PT mortality.

Table 1: Estimates of survival days by Pediatric Priority score

	N	WLAUC (days)	PTAUC (days)	LAS(p)
Priority I	133	247	333	52.0
Priority II	138	325	328	37.3
Overall	271	286	331	44.5

Fig 1: Effect of Pediatric Priority I vs. II on waitlist and posttransplant survival



CITATION INFORMATION: Skeans M., Wey A., Lease E., Lehr C., Alcorn J., Goff R., Stewart D., Valapour M. Aligning Pediatric Waiting List and Post-Transplant Outcomes with the Adult Lung Allocation Score *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Skeans: None. **A. Wey:** None. **E. Lease:** None. **C. Lehr:** None. **J. Alcorn:** None. **R. Goff:** None. **D. Stewart:** None. **M. Valapour:** Grant/Research Support; Name of Commercial Interest; NIH, Cystic Fibrosis Foundation. Grant/Research Support; Nature of Relationship; Research Support.

Abstract# 491

The Implementation of the New Unos Policy That Relegates C-peptide and Body Mass Index Criteria Has Resulted in Shifting Recipient Demographics

R. Teo, A. Rechnitzer, N. A. Muhdi, J. Torabi, M. Ajaimy, L. Liriano-Ward, Y. Azzi, C. Pynadath, P. Loarte-Campos, A. Brooks, J. P. Rocca, M. Le, E. Akalin, J. A. Graham, *Montefiore Medical Center, Bronx, NY*

Purpose: Waitlist time accrual for SPK was previously limited to candidates on insulin that had either a c-peptide ≤ 2 ng/ml, or a c-peptide > 2 ng/ml and a body mass index (BMI) ≤ 30 kg/m^2. As of July 11, 2019, these requirements were removed from the UNOS Pancreas Transplantation Committee Policy 11.3.B. The effect of this policy change on recipient demographics and outcomes has not been studied.
Methods: An analysis of 76 SPK transplantations at Montefiore Medical Center from June 2014 to October 2020 was performed. SPK recipients pre- and post-policy change were compared. Endpoints included post-operative graft function and complications.
Results: There were 51 SPK recipients before and 25 recipients after the policy change. There was a significant increase in the average age (38.9 v 46.2 years, p = .01), BMI (25.5 v 27.5 kg/m^2, p = .03), and c-peptide levels (1.7 v 4.5 ng/ml, p = .01) following the removal of BMI and c-peptide requirements. There were no significant differences in outcomes or rates of complications.
Conclusions: The modification to the current policy expanded potential recipient demographic criteria while maintaining suitable outcomes. Our single center experience reflects the intended consequences of the adoption of the UNOS Pancreas Transplantation Committee Policy 11.3.B. This may prove to be beneficial for disadvantaged populations.
CITATION INFORMATION: Teo R., Rechnitzer A., Muhdi N., Torabi J., Ajaimy M., Liriano-Ward L., Azzi Y., Pynadath C., Loarte-Campos P., Brooks A., Rocca J., Le M., Akalin E., Graham J. The Implementation of the New Unos Policy That Relegates C-peptide and Body Mass Index Criteria Has Resulted in Shifting Recipient Demographics *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Teo: None. **A. Rechnitzer:** None. **N.A. Muhdi:** None. **J. Torabi:** None. **M. Ajaimy:** None. **L. Liriano-Ward:** None. **Y. Azzi:** None. **C. Pynadath:** None. **P. Loarte-Campos:** None. **A. Brooks:** None. **J.P. Rocca:** None. **M. Le:** None. **E. Akalin:** None. **J.A. Graham:** Other; Name of Commercial Interest; Transplant Hero Mobile App. Other; Nature of Relationship; Owner/Founder.

Abstract# 492

Frailty and Short-Term Outcomes in Kidney Transplant

S. Van Arsdale[1], K. Torbert[1], R. Harland[2], A. Turner[2], B. Tanriover[3], V. Ariyamuthu[3], *[1]Banner University Medical Center, Tucson, AZ, [2]Surgery, Banner University Medical Center, Tucson, AZ, [3]Internal Medicine, Banner University Medical Center, Tucson, AZ*

Purpose: Studies suggest worse outcomes for frail solid organ transplant recipients. We analyzed post transplant outcomes in relation to frailty.
Methods: We conducted a retrospective study of 476 kidney transplant recipients from 1/1/2016-8/10/2020. Frailty was assessed using handgrip, physical inactivity, gait speed, weight loss and exhaustion. Scores as outlined in the fried frailty phenotype (FFP) assessment, 0 = not frail, 1-2 = pre-frail, 3-5 = frail. This cohort included pre-FFP tested recipients (no frailty testing) n = 325 and post-FFP tested (implementation of FFP testing) recipients n = 151. Changes in delayed graft function (DGF), length of stay (LOS), and 30-day readmission as primary outcomes pre- and post-implementation of FFP testing were analyzed. Logistic regression models were fitted to estimate the odds ratios of primary outcomes. Multivariable logistic regression was adjusted for age, gender, race, dialysis duration, diabetes, BMI, donor type (living vs deceased), cPRA, and previous transplant. P values < 0.05 were considered statistically significant.
Results: The DGF rate significantly decreased from 44.3% to 29.8% post-FFP (OR 0.50, CI 95%: 0.32-0.78, P=0.003) compared to pre-FFP era. There was no significant change for LOS (52.9% vs 51.0%, p=0.70) (OR 1.10, 95%CI 0.72-1.67), but an increase in the 30-day readmission rate (32.4% vs 45.0%, p=0.01) (OR 170, 95%CI 1.13-2.56) post-FFP assessment.
Conclusions: A significant association between frailty assessment and reduction in DGF rate was demonstrated. Use of frailty assessments in pre-transplant patient selection may be beneficial in reducing post-operative short-term outcomes.
CITATION INFORMATION: Van Arsdale S., Torbert K., Harland R., Turner A., Tanriover B., Ariyamuthu V. Frailty and Short-Term Outcomes in Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Van Arsdale: None. **K. Torbert:** None. **R. Harland:** None. **A. Turner:** None. **B. Tanriover:** None. **V. Ariyamuthu:** None.

Abstract# 493

Single Day Centralized Approach in Kidney Transplant Workup - Lessons Learned from 2 Centers

A. Vijay, N. Langford, K. Atiemo, S. Giusti, M. Killackey, A. Paramesh, H. Jeon, *Tulane Abdominal Transplant Institute, New Orleans, LA*

Purpose: Time from transplant evaluation to UNOS listing is unaccounted towards wait-list time in pre-dialysis patients and hence longer evaluation to listing times can prolong the transplant candidate's time on dialysis. In the past, centers have reported a reduction in time to listing by implementing a 1-day center-coordinated pre-transplant workup. However these studies are single center studies that have compared listing times before and after adopting a one day workup approach. Such studies may have limitations due to comparing patients in different eras and may not have accounted for the changes in transplant staff nor changes in minimal listing criteria during the different study periods.
Methods: 310 patients were evaluated for Kidney transplant candidacy at 2 centers operated under a common university-based hospital from July 1, 2019 to July 1, 2020. Single day centralized work-up was used at one center which coordinated necessary tests needed to fulfill minimum listing criteria (same day echo, stress test, ultrasound, ct scan, PFTs, labs, CXR, EKG). This was compared with the conventional evaluation center (same-day labs, CXR, EKG with remaining tests individually scheduled after the initial visit). Staff resources at both centers were the same (Transplant surgeons, physicians, coordinators). Time from referral to UNOS listing and evaluation to UNOS listing were compared between the two groups.
Results: Of the 310 patients analyzed, 72 underwent 1-day center-coordinated evaluation and 238 underwent conventional evaluation. 27 patients at 1 day center and 87 patients at conventional center were deemed not candidate for transplant and were excluded from the study. The median time from referral to evaluation was slightly higher in the 1-day center, 77days vs 69 days in conventional center. The median time from evaluation to being presented at selection meeting was slightly higher in the conventional center group (125 days vs 121 days). The 1-day center had a slightly lower median time from evaluation to UNOS listing (154 days vs 165 days).
Conclusions: We did not find a significant decrease in time to listing for kidney transplant in spite of incorporating a 1-day center-coordinated pre-transplant workup. We believe that prioritizing staff resources is paramount to optimizing the advantages of a single day centralized pre-transplant kidney workup. Channeling selected patients (pre-dialysis, recipients with potential living donors, high pra, or many years of dialysis behind them) who might benefit from a decreased time to waitlist into a 1-day pretransplant workup center may make more meaningful resource utilization.
CITATION INFORMATION: Vijay A., Langford N., Atiemo K., Giusti S., Killackey M., Paramesh A., Jeon H. Single Day Centralized Approach in Kidney Transplant Workup - Lessons Learned from 2 Centers *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Vijay: None. **N. Langford:** None. **K. Atiemo:** None. **S. Giusti:** None. **M. Killackey:** None. **A. Paramesh:** None. **H. Jeon:** None.

Abstract# 494

Creating Efficiency in the Kidney Transplant Listing: Can We Streamline Candidate Ineligibility?

A. Vijay, N. Langford, K. Atiemo, S. Giusti, M. Killackey, H. Jeon, A. S. Paramesh, *Tulane Abdominal Transplant Institute, New Orleans, LA*

Purpose: Evaluation of multiple transplant candidate referrals is a resource-intensive process that may delay listing and eventually transplanting appropriate patients. In this study, we sought to streamline ineligibility criteria at a single transplant center as a quality improvement initiative to make the transplant listing process more efficient.

Methods: We evaluated all patients referred to our center for kidney transplants between July 1, 2019, and July 1, 2020. All patients underwent testing consistent with UNOS established minimum listing criteria and were presented at a multidisciplinary transplant selection committee. We analyzed and grouped specific reasons for transplant ineligibility among those patients who were declined for transplant listing.

Results: Three hundred and ten patients were referred and evaluated for kidney transplant candidacy. Of these, 110 patients (35%) were declined for transplant listing. Medical comorbidities were the reason for ineligibility in 55 (50%) patients (including poor functional status in 32 pts., cardiac disease 10 pts., peripheral vascular disease 6 pts., morbid obesity 4 pts., malignancy 3 pts). Fifty-four patients (49%) were ineligible due to psychosocial concerns (non-compliance 28 pts, travel/family support issues 14 pts., legal issues 10 pts., financial issues 2 pts.). One patient had improvement in kidney function during the evaluation process and no longer qualified for transplant.

Conclusions: Pre-transplant evaluation is very resource intensive for transplant centers. Detailing and understanding the reasons for ineligibility among referrals may help transplant centers streamline their evaluation processes to identify and list the right patients efficiently for transplant. This is an important quality initiative that every transplant center must consider.

CITATION INFORMATION: Vijay A., Langford N., Atiemo K., Giusti S., Killackey M., Jeon H., Paramesh A. Creating Efficiency in the Kidney Transplant Listing: Can We Streamline Candidate Ineligibility? *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Vijay: None. **N. Langford:** None. **K. Atiemo:** None. **S. Giusti:** None. **M. Killackey:** None. **H. Jeon:** None. **A.S. Paramesh:** None.

Abstract# 495

Value of a Personal Systems Approach in Improving Medication Adherence in Adult Kidney Transplant Patients: A Cost-effectiveness Analysis of the MAGIC Randomized Clinical Trial

M. R. Wakefield[1], M. Whittington[2], C. Ashbaugh[3], L. M. Remy[4], D. Aholt[4], C. Miller[4], D. Hathaway[5], D. Clark[5], K. Goggin[5], R. J. Ellis[6], C. L. Russell[4], *[1]Surgery/Urology, University of Missouri School of Medicine, Columbia, MO, [2]University of Kansas Medical Center, Kansas City, KS, [3]University of Missouri Health Care, Columbia, MO, [4]University of Missouri-Kansas City, Kansas City, MO, [5]Children's Mercy Kansas City, Kansas City, MO, [6]Indiana University School of Nursing, Indianapolis, IN*

Purpose: The objective of this evaluation was to estimate the cost of implementation and the cost-effectiveness of a person-level intervention called SystemCHANGE™.

Methods: To estimate the intervention costs, a direct measure micro-costing approach was used following key informant interviews with project champions and a review of implementation expenditures. Cost-effectiveness was calculated by comparing the incremental implementation costs and healthcare costs associated with non-adherence to the incremental percent adherent, defined as the percent of patients who took greater or equal to 85% of their medication doses, for each pairwise comparison.

Results: Medication adherence was improved at 6 months for the SystemCHANGE™ intervention (median 0.91, IQR 0.76-0.96) compared to attention control (median 0.67, IQR 0.52-0.72) with a marked difference in medians (0.24, 95% CI 0.13-0.30, $P < .001$). The intervention was low-resource to implement, costing approximately $520 to implement per patient, and was associated with significant improvements in medication adherence.

Conclusions: Interventions to improve medication non-adherence in transplantation have recently moved from a focus on motivation and intention, to a focus on person-level quality improvement strategies to link adherence to established daily routines, environmental cues and supportive people. In this study, the implementation costs were more than outweighed by the expected healthcare savings associated with improvements in adherence. This person-level intervention is a low cost, efficacious intervention associated with significant statistical and clinical improvements in medication adherence in adult kidney transplant recipients.

CITATION INFORMATION: Wakefield M., Whittington M., Ashbaugh C., Remy L., Aholt D., Miller C., Hathaway D., Clark D., Goggin K., Ellis R., Russell C. Value of a Personal Systems Approach in Improving Medication Adherence in Adult Kidney Transplant Patients: A Cost-effectiveness Analysis of the MAGIC Randomized Clinical Trial *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.R. Wakefield: None. **M. Whittington:** None. **C. Ashbaugh:** None. **L.M. Remy:** None. **D. Aholt:** None. **C. Miller:** None. **D. Hathaway:** None. **D. Clark:** None. **K. Goggin:** None. **R.J. Ellis:** None. **C.L. Russell:** None.

Abstract# 496

A New Triage-based Approach to Managing Transplant Referrals

H. L. Walther, *Division of Kidney & Pancreas Transplantation, UCI Health, Orange, CA*

Purpose: To develop and implement a novel triage-based approach to the management of referrals for kidney transplant evaluation

Methods: The transplant nurse coordinator dedicated to referral intake used the triage-based referral management protocol to separate the incoming referrals into three buckets: expedite, routine plus and routine referrals (refer to Figure 1: Triaging patients for scheduling). Expedited referrals were identified as those patients that would be most likely to receive deceased donor organ offers quickly after being added to the waiting list due to extensive time on dialysis and/or those that had an identified living donor. Routine plus and routine referrals were those patients which had less dialysis time accrued or those that just recently started dialysis and had none of the other identified factors to be an expedited candidate. A large bi-monthly pre-transplant education class that could accommodate up to 40 patients as compared to only 6 previously was implemented. All referral patients were eligible to be scheduled and attend education class as soon as possible. Due to limited clinic space availability, at least one appointment slot in each pre-transplant evaluation clinic was reserved for expedited referral patients. If at any time a referral patient's circumstances changed such as an identified living donor candidate coming forward, the patient would be re-triaged to an expedite referral.

Expedite	Routine Plus	Routine
7+ years of dialysis time	4-6 years of dialysis time	<1-3 years of dialysis time
Identified potential living donor	No potential donors	No potential donors
Pre-emptive transplant	Not a pre-emptive transplant	Not a pre-emptive transplant
Untreated Hepatitis C	Does not have untreated Hepatitis C	Does not have untreated Hepatitis C
Simultaneous pancreas/kidney (SPK) transplant candidate	Not an SPK candidate	Not an SPK candidate
"Will likely get an organ offer soon after listing"	**"Fall somewhere in the middle of Routine and Expedite – able to take blood typing into consideration as well, if available"**	**"Will likely be waiting several years on the waitlist after listing"**

Results: Prior to implementation of the new protocol in May 2019, the transplant program had over 350 new patient referrals backlogged along with the regularly incoming referrals. By January 2020, the 350 backlogged referral patients had attended the pre-transplant education class and had either been scheduled for a future appointment, attended their initial evaluation appointment, or had been ruled out by the triage nurse and made not a candidate. Another finding that was not anticipated but welcomed was fewer cancellations and fewer no shows for both the bi-monthly education class and the transplant evaluation appointments. This created further efficiency as scheduled slots for clinic appointments had increased utilization. The nurse coordinator along with administrative and financial coordinators facilitated the transplant program to then begin scheduling all patient's real time as referrals came in.

Conclusions: This triage-based approach to managing transplant referrals ensures that clinical operations for transplant programs are streamlined, the triage nurse and intake team can keep up on processing referrals real-time and ultimately this results in appropriate candidates being added more efficiently to the kidney waiting list.

CITATION INFORMATION: Walther H. A New Triage-based Approach to Managing Transplant Referrals *AJT, Volume 21 Supplement 3*

DISCLOSURES: H.L. Walther: None.

Abstract# 497

The Effect of Acuity Circles on Deceased Donor Transplant and Offer Rates Across Meld and Exception Statuses

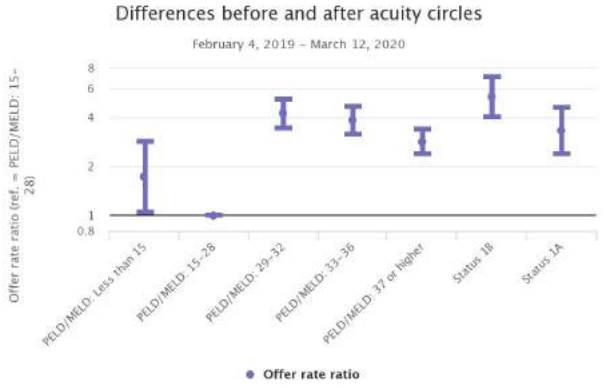
A. Wey[1], S. Noreen[2], S. Gentry[3], N. Salkowski[1], M. Cafarella[2], R. Hirose[4], J. Trotter[5], D. Segev[6], A. Israni[1], J. Snyder[1], B. Kasiske[1], *[1]SRTR, Minneapolis, MN, [2]UNOS, Richmond, VA, [3]USNA, Annapolis, MD, [4]Univ of San Francisco, San Francisco, CA, [5]BSW Health, Dallas, TX, [6]Johns Hopkins, Baltimore, MD*

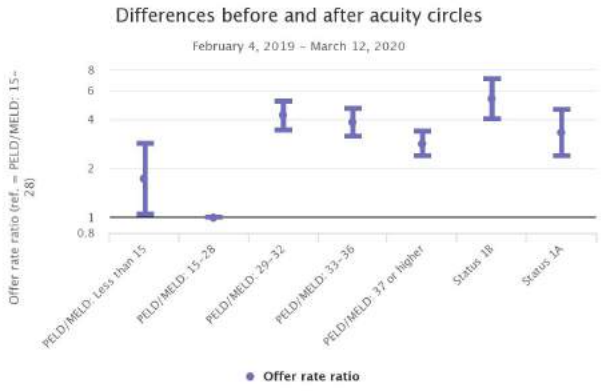
Purpose: Acuity circles (AC) allocation was implemented on February 4, 2020. AC significantly changed the relative priority of candidates with allocation PELD/MELD scores of 29 to 34. We therefore performed a difference-in-differences analysis for the effect of AC on adjusted deceased donor transplant and offer rates across PELD/MELD categories.

Methods: The before-AC period was February 4, 2019 to February 3, 2020, and the after-AC period was February 4 to March 12, 2020, the day before the national declaration of emergency due to COVID-19. Deceased donor transplant rates used active candidate time on the waiting list during the study period. The deceased donor offer rate was the number of offers in the first 10 spots of match run a candidate received per person-year. Only offers before the final acceptance were included. Transplant and offer rates were adjusted for other candidate characteristics.

Results: Candidates with PELD/MELD 29-32 and PELD/MELD 33-36 had larger differences in transplant rates before and after AC than candidates with PELD/MELD 15-28, while other PELD/MELD categories also had larger but non-significant dif-

ferences compared to candidates with PELD/MELD 15-28 (Figure 1). In contrast, all candidates with PELD/MELD 29 and higher had dramatically larger offers rates before and after AC than candidates with PELD/MELD 15-28 (Figure 2).
Conclusions: Taken together, the implementation of AC increased the relative access to deceased donor transplant for candidates with PELD/MELD of 29-36 without reducing access for candidates with higher allocation priority.





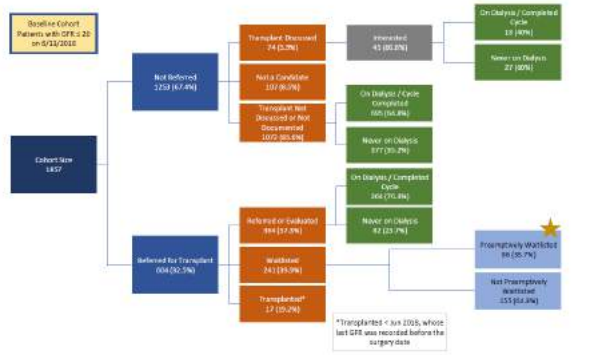
CITATION INFORMATION: Wey A., Noreen S., Gentry S., Salkowski N., Cafarella M., Hirose R., Trotter J., Segev D., Israni A., Snyder J., Kasiske B. The Effect of Acuity Circles on Deceased Donor Transplant and Offer Rates Across Meld and Exception Statuses *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Wey: None. **S. Noreen:** None. **S. Gentry:** None. **N. Salkowski:** None. **M. Cafarella:** None. **R. Hirose:** None. **J. Trotter:** Honoraria; Name of Commercial Interest; Mallinckrodt. Honoraria; Nature of Relationship; Speakers Bureau. **D. Segev:** None. **A. Israni:** None. **J. Snyder:** None. **B. Kasiske:** None.

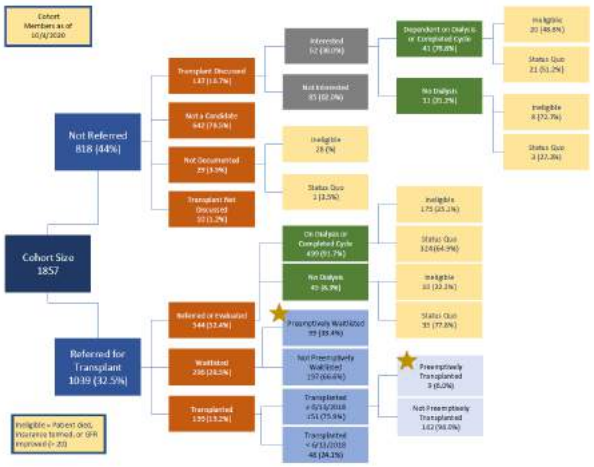
Abstract# 498

27 Months Follow Up of a Cohort in the Transplant Continuum After Using a New Electronic Medical Record Tool to Document Transplant Option Discussions Among Patients with EGFR <20 Ml/min/1.73m2

A. A. Yishak[1], M. S. Bhatnagar[2], A. V. Tomimatsu[3], R. La Londe[4], E. Clark[5], K. B. Rubenstein[6], S. Vupputuri[6], *[1]MAPMG, McLean, VA, [2]Kaiser Permanente |, Oakland, CA, [3]Kaiser Permanente, Oakland, CA, [4]Kaiser Permanente, Oakland,, CA, [5]Kaiser Permanente, Hyattsville, MD, [6]MAPRI, Rockville, MD*

Purpose: The purpose of this study was to assess: 1) the documentation of transplant option discussions; 2) the number of members listed & transplanted preemptively; and 3) transplant opportunity.
Methods: A new tool for documenting Transplant discussion options was implemented in the electronic medical record (EMR) and a cohort from June 13, 2018 was followed over the next 27 months. Our intervention consisted of training providers and case managers how to document transplant option discussions.
Results: A total of 1857 patients with eGFR ≤ 20 mL/min/1.73m2 were identified and of those, 604 (32.5%)) were in transplant continuum (referred, evaluated & waitlisted). Of those in the transplant continuum, 241 members were waitlisted of which 86 (36%) were preemptively listed. Of those 1253 not in the transplant continuum, 1070 did not have documentation of transplant option discussion. See attached cohort diagrams. In 27 months after the EMR tool was implemented, the undocumented transplant discussion improved from 1070 to 1. A total of 642 members were deemed not transplant candidates, of which 400 were above 75 years old & 81 were obese with BMI >40. As of 10/4/20, members in the transplant continuum increased from 604 to 1039, waitlisted from 241 to 447 of which 34.7% are preemptively listed. 151 were transplanted of which 9 were preemptively (out of 56 preemptively listed). Of the 9 preemptive transplants, 3 were from living and 6 were from deceased donor. The number of our waitlisted members per year increased from 70 in 2017 to 90 in 2018 and 120 in 2019. The total number of renal transplants per year increased from 46 in 2017 to 65 in 2018 and 77 in 2019.
Conclusions: We demonstrated a simple, easy EMR tool can help increase documentation of transplant option discussion, waitlisted members and transplant opportunity. This study suggests that patient management for transplant services could be significantly improved and clinical outcomes could potentially be impacted.





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DISCLOSURES: A.A. Yishak: None. **M.S. Bhatnagar:** None. **A.V. Tomimatsu:** None. **R. La Londe:** None. **E. Clark:** None. **K.B. Rubenstein:** None. **S. Vupputuri:** None.

Abstract# LB 25

Wave of the Future: Expanding Role and Necessity of the Dedicated Procurement Surgeon

C. Strom, B. Cimsit, H. Nelson, F. Delmonico, *New England Donor Services, Waltham, MA*

Purpose: To evaluate the quantitative and qualitative benefits of a dedicated procurement surgeon (DPS) across the transplant spectrum, including the DPS technical performance value for transplant recipients and the organ procurement organization (OPO). Non-technical benefits of the DPS in optimizing organ utilization include the opportunity to pursue more marginal and kidney-only donors, employment of longer wait times for donation after cardiac death donors, delay of cross clamp during intraoperative liver turn downs, and technical expertise with kidney perfusion pumps.
Methods: We performed a retrospective analysis of technical performance in the recovery of deceased donor abdominal organs within our donor service area (DSA) after the first complete year of an OPO-employed DPS. The DPS performance was compared to surgical recovery data by non DPS surgeons in the same time period, and

also in the two prior years of DSA experience without DPS recovery. Organ damage was classified as tier 1, representing minor technical error, and tier 2, representing surgical damage that rendered organs non-transplantable.

Results: Between January 6, 2020 to January 6, 2021, a total of 946 abdominal organs were procured for transplantation within the DSA. The incidence of DPS surgical damage was 2 of 290 organs (0.69%), and both were tier 1 injuries; there were 0 tier 2 injuries (no organ loss). Incidence of non DPS surgical damage in the same period was 9 of 656 organs (1.4%). Of those 656 organs, there were 6 tier 1 injuries (0.91%) and 3 tier 2 injuries (0.46%) resulting in organ loss. Over the prior two years, 2,145 abdominal organs were procured—all non DPS—with surgical damage noted in 45 organs (2.1%). Tier 1 injuries occurred in 33 of 2,145 organs (1.5%) and tier 2 injuries in 12 of 2,145 organs (0.56%).

Conclusions: The technical expertise of DPS recovery is evident and of significance to the optimization of organ utilization and transplant recipient outcome. Surgical damage of procured organs is not common, but has substantial effects on OPO's, transplant centers, and organ recipients. Maximizing successful organ recovery and utilization is achieved through the creation of the OPO-employed DPS, as we demonstrate substantive differences in technical performance and outcomes of the DPS compared to non DPS surgeons.

DPS and non DPS Procurement and Organ Injury Data			
	2018 and 2019 (all non DPS)	2020 (non DPS)	2020 (DPS)
Abdominal organs procured	2,145	656	290
Organs damaged (% of total)	45 (2.1%)	9 (1.4%)	2 (0.69%)
Tier 1 injuries (% of total)	33 (1.5%)	6 (0.91%)	2 (0.69%)
Tier 2 injuries (% of total)	12 (0.56%)	3 (0.46%)	0

CITATION INFORMATION: Strom C., Cimsit B., Nelson H., Delmonico F. Wave of the Future: Expanding Role and Necessity of the Dedicated Procurement Surgeon *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Strom: None. **B. Cimsit:** None. **H. Nelson:** None. **F. Delmonico:** None.

Abstract# LB 26

Peri-operative Liver Transplant Anesthesia Practice Patterns in the United States

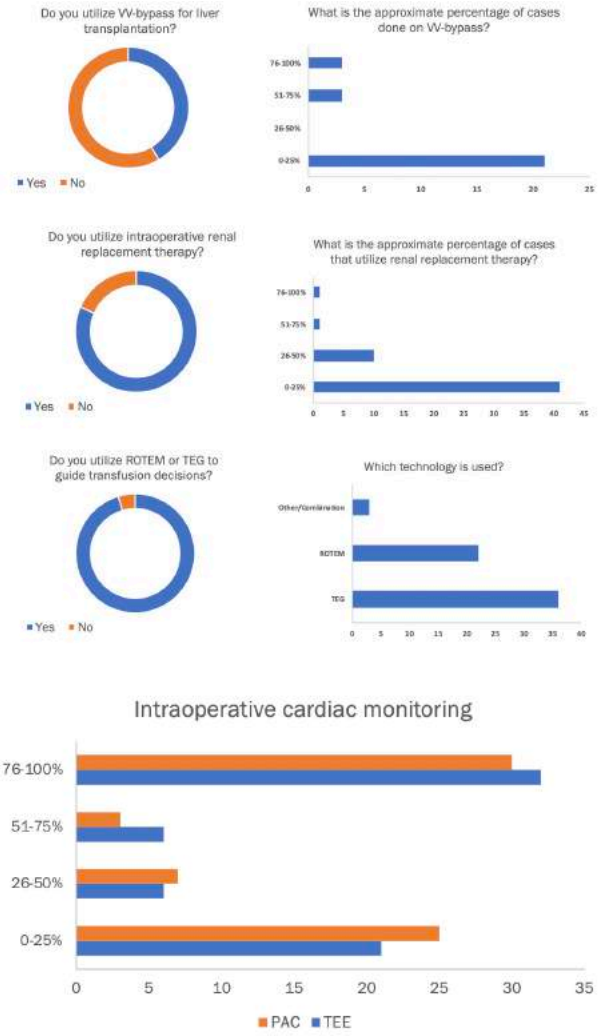
C. Crouch[1], A. Hendrickse[1], W. Stoll[2], C. Sullivan[3], M. Kaufman[4], E. Pivalizza[5], D. Damian[6], D. Sellers[7], M. Little[8], S. McCluskey[7], S. Kumar[9], L. De Marchi[10], S. Sridhar[5], T. Sakai[6], *[1]Department of Anesthesiology, University of Colorado, Aurora, CO, [2]Medical University of South Carolina, Charleston, SC, [3]Emory University, Atlanta, GA, [4]Lahey Health, Burlington, MA, [5]University of Texas Health Science Center at Houston, Houston, TX, [6]University of Pittsburgh, Pittsburgh, PA, [7]University of Toronto, Toronto, ON, Canada, [8]University of Texas Health Science Center San Antonio, San Antonio, TX, [9]University of Michigan, Ann Arbor, MI, [10]Georgetown University, Washington DC, DC*

Purpose: Transplant anesthesiology is an evolving subspecialty and has not been the subject of an overall review of practice patterns in the United States since 2013. The Society for the Advancement of Transplant Anesthesia Quality & Standards Committee conducted a survey to evaluate current practice patterns among all transplant programs in the United States.

Methods: A web-based survey was sent to every identified Director of Liver Transplant Anesthesia at each transplant center based on information from the Scientific Registry of Transplant Recipients database. A total of 112 surveys were distributed during a 3-month period ending in January 2021.

Results: Sixty-five responses were collected from both academic and private practice programs. Results showed wide variation in pre-operative evaluation, intraoperative management and postoperative disposition. Interestingly, 41.5% of responding programs report utilize veno-venous bypass; surprisingly, 18.5% of programs do not use any form of intraoperative renal replacement therapy. The use of viscoelastic coagulation testing and transesophageal echocardiography also appears to be expanding amongst transplant anesthesiologists. Pulmonary artery catheters, however, remain common practice in almost half of responding institutions.

Conclusions: Substantial differences exist in liver transplant anesthesiology practice in the United States. Transplant anesthesia is vital for the overall success of multidisciplinary liver transplant programs. This data will prove essential in determining future recommendations as our subspecialty continues to grow.



CITATION INFORMATION: Crouch C., Hendrickse A., Stoll W., Sullivan C., Kaufman M., Pivalizza E., Damian D., Sellers D., Little M., McCluskey S., Kumar S., De Marchi L., Sridhar S., Sakai T. Peri-operative Liver Transplant Anesthesia Practice Patterns in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Crouch: None. **A. Hendrickse:** None. **W. Stoll:** None. **C. Sullivan:** None. **M. Kaufman:** None. **E. Pivalizza:** None. **D. Damian:** None. **D. Sellers:** None. **M. Little:** None. **S. McCluskey:** None. **S. Kumar:** None. **L. De Marchi:** None. **S. Sridhar:** None. **T. Sakai:** Royalty; Name of Commercial Interest; Springer, Inc. Royalty; Nature of Relationship; Book Royalty.

Basic

Acute Rejection

Abstract# 499

Epigenetic & Functional Changes Associated with Alloreactive Memory CD8 T Cell Subsets in Liver Transplant Patients

H. Abdelsamed[1], S. Liu[1], M. Juya[1], D. Metes[2], F. Lakkis[1], A. Thomson[1], *[1]University of Pittsburgh Medical Center, Pittsburgh, PA, [2]UPMC, Pittsburgh, PA*

Purpose: Donor-specific allo-reactive memory CD8 T cells play a pivotal role in allo-immunity and represent a major hurdle against tolerance induction in solid organ transplantation. Hence, there is a critical need to understand the mechanisms regulating their development, function and maintenance.

Methods: Since epigenetic modifications play a major role in a wide range of biological processes and diseases, we sought to understand these mechanisms through the lens of epigenetics.

Results: Here, we report epigenetic and functional changes in alloreactive memory CD8 cells isolated from stable vs acutely-rejecting liver transplant patients each receiving standard of care immunosuppressive therapy. We observed low frequencies

of dividing naïve and memory CD8 T cell subsets in stable liver transplant patients compared to rejecting counterparts in mixed leukocyte reactions (CTV-MLRs). Surprisingly, the majority of the allo-reactive memory CD8 T cells were found in the central memory subset (TCM) sorted from rejecting patients. Using gold-standard methods for DNA methylation analysis, we observed hyper-methylation of effector-associated (IFNγ and CD69), costimulatory molecules (CD28 and CD70), and coinhibitory molecule CTLA-4 in TCM alloreactive CD8 T cells sorted from stable liver transplant patients compared to the rejecting group.

Conclusions: These novel data demonstrate that effector-associated epigenetic programs are acquired during allo-antigen-induced proliferation of memory CD8 T cells in stable liver transplant patients, which could be targeted for potential epigenetic-based therapies in solid organ transplantation.

CITATION INFORMATION: Abdelsamed H., Liu S., Juya M., Metes D., Lakkis F., Thomson A. Epigenetic & Functional Changes Associated with Alloreactive Memory CD8 T Cell Subsets in Liver Transplant Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Abdelsamed: None. **S. Liu:** None. **M. Juya:** None. **D. Metes:** None. **F. Lakkis:** None. **A. Thomson:** None.

Abstract# 500

Association Between Donor-Recipient Genetic Matching and Acute Rejection in Kidney Transplantation

R. Cao[1], V. Arthur[2], J. Chen[2], B. Keating[2], C. Dorr[3], D. Schladt[3], G. Onyeaghala[3], R. Mannon[4], A. Matas[1], R. Remmel[1], N. Pankratz[1], B. Wu[1], W. Oetting[1], P. Jacobson[1], A. Israni[3], W. Guan[1], *[1]University of Minnesota, Minneapolis, MN, [2]University of Pennsylvania, Philadelphia, PA, [3]Hennepin Healthcare Research Institute, Minneapolis, MN, [4]University of Nebraska, Omaha, NE*

Purpose: In this study we carried out a genome-wide association study (GWAS) between donor-recipient matching scores at individual SNP level and Acute rejection (AR) in kidney allograft recipients, aiming at finding potential genetic regions which are associated with AR posttransplant.

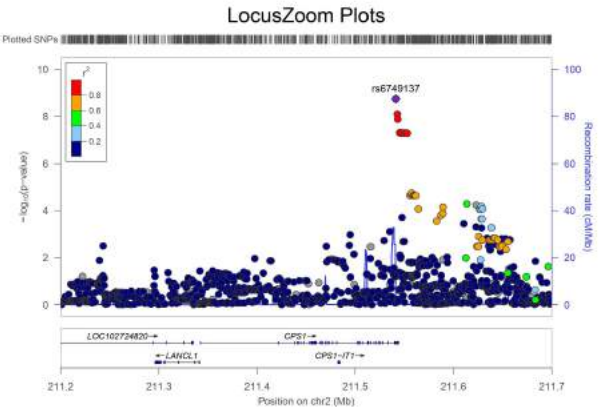
Methods: Recipients with European ancestry from the Deterioration of Kidney Allograft Function (DeKAF) Genomics were analyzed with their matched living donors (n = 784 pairs). All donors except one were with European ancestry. The study evaluated AR events (n=161) post-kidney transplantation. Donor-recipient matching score was defined by the identify-by-state (IBS) between donor and recipient genotypes. Association between matching scores and AR was tested using Cox regression, adjusting for recipient age at transplantation, gender, prior non-kidney transplantation, and PRA (positive or negative). Bonferroni correction was applied to control for multiple testing.

Results: There were 13 single-nucleotide polymorphisms (SNPs) at which donor-recipient matching scores were significantly associated with AR ($p<5E-08$). The strongest association was observed for an intronic variant rs6749137 ($p=1.78E-09$), which is located in the *CPS1* gene region. The *CPS1* gene codes a mitochondrial enzyme which catalyzes synthesis of carbamoyl phosphate from ammonia and bicarbonate, important in the removal of excess urea from cells. Other associated gene regions include *SOX6* and *CNOT6* (Table 1).

Conclusions: We identified novel variants beyond human leukocyte antigen (HLA) region where the matching between donor and recipient was associated with AR. The results need to be further validated in external cohorts. Functional analysis of these SNPs will be required. Identification of genetic regions besides the HLA region will improve matching between kidney transplant recipients and their donors, and achieve beneficial outcome post-transplant.

Table 1: Top SNPs that were associated with AR in Kidney Transplant Donor-Recipient Matching

Chromosome: Base location	SNP	Reference allele : Alternate allele	Minor allele frequency	Gene	Functional annotation	Hazard Rate	P-Value
chr2: 211541165	rs6749137	G:A	0.068	CPS1	Intronic	2.639	1.78E-09
chr22: 44126517	rs73174346	C:T	0.090	EFCAB6	Intronic	2.487	4.90E-09
chr11: 16520587	rs4573649	T:C	0.126	SOX6	Intronic	2.204	2.69E-08
chr4: 78733015	rs10050214	G:T	0.153	CNOT6L	Intronic	2.041	2.89E-08
chr17: 4673185	rs17824149	A:G	0.065	TM4SF5	Upstream transcript variant	2.441	3.27E-08
chr17: 12928324	rs147435965: 12928324	G:-GTGTGTC	0.051	**	**	2.535	3.63E-08



CITATION INFORMATION: Cao R., Arthur V., Chen J., Keating B., Dorr C., Schladt D., Onyeaghala G., Mannon R., Matas A., Remmel R., Pankratz N., Wu B., Oetting W., Jacobson P., Israni A., Guan W. Association Between Donor-Recipient Genetic Matching and Acute Rejection in Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Cao: None. **V. Arthur:** None. **J. Chen:** None. **B. Keating:** None. **C. Dorr:** None. **D. Schladt:** None. **G. Onyeaghala:** None. **R. Mannon:** None. **A. Matas:** None. **R. Remmel:** None. **N. Pankratz:** None. **B. Wu:** None. **W. Oetting:** None. **P. Jacobson:** None. **A. Israni:** None. **W. Guan:** None.

Abstract# 501

Murine Cytomegalovirus Induces Kidney Allograft Injury via Th17 Cells Recruited by Both Viral Antigen-Specific and Cytokine/chemokine Mediated Pathways

R. Dhital[1], V. Velazquez[1], Q. Zeng[2], B. Graber[1], K. Flint[1], M. Shimamura[1], *[1]Vaccines and Immunity, Nationwide Children's Hospital, Columbus, OH, [2]Center for Cardiovascular Research, Nationwide Children's Hospital, Columbus, OH*

Purpose: Cytomegalovirus infection in transplant recipients has been associated with renal allograft rejection and graft failure. We have previously shown that murine CMV (MCMV) infected allografts have greater infiltration of T helper 17(Th17) cells compared to uninfected transplants and are associated with more severe allograft injury. We hypothesized that only a fraction of these Th17 cells are CMV specific and are phenotypically different than the rest of the Th17 cells that infiltrate the allograft via alternate antigen independent mechanism.

Methods: Murine renal transplantation was performed between Donor BALB/cJ and recipient C57BL/6J/ OT-II/ IL-17A-GFP reporter mice (N=3-5 mice/group). The mice were infected with MCMVΔ157 at 10^6 pfu intraperitoneally for D+R+ transplants. At post-transplant day 7, leucocytes from allografts were stimulated with PMA-Ionomycin or MCMV peptide pool and were analyzed for polyfunctionality for CD4+ cells expressing cytokines (TNFα, IFNγ and IL17A) and chemokine receptors (CCR6, CCR4 and CXCR3). Intragraft level of Th cell associated cytokines were quantified using cytokine bead array.

Results: Compared to D-R-, allografts from D+R+ transplants had 1.75-fold higher frequency of $CD4^+IL17A^+$Th17 cells that co-expressed higher frequencies of $IL17A^+IFN\gamma^+$($p=0.0166$) and $IL17A^+TNF\alpha^+IFN\gamma^+$($p=0.0075$). CMV specific Th17 cells in the D+R+ allografts constituted an average of 5.47±0.96% of the total Th17 cells and predominantly expressed $IL17A^+IFN\gamma^+$. The CMV infected allografts also had 18.9-fold higher infiltration of antigen non-specific (OVA tetramer+) CD4+cells and Th17 cells ($p=0.0009$) that more often co-expressed IL17A and TNFα. The intragraft level of Th17 differentiating cytokines, IL6, IL1β and IL23 showed a higher trend in D+R+ group, compared to D-R- group. D+R+ allografts had greater proportion of Th17 cells expressing CCR6 ($p=0.0235$) or CXCR3 ($p= 0.0235$) alone or in combination ($p= 0.0235$), compared with D-R- allografts.

Conclusions: Cytomegalovirus infection induces the infiltration of CMV specific $IL17\text{-}A^+IFN\text{-}\gamma^+$ as well as antigen non-specific $IL17\text{-}A^+TNF\text{-}\alpha^+$ polyfunctional Th17 cells into the allografts. The allograft microenvironment favors the cytokine mediated differentiation of naïve T cells to polyfunctional Th17 cells. Additionally, recruitment of Th17 cells in CMV infected allografts are mediated by CCR6 and CXCR3 during allograft rejection. These data suggest that multifunctional inflammatory cytokine expressing Th17 cells infiltrate MCMV infected allografts by both antigen- dependent and -independent mechanisms in CMV infected allografts. Therefore, blockage of Th17 recruitment into the allograft can be good target to prevent Th17 mediated allograft injury in clinical solid organ transplantation.

CITATION INFORMATION: Dhital R., Velazquez V., Zeng Q., Graber B., Flint K., Shimamura M. Murine Cytomegalovirus Induces Kidney Allograft Injury via Th17 Cells Recruited by Both Viral Antigen-Specific and Cytokine/chemokine Mediated Pathways *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Dhital: None. **V. Velazquez:** None. **Q. Zeng:** None. **B. Graber:** None. **K. Flint:** None. **M. Shimamura:** None.

Abstract# 502

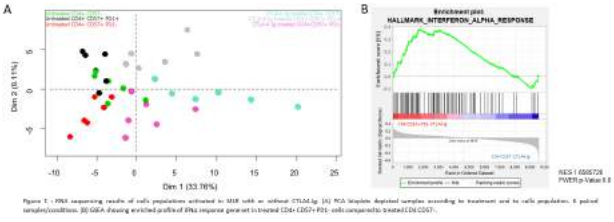
Belatacept-Resistant T Cells are Activated by IFNα-IRF7 Pathway

F. Herr, K. Bargiel, A. Vernochet, A. Durrbach, *UMR1186, Villejuif, France*

Purpose: Second signal of activation play an important role in activation of T lymphocytes. Their control by checkpoint inhibitor is efficient in auto-immune disease and allogenic transplantation. Belatacept, a CTLA4-Ig, has been developed to control activated T cells in renal transplantation as a maintenance therapy (Larsen et al. 2006). Belatacept has been demonstrated to improve the renal function, to increase graft and patient survival as compared to Calcineurin Inhibitor (CNI) (Vincenti et al. 2010). Belatacept is associated with reduced cardiovascular risk and occurrence of anti-donor antibodies, but also with a higher risk of acute cellular rejection (ACR) than observed with CNI (Rostaing et al. 2013). A previous study linked Acute Cellular Rejection (ACR) of belatacept-treated patients with the rate of CD4 CD57+PD1- T cells before transplantation. *In vitro* we showed that expansion of these cells is belatacept-resistant (Espinosa et al. 2016).

Methods: In this study we assessed activation mechanism of CD4 CD57+PD1- T cells in order to control their proliferation. We performed a transcriptomic analysis of CD4 CD57+PD1- cells from 6 donors after Mixed Leucocyte Reaction (MLR) with +/- belatacept. Then we assessed in MLR the activation pathway found by a computational method of analysis.

Results: A Principal Component Analysis demonstrated different transcriptional profiles between cells of interest and control populations (Fig1A). Belatacept have a weaker effect on pro-proliferative pathways of CD4 CD57+PD1- cells than on CD4 CD57-. A Gene Set Enrichment Analysis shows that Interferon (IFN) α response gene set is positively regulated in treated CD4CD57+PD1- cells (Fig1B).



This pathway is associated with an increase of IFN Regulatory Factor (IRF) 7 transcripts which control the pro-inflammatory cytokine IL6. *In vitro* we confirmed IRF7 over-expression in CD4 CD57+PD1- cells. Then we showed inhibition of CD4 CD57+PD1- cells proliferation by blocking type I IFN or IL-6 receptors with belatacept (Fig2).

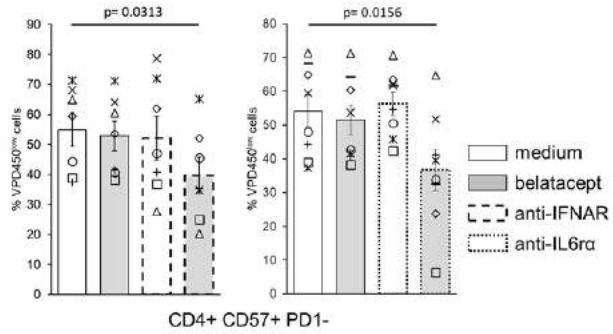


Figure 2: Inhibition of CD4 CD57+ PD1- cells proliferation. Proliferation of cells have been assessed by VPD450 dilution after 5 days of MLR with anti-IFNAR1/2, anti-IL6R and CTLA4-Ig. 8 independent experiments, Wilcoxon test analysis.

Conclusions: We demonstrated that activation of CD4 CD57+PD1- belatacept-resistant T cells is dependent of the IFNα-IRF7 pathway. *In vitro* inhibition of these cells by antiIFNAR or antiIL6rα blocking antibodies highlight new therapeutic options to prevent belatacept associated ACR.

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DISCLOSURES: F. Herr: Grant/Research Support; Name of Commercial Interest; bristol myers squibb. **K. Bargiel:** None. **A. Vernochet:** None. **A. Durrbach:** Grant/Research Support; Name of Commercial Interest; bristol myers squibb.

Abstract# 503

Successful Prophylaxis of Antibody-Mediated Rejection by Downregulation of C5 Expression via RNA Interference in a Rat Kidney Transplant Model

H. Ishigooka[1], S. Motoi[2], T. Yamakawa[1], C. Matsui[2], Y. Suzuki[3], R. Ishii[1], K. Saiga[1], D. Tokita[1], T. Imai[2], K. Tanabe[1], *[1]Urology, Tokyo Women's Medical University, Tokyo, Japan, [2]KAN Research Institute, Inc., Kobe, Japan, [3]Tsukuba Research Laboratories, Eisai, Co., Ltd., Ibaraki, Japan*

Purpose: Antibody-mediated rejection (AMR) is a major contributor towards poor prognosis in kidney transplantation. Circulating donor-specific antibodies (DSAs) cause AMR with complement activation. This study was conducted to evaluate the efficacy of a lipid nanoparticle formulation of small interfering RNA against complement C5 (C5 siRNA-LNP) for AMR in a rat kidney transplantation model.

Methods: Seven- to nine-week-old Lewis recipient rats were sensitized by skin grafting from Brown Norway donor rats, and kidney transplantation was performed at four weeks post-sensitization. Graft survival was followed up for 100 days post-transplantation. The grafts were histopathologically assessed using periodic acid-Schiff-stained images taken seven days after the transplantation. The serum levels of DSA-IgG were measured by flow cytometric crossmatch using molecules of equivalent soluble fluorochromosome. Suppression of C5 expression and complement activity was confirmed via Western blotting and hemolysis assays, respectively.

Results: C5 siRNA-LNP completely suppressed C5 expression and complement activity (hemolysis ≦ 20%) one week after its administration, and the suppressive effect was maintained up to 2 weeks later. Its weekly administration continued to suppress complement activity. C5 siRNA-LNP monotherapy (median survival time, MST: 8 days), combined therapy with C5 siRNA-LNP and cyclosporine (C5 siRNA+CsA, MST: 14 days), and treatment with CsA and deoxyspergualin (CsA+DSG, MST: 17 days) failed to prolong graft survival, whereas combination treatment with the three compounds (C5 siRNA+CsA+DSG, MST: 55.5 days) significantly prolonged graft survival (*P*=0.179, vs. CsA+DSG, log-rank test) (Figure). DSA-IgG was persistently present in peripheral blood in the triple-drug combination group. Severe mononuclear cell interstitial inflammation and moderate to severe peritubular capillaritis were observed in the CsA+DSG group but not in the triple-drug combination group.

Conclusions: AMR can be controlled by downregulating C5 expression along with the suppression of immune cell functions, such as T and B cells, even in the presence of DSAs without desensitization therapy.

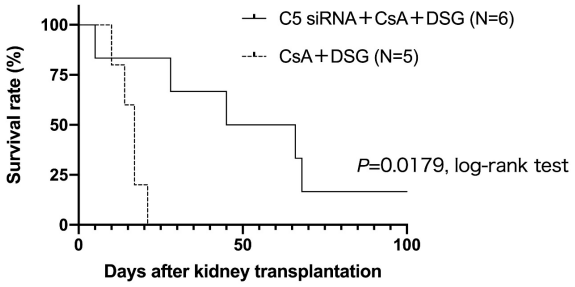


Figure: Prophylactic effect of C5 siRNA-LNP treatment on graft survival in a rat AMR model

CITATION INFORMATION: Ishigooka H., Motoi S., Yamakawa T., Matsui C., Suzuki Y., Ishii R., Saiga K., Tokita D., Imai T., Tanabe K. Successful Prophylaxis of Antibody-Mediated Rejection by Downregulation of C5 Expression via RNA Interference in a Rat Kidney Transplant Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Ishigooka: None. **S. Motoi:** Salary; Name of Commercial Interest; Eisai Co.,Ltd.. Salary; Nature of Relationship; Employee. **T. Yamakawa:** None. **C. Matsui:** Salary; Name of Commercial Interest; KAN Research institute, Inc. Salary; Nature of Relationship; Employee. **Y. Suzuki:** Salary; Name of Commercial Interest; Eisai Co.,Ltd.. Salary; Nature of Relationship; Employee. **R. Ishii:** None. **K. Saiga:** None. **D. Tokita:** Consulting Fee; Name of Commercial Interest; KAN Research Institute, Inc. Consulting Fee; Nature of Relationship; Scientific Medical Advisor. Consulting Fee; If "Other" Please Explain; Last year, the current year's compensation is zero. **T. Imai:** Salary; Name of Commercial Interest; KAN Research institute, Inc. Salary; Nature of Relationship; Board Member. **K. Tanabe:** None.

Abstract# 504

The Microenvironment of Belatacept-Resistant Rejection

A. Johnson, J. Zhang, C. Larsen, *Surgery, Emory University, Atlanta, GA*

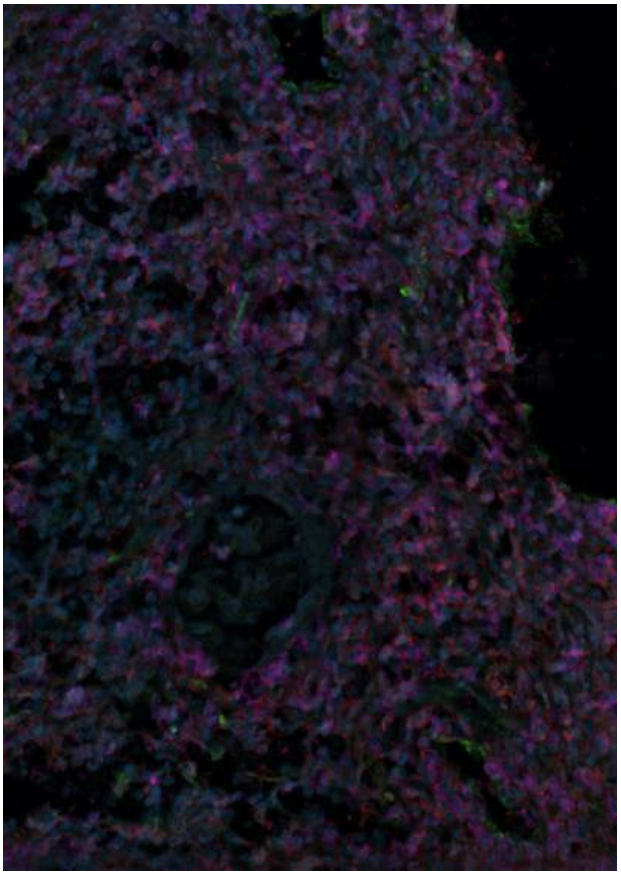
Purpose: Belatacept is a co-stimulation blockade immunosuppressant, that despite demonstrating improved long-term outcomes, has not been widely adopted, in part, due to concern over early episodes of acute rejection. A method of co-immunosuppression with transient calcineurin inhibitor (CNI) therapy has improved rejection

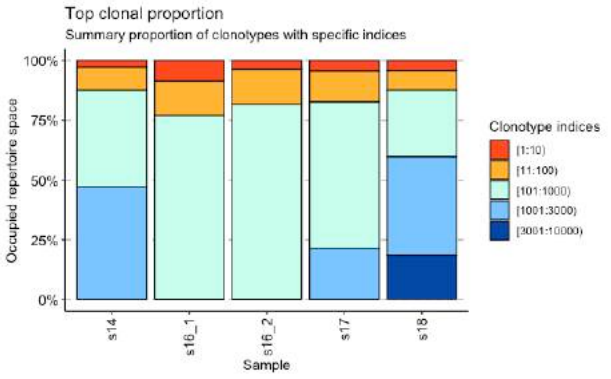
rates, but importantly, has also clearly defined a population of patients well controlled on CNIs but who develop rejection when that therapy is withdrawn. We aim to characterize the microenvironment of that rejection.

Methods: We selected formalin fixed paraffin embedded biopsies from 5 historical patients with Banff 2B acute rejection in the setting of CNI weaning. From these biopsies, we sequenced the β chain of T cell receptors (TCR) to analyze clonality of the T cells infiltrating biopsies. TCR sequences were analyzed with the R biostatistical package immunarch as well as Adaptive Biotechnologies ImmunoSeq Analyzer tool. In addition, we performed multiplex immunofluorescence to characterize the immune cells infiltrating these biopsies. Primary antibodies against CD4, CD8 and MHCII were used along with a DAPI stain to allow cell identification. Slides were imaged with a Nikon Leica Spinning Disk microscope, and image processing performed using Fiji software.

Results: There was an average of 3078 total and 2542 productive templates per sample, with 82% of templates productive. Productive Simpson clonality ranged from 0.02 to 0.057. The maximum productive frequency in sample s16_1 was 4.5%. The remaining samples had maximum productive frequencies between 0.4 and 1.1%. There was minimal repertoire overlap between samples. Analysis of V and J gene usage revealed a high frequency of BJ02-07 usage in all samples. Immunofluorescence imaging revealed a high density of both CD4 and CD8 cells, with a paucity of MHCII expressing cells.

Conclusions: Though individual clones do not predominate in these biopsies, V/J gene usage suggests high levels of similarity among clones. We plan to quantify this with CDRdist scoring, a method based on Smith-Waterman alignment calculation. Qualitative immunofluorescence data will be processed with CellProfiler software to analyze spatial relationships between cell types.





CITATION INFORMATION: Johnson A., Zhang J., Larsen C. The Microenvironment of Belatacept-Resistant Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Johnson: None. **J. Zhang:** None. **C. Larsen:** None.

Abstract# 505

The Efficacy of Delayed Fc-nonbinding Anti-CD3 Antibody Treatment in Sensitized Allogeneic Mouse Heart Transplantation

T. Ota[1], R. Goto[1], R. Kanazawa[1], K. Shibuya[1], Y. Ganchiku[1], N. Kawamura[2], M. Watanabe[2], M. Fukai[1], T. Shimamura[3], A. Taketomi[1], *[1]Dept. of Gastroenterological Surgery I, Hokkaido University, Sapporo, Japan, [2]Dept. of Transplant Surgery, Hokkaido University, Sapporo, Japan, [3]Division of Organ Transplantation, Hokkaido University Hospital, Sapporo, Japan*

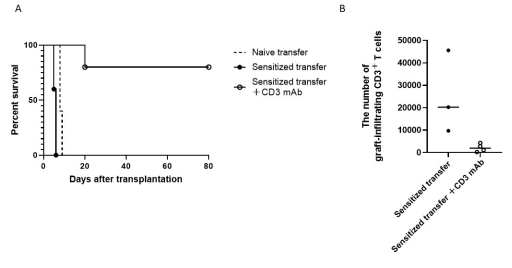
Purpose: *Delayed* treatment with Fc-nonbinding anti-CD3 antibody (ab) permits early graft infiltrating cells to promotes a transplant tolerance. However, graft infiltrating cells immediate after transplantation includes alloreactive memory T cells in sensitized situation, which may abrogate a tolerogeneic effect in *delayed* treatment protocol.

Methods: Sensitized splenocytes were obtained from recipient C57BL/6 (B6, $H2^b$) mice grafting cardiac allograft from BALB/c ($H2^d$) in 7 to 11 weeks post-transplantation. Naïve B6 mice were adoptively transferred with $15x10^6$ sensitized splenocytes at 2 or 3 days before grafting $H2^d$ heart and then treated with delayed anti-CD3F(ab')$_2$ treatment (anti-CD3F(ab')^2 for 5 days starting from 3 days post-transplantation).

Results: *Early* anti-CD3F(ab')$_2$ treatments for 5 days (day -1 to 3) significantly prolonged graft survival in BALC/c-to-B6 heart transplant model (n=5, median survival time [MST] 38 days , p=0.001 , vs. untreated control). Further, *delayed* anti-CD3F(ab')$_2$ treatments for 5 days (day 3 to 7) promoted indefinite graft survival (MST >100 days) which data is consistent with previous reports (Goto R et al., AJT 2012). Then we applied this *delayed* anti-CD3F(ab')$_2$ treatment to sensitized mice. Sensitized B6 mice promptly rejected $H2^d$ cardiac allografts within 7 days as shown in Figure 1A (n=5, black circles, p=0.003 , vs. B6 mice transferred naïve splenocytes, n=5, MST 8 days, dotted line). We also observed significant increased numbers of sensitized splenocytes were infiltrated within an allograft by CTV staining technique (n=5, $p<0.05$ vs. naïve cells transferred model). Interestingly, *delayed* anti-CD3F(ab')$_2$ treatments efficiently reduced the number of sensitized graft infiltrating cells (Fig.1B) and promoted long-term graft acceptance (n=5, MST>80 days, empty circles in Fig.1A).

Conclusions: *Delayed* anti-CD3F(ab')$_2$ treatment strategy allows long-term graft acceptance despite sensitized situation. In the development of Fc-nonbinding humanized anti-CD3 antibody, our findings would be useful in clinical organ transplantation.

Fig.1



CITATION INFORMATION: Ota T., Goto R., Kanazawa R., Shibuya K., Ganchiku Y., Kawamura N., Watanabe M., Fukai M., Shimamura T., Taketomi A. The Efficacy of Delayed Fc-nonbinding Anti-CD3 Antibody Treatment in Sensitized Allogeneic Mouse Heart Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Ota: None. **R. Goto:** None. **R. Kanazawa:** None. **K. Shibuya:** None. **Y. Ganchiku:** None. **N. Kawamura:** None. **M. Watanabe:** None. **M. Fukai:** None. **T. Shimamura:** None. **A. Taketomi:** None.

Abstract# 506

Pharmacokinetic and Toxicity Studies of an Anti CD40L Antibody, At-1501 in Rhesus Macaques

S. Perrin[1], A. Gill[2], C. Gill[2], F. Vieira[2], K. Thompson[2], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

Purpose: CD40L is a costimulatory receptor for CD40 found on T helper cells. Binding of CD40L on T cells to CD40 on antigen presenting cells induces downstream immune and inflammatory responses. Inhibition of CD40L signaling can abolish inflammation, induce T cell anergy, prevent the progression of autoimmunity, and instill transplant tolerance. AT-1501 is a humanized anti-CD40L antibody lacking Fc effector function with high affinity binding to CD40.

Methods: A pharmacokinetic study of AT-1501 at 1, 10 and 50 mg/kg was undertaken in rhesus macaques. In addition, we conducted 12 (3, 10, 30, 50 mg/kg) and 26 week (100, 200 mg/kg) toxicology studies with weekly dosing of AT-1501.

Results: The pharmacokinetic study demonstrated a half-life of 7-9 days at 50 mg/kg. Variability was apparent at lower doses, which was attributed to immunogenicity of AT-1501 in rhesus macaques responding to a human antibody. Plasma concentrations contributing to AUC were affected by the induction of anti-drug antibodies (ADA) and occurred markedly at 1 mg/kg, to an intermediate extent at 10 mg/kg, and was absent at 50 mg/kg. At 10 mg/kg, half of the animals elicited ADA responses, which were non-neutralizing and did not impact AT-1501 binding to CD40L at either 3 or 10 mg/kg. ADA responses were not observed above 10 mg/kg. All animals in the 100 mg/kg dose group completed the study, remained healthy and AT-1501 concentrations in plasma were as predicted. Animals in the 200 mg/kg group survived through 16 weeks without evidence of gross pathology. Four 200 mg/kg animals showed signs of toxicity and were euthanized at 17, 18, 25 and 26 weeks. Data were suggestive of a Type III hypersensitivity infusion reaction (IR) resulting in immune-complex (IC) formation, impacting multiple organs but primarily resulting in kidney pathology and dysfunction. Clinical chemistry and histopathology confirmed extravascular localization of AT-1501, NHP IgG1, IgM, Albumin, and C3. ICs were comprised of IgM, demonstrating that AT-1501 blocked IgM to IgG class switching.

Conclusions: These data demonstrate functional activity of AT-1501 in vivo. Thus, weekly doses of AT-1501 at 10 mg/kg or higher are considered therapeutic dosing, leading to levels that inhibit antigen presentation and pro-inflammatory lymphocyte signaling. The results for the 200 mg/kg group support a conclusion that the toxicity was due to the high concentration of circulating AT-1501, leading to IC formation and not due to the mechanism of action of the drug.

CITATION INFORMATION: Perrin S., Gill A., Gill C., Vieira F., Thompson K. Pharmacokinetic and Toxicity Studies of an Anti CD40L Antibody, At-1501 in Rhesus Macaques *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Perrin: Ownership Interest; Name of Commercial Interest; Novus Therapeutics. Ownership Interest; Nature of Relationship; stock options. Salary; Name of Commercial Interest; Novus Therapeutics. Salary; Nature of Relationship; Employee. **A. Gill:** None. **C. Gill:** None. **F. Vieira:** None. **K. Thompson:** None.

Abstract# 507

Belatacept and Rapamycin Maintenance Immunosuppression in a Sensitized Nonhuman Primate Kidney Allotransplantation Model

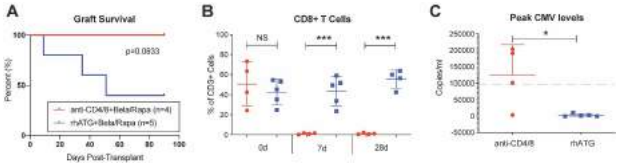
R. Schmitz[1], Z. W. Fitch[1], M. Manook[1], J. Yoon[1], A. B. Farris[2], J. Kwun[1], S. J. Knechtle[1], *[1]Department of Surgery, Duke University Medical Center, Durham, NC, [2]Department of Pathology and Laboratory Medicine, Emory University School of Medicine, Atlanta, GA*

Purpose: Desensitization with costimulation blockade and proteasome inhibition prior to kidney transplantation prevents early antibody-mediated rejection (AMR) and prolongs graft survival in highly sensitized nonhuman primates (NHP). However, recipients develop late AMR accompanied by elevation of Tfh and plasma cells. Therefore, we hypothesized that belatacept as a maintenance immunosuppression would control the post-transplant humoral immune response in conjunction with rapamycin.

Methods: Nine (9) rhesus macaques were sensitized to maximally MHC mismatched donors by two sequential skin transplants. Primates were desensitized with belatacept and carfilzomib. Following desensitization, primates received kidney allografts from their skin donors. Five primates received induction therapy with rhesus specific anti-thymocyte globulin (rhATG) and four primates received induction therapy with anti-CD4 and anti-CD8 monoclonal antibodies. Maintenance immunosuppression of all primates consisted of belatacept, rapamycin and prednisone.

Results: All primates tolerated the treatment well. In the rhATG group (n=5), we observed 3 cases of early graft rejection without DSA elevation, while we had no rejection 3 months post-transplant in the anti-CD4/8 group (p=0.08; **Figure 1A**). As expected, more significant depletion of CD8+ T cells was induced with the monoclonal antibodies compared to rhATG (**Figure 1B**). While preventing early graft rejection, the use of anti-CD4 and anti-CD8 mAbs increased the frequency of CMV reactivation requiring treatment (**Figure 1C**). Interestingly, all six animals that survived long-term showed no AMR under belatacept and rapamycin maintenance immunosuppression. We were furthermore able to wean immunosuppression to belatacept monotherapy in one primate and wean all immunosuppression in a second primate without observing graft dysfunction for at least 3 months.

Conclusions: Maintenance immunosuppression with belatacept and rapamycin prevents post-transplant AMR and allows for weaning of immunosuppression in highly sensitized nonhuman primate kidney transplant recipients. Induction therapy with anti-CD4 and anti-CD8 monoclonal antibodies prevents early ACR, which was observed with rhATG.



CITATION INFORMATION: Schmitz R., Fitch Z., Manook M., Yoon J., Farris A., Kwun J., Knechtle S. Belatacept and Rapamycin Maintenance Immunosuppression in a Sensitized Nonhuman Primate Kidney Allotransplantation Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Schmitz: None. **Z.W. Fitch:** None. **M. Manook:** None. **J. Yoon:** None. **A.B. Farris:** None. **J. Kwun:** None. **S.J. Knechtle:** None.

Abstract# 508

Inhibition of Fatty Acid Beta-Oxidation Prolongs Heart Allograft Survival

B. W. Wong, Y. Zhu, H. Dun, L. Ye, *Surgery, Washington University School of Medicine, Saint Louis, MO*

Purpose: To test the therapeutic efficacy of pharmacological inhibition of fatty acid beta-oxidation (FAO) on acute heart allograft survival.

Methods: We used a heterotopic *Balb/c* donor heart to *C57Bl/6* recipient mouse transplant model and tested the therapeutic efficacy of pharmacological inhibition of the rate-limiting FAO enzyme, carnitine palmitoyltransferase 1 (Cpt1), using the drug etomoxir. We assessed heart allograft survival by direct palpation of the transplanted heart, and assessed rejection by histology and immune cell infiltration. We further assessed immune cell composition in the transplanted heart, native heart, spleen and draining mediastinal lymph node by flow cytometry. Further, we assessed T cell activation by ELISPOT assay on splenocytes from heart transplants treated with vehicle or etomoxir using *Balb/c*-derived activated antigen-presenting cells (APCs). Finally, we utilized adoptive transfer of CD45.1$^+$ monocytes and in vitro monocyte differentiation assays to assess the effects of FAO inhibition *in vivo* and *in vitro*.

Results: Pharmacological inhibition of FAO significantly improved heart allograft survival, while reducing T cell infiltration and activation, and reducing the numbers of dendritic cells and macrophages within transplanted hearts in recipients treated with etomoxir, compared with those treated with vehicle controls. Splenocytes from heart transplanted recipients treated with etomoxir were less reactive to a general stimulus (concanavalin A) or allo-specific stimulus (activated *Balb/c* APCs). Adoptive transfer of CD45.1$^+$ monocytes revealed reduced monocyte-to-macrophage and monocyte-to-DC differentiation *in vivo*, and *in vitro* monocyte differentiation assays confirmed this observation.

Conclusions: Pharmacological inhibition of FAO is a promising therapeutic target that prolongs heart allograft survival, in part, through modulating monocyte differentiation, resulting in reduced T cell activation.

CITATION INFORMATION: Wong B., Zhu Y., Dun H., Ye L. Inhibition of Fatty Acid Beta-Oxidation Prolongs Heart Allograft Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: B.W. Wong: None. **Y. Zhu:** None. **H. Dun:** None. **L. Ye:** None.

Abstract# 509

Re-Transplantation of Mouse Kidney Grafts to Study Local Immune Responses

D. Zhao, M. Oberbarnscheidt, F. Lakkis, K. Khodor, *Starzl Transplantation Institution, Pittsburgh, PA*

Purpose: Mouse kidney transplantation has been widely used to study the immune response to allogeneic grafts. This response includes a circulating systemic compartment and a resident non circulating one. A distinction between these compartments remains an important caveat to the interpretation of the resident or local immune response's importance and function. This study aimed at developing a mouse kidney allograft re-transplantation model as a tool to investigate the local immunity in the grafts.

Methods: In primary kidney transplantation, the donor aorta (AO) was anastomosed to the recipient AO using "interrupted 6-stitch end-to-side" method. The donor renal vein was anastomosed to the recipient inferior vena cava (IVC) using end-to-side continuous suturing method. The donor ureter was implanted into the recipient bladder and secured to the posterior wall of the recipient bladder. In the re-transplantation,

the graft renal artery with a segment of the primary donor mouse's AO and a segment of the primary recipient mouse's AO was end-to-side anastomosed to the secondary recipient mouse's AO. The graft renal vein with a segment of the primary recipient's IVC was end-to-side anastomosed to the IVC of the secondary recipient mouse. A total of 3-4 well-proportioned stitches are applied to fix the ureter graft onto the posterior wall of the secondary recipient mouse's bladder.

Results: In syngeneic re-transplantation, the graft tissue architectures were normal and well maintained comparable with the primarily transplanted syngeneic graft. In allogenic re-transplantation, we firstly confirmed resident memory T cells formed and functioned in the kidney allografts by using this model. Our detailed, stepwise protocol can be stably replicated for both the primary and secondary, donor and recipient operations. The techniques in this protocol can be efficiently completed by an individual proficient in mouse kidney transplantation surgical procedures.

Conclusions: We successfully developed a mouse kidney re-transplantation model, which had not been previously described and can be harnessed in studying local immunity in the grafts.

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DISCLOSURES: D. Zhao: None. **M. Oberbarnscheidt:** None. **F. Lakkis:** None. **K. Khodor:** None.

Abstract# 510

Invariant Nkt Cells Promote Expansion of Novel Cxcr3$^+$Ccr4$^+$Cd8$^+$ T Cells in the Liver Following Allogeneic Hepatocyte Transplant

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Purpose: Hepatocyte transplantation represents a treatment for metabolic diseases and a bridge therapy to whole organ transplant but is limited in part by cell immunogenicity. Our prior work identified the critical role of both CD4-dependent and CD4-independent CD8$^+$ T cells in mediating hepatocyte rejection. We evaluated the influence of invariant natural killer T (iNKT) cells, known to be uniquely abundant in the liver, upon CD8-mediated immune responses in the presence and absence of CD4$^+$ T cells.

Methods: C57BL/6 (wild-type; WT), iNKT deficient Jα18 KO, and RAG1 KO mice (all H-2^b) were transplanted with FVB/N (H-2^q) hepatocytes. Cohorts of each strain were depleted of CD4$^+$ T cells. Some, cohorts of Jα18 KO mice received iNKT cell adoptive transfer. Recipients were evaluated for CD8-mediated *in vivo* and *in vitro* cytotoxicity, CD8$^+$ T cell phenotype, and allograft rejection.

Results: By comparing CD4-sufficient WT recipients to CD4-sufficient, iNKT cell-deficient Jα18 KO recipients, the presence of iNKT cells significantly enhanced CD8-mediated *in vivo* allocytotoxicity (WT= 83.8 ± 3.3%, n=15 vs. Jα18 KO 23.4 ± 3.1%, n=15, p<0.0001) but did not affect allograft median survival time (WT= 10 days, n=15 vs. Jα18 KO= 14 days, n=10; p>0.05). However, in the absence of CD4$^+$ T cells, iNKT cells were critically important for CD8-mediated *in vivo* allocytotoxicity (WT= 31.1 ± 3.1%, n=14 vs. Jα18 KO= 1.9 ± 0.7%, n=16, p<0.0001) and allograft median survival time (WT= 14 days, n=12 vs. Jα18 KO= 56 days, n=7, p<0.0001). Adoptive transfer of iNKTs restored cytotoxicity to WT levels (not shown). iNKT cells significantly enhance the quantity of a novel CD8$^+$ T cell subset (alloprimed CD44$^+$IFN-γ$^+$CXCR3$^+$CCR4$^+$CD8$^+$ T cells) in the liver (2-fold) of both CD4-sufficient and CD4-deficient recipients posttransplant (p<0.035 for all comparisons). When compared to alloprimed CD8$^+$ T cells that lack CCR4 expression (CXCR3$^+$CCR4$^-$CD8$^+$ T cells), CXCR3$^+$CCR4$^+$CD8$^+$ T cells express higher amounts of IFN-γ (32.0 ± 3.2%, n=9 vs. 9.1± 1.2%, n=9; p<0.0001) and TNF-α (37.0 ± 3.0%, n=9 vs. 6.6 ± 1.3%, n=9; p<0.0001). In addition, CXCR3$^+$CCR4$^+$CD8$^+$ T cells are more potent than CXCR3$^+$CCR4$^-$CD8$^+$ T cells since the transfer of small quantities (250 x 10^3 cells) induced significantly greater *in vivo* cytotoxicity (13.3 ± 1.1%; n=7, vs. 5.4 ± 0.6%; n=9; p<0.0001) and rapid hepatocyte rejection following adoptive transfer into RAG1 KO recipients with stable hepatocellular allografts (MST= day 5, n=4 vs. day 21, n=3; p=0.02).

Conclusions: iNKT cells enhance the expansion of highly cytotoxic alloprimed CXCR3$^+$CCR4$^+$CD8$^+$ T cells that mediate rapid rejection of allogeneic hepatocytes transplanted to the host liver.

CITATION INFORMATION: Zimmerer J., Ringwald B., Chaudhari S., Han J., Peterson C., Warren R., Hart M., Abdel-Rasoul M., Bumgardner G. Invariant Nkt Cells Promote Expansion of Novel Cxcr3$^+$Ccr4$^+$Cd8$^+$ T Cells in the Liver Following Allogeneic Hepatocyte Transplant *AJT, Volume 21 Supplement 3*

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Antigen Presentation / Allorecognition / Dendritic Cells

Abstract# 511

Environmental Factors That Shape T-cell Alloimmunity: Role of the Microbiome

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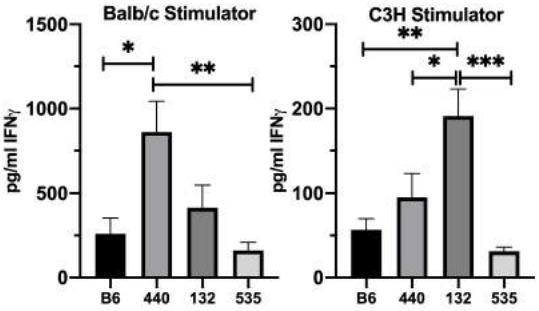
Purpose: Unlike other types of immunity, T-cell alloimmune responses to mismatched MHC proteins do not need priming by a previous exposure. While genetic differences between a recipient and donor are central to the strength of the alloreactive T cell, environmental factors can play a role. We hypothesize that the gut microbiome (MB) has a significant role in establishing an alloimmune response.

Methods: Using an internal renal transplant (RTx) registry of patients between ages 18-70 with no prior other organ tx, and no active infections, 58 patients at various points in their clinical course (on the waiting list, recent RTx, remote tx) were enrolled in our IRB-approved study. Stool samples from 36 of these patients, plus 5 enrolled healthy controls, were cryopreserved and bacterial composition was identified by 16s rRNA sequencing and analyzed for differences in operational taxonomic units. Germ-free mice (GF; 4 - 5 weeks old; C57BL/6 (B6) background) were conventionalized with fecal tx from individual Rtx patients. After 8 weeks, mice were euthanized and spleen was harvested for intracellular cytokine staining/ flow cytometric analysis and mixed lymphocyte reactions (MLR) against irradiated B6, Balb/c or C3H stimulator cells. Culture supernatants were collected on day 5 and analyzed for interferon gamma (IFNγ) by ELISA.

Results: Analysis of the bacterial composition of the feces revealed that >75% of the MB from RTx patients were substantially different than those of healthy controls. Eight weeks after colonization of GF, flow cytometric analysis revealed minimal differences between colonized GF and controls with respect to CD4 T cells. There were striking differences in CD8 T cells, in particular, the fraction of CD8 T cells that produce IFNγ. Mice colonized with fecal material from 2 RTx patients with type-2 diabetes had a significantly higher % of IFNγ-expressing CD8 T cells compared to control B6 mice or the mice colonized with fecal material from 2 other RTx patients. MLRs were generated using spleens from 3 sets of GF mice (n = 4 - 5 per set) conventionalized with fecal material from 1 of 3 RTx patients plus B6 controls (n=6). As shown below, GF mice colonized with Pt440 material had significantly higher IFNγ production than Pt 535 or B6 controls against Balb/c. In contrast, Pt132-colonized GF had a higher response to C3H compared to both Pt440 and Pt535 as well as the B6 control.

Conclusions: The data supports the hypothesis that recipient MB has the potential to alter the peripheral alloreactive T cell response.



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Abstract# 512

The Development and Characterization of AT1501, an Anti CD40L Antibody Lacking Fc Effector Function

S. Perrin[1], A. Gill[2], C. Gill[2], F. Vieira[2], K. Thompson[2], J. Lincecum[2], B. Jiang[2], *[1]Novus Therapeutics, Irvine, CA, [2]ALS Therapy Development Institute, Cambridge, MA*

Purpose: CD40L is a costimulatory type II membrane receptor for CD40. The binding of CD40L on T helper cells to CD40 on antigen presenting cells induces multiple downstream immune and inflammatory responses, including B and T cell clonal expansion, antibody production and the production of pro-inflammatory cytokines and chemokines. Hu5c8 is an IgG1 antibody with high affinity binding to CD40L

and was a promising candidate for organ transplant and autoimmune disease, but unpredicted on-target toxicity due to Fc effector and platelet activation, resulted in thromboembolic events in humans. AT-1501 contains point substitutions in the Fc region of the antibody, wherein three cysteine residues are substituted with serine and one proline residue is substituted with serine. We analyzed the binding affinity of AT-1501 and verified both functional activity and lack of binding to FCγRs or C1q.
Methods: Functional blocking of CD40L signaling was demonstrated by utilizing a HEK293 cell line expressing CD40 on the cell surface and by inhibition of downstream NFKB signaling in a cell lysate assay. PAC-1 is a protein expressed on the surface of activated platelets and was analyzed verify lack of platelet activation. We used CD40L specific antibodies to block function.
Results: AT-1501 and 5c8 have similar binding affinity to CD40L with an EC50 of 100 ng/mL. Unlike 5c8, the amino acid modifications in AT-1501 ablate Fc-effector function with no detectable binding to FCγRs or C1q. Pre-incubation of CD40L with AT-1501 blocked the binding to CD40 on the cell surface and inhibited NFκβ signaling. In our antibody competition studies incubation with AT-1501 demonstrated inhibition of AF488-5c8-(F(Ab')2 binding to CD40L expressing HEK293 cells equivalent to the reference 5C8 antibody. Similarly, AT-1501 inhibited the binding of AF488-5c8-F(Ab')2 to activated human peripheral blood lymphocyte cells. Positive control 5c8:sCD40L immune complexes (ICs) caused platelet activation leading to surface PAC-1 expression. Critically, PAC1 staining was undetectable in untreated platelets or platelets exposed to AT-1501:sCD40L ICs demonstrating the improved safety profile of AT-150
Conclusions: Our results support further clinical development of AT-1501 for transplantation and autoimmune indications.
CITATION INFORMATION: Perrin S., Gill A., Gill C., Vieira F., Thompson K., Lincecum J., Jiang B. The Development and Characterization of AT1501, an Anti CD40L Antibody Lacking Fc Effector Function *AJT, Volume 21 Supplement 3*
DISCLOSURES: **S. Perrin:** Ownership Interest; Name of Commercial Interest; Novus Therapeutics. Ownership Interest; Nature of Relationship; stock options. Salary; Name of Commercial Interest; Novus Therapeutics. Salary; Nature of Relationship; Employee. **A. Gill:** None. **C. Gill:** None. **F. Vieira:** None. **K. Thompson:** None. **J. Lincecum:** None. **B. Jiang:** None.

Abstract# 513

DAP12 Promotes Liver DC Tolerogenicity by Negative Regulation of the CGAS-STING-IFN I Pathway

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Purpose: Constitutive expression of comparatively high levels of DNAX-activating protein of 12KDa (DAP12) by liver myeloid dendritic cells (mDCs) has been implicated in their immune regulatory function. DAP12 knockout (KO) liver mDCs exhibit augmented migratory responses to secondary lymphoid tissue and enhanced ability to elicit alloreactive T cell responses in mice that may contribute to failure of DAP12 KO livers to induce spontaneous transplant tolerance. However, underlying mechanisms are unclear. There is recent evidence that in human and mouse DCs, DAP12 negatively regulates type I interferon (IFN-I) production, that is a high-risk factor for graft loss. IFN-I production can be initiated by retinoic acid-inducible gene I(RIG-I), Toll-like receptors (TLRs), and especially the cyclic GMP-AMP synthase-stimulator of IFN genes (cGAS-STING) pathway, which has been shown to promote liver injury. We postulated that DAP12 may promote liver mDC tolerogenicity by negatively regulating the cGAS-STING-IFN I signaling pathway.
Methods: Wild-type (WT) and DAP12 KO B6 mouse liver and spleen mDCs ($CD11b^+NK1.1^-CD11c^+$) were freshly-isolated and harvested after 4 hours culture in the absence or presence of 2,3-cGAMP or H-151(STING-specific inhibitor). Phenotypic analysis was performed by flow cytometry to characterize the expression of MHC II, CD80, CD86 and PD-L1. IFN-α and IFN-β mRNA transcripts and cytokine levels in supernatants were quantified using q-PCR and ELISA respectively. The activation of p-STING/STING and its downstream targets p-TBK1/TBK1, p-IRF3/IRF3 were probed by western blot. T cell allostimulatory function of the mDC was assessed by CFSE-MLR.
Results: DAP12 KO increased p-STING, p-TBK1 and p-IRF3 expression, enhanced MHC II and co-stimulatory molecule expression, but decreased co-inhibitory PD-L1 in the presence or absence of 2,3-cGAMP by both liver and spleen mDC. In addition, IFN-α and IFN-β mRNA levels and secretion in supernatants were augmented. DAP12 KO liver and spleen mDC showed superior ability to stimulate allogeneic T cell proliferation, while H-151-treated DAP12 KO mDCs exhibited reduced p-STING, p-TBK1 and p-IRF3 expression, lower MHC II and co-stimulatory molecule expression, but increased co-inhibitory PD-L1, impaired IFN-α and IFN-β expression and secretion with 2,3-cGAMP exposure in both liver and spleen mDC. The enhanced allogeneic T cell stimulatory ability of DAP12 KO liver and spleen mDC was reversed by STING inhibition via H-151. Notably, the elevation in STING-IFN-I activation in DAP12 KO compared with WT cells was much higher in liver mDC than in spleen mDC.
Conclusions: DAP12 may promote liver DC tolerogenicity by negatively regulating the STING-IFN I pathway.
CITATION INFORMATION: Zheng Y., Long J., Ryosuke N., Peng L., Peng F., Thomson A. DAP12 Promotes Liver DC Tolerogenicity by Negative Regulation of the CGAS-STING-IFN I Pathway *AJT, Volume 21 Supplement 3*
DISCLOSURES: **Y. Zheng:** None. **J. Long:** None. **N. Ryosuke:** None. **L. Peng:** None. **F. Peng:** None. **A. Thomson:** None.

Basic

B-cell / Antibody /Autoimmunity

Abstract# 514

Lung Transplant Recipients Developing Early DSAs are Characterized by a Shift Towards Memory B Cells Directly After Transplantation

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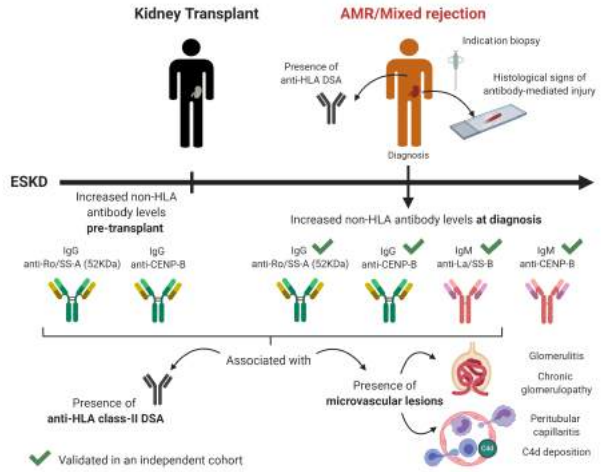
Purpose: After lung transplantation (LTx), the development of early donor HLA-specific antibodies (eDSA) is associated with antibody-mediated rejection (AMR) and poor graft survival. Since 2013, patients with eDSA within the first month after LTx are treated with IgA/IgM enriched intravenous immunoglobulins (IgGAM), occasionally with anti-CD20 antibody (Rituximab). We hypothesise that the composition of naïve and memory B cell subsets differs between eDSA-positive and negative patients already before and directly after LTx.
Methods: In a pilot study of 58 LTx recipients, B cell subsets were analysed by flow cytometry using CD19, CD20, IgD, CD24, CD27antibodies pre, post (T0), 24 hours (T24) and 3 weeks after LTx. The proportions of B cell subsets were compared between eDSA-positive (n=13, 22,4%) and -negative (n=45, 77,6%) patients at discharge three weeks after transplantation.
Results: Within the first 24h, patients without eDSAs showed a significant increase in IgD+ CD27- naïve B cells ($p<0,0001$) accompanied by a significant decrease in IgD- CD27+ memory B cells, independently of the presence of eDSA (all, $p<0,0007$). Of note, eDSA-positive patients constantly showed higher frequencies of $IgD^+CD27^-CD24^{hi}$ naïve and lower frequencies of $IgD^-CD27^-CD24^{lo}$ memory B cell subsets compared to eDSA-negative patients. A transient increase in IgD^+CD27^+ switch memory B cells was detected at T0 in both groups, returning to baseline levels already at T24.
Conclusions: Lung transplant recipients show remarkable dynamics of naïve, memory and switch memory B cells within the first 24 hours characterized by a shift from naïve towards memory B cells, which was more pronounced in the eDSA group. Based on these preliminary data, a refined B cell monitoring may be able to identify patients with a higher risk for eDSA development in the future and pave the way to more specific treatment options to prevent eDSA.
CITATION INFORMATION: Christoph S., Hitz A., Bellmàs Sanz R., Kühne J., Wiegmann B., Ius F., Salman J., Chichelnitskiy E., Siemeni T., Sommer W., Haverich A., Warnecke G., Falk C. Lung Transplant Recipients Developing Early DSAs are Characterized by a Shift Towards Memory B Cells Directly After Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: **S. Christoph:** None. **A. Hitz:** None. **R. Bellmàs Sanz:** None. **J. Kühne:** None. **B. Wiegmann:** None. **F. Ius:** None. **J. Salman:** None. **E. Chichelnitskiy:** None. **T. Siemeni:** None. **W. Sommer:** None. **A. Haverich:** None. **G. Warnecke:** None. **C. Falk:** None.

Abstract# 515

Autoantibodies Against Ro/SS-A, CENP-B, and La/SS-B are Increased in Patients with Kidney Allograft Antibody-mediated Rejection

S. Clotet-Freixas[1], M. Kotlyar[2], C. M. McEvoy[1], C. Pastrello[2], S. Rodríguez-Ramírez[1], S. Farkona[1], H. Cardinal[3], M. Dieudé[3], M. Hébert[3], Y. Li[1], O. Famure[1], P. Chen[1], S. Kim[1], E. Chan[4], I. Jurisica[2], R. John[1], A. Chruscinski[1], A. Konvalinka[1], *[1]Toronto General Hospital Research Institute, University Health Network, Toronto, ON, Canada, [2]Krembil Research Institute, University Health Network, Toronto, ON, Canada, [3]Centre de Recherche du Centre Hospitalier de l'Université de Montréal, Montreal, QC, Canada, [4]Department of Medicine, Division of Nephrology, University Health Network, Toronto, ON, Canada*
Purpose: Antibody-mediated rejection (AMR) causes >50% of late kidney graft losses. Although donor-specific antibodies (DSA) against HLA cause AMR, antibodies against non-HLA antigens are also linked to rejection. Identifying key non-HLA antibodies will improve our understanding of antibody-mediated injury.
Methods: We analyzed non-HLA antibodies using protein arrays in sera from 91 kidney transplant patients with AMR, mixed rejection, acute cellular rejection (ACR),

or acute tubular necrosis (ATN). IgM and IgG antibodies against 134 non-HLA antigens were measured pre-transplant and at the time of biopsy-proven diagnosis. Findings were validated in 60 kidney transplant patients from an independent cohort.
Results: Seventeen non-HLA antibodies were significantly increased (P<0.05) in AMR/mixed rejection compared to ACR or ATN pre-transplant, and 9 at diagnosis. AMR/mixed cases showed significantly increased pre-transplant levels of IgG anti-Ro/SS-A and anti-CENP-B, compared to ACR. Together with IgM anti-CENP-B and anti-La/SS-B, these antibodies were also significantly increased in AMR/mixed rejection at diagnosis. Increased IgG anti-Ro/SS-A and anti-CENP-B pre-transplant and at diagnosis, and IgM anti-La/SS-B at diagnosis, were associated with the presence of microvascular lesions and class-II DSA (P<0.05). Significantly increased IgG anti-Ro/SS-A in AMR/mixed compared to ACR (P=0.01), and numerically increased IgM anti-CENP-B (P=0.05) and anti-La/SS-B (P=0.06), were validated in the independent cohort.
Conclusions: This is the first study that implicates autoantibodies against Ro/SS-A and CENP-B in AMR. These non-HLA antibodies may participate in the crosstalk between autoimmunity and alloimmunity in kidney AMR.



CITATION INFORMATION: Clotet-Freixas S., Kotlyar M., McEvoy C., Pastrello C., Rodríguez-Ramírez S., Farkona S., Cardinal H., Dieudé M., Hébert M., Li Y., Famure O., Chen P., Kim S., Chan E., Jurisica I., John R., Chruscinski A., Konvalinka A. Autoantibodies Against Ro/SS-A, CENP-B, and La/SS-B are Increased in Patients with Kidney Allograft Antibody-mediated Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Clotet-Freixas: None. **M. Kotlyar:** None. **C.M. McEvoy:** None. **C. Pastrello:** None. **S. Rodríguez-Ramírez:** None. **S. Farkona:** None. **H. Cardinal:** None. **M. Dieudé:** None. **M. Hébert:** None. **Y. Li:** None. **O. Famure:** None. **P. Chen:** None. **S. Kim:** None. **E. Chan:** None. **I. Jurisica:** Other; Name of Commercial Interest; personal fees from Canadian Rheumatology Association, grants and nonfinancial support from IBM, and personal fees from Novartis.. **R. John:** None. **A. Chruscinski:** None. **A. Konvalinka:** None.

Abstract# 516

Properties of Regulatory B Cells Suppressing B Cells

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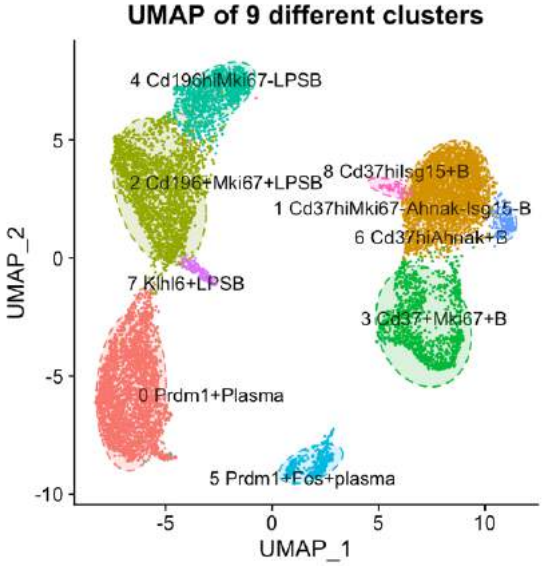
Purpose: Our previous study showed that TLR-Bregs, regulatory B cells generated *in vitro* through TLR activation, suppressed naïve B cell proliferation triggered by a mitogen (LPS-B cells). The mechanism underlying Breg suppression is presently unknown. The present study on batch and single-cell RNAseq analyses of suppressed LPS-B cells and suppressive TLR Bregs provide important insights on pathways associated with suppression.
Methods: TLR-Bregs were generated from enriched C57BL/6 splenic CD19+B cells cultured in the presence of CpG ODN1668 for 3 days (CpG-B cells), followed by the addition of LPS (10ug/ml), PMA (50ng/ml), and ionomycin (1ug/ml) for the last 5 hours. Suppression was measured in 3 day-cocultures of TLR-Bregs and naïve B cells stimulated with LPS (LPS-B cells). B cell proliferation/ differentiation was assessed by flow cytometry. RNAseq analysis was performed on naive B, CpG-B cells, and TLR-Bregs. RNA-Seq data of the LPS-B cells (LPS-B24h and LPS-B72h) and TLR-Bregs were analyzed using R programming (version 3.6.3). Gene Ontology (GO) was used to perform enrichment analysis on differentially expressed genes (DEGs).
Results: Co-DEGs among those LPS-B cells identified 23 and 6 genes with up or down-regulation of expression among LPS-B72h, LPS-B24h, and naive B cells. Among those 29 genes, 17 were also differentially expressed in TLR-Bregs in comparison with CpG-B and naive B cells. Go pathway analysis for these 17 co-genes found that Il10, Prdm1, and Il2ra (CD25) were positively enriched in B cell proliferation. Among those three genes, Il10 and Il2ra both increased in LPS-B cells and TLR-Bregs while Prdm1 increased in LPS-B cells and decreased in TLR-Bregs. Flow cytometry revealed that TLR-Bregs, but not CpG-B cells, inhibited Prdm1 expression. The scRNA-seq analysis suggested clusters 0, 2, 5, and 7 were proliferated B cells after LPS stimulation (Figure 1). Clusters 0 and 5 also highly-expressed Prdm1 and Sdc1, which were identified as plasma cells. These combined results indicated that TLR-Bregs suppressed clusters 0, 2, 5, and 7 and eventually suppressed proliferation and differentiation of LPS-B cells.
Conclusions: TLR-Bregs can suppress the proliferation and differentiation of naïve B cells induced by LPS. The suppression of Prdm1 may indicate that the mechanism for which TLR-Bregs suppress other B cells lies in the Prdm1-relevant pathway.



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DISCLOSURES: Q. Fu: None. K. Lee: None. **K. Deng:** None. **G. Huai:** None. **C. Rickert:** None. **H. Yang:** None. **C. LeGuern:** None. **S. Deng:** None. **J.F. Markmann:** None.

Abstract# 517

Autoimmune Responses to DNA Topoisomerase I Exacerbate Renal Allograft Injury

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Purpose: Multiple clinical and pre-clinical studies describe correlations between pre-existing or *de novo* autoimmune responses and poor transplant outcome. We have previously reported that following renal transplantation, mouse recipients containing donor-reactive memory CD4 T cells rapidly develop donor specific alloantibody (DSA) causing acute antibody-mediated rejection (AMR). Inhibition of DSA production prevented acute AMR but the allografts in these recipients developed signs of chronic tissue injury at later time points. The goal of this study was to test whether donor-reactive memory T cells also induce generation of autoantibodies and investigate the relevance of these autoantibodies to renal tissue injury.
Methods: C57BL/6 (B6, H-2^b) recipients containing donor-reactive memory T cells were transplanted with BALB/c (H-2^d) renal allografts. Recipient sera were collected at d. 7 posttransplant and screened for reactivity to potential autoantigen epitopes using PEPperCHIP Autoimmune Epitope Microarray. Peptide TI-$I_{205-219}$ representing an identified DNA topoisomerase I (TI-I) 205-219 epitope was custom-synthesized. B6 mice immunized with TI-$I_{205-219}$ (3 biweekly injections of 100μg TI-$I_{205-219}$/CFA s.c.) were tested in a model of bilateral renal warm ischemia or used as recipients of BALB/c renal allografts.
Results: DNA topoisomerase I peptide TI-$I_{205-219}$ was identified as the most prominent epitope in sensitized renal allograft recipients. Anti-TI-$I_{205-219}$ antibodies were induced after transplantation of BALB/c kidney allografts into non-sensitized B6.WT but not B6.TCRβ-/- recipients indicating that T cell help is required for autoantibody production. Furthermore, the level of anti-TI-$I_{205-219}$ autoantibodies was further increased in sensitized recipients.Immunization with TI-$I_{205-219}$ resulted in the generation of TI-$I_{205-219}$ IgG autoantibody and markedly exacerbated renal pathology after 25 min of bilateral warm kidney ischemia followed by reperfusion. TI-$I_{205-219}$/CFA immunization resulted in rapid rejection in 10/12 kidney allograft recipients (MST of

13.5 d) whereas only 2/6 CFA-immunized controls rejected by d. 16 posttransplant. TI-$I_{205-219}$/CFA immunization increased frequencies of donor BALB/c-reactive T cells but not serum class I and class II DSA levels at the time of rejection.

Conclusions: Our data identify DNA topoisomerase I as a novel self-antigen target and suggest complex interplay between auto- and alloreactive T cells and antibodies in the context of kidney transplantation.

CITATION INFORMATION: Gorbacheva V., Fan R., Miyairi S., Baldwin W., Fairchild R., Valujskikh A. Autoimmune Responses to DNA Topoisomerase I Exacerbate Renal Allograft Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: V. Gorbacheva: None. **R. Fan:** None. **S. Miyairi:** None. **W. Baldwin:** None. **R. Fairchild:** None. **A. Valujskikh:** None.

Abstract# 518

Donor-specific Regulatory B Cells Prolong Skin Graft Survival by Preventing the Proliferation of Donor-specific CD4 Helper but Not of CD8 Effector T Cells

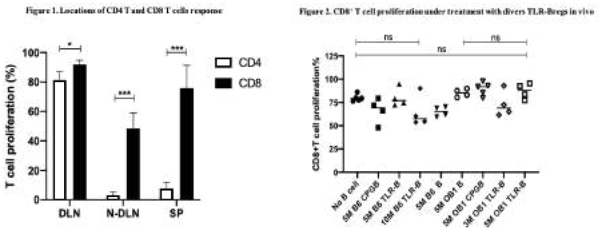
G. Huai[1], K. Lee[2], K. Deng[2], Q. Fu[1], C. G. Rickert[2], S. Deng[1], C. LeGuern[2], J. F. Markmann[2], *[1]Department of Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

Purpose: TLR-Bregs were defined by our group as B cells generated *in vitro*. They have demonstrated the ability to inhibit CD4 T cell proliferation. Since CD8 T cells are also major players in rejection of organ transplants, the present report explores the mechanisms by which TLR-Breg suppression may differentially affects CD4 and CD8 T cells in a transplantation setting.

Methods: B6 TLR-Bregs and OB1 TLR-Bregs were generated from B cells isolated from C57BL/6 and transgenic OB1 mice (B cell receptor specific to ovalbumin, OVA). *In vitro* MLR was set up in co-culture of CFSE-labeled $CD8^+$ T cells (OVA-specific) as responders, irradiated OVA splenic cells as stimulators, and OB1 TLR-Bregs as suppressors. For *in vivo* suppression experiments, CD8 T cells were adoptively transferred to B6 underwent OVA skin graft, with or without B6 or OB1 TLR-Bregs. Cells from draining lymph nodes (DLN), non-draining lymph nodes (N-DLN), and spleen (SP) were harvested and analyzed by flow cytometry. The combination of anti-CD8 mAb and OB1 TLR-Bregs were administrated to check skin graft survival.

Results: *In vitro* assays showed that OB1 TLR-Bregs suppress $CD8^+$T cell proliferation and INF-γ production ($p<0.05$, vs control). In contrast to previous results showing that $CD4^+$ T cells were concentrated in DLN, $CD8^+$ T cells were not only found in the DLN, but also in the N-DLN and spleen (Figure 1). Suppression assays *in vivo* confirmed the inability of either B6 or OBI TLR-Bregs to inhibit $CD8^+$ T cell proliferation, positive controls of proliferation were at 79.9%±3.8% and had no significant difference with Bregs treatment (64.7%±17.3%, Figure 2). Importantly, the in vivo depletion of $CD8^+$T cells in mice treated with OB1 TLR-Bregs (61 days) did not significantly prolong graft survival than OB1 TLR-Bregs alone treatment (38 days).

Conclusions: The lack of TLR-Breg control over $CD8^+$ T cell proliferation may result from a more disperse lymphoid tissue distribution of these cells as compared to that of $CD4^+$T cells. Collectively, these data indicate that ex-vivo generated Bregs promote prolongation of graft survival, mainly by downregulating $CD4^+$ helper T cell proliferation, which in turn may curtail graft-specific CD8 reactivity. Additional studies will be required to identify potential therapeutic targets to improve graft survival.



CITATION INFORMATION: Huai G., Lee K., Deng K., Fu Q., Rickert C., Deng S., LeGuern C., Markmann J. Donor-specific Regulatory B Cells Prolong Skin Graft Survival by Preventing the Proliferation of Donor-specific CD4 Helper but Not of CD8 Effector T Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Huai: None. K. Lee: None. **K. Deng:** None. **Q. Fu:** None. **C.G. Rickert:** None. **S. Deng:** None. **C. LeGuern:** None. **J.F. Markmann:** None.

Abstract# 519

In Vitro Generated Regulatory B Cells Induce $Cd4^+Cd25^+Foxp3^+$Tregs from $Cd4^+Cd25^-$T Cells via TGF-β

G. Huai[1], K. Lee[2], K. Deng[2], Q. Fu[1], C. G. Rickert[2], S. Deng[1], C. LeGuern[2], J. F. Markmann[2], *[1]Department of Organ Transplantation Center, Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China, [2]Center for Transplantation Sciences, Massachusetts General Hospital, Harvard Medical School, Boston, MA*

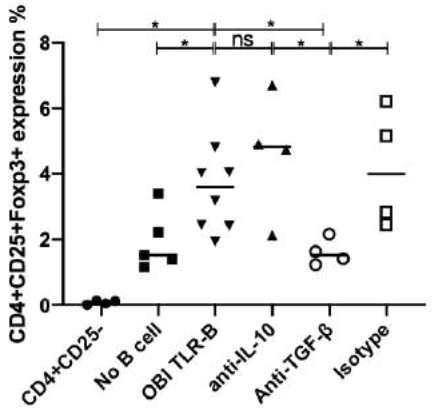
Purpose: Our team previous study showed that TLR-Bregs, stimulated through TLR pathway *in vitro*, harbored regulatory properties by suppressing $CD4^+$ T cell proliferation and function *in vitro* and *in vivo*. These TLR-Bregs can also prolong skin graft survival. We describe here to explore TLR-Bregs function to induce Tregs and identify the mechanism of Tregs induction by TLR-Bregs.

Methods: OB1 TLR-Bregs were generated *in vitro* from B cells isolated from transgenic OB1 mice (B cell receptor specific to OVA). For Tregs induction by TLR-Bregs assay, C57BL/6 mice, transplanted with OVA skin, treated with or without OB1 TLR-Bregs. The $CD4^+Foxp3^+$ Tregs expression in draining lymph node (DLN) of recipient will be detected at day 14. To identify the mechanism of OB1 TLR-Bregs on Tregs induction, $CD4^+CD25^-$ T cells sorted from OT II mice spleen, and then adoptively transfer to the SCID mice underwent OVA skin graft. In the same line, the SCID mice would be administrated OB1 TLR-Bregs (BCR specific for OVA) alone or combine with anti-IL-10 antibody (250 ug/mice), anti-TGF-β antibody (200ug/mice) or isotype control (200ug/mice) every other day from day 0 to day 8. After 14 days, $CD4^+CD25^+Foxp3^+$ Tregs from DLN would be analyzed by flow cytometry.

Results: The results from Tregs induction by TLR-Bregs assay showed that, with OB1 TLR-Bregs treatment, the $CD4^+Foxp3^+$ Tregs expression is highly increased ($p<0.05$, vs control). The experiment of Tregs generation in SCID mice revealed significant upregulation in $CD4^+CD25^+Foxp3^+$Tregs expression with OB1 TLR-Bregs treatment (3.7%±1.6%, $p<0.05$, vs no B cells). In the same time, when SCID mice administrated with the combination of OB1 TLR-Bregs and anti-TGF-β antibody, $CD4^+CD25^+Foxp3^+$Tregs expression would be decreased significantly (1.6%±o.4%, $p<0.05$, vs OB1 TLR-B cells). However, depletion of IL-10 in mice treated with OB1 TLR-Bregs showed no big difference with OB1 TLR-Bregs alone.

Conclusions: OBI TLR-Bregs can convert the $CD4^+CD25^-$ T cells to $CD4^+CD25^+Foxp3^+$Tregs, and only the ablation of the TGF-β antibody block Tregs induction, that attributes to TLR-Breg cells induce Foxp3 expression of $CD4^+CD25^-$ T cells through TGF-β but not IL-10. Tregs induced by TLR-Bregs is related to prolong the skin graft survival. Therefore, TGF-β dependent tolerance induction by TLR-Bregs will be explored in organ transplantation model.

Figure 1 The mechanism of Tregs induction by TLR-Bregs



CITATION INFORMATION: Huai G., Lee K., Deng K., Fu Q., Rickert C., Deng S., LeGuern C., Markmann J. In Vitro Generated Regulatory B Cells Induce $Cd4^+Cd25^+Foxp3^+$Tregs from $Cd4^+Cd25^-$T Cells via TGF-β *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Huai: None. K. Lee: None. **K. Deng:** None. **Q. Fu:** None. **C.G. Rickert:** None. **S. Deng:** None. **C. LeGuern:** None. **J.F. Markmann:** None.

BASIC

Abstract# 520

Quantifying Hidden Sensitization: HLA-reactive Memory B Cells in the Spleens of Sensitized Women

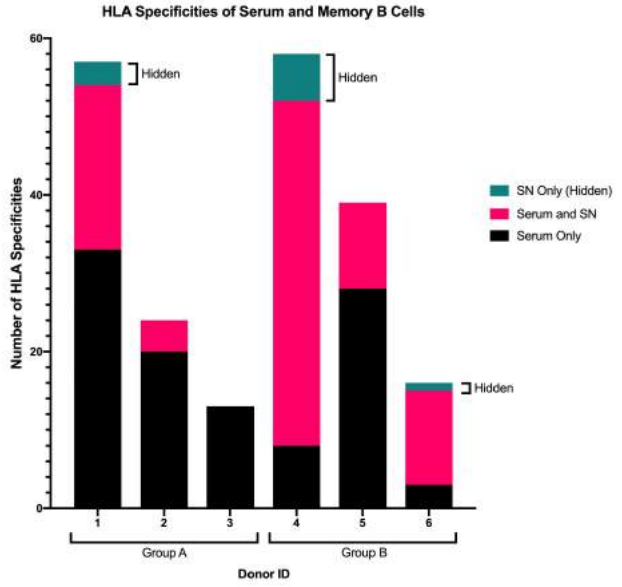
J. T. Killian[1], J. A. Houp[1], A. Nellore[2], R. G. King[3], P. M. Porrett[1], F. E. Lund[3], *[1]Department of Surgery, University of Alabama at Birmingham School of Medicine, Birmingham, AL, [2]Department of Medicine, University of Alabama at Birmingham School of Medicine, Birmingham, AL, [3]Department of Microbiology, University of Alabama at Birmingham School of Medicine, Birmingham, AL*

Purpose: Measurement of circulating anti-HLA antibody (anti-HLA-Ab) in transplant candidates and recipients is required for successful organ transplantation. However, serum Ab measurement alone likely underestimates the full spectrum of HLA reactivity in sensitized individuals, as memory B cells (Bmems) which target HLA specificities distinct from anti-HLA-Abs may also be generated during a sensitization event. While this "hidden" sensitization (HS) may predispose patients to an early anamnestic response posttransplant, the prevalence of HS is unknown as studies of HLA-reactive Bmems have relied on peripheral blood samples with a limited number of HLA-reactive Bmems. We aimed to improve our understanding of the prevalence and specificity of HS by analyzing Bmems in human spleens.

Methods: IgG+ Bmems were purified from the spleens of six sensitized female organ donors. Cells, which were activated with IL-2, IL-21, and R848, secreted Abs into the supernatants (SNs) that reflected the Bmem specificities. Serum and SN anti-HLA-Abs were identified using a Luminex assay. The number of HLA specificities was compared between serum and SN for each donor. HLA specificities present only in SNs were classified as "hidden" (teal bars in Fig. 1).

Results: HS was detected in three of six females, and detection markedly improved in samples with greater than 500,000 Bmems (Fig. 1, Group B). Among samples with fewer than 500,000 activated Bmems (Group A), SNs contained an average of 19% of the serum specificities (0%, 17%, and 39% for the three donors respectively), while samples with greater than 500,000 activated Bmems (Group B) produced antibodies that contained an average of 64% of the serum specificities (44%, 80%, and 85% for the three donors respectively). HS was detected in two of three donors in Group B.

Conclusions: Using serum anti-HLA-Abs alone underestimates the breadth of sensitization. By analyzing the spleen, we were able to increase the number of Bmems sampled by over 100-fold relative to peripheral blood-based studies. Compared to those studies, we detected a higher percentage of serum specificities contained in SNs. HS was also detected more frequently. This approach may improve the sensitivity for detecting HLA-reactive Bmems and for developing a more comprehensive picture of HLA-reactive B cell memory.



CITATION INFORMATION: Killian J., Houp J., Nellore A., King R., Porrett P., Lund F. Quantifying Hidden Sensitization: HLA-reactive Memory B Cells in the Spleens of Sensitized Women *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.T. Killian: None. **J.A. Houp:** Other; Name of Commercial Interest; Natera. Other; Nature of Relationship; Member of speakers' bureau. **A. Nellore:** None. **R.G. King:** None. **P.M. Porrett:** Other; Name of Commercial Interest; Janssen Research & Development. Other; Nature of Relationship; Scientific Advisor. **F.E. Lund:** Consulting Fee; Name of Commercial Interest; Altimmune. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; Name of Commercial Interest; Altimmune, Sanofi. Grant/Research Support; Nature of Relationship; Sponsored Research Funding, Sponsored Research Funding.

Abstract# 521

Suppression of T Cell Proliferation by Activated Nonhuman Primate B Cells

K. Lee, K. Deng, G. Huai, F. Qiang, C. Rickert, J. Lei, C. Leguern, J. Markmann, *Massachusetts General Hospital, Boston, MA*

Purpose: We previously generated Toll-like receptor (TLR)-activated B cells in rodent settings. These B cells can suppress T cell proliferation via *in vitro* mixed lymphocytes reaction and promote allograft tolerance as Regulatory B cells (Bregs). A continuous effort toward Bregs drove us to generate TLR-activated B cells in Nonhuman primates using the same protocol in the murine model. In this study, we evaluated the efficacy of their phenotype, function, and mechanism to suppress T cell responses.

Methods: Purified splenic NHP B cells were activated with CpG ODN 2006-5G for 3 days with the addition of LPS, PMA, and ionomycin for the last 5 hours. They were then harvested and co-cultured with CFSE-labeled autologous T cells stimulated with polyclonal CD3/CD28 beads or PHA. On day 4, proliferation was measured by flow cytometry. In some cultures, anti-PD1, or anti-GzmB was added to evaluate their role in suppressing T cell proliferation.

Results: The majority of CpG/LPI-NHP B cells had immature phenotypes, CD20+CD21+CD27-IgM+ on surface. In *in vitro* experiment, they effectively suppressed CD4+ and CD8+ T cell proliferation and reduced their viability upon stimulation, while B cells with only CpG activation did not. The CpG/LPI-NHP B cells expressed higher levels of LAP, a surrogate marker for TGF-β, and programmed death (PD1), but not expressed a higher level of IL-10 compared to naïve NHP B cells. Instead, it seemed that Granzyme B (GzmB) was instrumental to the suppressive effect because the blockade of GzmB increased the proliferation in the coculture.

Conclusions: We have successfully generated NHP Bregs with *in vitro* suppressive capacity toward T cell responses. Here we show for the first time that CpG-activated NHP B cells exert regulatory function. Our studies suggest that Bregs may provide a great option for regulatory cell-based therapy. We are pursuing the translational potential of Bregs in a large animal model by evaluating their regulatory function i*n vivo*.

CITATION INFORMATION: Lee K., Deng K., Huai G., Qiang F., Rickert C., Lei J., Leguern C., Markmann J. Suppression of T Cell Proliferation by Activated Nonhuman Primate B Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Lee: None. **K. Deng:** None. **G. Huai:** None. **F. Qiang:** None. **C. Rickert:** None. **J. Lei:** None. **C. Leguern:** None. **J. Markmann:** None.

Abstract# 522

Targeting Il-21 Receptor Shifts Tfh/tfr Balance and Amelioratechronic Antibody Mediated Rejection

Y. Nian, Z. Xiong, J. Zhao, Y. Fu, *Tianjin First Central Hospital, Tianjin, China*

Purpose: Donor specific antibody (DSA) plays a central role in chronic kidney allograft injury. As a trigger of humoral alloimmune response, follicular T helper cells(Tfh) promote DSA generation, while T-Follicular regulatory cells(Tfr) inhibit antibody production by suppressing Tfh and B cells. The key cytokine IL-21 exerts distinct effect on Tfh and Tfr. Here we studied whether blocking IL-21 by monoclonal IL-21R antibody changes the Tfh/Tfr balance and inhibits dnDSA generation.

Methods: First, we investigated the impact of αIL-21R on Tfh and Tfr in in-vitro conditioned culture. Naïve CD4+ T cells were isolated from 3 months old C57BL6 mouse and cultured in Tfh condition with αIL-21R or isotype IgG. Proliferation and differentiation were evaluated by CFSE dilution and BCL-6, ICOS, PD-1 expression with flow cytometry. For further in-vivo investigation, a fully mismatch skin transplantation model was utilized to trigger the humoral alloimmune response. For further in-vivo investigation, a fully mismatch skin transplantation model was utilized to trigger the humoral alloimmune response.

Results: . αIL-21R inhibits Tfh proliferation and differentiation significantly. By contrast, in modified Treg condition (conventional Treg condition plus IL-6), cell proliferation and Bcl-6 expression were not inhibited by αIL-21R. Notably, Inhibition of IL-21 on Tfr proliferation can be reversed by αIL-21R. Mechanistically, Akt signal pathway was significantly up-regulated and inhibited by αIL-21R in Tfh, while remained in constant quiescent level in Tfr regardless of administration of αIL-21R. In consistent with in-vitro data, flow cytometry and immunofluorescence revealed reduced Tfh/Tfr ratio in recipients treated with αIL-21R. Germinal center response was evaluated with lectin histochemistry. αIL-21R inhibited the formation of germinal center significantly. Most importantly, dnDSA level in different time points after transplantation revealed a significant inhibition of αIL-21R on dnDSA generation.

Conclusions: In summary, our results demonstrate that monoclonal αIL-21R shifts Tfh/Tfr balance towards dnDSA reduction and ameliorates chronic injury by suppressing Tfh and blocking the impact of IL-21 on Tfr. The αIL-21R might, therefore, be a useful treatment in organ transplantation to prevent chronic antibody mediated rejection.

CITATION INFORMATION: Nian Y., Xiong Z., Zhao J., Fu Y. Targeting Il-21 Receptor Shifts Tfh/tfr Balance and Amelioratechronic Antibody Mediated Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Nian: None. **Z. Xiong:** None. **J. Zhao:** None. **Y. Fu:** None.

Abstract# 523

Antibodies to Hla Molecules Lead to Induction and Release of Circulating Exosomes with Lung Self-Antigens

R. Ravichandran, M. Smith, R. Bremner, T. Mohanakumar, *St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Purpose: Antibodies (Abs) to human leukocyte antigen (HLA) (anti-HLA) can injure allograft by complement-dependent/independent mechanisms. Crosslinking of HLA-class I with Abs associate with integrin β4 and Src/FAK signaling pathway in endothelial cells and induction of endoplasmic reticulum (ER) stress. We sought to determine whether anti-HLA both class I and II can induce circulating exosomes from human airway epithelial cells *in vitro* and mechanism involved in exosome release.

Methods: Human airway epithelial cell line (KCC266) was incubated with anti-HLA-A2 or high panel reactive sera (ie, anti-HLA), W6/32 (anti-HLA class I), anti-HLA class II (DR and DQ) for 24 hours. Exosomes were isolated by ultracentrifugation; size was defined by Nanosight NS300. Western blot was performed to determine lung self-antigens (Kα1Tubulin, Collagen V). Ability of anti-HLA to induce stress kinases and influence of exosome inhibitor GW4869 (20μM) in exosome release were determined.

Results: Airway epithelial cells incubated with anti-HLA demonstrated induction of exosomes (<200 nm) containing self-antigen (Collagen V) (fold change: anti-A2, 3±1; anti-HLA, 2±0.5). Anti-HLA class I and II also induced exosomes with self-antigens (Collagen V (W6/32, 3±0.4; Abs to HLA-DR, 3±0.5; Abs to HLA-DQ, 2±0.6, and Kα1Tubulin (W6/32, 2±0.6; Abs to HLA-DR, 2.±0.4 Abs to HLA-DQ, 1.9±0.3). Anti-HLA induced ER stress markers in airway epithelial cells; PKR-like endoplasmic reticulum kinase (1.52±0.1) and eukaryotic translation initiation factor α (1.8±0.3). Anti-HLA class I (W6/32) also induced ER stress markers in airway epithelial cells; PKR-like endoplasmic reticulum kinase (2±0.8) and eukaryotic translation initiation factor α (2±0.4). Exosome release from airway epithelial cells was inhibited by GW4869 (20μM; 82±8%) but did not abrogate ER stress. Anti-HLA class I upregulated integrin β4 /FAK/SRC pathway and ER stress in AEC and lead to exosome release.

Conclusions: Ligation of HLA molecules (class I and II HLA-DR, DQ) on human airway epithelial cell line by Abs specific to HLA induced exosomes with lung self-antigens (Kα1Tubulin, Collagen V), and ER stress *in vitro*. Anti-HLA class I ligation induced integrin β4 signaling by FAK/SRC pathway and ER stress which lead to release of exosomes from airway epithelial cells. We, therefore, present a new mechanism by which anti-HLA-induced stress of the transplanted organ can induce exosome release with self-antigens, contributing to the pathogenesis of rejection of the allograft.

CITATION INFORMATION: Ravichandran R., Smith M., Bremner R., Mohanakumar T. Antibodies to Hla Molecules Lead to Induction and Release of Circulating Exosomes with Lung Self-Antigens *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Ravichandran: None. **M. Smith:** None. **R. Bremner:** None. **T. Mohanakumar:** Grant/Research Support; Name of Commercial Interest; NIH. Grant/Research Support; Nature of Relationship; PI.

Abstract# 524

Development of a Rat Model of Antibody-Mediated Rejection After Liver Transplantation

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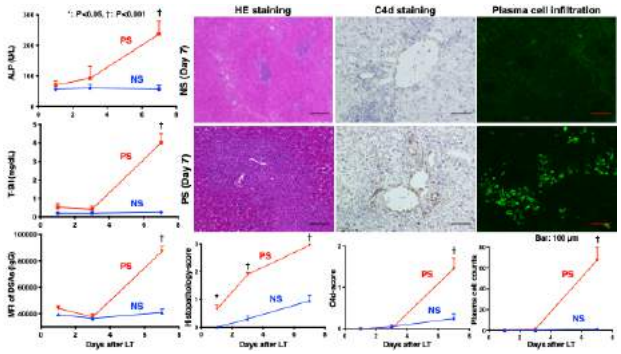
Purpose: Antibody-mediated rejection (AMR) is a refractory rejection after donor-specific antibody (DSA)-positive or ABO blood-type incompatible liver transplantation (LT), due at least in part to lacking a standardized rodent model of AMR.

Methods: Orthotopic LT was performed from male Dark Agouti rats (DA, 240-260g, donors) to male Lewis rats (LEW, 280-300g, recipients), served as non-sensitized controls (Group-NS). In pre-sensitized group (Group-PS), LEW were pre-sensitized by a preceding skin transplantat (2 x 2 cm^2) from DA with subcutaneous aluminum adjuvant 4-6 weeks prior to LT.Tacrolimus was daily administered (0.1 mg/kg/day) after LT until sacrifice to suppress cellular rejections. Blood and liver tissues were sampled on post-transplant day (PTD)-1, -3, and -7 (n =5 each). Both IgG- and IgM-DSA titers in recipient sera were determined by flow cytometry.

Results: AST, ALT, ALP, total bile-acid (TBA), and bilirubin were all significantly higher in Group-PS than in Group-NS (P<0.01). In particular, biliary damage markers, i.e. ALP, TBA, and bilirubin, were significantly deteriorated in Group-PS than in -NS on PTD-7 (P <0.001), followed by thrombocytopenia (P <0.05) and aggravated PT-INR (P <0.05). Histopathological grading (P <0.001) and C4d scores (P <0.001) were also significantly deteriorated in Group-PS than in -NS on PTD-7. As underlying mechanisms, we demonstrated significantly upregulated IgG- and IgM-DSA titers (P<0.001 and <0.05, respectively), accompanied with significantly-more infiltrated plasma cells to transplanted liver tissues (P <0.001) in Group-PS than in -NS on PTD-7.

Conclusions: By a preceding skin sensitization with post-transplant tacrolimus, we developed a rat AMR model after LT that satisfies the Banff criteria for AMR diagnosis.



CITATION INFORMATION: Tajima T., Hata K., Kusakabe J., Miyauchi H., Uemoto S. Development of a Rat Model of Antibody-Mediated Rejection After Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Tajima: None. **K. Hata:** None. **J. Kusakabe:** None. **H. Miyauchi:** None. **S. Uemoto:** None.

Abstract# 525

A Novel Mouse Model of Cardiac Allograft Vasculopathy

H. Tsuda[1], E. Reed[2], W. Baldwin[1], R. Fairchild[1], *[1]Inflammation and Immunity, Cleveland Clinic, Cleveland, OH, [2]Pathology and Laboratory Medicine, University of California, Los Angeles, CA*

Purpose: Cardiac allograft vasculopathy (CAV) is a major long-term complication of heart transplantation and the presence of donor specific antibodies (DSA) is associated with an increased incidence of CAV in heart transplant recipients. However, mechanisms underlying development and progression of the pathology remain poorly understood. We previously have reported that MHC-mismatched A/J cardiac allografts in B6.CCR5-/- recipients were acutely rejected within 7-10 days with low T cell infiltration, but intense deposition of C4d in the large vessels and capillaries of the graft, as well as high serum titers of DSA, characteristics observed in antibody-mediated rejection (AMR).

Methods: In this study, we utilized this AMR model to investigate mechanisms of CAV development within the grafts. To test this, we transplanted A/J allografts into B6.CCR5-/- CD8 -/- mice and treated recipients with a low dose of anti-CD4 mAb on days 0, 2 and 7.

Results: While the mild inhibition of CD4 T cells extended the survival of allografts, the grafts developed CAV with intense C4d deposition in the myocardial capillaries accompanied by macrophage infiltration on days 14 post-transplant. Consistent with this, DSA titers were also much higher than in B6.CD8-/- recipients. Interestingly, development of CAV was absent in semi-allogeneic (A/J x B6) F1 grafts which inhibit recipient NK cell activity.

Conclusions: In conclusion, we have developed a novel antibody mediated CAV model using CCR5-/- CD8-/- mice as allograft recipients that will facilitate an understanding of molecular and cellular mechanisms of CAV.

CITATION INFORMATION: Tsuda H., Reed E., Baldwin W., Fairchild R. A Novel Mouse Model of Cardiac Allograft Vasculopathy *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Tsuda: None. **E. Reed:** None. **W. Baldwin:** None. **R. Fairchild:** None.

Abstract# 526

Iguratimod Prevents Antibody-mediated Rejection by Regulating Germinal Center Formation and Antibody Production

H. Zhang, A. Chandraker, P. Sage, N. Murakami, *Transplantation Research Center, Brigham and Women's Hospital, Boston, MA*

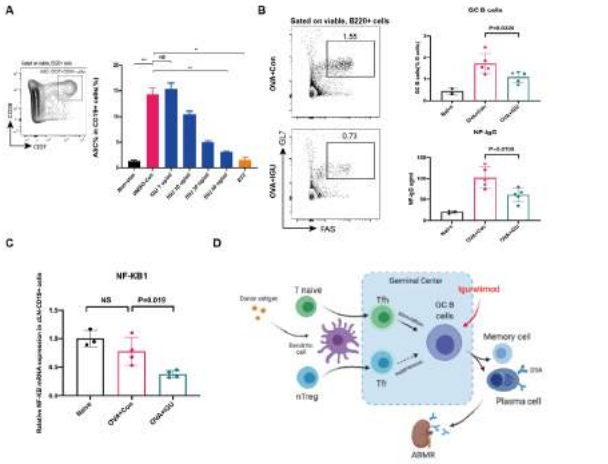
Purpose: Antibody-mediated rejection (ABMR) is a major cause of chronic renal allograft failure without effective treatment, and developing a novel therapy is an urgent need. Here, we hypothesized that Iguratimod (IGU), an immunomodulator that has been approved for treating rheumatoid arthritis, can prevent the ABMR in kidney transplantation.

Methods: Human PBMCs were stimulated with anti-CD3 and anti-CD28 with and without iguratimod as well as were cultured for 5 days in the presence of IL-2 and R848, with and without various concentration of iguratimod, or bortezomib (BTZ, positive control) in vitro to test the effect of iguratimod on cell proliferation and whether iguratimod affects human B cell differentiation to antibody-stimulating cells (ASCs). To dissect the exact mechanism, we immunized C57BL/6 mice with NP-OVA/CFA, pre- and post-treated the IGU (30 mg/kg/d, PO, from day -7 to day 10), isolated serum and draining lymph nodes (dLNs) for analysis. Using a sequential skin and kidney transplantation ABMR model in rat to explore its function in organ transplant.

Results: We found iguratimod did not affect survival of T and B cells after stimulation for 5 days. In the absence of iguratimod, about 15% of B cells differentiated into ASCs (CD19+CD38+CD27+, (Figure A)). Iguratimod inhibited B cell differentiation

to ASCs in a dose-dependent manner (Figure A, right). A clear reduction was shown in the frequency of CD19+FAS+GL7+ germinal center (GC) B cells in the IGU group (Figure B). IGU attenuated IgG1+ class-switched B cells, IgG1+CD38+ memory-like B cells and NP-specific IgG and IgM in serum, suggesting that IGU inhibited B cell differentiation and proliferation, and antigen-specific antibody responses by inhibiting early GC responses. In B cells isolated from dLN, NF-KB, one of the key transcription factors regulating GC formation, was inhibited by IGU in dLNs, which is consistent with OVA stimulation data (Figure C). This suggests that IGU inhibited GC formation probably by regulating the NF-KB pathway. Finally, in ABMR rat model, we found IGU attenuated ABMR and prolonged the graft survival, with histological evidence of ameliorated glomerulitis and peritubular capillaritis, less C4d deposition in kidney grafts, and lower titer of DSA in serum.

Conclusions: IGU specifically inhibited GC formation and thus attenuated DSA formation without impacting T cell survival. IGU can be a potential new immunosuppressant to prevent and attenuate ABMR in kidney transplantation (Figure D).



CITATION INFORMATION: Zhang H., Chandraker A., Sage P., Murakami N. Iguratimod Prevents Antibody-mediated Rejection by Regulating Germinal Center Formation and Antibody Production *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Zhang: None. **A. Chandraker:** None. **P. Sage:** None. **N. Murakami:** None.

Basic

Cellular Therapies, Tissue Engineering/Regenerative Medicine

Abstract# 527

Transgenic Beta-cell Cxcl12 Expression and Stem Cell Mobilization Synergize to Suppress Type 1 Diabetes

D. A. Alagpulinsa, A. Jajoo, M. H. Chapin II, M. C. Poznansky, *Vaccine & Immunotherapy Center, Massachusetts General Hospital and Harvard Medical School, Boston, MA*

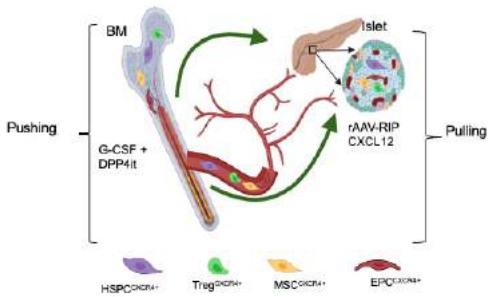
Purpose: Hematopoietic stem and progenitor cells (HSPCs) and regulatory T cells (Tregs) highly express CXCR4, the receptor for the CXCL12 chemokine. This keeps them predominantly anchored to the bone marrow (BM) where CXCL12 is constitutively expressed at high levels. HSPCs and Tregs possess superior immunoregulatory properties and infusion of autologous HSPCs and Tregs is intensively investigated as a treatment for type 1 diabetes (T1D), which results from autoimmune-mediated destruction of insulin-producing β cells. β cells also express CXCR4 and CXCL12 exerts growth and pro-survival effects on them and can repel autoreactive T cells from islets. We hypothesized that CXCL12 could be exploited to recruit and retain endogenous HSPCs and Tregs in the islets to ameliorate autoimmune destruction of β cells and support β-cell survival and growth (Figure 1).

Methods: We evaluated this hypothesis in NOD mice that spontaneously develop autoimmune diabetes.

Results: CXCL12 levels were 3-fold higher in the BM of autoimmune diabetic NOD mice compared with age matched non-diabetic C57BL/6 mice. In reverse, the activity of DPP4, an exopeptidase that cleaves and inactivates the chemotactic effects of CXCL12, was ~2-fold lower in the BM of these NOD mice compared with their age matched C57BL/6 mice. This dysregulation of CXCL12 could contribute to polarized BM retention and impaired peripheral mobilization of HSPCs and Tregs in T1D. We showed that ectopic β-cell-specific expression of CXCL12 transgene under the control of the rat insulin promoter using a recombinant adeno-associated virus vector ($p<0.05$) and peripheral mobilization of HSPCs using granulocyte-colony stimulating factor plus DPP4 inhibitor treatment ($p<0.06$) delay autoimmune diabetes onset in NOD mice. Intriguingly, ectopic β-cell expression of CXCL12 synergized with peripheral mobilization to suppress autoimmune diabetes compared with either treatment alone ($p<0.02$; $n\geq10$ per group). This synergy was characterized by increased numbers of circulating HSPCs, reduced insulitis, improved glucose tolerance and enhanced β-cell mass.

Conclusions: Our findings demonstrate proof-of-concept of a novel "pushing" and "pulling" approach for T1D treatment.

Figure 1. A model for exploiting CXCL12 to recruit and retain HSPCs and Tregs as well as other CXCR4-expressing cells (mesenchymal stem cells, MSCs; endothelial progenitor cells, EPCs) in the islets.



CITATION INFORMATION: Alagpulinsa D., Jajoo A., Chapin II M., Poznansky M. Transgenic Beta-cell Cxcl12 Expression and Stem Cell Mobilization Synergize to Suppress Type 1 Diabetes *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.A. Alagpulinsa: None. **A. Jajoo:** None. **M.H. Chapin II:** None. **M.C. Poznansky:** None.

Abstract# 528

Versatile Strategy to Enhance Nanomedicine Delivery to Graft Endothelial Cells

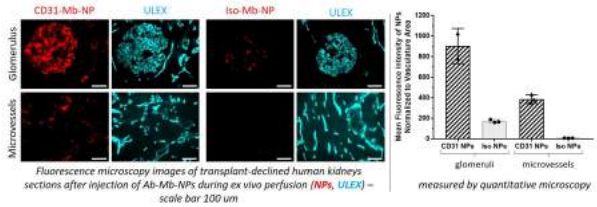
C. Albert[1], L. G. Bracaglia[1], A. Koide[2], J. DiRito[1], T. Lysyy[1], C. Edwards[1], J. T. Langford[1], D. Haakinson[1], S. A. Hosgood[3], M. L. Nicholson[3], J. S. Pober[1], W. M. Saltzman[1], S. Kiode[2], G. Tietjen[1], *[1]Yale University, new haven, CT, [2]Perlmutter Cancer Center, New York University, Langone Medical Center, New York, NY, [3]University of Cambridge, Cambridge, United Kingdom*

Purpose: Efficient delivery of therapeutics to graft endothelial cells (EC) can potentially render organs more resistant to injury, improving clinical outcomes. Specific targeting of polymeric nanoparticles (NPs) during *ex vivo* machine perfusion prior to transplant can allow both sustained delivery and increased local concentration of an encapsulated therapeutic. Despite ready access, effective retention by ECs lining graft vessels remains as a significant hurdle. Here we describe a new targeting approach based on oriented presentation of a targeting antibody using a linker called a "monobody" (Mb).

Methods: Mbs are synthetic binding proteins with a unique cysteine engineered to enable site-specific conjugation to NPs through thiol chemistry. Specific Mbs can potently and selectively bind to the Fc region of a targeting antibody (Ab), forming Ab-Mb-NP conjugates. We used flow cytometry and quantitative fluorescence microscopy of dye-loaded NPs to measure efficiency of binding to ECs in cell culture and in ex-vivo perfusion systems of single vessels and of transplant-declined human kidneys.

Results: Ab-Mb-NPs showed up to a 1000-fold enhancement of binding *in vitro* under flow compared to EDC-NHS conjugated Ab-NPs used in our prior work. This is likely due to a higher number of Ab attached and a better control of Ab orientation leading to high retention of antibody function. In the first transplant-declined human kidneys enrolled in the study, the targeted Ab-Mb-NPs bound specifically to the endothelial cells covering ~40% of the microvessels and ~70% of the glomeruli vasculature area. In addition, the Mb approach is readily adaptable to different NP compositions or conjugation of different Abs of the same species/isotype without re-engineering as is necessary with EDC/NHS conjugation. For example, we easily changed the polymer used to formulate the NPs (poly(lactic acid)-poly(ethylene glycol) [PLA-PEG] or poly(amine-co-ester) [PACE]). We also easily changed the targeted molecule (CD31 or ICAM2) or the species of the targeted molecule (human or pig) using identical conditions for conjugation.

Conclusions: Mb-coupled conjugation can both simplify and enhance the use of nanomaterials to target graft ECs, opening opportunities to efficiently deliver therapeutics prior to transplantation.



Fluorescence microscopy images of transplant-declined human kidneys sections after injection of Ab-Mb-NPs during ex vivo perfusion (NPs, ULEX) – scale bar 100 um

measured by quantitative microscopy

CITATION INFORMATION: Albert C., Bracaglia L., Koide A., DiRito J., Lysyy T., Edwards C., Langford J., Haakinson D., Hosgood S., Nicholson M., Pober J., Saltzman W., Kiode S., Tietjen G. Versatile Strategy to Enhance Nanomedicine Delivery to Graft Endothelial Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Albert: None. **L.G. Bracaglia:** None. **A. Koide:** Grant/Research Support; Name of Commercial Interest; Puretech Health, Argenx BVBA. Intellectual Property Rights; Name of Commercial Interest; University of Rochester, University of Chicago, Puretech Health, Argenx BVBA, Absolute Antibody, Diagenode, Millipore Corporation, Novartis, Soteria Biotherapeutics, Amano Enzyme. Other; Name of Commercial Interest; Black Diamond Therapeutics. Other; Nature of Relationship; Scientific advisory board and stock option. **J. DiRito:** Grant/Research Support; Name of Commercial Interest; CareDx. **T. Lysyy:** None. **C. Edwards:** None. **J.T. Langford:** None. **D. Haakinson:** None. **S.A. Hosgood:** None. **M.L. Nicholson:** None. **J.S. Pober:** None. **W.M. Saltzman:** Consulting Fee; Name of Commercial Interest; Stradefy Biosciences. Grant/Research Support; Name of Commercial Interest; Stradefy Biosciences. Intellectual Property Rights; Name of Commercial Interest; Stradefy Biosciences. **S. Kiode:** Grant/Research Support; Name of Commercial Interest; Puretech Health, Argenx BVBA. Intellectual Property Rights; Name of Commercial Interest; University of Rochester, University of Chicago, Puretech Health, Argenx BVBA, Absolute Antibody, Diagenode, Millipore Corporation, Novartis, Soteria Biotherapeutics, Amano Enzyme. Other; Name of Commercial Interest; Black Diamond Therapeutics. Other; Nature of Relationship; Scientific advisory board and stock option. **G. Tietjen:** Grant/Research Support; Name of Commercial Interest; CareDx. Travel; Name of Commercial Interest; CareDx.

Abstract# 529

Single Cell RNA Sequencing Reveals a Global Increase in Inflammatory Gene Signature Following Normothermic Ex Vivo Liver Perfusion

K. Carlson, J. Pavan-Guimaraes, B. Verhoven, J. Verhagen, F. Najmabadi, D. P. Al-Adra, *Surgery, University of Wisconsin, Madison, WI*

Purpose: Normothermic *ex vivo* liver perfusion (NEVLP) provides an exciting system for improved organ preservation and optimized therapeutic agent delivery to a donor liver prior to transplantation. However, previous studies have shown examples of the inherent inflammatory nature of machine perfusion, including production of damage-associated molecular patterns and secretion of pro-inflammatory cytokines. Further characterization of the inflammatory processes induced by NEVLP are required to determine the optimal pathways to target with immunomodulatory therapies. Using single-cell RNA sequencing, we comprehensively characterized the inflammatory signatures of liver-resident immune cells following NEVLP.

Methods: Rat livers were procured and divided randomly into a naïve group or an NEVLP at 37°C for 4 hours group. We isolated non-parenchymal cells, and celll sorted for live cells. Single cell transcriptomic profiling of 12,259 total cells across two experimental conditions was generated using the 10x Genomics NextGEM Single Cell 3' (v3.1) assay. Libraries were sequenced on an Illumina NovaSeq6000 sequencer targeting an average depth of 70,000 reads/cell.

Results: NEVLP induced expression of an inflammatory gene signature in T-cells, dendritic cells, and several macrophage subpopulations in comparison to naïve controls (**Fig. 1**). An increase in expression of inflammatory mediators chemokine (C motif) ligand (Xcl1), OX40 receptor (Tnfrsf4), interferon gamma (Ifng), and chemokine (C-C motif) ligand 1 (Ccl1) was observed in T-cells isolated from perfused livers. Pleiotropic cytokines interleukin (IL)-6 and IL-27 were upregulated in perfused macrophages, and anti-inflammatory mediators including NLR family pyrin domain containing 12 (Nlrp12) were substantially downregulated.

Conclusions: NEVLP induced a global inflammatory signature, increasing expression of pro-inflammatory or pleiotropic cytokines and chemokines and decreasing expression of anti-inflammatory mediators. These changes were observed in multiple cell types, including T-cells, several macrophage subpopulations, and dendritic cells. The results from this study are critical for the optimization of targeted therapeutic interventions during machine perfusion.

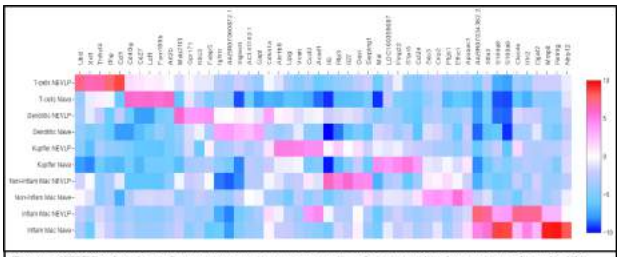


Figure 1. NEVLP induced an inflammatory gene expression signature. Gene expression signatures were determined for naïve and perfused livers using single cell RNA sequencing. A comparison of naïve and NEVLP livers showed that for T-cells, dendritic cells, and macrophages, there was an increase in expression of pro-inflammatory cytokines and chemokines and a decrease in expression of anti-inflammatory immune mediators.

CITATION INFORMATION: Carlson K., Pavan-Guimaraes J., Verhoven B., Verhagen J., Najmabadi F., Al-Adra D. Single Cell RNA Sequencing Reveals a Global Increase in Inflammatory Gene Signature Following Normothermic Ex Vivo Liver Perfusion *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Carlson: None. **J. Pavan-Guimaraes:** None. **B. Verhoven:** None. **J. Verhagen:** None. **F. Najmabadi:** None. **D.P. Al-Adra:** None.

Abstract# 530

Patterns and Inhibition of Cell Death During Static Cold Storage of Human Kidneys

J. R. DiRito[1], G. Chickering[2], J. T. Langford[1], D. Stern[1], S. Hosgood[3], M. L. Nicholson[3], E. Gavathiotis[4], R. N. Kitsis[5], M. Saltzman[2], J. S. Pober[6], G. T. Tietjen[7], *[1]Surgery, Yale School of Medicine, New Haven, CT, [2]Biomedical Engineering, Yale University, New Haven, CT, [3]Surgery, University of Cambridge, Cambridge, United Kingdom, [4]Biochemistry and Medicine, Wilf Family Cardiovascular Research Institute, Albert Einstein College of Medicine, Bronx, NY, [5]Surgery, Albert Einstein College of Medicine, Bronx, NY, [6]Immunobiology, Yale University, New Haven, CT, [7]Surgery and Biomedical Engineering, Yale School of Medicine, New Haven, CT*

Purpose: As the donor population continues to age and accumulate co-morbidities, more marginal kidneys are being retrieved for transplantation. However, estimates suggest that more than 40% of kidneys from extended criteria donors are discarded annually. Many of these kidneys are not considered for transplantation because we do not currently understand why these organs fail nor do we have appropriate strategies to preserve them. By studying human organs that were deemed unsuitable for transplantation, we can begin to define new modes of failure in particularly marginal organs.

Methods: To better appreciate how kidneys respond to cold ischemia, we biopsied a series of nine kidneys at times from 12 to 72 hours of cold storage.

Results: We found that older donors (70-74 y/o) had significantly more cell death visualized via TUNEL staining (Figure 1B) than younger donors (39-52 y/o) in this series (Figure 1A). Pervasive cell death throughout a biopsy became apparent in older donors between 30-36 hours of cold storage (Figure 1B). Preliminary data suggest that tubular epithelial cells are the predominate cell type positive for TUNEL staining as cold time increases. Additionally, Bax inhibitor BAI1 can significantly decrease cell death in models of human organ culture (Figure 2A), inhibiting cell death both during cold storage and after a period of warm injury.

Conclusions: These data suggest that cell death throughout the course of cold storage can be reduced by pharmacological intervention in marginal organs and thus may improve clinical outcomes.

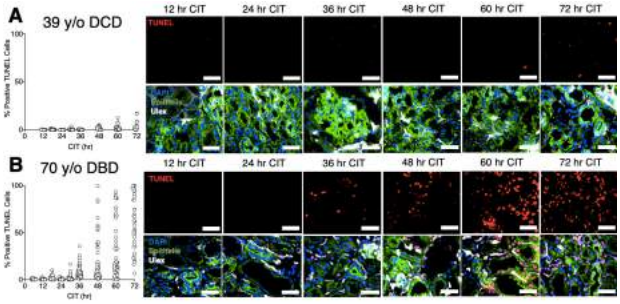


Figure 1. Cell death increases throughout the course of cold storage in kidneys from old donors. Quantification of cell death visualized with TUNEL staining in representative kidneys from younger (A) and older (B) donors throughout 72 hours of cold storage. (Red – TUNEL; Blue – DAPI; Green – Epithelial; White – Ulex) Scale bars are 50 μm.

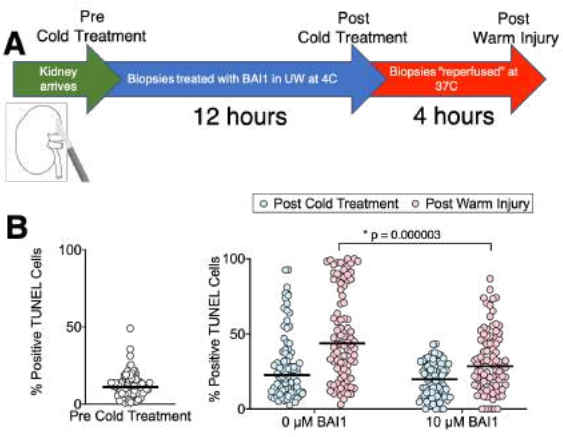


Figure 2. BAI1 can inhibit cell death during cold storage and after a period of warm injury. (A) Schematic of human organ culture model. (B) Quantification of TUNEL positive cells pre cold treatment, post cold treatment, and post warm injury. Each dot represents one 40X image. *p = 0.000003 using two-tailed student's t-test.

CITATION INFORMATION: DiRito J., Chickering G., Langford J., Stern D., Hosgood S., Nicholson M., Gavathiotis E., Kitsis R., Saltzman M., Pober J., Tietjen G. Patterns and Inhibition of Cell Death During Static Cold Storage of Human Kidneys *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.R. DiRito: ; CareDx. **G. Chickering:** None. **J.T. Langford:** None. **D. Stern:** None. **S. Hosgood:** None. **M.L. Nicholson:** None. **E. Gavathiotis:** None. **R.N. Kitsis:** None. **M. Saltzman:** Consulting Fee; Name of Commercial Interest; Stradefy Biosciences. Consulting Fee; Nature of Relationship; consulting, research support, intellectual property. **J.S. Pober:** None. **G.T. Tietjen:** None.

Abstract# 531

Ectopic Hepatocyte Transplantation Into the Lymph Nodes in a Fully Mismatched Allogeneic Dog Model Using Tacrolimus and Prednisone

P. A. Fontes, *NA, LyGenesis, Pittsburgh, PA*

Purpose: Develop organogenesis through ectopic hepatocyte transplantation (HT) into the upper abdominal lymph nodes (LN).

Methods: Three groups of Mongrel dogs weighting between 25-35 kg (control (C) n=3, autologous (AU) n=6; allogeneic (AL) n=21) underwent heterotopic HT into their LNs through either direct or endoscopic ultrasound (EUS) guided endoluminal injections. The hepatocytes were isolated from the liver left lateral segment of a donor group of animals (n=10) using a modified two-step collagenase perfusion method and transplanted using 3 different doses (low=75M, medium=150M and high=750M) through 1 ml infusions into the LNs. All the recipients underwent an end-to-side portacaval shunt (PCS) as a way to induce sub-acute liver failure and upregulation of hepatotropic factors. These recipients received immune suppressive (IS) therapy (Tacrolimus (Tac) and Prednisone) post-operatively for the duration of the experiments (30-180 days follow up).

Results: The median cold ischemia time for HT was 25.1 hours, ranging from 5.5 to 54.8 hours. The median cell viability was 81%. The C group had a 66% mortality. The AU and AL groups had survival rates of 75% and 78%, respectively. Early deaths were attributed to acute hepatic failure and ischemic bowel. Both primary end points for safety and efficacy were successfully achieved. The AU group had 100% engraftment and the AL 50%. The effect sizes for transplantation of hepatocytes were large for both the AU group (d=1.12, n=6, with one early death due to infection) and the AL group (d=1.01, n=21). A strong association between effect size and dose was also noted, with the highest dose (750M) having the largest effect size (d=2.65, n=3). Histopathological analysis showed the formation of normal ectopic hepatic tissue within the transplanted LNs, including the presence of sinusoids, portal triads and bile ducts in both AU and AL groups. Most animals were required to be maintained on sub-therapeutic Tac levels due to significant adverse events (neurotoxicity 30%, infections 18% and diabetes 12.5%.

Conclusions: Hepatocyte transplantation can be performed safely and effectively using this new minimally invasive EUS method under standard IS therapy in a fully mismatched allogeneic combination. Suboptimal IS yielded decreased engraftment in the AL group. The ectopic liver tissue had normal hepatic cytoarchitecture and no signs of acute cellular rejection up to 180 days follow up.

CITATION INFORMATION: Fontes P. Ectopic Hepatocyte Transplantation Into the Lymph Nodes in a Fully Mismatched Allogeneic Dog Model Using Tacrolimus and Prednisone *AJT, Volume 21 Supplement 3*

DISCLOSURES: P.A. Fontes: None.

Abstract# 533

The Hepatoprotective Role of Innate Lymphoid Cells in Liver Transplantation

H. Kojima, H. Hirao, H. Zhang, K. Kadono, K. J. Dery, Y. Zhai, J. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

Purpose: Although NKp46$^+$group 3innate lymphoid cells (ILCs) (RORγt$^+$IL-22-producing NKp46$^+$cells) were reported to protect liver against ischemia-reperfusion injury (IRI), no study has demonstrated the contribution of ILCs in liver transplantation. Therefore, we investigate whether and how ILCs affect liver transplant outcomes in a mouse orthotopic liver transplantation (OLT) model.

Methods: Wild type (WT) C57BL/6J mouse liver grafts were subjected to the extended cold storage (4°C/18 hours) in UW solution to mimic the marginal donor livers in human OLT.To evaluate the role of ILCs in OLT, we transplanted the cold-stored grafts into: WTmice, Rag2 knockout (KO) mice that lack T and B cells, and Rag2-common-γ-chain double KO (Rag2-γc-DKO) mice that lack ILCs in addition to T and B cells (all in C57BL/6J background). We used 0.5 mg of anti-CD90.2 antibody (Bio X Cell) intravenously at 48 hours prior to transplantation to deplete ILCs in Rag2 KO mice. Liver IRI was evaluated at 6 hours post-Tx.

Results: Compared with WT and Rag2 KO, but not Rag2-γc-DKO, recipients were protected from liver IRI, as documented by serum ALT and AST levels, Suzuki's histological grading, quantities of infiltrating CD11b+ macrophages/Ly6G+ neutrophils, and frequency of TUNEL+ cells. Furthermore, depletion of ILCs with CD90.2 increased hepatocellular injury in Rag2 KO mice and diminished Rag2 KO and Rag2-γc-DKOmouse disparities, suggesting that recipient derived ILCs might exert protective function against IRI in OLT. The intra-graft gene expression of T-box transcriptional factor T-bet significantly increased while IL-23 decreased in Rag2 KO recipients as compared with Rag2-γc-DKOcounterparts.

Conclusions: This study is the first to reveal that ILCs might protect OLT from IRI, which provides us a novel therapeutic target for future clinical application in transplant recipients.

CITATION INFORMATION: Kojima H., Hirao H., Zhang H., Kadono K., Dery K., Zhai Y., Kupiec-Weglinski J. The Hepatoprotective Role of Innate Lymphoid Cells in Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Kojima: None. **H. Hirao:** None. **H. Zhang:** None. **K. Kadono:** None. **K.J. Dery:** None. **Y. Zhai:** None. **J. Kupiec-Weglinski:** None.

Abstract# 534

Pathways and Factors That Confer Therapeutic Properties of Adipose Derived Regenerative Cells in Reducing Ischaemia Reperfusion Injury in Kidney Transplantation

R. Lathan, P. Mark, M. Clancy, R. Touyz, *Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow, United Kingdom*

Purpose: Studies in our rat model of ischemic reperfusion injury (IRI) demonstrate improved kidney function post injection of non-cultured autologous adipose-derived regenerative cells (ADRC). The mechanism on how these cells induce reparative effects during IRI remains elusive. We investigated ADRC-derived effects on the injured kidney utilizing single cell RNA-sequencing and pathway driven data-mining.

Methods: ADRC were harvested from inguinal F344 rats (pooled n=5). Stimulated ADRC were exposed for one hour to an ischemic and perfused kidney ex vivo in a transwell system as a mimic of the ADRC treated kidney transplant process and compared to non-stimulated ADRC with no kidney exposure. RNA from single cells was isolated from non-stimulated and stimulated ADRC using the 10X Chromium system and sequencing was performed on a Nextgen 500 at a target 30,000 reads/cell depth (Glasgow Polyomics). Two experimental runs were performed. Post R Seurat sequence analysis, non a priori and directed pathway analysis targeting previous experimental data which implicated anti-inflammatory pathways were evaluated using Ingenuity Pathway Analysis. Sequenced ADRC data results were compared to transcript expression uncovered in the whole rat animal model IRI kidney through qPCR (n=6-8).

Results: Three merged runs of both Stimulated and Non-stimulated ADRC yielded an average of 6018 cell transcriptomes and 18 distinct cell cluster populations - an enrichment in leukocytes, but also included mesenchymal stem cell and adipocyte populations. Stimulated ADRC yielded 786 cell transcriptomes - primarily T-cell and antigen presenting cell clusters. Cell death transcript expression and low cell yield of treated ADRC suggest higher apoptotic ADRC activity after exposure to the injured kidney. Cell pathways differentially expressed between the two groups implicated a helper T-cell, Th1 profile, an IL-17, and a regulatory pathway, indicating a highly active and proliferating T-cell response. Transcript analysis in IRI and ADRC-treated kidneys showed an increase in cytotoxic T-lymphocyte-associated protein 4 starting at day 48 post treatment. At 48 hours post-treatment, IRI kidneys also contained higher levels of CD45+ leukocytes as assessed by histology and flow cytometry compared to vehicle controls, implicating an immune and regulatory effect of ADRC treatment.

Conclusions: Pathway analysis in ADRC alone implicate a role for immune cells in modulating the immune response in the IRI kidney. Collectively, gene expression and histological evidence in the model and in ADRC ex vivo suggest that ADRC treated IRI kidneys experience early anti-inflammatory changes involving T-cell and antigen presenting cell subsets that ultimately generate an anti-inflammatory environment in the IRI treated kidney.

CITATION INFORMATION: Lathan R., Mark P., Clancy M., Touyz R. Pathways and Factors That Confer Therapeutic Properties of Adipose Derived Regenerative Cells in Reducing Ischaemia Reperfusion Injury in Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Lathan: None. **P. Mark:** None. **M. Clancy:** None. **R. Touyz:** None.

Abstract# 535

Lacripep™-like Peptide N-104 Promotes Beta Cell Proliferation in Murine Pancreatic Islets

M. Ma, P. Chhabra, K. Fread, K. Dias Teixeira, G. Laurie, K. Brayman, *University of Virginia Health System, Charlottesville, VA*

Purpose: To monitor time-dependent cellular changes, with emphasis on beta cell regeneration, in pancreatic islets following treatment with Lacripep™-like peptide N-104 by mass cytometry. **Background:** Lacritin is a multifunctional tear protein with prosecretory, prosurvival and mitogenic properties. Islets are Lacritin responsive, and prominently express known elements of the Lacripep™ receptor complex and signaling pathways. N-104 peptide comprises the fifteen C-terminal amino acids of Lacritin. Mass cytometry was used to measure the expression of proliferative markers of all major endocrine cells as well exocrine cells.

Methods: Mouse islets were cultured with 4 μM N-104, or negative control peptide C95, or left untreated for 24 hours, following which islets were dissociated into single cells by treatment with trypsin. Single cells were fixed and stained with 35 antibody markers. Mass cytometry data were obtained on CyTOF2 (Fluidigm) at the Flow Cytometry core at UVA.

Results: At the single cell level, N-104 stimulated the proliferation of all major endocrine cells. Ki67 was measured as a marker for proliferation. Proliferation of alpha cells, identified by the expression of marker Proprotein convertase 2 was 0.90% for N-104 treated islets, 0.32% for untreated islets and 0.24% for negative control C-95. Proliferation of alpha cells using Glucagon as marker was 1.12%, 0.64% and 0.69% for N-104 treated, untreated and C-95 treated islets respectively. Proliferation of beta cells as identified by cytoplasmic insulin and proinsulin was the most significant - in keeping with the enhancement of glucose-stimulated insulin secretion that was observed in parallel. Proliferation of beta cells, identified by NKX6.1 was 2.88% for N-104 treated islets, 1.28% for untreated samples and 1.62% for C95 treated islets. Proinsulin showed increases of 3.87%, 1.00% and 1.44% and Insulin showed increases of 5.02%, 1.14% and 1.92% for N-104 treated, untreated and C-95 treated samples respectively. To a lesser degree, N-104 also enhanced delta and ductal cells proliferation - without substantially affecting acinar cells identified by markers PDX1, SST, and CD44.

Conclusions: Our data indicate that systemic N-104 treatment promoted single cell proliferation in islets, especially that of beta cells, without affecting exocrine acinar cell proliferation.

CITATION INFORMATION: Ma M., Chhabra P., Fread K., Dias Teixeira K., Laurie G., Brayman K. Lacripep™-like Peptide N-104 Promotes Beta Cell Proliferation in Murine Pancreatic Islets *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Ma: Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019. **P. Chhabra:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019. **K. Fread:** None. **K. Dias Teixeira:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019. **G. Laurie:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019, Cofounder and CSO of TearSolutions, Inc. **K. Brayman:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019.

Abstract# 537

Platelets Stimulate Liver Regeneration After Partial Liver Transplantation

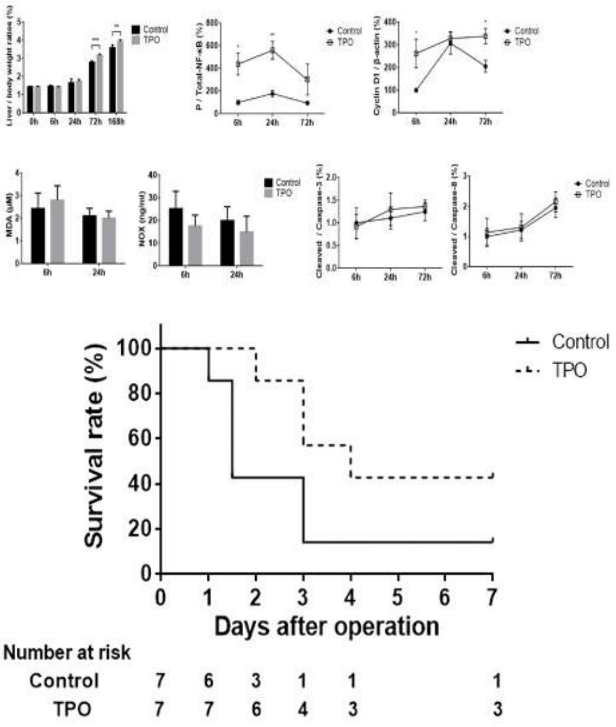
K. Takahashi, C. Liang, K. Furuya, T. Oda, *GI and HBP Surgery, University of Tsukuba, Tsukuba, Japan*

Purpose: Living donor liver transplant (LDLT) can sometimes be associated with impaired regeneration and severe ischemia/reperfusion (I/R) injury in the liver graft, resulting in small-for-size syndrome. Platelets are considered to act in concert with activated Kupffer cells (KCs) and leukocytes, which can be the core mechanisms for I/R injury. Recent studies highlighted platelets have strong effects on promoting liver regeneration. However, these studies are based on partial hepatectomized model, and the results in LDLT haven't been thoroughly investigated. The aim of our study was to identify the role of platelets in liver graft regeneration and its outcomes after partial LT.

Methods: We used a rat model of partial LT to mimic human LDLT. Firstly a 30% partial LT was performed. Recipient rats were treated with thrombopoietin before operation (TPO group), or given phosphate-buffered saline administration as control (control group). Postoperative parameters for regeneration and I/R injury were evaluated after transplantation. Both donors and recipients were administrated with clodronate liposome to deplete KCs (KDTPO group), changes in liver regeneration were analyzed. Secondly, a 20% partial LT was performed, and the effect of thrombocytosis on postoperative survival was evaluated.

Results: The liver-to-body weight ratio was significantly higher post-LT in the TPO group compared with the control group. In western blot, the phosphorylation of Stat3, Nf-κB and CyclinD1 are increased in the TPO group. For I/R injury-related parameters, thrombocytosis didn't aggravate the oxidative stresses and their downstream pathways (Fig1). After KC depletion, platelet accumulation was significantly lower in the KDTPO group compared with the TPO groups, and platelet-induced increment of IL-6 and TNF-α were cancelled . Thrombocytosis improved postoperative survival in the TPO group (Fig 2).

Conclusions: Our results suggested that thrombocytosis stimulated graft regeneration without aggregating I/R injury after partial LT, and Kupffer cells vitally contributed to platelet-derived regeneration. Platelet therapies to increase perioperative platelet counts may improve the outcomes after LDLT.



CITATION INFORMATION: Takahashi K., Liang C., Furuya K., Oda T. Platelets Stimulate Liver Regeneration After Partial Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Takahashi: None. **C. Liang:** None. **K. Furuya:** None. **T. Oda:** None.

Abstract# 538

The Tumor-suppressor Signaling of the α1-na/k-atpase- Cav-1-src Complex at the Caveola in Nash Related Hepatocellular Carcinoma

U. S. Udoh[1], J. D. Sanabria[1], M. Banerjee[1], P. K. Rajan[1], M. Schade[1], J. A. Sanabria[1], A. Mallick[1], G. Smith[1], G. U. Udoh[2], K. Sodhi[1], S. Pierre[2], Z. Xie[2], J. Shapiro[2], J. Sanabria[1], *[1]Dept. of Surgery/ Marshall Institute for Interdisciplinary Research, Marshall University, Huntington,, WV, [2]Marshall Institute for Interdisciplinary Research, Marshall University, Huntington,, WV*

Purpose: Hepatocellular Carcinoma (HCC) is the 2nd and fastest-growing cause of cancer related mortality worldwide, mainly from the metabolic cellular disturbances promoted by the epidemic of obesity and a lack of markers for its early detection. Our group has identified a novel signaling pathway, comprising of the α1-Na/K-ATPase (NKA), Caveolin-1 (Cav-1) and Src kinase (Src) which is necessary for cell development and function. In carcinogenesis, regulation of Src-phosphorylation by the α1-subunit of the Na/K-ATPase at caveola may initiate protein interactions, beginning at Cav-1 in the plasma membrane that leads to a disequilibrium in the SMAC-Survivin apoptotic signaling in the cell, resulting in a pathogenic "apoptotic switch" that favors HCC tumorigenesis. We propose that these interactions are relayed via the PI3K- Akt- S6K1 and the EGFR- STAT 3 signaling pathways from cell membrane to its interior. We hypothesize inhibition of α1-Na/K-ATPase-CAV-1-Src signaling as putative target for the treatment of HCC.

Methods: Expression of Cav-1/SMAC-Diablo/Survivin proteins was performed by confocal-microscopy on immuno-stained livers from HCC, NASH and nor-

mal human subjects, and rodent models. NASH and HCC mice were exposed to doses of pNaKtide, an inhibitor of Scr-phosphorylation at the NKA α1-caveolin-1 complex. Significant differences among groups were established at p<0.05 using ANOVA/t-test.

Results: The expression of Cav-1 was significantly higher in liver tissue from patients with NASH±HCC vs normal livers or livers with metastases (p<0.05). Survivin expression was significantly higher in patients with NASH/HCC+ vs NASH/HCC-, normal livers, and liver with metastases (p<0.05). In contrast, SMAC protein expression was significantly lower in liver tissue with NASH or HCC vs controls. Similar results were obtained in the murine models. In mouse models, pNaKtide, significantly restored SMAC expression and attenuated Survivin expression in a dose-dependent manner (p<0.01). Also, in HCC murine model, pNaKtide treated groups showed a significantly dose- dependent lower tumor burden as well as fibrosis vs the untreated group(p<0.01). On the contrary, apoptosis increased significantly in pNaKtide treated groups vs untreated group (p<0.05).

Conclusions: Cav-1, SMAC and Survivin proteins expression differed significantly in patients with HCC and NASH when compared to normal livers or livers with metastases. This observation was validated in NASH and HCC murine models. Inhibition α1-Na/K-ATPase-CAV-1-Src signaling pathway by pNaktide resulted in the reversal of the "oncogenic apoptotic switch", leading to HCC prevention/ tumor regression.

CITATION INFORMATION: Udoh U., Sanabria J., Banerjee M., Rajan P., Schade M., Sanabria J., Mallick A., Smith G., Udoh G., Sodhi K., Pierre S., Xie Z., Shapiro J., Sanabria J. The Tumor-suppressor Signaling of the α1-na/k-atpase- Cav-1-src Complex at the Caveola in Nash Related Hepatocellular Carcinoma *AJT, Volume 21 Supplement 3*

DISCLOSURES: U.S. Udoh: None. **J.D. Sanabria:** None. **M. Banerjee:** None. **P.K. Rajan:** None. **M. Schade:** None. **J.A. Sanabria:** None. **A. Mallick:** None. **G. Smith:** None. **G.U. Udoh:** None. **K. Sodhi:** None. **S. Pierre:** None. **Z. Xie:** None. **J. Shapiro:** None. **J. Sanabria:** None.

Abstract# 539

Human Liver-derived Mesenchymal Stromal Cells (MSC) are Superior Inhibitors of Natural Killer Cells Compared to Bone Marrow or Adipose Tissue-derived MSC

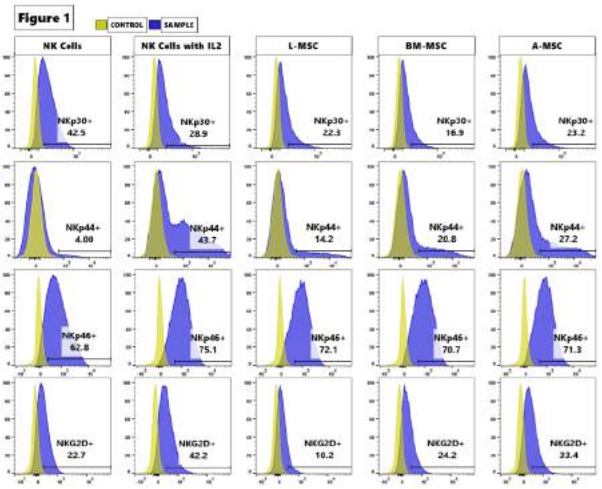
F. Yigitbilek, M. J. Hansen, W. D. Park, M. D. Stegall, T. Taner, *Mayo Clinic, Rochester, MN*

Purpose: Guided by the liver allografts' unique tolerogenic microenvironment and the immunoprotective impact on simultaneously transplanted organs, we recently isolated liver mesenchymal stromal cells (L-MSC) and demonstrated that they inhibit alloreactive T cell responses better than their counterparts from bone marrow (BM-MSC) or adipose tissue (A-MSC). Here, we compared the impact of L-MSC on natural killer (NK) cell functions to those of BM-MSC and A-MSC.

Methods: L-MSC were obtained from deceased donor allografts, while BM-MSC and A-MSC were derived from living kidney donors at the time of procurement (n=6 each). Comparative proteomic analysis was done on the secretome of each cell type. Primary NK cells were isolated from blood donor waste products using an NK cell isolation kit, stimulated with IL-2 (100U/mL), and cultured with MSC in a ratio of 10:1. Surface marker expression was assessed by Flow Cytometry, IFNɣ production by ELISA, and NK function by target cell cytolysis after 3 days of co-culture.

Results: The PCA analysis showed that the L-MSC secretome clustered together, and was distinctly different than the A-MSC and BM-MSC secretomes. Specifically, multiple proteins involved in NK activation were reduced >2-fold (p<0.05), and those involved in NK inhibition were in upregulated >2-fold (p<0.05) in L-MSC cultures. Compared to NK cultured with BM-MSC or A-MSC, NK cultured with L-MSC had reduced surface expression of the two activation markers, Nkp44 (14.2% vs. 20.8% and 27.2%) and NkG2D (10.2% vs. 24.2% and 33.4%) (p<0.05, both) (Figure 1). Similarly, L-MSC reduced IFNγ production by NK cells by 54% (p<0.05), compared to 50% by BM-MSC and 37% by A-MSC (p<0.05). Although all three MSC reduced the cytolytic function of NK cells, the biggest reduction was observed in NK cells co-cultured with L-MSC (34% vs. 40% and 38%; p<0.05).

Conclusions: These results suggest that L-MSC are superior to BM-MSC and A-MSC in inhibiting NK cell activation and cytolytic function in vitro. These findings provide further evidence for the immunomodulatory properties of L-MSC in their potential utilization as cellular therapeutics in the pathogenesis of autoimmune diseases and transplantation.



CITATION INFORMATION: Yigitbilek F., Hansen M., Park W., Stegall M., Taner T. Human Liver-derived Mesenchymal Stromal Cells (MSC) are Superior Inhibitors of Natural Killer Cells Compared to Bone Marrow or Adipose Tissue-derived MSC *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Yigitbilek: None. **M.J. Hansen:** None. **W.D. Park:** None. **M.D. Stegall:** None. **T. Taner:** None.

Basic

Endothelial Cell Biology

Abstract# 540

Src Kinase Inhibitor Pp1 Blunts Tgf-β1 Dependent Endothelial-to-Mesenchymal Transition to Alleviate Allograft Kidney Fibrosis Through Orchestrating β-catenin Signaling

Z. Gui, Z. Wang, Z. Han, J. Tao, X. Ju, R. Tan, M. Gu, *Urology, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

Purpose: Allograft fibrosis is an important contributor to graft loss in chronic renal allograft injury. Endothelial-to-mesenchymal transition (EndMT), dysfunction of endothelial cells, played a vital role in formation of transplanted kidney fibrosis. Src family kinases (SFKs), an important group of proto-oncogenes, were reported to play a critical role in formation of renal fibrosis. However, the effect of Src in formation of allograft kidney fibrosis remains to be determined.

Methods: Expression of Src Kinase in CAD were examined compared with non-rejecting tissue. The long-term prognosis of CAD patients were analyzed with the Src Kinase expression. HUVECs were primarily extracted and cultured. Transforming growth factor-β1 (TGF-β1) was used to induce EndMT. Src Kinase activation was tested in cell culture. Upon silencing Src or using Src Kinase Inhibitor PP1, progression of TGF-β1 induced EndMT related cellular remodeling, extra cellular matrix (ECM) production, cell migration and invasion, were tested. By establishing rat kidney transplantation model, the protective role of PP1 in allograft fibrosis and survival rate of allo-recipients were investigated.

Results: In this study, we found significantly higher expression of Src Kinase in CAD compared with non-rejecting tissue, and downregulation of Src Kinase was negatively related to poor prognosis in CAD patients. In addition, we observed the Src Kinase activation in transforming growth factor-β1 (TGF-β1) induced EndMT. Upon silencing Src or using Src Kinase Inhibitor PP1, progression of TGF-β1 induced EndMT related cellular remodeling, extra cellular matrix (ECM) production, cell migration and invasion, got significantly reverted. Then, we found Src kinase controlled the progression of EndMT by orchestrating β-catenin signaling. By establishing rat kidney transplantation model, we confirmed the protective role of PP1 in allograft fibrosis and survival rate of allo-recipients. Then, our outcomings revealed PP1 alleviated TGF-β depended EndMT in allograft organ. In *vitro* study, we furtherly confirmed our *vivo* findings.

Conclusions: In conclusion, to the best of our knowledge, the present study was the first to investigate the role of Src kinase in allograft kidney and suggest that PP1 blunts TGF-β1 dependent EndMT to alleviate allograft kidney fibrosis through orchestrating β-catenin signaling.

CITATION INFORMATION: Gui Z., Wang Z., Han Z., Tao J., Ju X., Tan R., Gu M. Src Kinase Inhibitor Pp1 Blunts Tgf-β1 Dependent Endothelial-to-Mesenchymal Transition to Alleviate Allograft Kidney Fibrosis Through Orchestrating β-catenin Signaling *AJT, Volume 21 Supplement 3*

DISCLOSURES: Z. Gui: None. **Z. Wang:** None. **Z. Han:** None. **J. Tao:** None. **X. Ju:** None. **R. Tan:** None. **M. Gu:** None.

Abstract# 541

Extracellular Vesicles from Patients with Diabetic Nephropathy Induce Endothelial Dysfunction Through Icam-1 and Vcam-1 in an In Vitro Model

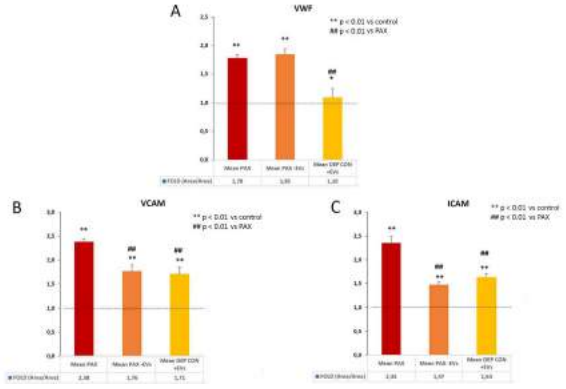
E. Montagud-Marrahi[1], S. Torramadé-Moix[2], M. Ramirez-Bajo[3], J. Rovira[3], E. Bañón-Maneus[3], E. Hermida[1], F. Diekmann[1], M. Palomo[4], M. Díaz-Ricart[2], P. Ventura-Aguiar[1], *[1]Nephrology and Kidney Transplantation Department, Hospital Clínic de Barcelona, Barcelona, Spain, [2]Hematopathology Department, Hospital Clínic de Barcelona, Barcelona, Spain, [3]Nephrology and Transplant Experimental Laboratory (LENIT), Hospital Clínic de Barcelona, Barcelona, Spain, [4]Josep Carreras Leukaemia Research Institute, Hospital Clínic de Barcelona, Barcelona, Spain*

Purpose: Extracellular Vesicles (EVs) are membranous structures produced by cells which contain different cytoplasmic compounds and that have been described as potentially pathogenic elements in endothelial dysfunction (ED) through a modification of the expression of endothelial receptors. The mechanisms of ED in patients with chronic kidney disease (CKD) and diabetes mellitus (DM) are not well defined, although EVs could have a key role. Thus, the aim of the study was to evaluate the role of EVs in ED in patients with diabetes and ESKD in an *in vitro* model of ED.

Methods: Cross-sectional study with sera from 11 patients with a mean age of 46±7.6 years (45% women) and CKD (eGFR 18±7 mL/min) due to diabetic nephropathy (DM1), grouped into 4 pools. The role of the EVs was studied in an *in vitro* model of ED with HMEC-1 cells exposed during 72 hours to supplemented medium with: a) patient sera (group 1/red), b) EVs-depleted patient sera (group 2/orange) and c) EVs-depleted control sera in which patient's EVs were added (group 3/yellow). Changes in the expression of vWF and the membrane adhesion receptors VCAM-1 and ICAM-1 were analyzed in the cells exposed to the different conditions, with respect to the healthy donor serum.

Results: The expression of ED markers (vWF, VCAM-1 and ICAM-1) in cells exposed to patient serum (with or without EVs) was higher compared to that observed after exposure to control sera (vWF, p <0.01; Fig. 1A; VCAM-1, p <0.01; Fig. 1B; ICAM-1, p <0.01; Fig. 1C). Moreover, EVs depletion significantly decreases the expression of VCAM-1 and ICAM- 1 with respect to the patient's serum (Fig. 1B, p <0.01 and 1C, p <0.01), but not vWF expression.

Conclusions: EVs increase endothelial damage through an increased VCAM-1 and ICAM-1 expression, both being inflammatory markers associated with leukocyte adhesion. Thus, EVs constitute a pathogenic element in ED in patients with DM1 and CKD.



CITATION INFORMATION: Montagud-Marrahi E., Torramadé-Moix S., Ramirez-Bajo M., Rovira J., Bañón-Maneus E., Hermida E., Diekmann F., Palomo M., Díaz-Ricart M., Ventura-Aguiar P. Extracellular Vesicles from Patients with Diabetic Nephropathy Induce Endothelial Dysfunction Through Icam-1 and Vcam-1 in an In Vitro Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Montagud-Marrahi: None. **S. Torramadé-Moix:** None. **M. Ramirez-Bajo:** None. **J. Rovira:** None. **E. Bañón-Maneus:** None. **E. Hermida:** None. **F. Diekmann:** None. **M. Palomo:** None. **M. Díaz-Ricart:** None. **P. Ventura-Aguiar:** None.

Abstract# 542

HLA I Antibody-Activated Endothelium Polarized M2-Like Macrophages with Increased Efferocytic and Phagocytic Capacity

J. Nevarez-Mejia[1], X. Wei[1], N. M. Valenzuela[1], M. Rossetti[1], H. Pickering[1], G. A. Fishbein[1], A. Mulder[2], E. F. Reed[1], *[1]Pathology and Laboratory Medicine, UCLA, Los Angeles, CA, [2]Immunohematology and Blood Transfusion, LUMC, Leiden, Netherlands*

Purpose: The role of intragraft macrophages (Mϕs) during antibody-mediated rejection (AMR) remains unclear. Anti-HLA Abs during AMR drives vascular inflammation as seen by monocyte recruitment and endothelial cell (EC) injury. Prior studies in our lab have indicated that monocyte and HLA I Ab-activated EC interactions skew monocytes to resolving M2-like phenotypes (CD68+CD206+CD163+). In this study, we validated the capacity of HLA I Ab-activated EC polarized Mϕs to a) efferocytose apoptotic ECs and b) phagocytose *E.coli* particles as in the setting of graft injury or infection, respectively. Moreover, we identified immune responses post-engulfment.

Methods: Using a transwell *in vitro* co-culture system, human primary aortic ECs were stimulated with allele specific HLA I hIgG or HLA I $F(ab')_2$ Ab portion, anti-CD105 Ab, TNF-a, hIgG isotype control, or left untreated. Third-party human monocytes added above activated ECs transmigrate to the bottom chamber and differentiate into Mϕs (5-days). Cytokine-polarized Mϕs (M1/M2) were generated as controls. EC apoptosis was induced using TNF-a and cycloheximide (16-hours) and was validated via caspase-3 activation. Apoptotic ECs and *E. coli* particles were labeled with pHRodo (pH sensitive dye; measured by FITC). Mϕs were co-cultured with labeled apoptotic ECs or *E.coli* particles for 24-hours. The phenotype of $FITC^{Pos}$ Mϕs was measured by flow cytometry. Cytokine secretion of culture supernatants from Mϕs treated with target cells and untreated Mϕs was measured via Luminex.

Results: All transwell polarized Mϕs exhibited significantly higher levels of apoptotic EC efferocytosis (~20-40% $FITC^{Pos}$) and *E.coli* phagocytosis (~60-80% $FITC^{Pos}$) compared to cytokine-polarized Mϕs. Immune profiling results show that $FITC^{Pos}$ Mϕs post-apoptotic EC efferocytosis increased expression of CD40, CR1, and CD71 compared to $FITC^{Neg}$ Mϕs. Precisely, TNF-a activated EC polarized Mϕs significantly increased CD163 (*p=0.03) compared to untreated EC polarized Mϕs. Moreover, all transwell conditions exhibited an added increased in adhesive molecules (ICAM-1, CCR2, and PSGL-1) post-*E.coli* phagocytosis. Specifically, HLA I IgG Ab-activated EC polarized Mϕs significantly increased CR1 (*p=0.03) compared to untreated EC polarized Mϕs. Mϕ culture supernatants following apoptotic EC efferocytosis significantly increased FGF-2 while culture supernatants post-*E.coli* phagocytosis increased inflammatory cytokines (e.g. IL-6, IL-8, and IL-1b).

Conclusions: Our studies indicate that endothelium polarized M2-like Mϕs exhibit high efferocytic and phagocytic capacities, and activate immune responses which are enhanced by TNF-a and HLA I Abs. This provides insight into Mϕ functions which may help mediate vascular repair, and clearance of pathogens following transplantation.

CITATION INFORMATION: Nevarez-Mejia J., Wei X., Valenzuela N., Rossetti M., Pickering H., Fishbein G., Mulder A., Reed E. HLA I Antibody-Activated Endothelium Polarized M2-Like Macrophages with Increased Efferocytic and Phagocytic Capacity *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Nevarez-Mejia: None. **X. Wei:** None. **N.M. Valenzuela:** None. **M. Rossetti:** None. **H. Pickering:** None. **G.A. Fishbein:** None. **A. Mulder:** None. **E.F. Reed:** None.

Abstract# 543

IFNγ, and to a Lesser Extent TNFα, Elicits Protracted Endothelial Cell Expression of Costimulatory Molecules and Antigen Presentation Machinery

N. M. Valenzuela, *Pathology and Laboratory Medicine, UCLA, Los Angeles, CA*

Purpose: Beyond simply "recruiting" leukocytes to sites of injury, local stimulation by the donor vascular compartment may prolong alloimmune responses. Moreover, the dynamics of endothelial resolution of inflammation, particularly with respect to costimulatory phenotype, is not well-defined. We characterized the repertoire of cytokines, antigen presentation and costimulatory/coinhibitory molecules produced by inflamed vascular endothelial cells (EC), under chronic stimulation and after short cytokine priming and prolonged withdrawal.

Methods: Human aortic EC were stimulated with continuous TNFα or IFNγ for 1-48hr, or primed with TNFα or IFNγ for 3hr, before withdrawal of stimulus for up to 45hr. mRNA were measured by Nanostring; protein were measured by flow cytometry, ELISA and Luminex. Key findings were confirmed in primary human EC from 4-6 different vascular beds, and publicly available datasets were leveraged to further corroborate the findings.

Results: 42 genes encoding antigen presentation, costimulation/coinhibition molecules or cytokines were upregulated in EC by TNFα, IFNγ or both. 35 other cytokines, antigen presentation and costimulatory genes were either not found to be expressed by endothelium or were expressed but not induced by TNFα or IFNγ. TNFα triggered IL6, IL6ST, IL15, TRAIL and BAFF production from EC as an intermediate phase (>6hr) response, while IFNγ stimulated only TRAIL, BAFF and IL15 after 18hr. EC upregulated CD40, ICOSL, HVEM, PD-L1, PD-L2 and 4-1BB as early as 3hr, and down-regulated B7-H3, in response to TNFα; while IFNγ increased CD40, HVEM, PD-L1 and PD-L2. TNFα augmented expression of HLA I, TAP1 and immunoproteasome components; while IFNγ also increased HLA II, CIITA, and CD74. After only short (3hr) cytokine priming and extended withdrawal from cytokine exposure, TNFα-induced HLA I, IL6ST and PD-L2 were enhanced at 24hr, but other TNFα-induced molecules rapidly contracted. In contrast, HLA I, HLA II and proteasome induction at 48hr was elevated whether IFNγ was chronic or withdrawn. In addition, nearly all IFNγ-induced costimulatory molecules and cytokines persisted up to 45hr after IFNγ withdrawal.

Conclusions: Although endothelial cells lacked CD28 ligands (CD80, CD86) and did not produce many of the typical cytokines needed for Th skewing, they could

be provoked to express PD-1 ligands, CD40 and other cytokines that can bias T cell activation. We were also surprised to find that activated EC elaborated BAFF and IL-15, cytokines which shape B cell and NK cell survival and activation. In addition to different profiles elicited by TNFα to IFNγ, our results show that IFNγ elicits prolonged gene expression changes and immune phenotype alterations that persist days after initiation. That systemic and tissue resident vascular EC possess a wide constellation of costimulatory molecules suggest that adaptive immunity takes shape not only in secondary lymphoid organs but also locally in the periphery.
CITATION INFORMATION: Valenzuela N. IFNγ, and to a Lesser Extent TNFα, Elicits Protracted Endothelial Cell Expression of Costimulatory Molecules and Antigen Presentation Machinery *AJT, Volume 21 Supplement 3*
DISCLOSURES: N.M. Valenzuela: None.

Basic

Biomarker Discovery and Immune Modulation

Abstract# 544

Hypoxia Inducible Factor 1á (HIF-1á) Regulates Carcinoembryonic Antigen-related Cell Adhesion Molecule-1 (CEACAM1) Splice Isoforms to Protect Against Ischemic Injury in Mouse and Human Liver Transplantation

K. J. Dery, H. Kojima, K. Kadono, H. Hirao, J. W. Kupiec-Weglinski, *The Dumont-UCLA Transplantation Center, Los Angeles, CA*

Purpose: CEACAM1 (CC1) is a transmembrane glycoprotein that undergoes extensive alternative splicing (AS) to generate CC1-S and CC1-L. It is currently unclear which of these two cytoplasmic isoforms is involved at the interface of immune liver injury and metabolic homeostasis.
Methods: Murine studies used warm liver IRI (wIRI) for 6 h or 7 days to assess RNA splicing in CC1. Primary hepatocytes were cultured under hypoxia-reoxygenation (H/R) stress conditions to mimic liver wIRI. Antisense oligomer morpholinos, targeting CC1 exon 7, were used to induce "cytoprotective" hepatocyte CC1-S signaling under hypoxic conditions in hepatocyte cultures and orthotopic liver transplant (OLT) settings. Human liver biopsies were obtained 2 h after reperfusion and analyzed by qRT-PCR-assisted detection of CC1-S and HIF-1α.
Results: Longitudinal CC1 AS mRNA isoform profiles were analyzed in a wIRI model. The peak of CC1-S occurred at 6 h (P<0.0009) and 7d (P<0.0007), reflecting combinatorial interactions at the CC1 variable exon 7. We addressed next how CC1 is regulated by oxidative stress by investigating the role of HIF-1α. Notably, in the presence of HIF-1α, under cold stimuli, CC1 responded to hepatocyte damage by dramatically upregulating its expression (P<0.001). This correlated with a decrease of p38 MAPK levels (P<0.001), a negative regulator of hepatic autophagy pathways. As proof-of-principle, wild-type mice treated with antisense morpholinos targeting CC1 exon 7 and subjected to warm IR-stress showed marked improvement of liver function, increased CC1-S in the liver, and spleen (P<0.0001). To clinically validate the murine findings, we retrospectively analyzed hepatic biopsies from fifty-five human OLT patients. We found a positive correlation between CC1 and HIF-1α levels in post-transplant donor liver biopsies (P<0.0128). Human OLTs divided into "low" (n=20) vs. "high" (n=20) CC1-S expression groups (n=40) showed high CC1-S levels were accompanied by improved pre-OLT hepatocellular function.
Conclusions: This novel translational study identifies oxidative stress and hepatic tissue injury as catalytic drivers of CEACAM1 AS. The uncovered HIF-1α - CC1-S cytoprotective axis points toward its function in alleviating hepatic IRI and improving OLT survival/outcomes.
CITATION INFORMATION: Dery K., Kojima H., Kadono K., Hirao H., Kupiec-Weglinski J. Hypoxia Inducible Factor 1á (HIF-1á) Regulates Carcinoembryonic Antigen-related Cell Adhesion Molecule-1 (CEACAM1) Splice Isoforms to Protect Against Ischemic Injury in Mouse and Human Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.J. Dery: None. **H. Kojima:** None. **K. Kadono:** None. **H. Hirao:** None. **J.W. Kupiec-Weglinski:** None.

Abstract# 545

Microbial Signatures Promote Antibiotic-Mediated Alleviation of Peritransplant Liver Damage in Mouse Recipients

K. J. Dery[1], S. Kageyama[1], H. Hirao[1], H. Kojima[1], K. Kadono[1], T. Dong[2], J. W. Kupiec-Weglinski[1], *[1]The Dumont-UCLA Transplantation Center, Los Angeles, CA, [2]Department of Medicine, Vatche & Tamar Manoukian Division of Digestive Diseases, UCLA, Los Angeles, CA*

Purpose: Although recent evidence shows that modifications of gut microbiota by antibiotics (Abx) influences liver allograft function, its compositional role in orthotopic liver transplantation (OLT) remains unknown. Here we aimed to determine how recipient Abx pretreatment affects hepatic ischemia-reperfusion injury (IRI) and OLT outcomes.
Methods: C57BL/6 recipient mice were pretreated with amoxicillin (Amx) or metronidazole (Mtz) prior to transplantation of Balb/c livers subjected to ex-vivo hepatic cold storage (18 h/4C). Groups of C57BL/6 mice were fed Amx or Mtz (days -11 to -1) and then conditioned with or without fecal microbiota transfer
(FMT) by gavage from naïve C57BL/6 mice (200 mg/ml; day -1 and 0) prior to OLT. Genomic DNA of fecal samples was then isolated and subjected to microbiome 16S rRNA gene sequencing.
Results: Taxonomic classification revealed significant differences between the Amx-treated and untreated groups in the family-, genus, and species-level analyses. Faith's Phylogenetic Diversity index, Shannon Index, and Chao1 Index all revealed significant declines in taxon richness, species diversity, and overall abundance after Amx-treatment alone (p<0.0001 in each index). By contrast, FMT re-established the microbiota to Sham and OLT-levels, suggesting that normal commensal flora is antagonistic to liver IRI-resistance. The bacterial phyla Verrucomicrobia and Firmicutes showed the largest decline of representation in the Amx-treated microbiota compared to Sham-treated mice. Remarkably, Mtz pretreated OLT recipients experienced severe IRI, with increased sALT (8853Â±353.5 vs. 5486Â±1345 U/L, p<0.05), augmented Suzukiâ€™s score, TUNEL+ cells, and graft-infiltrating neutrophils/macrophages, and decreased hepatic EP4 expression vs. controls. However, adjunctive FMT in Mtz-treated OLT recipients mitigated IR-stress and restored hepatocellular function to control levels (sALT: 4301Â±2145U/L, ns vs. control, p<0.05 vs. Mtz group).
Conclusions: This study documents the striking benefits of microbiota modulation in a clinically relevant mouse OLT model; and identifies a specific microbiota genus profile as a target for novel therapeutic manipulation in IRI-OLT.
CITATION INFORMATION: Dery K., Kageyama S., Hirao H., Kojima H., Kadono K., Dong T., Kupiec-Weglinski J. Microbial Signatures Promote Antibiotic-Mediated Alleviation of Peritransplant Liver Damage in Mouse Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.J. Dery: None. **S. Kageyama:** None. **H. Hirao:** None. **H. Kojima:** None. **K. Kadono:** None. **T. Dong:** None. **J.W. Kupiec-Weglinski:** None.

Abstract# 546

Neutrophil CEACAM1 Induces Hepatic Autophagy and Shapes Innate-adaptive Immune Response in Liver Transplantation: From Mouse-to-human

H. Hirao[1], H. Kojima[1], K. Kadono[1], K. J. Dery[1], K. Nakamura[2], D. G. Farmer[1], F. M. Kaldas[1], J. W. Kupiec-Weglinski[1], *[1]Surgery, Dumont-UCLA Transplant Center, Los Angeles, CA, [2]Surgery, Kyoto University, Kyoto, Japan*

Purpose: Although CEACAM1 (CC1; carcinoembryonic antigen-related cell adhesion molecule 1; CD66a) regulates innate-adaptive immunity, its role in orthotopic liver transplantation (OLT) remains unknown. CC1 expresses two isoforms, i. e., CC1 short (CC1S) and CC1 long (CC1L) isoform. The CC1L isoform in mouse OLTs has been confined primarily to host-derived circulating infiltrating neutrophils. Here, we analyzed mouse and human OLT biopsies (Bx) to determine as to whether/how neutrophil CC1L isoform may contribute to OLT outcomes.
Methods: In the experimental arm, donor WT (C57/BL6) livers were transplanted, after cold storage (4oC/18h), to groups of syngeneic WT or CC1-deficient
(CC1-KO) mouse recipients, and sampled at 6h post-OLT. In parallel in vitro study, neutrophils isolated from WT or CC1-KO mice were cultures with: 1/ LPS or IL-4 adjunct; or 2/ co-cultured with WT bone marrow macrophages stimulated with LPS. In the clinical arm, human hepatic biopsies obtained at 2h post-OLT Bx
(n=55) were screened for CC1L, ATG5, ATG7, LC3B expression (Western blots) and for pro-inflammatory phenotype (RT-PCR).
Results: Mouse OLTs (WT) were negative for CC1L expression when transplanted to CC1-KO but not to WT recipients. Recipient CC1 null mutation augmented IRI-OLT (WT>CC1-KO) as evidenced by increased sAST/sALT levels (p<0.05), deteriorated pro-inflammatory cytokine/chemokine programs (p<0.05) and impaired post-LT autophagy induction. CC1-KO neutrophils showed higher amount of IL-1β/elastase expression and depressed arginase-1 after LPS challenge; and decreased p-stat6 levels in response to IL-4 stimulation. In neutrophil-macrophage co-culture system, CC1-proficient, but not CC1-KO neutrophils suppressed macrophage activation after LPS stimulation. Consistent with mouse data, CC1L expression in human liver Bx correlated positively with ATG7 (r=0.2628,
p=0.0526), ATG5 (r=0.2994, p=0.0264) and LC3B (r=0.2739, p=0.0430). When divided into low (n=28) vs. high (n=27) CC1L expression groups, CC1L low human OLTs showed enhanced innate/adaptive immune activation, and higher incidence of early allograft dysfunction (EAD; 28.6% vs 11.1%).
Conclusions: As a checkpoint regulator of IR-stress and sterile inflammation, neutrophil CC1L may serve as a novel biomarker and target for therapeutic modulation in OLT recipients.
CITATION INFORMATION: Hirao H., Kojima H., Kadono K., Dery K., Nakamura K., Farmer D., Kaldas F., Kupiec-Weglinski J. Neutrophil CEACAM1 Induces Hepatic Autophagy and Shapes Innate-adaptive Immune Response in Liver Transplantation: From Mouse-to-human *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Hirao: None. **H. Kojima:** None. **K. Kadono:** None. **K.J. Dery:** None. **K. Nakamura:** None. **D.G. Farmer:** None. **F.M. Kaldas:** None. **J.W. Kupiec-Weglinski:** None.

Abstract# 547

Treg Lymphotoxin Engages Lymphotoxin Receptor on Cancer and Endothelial Cells to Promote Cancer Metastatic Migration: Mechanisms for Treg-Cancer Interactions

W. Piao, R. Oakes, C. Paluskievicz, J. Christopher, J. Bromberg, *U Maryland, Baltimore, MD*

Purpose: Treg immune suppression which is critical for transplant graft survival may also enhance tumor growth and metastases. Treg lymphotoxin (LTα1β2) may directly engage the LT beta-receptor (LTβR), which most tumor cells express, and signal through classical p65 and non-classical (NIK) NFκB pathways. We tested the hypothesis that direct Tregs-cancer cell interactions stimulate LTβR NFκB signaling pathways and influence the migration of cancer cells.

Methods: The murine melanoma cell line B16F10-eGFP and murine dermal lymphatic endothelial cells (LEC) were used in biochemical, phenotypic, and functional analyses of LTβR signaling and migration assays. Murine CD4 T cells or Tregs were isolated from wild type or $LT\alpha^{-/-}$ mice, and co-cultured with tumor cells or LEC. LTβR signaling was assessed with western blots and immunohistochemistry, and with highly specific LTβR-NFκB blocking peptides.

Results: LTβR was highly expressed on B16-F10 and many other cancer cells. LTβR classical NFκB signaling was constitutively activated in B16-F10, leading to higher expression of VCAM-1, CCR5, CXCL10 and CCL2 which were enhanced by inflammatory cytokines and suppressed by LTβR-NFκB-p65 blocking peptide. LTβR non-classical NFκB-NIK signaling was also constitutively activated, leading to expression of CCL21, CCL27, and CXCL12 which were suppressed by LTβR-NFκB-NIK blocking peptide. Cancer cells chemotactically migrated across LEC, and migration was prevented by inhibiting cancer cell NFκB-NIK signaling. Treg LTα1β2 further stimulated cancer cell LTβR to enhance cancer cell migration. $LT\alpha^{-/-}$ Treg failed to stimulate cancer cell migration, so that Treg regulated cancer cell migration is LT dependent. Treg LTα1β2 also stimulated LTβR on LEC, which conditioned the LEC by down regulating the cell junction molecule VE-cadherin, and thus further promoted cancer cell migration. Co-inoculation of B16-F10 with inhibitors of NFκB signaling suppressed melanoma tumor growth and metastases in vivo.

Conclusions: Treg LTα1β2 directly signals LTβR on cancer cells to promote cancer cell metastatic migration. Treg LTα1β2 directly signals LTβR on LEC to promote cancer cell transendothelial migration. LTβR-NFκB-signaling blocking peptides suppress cancer migration and chemokines to block cancer metastatic invasion. These observations provide a rational strategy to modulate Treg activities to prevent tumor spread in transplant recipients.

CITATION INFORMATION: Piao W., Oakes R., Paluskievicz C., Christopher J., Bromberg J. Treg Lymphotoxin Engages Lymphotoxin Receptor on Cancer and Endothelial Cells to Promote Cancer Metastatic Migration: Mechanisms for Treg-Cancer Interactions *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Piao: None. **R. Oakes:** None. **C. Paluskievicz:** None. **J. Christopher:** None. **J. Bromberg:** None.

Abstract# 548

Development of a Lateral Flow Assay Detecting CXCL9 within Antibody Mediated and Acute T Cell Mediated Rejections After Kidney Transplantation

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Purpose: Despite tremendous improvements in quality and tolerability of immunosuppressive medications after successful kidney transplantation, numerous kidney grafts undergo acute and chronic rejections with following function loss. To detect and treat rejections as early as possible, follow-up examinations are mandatory and here the gold standard is represented by kidney graft biopsies. However, these sensitive examinations are not harmless and involve risks like bleeding and infections. Therefore, an easy-to-use lateral flow assay (LFA) for kidney transplant recipients (KTRs) was developed in the here presented project.

Methods: CXCL9 in urine and plasma samples from kidney graft recipients were analyzed by multiplex-ELISA. This messenger protein out of a group of homologous chemokines is an early signal produced within rejection episodes, e.g. by human macrophages presenting allogen or by the activated renal graft endothelium itself. Based on the identified range of relevant CXCL9 concentrations in urine and plasma samples, a LFA was developed. Initially, spiked buffer was used and the lateral flow assay was established. Following, samples from patients with kidney rejections as well as samples of unsuspicious patients as negative controls were applied onto the optimized LFA.

Results: An association between acute T cell mediated and antibody mediated chronic rejections and CXCL9 in plasma and urine could be determined (rejectors (N=48)/plasma: 720.96 pg/mL &plusmn 677.96 pg/mL versus controls (N=42), 213.60 pg/mL plusmn 160 pg/mL, p<0.0001; rejectors (N=47)/urine: 127.56 pg/mL plusmn 143.62 pg/mL versus controls (N=31), 39.61 pg/mL plusmn 29.86 pg/mL, p<0.001 Mann Whitney U test). In the lateral flow assay using spiked buffer a limit of detection was realizied. Samples from patients with a biopsy proven acute or chronic kidney rejection as well as samples of unsuspicious patients were already successfully applied with a reasonable sensitivity and specificity values >70&percnt.

Conclusions: In this study, the value of CXCL9 detection in plasma and urine of patients with TCMR and AMR after kidney transplantation was confirmed. Furthermore, a lateral flow assay as point of care test for CXCL9 was developed.

CITATION INFORMATION: Seiler L., Jonczyk R., Lindner P., Phung L., Falk C., Blume C. Development of a Lateral Flow Assay Detecting CXCL9 within Antibody Mediated and Acute T Cell Mediated Rejections After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.K. Seiler: None. **R. Jonczyk:** None. **P. Lindner:** None. **L. Phung:** None. **C. Falk:** None. **C. Blume:** None.

Abstract# 550

Novel Morphologic Biomarkers of Cardiac Allograft Remodeling are Associated with Multiple Peri- and Post-transplant Inflammatory Processes

C. Yuan[1], S. Arabyarmohammadi[1], H. Li[1], E. Peyster[2], P. Lal[3], M. Feldman[3], K. Margulies[2], A. Madabhushi[1], *[1]Department of Biomedical Engineering, Case Western Reserve University, Cleveland, OH, [2]Cardiovascular Research Institute, University of Pennsylvania, Philadelphia, PA, [3]University of Pennsylvania, Philadelphia, PA*

Purpose: It has long been recognized that transplanted hearts develop a stiffened, restrictive physiology at an accelerated rate compared to native hearts. While this is thought to be due to a variety of factors which result in local inflammatory injury and subsequent remodeling. Inflammatory insults and their subsequent effects on in-situ tissue architecture have never been rigorously studied. In this work, we sought to use quantitative image analysis tools to measure a variety of morphologic biomarkers pertaining to collagen changes in a large cohort of endomyocardial biopsy (EMB) samples. We then apply these features to investigate the roles of several potential causes of inflammation (reperfusion injury, quilty lesions, and a history of cellular rejection) in the transplanted heart.

Methods: Given that the collagen in different regions have different responses to the causes of inflammation, a U-net model was trained to classify collagen into three types according to its location: collagen at the edge of the myocardium, collagen around myocytes, and collagen inside stroma. Collagen fibers were further segmented by utilizing a local binary pattern operator combined with OTSU algorithm. We then extracted a set of 216 biologically-inspired collagen features, relating to the density, morphology, spatial arrangement and interaction with myocytes. The relationship between 216 collagen features and the causes of inflammation were comparatively analyzed. Feature selection was employed to identify the most 5 predictive features on a set of 911 slides and these were subsequently trained with a random forest classifier to predict the existence of the causes of inflammation. The area under the receiver operating characteristic curves (AUCs) were calculated to evaluate the model performance on the test 395 slides.

Results: 1) The AUCs for predicting the existence of reperfusion injury, quilty lesions, and a history of cellular rejection reached 0.65, 0.61 and 0.81, respectively. This showed that collagen features were strongly linked to the causes of inflammation studied. 2) Different causes of inflammation showed different effects on the three types of collagen; quilty lesion mainly acted on the collagen at the edge of the myocardium, while reperfusion injury mainly acted on the collagen around myocytes. 3) Collagen features were more closely related to the historical rejection grade than the current rejection grade, indicating that the change of collagen features was a gradual accumulation process.

Conclusions: This work demonstrates that the novel biomarkers derived from collagen are highly potential for the mechanism-exploring of the causes of inflammation in remodeling of the transplanted myocardium.

CITATION INFORMATION: Yuan C., Arabyarmohammadi S., Li H., Peyster E., Lal P., Feldman M., Margulies K., Madabhushi A. Novel Morphologic Biomarkers of Cardiac Allograft Remodeling are Associated with Multiple Peri- and Post-transplant Inflammatory Processes *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Yuan: None. **S. Arabyarmohammadi:** None. **H. Li:** None. **E. Peyster:** None. **P. Lal:** None. **M. Feldman:** None. **K. Margulies:** None. **A. Madabhushi:** None.

Abstract# LB 28

Urinary Exosomal Cystatin C and Lipopolysaccharide Binding Protein as Biomarkers for Monitoring Antibody-mediated Rejection After Kidney Transplantation

M. Kim, S. Lim, S. Shin, *Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, Republic of*

Purpose: This study aims to discover and validate urinary exosomal biomarkers for antibody-mediated rejection (ABMR) after kidney transplantation.

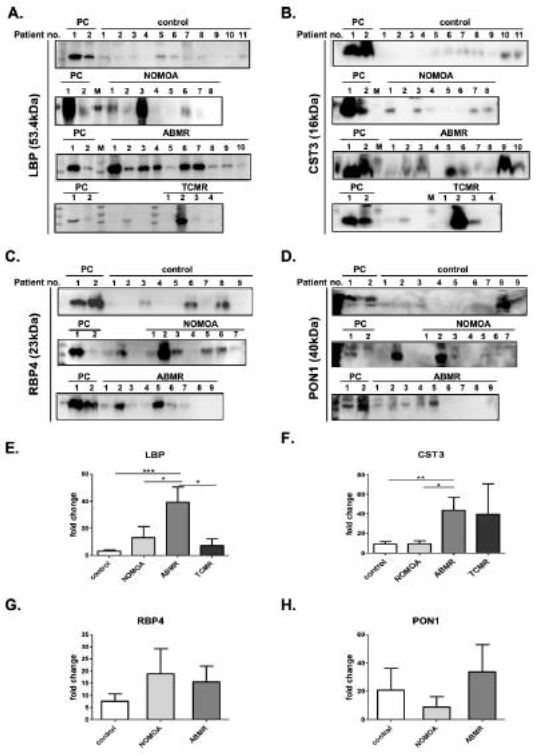
Methods: A total of 60 urine samples from kidney transplant recipients were collected at the time of check-up or 2 - 3 hours before the for-cause biopsy. In addition, urine specimens were collected from living kidney donors just before donor nephrectomy. They were classified into five groups; ABMR group (12 cases), T cell-mediated rejection (TCMR) group (8 cases), BK virus nephropathy (BKVN)

group (5 cases), no major abnormality (NOMOA) group (11 cases) and donor (DONOR) group (24 cases). Exosome was fractionated from patient's urine by stepwise ultra-centrifugation for proteomics analysis to find out biomarker candidates for ABMR. In the validation cohort, there were 25, 10, 19, and 25 recipients in the ABMR, TCMR, NOMOA, and control groups, respectively.

Results: Totally, 1,820 exosomal proteins were identified in the discovery set. Among those proteins, four biomarker candidates were selected for ABMR; Cystatin-C (CST3), serum paraoxonase/arylesterase (PON1), retinol-binding protein 4 (RBP4), and lipopolysaccharide-binding protein (LBP). In the validation cohort, Western blot analysis was performed to validate urinary exosomal biomarker candidates for ABMR. Urinary exosomal LBP in the ABMR group significantly increased compared with the other groups. In addition, urinary exosomal CST3 in the ABMR group significantly increased compared with the control and NOMOA groups whereas there was no significant difference between the ABMR and TCMR groups. Immunohistochemical staining showed that relative intensities of LBP and CST3 at glomerulus were significantly higher in the ABMR group compared with the NOMOA and TCMR groups.

Conclusions: In conclusion, urinary exosomal CST3 and LBP are potent biomarkers for ABMR after kidney transplantation.

Figure 1. Validation of proteomic biomarker candidates for ABMR



CITATION INFORMATION: Kim M., Lim S., Shin S. Urinary Exosomal Cystatin C and Lipopolysaccharide Binding Protein as Biomarkers for Monitoring Antibody-mediated Rejection After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Kim: None. **S. Lim:** None. **S. Shin:** None.

Basic

Innate Immunity; Chemokines, Cytokines, Complement

Abstract# 551

Adjuvant Treatment Shapes the Bone Marrow Myeloid Compartment Towards an Immunosuppressive Phenotype That Can Suppress Allograft Rejection

J. Ge[1], E. Anderson[1], J. F. Markmann[2], A. Cuenca[1], *[1]Surgery, Boston Children's Hospital, Boston, MA, [2]Surgery, Massachusetts General Hospital, Boston, MA*

Purpose: Myeloid derived suppressor cells (MDSCs) expand in response to inflammatory stimuli and have been shown to suppress adaptive immunity. Preliminary data from our lab suggests that adjuvant treatment expands MDSCs that can suppress allograft rejection. We hypothesized that distinct phenotypic and functional changes occur in bone marrow myeloid compartment that lead to the production of MDSCs following adjuvant treatment.

Methods: C57Bl/6 mice were injected with 200 µl saline or alum intraperitoneally every other day for a total of 3 doses. Spleen, peripheral blood and bone marrow was examined at different time points via flow cytometry from either saline or alum treated mice. A separate aliquot of cells were stimulated with PMA (50 ng/mL) and ionomycin (1 ug/mL) and analyzed for the presence of IL-10 via flow cytometry.

Results: At 7 days post adjuvant treatment, we noted an expansion of common myeloid progenitors (0.28 ± 0.044% vs 0.108 ± 0.013%, p=0.009), macrophage and DC progenitors (0.053 ± 0.010% vs 0.023 ± 0.003%, p=0.034) and common monocyte progenitors (0.62 ± 0.080% vs 0.39 ± 0.033%, p=0.038) in the bone marrow compared to saline controls. In alum treated animals, both monocytic (m)-MDSCs and granulocytic (g)-MDSCs significantly expanded in bone marrow, spleen, and peripheral blood and demonstrated significantly lower expression of CX_3CR_1 but increased expression of PD-L1, suggestive of a more suppressive phenotype. To support this, alum treatment increased IL-10 production by both M-MDSCs (34.37 ± 4.26 vs 11.32 ± 2.18%, p=0.028) and G-MDSCs (28.6 ± 2.54 vs 5.88 ± 1.46 %, p=0.007) in response to PMA stimulation compared to saline controls

Conclusions: Adjuvant treatment skews the bone marrow myeloid compartment towards a potent suppressor phenotype. These data support our previous findings that adjuvant treatment can expand m-MDSCs and g-MDSCs that suppress adaptive immunity and allograft rejection. Our data suggest that adjuvants can be designed to selectively expand suppressor cell populations *in vivo* by shaping the bone marrow compartment. Further, this strategy could be utilized to condition transplant recipient preoperatively and decrease the significant morbidity associated with current immunosuppressive regimens.

CITATION INFORMATION: Ge J., Anderson E., Markmann J., Cuenca A. Adjuvant Treatment Shapes the Bone Marrow Myeloid Compartment Towards an Immunosuppressive Phenotype That Can Suppress Allograft Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Ge: None. E. Anderson: None. **J.F. Markmann:** None. **A. Cuenca:** None.

Abstract# 552

Donor Kidney-Resident Macrophages Promote Allograft Inflammation and CD8 T Cell Response Post-Transplantation

A. Dangi[1], S. Yu[2], I. Husain[1], R. Geesala[1], X. Luo[1], *[1]Nephrology, Medicine, Duke University, Durham, NC, [2]Division of Organ Transplantation, The First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China*

Purpose: Kidney-resident macrophages play important roles in maintaining normal kidney function and promoting prompt repair following kidney injuries. Nevertheless, their fate and role in kidney transplantation remain unknown.

Methods: Donor kidneys from BALB/c mice (CD45.2) were transplanted into bilaterally nephrectomized C57BL/6 (B6; CD45.1) recipients. Untreated transplant recipients were sacrificed at various time points to track donor kidney-resident macrophages. To investigate the role of donor kidney-resident macrophage, these cells were depleted by *treating BALB/c donors* with clodronate-liposomes (200 µl/mouse for a week) prior to the transplantation into B6 recipients (Clodro Group). A Control Group of B6 recipients received kidney allografts from BABL/c donors treated with control liposomes without clodronate. Post-transplant intragraft inflammation and cellular infiltration were determined using qPCR and FACS.

Results: In naïve untransplanted donor kidneys, resident macrophages were identified as $F4/80^{HI}CD11c^{INT}MHCII^{HI}CCR2^{-}$ cells, constituting ~25% of total $CD11b^{+}$ myeloid cells. Post-transplantation, the majority of these cells of donor-origin were eliminated by day7, and were undetectable by day15 in rejecting kidney allografts from untreated recipients. FACS analysis of graft-infiltrating *recipient* $CD45.1^{+}$ *monocytes/macrophages* from Control Group on day7 post-transplant revealed elevated expression of MHC II and co-stimulatory CD86. These cells also expressed elevated level of inflammatory cytokine TNFα measured by intracellular cytokine staining. qPCR analysis of allografts also demonstrated elevated levels of Il17a and Ccl8. Interestingly, all of these immune parameters were *significantly downregulated* in Clodro Group. In addition, the number of graft-infiltrating CD8 T cells also reduced significantly in Clodro Group in comparison to Control Group.

Conclusions: Our data demonstrate that donor kidney-resident macrophages may cause acute kidney allograft injury post-transplantation by promoting inflammation and CD8 T cell-infiltration. It is well recognized that acute kidney allograft-injury has detrimental effects on long-term transplant outcome. Thus, as a proof of concept our data suggest that targeting donor kidney-resident macrophages, probably during preservation time, may improve transplant outcomes.

CITATION INFORMATION: Dangi A., Yu S., Husain I., Geesala R., Luo X. Donor Kidney-Resident Macrophages Promote Allograft Inflammation and CD8 T Cell Response Post-Transplantation *AJT, Volume 21 Supplement 3*

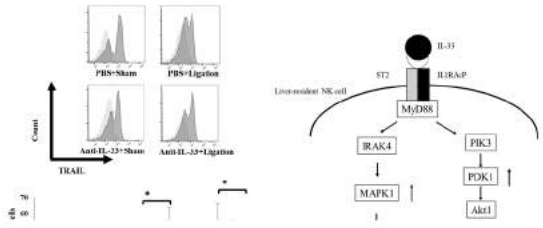
DISCLOSURES: A. Dangi: None. **S. Yu:** None. **I. Husain:** None. **R. Geesala:** None. **X. Luo:** None.

Abstract# 553

Portal Hypertension Abrogates Trail Expression of Liver Resident Nk Cells via Il-33

Y. Imaoka, M. Ohira, K. Sato, H. Ohdan, *Hiroshima Uni., Hiroshima, Japan*

Purpose: Portal vein hypertension (PHT) is associated with poor prognosis, risk factors for small graft syndrome, bloodstream infection, and acute rejection after living donor liver transplantation. We have recently reported that liver-resident natural killer cells (lr-NK cells) activity reduced via IL-33 signal in PHT mice model, depending on tumor necrosis factor-related apoptosis-inducing ligand (TRAIL).To clarify the weakening mechanism of lr-NK cells' function, we focused on IL-33, a cytokine released as DAMPs, due to sinusoidal endothelial cell injury and hepatocyte injury caused by portal hypertension and blood flow disturbance, using a PHT mice model.
Methods: The right branch of the portal vein was selectively ligated as PHT mice model, and the left hepatic lobe on the non-ligated side was evaluated. The lr-NK cell activity was evaluated by flowcytometory, cytotoxicity test and expression analysis of IL-33 signaling in lr-NK cells by quantitative PCR method.
Results: (1) TRAIL expression of lr-NK cells improved in anti-IL-33 treated PHT model. ($p<0.05$, 5 mice per group). (2) The Ingenuity-based URA predicted that various pathways were differentially activated between TRAIL+ vs. TRAIL- NK cell subsets. Foxo1 and MAPK1 were detected as TRAIL-inhibited genes, which were reported to be induced by IL-33. (3) Akt-Foxo and MAPK signaling in lr NK cells were analyzed by qRT-PCR 1h after co-cultured with IL-33. mRNA expression of PI3K, MAPK1, Tbx-21 and EOMES in lr- NK cells increased 1h after co-cultured with IL-33. On the other hand, mRNA expression of Foxo1 and TNFSF10 in lr-NK cells decreased 1h after co-cultured with IL-33.
Conclusions: Akt-Foxo and MAPK signaling through IL-33/ST2 in lr- NK cells play a negative role on TRAIL expression of lr- NK cells in PHT mice.



CITATION INFORMATION: Imaoka Y., Ohira M., Sato K., Ohdan H. Portal Hypertension Abrogates Trail Expression of Liver Resident Nk Cells via Il-33 *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Imaoka: None. **M. Ohira:** None. **K. Sato:** None. **H. Ohdan:** None.

Abstract# 554

Taurodeoxycholic Acid and L-valine Ameliorate Macrophage Driven Alloimmunity in Obese Transplant Recipients

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Purpose: Obesity initiates a chronic inflammatory network linked to more frequent perioperative complications and increased acute rejection rates after organ transplantation. Clinically, morbidly obese transplant candidates and recipients have undergone bariatric surgery facilitating transplantation. The effects of obesity on alloimmunity and transplant outcomes have not been defined.
Methods: We delineated the effects of obesity and bariatric surgery on alloimmunity and transplant outcomes in diet induced obese (DIO) mice. Performing allogeneic skin transplants in DIO recipient mice that underwent sleeve gastrectomies (SGx), we defined the interplay of innate and adaptive immune responses; quantitative metabolomic profiling in lean, DIO and DIO mice undergoing SGx delineated the effects of metabolic changes on alloimmunity.
Results: Skin transplants were rejected significantly earlier in completely mismatched DIO mice ($p<0.01$); DIO recipients of isogeneic transplants contained their grafts indefinitely. DIO recipients that underwent SGx prior to transplantation, in contrast, demonstrated significantly prolonged graft survival times ($p=0.05$); SGx also attenuated alloimmune responses including reduced Th1 and Th17 frequencies ($p<0.001$). Additional in-vitro studies identified ameliorated alloimmune responses with a reduced IFN-γ production and higher amounts of IL-10 by $CD4^+$ T cells in MLR ($p<0.01$). Through unbiased quantitative metabolomic profiling, we identified restored Taurodeoxycholic acid and L-Valine (TDCA/Valine) levels following SGx comparable to those in lean controls; in contrast, TDCA/Valine levels had been depleted in obese mice. Mechanistically, we identified restrained macrophage polarization through TDCA/valine via TGR5 signaling to inhibit $CD4^+$ T cell activation leading to a decreased production of IL-17 and IFN-γ in vitro and in vivo.
Conclusions: We provide novel insight into obesity induced inflammation and the consequences on allo-immunity and transplant outcomes. SGx initiated anti-inflammatory capacities on $CD4^+$ T cell driven allo-immune responses through compromised macrophage polarization. Restored TDCA/Valine levels simulated the effects of bariatric surgery, suggesting those metabolites as novel treatments ameliorating obesity augmented alloimmune responses.
CITATION INFORMATION: Quante M., Iske J., Perkins D., Alegre M., Zhou H., Elkhal A., Tullius S. Taurodeoxycholic Acid and L-valine Ameliorate Macrophage Driven Alloimmunity in Obese Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Quante: None. **J. Iske:** None. **D. Perkins:** None. **M. Alegre:** None. **H. Zhou:** None. **A. Elkhal:** None. **S.G. Tullius:** None.

Abstract# 555

Recipient Neutrophils Producing Myeloperoxidase Provoke Nk Cell and Monocyte/macrophage Activation During Acute Antibody-mediated Rejection of Kidney Allografts

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Purpose: Dysregulated donor-specific antibody (DSA) responses are induced in $B6.CCR5^{-/-}$ mice transplanted with complete MHC mismatched A/J kidney allografts and mediate acute graft rejection. Acute antibody-mediated rejection (AMR) also requires NK cell and myeloid cell activation to express effector functions within the graft.
Methods: This study used recipients deficient in myeloperoxidase (MPO) to test the influence of recipient myeloid cells on NK cell activation during acute AMR.
Results: $B6.CCR5^{-/-}$ recipients rejected A/J kidneys between days 18-25 vs. days 46-54 in $B6.CCR5^{-/-}MPO^{-/-}$ recipients, despite equivalent DSA titers. On day 15, NK cell activation to proliferate and express CD107a was markedly decreased within allografts in $B6.CCR5^{-/-}MPO^{-/-}$ recipients. RNA isolated from purified allograft infiltrating NK cells, monocytes and macrophages on day 15 post-transplant was interrogated by NanoString and indicated completely different transcript landscapes in all 3 leukocyte populations from $B6.CCR5^{-/-}MPO^{-/-}$ vs. $B6.CCR5^{-/-}$ recipients that correlated with development of acute vs. chronic allograft injury, respectively.
Conclusions: Neutrophil depletion abrogated NK cell activation and decreased macrophage infiltration into the allografts but increased monocytes producing MPO. Overall, the results indicate that neutrophils regulate graft-infiltrating NK cell activation and monocytes/macrophage development promoting acute AMR of kidney allografts.
CITATION INFORMATION: Ueda D., Miyairi S., Keslar K., Baldwin W., Fairchild R. Recipient Neutrophils Producing Myeloperoxidase Provoke Nk Cell and Monocyte/macrophage Activation During Acute Antibody-mediated Rejection of Kidney Allografts *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Ueda: None. **S. Miyairi:** None. **K. Keslar:** None. **W.M. Baldwin:** None. **R.L. Fairchild:** None.

Abstract# LB 34

CHBP Induces Stronger Immunosuppressive $CD127^+$ M-MDSC via Erythropoietin Receptor

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Purpose: Erythropoietin (EPO) is not only an erythropoiesis hormone, but also an immune regulatory cytokine. The receptors of EPO, $(EPOR)_2$ and tissue protective receptor (TPR), mediate EPO's immune regulation. Our group firstly reported a non-erythropoietic peptide derivant of EPO, cyclic helix B peptide (CHBP), which could inhibit macrophages inflammation and dendritic cells (DCs) maturation. As a kind of innate immune regulatory cell, myeloid-derived suppressor cells (MDSCs) share a common myeloid progenitor with macrophages and DCs. In this study, we investigated the effects on MDSCs differentiation and immunosuppressive function via CHBP induction.
Methods: MDSC differentiation and function was evaluated with or without CHBP stimulation. To compare the immune regulation difference of M-MDSC with or without CHBP stimulation, murine allo-skin transplant model was established. Signal pathways were detected by western blot, RNA-sequencing and protein array.
Results: CHBP promoted MDSCs differentiate toward M-MDSCs with enhanced immunosuppressive capability. Infusion of CHBP-induced M-MDSCs significantly prolonged murine skin allograft survival compared to its counterpart without CHBP stimulation. In addition, we found CHBP increased the proportion of $CD11b^+Ly6G^-Ly6C^{high}CD127^+$ M-MDSCs, which exerted stronger immunosuppressive function compared to $CD11b^+Ly6G^-Ly6C^{high}$ $CD127^-$ M-MDSCs. In CHBP induced M-MDSCs, we found that EPOR downstream signal proteins Jak2 and STAT3 were upregulated, which had strong relationship with MDSC function. In addition, CHBP upregulated GATA-binding protein 3 (GATA-3) protein translation level, which was an upstream signal of CD127 and regulator of STAT3. These effects of CHBP could be reversed if *Epor* was deficient.
Conclusions: Our novel findings identified a new subset of M-MDSCs with better immunosuppressive capability, which was induced by EPOR-mediated Jak2/GATA3/STAT3 pathway. These results are benefit for CHBP clinical translation and MDSC cell therapy in future.

CITATION INFORMATION: Yang C. CHBP Induces Stronger Immunosuppressive CD127$^+$ M-MDSC via Erythropoietin Receptor *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Yang: None.

Abstract# LB 35

Influence of Immunosuppressive Drug Trough Levels on Nk Cells in Liver Transplantation

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Purpose: Natural killer (NK) cells are enriched in lymphocytes within the liver and are considered to be main regulators of liver transplantation (LT) rejection and tolerance. However, the effects of immunosuppressants on NK cells are not clearly understood. The purpose of this study was to evaluate the impact of trough level conditions in long term patients on NK cell activation and function.

Methods: Peripheral blood mononuclear cells (PBMC) of 14 LT recipients and 14 healthy individuals (control) were used. Flow cytometry was done to analyse lymphocyte subsets and the phenotype of NK cells for in vivo and vitro. PBMC were exposed to single drugs [Everolimus(EVR), 5ng/ml; Sirolimus(SIR), 5ng/ml; Tacrolimus(TAC), 5ng/ml; Cyclosporine A (CSA), 125ng/ml; Mycophenolic acid (MPA), 15ug/ml; Steroid, 0.5ug/ml], and in typical combinations of [TAC, 0.5ng/ml + MMF, 15ug/ml + Steroid, 0.5ug/ml; TAC, 5ng/ml + SIR, 5ng/ml + Steroid, 0.5ug/ml; TAC, 5ng/ml + EVE, 5ng/ml + Steroid, 0.5 ug/ml] for 3 days. NK cells were sorted from PBMC under the same culture conditions, and RNA-seq was performed analysing genes for inhibition and activation.

Results: 1. Immunosuppressants reduced in vivo the number of CD4T, CD8T and NK cells, but did not change the percentage. For NK cells, the number of CD-56dimCD16+/- subgroups were mainly reduced. 2. It is worth noting that NK cells activity increased in LT 3. In vitro, Clinical drug treatment impaired the ability of NK cells to secrete interferon-r and perforin by flow cytometry and RNA- seq, and reduced expression of NKp44, CD69, NKG2D. In particular, no difference of NK cell activity was noted, when exposed to the three combination groups, despite their different impact on NK cells when exposed to the single drug.

Conclusions: This is the first time to use drug plasma concentrations simulating the clinical microenvironment in stable liver transplant recipients under in vitro conditions. Clinical drug treatment severely impairs NK cell activation and function. Despite of distinct actions on NK cells if given as single drugs, no differences are observed between all three different combinations of TAC neither with an mTOR nor MMF.

CITATION INFORMATION: Qin R., Qin J., Sun C., Nashan B. Influence of Immunosuppressive Drug Trough Levels on Nk Cells in Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Qin: None. **J. Qin:** None. **C. Sun:** None. **B. Nashan:** None.

Abstract# LB 36

Naïve Rhesus Monkey CD4$^+$CD8^{lo}T Cells Comprise High Percentage of Memory T Cells with Strong Effector Function

M. Kubo, K. Sasaki, A. P. Gutiérrez, L. Lu, V. Vujevich, A. W. Thomson, M. Ezzelarab, *Department of Surgery, University of Pittsburgh, PITTSBURGH, PA*

Purpose: Human CD4$^+$CD8^{lo}T cells have been reported in patients with organ allograft rejection. We evaluated the incidence, phenotype, and function of CD4$^+$CD8^{lo}T cells in nonhuman primates (NHP).

Methods: Peripheral blood mononuclear cells (PBMC) were isolated from peripheral blood of naïve rhesus monkeys. The percentages of CD4$^+$CD8^{lo}T cells were evaluated. In comparison to CD4$^+$CD8^{neg}T cells, memory T cell (Tmem) subsets were evaluated based on their expression of CD45RA, CCR7, CD28, and CD95. Effector function was assessed by the production of interferon-gamma (IFNg) and tumor necrosis factor-alpha (TNFa). Cytokine production was also assessed after stimulation with allogeneic PBMC for 5 days. The mean fluorescence intensity (MFI) of T-box transcription factors T-bet and Eomesodermin (Eomes) was also assessed.

Results: In naïve rhesus monkeys, the percentage of CD4$^+$CD8^{lo}T cells in peripheral blood was 1.54±0.32%. In CD4$^+$CD8^{lo}T cells, CD45RA$^-$CCR7$^-$ effector Tmem (Tem) were 17.9±2.0%, compared to 11.3±1.1% in CD4$^+$CD8^{neg}T cells ($p<0.01$). CD45RA$^+$CCR7$^-$ terminally-differentiaed effector Tmem (Temra) were 25.3±4.2%, compared to 5.8±0.8% in CD4$^+$CD8^{neg} T cells ($p<0.01$). CD95$^+$CD28$^-$ Tem were 33.4±5.5%, compared to 4.0±0.8% in CD4$^+$CD8^{neg}T cells ($p<0.01$).The percentage of IFNg$^+$TNFa$^+$ T cells in CD4$^+$CD8^{lo}T cells was 28.6±3.1%, compared to 8.2±1.8% in CD4$^+$CD8^{neg} T cells ($p<0.01$) Notably, following allogeneic stimulation, IFNg$^+$TNFa$^+$ T cells were significantly higher in CD4$^+$CD8^{lo}T cells (22.7±3.3%) compared to CD4$^+$CD8^{neg}T cells (8.7±0.8%) ($p<0.01$). Additionally, CD4$^+$CD8^{lo}T cells exhibited significantly higher Eomes and T-bet expression (MFI= 95.6±3.7 and 588.7±87, respectively), compared to CD4$^+$CD8^{neg}T cells (MFI= 66.1±3.2, and 232.3±3.5, respectively) ($p<0.05$).

Conclusions: We show for the first time that under steady-state conditions, CD4$^+$CD8^{lo}T cells exhibit a higher memory profile and effector function in comparison to CD4$^+$CD8^{neg}T cells. These findings justify the evaluation of the role of CD4$^+$CD8^{lo}T cells in organ allograft rejection in NHP and their response to therapeutic intervention.

CITATION INFORMATION: Kubo M., Sasaki K., Gutiérrez A., Lu L., Vujevich V., Thomson A., Ezzelarab M. Naïve Rhesus Monkey CD4$^+$CD8^{lo}T Cells Comprise High Percentage of Memory T Cells with Strong Effector Function *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Kubo: None. **K. Sasaki:** None. **A.P. Gutiérrez:** None. **L. Lu:** None. **V. Vujevich:** None. **A.W. Thomson:** None. **M. Ezzelarab:** None.

Basic

Lymphocyte Biology: Signaling, Co-Stimulation, Regulation

Abstract# 556

Effects of IL-18 on Key Post-Translational Modifications of Human Foxp3 and Innate Immunity

T. Akimova[1], L. M. Christensen[1], Z. Wang[2], M. H. Levine[2], W. W. Hancock[1], *[1]CHOP & University of Pennsylvania, Philadelphia, PA, [2]University of Pennsylvania, Philadelphia, PA*

Purpose: Most of our ideas about Treg cells are extrapolated from findings in mice, with actual clinical data typically involving flow cytometric enumeration of CD4+FOXP3+ cells, with the implication that Treg cell numbers correlate with Treg function. However, FOXP3 is subject to many post-translational modifications that critically determine the function of Treg cells, and those modifications have not yet been studied in primary human Treg cells.

Methods: Tregs and plasma were isolated from healthy controls or patients listed for lung, liver or kidney transplantation (Tx). We studied FOXP3 protein by Taqman protein assay. In addition, in studies of lung ischemia/reperfusion injury (IRI), IL-18-treated or control Tregs from normal C57BL/6 mice were adoptively transferred into immunodeficient (Rag1-/-) mice.

Results: Obese (but not non-obese) patients listed for lung, kidney and liver Tx had impaired pre-Tx Treg suppressive function and increased levels of IL-18 compared to healthy individuals. In healthy donor Tregs, ~50% of FOXP3 protein was present as dimers and/or oligomers, ~25% of total FOXP3 was ubiquitinated, and ~80% of total FOXP3 was acetylated. Exposure of Treg cells to IL-18 led to a significant decrease of total FOXP3 protein level (~69% of initial levels) and a 2-fold reduction of FOXP3 dimerization and/or oligomerization; such assembly of FOXP3 into higher-ordered structures is critical for Treg function. We also observed a substantial increase of FOXP3 ubiquitination, but not FOXP3 acetylation, and increased TRAF6-STUB1 complexes, decreased TRAF6-FOXP3 complexes and increased STUB1-FOXP3 complexes in Treg after exposure to IL-18. UbiTest confirmed that in the presence of IL-18, FOXP3 ubiquitination was significantly increased, with increased K48-linked ubiquitination and STUB1 involvement. IL-18 also induced expression of the pro-inflammatory cytokines, IL-1β and IL-6, in Treg cells. In conjunction with increased FOXP3 ubiquitination and disrupted di- and oligomerization of FOXP3, the stability of FOXP3 expression under stimulatory conditions was significantly altered. Lastly, we assessed direct effects of IL-18 on Treg function in vivo using a murine IRI model. We found that adoptively transferred Tregs that had been pretreated with IL-18 were unable to prevent lung IRI, whereas control Tregs significantly suppressed such injury, revealing previously unknown direct effects of Tregs on the innate immune system.

Conclusions: We provide quantitative insights into human FOXP3 biology and how such parameters can be modulated by IL-18. The effects of IL-18 on Tregs have relevance to both the innate and adaptive immune systems, and for the pre-Tx evaluation of patients.

CITATION INFORMATION: Akimova T., Christensen L., Wang Z., Levine M., Hancock W. Effects of IL-18 on Key Post-Translational Modifications of Human Foxp3 and Innate Immunity *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Akimova: None. **L.M. Christensen:** None. **Z. Wang:** None. **M.H. Levine:** None. **W.W. Hancock:** None.

Abstract# 557

The Absence of T Follicular Regulatory Cells Prolongs Germinal Center Reactivity in Transplantation

E. S. Crichton, S. Zeng, I. Badell, *Emory University, Atlanta, GA*

Purpose: Deleterious alloantibodies result from T follicular helper (Tfh) cell-driven germinal center (GC) reactivity. T follicular regulatory (Tfr) cells are a subset of regulatory T cells that have been identified as important regulators of GC responses and antibody formation. However, whether Tfr cells regulate Tfh cells in vivo is unknown and little is understood of their role in transplantation. Thus given the potentially beneficial impact Tfr cells could have in controlling pathologic donor-specific antibody (DSA) responses, it is of great interest to understand their role in transplantation.

Methods: To examine the impact of Tfr cells in transplantation, we first utilized a full MHC mismatch murine skin allograft model to test for and define the kinetics of alloresponsive Tfr cells. We then used a conditional Tfr knockout (KO, $Bcl6^{fl/fl}Foxp3^{Cre}$) mouse to study the function of Tfr cells in response to BALB/c and OVA antigen mismatch skin grafts. Graft-draining lymph node (dLN) Tfh and GC B cell, and DSA responses in the absence of Tfr cells were evaluated in comparison to wild type (WT, $Bcl6^{fl/fl}Foxp3^{wt}$) controls. Tfh:B cell co-cultures, alloantibody subclass and affinity were also examined in the presence or absence of Tfr cells.
Results: Tfr cells were detected following transplantation, but the frequency and number of Tfr cells remained stable over time relative to the dynamic expansion and contraction of their Tfh cell counterparts. Tfr KO mice were confirmed by the absence of $CD4^+CXCR5^+PD1^{hi}Foxp3^+$ T cells. 10 days after primary Balb/c and OVA skin grafts, no significant differences were observed in the frequencies of Balb/c-reactive or OVA-specific Tfh cells (Figure 1) or $H2K^d$-specific or alloreactive GC B cells between WT and KO recipient mice. In Tfh:B cell co-culture studies there were no significant differences in class-switched B cell or IgG formation between WT and KO groups. Interestingly, 35 days following skin transplants, KO mice exhibited a greater frequency of Tfh cells (4.27 vs. 2.05, p=0.016) compared to WT mice in post-transplant dLNs (Figure 2). No differences were observed in the quantity (MFI and OD) or quality (antibody subclasses and affinity) of donor specific antibody formation.
Conclusions: These findings implicate Tfr cells in humoral alloreactivity and suggest an in vivo role for Tfr cells after transplantation in mediating GC reactivity. While their absence doesn't affect peak (d10) GC responses, it did significantly delay the contraction (d35) of GC Tfh cells. As such, Tfr cells may influence GC kinetics and the development of anamnestic alloimmunity that may manifest in secondary humoral responses.

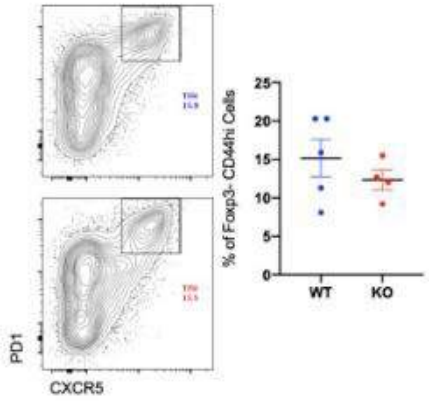

Figure 1

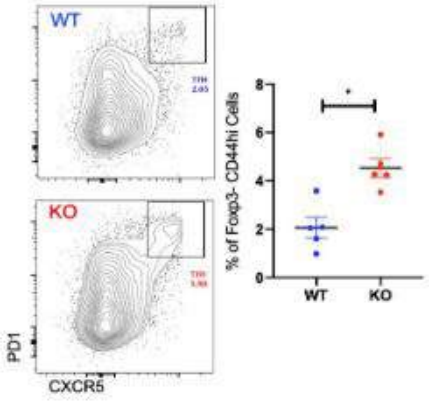

Figure 2

CITATION INFORMATION: Crichton E., Zeng S., Badell I. The Absence of T Follicular Regulatory Cells Prolongs Germinal Center Reactivity in Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: E.S. Crichton: None. **S. Zeng:** None. **I. Badell:** None.

Abstract# 558

Tip60 Inhibitors Enhance Regulatory T Cells (Treg) Induction by Promoting Acetylation of Foxp3

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Purpose: TIP60, a histone/protein acetyltransferase essential for multiple functions in the cell, is involved in Foxp3 acetylation in Treg. Acetylation protects Foxp3 from degradation, and acetylated Foxp3 translocates to the nucleus to activate the immunosuppressive transcriptional program. TIP60 inhibitors have been studied in the context of cancer, but their effect on Treg remains unknown.
Methods: We performed *in vitro* murine and human Treg inductions in the presence or absence of three TIP60 inhibitors (NU9056, MG149, and TH1834) and analyzed Foxp3 expression using flow cytometry, and Foxp3 acetylation using a proximity ligation assay.
Results: *In vitro* Treg induction cultures (murine and human) showed that TIP60 inhibitors augment the percentage of Foxp3+ cells in a dose-dependent manner (**Fig. 1A**). To address the molecular mechanisms we performed mathematical modeling that hypothesized an activating effect of TIP60 inhibitors through an increase of Foxp3 acetylation, which we then validated experimentally in our cultures (**Fig.1B**).
Conclusions: Our data newly indicate that TIP60 inhibitors have immunomodulatory properties with the potential to prolong allograft survival.

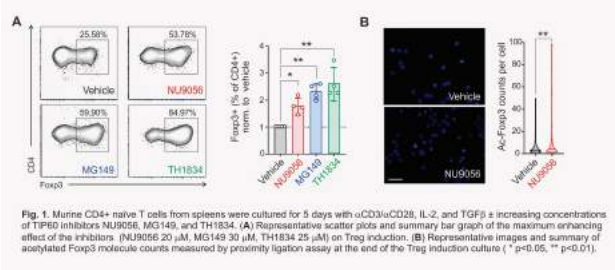


Fig. 1. Murine CD4+ naïve T cells from spleens were cultured for 5 days with αCD3/αCD28, IL-2, and TGFβ ± increasing concentrations of TIP60 inhibitors NU9056, MG149, and TH1834. (**A**) Representative scatter plots and summary bar graph of the maximum enhancing effect of the inhibitors (NU9056 20 μM, MG149 30 μM, TH1834 25 μM) on Treg induction. (**B**) Representative images and summary of acetylated Foxp3 molecule counts measured by proximity ligation assay at the end of the Treg induction culture (* p<0.05, ** p<0.01).

CITATION INFORMATION: Fueyo-Gonzalez F., Vilanova G., Fribourg M. Tip60 Inhibitors Enhance Regulatory T Cells (Treg) Induction by Promoting Acetylation of Foxp3 *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Fueyo-Gonzalez: None. **G. Vilanova:** None. **M. Fribourg:** None.

Abstract# 559

IL-10 Signaling in T Cells Modulates Costimulation-independent Activation and is Essential for Transplant Tolerance Induction

M. Iglesias Lozano[1], D. Bibicheff[1], M. Chicco[2], A. Komin[1], G. Brandacher[1], G. Raimondi[1], *[1]Plastic Surgery, Johns Hopkins University, Baltimore, MD, [2]Frimley Health NHS Foundation Trust, London, United Kingdom*
Purpose: Costimulation blockade (CoB)-based immunotherapy remains a very promising approach for better management of transplant recipients. Understanding the mechanisms that impact the efficacy of CoB is a necessary step toward translation into a clinically successful protocol. Integration of pro- and anti-inflammatory cues by T cells is now recognized to modulate their activation. We aimed at elucidating the role of direct IL-10 signaling in T cells in the outcome of CoB therapy.
Methods: Balb/c skin was transplanted to wt C57BL/6 (B6) or to B6 with T cells expressing a dominant negative IL-10 receptor which make them unresponsive to this cytokine (10R-DN). Recipients received peri-transplant donor specific infusion and three weekly anti-CD154 mAb administrations. Studies on effector T cells were conducted using in vitro activated polyclonal T cells that were then rested for 3 days.
Results: Unmanipulated 10R-DN recipients rejected their transplant with dynamics identical to wt B6. However, differently from wt B6, graft survival in 10R-DN could not be promoted by CoB (MST 105d vs 30d in the latter) revealing an unexpected important direct effect of IL-10 on T cells. This accelerated rejection correlated with increased production of TNF-a, IFN-g and IL-17A by T cells in spleen and draining lymphoid tissues of 10R-DN mice, in comparison to B6 recipients. Surprisingly, in vitro experiments of both TH differentiation and effectors reactivation showed that IL-10 did not significantly altered effector functions (cytokine secretion). Moreover, IL-10 did not alter the expression of important checkpoint receptors. We then tested if IL-10 could impact costimulation-independent T cell activation (recognized to afflict the efficacy of CoB). In vitro experiments clearly showed that IL-10 neutralizes the poorly investigated effect of TLR-mediated costimulation of naïve, effector, and memory T cells. We are now interested in deciphering the mechanisms behind such an important regulation.
Conclusions: Overall, these results reveal a previously unappreciated role of IL-10 signaling in T cells as pre-requisite for the therapeutic efficacy of CoB. Merged with the recognized plasticity of IL-10 signaling, this observation opens a novel

area of investigation that could reveal new "Achille's Heels" in the successful implementation of CoB and suggest complementary interventions for the actuation of robust immunoregulation.

CITATION INFORMATION: Iglesias Lozano M., Bibicheff D., Chicco M., Komin A., Brandacher G., Raimondi G. IL-10 Signaling in T Cells Modulates Costimulation-independent Activation and is Essential for Transplant Tolerance Induction *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Iglesias Lozano: None. **D. Bibicheff:** None. **M. Chicco:** None. **A. Komin:** None. **G. Brandacher:** None. **G. Raimondi:** None.

Abstract# 560

Evaluation of the Differentiation Program of Endogenous Antigen-specific CD8$^+$T Cells Following Transplantation

S. M. Krummey[1], K. Tong[2], M. L. Ford[2], *[1]Pathology, Johns Hopkins University, Baltimore, MD, [2]Surgery, Emory Transplant Center, Atlanta, GA*

Purpose: Despite advances in the survival of transplanted organs, acute T cell mediated rejection remains a significant clinical problem with few effective or targeted treatments. The differentiation of naïve CD8$^+$ T cells into effector populations is governed by cues that occur during antigen priming. Therefore, understanding the characteristics of CD8$^+$ T cell differentiation in response to allogeneic antigen has the potential to uncover strategies that could selectively restrain donor-reactive T cell responses.

Methods: In order to gain a detailed understanding of the differentiation of endogenous CD8$^+$ T cells in response to allografts, we evaluated the C57BL/6 H-2(b) CD8$^+$ T cell response to an allogeneic H-2L(d)-restricted epitope (termed "QL9") using an MHC class I tetramer. Using a magnetic enrichment method, we established that the QL9/L(d) tetramer specifically stained naïve CD8+ T cells in a peptide-dependent manner.

Results: Following skin grafting with H-2L(d)-expressing Balb/c skin grafts, the absolute number of QL9/L(d)-specific CD44^{hi} CD8$^+$ T cells expanded approximately 10-fold relative to naïve mice, and nearly all of the CD44^{hi}QL9/L(d)-specific cells were Ki67$^+$ at day 10 in the draining lymph node and spleen. In infection models, the expression of KLRG-1 and CD127 (IL-7Rα) on effector CD8$^+$ T cell populations correlates with divergent cellular fates as either short-lived effectors (KLRG-1^{hi}CD127^{lo}) or memory T cells (KLRG-1^{lo}CD127^{hi}). We next evaluated the phenotype of QL9/L(d)-specific effector cells during the first two weeks post-graft. The expression of CD127 declined acutely at day 7 post-graft and was re-expressed by day 14, similar to the kinetics of expression on post-infection viral-specific CD8$^+$ T cells. However, in contrast to the high frequency of KLRG-1^{hi} short-lived effector cells that emerge post-infection, following skin grafting a very low frequency of QL9/L(d)-specific cells were KLRG-1^{hi} (avg. 4.4% and 8.5% in draining lymph nodes and spleen, respectively).

Conclusions: These results suggest that a significant portion of allogeneic short-lived effector CD8+ T cells have a KLRG-1lo phenotype that is distinct from the established population definitions. Future studies will investigate the subpopulations of KLRG-1lo QL9/L(d)-specific effector CD8+ T cells that have potent effector function, with the goal of identifying novel cellular pathways that might serve as effective therapeutic targets.

CITATION INFORMATION: Krummey S., Tong K., Ford M. Evaluation of the Differentiation Program of Endogenous Antigen-specific CD8$^+$T Cells Following Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.M. Krummey: None. **K. Tong:** None. **M.L. Ford:** None.

Abstract# 561

CD40/40L Pathway is Critical in Controlling CMV Transmission Following Kidney Transplantation in Immunocompromised Mice

X. Lai[1], L. Qiu[2], J. Wang[1], L. VanOsdol[1], S. Yan[3], M. Kandpal[4], M. Abecassis[5], Z. Zhang[1], *[1]Comprehensive Transplant Center, Microsurgery core, Northwestern University, Chicago, IL, [2]University of California,, San Francisco, CA, [3]Northwestern University, Chicago, IL, [4]Comprehensive Transplant Center, Northwestern University, Chicago, IL, [5]University of Arizona, Tucson, AZ*

Purpose: We have previously shown that transplant of kidneys from donor mice latently infected with murine cytomegalovirus (CMV) into naïve recipients treated with clinically relevant immunosuppression results in CMV reactivation and systemic dissemination. Our study is to determine the cellular and molecular mechanisms underlying CMV dissemination following kidney transplantation in immunocompromised recipients by blocking inflammatory mediators associated with transplant injury.

Methods: Kidneys from BALB/c mice latently infected with Smith murine CMV were transplanted to binephrectomized naïve immunodeficient NSG mice deficient of T cells, B cells and NK cell function. Recipients were treated with various extracellular mediator blockers, including anti-IL-1β, anti-IL-6 receptor, anti-IL-18 receptor, anti-CD40L, anti-TNFα, or a cocktail mixed with the above antibodies. At endpoints, kidney grafts, spleens, salivary glands and lungs were collected for CMV immediate early (IE) gene copy analysis and/or flow cytometry analysis.

Results: We observed that treatment with the cocktail antibodies resulted in a dramatic increase in viral DNA copies in the kidney grafts as measured on post-transplant day (POD) 28 and POD42, compared with the transplants treated with isotype controls. To determine the role of each individual inflammatory mediator in controlling post-transplant reactivation, the recipients were treated with a single monoclonal antibody against CD40L, IL-6, TNFα, IL-1β or IL-18. Interestingly, recipients received anti-CD40L treatment accelerated CMV reactivation and dissemination as a significant increase in DNA replication was observed in the kidney grafts as early as POD14, compared with recipients untreated or treated with the other antibodies. The increased DNA copies were also observed in distal organs such as salivary glands and lungs, indicating that blockade of CD40/CD40L signaling promoted CMV reactivation and dissemination at early stage after transplantation. Flow cytometry analysis exhibited that anti-CD40L treatment dramatically increased myeloid cells infiltration in kidney grafts, including both Ly6C$^+$CX3CR1$^+$ inflammatory macrophages and Ly6C$^-$CX3CR1$^+$ patrolling monocytes which are key vehicles of murine CMV dissemination, suggesting that blocking CD40/CD40L signaling enhanced influx of monocyte and macrophages, leading to accelerated CMV transition.

Conclusions: We conclude that CD40/40L signaling plays a pivotal role in controlling CMV transmission following kidney transplantation in immunocompromised recipients.

CITATION INFORMATION: Lai X., Qiu L., Wang J., VanOsdol L., Yan S., Kandpal M., Abecassis M., Zhang Z. CD40/40L Pathway is Critical in Controlling CMV Transmission Following Kidney Transplantation in Immunocompromised Mice *AJT, Volume 21 Supplement 3*

DISCLOSURES: X. Lai: None. **L. Qiu:** None. **J. Wang:** None. **L. VanOsdol:** None. **S. Yan:** None. **M. Kandpal:** None. **M. Abecassis:** None. **Z. Zhang:** None.

Abstract# 562

Laminins Differentially Regulate Tolerogenic T Cell Migration and Homing to Lymph Nodes

L. Li[1], M. Shirkey[1], W. Piao[1], Y. Xiong[1], V. Saxena[2], T. Zhang[1], J. Iyyathurai[2], R. Lakhan[1], R. Abdi[3], J. Bromberg[1], *[1]Surgery, UMB, Baltimore, MD, [2]CVID, UMB, Baltimore, MD, [3]Harvard University, Boston, MA*

Purpose: Laminin α5 (Lama5) and α4 (Lama4), which are produced by lymph node (LN) stromal cells, influence CD4 T cell migration and stimulation. We hypothesized that laminins may regulate entry of T cells to LNs, thereby determining intranodal distribution and channeling alloimmunity under tolerant and immune conditions.

Methods: The effects of Lama4 and Lama5 on mouse and human T cells were evaluated in static and shear flow transendothelial migration (TEM). Lama5 conditional knock out (KO) and Lama4 conditional KO mice, in which expression of these fibers was specifically deleted in fibroblastic reticular stromal cells, and littermate controls (WT) were adoptively transferred with CD4 T cells and regulatory T cells (Treg) to analyze their trafficking. WT and Lama5 KO recipients were treated with BALB/c donor-specific splenocytes (DST) and anti-CD40L mAb along with adoptive transfer of T cell receptor transgenic TEa CD4 T cells recognizing donor alloantigen.

Results: Lama4 promoted but Lama5 inhibited TEM of various T cell subsets, including murine CD4 and CD8 naïve, memory and effector cells, Treg, and human activated CD4 T cells and Treg, in both static and shear stress flow conditions. Lama5 receptors on T cells were shown to be α6 integrin and α-dystroglycan (αDG) and blocking either with specific mAbs attenuated Lama5 inhibitory effects. Transferred CD4 T cells and Treg had enhanced entrance to Lama5 KO LNs and reduced entrance to Lama4 KO LNs. Transferred cells localized to the T cell zone, particularly the cortical ridge (CR) and around high endothelial venules (HEV), where Treg are induced. Blocking Lama5 receptors also promoted CD4 and Treg entry into the CR. Under both immune and tolerance conditions, more alloantigen specific T cells trafficked through Lama5 KO HEV and CR, demonstrating the inhibitory role of Lama5 for migration and Treg induction. After transplantation, depleting stromal Lama5 promoted TEa cell differentiation toward Foxp3+ Treg and suppressed the differentiation toward IL-17+ Th17 cells.

Conclusions: Lama4 promoted human and murine T cell migration in homeostasis, immunity, and tolerant conditions. Lama5, through binding of the T cell adhesion receptors α6 integrin and αDG, inhibited T cell migration. Depleting stromal Lama5 promoted, while depleting Lama4 suppressed, CD4 T cell and Treg entrance into the LN, indicating laminins are efficient targets to modulate T cell trafficking and immunity to alter immune responses.

CITATION INFORMATION: Li L., Shirkey M., Piao W., Xiong Y., Saxena V., Zhang T., Iyyathurai J., Lakhan R., Abdi R., Bromberg J. Laminins Differentially Regulate Tolerogenic T Cell Migration and Homing to Lymph Nodes *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Li: None. M. Shirkey: None. **W. Piao:** None. **Y. Xiong:** None. **V. Saxena:** None. **T. Zhang:** None. **J. Iyyathurai:** None. **R. Lakhan:** None. **R. Abdi:** None. **J. Bromberg:** None.

Abstract# 563

P2X7 Receptor Activity Mediates Th17-Specific Self- and Alloreactivity in Non-Human Primates

C. Little, J. Sullivan, W. Burlingham, D. Kaufman, *Department of Surgery, University of Wisconsin, Madison, WI*

Purpose: The broadly expressed ATP-binding purinergic receptor, P2X7 (P2X7R) is involved in the Th17 mediated cellular immune response to allo- and select self-antigens (Collagen type V [ColV], vimentin, kα1-tubulin). Inhibition of the P2X7R abates these responses without loss of Th1 mediated reactivity to bacterial/viral challenge. Normal regulation of these Th17 mediated responses is controlled by Tregs positive for CD39, an enzyme required for hydrolysis of extracellular ATP. Together these results identify the P2X7R as a promising target for selective inhibition of allogenic responses while preserving Th1 function. Importantly, naturally occurring functional polymorphisms conferring high and low pore activity exist in humans, which must be considered in therapeutic implementation of P2X7R inhibition. Based on these findings in humans, we sought to evaluate the role of the P2X7R in allo- and self-antigen responses in rhesus macaques (RMs) and to characterize the baseline functional polymorphisms within this species.

Methods: Flow cytometric analyses of YO-PRO-1 dye uptake and IL-17 production were utilized to determine pore activity and Th17 polarization, respectively. Trans-vivo delayed type hypersensitivity assays (tv-DTH) to evaluate immunologic response were performed using PBMC from RMs.

Results: Treg suppression via TGF-β neutralization or CD39 ATPase inhibition uncovered marked inflammatory responses to Col V, kα1-tubulin, and vimentin. Treg depletion, in lieu of molecular neutralization, similarly unmasked reactivity to these antigens. Importantly, the uncovered inflammatory responses were fully abrogated when performed in the presence of the P2X7R inhibitor, AZD9056. Compared to the baseline P2X7R functional polymorphisms observed in humans, RMs demonstrated similar population-level frequencies of high and low P2X7R pore activity. Furthermore, we found that high pore activity was associated with increased Th17 polarization, via enhanced IL-17 production by CD4+ T-cells.

Conclusions: As observed in humans, RM P2X7R activity is involved in uncovered, Th17 specific cellular immune responses. Importantly, by revealing functional polymorphisms consistent with human variations, we validated their rigor as a preclinical model for P2X7R-targeted therapies. Based on these findings, we hypothesize that low pore activity is associated with a tolerogenic state and that P2X7R inhibition could enhance tolerance induction protocols. Studies are ongoing within our renal transplant tolerance model evaluating P2X7R activity and T-cell polarization.

CITATION INFORMATION: Little C., Sullivan J., Burlingham W., Kaufman D. P2X7 Receptor Activity Mediates Th17-Specific Self- and Alloreactivity in Non-Human Primates *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Little: None. **J. Sullivan:** None. **W. Burlingham:** None. **D. Kaufman:** None.

Abstract# 564

Single Cell RNAq-seq Analysis of Paired Peripheral and Intragraft T Cells Reveals Biopsy Specific Fc Receptor Gene Expression in Rejection Only

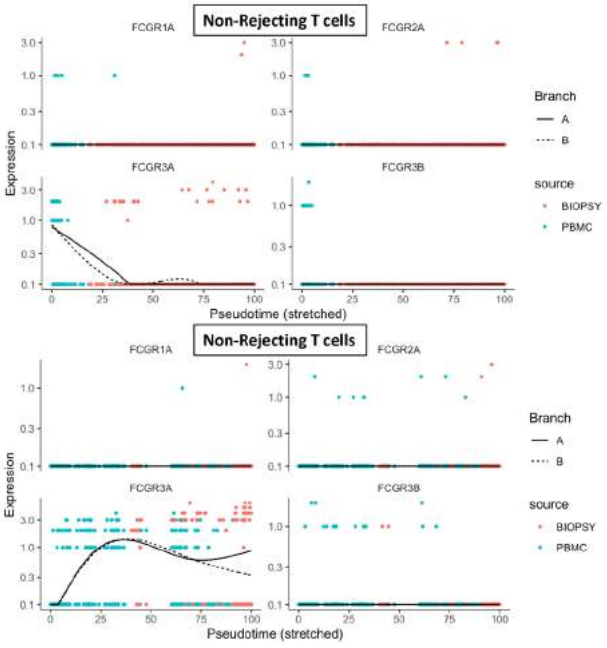
A. Malone, A. Leckie-Harre, I. Silverman, A. Chadha, H. Wu, B. Humphreys, *Washington University School of Medicine, St Louis, MO*

Purpose: Antibody mediated rejection (AMR) remains one of the major causes of allograft failure and our understanding of this disease process is poor. Transcriptomics studies have suggested antibody binding to Fc receptors plays a role in allograft injury by triggering T cell and NK cell activation in AMR. We performed single cell RNAseq on paired peripheral blood and biopsies from patients with AMR and non-rejection focusing on T cells and Fc receptor expression.

Methods: The 10X Genomics platform was used to make libraries which were sequenced to a depth of ~50k reads/cell. Gene-cell matrices were obtained from CellRanger and the downstream analysis (clustering, integration analysis, expression analyses) were done using R, Seurat and Monocle2. This study had IRB approval.

Results: 16086 immune cells in total (avg = 1124 genes/cell) from 5 kidney transplant patients (biopsy and pbmc's) were included in the final integrated analysis using UMAP. All major kidney cell types were identified including macrophages, B cells and T cells. T cells from rejecting samples (2442 T cells) and non-rejecting samples (2971 T cells) were subset for further analysis. A pseudotime analysis using Monocle2 was performed on these T cell subsets. We examined the expression of the Fc receptor genes, *FCGR3B, FCGR2A, FCGR3A, FCGR1A, FCGR2C*. We found that only *FCGR3A* (CD16a) varied with pseudotime and that expression increased from peripheral T cells to intragraft T cells in AMR patients only.

Conclusions: Our study find that *FCGR3A* expression is increased in T cells in AMR and is specific for the local environment of the allograft. These data confirm intragraft T cells as the source *FCGR3A* expression previously suggested in microarray based studies.



CITATION INFORMATION: Malone A., Leckie-Harre A., Silverman I., Chadha A., Wu H., Humphreys B. Single Cell RNAq-seq Analysis of Paired Peripheral and Intragraft T Cells Reveals Biopsy Specific Fc Receptor Gene Expression in Rejection Only *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Malone: Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Advisory Board. **A. Leckie-Harre:** None. **I. Silverman:** None. **A. Chadha:** None. **H. Wu:** None. **B. Humphreys:** None.

Abstract# 565

Establishing a Linear Program for the Development of Costimulation Resistant T-Cells

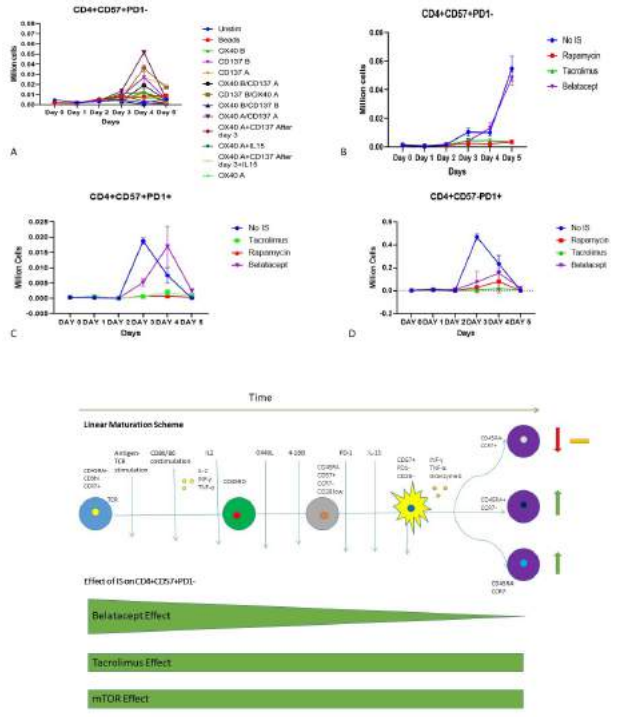
D. P. Moris, A. Lucander, A. Kirk, *Surgery, Duke, Durham, NC*

Purpose: CD4+CD57+PD1-T-cells are primed effectors capable of mediating belatacept-resistant rejection, however, the developmental program giving rise to these cells has not been elucidated in detail. We hypothesized that upon stimulation, naïve T-cells begin down an anticipatable path that progressively reduces their need for CD28-B7 costimulation and endows them with a phenotype of belatacept resistance.

Methods: Peripheral blood mononuclear cells were cultured in vitro from healthy volunteers. Cultures were stimulated with Human 4-1BB/TNFRSF9/CD137 Antibody(10 ug/ml) and Human OX40 Ligand/TNFSF4 Protein, Fc Tag(10 ug/ml). Cells were also cultured in the presence or absence of interleukin 15(IL-15) and stimulated or non-stimulated with 4-1BB and OX40 costimulation. Immunosuppression such as tacrolimus(10ng/ml), rapamycin(10ng/ml) and belatacept(125ug/ml) was added on day 0 of the culture.

Results: Cultures were exogenously stimulated with OX40 and CD137 before(B) or after(A) day 2. Exogenous IL-15 was administered after day 3. Conditions such as CD137B/OX40A and OX40A+CD137 after day 3+IL-15 were equally effective and generated the highest count of CD4+CD57+PD1- T-cells by day 5 ($p<0.05$ to all comparisons, Fig 1a). Stimulated cells with OX40A+CD137 After day 3+IL-15 demonstrated a rapid increase of CD4+CD57+PD1- cells after day 3 under belatacept, trend that was similar to the one found in the no immunosuppression group. Under tacrolimus and rapamycin treatment, the absolute counts of CD4+CD57+PD1 cells remained remarkable low (Fig. 1b). Similarly, CD4+CD57+PD1+ cells were also resistant to belatacept treatment but sensitive to tacrolimus and rapamycin effects(Fig. 1c). However, CD4+CD57- cells were sensitive to belatacept effect showing similar kinetics to those under tacrolimus and rapamycin(Fig. 1d).

Conclusions: In this study it was shown that following TCR stimulation and appropriate costimulation, OX40 and CD137 play integral roles in the development of CD57+ cytotoxic CD4 T-cells. This maturation scheme is linear and anticipatable, and the movement from costimulation dependence to independence involves specific, time-dependent signals, which lead to tractable changes in surface molecule expression that may have prognostic and therapeutic value.



CITATION INFORMATION: Moris D., Lucander A., Kirk A. Establishing a Linear Program for the Development of Costimulation Resistant T-Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.P. Moris: None. **A. Lucander:** None. **A. Kirk:** None.

Abstract# 566

K562 Cells Expressing HLA-A2 Stimulate Alloreactive CD8+ T Cells

A. B. Morris, E. Peek, A. Hadley, C. P. Larsen, *Emory Transplant Center, Emory University, Atlanta, GA*

Purpose: T cell-mediated rejection is a significant factor that leads to graft damage and loss in transplant recipients. Due to the complexity of the TCR:pMHC interaction, prediction of alloreactive T cells is difficult, and there are no widely available methods to measure alloreactive T cell responses at the allele level in a given recipient.

Methods: To understand the phenotype and function of alloreactive T cells, we developed an *in vitro* system to detect HLA-A2-alloreactive CD8+ T cells using K562 cells that express the HLA Class I molecule HLA-A2:01 and the costimulatory molecule CD86.

Results: Using these K562-A2$^+$ cells, we find that HLA-A2-negative individuals harbor a mean precursor frequency of 1.53% (n=5) of alloreactive T cells against HLA-A2-expressing K562 cells. Furthermore, these alloreactive HLA-A2-specific CD8$^+$ T cells exhibited a ~30-fold expansion in culture, indicating robust divisional capacity. Monoclonal antibody treatment blocking anti-HLA-A2 (clone BB7.2) completely abrogated proliferation of CD8$^+$ T cells by these K562-A2$^+$ stimulator cells as detected by Cell Trace Violet (CTV) dilution (25% CTV^{lo} vs 2%), confirming HLA-A2 allospecificity. In addition to their specificity to HLA-A2, T cell proliferation depended on costimulatory molecule CD86, as therapeutic blockade with anti-CD86 completely abrogated proliferation in HLA-A2 negative individuals (1% CTV^{lo}). Phenotypically, we find that the majority of HLA-A2 allospecific cells detected by proliferation are CD45RA$^-$CCR7$^-$ (Tem) or CD45RA$^-$CCR7$^+$ (Tcm), and >90% express the IL-2Ra as detected by CD25. As these phenotypes are likely due to their activation and not reflective of their initial state, further sorting experiments will determine from which subset allospecific cells reside.

Conclusions: Based on these data, we hypothesize that use of this *in vitro* system will allow for the detection and expansion of alloreactive T cells in transplant recipients. Further work elucidating the peptides presented by these K562-A2$^+$ cells will contribute to novel tools that will aide our understanding of the presence, phenotype, and function of alloreactive T cells in transplant recipients.

CITATION INFORMATION: Morris A., Peek E., Hadley A., Larsen C. K562 Cells Expressing HLA-A2 Stimulate Alloreactive CD8+ T Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.B. Morris: None. **E. Peek:** None. **A. Hadley:** None. **C.P. Larsen:** None.

Abstract# 567

CD80/PD-L1 Uniquely Regulates CD4 Effector T Cell Migration

W. Piao[1], L. Li[1], Y. Zhang[2], K. Hippen[2], M. WillsonShirkey[1], B. Blazar[2], L. Riella[3], J. Bromberg[1], *[1]U Maryland, baltimore, MD, [2]U Minnesota, Minneapolis, MN, [3]Harvard U, boston, MA*

Purpose: CD80 is a costimulatory molecule expressed on antigen presenting cells (APCs) that binds CD28 and CTLA4, stimulating or inhibiting immunity, respectively. CD80 also binds Programmed Death-1 Ligand (PD-L1) to transduce coinhibitory signals for T cell activation. Blockade of PD-L1-CD80 with anti-PD-L1 exacerbates allograft rejection, while anti-CD80 mAb has inhibitory and stimulatory effects, suggesting additional mechanisms for regulation of immunity by this interaction. Notably, CD80 is highly expressed on activated effector CD4 T cells (Teffs), and PD-L1 is highly expressed by lymphatic endothelial cells (LEC). We tested whether Teffs-LEC CD80/PD-L1 signaling regulates Teffs function, including lymphatic transendothelial migration (TEM).

Methods: Human and mouse activated effector CD4 T cells were migrated across human or mouse LEC. Anti-CD80 and anti-PD-L1 mAbs or recombinant CD80-Fc and PD-L1-Fc were used to block or stimulate CD80 or PD-L1 on T cells and LEC. Their effects were assessed for cell signaling and in vitro and in vivo migration.

Results: Teffs expressed high levels of CD80. Blockade of CD80 on human or mouse Teffs with anti-CD80 mAb (1G10), which interrupts CD80 binding to PD-L1, inhibited human or mouse Teffs TEM in vitro and in vivo. PD-L1-Fc engagement of Teffs CD80 promoted Teffs TEM. Engagement of CD80 on Teffs with immobilized PD-L1Fc suppressed the constitutive phosphorylation of ERK without a specific effect on NFκB or Akt phosphorylation. Blocking LEC with anti-mouse PD-L1 mAb (10F.2H11) which blocks only the CD80-PD-L1 interaction, inhibited Teffs but not regulatory T cell (Treg) TEM. Crosslinking LEC PD-L1 with CD80-Fc induced strong phosphorylation of ERK, modest classical NFκB activation, but did not signal to Akt. CD80 engagement of LEC PD-L1 also enhanced VCAM-1 expression, which is important for TEM, and this increased expression was inhibited by blocking both classical NFκB and ERK signaling. Notably, LEC VE-cadherin expression, which is also important for TEM, was not affected by PD-L1 ligation by CD80-Fc.

Conclusions: Teff but not Treg uniquely use the CD80/PD-L1 to regulate TEM. Teff CD80 signals through classical NFκB and ERK pathways to enhance LEC expression of the VCAM-1 adhesion molecule. These data demonstrate a novel role for Teffs CD80 and LEC PD-L1 in regulation of lymphatic migration and provide new pathways for regulating immunity and understanding checkpoint molecules and blockade.

CITATION INFORMATION: Piao W., Li L., Zhang Y., Hippen K., WillsonShirkey M., Blazar B., Riella L., Bromberg J. CD80/PD-L1 Uniquely Regulates CD4 Effector T Cell Migration *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Piao: None. L. Li: None. **Y. Zhang:** None. **K. Hippen:** None. **M. WillsonShirkey:** None. **B. Blazar:** None. **L. Riella:** None. **J. Bromberg:** None.

Abstract# 568

CRISPR Screens to Map CTLA-4 Regulatory Networks in Primary Human T Cells

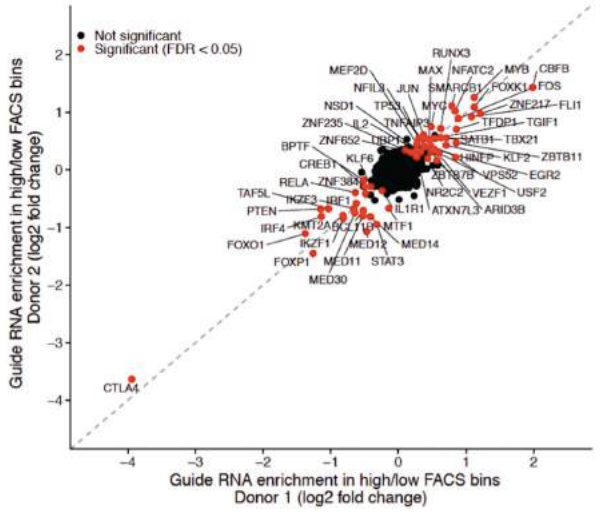
O. Shaked[1], J. Freimer[1], J. Pritchard[2], A. Marson[1], *[1]UCSF, San Francisco, CA, [2]Stanford University, Stanford, CA*

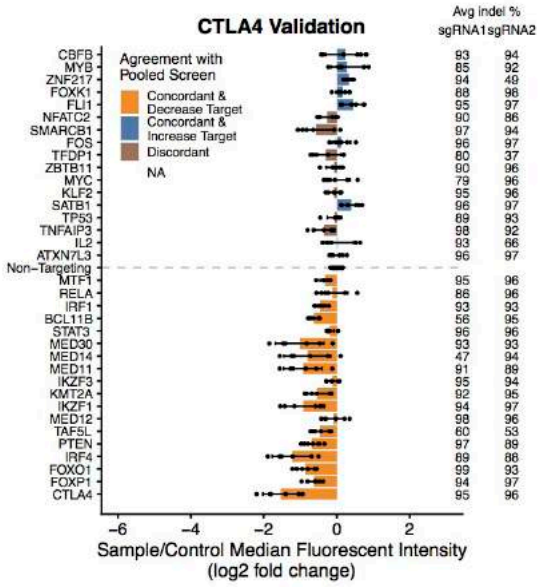
Purpose: For most cell types, the pathways that regulate the levels of critical disease-relevant genes are not known. Recent advances in gene editing have enabled us to perform large-scale perturbation experiments in primary human T cells, allowing for identification of key regulators of disease relevant genes which may have applicability in modulating the transplant immune response.

Methods: Using a CRISPR loss-of-function screen, we identified transcription factors that regulate levels of CTLA-4, a checkpoint inhibitor found on regulatory T cells as well as activate conventional T cells that is the target of Belatacept. We created a library of 6000 guide-RNAs which target 1349 genes (generally 4 guides per gene), and 600 control guides. Results were validated using ribonucleoprotein knockouts of individual genes of interest.

Results: Fifty-nine genes significantly regulate the levels of CTLA-4 (FDR < 0.05, Figure 1), 23 of which decrease levels of CTLA-4, while 36 increase CTLA-4. The majority of these hits were validated using an independent arrayed validation strategy (Figure 2).

Conclusions: CRISPR screens can be used to map regulatory networks that control protein levels of critical factors that mediate the immune response in primary human T cells. We identified both canonical and novel regulators of CTLA-4. These data may help elucidate variances in regulation that could explain phenotypic differences seen in the clinical setting among well-matched recipients who experience heterogeneous outcomes. As gene editing moves into clinical practice, understanding key regulators of the immune system will be critical in selecting appropriate targets for therapeutic intervention.





CITATION INFORMATION: Shaked O., Freimer J., Pritchard J., Marson A. CRISPR Screens to Map CTLA-4 Regulatory Networks in Primary Human T Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: O. Shaked: None. **J. Freimer:** None. **J. Pritchard:** None. **A. Marson:** Consulting Fee; Name of Commercial Interest; Juno Therapeutics, PACT Pharma, Trizell. Consulting Fee; Nature of Relationship; Advisor, Member, Scientific Advisory Board, Advisor. Ownership Interest; Name of Commercial Interest; Spotlight Therapeutics, Arsenal Biosciences, PACT Pharma. Ownership Interest; Nature of Relationship; Cofounder, Member of the Board, Cofounder, Member of the Board, Stock owner.

Abstract# 569

Anti-CD272 Antibody (6B2) Generated Foxp3$^+$Regulatory T Cells and Suppressed Donor Specific Antibody in Murine Cardiac Transplant Model

Y. Yamamoto[1], M. Uchiyama[2], K. Uchida[3], H. Yagita[3], M. Niimi[1], *[1]Department of Surgery, Teikyo University, Tokyo, Japan, [2]Department of Cardiovascular Surgery, Teikyo University, Tokyo, Japan, [3]Juntendo University, Tokyo, Japan*

Purpose: The co-inhibitory receptor B and T lymphocyte attenuator (BTLA; CD272) has been implicated in the regulation of autoimmune and may potentially play an important role in alloimmune responses. We investigated the effects of agonistic anti-BTLA monoclonal antibody (6B2) on alloimmune responses in a murine model of cardiac allograft transplantation.

Methods: CBA mice ($H2^k$) underwent transplantation of C57BL/6 ($H2^b$) hearts and received four doses of 6B2 on day 0, 3, 6 and 9. Adoptive transfer study, flow cytometry study, and immunohistochemical (IHC) study were performed .

Results: Untreated CBA recipients rejected C57BL/6 cardiac grafts acutely (median survival time [MST], 7 days). CBA recipients exposed with four doses of 6B2 significantly prolonged allograft survival (MST, >100 days). Secondary CBA recipients given whole splenocytes from primary 6B2-exposed CBA recipients with beating B6 cardiac allografts 30 days after transplantation had prolonged B6 allograft survival (MST, >100 days). Histological studies showed that cardiac allografts from 6B2-exposed recipients had sparse cell infiltration and only slight myocardial damage and IHC showed more CD4$^+$Foxp3$^+$ cells in myocardiumon on day 30 after transplantation. Additionally, flow cytometry studies show an increased CD4$^+$CD25$^+$Foxp3$^+$ cell population in splenocytes from 6B2-exposed recipients and suppressed donor specific antibody (DSA) on day 30 and 100 after transplantation.

Conclusions: 6B2 could induce the prolongation of fully MHC-mismatched cardiac allograft through an increase of CD4$^+$CD25$^+$Foxp3$^+$ regulatory T cells and consequently the suppression of DSA.

CITATION INFORMATION: Yamamoto Y., Uchiyama M., Uchida K., Yagita H., Niimi M. Anti-CD272 Antibody (6B2) Generated Foxp3$^+$Regulatory T Cells and Suppressed Donor Specific Antibody in Murine Cardiac Transplant Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Yamamoto: None. **M. Uchiyama:** None. **K. Uchida:** None. **H. Yagita:** None. **M. Niimi:** None.

Abstract# 570

Alloreactive Memory T Follicular Helper Cells Rapidly Differentiate Into Effectors Independent of B Cell Memory Following Retransplantation

S. Zeng, E. S. Crichton, I. R. Badell, *Department of Surgery, Emory, Atlanta, GA*

Purpose: Donor-directed HLA antibodies are an important cause of renal allograft injury, but effective therapeutic options to prevent or eliminate donor-specific antibodies (DSA) do not exist. Current therapies primarily target B lineage cells or center around alloantibody removal without focus on T follicular helper (Tfh) cells, the lineage of CD4+ T cells required for the provision of B cell help to generate mature antibody responses. Tfh cells drive de novo antibody formation and can differentiate into memory, but little is known about the role of memory Tfh (mTfh) cells in mediating humoral recall responses in transplantation. Thus, determining whether mTfh cells can accelerate humoral alloresponses and the factors influencing this process will guide strategies to combat HLA antibodies.

Methods: To examine the mTfh cell alloresponse we utilized a full MHC mismatch BALB/c to B6 murine skin allograft model. Naïve B6 recipients were grafted BALB/c skin, allowed to reject, and then re-grafted BALB/c skin 4-6 weeks after rejection of the primary graft. Graft-draining lymph node (DLN) and serum analyses were performed to measure cellular and humoral recall responses. To determine whether memory responses were mTfh cell-mediated and examine the role of endogenous B cell memory, sorted Balb/c-sensitized congenically-marked Tfh cells were adoptively transferred into naïve B6 mice that were then grafted BALB/c skin and their DLNs examined post-transplant. Tfh cells were also transferred into T cell deficient mice (Tcra KO) to isolate memory from the endogenous primary response.

Results: DLN analyses of Balb/c sensitized mice following skin graft re-challenge revealed accelerated Tfh cell, germinal center (GC) B cell and DSA responses compared to the primary response in skin-grafted naïve controls. These rapid memory responses were alloreactive in that they occurred upon rechallenge with Balb/c but not syngeneic B6 skin grafts. Memory Tfh cells adoptively transferred into naïve B6 mice without B cell memory exhibited rapid differentiation into effector Tfh cells compared to naïve CD4+ T cell controls 5 days after Balb/c skin-grafting. Transfer of mTfh cells into Tcra KO mice incapable of a primary T cell response and devoid of B cell memory also resulted in accelerated effector Tfh cell differentiation.

Conclusions: In sum, mTfh cells independent of B cell memory and primary T cell responses exhibit accelerated effector Tfh cell differentiation following repeat alloantigen exposure via transplantation. These findings support further elucidating the role of mTfh cells in recall humoral alloresponses, as their anamnestic qualities could have important diagnostic and therapeutic clinical implications.

CITATION INFORMATION: Zeng S., Crichton E., Badell I. Alloreactive Memory T Follicular Helper Cells Rapidly Differentiate Into Effectors Independent of B Cell Memory Following Retransplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Zeng: None. **E.S. Crichton:** None. **I.R. Badell:** None.

Abstract# 571

Distinct Phenotype and Function of Antibody-suppressor Cxcr5$^+$Cd8$^+$ T Cells

J. Zimmerer, J. Han, M. Hart, S. Chaudhari, C. Peterson, G. Bumgardner, *OSU, Columbus, OH*

Purpose: We have reported that the novel subset of antibody-suppressor CD8$^+$ T cells (termed CD8$^+$ $T_{Ab\text{-}supp}$ cells) require the expression of CXCR5. In addition, alloprimed CXCR5$^+$CD8$^+$ $T_{Ab\text{-}supp}$ cells inhibit production of alloantibody (but do not reject allografts) while CXCR3$^+$CD8$^+$ T cells reject allogeneic transplants (but

do not inhibit antibody). Recent report demonstrates that there are many subsets of $CXCR5^+CD8^+$ T cells with different effector function including anti-viral, anti-tumor, anti-autoimmune, or antibody enhancers. By investigating $CD8^+$ $T_{Ab\text{-}supp}$ cell protein and transcript expression, we aim to determine a profile that might distinguish this novel $CD8^+$ $T_{Ab\text{-}supp}$ cell subset.

Methods: C57BL/6 (wild-type; WT; H-2^b) were transplanted with FVB/N (H-2^q) hepatocytes. On day 7 (peak activation of $CD8^+$ $T_{Ab\text{-}supp}$ cells), splenic $CXCR5^+CD8^+$ T cells were evaluated by RNA-seq and flow cytometry. Alloprimed $CXCR5^+CD8^+$ T cells were compared to naïve $CD8^+$ T cells as well as alloprimed $CXCR3^+CD8^+$ T cells. Fluorescence minus one controls were used to determine background staining (flow cytometry).

Results: RNA-seq analysis show that 1670 transcripts were upregulated or downregulated when comparing between flow sorted alloprimed ($CD62L^-CD44^+$) $CXCR5^+CD8^+$ T cells and naïve ($CD62L^+CD44^-$) $CD8^+$ T cells. Transcripts of note include Bcl-6 (3.3-fold upregulated), CXCR3 (8.4-fold downregulated), and S1pr3 (140-fold upregulated). The latter suggests an important role for S1PR3 on $CXCR5^+CD8^+$ $T_{Ab\text{-}supp}$ cell trafficking into the circulation, perhaps from the germinal center. Flow cytometry analysis suggests that $CD8^+$ $T_{Ab\text{-}supp}$ cells are short-lived effectors cells based on the expression of CD44, KLRG1, and CD122 (not CD62L or CD127). An expansive flow analysis panel (not shown, and review of the literature) comparing differences in transcript and protein expression between alloprimed, antibody-suppressor $CXCR5^+CD8^+$ $T_{Ab\text{-}supp}$ cells and other reported $CXCR5^+CD8^+$ T cell subsets indicates that the absence of PD-1, IL-10 and FoxP3 expression distinguishes $CD8^+$ $T_{Ab\text{-}supp}$ cells from all reported $CXCR5^+CD8^+$ T cell subsets (including $CD8^+$ T_{reg} and $CD8^+$ T follicular regulatory cells).

Conclusions: The phenotype of novel $CXCR5^+CD8^+$ $T_{Ab\text{-}supp}$ cells suggests cytotoxic $CD8^+$ T cells with short-lived effector function.

CITATION INFORMATION: Zimmerer J., Han J., Hart M., Chaudhari S., Peterson C., Bumgardner G. Distinct Phenotype and Function of Antibody-suppressor $Cxcr5^+Cd8^+$ T Cells *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Zimmerer: None. **J. Han:** None. **M. Hart:** None. **S. Chaudhari:** None. **C. Peterson:** None. **G. Bumgardner:** None.

Abstract# LB 37

Proteomic Analysis of Extracellular Vesicles Derived From a Potent Donor-specific Regulatory T Cell-enriched Population Demonstrates Multiple Markers of Immune Suppression

B. Schreiber[1], S. Tripathi[1], M. Blaser[2], T. Pham[2], S. Kuraoka[2], S. A. Singh[2], E. Aikawa[2], A. Chandraker[1], *[1]Transplantation Research Center, Renal Division, Brigham and Women's Hospital, Boston, MA, [2]Center for Interdisciplinary Cardiovascular Sciences, Division of Cardiovascular Medicine, Brigham and Women's Hospital, Boston, MA*

Purpose: Extracellular vesicles (EVs) are emerging as vital mediators of intercellular communication and immune regulation. Regulatory T cells (Tregs) play an integral role in immune suppression and are both avid EV secretors and acquirers. However, the challenges of expanding human Tregs *ex vivo* and isolating pure EVs have limited molecular investigations largely to their microRNA cargoes. Using EVs isolated from donor Antigen-Specific T cell-enriched immune-Regulatory cell Lines (ASTRLs) with known suppressive function, we performed an in-depth proteomic analysis of Treg EVs and identified pathways of EV-mediated immune suppression.

Methods: ASTRLs were expanded *ex vivo* from peripheral blood mononuclear cells (PBMCs) of 4 transplant recipients prior to EV isolation/characterization from culture media via differential ultracentrifugation and nanoparticle tracking analysis (NTA). Global proteomics was performed by liquid chromatography-mass spectrometry; statistical analysis/visualization was completed in Qlucore Omics Explorer. Gene ontology (GO), pathway over-representation and protein-protein interaction (PPI) network analyses was performed using Consensus Path DB and STRING, respectively. ATPase functional capacity was assessed with a commercial kit.

Results: Of the 1,704 unique proteins identified, 848 were known to be EV-associated. NTA confirmed isolated particle size was consistent with that of EVs (mean diameter 133.9 +/- 3.1 nm). 89 differentially expressed proteins were detected between PBMC and ASTRL-derived EVs, 35 of which were over-represented in ASTRL-EVs ($q \leq 0.05$, fold-change >2; Figure 1). Enrichment analysis of those 35 proteins revealed significant over-representation of pathways involved in immunity, including negative regulation of T cell activation, antigen receptor signaling, and ATP hydrolysis coupled transmembrane transport. PPI network analysis with unbiased clustering identified 7 local network clusters (Figure 2), including those associated with ATP hydrolysis. ATP hydrolysis assay confirmed functional EV ATPase capacity.

Conclusions: These findings provide insight into Treg EV-mediated mechanisms of immune suppression, suggest EVs play a key role in the Treg response, and implicate ATP hydrolysis as a putative mechanism.

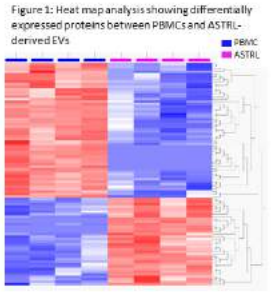


Figure 1: Heat map analysis showing differentially expressed proteins between PBMCs and ASTRL-derived EVs

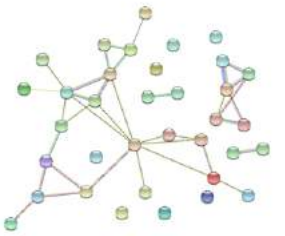


Figure 2: PPI network analysis of differentially expressed proteins over-represented in ASTRL EVs

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Basic

Tolerance / Immune Deviation

Abstract# 572

Estrogen Receptors Alpha and Beta are Required for Immune Homeostasis and Normal Treg Function

L. M. Christensen[1], T. Akimova[2], G. Ge[3], R. Han[1], L. Wang[1], P. Hernandez[3], C. O'Brien[3], M. H. Levine[3], W. W. Hancock[1], *[1]Children's Hospital of Philadelphia, Philadelphia, PA, [2]Children's Hospital of Philadelphia and University of Pennsylvania, Philadelphia, PA, [3]University of Pennsylvania, Philadelphia, PA*

Purpose: Estrogen signaling is a critical component of mammalian homeostasis, acting through a complex and interconnected system of hormone synthesis pathways and receptor signaling cascades. Estrogen signaling is thought to play a role in nearly every cell type throughout the body, including cells of the immune system. However, the interactions and functions of estrogen signaling within the immune system have yet to be elucidated.

Methods: We investigated the roles of estrogen receptor-alpha (ER-a) and estrogen receptor-beta (ER-b) in host T cells by undertaking their conditional deletion in adult mice, using floxed genes and tamoxifen-inducible Cre.

Results: In the absence of ER-b, secondary lymphoid organs had increased proportions of CD4+ cells (ranging from 15-33%; $p<0.05$). Ratios of T effectors to T regulatory cells (Tregs), and follicular T effectors (Tfh) to follicular Tregs (Tfreg) were drastically increased within the spleens (48% increase of Tfh:Tfreg; $p=0.0029$), superficial lymph nodes (sLNs) (29% with $p=0.0049$ and 68% with $p<0.0001$, respectively), and mesenteric lymph nodes (mLNs) (26% with $p=0.04$ and 42% with $p=0.0002$, respectively). Germinal Center B cell proportions were increased in both lymph node types (sLNs by 80% with $p=0.046$; mLNs by 30% with $p=0.049$). Specifically in the mLNs, ER-b KO resulted in significantly higher proportions of follicular B cells (54% with $p<0.0001$), in addition to follicular type I and type II cells (53% with $p<0.0001$ and 63% with $p=0.0001$, respectively). ER-b KO mice also had decreased proportions of Tregs and Tfregs most prominently in the mLNs (37% with $p<0.0001$ and 60% with $p=0.0014$, respectively). While ER-a KO mice had fewer and less pronounced differences in immune cell proportions compared to WT, notably there were significantly less Tregs (31% with $p=0.0007$) in mLNs and their Tregs had decreased suppressive function *in vitro*.

Conclusions: These data show that in the absence of estrogen signaling via ER-a or ER-b, cells within secondary lymphoid organs display inflammatory phenotypes, especially within the mLNs. In addition, these data suggest a potential role for estrogen signaling in influencing a tolerogenic immune environment suitable for transplantation. We are now undertaking studies to assess the effects of ER-a and ER-b deletion on allograft survival.

CITATION INFORMATION: Christensen L., Akimova T., Ge G., Han R., Wang L., Hernandez P., O'Brien C., Levine M., Hancock W. Estrogen Receptors Alpha and Beta are Required for Immune Homeostasis and Normal Treg Function *AJT, Volume 21 Supplement 3*

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Abstract# 574

Selective Bcl-2 Inhibition to Deplete Hematopoietic Stem Cells in Bone Marrow Niche: A Novel Approach to Promote Mixed Chimerism

T. Hirose[1], H. Sasaki[1], G. Lassiter[1], D. Ma[1], T. Oura[1], A. Dehnadi[1], A. Cosimi[1], P. Cippa[2], T. Fehr[2], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Institute of Physiology, University of Zurich, Zurich, Switzerland*

Purpose: A recent murine study has shown that successful mixed chimerism is achievable without myelosuppressive treatments by Bcl-2 inhibition. However, the mechanism by which selective Bcl-2 inhibition promotes chimerism was unclear. Since Mcl-1, not Bcl-2, has been reported as a major survival factor for hematopoietic stem cells (HSC), Bcl-2 inhibition is not supposed to deplete HSCs to open a space in the BM niches for allogeneic HSC engraftment. We therefore, tested Venetoclax, an FDA approved a highly selective Bcl-2 inhibitor, to evaluate whether selective Bcl-2 inhibition alone can deplete HSCs in BM niches. Venetoclax was then included in our conditioning regimen for combined BM and kidney transplantation (KTx) with only half dose (1.5Gy) of total body irradiation (TBI) previously required (3 Gy) to induce mixed chimerism.

Methods: Cynomolgus macaques were treated with 10 mg/kg of Venetoclax for 5 days. BM cells were serially aspirated to evaluate HSC (CD34+CD90+CD45RA-) depletion. Expression of apoptotic cascade proteins (BAX, Cytochrome C, Caspase-3, -7, and -9) on BM cells were also evaluated by flow cytometry. Finally, peri-transplant administration of Venetoclax (10mg/kg for 11 days) was added to our standard conditioning regimen (TBI, thymic irradiation, anti-CD154 mAb, ATG and a one month course of CyA) for combined BM transplantation (BMT) and KTx but with reduced (1.5Gy) TBI.

Results: After Venetoclax treatment, expression of Caspase-7 and -9 in HSC was significantly increased (167 ± 25% and 135 ± 6%; $p<0.01$ and $p<0.001$; Fig. 1a). As a result, HSCs were significantly depleted to 36 ± 15% of baseline levels (Fig.1b). In peripheral lymphocytes, expression of those apoptotic proteins in T cells, B cells, and NK cells also remarkably increased. With 1.5Gy TBI without Venetoclax in our conditioning regimen for BMT, no chimerism was induced in all four recipients and three rejected kidney (58, 100 and 167days). In contrast, all five BMT recipients with Venetoclax consistently developed excellent mixed chimerism, which was significantly superior to those induced by 3 Gy TBI but without Venetoclax (Fig. 2). Three combined KTx recipients also achieved renal allograft tolerance (>313, >946 and >1274 days).

Conclusions: Bcl-2 appeared to be a critical survival factor for HSCs and its inhibition resulted in promotion of chimerism induction with significantly lower dose of myelosuppressive treatment.

Fig. 1 (a) (b)

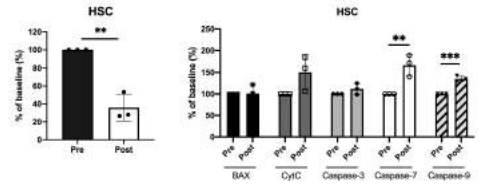

Fig. 2

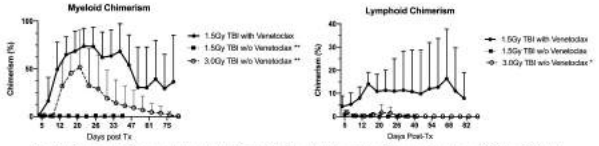

Fig.1(a). Deletion of HSC pre- post-Venetoclax (10mg/kg for 5 days). (b) Expression of Apoptotic protein on HSC. **: p<0.01, ***: p<0.01 compared to each parameter at pre-venetoclax.
Fig.2. Chimerism in the peripheral blood was measured by flow cytometry. *: p <0.05 (vs 1.5Gy TBI with Venetoclax), **: p<0.01 (vs 1.5Gy TBI with Venetoclax)

CITATION INFORMATION: Hirose T., Sasaki H., Lassiter G., Ma D., Oura T., Dehnadi A., Cosimi A., Cippa P., Fehr T., Kawai T. Selective Bcl-2 Inhibition to Deplete Hematopoietic Stem Cells in Bone Marrow Niche: A Novel Approach to Promote Mixed Chimerism *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Hirose: None. **H. Sasaki:** None. **G. Lassiter:** None. **D. Ma:** None. **T. Oura:** None. **A. Dehnadi:** None. **A. Cosimi:** None. **P. Cippa:** None. **T. Fehr:** None. **T. Kawai:** None.

Abstract# 575

Donor Lymphocytes in Peripheral Blood of Patients After Lung Transplantation Comprise High Frequencies of Killer Cell Immunoglobulin-like Receptor-positive T and NK Cell Subsets

J. F. Kühne[1], A. Hitz[1], K. A. Bläsing[1], B. Wiegmann[2], R. Bellmàs Sanz[1], F. Ius[2], A. Haverich[2], G. Warnecke[2], C. S. Falk[1], *[1]MHH, Institute of Transplant Immunology, Hannover, Germany, [2]MHH, Department for Cardiothoracic, Transplantation and Vascular Surgery, Hannover, Germany*

Purpose: For end-stage lung diseases, lung transplantation (LuTx) is the only curative treatment option. However, acute and chronic rejections are major limitations. Thus, a deeper understanding of the contribution of immune responses early after LuTx is urgently needed. Passenger leukocytes, derived from donor lungs and migrating into the recipients` periphery, are primarily NK and T cells. Our aim was to characterize the expression of killer cell immunoglobulin-like receptors (KIR), regulating NK and $CD8^+$ T cell activity, on donor and recipient NK and T cells in recipient blood after LuTx. Moreover, we investigated the functional capacity of donor vs. recipient NK cells.

Methods: Peripheral blood samples at pre, T0hr, T24hrs and 3wks post Tx of n=51 LuTx recipients were analyzed for the presence of HLA-mismatched donor cells and their KIR repertoire as well as activation status using flow cytometry. These results were correlated with clinical parameters, i.e. primary graft dysfunction (PGD) and cold ischemic times (CIT).

Results: Within the first 3wks after LuTx, donor NK and T cells were detected in n=51 patients with a peak at T0hr. An increase of the KIR2DL1-positive subset was detected within the donor NK cell repertoire. Moreover, donor NK cells showed significantly higher frequencies of KIR2DL1-positive cells ($p<0.01$) 3wks post LuTx compared to recipient NK cells. This effect was also observed in donor T cells 3wks after LuTx with higher proportions of KIR2DL1- ($p<0.05$) and KIR3DL1- ($p<0.01$) positive T cells. Higher activation levels of donor NK and T cells ($p<0.001$) were detected as compared to recipient cells via CD25 expression as well as enhanced degranulation capacity upon activation by K562 target cells. The KIR repertoire on donor NK and T cells in LuTx recipient blood does not correlate with PGD, while the frequencies of KIR^+ donor NK cells increased directly after LuTx with longer CIT.

Conclusions: Higher frequencies of donor NK and T cells expressing KIR compared to recipient NK and T cells argue for their origin in the lung as part of a highly specialized immunocompetent compartment. Despite KIR expression, the activation level of donor NK and T cells in the periphery of the recipient may be higher compared to recipient cells. Moreover, a positive correlation was detected for KIR surface expression on NK cells and CIT but not PGD implying extended preservation times have an impact on the NK subset composition. Hence, donor NK and T cells might have a regulatory effect in the balance between tolerance and rejection as well as graft survival after LuTx.

CITATION INFORMATION: Kühne J., Hitz A., Bläsing K., Wiegmann B., Bellmàs Sanz R., Ius F., Haverich A., Warnecke G., Falk C. Donor Lymphocytes in Peripheral Blood of Patients After Lung Transplantation Comprise High Frequencies of Killer Cell Immunoglobulin-like Receptor-positive T and NK Cell Subsets *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.F. Kühne: None. **A. Hitz:** None. **K.A. Bläsing:** None. **B. Wiegmann:** None. **R. Bellmàs Sanz:** None. **F. Ius:** None. **A. Haverich:** None. **G. Warnecke:** None. **C.S. Falk:** None.

Abstract# 576

Selective Bcl-2 Inhibition for Induction of Mixed Chimerism and Renal Allograft Tolerance without Myelosupression

G. Lassiter[1], T. Hirose[1], H. Sasaki[1], D. Ma[1], T. Oura[1], A. Dehnadi[1], A. Cosimi[1], P. Cippa[2], T. Fehr[3], T. Kawai[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA, [2]Division of Nephrology, Ente Ospedaliero Cantonale, Lugano, Switzerland, [3]Division of Nephrology, University of Zurich, Zurich, Switzerland*

Purpose: Immunologic tolerance of renal allograft has been achieved by induction of hematopoietic chimerism through donor bone marrow transplantation (DBMT). The myeloablative and genetic toxicity associated with DBMT conditioning hampers widespread application of tolerance protocols. To this end, we have recently shown that the addition of selective BCL-2 inhibition with Venetoclax (Vtx) to our nonmyeloablative conditioning regimen can promote chimerism and allograft tolerance without myelosuppression. To establish the Vtx-based regimen for clinical application, the necessity of all aspects of the protocol for combined kidney and bone marrow transplantation was evaluated individually.

Methods: Cynomolgus monkeys received various regimens which included low dose total body irradiation (TBI), local TI and ATG pre-CKBMT, followed by a short course of anti-CD154 mAb and Cyclosporine. The study groups consisted of 6 arms. Group A and B received no Vtx, but 3GyTBI and 1.5Gy TBI. Groups C,D,E and F all received Vtx but 1.5Gy TBI, no TBI, no TI, or no CoB, respectively.

Results: All recipients of the conventional regimen, Group A, achieved chimerism and long-term allograft tolerance but experienced severe transient pancytopenia. With reduced TBI (1.5Gy) without Vtx, all recipients failed to develop chimerism and ¾ rejected by day 167. By adding Vtx, all three recipients achieved excellent

chimerism (Fig. 1) and renal allograft tolerance without pancytopenia. Without TBI or CoB, all recipients failed to develop chimerism and rejected kidney allografts. Without TI, all three recipients failed to achieve tolerance despite successful development of chimerism. In this group, early repopulation of recent thymic emigrants and naive T cells were observed.

Conclusions: TBI dose was reduced by adding Vtx, leading to successful chimerism and allograft tolerance without myelosuppression. Minimal TBI, TI, and CoB appeared to be essential in the protocol with selective Bcl-2 inhibition.

Figure 1

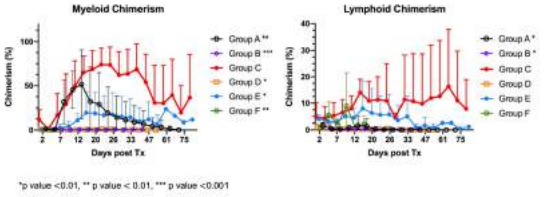

Table 1 Results of other factors in the regimen with Bcl-2 inhibition

	Group	n	TBI	TI	CoB	Vtx	Chimerism	Renal Allograft Survival (days)
No Vtx	A	8	3Gy	7Gy	+	-	7/8	2498, 4328, 837, 755, 401 373, 206, 58
	B	4	1.5Gy	7Gy	+	-	0/4	>688, 167, 100, 58
Vtx	C	3	1.5Gy	7Gy	+	+	3/3	>1276, >940, >326
	D	2	-	7Gy	+	+	0/2	120, 142
	E	3	1.5Gy	-	+	+	3/3	97, 100, 163
	F	3	1.5Gy	7Gy	-	+	0/3	74, 127, >66

TBI: total body irradiation, TI: thymic irradiation, CoB: costimulatory blockade using anti-CD154 mAb

CITATION INFORMATION: Lassiter G., Hirose T., Sasaki H., Ma D., Oura T., Dehnadi A., Cosimi A., Cippa P., Fehr T., Kawai T. Selective Bcl-2 Inhibition for Induction of Mixed Chimerism and Renal Allograft Tolerance without Myelosupression *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Lassiter: None. **T. Hirose:** None. **H. Sasaki:** None. **D. Ma:** None. **T. Oura:** None. **A. Dehnadi:** None. **A. Cosimi:** None. **P. Cippa:** None. **T. Fehr:** None. **T. Kawai:** None.

Abstract# 577

Effects of IL-2 and/ or Anti-IL6R Therapy on Long-term Cardiac Allograft Survival in Non-Human Primates (NHPs)

C. L. Miller, K. J. Ahrens, J. M. O, P. M. Patel, J. A. Morrissette, D. Becerra, T. Costa, A. Dehnadi, I. M. Hanekamp, G. Benichou, J. C. Madsen, *Center for Transplantation Sciences, Massachusetts General Hospital, Boston, MA*

Purpose: Cardiac allograft tolerance in NHPs has been achieved by our group using a mixed chimerism model with allogeneic bone marrow transplant after non-myeloablative conditioning but not without kidney co-transplantation. Transplantation of the heart alone results in graft rejection within 150-180 days. Our results suggest that the ability of the kidney to confer tolerance on the co-transplanted heart relates to its ability to induce the expansion/activation of host regulatory T cells (Tregs). We investigated whether IL-2 and/ or anti-IL6R therapy could substitute for the kidney and induce cardiac allograft tolerance by augmenting Tregs.

Methods: Sixteen cynomolgus NHPs underwent heart and donor bone marrow transplant with mixed chimerism conditioning including total body and thymic irradiation, ATGAM, anti-CD154 mAb, and cyclosporine until post-operative day (POD) 28. Recipients in Group A (n=5) received low dose IL-2 therapy (1M IU/m^2 SC, POD -6 to 5) and an anti-IL6R mAb (tocilizumab, 10 mg/kg IV, POD 0, 7, 14, 21, 28, 56, 84, 112). Recipients in Group B (n=11) received tocilizumab alone (10 mg/kg IV, POD 0, 7, 14, 21, 28, 56, 84).

Results: In Group A, 3/5 recipients rejected at POD 127, 198, and 254 with acute cellular rejection (ACR), antibody mediated rejection (AMR), and donor specific antibodies (DSA). 2/5 died due to sepsis (POD11) or technical complications (POD7). In Group B, 4/11 recipients are ongoing, of which 2 are >430 days post-transplant without ACR. 1/11 rejected at POD 621 but only after donor skin transplant on POD 526. 1/11 failed to develop chimerism and rejected at POD 169. Graft failure/ death occurred in 5/11 due to technical or sedation complications (POD3, POD5 [n=2], POD9) and pancytopenia (POD65). Group A recipients exhibited an average 15-fold expansion in percent CD25+FoxP3+ of peripheral CD3+CD4+ cells compared to 3-fold expansion in Group B.

Conclusions: Despite its ability to promote Tregs, combined IL-2/ aIL6R treatment failed to achieve long-term allograft survival. We surmise that this was due to IL-2 stimulation of alloreactive memory T cells. In contrast, aIL6R mAb treatment alone achieved long-term allograft survival (>1 year) off immunosuppression in 3 recipients and represents a promising strategy towards clinical cardiac allograft tolerance.

CITATION INFORMATION: Miller C., Ahrens K., O J., Patel P., Morrissette J., Becerra D., Costa T., Dehnadi A., Hanekamp I., Benichou G., Madsen J. Effects of IL-2 and/ or Anti-IL6R Therapy on Long-term Cardiac Allograft Survival in Non-Human Primates (NHPs) *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.L. Miller: None. **K.J. Ahrens:** None. **J.M. O:** None. **P.M. Patel:** None. **J.A. Morrissette:** None. **D. Becerra:** None. **T. Costa:** None. **A. Dehnadi:** None. **I.M. Hanekamp:** None. **G. Benichou:** None. **J.C. Madsen:** None.

Abstract# 578

Donor T and NK Cells with a Special Tissue-Resident Memory Phenotype Migrate Into the Periphery of Lung Transplant Recipients - A Potential Feature for Tolerance Development

L. M. Ruhl[1], R. Bellmàs Sanz[1], A. Hitz[1], B. Wiegmann[2], K. A. Bläsing[1], W. Sommer[2], F. Ius[2], J. F. Kühne[1], A. Knöfel[2], L. M. Horn[1], I. Tudorache[2], A. Haverich[2], D. Jonigk[3], G. Warnecke[2], C. S. Falk[1], *[1]MHH, Institute of Transplant Immunology, Hannover, Germany, [2]MHH, Department for Cardiothoracic, Transplantation and Vascular Surgery, Hannover, Germany, [3]MHH, Institute of Pathology, Hannover, Germany*

Purpose: After lung transplantation (LuTx), a transient chimerism of donor cells exists in the blood of recipients due to the migration of lymphocytes from the transplanted lung into the periphery. We aimed to characterize the phenotype of donor $CD8^+$ and $CD4^+$ T and NK cells and to investigate whether they might represent tissue-resident memory (TRM) cells.

Methods: Lymphocyte dynamics in recipient blood were determined in 97 lung transplant patients directly (T0), 24 hours (T24) and 3 (wks) weeks after LuTx using flow cytometry with lineage-, tissue-, and donor HLA class I allele-specific mAb. The same makers were used to determine the phenotype of lymphocytes present in organ storage solution (perfusate, n=102), recipient explanted lung parenchyma (n=28) and donor trachea (n=17).

Results: In peripheral blood of all recipients, donor-derived $CD4^+$ and $CD8^+$ T and $CD56^{dim}$ NK cells were detected at T0, T24 and 3 wks after LuTx and had higher CD69 expression compared to recipient cells ($p=0.01$ to 0.04), were mostly CCR7-memory cells and CD25 negative. This phenotype was similar to T and NK cells in corresponding perfusates. In recipient parenchyma and donor trachea, most $CD69^+$ T and NK cells showed coexpression of other tissue residency markers such as CD103, CD49a and PD-1 with significant enrichment in trachea ($p<0.05$). In contrast, these markers were not found in circulating donor lymphocytes and perfusates, indicating that they represent distinct memory T and NK subsets. Donor T and NK cells showed higher IFN-g production with and w/o PMA/Iono stimulation compared to recipient cells ($p<0.05$). The presence of these particular TRM cells did not have an impact on the development of PGD 24h after transplantation. However, patients with high frequencies of donor T cells showed a trend towards a CLAD-free survival 2 years post LuTx, although no statistical significance was reached ($p=0.15$).

Conclusions: Our results demonstrate that donor T and NK cells found in the periphery of lung transplant recipients are a distinct subset from circulating lymphocytes and TRM cells present in lung tissue, since they express CD69 but lack expression of other classical TRM markers. They display a higher functional capacity despite the onset of immunosuppression. Donor T cells might be clinically relevant for tolerance induction and long-term survival after transplantation due to their unique features.

CITATION INFORMATION: Ruhl L., Bellmàs Sanz R., Hitz A., Wiegmann B., Bläsing K., Sommer W., Ius F., Kühne J., Knöfel A., Horn L., Tudorache I., Haverich A., Jonigk D., Warnecke G., Falk C. Donor T and NK Cells with a Special Tissue-Resident Memory Phenotype Migrate Into the Periphery of Lung Transplant Recipients - A Potential Feature for Tolerance Development *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.M. Ruhl: None. **R. Bellmàs Sanz:** None. **A. Hitz:** None. **B. Wiegmann:** None. **K.A. Bläsing:** None. **W. Sommer:** None. **F. Ius:** None. **J.F. Kühne:** None. **A. Knöfel:** None. **L.M. Horn:** None. **I. Tudorache:** None. **A. Haverich:** None. **D. Jonigk:** None. **G. Warnecke:** None. **C.S. Falk:** None.

Abstract# LB 39

Regulatory Macrophage Induced by Il-33 Promoted Immune Tolerance of Kidney Transplantation Through Siglec-10

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Purpose: Acute and chronic rejection are key problems in renal transplantation. It is ideal to induce immune tolerance to suppress rejection while regulatory macrophages (Mregs) which play critical roles are one of the approaches against rejection. Little do scientists know about how to further improve and establish the Mregs with powerful immunosuppressive function.

Methods: To solve this problem, we induced regulatory macrophages derived from BALB/c bone marrow through various cytokines in vitro. Cell phenotype was analyzed by flow cytometry. ConA stimulated T cell proliferation assay was used to evaluate Mregs inhibitory function. RNA-seq revealed immunosuppressive molecules that regulate the functioning of regulatory macrophages. RT-PCR and flow cytometry were used to further validate the identified immunosuppressive molecules.

Results: The results indicated that macrophages induced by IL-33 showed the characteristics of Mregs, which significantly inhibited the proliferation of T cells and promoted the high expression of Foxp3 in CD4+ T cells. Moreover, Mregs induced by IL-33 exert immunosuppressive function mainly through siglec-10.
Conclusions: Our study optimized the amplification system of Mregs induced by IL-33 in vitro and clarified systematically the characteristics of the gene expression profile of Mregs induced by IL-33 and the cellular and molecular mechanisms in the establishment of transplant immune tolerance. In summary, our study provides a strategy for the construction of immunosuppressive Mregs and comes up with a novel method to ameliorate rejection after renal transplantation.
CITATION INFORMATION: zhang J., wang w. Regulatory Macrophage Induced by Il-33 Promoted Immune Tolerance of Kidney Transplantation Through Siglec-10 *AJT, Volume 21 Supplement 3*
DISCLOSURES: J.D. zhang: None. **W. wang:** None.

Basic

Histocompatibility and Immunogenetics

Abstract# 579

Anti-HLA-DP Antibodies Positive - A Retrospective Review of Outcomes in Renal Transplantation- Single Centre Experience

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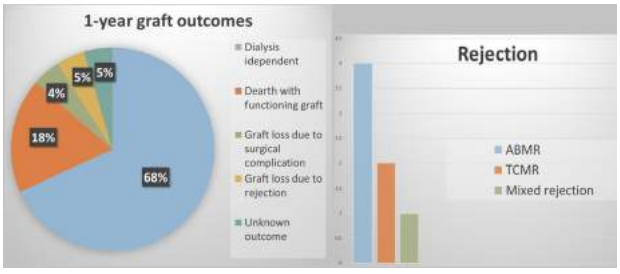
Purpose: Data on the role of HLA-DP antibodies on graft outcome is not precise. Studies suggested that the presence of donor-directed HLA-DP antibodies correlate with reduced allograft survival and increased ABMR risk among kidney transplant recipients. We investigated one -year graft outcomes of patients with donor-directed HLA-DP antibodies who received a renal transplant. Primary outcomes included dialysis independence at one-year and rejection (ABMR, TCMR or mixed).
Methods: Retrospective data were collected on 22 Kidney Transplant recipients who had donor-directed HLA-DP antibody at the time of transplantation
Results: We identified 22 patients. Induction IS: Basiliximab 6; Alemtuzumab 11; Unknown 5 Maintenance IS Myfortic, and Tacrolimus or Myfortic, Tacrolimus and Prednisolone.19 patients had deceased donor, and 3 patients had a live donor transplant. The majority of our patients were highly sensitised (cRF>85%) pre-transplant 81% (n=18). 18% (n=4) patients were not mismatched at HLA A, B, and DR. 68% were at their 2nd or 3rd transplant. At 1-year post-transplant, 68% (non-censored for death) had a working graft (defined as dialysis independent regardless of eGFR). Graft losses were due to rejection (1), surgical complication (1), unknown (2) and death with a functioning graft (4). A majority of 13 (59%) had DGF, and six patients had a biopsy in the first-week post-transplant (ATN- 5 and acute vascular rejection-1). 72%(n=16) had donor-directed HLA-DP antibody MFI > 5000 at the time of transplantation;63% (n=14) had a positive FCXM at the time of transplantation. Post tx only 10% had an increase in DP DSA MFI, 68% MFI remained the same or decreased, 23% became negative. 32% (n=7) had a biopsy-proven rejection. The majority 5 out of 7 being ABMR
Conclusions: Most of our patients were highly sensitised and at their 2nd or 3rd transplant. Even though 63% had positive FCXM at the time of transplantation, the rate of rejection was 32%. Most rejections were ABMR. At 1-year post-transplant, 68% of the patients were dialysis independent. Our centre experience suggests that KTx across DP DSAs with +/-ve FCXM could be a feasible option for carefully selected, highly sensitised patients who otherwise may not find a compatible donor.



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Abstract# 580

Disparities in HLA Representation by Single Antigen Reagents in Different Ethnic Populations

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Purpose: It is not possible to test for antibodies against the antigens encoded by every HLA allele due to cost and throughput constraints. When alleles are not represented in the single antigen reagents, donor specific antibodies may be missed because their antibody epitopes are not present. The extent of this problem is not evident without the benefit of allele-level typing, which is required to differentiate antigens in the panels and those expressed by donors. To investigate the limitations of single antigen reagents, HLA gene frequencies in four populations: European (EUR), African American (AFA), Asian/Pacific Islander (API), and Hispanic (HIS) were used to determine antigen coverage with single antigen reagents from two vendors.
Methods: Allele frequencies (Common, Intermediate, and Well Documented HLA allele catalog, version 3.0) were used to determine the percentage of HLA-A, -B, -C, and -DRB1 alleles for EUR, AFA, API, and HIS populations that are not represented in single antigen reagents. Three commercial products were compared: Vendor 1, Vendor 2, and a combination of three reagents (both vendors and a supplemental panel).
Results: For HLA-A, -B, -C, and -DRB1, the percentage of donor population unrepresented by the combined reagents ranged from 2.3% to 18.1% (Figure 1). The best representation was observed in the EUR population, where 6.3%, 8.4%, 17.5%, and 2.3% lacked representation at the HLA-A, -B, -C, and -DRB1 loci respectively. For the combined reagents, the percentage of each population not represented ranged from 7.1% to 14.6% for AFA, 3.4% to 18.1% for API, and 7.1% to 17.7% for the HIS population.

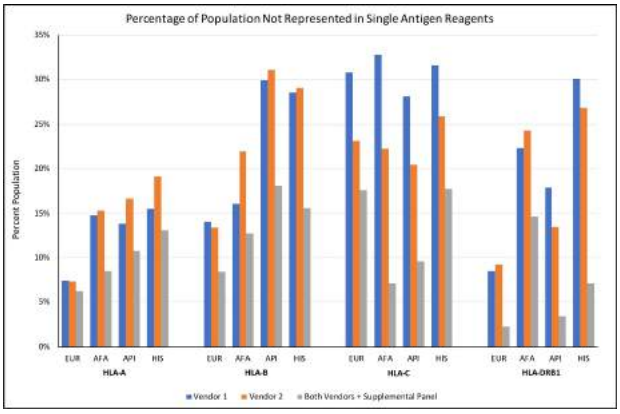

Figure 1. Percentage of EUR, AFA, API, and HIS populations that express HLA-A, -B, -C, and -DRB1 alleles not represented in single antigen reagents.
Conclusions: All populations have HLA antigens that are not represented in single antigen reagents, which could result in failure to detect clinically significant antibodies. Single antigen reagents better represent the antigens of the EUR population compared to those in AFA, API, and HIS populations. This suggests that allele-level typing is important to identify situations where donor specific antibodies may not be detectable, including prevention and treatment of antibody mediated rejection.
CITATION INFORMATION: Quon J., Menteer J., Fotiadis N., Lestz R., Baxter-Lowe L. Disparities in HLA Representation by Single Antigen Reagents in Different Ethnic Populations *AJT, Volume 21 Supplement 3*
DISCLOSURES: J.C. Quon: None. **J. Menteer:** None. **N. Fotiadis:** None. **R.M. Lestz:** None. **L.A. Baxter-Lowe:** Consulting Fee; Name of Commercial Interest; Luminex Inc. Consulting Fee; Nature of Relationship; Advisory Board Member.

BASIC

Abstract# 581

HLA Mismatching and Subclinical Inflammation: An Association to be Considered in Kidney Transplant Patients with Low Immunological Risk

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Purpose: Subclinical inflammation (SCI) ($<t_2+i_2$ Banff Classification) is a very common histological finding in kidney transplants (KT) (± 40-60%) with modern immunosuppression. Its influence in reducing long-term graft survival is known. Our aim is to analyze whether HLA mismatching is associated with the risk of suffering from SCI.

Methods: As a part of clinical Trial NCT02284464, we collected the protocol biopsy results at third month after KT in 105 patients with low immunological risk. We evaluated the histological findings according to the Banff 17 classification. We divided them in Group I (n=51), with no inflammation (NI) and Group II (n=54) with SCI. We analyzed the HLA-histocompatibility between donor and recipient with PCR-SSP. We determined A, B, C, DR and DQ alleles.

Results: Most of the patients were male and the donor mean age was 52 years old in Group I and 55 in Group II. There were no differences in the time in dialysis, cold ischemia time, induction therapy, tacrolimus levels, pretransplant PRA or the delayed graft function (DGF). We found that those who had SCI had a worse graft function and more chronic lesions than the NI group (ct+ci+cg+cv 1.6±1.2 vs 0.76±1.03 p=0.001). Group II had more HLA mismatching than Group I.62.5% of the patients who presented with NI had less than or equal to 6 HLA-incompatibilities. 61.5% of those with SCI had more than 6 HLA-incompatibilities.$$table1

	NI (n=51)	SCI (n=54)	p
Donor age (years)	52.4±13.4	55±11.8	0.311
Expanded criteria donor (%)	36	49,1	0,181
Recipient BMI (kg/m²)	27.4±3.9	25.7±4.3	0.094
Male (%)	72.5	74.1	0.860
Hemodialysis (%)	72	64,8	0.686
Time in dialysis (months)	24.3±17.5	19.3±1.1	0.182
Induction therapy (%)	53.9	90.2	0.270
Cold ischemia time (h)	10.6±6.7	10.8±6	0.877
Pretransplant PRA (%)	0,43±2.7	0	0.323
DGF (%)	24	26.9	0.735
Tacrolimus levels (ng/ml)	9.7±2.9	9.2±2.1	0.286
HLA mismatches (n) (A,B,C,DR,DQ)	5.4±2.4	6.9±2	0.002
Proteinuria (mg/dl)	297.4±229.4	278.9±224.9	0.763
MDRD-4 (ml/min)	60±23.4	48.5±13.6	0.003

Conclusions: We highlight the importance of HLA mismatching in patients with low immunological risk and the assessment in the induction therapy as well as in the maintenance immunosuppression.

CITATION INFORMATION: Vazquez-Sanchez T., Alonso-Titos J., Ruiz-Esteban P., Caballero A., Leon M., Lopez V., Sola E., Hernández D. HLA Mismatching and Subclinical Inflammation: An Association to be Considered in Kidney Transplant Patients with Low Immunological Risk *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Vazquez-Sanchez: None. **J. Alonso-Titos:** None. **P. Ruiz-Esteban:** None. **A. Caballero:** None. **M. Leon:** None. **V. Lopez:** None. **E. Sola:** None. **D. Hernández:** None.

Abstract# 582

The Co-Occurrence of Newly Developed HLA Donor Specific Antibody and Positive C3d/C4d Profiles Along with Immune Therapy Non-Compliance in Pediatric Heart Transplant Recipients is a High Risk Indicator for Patient Mortality

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Purpose: Increasing evidence has implicated the deleterious effect of HLA donor specific antibody (DSA) in pediatric heart transplantation (PHTx). However, there are still insufficient research results illustrating the comprehensive predictors that lead to severe graft failure and mortality. This study sought to investigate the degree to which DSA has contributed to negative PHTx outcomes in correlation with other potential detrimental factors.

Methods: A total of 155 recipients (164 allografts) who underwent PHTx between 1985-2019 were retrospectively analyzed for DSA (Mean Fluorescent Intensity ≥1000 as positive, ≥4000 as strong, ≥17,000 correlated to +C1q as high risk), C3d and C4d, and demographic characteristics (Table 1b). Antibody mediated rejection (AMR), graft failure (GF), and patient expiration (PE) were evaluated as PHTx outcomes. *P* values were calculated by chi-square or Fisher exact tests for categorical variables and by Wilcoxon rank test for continuous varibles.

Results: Newly developed DSA (ndDSA) was significantly related to the occurrence of AMR ($p<0.05$ and $p<0.001$) and PE (all $p<0.05$), but not to GF. Preformed DSA had no apparent negative effect on PHTx outcomes (Table 1a). Non-compliance with immune therapy (NC) was significantly associated with AMR, GF and PE (all $p<0.05$). Median ages of NC vs compliance were 14 (13-18) and 7 (2-14), respectively. Assist devices were correlated with low occurrences of GF and PE (all $p<0.05$). No other demographic characteristic included in this study displayed an impact on PHTx (Table 1b). High risk and strong DQ ndDSA with positive C3d/C4d showed significant correlation to GF and PE (all $p<0.05$). Interestingly, the combination of strong DQ ndDSA, positive C3d/C4d, and the additional risk factor of NC demonstrated a dramatic increase in the incidence of PE ($p<0.001$) (Table 1c).

Conclusions: High risk and strong DQ ndDSA supported by pathological findings is a critical barrier of successful PHTx for teenaged recipients with immune therapy compliance issues. The co-occurrence of these factors warrant timely enhanced post PHTx management to prevent final allograft failure and patient mortality.

Table 1a. The Association of Donor Specific Antibodies to Pediatric Heart Transplantation Outcomes

*DSA			**AMR	No AMR	p value	Graft Failure	Graft Function	p value	Expired	Alive	p value
Preformed DSA	Total	Yes	8	11	>0.05	6	17	>0.05	5	18	>0.05
		No	28	62		49	69		32	76	
	Strong	Yes	5	4	>0.05	4	6	>0.05	3	7	>0.05
		No	53	72		53	90		44	87	
Newly Developed DSA	Total	Yes	24	30	<0.05	22	35	>0.05	18	37	<0.05
		No	10	39		12	87		3	50	
	Class I Strong	Yes	13	9	<0.05	11	13	>0.05	9	14	<0.05
		No	21	60		22	99		12	73	
	Class II Strong	Yes	24	19	<0.001	17	28	>0.05	14	30	<0.05
		No	9	50		15	54		8	57	

*DSA: Donor Specific Antibody (Mean Fluorescent Intensity ≥1000 as positive, ≥4000 as strong)
**AMR: Antibody Mediated Rejection

Table 1b. The Influence of Patient Demographic Characteristics to Pediatric Heart Transplantation Outcomes

		*AMR	No AMR	p value	Graft Failure	Graft Function	p value	Expired	Alive	p value
Patient Age	(X ± SD)	9 ± 7	10 ± 7	>0.05	11 ± 6	9 ± 7	>0.05	11 ± 7	9 ± 7	>0.05
Gender	Male	22	50	>0.05	45	51	>0.05	31	59	>0.05
	Female	18	33		24	42		20	43	
Race	African American	32	59	>0.05	50	65	>0.05	37	73	>0.05
	Caucasian	6	11		14	12		10	14	
	Other	1	9		3	12		2	12	
ABO Type	A	13	27	>0.05	22	35	>0.05	15	41	>0.05
	B	2	15		8	13		7	13	
	AB	2	3		4	3		3	4	
	O	13	34		13	38		14	41	
Assist Device	Yes	3	18	>0.05	9	25	<0.05	5	26	<0.05
	No	30	59		57	86		42	74	
Compliance with Immune Therapy	Yes	28	73	<0.05	61	83	<0.05	50	81	<0.05
	No	12	8		15	6		10	9	

*AMR: Antibody Mediated Rejection

Table 1c. The Association of Newly Developed Donor Specific Antibodies, Positive C3d/C4d, and Non-compliance with Immune Therapy to Allograft Loss and Patient Expiration

		Graft Failure	Graft Function	p value	Expired	Alive	p value
Newly Developed Class I/Class II **High Risk DSA + Positive C3d/C4d	Yes	8	7	<0.05	7	5	<0.05
	No	2	14		5	15	
Newly Developed ***Strong DQ DSA + Positive C3d/C4d	Yes	8	20	<0.05	7	9	<0.05
	No	8	72		10	75	
Newly Developed Strong DQ DSA + Positive C3d/C4d + Non-compliance	Yes	5	5	<0.05	5	5	<0.001
	No	20	79		13	86	

**High Risk DSA: Donor Specific Antibody (DSA) with Mean Fluorescent Intensity (MFI) ≥17000
***Strong DQ DSA: DQ DSA with MFI ≥4000

CITATION INFORMATION: Zhang A., Nasman C., Allen J., Sun Y., Thomas D., Rodriguez R., Tan C., Boyle G. The Co-Occurrence of Newly Developed HLA Donor Specific Antibody and Positive C3d/C4d Profiles Along with Immune Therapy Non-Compliance in Pediatric Heart Transplant Recipients is a High Risk Indicator for Patient Mortality *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Zhang: None. **C. Nasman:** None. **J. Allen:** None. **Y. Sun:** None. **D. Thomas:** None. **R. Rodriguez:** None. **C. Tan:** None. **G. Boyle:** None.

Basic

Immunosuppression Preclinical Studies

Abstract# 583

Transforming Growth Factor-Beta Induced Myeloid-Derived Suppressor Cells Promote Transplant Immune Tolerance

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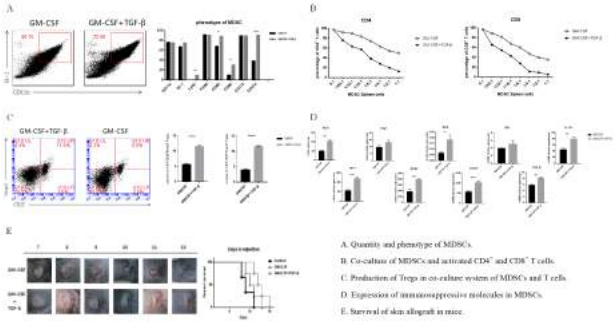
Purpose: Myeloid-derived suppressor cells (MDSCs) are a group of heterogeneous cells derived from bone marrow with immunosuppressive effect, which contribute to the establishment of transplant immune tolerance. Obtaining a sufficient number of MDSCs with potent suppressive function and good stability is a prerequisite for their clinical transformation and application. Our research found that transforming growth factor-beta (TGF-b) induced MDSCs with potent suppressive function promoted transplant immune tolerance.

Methods: In vitro, we used mouse bone marrow cells as precursor cells for the induction of MDSCs, which obtained by TGF-b combined with GM-CSF, a growth factor stimulating the proliferation and differentiation of bone marrow cells. Flow cytometry detected the phenotype of induced MDSCs, and the immunosuppressive function and underlying cellular and molecular mechanism of these cells were explored by mixed lymphocyte culture and mouse skin transplantation model.

Results: Compared with GM-CSF treatment alone, TGF-b combined with GM-CSF could induce more MDSCs, which have a stronger function of inhibiting activated $CD4^+$ and $CD8^+$ T cells. In addition, TGF-b induced MDSCs expressed higher levels of PD-L1. We further found that TGF-b induced MDSCs promoted the production of Tregs, and upregulated the expression of a variety of immunosuppressive molecules. Finally, adoptive transfer of these cells significantly prolonged the survival of allograft and promoted transplant immune tolerance.

Conclusions: These results indicated that TGF-b combined with GM-CSF is an efficient and stable protocol to induce MDSCs *in vitro*. TGF-b induced MDSCs play a stronger immunosuppressive effect though inducing the production of Tregs and the expression of immune effector molecules. We firmly believe that TGF-b induced MDSCs combined with immunosuppressants are promising to further prolong the survival of allograft and promote transplant immune tolerance.



CITATION INFORMATION: Zhang F. Transforming Growth Factor-Beta Induced Myeloid-Derived Suppressor Cells Promote Transplant Immune Tolerance *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Zhang: None.

Basic

Islet Cell and Cell Transplantation

Abstract# 584

Islet Isograft Transplantation Improves Insulin Sensitivity in a Murine Model of Type 2 Diabetes

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Purpose: Type 2 diabetes develops in the presence of chronic overnutrition and genetic susceptibility, and causes insulin resistance and relative insulin deficiency. We hypothesized that islet transplantation can improve insulin sensitivity by modifying the mediators of insulin sensitivity in the pancreas, liver, muscle, adipose tissues.

Methods: Eight-weeks-old male mice were used as both recipients and donors in this study. To induce type 2 diabetes with partial β-cell failure, the mice were fed a high-fat diet for 4 weeks and then injected with low-dose streptozotocin. Approximately 400 islet cells from a donor mouse were injected into the renal capsule of a recipient mouse for islet transplantation. After six weeks following transplantation, the mediators of insulin sensitivity in the pancreas, liver, muscle, and adipose tissues were quantitatively compared between islet-transplanted and non-transplanted groups.

Results: Intravenous glucose tolerance test showed that whereas the non-transplanted mice failed to show notable reductions in the glucose level, the islet-transplanted mice showed significant reductions in the serum glucose level to ~200 mg/dL at six weeks after islet transplantation. The islet-transplanted mice showed significantly higher Matsuda index and significantly lower HOMA-IR than did the non-transplanted mice, thus signifying improved insulin sensitivity. In the kidney, the insulin/amyloid ratio significantly increased between three and six weeks after islet transplantation. In the liver, the expression levels of insulin sensitivity mediators (ie, adiponectin, GLUT2, IRS-1, and pIRS-1) were significantly higher in the islet-transplanted mice. The islet-transplanted mice also had significantly higher expression levels of IRS-1 in white adipose tissues and GLUT4 in brown adipose tissues compared with non-transplanted mice. Lastly, the islet-transplanted mice showed a significant increase in adiponectin and a decrease in interferon-gamma in white muscle tissues; moreover, the islet-transplanted mice had a significantly higher ratio of phosphorylated AMP-activated protein kinase-α/AMP-activated protein kinase-α in red muscle tissues compared with the non-transplanted mice.

Conclusions: Islet transplantation resulted in improvements in multiple indices of insulin sensitivity in a murine model of type 2 diabetes. Islet transplantation may be utilized to improve insulin sensitivity in patients with type 2 diabetes.

CITATION INFORMATION: Lim S., Choi M., Kim M., Wee Y., Kwon H., Jung C., Kim Y., Han D., Shin S. Islet Isograft Transplantation Improves Insulin Sensitivity in a Murine Model of Type 2 Diabetes *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Lim: None. **M. Choi:** None. **M. Kim:** None. **Y. Wee:** None. **H. Kwon:** None. **C. Jung:** None. **Y. Kim:** None. **D. Han:** None. **S. Shin:** None.

Abstract# 585

Lacripep™-like Peptide N-104 Increases Insulin Secretion and Promotes Islet Transplantation Outcomes

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Purpose: To study if Lacripep™-like peptide N-104 promotes beta-cell stabilization and islet transplantation outcomes. **Background:** Lacritin is a multifunctional tear protein with prosecretory, prosurvival and mitogenic properties. Islets are Lacritin responsive, and prominently express known elements of the Lacripep™ receptor complex and signaling pathways. N-104 peptide comprises the fifteen C-terminal amino acids of Lacritin.

Methods: a) Human or mouse islets were cultured with 4μM of Lacripep™-like peptides N-94, N-104, N-104/C-6 or Tearpep3/N-104, or with negative control C95 or were left untreated in DMEM at 37oC for different periods of time ranging from 1 - 20 days. Islet viability was scored by propidium iodide - fluorescein diacetate staining, and function by Glucose Stimulated Insulin secretion (GSIS) assay. b) C57BL/6 islets were pretreated with 4 μM N-94, N-104, or C95, or saline for 24 hours followed by minimal islet mass transplantation into syngeneic diabetic recipients. Tail vein blood glucoses were measured daily.

Results: For mouse islets, N-104 was ~45% more active than N-94 and 25% better than TearPep3/C-6 in GSIS assays. N-104 increased GSIS by about 5.5-fold, while N-94 or Tearpep3/N-104 increased GSIS by about 4-fold compared to untreated controls. Human islets cultured for 24hrs in the presence of N-104 also demonstrated a 2.7-fold GSIS increase compared with untreated controls. N-104/C-6 (in which six C-terminal amino acids have been removed) failed to enhance GSIS compared to untreated islets. The viability of human islets treated with N-104 was 95.6% at Day 6, and 84%, 66% and 58% following culture with N-94 C-95, and saline. Incubation of mouse islets with N-104 permanently returned syngeneically transplanted mice to normoglycemia with glucoses below 200mg/dL within 7 days post-transplant, with treatment efficacy continuing 55 days post-transplant. In comparison, N-94 restored blood glucose levels to normal after 9 days post-transplant. Blood glucose was <250mg/dL following treatment with C95 at Day12 post-transplant. Average blood glucoses measured between Days 22 to 43 was 151±20.7mg/dL for N-104 group and 142.9±17.6mg/dL for N-94 group compared to 275±34.8mg/dL for the C95 group.

Conclusions: Islet viability, glucose stimulated insulin secretion, and transplantation outcomes indicate that N-104 is the most viable candidate for clinical translation as an interventional agent to promote islet transplantation outcomes.

CITATION INFORMATION: Ma M., Chhabra P., Dias Teixeira K., Laurie G., Brayman K. Lacripep™-like Peptide N-104 Increases Insulin Secretion and Promotes Islet Transplantation Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Ma: Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019. **P. Chhabra:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019. **K. Dias Teixeira:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019. **G. Laurie:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019, Cofounder and CSO of TearSolutions, Inc. **K. Brayman:** Intellectual Property Rights; Name of Commercial Interest; Patent international application #62/817,790 filed on March 13, 2019.

BASIC

Abstract# 586

A Small Molecule Inhibitor of Toll-like Receptor-4 TAK-242 Attenuates IBMIR Against Human Islets

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Purpose: A large portion of grafted islets are lost shortly after infusion due to the instant blood mediated inflammatory reaction (IBMIR). In our previous studies, we have observed increased viability and functionality of transplanted islets as well as decreased inflammatory markers in serum when islets were transplanted into mice following isolation with TAK-242 supplemented solutions. Therefore, we sought to investigate the effects of TAK-242 in an in vitro IBMIR model using human islets.

Methods: Following isolation of human islets, islets were allowed to recover in culture for 24 hours. Islets were challenged with the administration of whole blood with and without supplemental TAK-242. Serum or supernatant was collected at 0 and 3 hours. These samples were analyzed for damage associated biomarkers hsa-miRNA 375 using RT-qPCR. C-peptide was measured by ELISA. IL-1β, IL-6, and IL-8 in plasma or supernatant were measured by Luminex assay.

Results: Damage associated hsa-miRNA 375 showed a significant decrease ($p<0.005$) with the addition of TAK-242 when compared to control after being exposed to blood for 3 hours (Figure 1). C-peptide also showed decreases in TAK-242 samples ($p<0.005$) following 3 hours of exposure to whole blood further verifying attenuated islet stress and damage with the administration of TAK-242. Inflammatory cytokines IL-1β, IL-6, and IL-8 in TAK-242 treated samples also showed significant decreases compared to control ($p<0.05$) after 3 hours exposure to blood.

Conclusions: The results of this study confirm the efficacy of TAK-242 and its ability to attenuate IBMIR in a human in vitro model as all markers measured in this experiment showed decreases in damage and inflammatory biomarkers of islets. This study also implicates the TLR4 signaling pathway as a potential therapeutic target for attenuating IBMIR during islet transplant procedures.

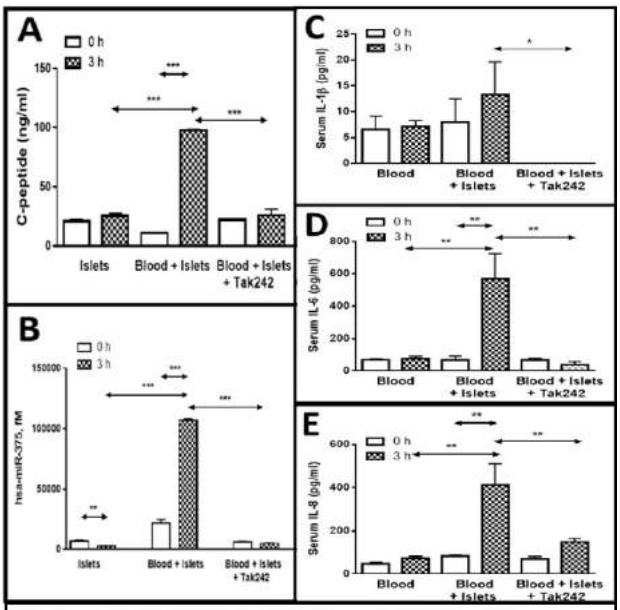


Figure 1. Measurement of damage and inflammatory markers with or without TAK242. A. C-peptide levels 0h and 3h following challenge with blood. B. hsa-miRNA levels following addition of blood. C-E. Levels of inflammatory cytokines IL-1β, IL-6, IL-8 following treatment of islets with blood. ***p<0.005, **p<0.05

CITATION INFORMATION: Mattke J., Vasu S., Kumano K., Liu Y., Darden C., Lawrence M., Kane R., Naziruddin B. A Small Molecule Inhibitor of Toll-like Receptor-4 TAK-242 Attenuates IBMIR Against Human Islets *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Mattke: None. **S. Vasu:** None. **K. Kumano:** None. **Y. Liu:** None. **C.M. Darden:** None. **M.C. Lawrence:** None. **R.R. Kane:** None. **B. Naziruddin:** None.

Abstract# 587

Bone Marrow-Derived Mesenchymal Stem Cells Improve Rat Islet Graft Revascularization by Upregulating Isl1

W. Ying, J. Wang, X. Ding, *Kidney Transplantation, The First Affiliated Hospital of Xi'an Jiaotong University, Xi An, China*

Purpose: Revascularization of the transplant islet is a crucial step that defines the success rate of patient recovery. Though bone marrow-derived mesenchymal stem cells (BMSCs) have been reported to promote revascularization, its cellular mechanism remains unclear. The transcription factor, insulin gene enhancer binding protein-1 (ISL1), which is involved in islet cell proliferation also plays a potential regulatory role in the revascularization of islet cells. Our LC−MS/MS analyses results showed that BMSCs could promote the expression of ISL1 in islets. Hence, we set out to investigate the potential role of ISL1 in the revascularization process of islet transplantation.

Methods: Pancreatic islets and BMSC were isolated from Lewis rats. Quantitative proteomic analysis with TMT labeling was conducted to evaluate the change of protein profiles between islets that were cultured with or without BMSCs. By using in vitro co-culturing system and rat diabetes model, we examined the function, revascularization and ISL1 expression in islets and in rat pancreatic β (INS-1) cells with or without co-cultured/co-transplanted with BMSCs. Furthermore, INS-1 cells were transfected with lentivirus that can elevate or inhibit ISL1 expression. Chromatin immunoprecipitation (ChIP) were used to investigate the potential correlation between ISL1 and vascular endothelial growth factor A (VEGFA).

Results: Our LC−MS/MS data showed that the expression of ISL1 and VEGFA were significantly increased in the islets after it was co-cultured with BMSCs. The results from in vitro co-culturing system and rat diabetes model showed that the survival rate and insulin secretion from islets were increased with BMSCs were present, indicating that BMSCs promotes islet revascularization. We also observed that the presence of BMSCs led to an increase of ISL1 and VEGFA expression in both the islets and INS-1 cells. In silico protein structure modelling indicate that ISL1 is a transcription factor that has 4 binding sites with the mRNA of VEGFA. Further results showed that over-expression of ISL1 increased both the abundance of VEGFA transcripts and protein accumulation, whilst inhibition of ISL1 decreased the abundance of VEGFA. CHIP-qPCR assay results indicated that direct molecular interactions between ISL1 and VEGFA occur in INS-1 cells.

Conclusions: Our results revealed that BMSCs promote the expression of ISL1 in islets and lead to an increase of VEGFA in grafted islets. Hence ISL1 is a potential target to induce early revascularization for islet transplantation.

CITATION INFORMATION: Ying W., Wang J., Ding X. Bone Marrow-Derived Mesenchymal Stem Cells Improve Rat Islet Graft Revascularization by Upregulating Isl1 *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Ying: None. **J. Wang:** None. **X. Ding:** None.

Basic

Xenotransplantation

Abstract# 588

Cold Perfusion for Ischemia Minimization Reduces Cardiac Injury in an Ex Vivo Xenoperfusion Model

M. R. Connolly[1], A. Calhoun[1], F. Pollok[1], L. Burdorf[1], Z. Habibabady[1], M. Ma[1], S. Miura[1], W. Eyestone[2], C. Phelps[2], D. Ayares[2], *[1]Massachusetts General Hospital, Boston, MA, [2]Revivicor, Blacksburg, VA*

Purpose: Prior studies using Steen's cold perfusion storage technique for heart ischemia minimization (IM) prevented initial xenograft dysfunction (IXD). Our pilot data evaluates the effect of IM on cardiac injury and function during subsequent *ex vivo* xenoperfusion of wild-type (WT) and quadruple knock-out (QKO) porcine hearts.

Methods: Hearts from pigs with knockout of growth hormone receptor and the three principal antigens causing antibody-mediated graft injury (QKO) were compared to WT hearts on an *ex vivo* perfusion circuit. Three QKO and 1 WT hearts were perfused with a cold Steen solution for 2.5h after procurement (IM); 2 QKO and 2 WT hearts were cold-stored in iced saline for 2.5h (CS). Cardiac function was assessed in working heart mode (WHM) during subsequent perfusion with fresh human blood.

Results: Both WT CS hearts did not generate forward flow in WHM; 1 WT IM heart had declining function and failed at 3h (Fig.2F). Troponin levels increased throughout *ex vivo* perfusion in both QKO and WT groups, however troponin elaboration (as mean final troponin, ng/mL) was significantly attenuated with IM compared to CS for WT (IM 185, CS>1000; p=0.02) but not QKO hearts (IM 750, CS>1000; p=0.37)(Fig.1). Cardiac function (as increase in cardiac output with increased LA pressure) was relatively preserved over 4h in 2/3 QKO IM hearts (Fig2A,B) and 1/2 QKO CS hearts (2E), while 3/3 WT hearts (2 with CS; 1 with IM, 2F) and 2/5 QKO hearts (1 with IM, 2C; 1 with CS, 2D) failed within 4h. In this pilot series, IM did not significantly improve survival to 4h.

Conclusions: IM with cold Steen solution appears to protect WT hearts from IXD, with a trend toward reduced cardiac injury (as troponin release) during subsequent perfusion with human blood for both WT and QKO hearts. While preliminary, these observations support prior demonstrations of the effectiveness of IM to prevent IXD

in orthotopic cardiac xenotransplantation. The incomplete physiologic protection and residual troponin release seen in QKO hearts despite IM indicates the need to address other mechanisms of graft injury such as complement, coagulation, and adhesive interactions.

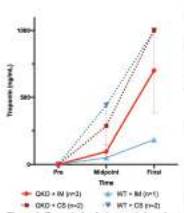


Figure 1. Troponin levels increased throughout all experiments over time, with cold perfusion (solid lines) trending toward delayed and attenuated rise compared to the non-cold perfused hearts (dotted lines) for both TKO:GhKO (red) and WT (blue) groups.

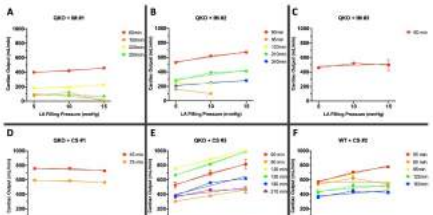


Figure 2. Cardiac performance under loading conditions trended toward more rapid decline during xenoperfusion in the hearts preconditioned with cold saline (CS) (D-F) than those with ischemia minimization (IM) preconditioning (A-C), as demonstrated by flattening of the cardiac output curve with increasing left atrial filling pressure over time.

CITATION INFORMATION: Connolly M., Calhoun A., Pollok F., Burdorf L., Habibabady Z., Ma M., Miura S., Eyestone W., Phelps C., Ayares D. Cold Perfusion for Ischemia Minimization Reduces Cardiac Injury in an Ex Vivo Xenoperfusion Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.R. Connolly: None. **A. Calhoun:** None. **F. Pollok:** None. **L. Burdorf:** None. **Z. Habibabady:** None. **M. Ma:** None. **S. Miura:** None. **W. Eyestone:** Salary; Name of Commercial Interest; Revivicor. Salary; Nature of Relationship; employee. **C. Phelps:** Salary; Name of Commercial Interest; Revivicor. Salary; Nature of Relationship; employee. **D. Ayares:** Salary; Name of Commercial Interest; Revivicor. Salary; Nature of Relationship; employee.

Abstract# 589

Imaging Flow Cytometry Reveals That Platelet-Sized Erythrocyte Fragments are Formed During Pig Organ Perfusion with Human Blood

Z. A. Habibabady[1], F. Ellett[2], L. Burdorf[1], M. Connolly[1], F. Pollok[1], D. Irimia[2], R. N. Pierson III[1], A. M. Azimzadeh[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital and Harvard School of Medicine, Boston, MA, [2]Center for Engineering in Medicine and Surgery, Massachusetts General Hospital and Harvard School of Medicine, Boston, MA*

Purpose: Severe thrombocytopenia frequently occurs after xenotransplantation of porcine cells or organs, and when pig organs are perfused with human blood. We developed a flow cytometry-based technique to accurately quantify platelets and to distinguish them from similarly-sized particles found in blood during cross-species organ perfusion studies.

Methods: Three pairs (n=6) of wild type pig lungs were perfused with heparinized human whole blood. Blood perfusate was left untreated (n=3) or treated with a thromboxane synthase inhibitor and histamine receptor blocker (n=3). Platelet counts measured by an Heska (Hematru) traditional hemocytometer (HC), and a refined flow cytometric method (FC) using calibrated beads. FC results analyzed by FlowJo were compared with HC results. Imaging flow cytometry using Image StreamX Mark II imaging flow cytometry (Amnis Corporation) was employed to visualize and identify blood elements.

Results: Platelet counts measured by FC showed a decreasing trend over time while platelet counts by HC showed an increasing trend and large variations within 4hrs of lung perfusion (Figure 1). FC analysis revealed an increasing population of "platelet-sized events" which were negative for human platelet markers (CD41, CD61). Using human leukocyte (CD45), erythrocyte (CD235a), and pig-specific (CD41, CD45, CD31) antibodies a majority of platelet-sized CD41-negative events express the CD235a red blood cell marker (Figure 2A). Platelets, intact RBC and platelet-sized RBC fragments were distinguishable by AMNIS (Figure 2B).

Conclusions: Flow cytometric counting improves the accuracy of platelet enumeration. AMNIS image analysis reveals that red blood cell fragments are falsely detected as platelets by hemocytometers, causing overestimation of platelet counts by that method.

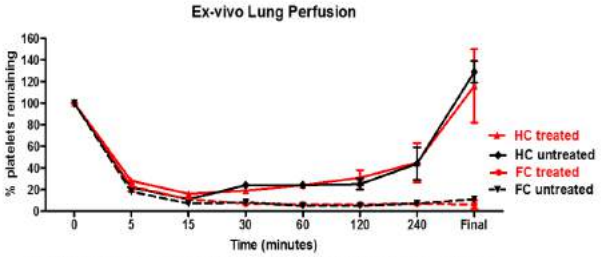


Figure 1. Comparison of platelet counts (mean ± SEM) from flowcytometry vs. hemocytometers in ex-vivo lung perfusions.

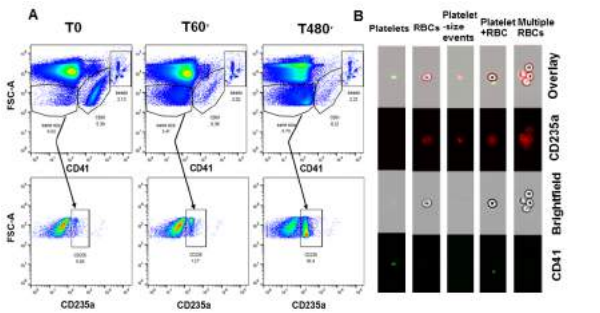


Figure 2. A) Platelet numbers (CD41+ events) decrease overtime, while platelet-like events(CD41-) increase, the majority of platelet-like events express CD235a. **B)** Platelets, intact RBC and platelet-sized RBC fragments visualization by AMNIS

CITATION INFORMATION: Habibabady Z., Ellett F., Burdorf L., Connolly M., Pollok F., Irimia D., Pierson III R., Azimzadeh A. Imaging Flow Cytometry Reveals That Platelet-Sized Erythrocyte Fragments are Formed During Pig Organ Perfusion with Human Blood *AJT, Volume 21 Supplement 3*

DISCLOSURES: Z.A. Habibabady: None. **F. Ellett:** None. **L. Burdorf:** None. **M. Connolly:** None. **F. Pollok:** None. **D. Irimia:** None. **R.N. Pierson III:** None. **A.M. Azimzadeh:** None.

Abstract# 590

Initial Experience with Growth Hormone Receptor Knockout in Pig-to-Baboon Kidney Transplantation: Effect on Ureteric Viability and Kidney Growth

C. Hansen-Estruch[1], H. Iwase[1], A. Jagdale[1], T. Yamamoto[1], M. H. Bikhet[1], J. Foote[2], H. Hara[1], D. Anderson[1], P. Porrett[1], D. Eckhoff[1], D. Ayares[3], W. Eyestone[3], J. Locke[1], D. K. Cooper[1], *[1]Xenotransplantation Program, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, [2]Department of Microbiology and Animal Resources Program, University of Alabama at Birmingham, Birmingham, AL, [3]Revivicor, Blacksburg, VA*

Purpose: The purpose of this study was to report outcomes of pig-to-baboon renal transplants using a novel growth hormone receptor knockout (GHRKO) organ-source pig created to address rapid initial kidney graft growth seen in prior xenotransplant experiments.

Methods: Kidney transplants from pigs expressing the GHRKO modification were carried out in 13 baboons. The immunosuppressive regimen included induction therapy with ATG (Thymoglobulin), anti-CD20mAb (Rituximab), and cobra venom factor or a C1-esterase inhibitor, and maintenance therapy based on anti-CD40mAb, rapamycin, and low-dose steroids. In Group A (n=7), a standard surgical procedure was carried out, as previously described, including bilateral native nephrectomy and graft implantation to the aorta and inferior vena cava. In Group B (n=6), much greater peri-ureteral tissue was maintained with the graft.

Results: Five of the first 7 baboons (71%) (Group A) developed a urinary leak between 8 and 25 days post-transplant from necrosis of the distal pig ureter, a complication we have never seen previously. In one case, the entire ureter had necrosed. In 2 of the 5 cases, histopathological features of antibody-mediated rejection were present in the kidney and ureter. In Group B, modifications to the surgical technique to ensure retention of vascularity of the ureter, e.g., maintenance of peri-ureteric tissue, prevented a ureteric leak. Baboons from both groups with graft survival greater than 30 days demonstrated an approximate 40% reduced graft growth compared with historic controls as measured by kidney dimensions seen on ultrasound.

Conclusions: Grafts from GHRKO pigs have reduced growth post-transplant compared to historical controls. GHRKO may have a detrimental effect on healing of the anastomosis between the graft ureter and recipient bladder, but does not affect healing of the vascular anastomoses or the abdominal wound. Taking special steps to maintain ureteric vascularity can prevent this problem.

CITATION INFORMATION: Hansen-Estruch C., Iwase H., Jagdale A., Yamamoto T., Bikhet M., Foote J., Hara H., Anderson D., Porrett P., Eckhoff D., Ayares D., Eyestone W., Locke J., Cooper D. Initial Experience with Growth Hormone Receptor Knockout in Pig-to-Baboon Kidney Transplantation: Effect on Ureteric Viability and Kidney Growth *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Hansen-Estruch: None. **H. Iwase:** None. **A. Jagdale:** None. **T. Yamamoto:** None. **M.H. Bikhet:** None. **J. Foote:** None. **H. Hara:** None. **D. Anderson:** None. **P. Porrett:** None. **D. Eckhoff:** None. **D. Ayares:** Salary; Name of Commercial Interest; Revivicor. Salary; Nature of Relationship; Employee. **W. Eyestone:** Salary; Name of Commercial Interest; Revivicor. Salary; Nature of Relationship; Employee. **J. Locke:** None. **D.K. Cooper:** None.

BASIC

Abstract# 591

Anti-pig IgE and IgA Antibodies in Sera of (i) Naïve Primates and (ii) Non-human Primates Sensitized to Pig Xenografts

H. Hara, Q. Li, H. Iwase, T. Yamamoto, D. Ayares, D. K. Cooper, *University of Alabama at Birmingham, Birmingham, AL*

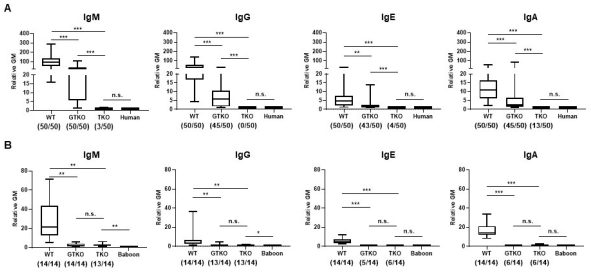
Purpose: Anti-pig IgM and IgG antibodies in primates play an important role in xenograft rejection. The possible roles of anti-pig IgE and IgA have not been investigated. Our aim was to measure (i) preformed serum anti-pig IgE and IgA in naïve humans and nonhuman primates (NHPs), (ii) elicited IgE and IgA after pig organ or tissue transplantation in NHPs, and (iii) their deposition in rejected pig xenografts.

Methods: The binding of IgM, IgG, IgE and IgA antibodies to red blood cells (RBCs) from WT, GTKO, and TKO (i.e., not expressing Gal, Neu5Gc, or Sd^a xenoantigens) pigs was measured by flow cytometry in naïve humans (n=50) and baboons (n=14). Antibody binding to WT and GTKO pig (p) RBCs was also measured in the sera of baboons (non-sensitized: n=7, sensitized: n=2) and rhesus monkeys (non-sensitized: n=2, sensitized: n=11) following WT or GTKO pig organ/tissue xenotransplantation. Deposition of IgE/IgA in the grafts was detected by immunohistochemistry.

Results: The majority of humans had natural preformed IgM/IgG/IgE/IgA to WT and GTKO pRBCs. In contrast, IgM/IgG/IgE/IgA to TKO pRBCs were present at lower levels and frequency ($p<0.01$) (Figure 1A). Baboons also had IgM/IgG/IgE/IgA antibodies against WT pRBCs, but less to GTKO and TKO ($p<0.01$) (Figure 1B). After xenotransplantation into NHPs, when IgM/IgG increased, IgE/IgA also increased, but to a lesser extent. In addition to IgM/IgG, IgE and/or IgA deposition was observed in rejected pig xenografts.

Conclusions: Primates, especially humans, have natural IgE/IgA antibodies to GTKO pig cells, but little or none to TKO pig cells. After exposure to a pig graft, IgE and IgA antibody levels increase, but not to the same extent as IgM or IgG. Their exact role, if any, in xenograft rejection remains uncertain.

Figure 1



CITATION INFORMATION: Hara H., Li Q., Iwase H., Yamamoto T., Ayares D., Cooper D. Anti-pig IgE and IgA Antibodies in Sera of (i) Naïve Primates and (ii) Non-human Primates Sensitized to Pig Xenografts *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Hara: None. **Q. Li:** None. **H. Iwase:** None. **T. Yamamoto:** None. **D. Ayares:** Salary; If "Other" Please Explain; Revivicor Inc.. **D.K. Cooper:** None.

Abstract# 592

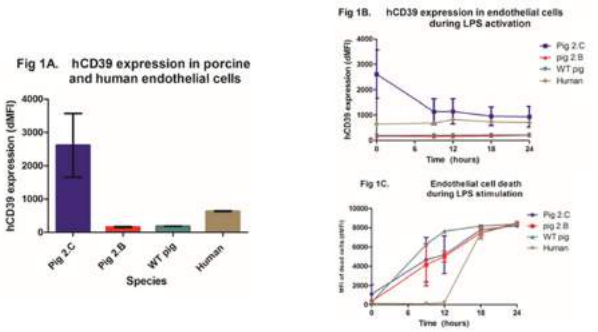
Transgenic Overexpression of Human Ectonucleoside Triphosphate Diphosphohydrolase 1 (entpd1, Or Hcd39) in Pig to Primate Xenotransplantation Models

R. Matheson[1], K. Deng[1], K. M. Lee[1], Z. A. Habibabady[1], C. G. Rickert[1], K. J. Ahrens[1], J. M. O[1], D. Becerra[1], P. Patel[1], W. Westlin[2], M. Youd[2], N. Serifis[1], T. M. Coe[1], D. Cloonan[1], A. M. Azimzadeh[1], C. LeGuern[1], J. C. Madsen[1], S. C. Robson[3], J. F. Markmann[1], *[1]Transplantation Surgery Research, Massachusetts General Hospital, Boston, MA, [2]eGenesis, Cambridge, MA, [3]Beth Israel Deaconess Medical Center, Boston, MA*

Purpose: Human CD39 (hCD39) is the gene of interest in xenotransplantation due to its reported capacity to prevent platelet aggregation by metabolizing extracellular ATP to AMP, reducing IL-6 and ALT and depleting resident $CD4^+$ T lymphocyte in the graft. One heterotopic cardiac xenotransplantation using a TKO-hCD39 donor (Pig 2.C, n=1) survived >100 days. We studied the impact of endothelial cell activation and expression of hCD39 on survival of aortic endothelial cells (AEC) recovered from normal and genetically modified pigs.

Methods: AECs from wild type (WT) (n=1), TKO.hCD39 (Pig 2.C; n=3), TKO (Pig 2.B; n=3) pigs and one human deceased donor were isolated and activated using LPS (1ug/mL), Ionomycin (1ug/mL), and PMA (50ng/mL) for 9, 12, 18 and 24 hours at 37°C. CD31 and hCD39 expression and viability were measured by flow cytometry.

Results: TKO.hCD39 AECs expressed more hCD39 than hAECs, while, as expected, no human CD39 was detected on WT or TKO AECs (Fig 1A). However, after nine hours of LPS challenge, hCD39 expression by the TKO.hCD39 AECs decreased to less than 50% of baseline, while expression of CD39 remained stable in the human AECs (Fig 1B). At nine hours, substantial cell death, as well as decreased CD39, was observed in the activated TKO.hCD39. At 18 hours, cell death measurements in the TKO.hCD39 AECs neared the maximal level observed at 24 hours. In the human AECs, no significant cell death was observed at 9 and 12 hours. However, at 18 hours the signal representing dead hAECs was high (Fig. 1C).



Conclusions: When compared to porcine AECs, human AECs appear more resistant to activation-mediated cell death. Overexpression of transgenic CD39 in the pig AEC did not afford significant protection, potentially as levels of hCD39 decreased with cellular activation. Further work will be conducted in order to understand effects of hCD39 and other human transgenes in these genetically engineered animals and to determine the impacts on immune and thromboregulatory pathways *in vivo*.

CITATION INFORMATION: Matheson R., Deng K., Lee K., Habibabady Z., Rickert C., Ahrens K., O J., Becerra D., Patel P., Westlin W., Youd M., Serifis N., Coe T., Cloonan D., Azimzadeh A., LeGuern C., Madsen J., Robson S., Markmann J. Transgenic Overexpression of Human Ectonucleoside Triphosphate Diphosphohydrolase 1 (entpd1, Or Hcd39) in Pig to Primate Xenotransplantation Models *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Matheson: None. **K. Deng:** None. **K.M. Lee:** None. **Z.A. Habibabady:** None. **C.G. Rickert:** None. **K.J. Ahrens:** None. **J.M. O:** None. **D. Becerra:** None. **P. Patel:** None. **W. Westlin:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **M. Youd:** Salary; Name of Commercial Interest; eGenesis. Salary; Nature of Relationship; Employee. **N. Serifis:** None. **T.M. Coe:** None. **D. Cloonan:** None. **A.M. Azimzadeh:** None. **C. LeGuern:** None. **J.C. Madsen:** None. **S.C. Robson:** None. **J.F. Markmann:** Grant/Research Support; Name of Commercial Interest; eGenesis. Grant/Research Support; Nature of Relationship; Scientific Advisor.

Abstract# 593

HTFPI.hCD47 and Adhesion Inhibition in GTKO.hCD46 Pig Lung Xenograft Injury

S. Miura[1], L. Burdorf[1], Z. Habibabady[1], A. Dandro[2], M. Connolly[1], S. Pratts[1], C. Phelps[2], W. Eyestone[2], D. Ayares[2], A. Azimzadeh[1], R. Pierson III[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Revivicor, Inc, Blacksburg, VA*

Purpose: We evaluate whether genetic expression of human tissue factor pathway inhibitor (TFPI, extrinsic coagulation pathway inhibitor) and human CD47 ("don't eat me" immunoregulator), alone or with combined PSGL-1 (selectin) and Mac-1 (integrin) ("adhesion inhibition"), influences GalTKO.hCD46 porcine lung injury during perfusion with human fresh blood.

Methods: Expression of TFPI and CD47 was confirmed by qRT-PCR and immunochemistry; TFPI function on pAECs was assessed using a thrombin generation assay. In a well-established paired *ex vivo* lung perfusion model, GTKO.hCD46.hTFPI.hCD47 transgenic pig lungs (n=5) were compared to reference GTKO.hCD46 lungs (n=5). All lungs were treated with a thromboxane synthase inhibitor (1-BIA), anti-histamine (Famotidine), and anti-GPIb integrin-blocking Fab. In both genotypes, one lung of each pair was additionally treated with adhesion inhibitors (n=4 hTFPI.hCD47, n=3 reference).

Results: *In vitro,* GTKO.CD46.TFPI.CD47 pAEC triggered less thrombin formation compared to GTKO (normalized AUC: 93 +/- 2 vs. 100 +/- 0.4, $p<0.005$). *Ex vivo*, all except for two GalTKO.hCD46 lungs (183, 440 min) survived until elective termination at 8 hours. Additional adhesion inhibition moderately lowered PVRs in lungs expressing hTFPI.hCD47 during the first 2 hours. Neutrophil sequestration was significantly delayed during the first hour ($P<0.05$) in association with hTFPI.hCD47 expression, but not with adhesion inhibition (Fig.A). Lungs expressing hTFPI.hCD47 significantly attenuated terminal platelet activation measured by CD62P expression compared to GTKO.CD46 ($P<0.001$) (Fig.B). Additional adhesion inhibitors didn't further suppress platelet activation in GalTKO.hCD46 or GalTKO.hCD46.hTFPI.hCD47-expressing lungs.

Conclusions: Expression of hTFPI.hCD47 showed protective effects (prolonged survival, delayed initial neutrophil sequestration and attenuated platelet activation) under these study conditions. While additional adhesion inhibitor reduced PVR elevation associated with hTFPI.hCD47 expression, it didn't significantly attenuate neutrophil or platelet sequestration by the lung. We conclude that non-canonical

adhesive mechanisms mediate the adhesion of human formed blood elements to pig endothelium that occurs even in the context of multiple genetic modifications and drug treatments designed to attenuate lung xenograft injury by these pathways.

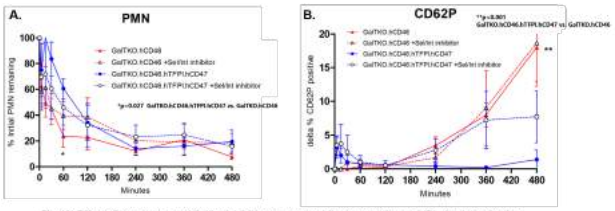


Fig. (A) Effect of transgenes and Sel/Int inhibition on neutrophil sequestration and (B) platelet activation.

CITATION INFORMATION: Miura S., Burdorf L., Habibabady Z., Dandro A., Connolly M., Pratts S., Phelps C., Eyestone W., Ayares D., Azimzadeh A., Pierson III R. HTFPI.hCD47 and Adhesion Inhibition in GTKO.hCD46 Pig Lung Xenograft Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Miura: None. **L. Burdorf:** None. **Z. Habibabady:** None. **A. Dandro:** None. **M. Connolly:** None. **S. Pratts:** None. **C. Phelps:** None. **W. Eyestone:** None. **D. Ayares:** None. **A. Azimzadeh:** None. **R. Pierson III:** None.

Abstract# 594

Triple-Knockout Pig Red Blood Cells Are a Potential Alternative Source for Clinical Blood Transfusion

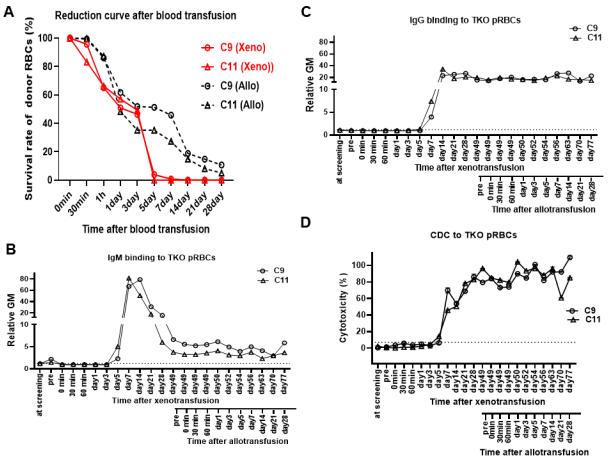
T. Yamamoto[1], M. H. Bikhet[1], H. Q. Nguyen[1], M. Javed[1], D. Ayares[2], H. Iwase[1], H. Hara[1], D. K. Cooper[1], *[1]Xenotransplantation Program, Surgery, The University of Alabama at Birmingham, Birmingham, AL, [2]Revivicor, Blacksburg, VA*

Purpose: Triple-knockout (TKO) pig RBCs (pRBCs) may be an alternative source for clinical blood transfusion because almost humans have no preformed antibody to TKO pRBCs. However, we are still unclear how important the species incompatibility of CD47/SIRP-α affects the result. Old World NHPs (e.g., baboons, rhesus monkeys) have antibodies to TKO pig cells, but capuchin (New World NHPs) monkeys immunologically mimic humans in respect to their response to TKO pig cells. The aim of this study was to determine survival of (i) TKO pRBCs (xenotransfusion) and (ii) of allogeneic monkey RBCs in capuchin monkeys (allotransfusion) after xenotransfusion in capuchin monkeys.

Methods: After 25% of the blood volume was removed from capuchin monkey (n=2), the same volume of carboxyfluorescein diacetate succinimidyl ester (CFSE)-labeled TKO pRBCs was transfused into these monkeys (xenotransfusion). Seven weeks after xenotransfusion, CFSE-labeled allogeneic monkey RBCs were transfused. No immunosuppressive therapy was administered. The percentage of donor blood, complete blood count, IgM/IgG binding, and complement-dependent cytotoxicity (CDC) to TKO pRBCs or allogeneic monkey RBCs were measured after xenotransfusion and allotransfusion. Spleen mononuclear cells were isolated from recipient capuchin monkeys at euthanasia to evaluate direct and indirect phagocytosis of TKO pRBCs or allogeneic monkey RBCs by flow cytometry.

Results: After xenotransfusion, survival of TKO pRBCs was for 5 or 7 days (Fig. A red) even though direct phagocytosis of TKO pRBCs (5.5%) was significantly greater than of allogeneic monkey RBCs (1.6%) ($p<0.01$). After allotransfusion, survival of RBCs was significantly longer at >28 days (Fig. A black). After xenotransfusion, IgM/IgG binding (Figs. B and C) and CDC (Fig. D) to TKO pRBCs increased after days 5 and 7, but there was no further increase after allotransfusion. After xenotransfusion Indirect phagocytosis of TKO pRBCs (10.5%) was significantly greater than of allogeneic monkey RBCs (2.7%) ($p<0.05$).

Conclusions: (1) TKO pRBCs survived in capuchin monkeys for 5 or 7 days without any immunosuppressive therapy. (2) Loss of TKO pRBCs by direct phagocytosis (due to the species incompatibility of CD47/SIRP-α) is less than by indirect phagocytosis and CDC. (3) TKO pRBCs xenotransfusion in primates does not sensitized to subsequent allotransfusion. (4) TKO pRBCs may be life-saving if no human RBCs are immediately available.



CITATION INFORMATION: Yamamoto T., Bikhet M., Nguyen H., Javed M., Ayares D., Iwase H., Hara H., Cooper D. Triple-Knockout Pig Red Blood Cells Are a Potential Alternative Source for Clinical Blood Transfusion *AJT, Volume 21 Supplement 3*

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Basic

Ischemia Reperfusion & Organ Rehabilition

Abstract# 595

MiRNA as Regulator of Cell Death and Inflammatory Response in Hepatic Iri

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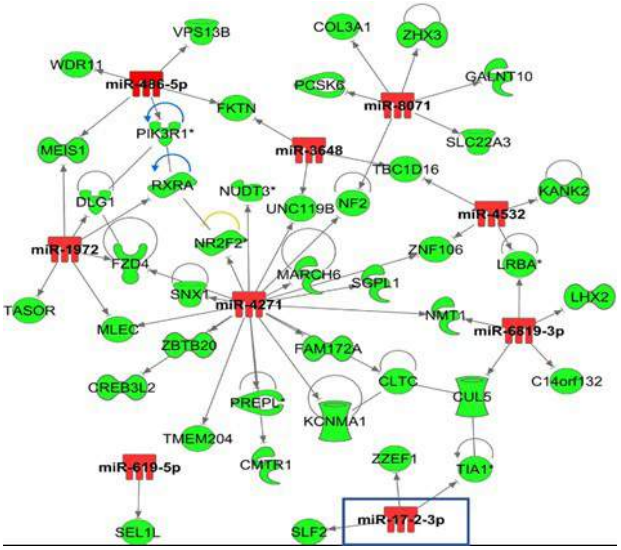
Purpose: Hepatic IRI represents a barrier to the use of available organs. Early graft dysfunction of donor livers is directly related to the severity of hepatic IRI. We aimed to identify upstream regulators of IRI pathways as targets for therapeutics interventions.

Methods: High-throughput gene expression , miRNAs and DNA methylation were done in pre-implantation (L1) and post-reperfusion (L2) biopsies from DDLT recipients. After pre-processing and normalization, differential expressed genes (FDR 0.05, FC>2), miRNAs (FDR 0.05) and CpGs (FDR 0.05, delta>0.20) were identified between groups and at each time point. CpGs were mapped to genes. Integration of significant miRNAs and mRNAs was done using IPA.

Results: Patients presented different extent of IRI post-LT (high (n=20) and low (n=20) IRI groups). CIT was similar between groups (7.4 ± 1.8 vs. 7.1 ± 2.8, p=0.62). Steatosis (%) was statistically different between groups (% steatosis: 25 ± 11.8 vs. 4.1 ± 5.6 ± 3. 4, $p<0.001$). A total of 20 miRNAs in the high IRI group and 26 miRNAs in the low IRI group were statistically differentially expressed (FDR 0.05), of which 7 miRNAs were common to both groups. Differentially expressed miRNAs and mRNAs from same samples were integrated. Within the high IRI group 16 out of 20 differentially expressed miRNAs presented 70 gene targets also differentially expressed in the same samples and following the predicted directionality in expression **(Fig. 1)**. For the low IRI low injury group, 15 out of 26 differentially expressed miRNAs presented 95 gene targets differentially expressed in the same tissue samples. The integrated list of DEGs from the high IRI group when enriched for functions showed activation of cell death (p= 2.9E-04, Z-score 4.7), growth failure (p= 1.4E-03; Z-score 3) and inhibition of transport of molecules (p= 3.23E-03; Z-score 3.02). Analysis from the low IRI injury group showed gene enriched functions mainly related to chemotaxis (p = 1.45E-12, Z-core 2.23), migration of neutrophils (p= 2.69E-05; Z-score 2.41), and T cell development (p= 6.33E-12; Z-score 2.42). Differentially expressed miRNAs were also presenting differentially methylated CpGs at their gene regulatory regions (i.e., MIR17 (TSS1500), MIRLET7A2 (TSS200), MIR144|MIR451 (TSS1500), C9orf3| MIR23B| MIR27B (3UTR|TSS1500).

Conclusions: These preliminary integrative analyses support a role for miRNAs as regulators of pathways of donor organ damage in hepatic IRI and likely targets for intervention.



CITATION INFORMATION: Bardhi E., Rousselle T., McDaniels J., Bontha S., Eason J., Maluf D., Mas V. MiRNA as Regulator of Cell Death and Inflammatory Response in Hepatic Iri *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Bardhi: None. **T. Rousselle:** None. **J. McDaniels:** None. **S. Bontha:** None. **J. Eason:** None. **D. Maluf:** None. **V. Mas:** None.

Abstract# 596

Spleen Tyrosine Kinase (syk): A Novel Regulator of Neutrophil Infiltration in Hepatic Iri

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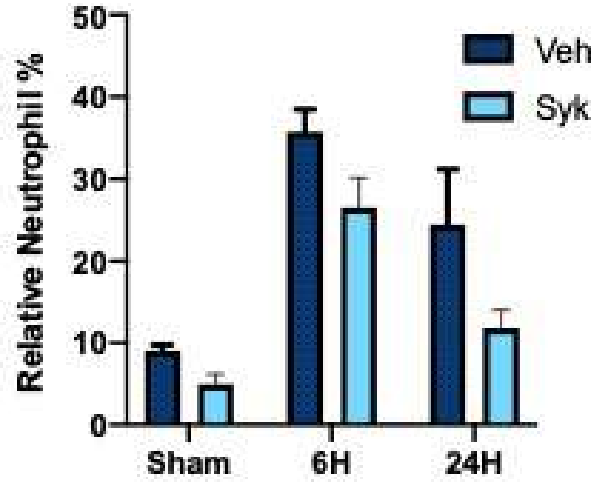
Purpose: Hepatic ischemia-reperfusion injury (IRI) plays a governing role in orthotopic liver transplantation, significantly impairing early graft function and increasing organ susceptibility to rejection. Neutrophil activation is a major, but still incompletely characterized, event driving the progression of hepatic IRI. A previously performed multi-omic analysis on post reperfusion liver tissue from a mouse model of hepatic IRI, and human orthotopic liver transplants, identified SYK as a potential mediator of neutrophil activation IRI. Therefore, this study was designed to address the underlying mechanism of Syk signaling pathways that are active and their inflammatory process occurring during hepatic IRI.
Methods: Adult 10-12 week old mice were split in to two groups: treatment with a) Syk inhibitor R788 every day for 5 days prior to IRI, and b) Vehicle everyday for 5 days prior to IRI. Mice in each group were then subdivided in to mice that underwent a 70% partial warm ischemia for 60 minutes, followed by 6 and 24 hours of reperfusion (n=5/group), or mice that were subject only to a sham midline laparotomy (n=3/group). All mice were then euthanized for blood and hepatic tissue collection at each time point. Standard flow cytometry of whole blood was performed with cell specific target markers to identify specific subpopulations.
Results: Specific Syk inhibition depressed neutrophil activation and recruitment in hepatic IRI. Flow cytometric analysis of the circulating CD11b+/Ly6G+ neutrophil cell subset in whole blood retrieved at 6h and 24h post-IRI showed a significantly lower relative % of CD11b+/Ly6G+ neutrophils in mice treated with R788, when compared to those treated solely with vehicle. Inhibiting neutrophil activation was also associated to a significant decrease in the number of liver infiltrating Ly6G+ neutrophils at 6h and 24h post-reperfusion, when compared to vehicle treated control mice. Syk inhibition led to reduced expression of pro-inflammatory iNOS and increased expression of TGF-β at 6h of reperfusion. As a result, mice treated with R788 had significantly reduced serum ALT levels and ameliorated histological hepatic injury at both 6h and 24h of hepatic reperfusion.
Conclusions: This study demonstrates that preconditioning mice with SYK specific inhibition protects livers from hepatic IRI via the downregulation of neutrophil infiltration. Moreover, it demonstrates the potential of multi-omics analysis approach for the identification of novel therapeutic targets in hepatic IRI.



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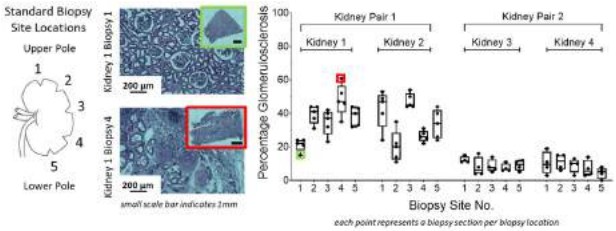
DISCLOSURES: V. Boominathan: None. **A. Kobayashi:** None. **S. Duarte:** None. **A. Zarrinpar:** None.

Abstract# 597

Sampling Renal Biopsies in Pre-Clinical Research for Comprehensive Assessment

C. M. Edwards[1], C. Albert[2], D. Stern[1], J. Langford[1], W. Day[2], J. R. DiRito[1], W. M. Saltzman[2], M. Kashgarian[3], J. S. Pober[4], G. T. Tietjen[1], *[1]Surgery, Yale School of Medicine, New Haven, CT, [2]Biomedical Engineering, Yale School of Medicine, New Haven, CT, [3]Pathology, Yale School of Medicine, New Haven, CT, [4]Immunobiology, Yale School of Medicine, New Haven, CT*

Purpose: Previous literature has demonstrated that single biopsies are not representative of a whole kidney in clinical assessments. In this study we aimed to design a statistically powered renal biopsy sampling procedure for pre-clinical research that characterizes the variability of glomerulosclerosis in a kidney.
Methods: Cortical wedge biopsies were obtained from 7 transplant-declined human kidneys in 5 standardized locations. Initial investigation was conducted with 2 kidney pairs. Five sections of 4 μm thickness were spaced at 200 μm along each formalin-fixed biopsy. These sections were stained with H&E and imaged at 20x. The percentage of glomerulosclerosis (%GS) was calculated for each section by counting the ratio of sclerosed glomeruli to total glomeruli. The heterogeneity in %GS within sections, between biopsies, and between paired organs from the same donor was evaluated.
Results: For Kidney Pair 1 (KP1), there was high variability in %GS calculated within a single biopsy, between biopsy locations, and between paired organs. For Kidney Pair 2 (KP2), there was significantly less variability in %GS for these comparisons. KP1 was from a 36-year-old donor, had a Kidney Donor Profile Index (KDPI) of 32, and was expected to be of superior clinical quality compared to KP2 (age 66 and KDPI 95). Interestingly, KP1 demonstrated higher variability in %GS and had higher overall %GS scores compared to KP2.
Conclusions: The findings of our study suggest that limited biopsies, taken for clinical evaluation, may be misleading and alternative approaches, such as imaging, may offer additional information. One biopsy section will not yield a representative value of %GS for an entire kidney or kidney pair. In research settings, the quantity of tissue taken from a kidney is inconsequential because the organ is not being transplanted into a patient. Obtaining multiple biopsies from different anatomic positions and scoring several sections per biopsy is one method for calculating a representative value of %GS. This method may also prove useful for other preclinical endpoints such as immunofluorescence staining or transcriptomics, both of which we are currently evaluating. Further investigation is needed to determine how the biopsy sampling procedure should be adjusted for a given research endpoint based on organ donor health or kidney quality.



CITATION INFORMATION: Edwards C., Albert C., Stern D., Langford J., Day W., DiRito J., Saltzman W., Kashgarian M., Pober J., Tietjen G. Sampling Renal Biopsies in Pre-Clinical Research for Comprehensive Assessment *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.M. Edwards: None. **C. Albert:** None. **D. Stern:** None. **J. Langford:** None. **W. Day:** None. **J.R. DiRito:** None. **W.M. Saltzman:** None. **M. Kashgarian:** None. **J.S. Pober:** None. **G.T. Tietjen:** None.

Abstract# 598

Indocyanine Green Fluorescence Imaging Allows Quantification of Ischemic Injury During Porcine Normothermic Ex Situ Perfusion

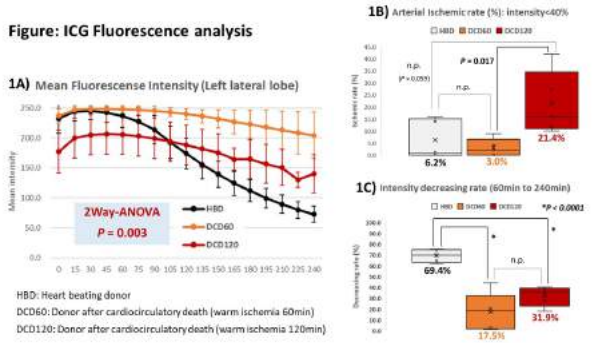
T. Goto, Y. Noguchi, S. Ganesh, L. Mazilescu, T. Reichman, N. Selzner, M. Selzner, *Ajmera Transplant Program, Department of Surgery, Toronto General Hospital, Toronto, ON, Canada*

Purpose: Normothermic Ex Situ Liver Perfusion (NEsLP) is a novel preservation technique for the storage and assessment of grafts retrieved after Donation after Cardio-circulatory Death (DCD). Reliable parameters reflecting graft injury, graft function, and vascular injury during NEsLP are currently missing. Indocyanine Green (ICG) emits fluorescence with near-infrared light and is exclusively cleared by hepatocytes and excreted into the bile without biotransformation. We performed ICG imaging during NEsLP and quantified ICG enhancing and clearance as markers of ischemic liver injury.

Methods: 30 to 35 kg male Yorkshire pigs were allocated to 3 groups; Heart beating donor (HBD), DCD 60minutes and DCD 120minutes, each n=5. Following induction of warm ischemia with heparinization, procurement and 2-hour cold storage, the livers were connected to the NEsLP circuit and ICG was injected via the hepatic artery. ICG enhancement and clearance was measured with the SPY Elite® System (Stryker) and analyzed by Image J (National Institutes of Health) software.

Results: ICG intensity analysis clearly classified three liver patterns (Figure 1A). HBD and DCD60 livers showed rapid intensity increase. Fast clearance of ICG occurred in HBD but not DCD60 livers. DCD120 demonstrated slow enhancement and slow clearance. The arterial ischemic areas were significantly larger in the DCD120 group compared to DCD60 and HBD livers (Figure 1B). ICG excretion rate was significant higher in HBD (69.4%) vs DCD60 (17.5%) vs DCD120 (31.9%) grafts, each $P < 0.0001$) as shown in Figure 1C.

Conclusions: ICG imaging during NEsLP is a novel and non-invasive method for classification of DCD liver grafts, which reflects the impairment of arterial perfusion and the metabolic function in the whole graft.



CITATION INFORMATION: Goto T., Noguchi Y., Ganesh S., Mazilescu L., Reichman T., Selzner N., Selzner M. Indocyanine Green Fluorescence Imaging Allows Quantification of Ischemic Injury During Porcine Normothermic Ex Situ Perfusion *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Goto: None. **Y. Noguchi:** None. **S. Ganesh:** None. **L. Mazilescu:** None. **T. Reichman:** None. **N. Selzner:** None. **M. Selzner:** None.

Abstract# 599

The Harmful Effect of Retained Peripheral Cells During Flushing and Static Cold Storage in Rat Liver Normothermic Machine Perfusion

O. Haque[1], C. A. Pendexter[2], J. F. Markmann[2], K. Uygun[2], H. Yeh[2], S. N. Tessier[2], *[1]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

Purpose: Retained donor blood in a liver graft can cause damage to resident cells that is exacerbated by static cold storage (SCS), leading to platelet activation, neutrophil extracellular trap formation, and RBC aggregation at reperfusion. We used normothermic machine perfusion (NMP) to study differences in hepatic function after a variety of flush and SCS conditions.

Methods: Adult, Sprague Dawley rats were heparinized and the livers procured for 6 hours of NMP. Prior to NMP, livers underwent one of the following conditions (n = 4 per group): (1) room temperature (RT) lactated ringers (LR) flush with no SCS, (2) cold University of Wisconsin solution (UW) flush with 24h SCS, (3) RT LR flush with 24h SCS, or (4) no flush with 24h SCS. Perfusion metrics and injury markers were compared by two-way ANOVA testing and histology by H&E and TUNEL staining.

Results: Comparing RT LR flush livers with 24h SCS versus no SCS yielded very similar perfusion results (**fig 1**). Since SCS had no effect on this model, we then compared livers with cold UW flush (group 2), LR flush (group 3), and no flush (group 4), and found, as expected, no flush livers had the highest resistance, lactate, and transaminase levels (**fig 1**). Interestingly, when we compared cold UW flush with RT LR flush, liver allografts flushed with RT LR had lower intrahepatic resistance (0.342 vs. 0.183 mmHg/ml/min, p = 0.007), lactate (7.59 vs. 3.94 mmol/L, p = 0.003), AST (629 vs. 351 U/l, p = 0.046), and ALT (491 vs. 278 U/l, p = 0.068) at 6 hours (**fig 1**). Histology also showed that compared to the cold UW flush livers, the RT LR flush livers had healthier cellular architecture, less endothelial damage, and less TUNEL staining.

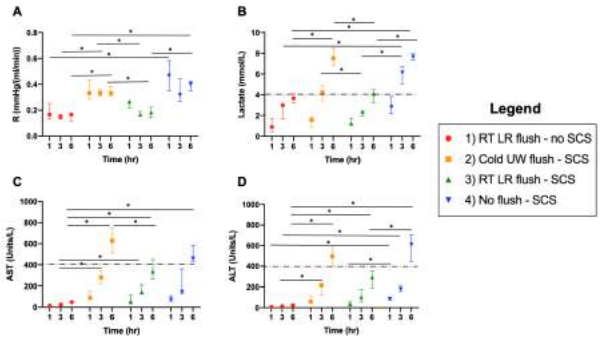


Figure 1: Perfusion and injury metrics of 6 hour ex-vivo rat liver NMP detailing (A) R, intrahepatic resistance, (B) lactate, (C) AST, and (D) ALT. Stars denote p < 0.05 on two-way ANOVA. Icons report median and error bars indicate interquartile range. Horizontal dashed lines indicate transplantable criteria.

Conclusions: Cold UW appears to perform worse than RT LR as a flush, indicating that RT flush prior to cooling may have benefit. Clinically in humans, this would require a cold flush *after* a RT flush, as rat livers cool quickly on ice by virtue of being small. Conventional wisdom suggests that the cold flush should be UW rather than LR because of its preservation properties, but our results suggest that the quality of the flush is more important than the preservation properties. Further studies are needed to compare RT UW to RT LR and cold LR to cold UW flushes to ascertain whether it is UW solution or flush temperature that is damaging the liver allograft.

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DISCLOSURES: O. Haque: None. **C.A. Pendexter:** None. **J.F. Markmann:** None. **K. Uygun:** Intellectual Property Rights; Name of Commercial Interest; patent applications relevant to this technology. Ownership Interest; Name of Commercial Interest; Organ solutions, a company focused on developing organ preservation technology. **H. Yeh:** None. **S.N. Tessier:** None.

Abstract# 600

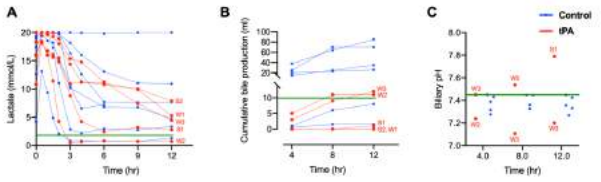
Thrombolytic Therapy During Ex-Vivo Normothermic Machine Perfusion of Human Livers Reduces Peribiliary Vascular Plexus Injury

O. Haque[1], S. Raigani[2], I. Rosales[2], C. Carroll[2], T. M. Coe[2], S. Baptista[2], H. Yeh[2], K. Uygun[2], J. F. Markmann[2], *[1]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [2]Massachusetts General Hospital, Boston, MA*

Purpose: A major limitation in expanding the use of DCD livers in transplantation are the higher rates of graft failure secondary to ischemic cholangiopathy. Warm

ischemia causes thrombosis and injury to the peribiliary vascular plexus (PVP), which is supplied by branches of the hepatic artery, causing higher rates of biliary complications in DCD allografts. We aimed to recondition discarded DCD livers with tissue plasminogen activator (tPA) while on normothermic machine perfusion (NMP) to improve PVP blood flow and reduce biliary injury.

Methods: Five discarded DCD human livers underwent 12 hours of NMP. Plasminogen was circulated in the base perfusate prior to initiation of perfusion and 1 mg/kg of tPA was administered through the hepatic artery at T=0.5 hours. Two livers were split prior to perfusion (S1, S2), with tPA administered in one lobe, while the other served as a control. The remaining three whole livers (W1-W3) were compared to seven DCD control liver perfusions (C1-C7) with similar hepatocellular and biliary viability criteria (**fig 1**). D-dimer levels were measured at T=1 hour to verify efficacy of tPA. Lactate, total bile production, bile pH, and difference in biliary injury scores before and after perfusion were compared between tPA and non-tPA groups using two-tailed t-tests.



Liver number	S1	S2	W1	W2	W3	C1	C2	C3	C4	C5	C6	C7
Hepatocellular Viability Criteria												
(A) Lactate remains < 1.7 mmol/L w/in 4 hrs of NMP*	N	N	N	Y	N	N	N	N	N	Y	N	N
(B) Total bile production > 10 ml at 4 hrs of NMP*	N	N	N	N	N	Y	N	N	Y	Y	N	Y
Biliary Viability criteria												
(C) bile pH remains > 7.45 w/in 4 hrs of NMP	N	N	N	N	N	N	N	N	N	N	N	N

Figure 1: Viability criteria for donor liver assessment during NMP. (**A**) Inflow lactate levels (**B**) cumulative bile production and (**C**) bile pH in tPA livers (red) and control livers (blue). Green lines indicate viability criteria. **Table** summarizes hepatocellular and biliary viability criteria for transplantation. *Both hepatocellular viability criteria must hold true for a liver to be transplantable. tPA, tissue plasminogen activator. W, whole livers with tPA. S, split liver lobe with tPA. C, whole liver controls without tPA. bPH, biliary pH. Y, yes. N, no.

Results: Average weight-adjusted D-dimer levels were higher in tPA livers in the split (p=0.002) and whole-liver model (p=0.02), verifying drug function. There were no differences in perfusion hepatic artery resistance, portal vein resistance, and arterial lactate between tPA livers and non-tPA livers in both the split and whole-liver model. However, when comparing biliary injury between hepatocellular and biliary non-viable whole livers, tPA livers had significantly lower PVP injury scores (0.67 vs. 2.0, p=0.01) and mural stroma (MS) injury scores (1.3 vs. 2.7, p=0.05) (**fig 2**).

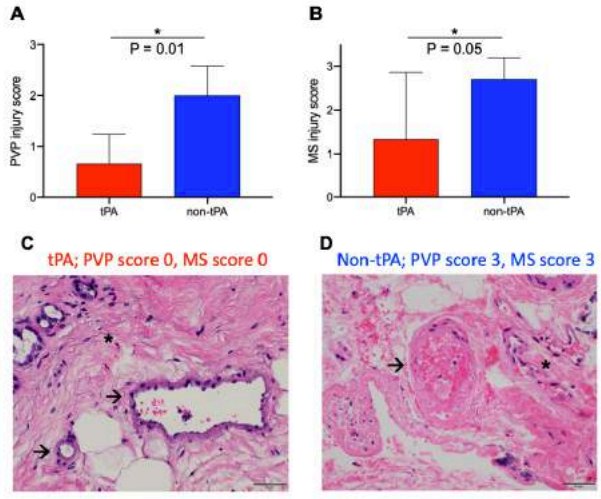


Figure 2: Difference in bile duct injury scores before and after 12 hours of NMP between whole, non-viable tPA livers (red) and whole, nonviable control livers (blue). tPA livers exhibit less (**A**) peribiliary vascular plexus (PVP) injury ($p = 0.01$) and (**B**) mural stroma (MS) injury ($p = 0.05$). Stars denote statistical significance on two-tailed, unpaired t-test: *$p \leq 0.05$. Error bars denote standard deviation. Representative H&E histology of tPA liver (**C**) shows normal peribiliary arterioles (arrows) and no injury to MS (asterisk) versus non-tPA liver histology (**D**) shows arteriolonecrosis (arrow) and necrotic mural stroma (asterisk).

Conclusions: This study demonstrates that administration of tPA into DCD livers during NMP can reduce PVP and MS injury. Further studies are necessary to assess the effect of tPA administration on long term biliary complications.

CITATION INFORMATION: Haque O., Raigani S., Rosales I., Carroll C., Coe T., Baptista S., Yeh H., Uygun K., Markmann J. Thrombolytic Therapy During Ex-Vivo Normothermic Machine Perfusion of Human Livers Reduces Peribiliary Vascular Plexus Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: O. Haque: None. **S. Raigani:** None. **I. Rosales:** None. **C. Carroll:** None. **T.M. Coe:** None. **S. Baptista:** None. **H. Yeh:** None. **K. Uygun:** Other; Name of Commercial Interest; Organ Solutions. Other; Nature of Relationship; financial interest. Other; If "Other" Please Explain; company focused on developing organ preservation technology. **J.F. Markmann:** None.

Abstract# 601

Sigma-1 Receptor Agonists are Renoprotective in Experimental Kidney Transplantation

A. Hosszu[1], T. Lakat[1], A. Toth[1], D. Balogh[1], J. Hodrea[1], L. J. Wagner[2], A. J. Szabo[1], A. Fekete[1], *[1]1st Department of Pediatrics, Semmelweis University, Budapest, Hungary, [2]Department of Transplantation and Surgery, Semmelweis University, Budapest, Hungary*

Purpose: Kidney transplantation (Tx) is associated with better quality of life and reduced costs compared to dialysis, but the shortage in donor organs is a limiting factor. Graft survival is highly dependent on the extent of ischemia/reperfusion injury (IRI) during Tx. We recently described the renoprotective effects of Sigma-1 receptor (S1R) agonist treatment in renal IRI. Thus, our aim was to develop a preservation solution which minimizes ischemic graft damage in order to improve Tx outcomes and to increase the number of organs suitable for Tx.

Methods: Kidneys of male Wistar rats were perfused and placed in ice cold (i) Custodiol preservation solution; Custodiol containing S1R agonists (ii) fluvoxamine; (iii) SA-4503 or (iv) VCC compound for 2 hours, then autotransplanted and sacrificed 24 hours or 9 days after reperfusion. Sham-operated rats served as controls. In a second experiment kidneys wild-type and S1R knockout mice were perfused and placed in ice cold Custodiol or Custodiol containing various selective S1R agonists for 2/3/8/24 hours of cold ischemia and tissue samples were collected for histological evaluation.

Results: S1R agonists mitigated renal functional impairment and tubular dilatation following Tx. Expression of early and sensitive tubular injury markers *Kim1* and *Ngal* were markedly less elevated in S1R agonist-treated kidneys. S1R agonists alleviated renal apoptosis as shown on TUNEL-stained kidney sections, decreased apoptotic *Bax* expression, while increased anti-apoptotic *Bcl2* expression. Reduced number of CD45+ leukocytes and reduced inflammatory cytokine (*Mcp1, Il1a, Il6, Tnf*) expressions confirmed the anti-inflammatory effect of S1R agonists. All S1R agonists mitigated cold ischemic structural kidney damage at all time points.

Conclusions: The addition of S1R agonists to the preservation solution during Tx improves graft function and alleviates structural damage, thus improving long-term outcomes. S1R agonists reduce graft injury during cold storage, therefore the number of transplantable donor organs can be increased.

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CITATION INFORMATION: Hosszu A., Lakat T., Toth A., Balogh D., Hodrea J., Wagner L., Szabo A., Fekete A. Sigma-1 Receptor Agonists are Renoprotective in Experimental Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Hosszu: None. **T. Lakat:** None. **A. Toth:** None. **D. Balogh:** None. **J. Hodrea:** None. **L.J. Wagner:** None. **A.J. Szabo:** None. **A. Fekete:** None.

Abstract# 602

An Immune-modulatory Strategy to Mitigate Hepatic Ischemia/reperfusion Injury in a Murine Model

A. Kobayashi, A. Wanchoo, S. Farhadi, J. Simonovich, S. Duarte, V. Boominathan, S. Shrestha, G. Hudalla, B. G. Keselowsky, A. Zarrinpar, *University of Florida, Gainesville, FL*

Purpose: Hepatic ischemia/reperfusion injury (IRI) is the leading cause of early graft dysfunction and contributes to the shortage of donor liver grafts. However, despite its obvious clinical importance, there are no effective therapies to prevent or treat this condition. Indoleamine 2,3-dioxygenase (IDO) is an intracellular enzyme that catalyzes the catabolism of the essential amino acid tryptophan to the product kynurenine. It is well known for inducing a powerful immunosuppressive metabolic programming. To date, studies have mostly focused on prolonging graft survival by overexpressing IDO in the transplanted tissue. PEGylation of therapeutic proteins reduces their immunogenicity and extends systemic circulation time. Here, we PEGylate IDO and evaluate efficacy and safety of this IDO delivery strategy to control the local hepatic inflammatory response in a mouse model of warm hepatic IRI

Methods: We used a well-established mouse model of partial hepatic IRI. Partial hepatic ischemia was produced in the left and median lobes for 90 minutes followed by 6 hours reperfusion. Male 8-12 week old Balb/c mice were separated into 3 cohorts; PEGylated-IDO (PEG-IDO), IDO, and phosphate buffered saline (PBS) intravenously administered 48 hours prior to inducing ischemic injury.

Results: PEGylated-IDO significantly improved hepatic IRI; plasma levels of aspartate alanine aminotransferase and alanine aminotransferase at 6 hours after reperfusion were significantly lower in the PEG-IDO group, when compared with those in PBS group ($P<0.05$). Histological analysis showed significantly less congestion, necrosis, and vacuolization in the PEG-IDO group compared with those in PBS groups ($P<0.05$) as assessed by Suzuki score. It decreased the local infiltration of the inflammatory cells such as T cells, neutrophils, and macrophages, and it re-

duced the expression of proinflammatory cytokines and chemokines. Furthermore, apoptosis, as measured by the number of TUNEL+ hepatocytes, was also suppressed in PEG-IDO treated mice.

Conclusions: The results in this study indicate that PEG-IDO preconditioning protects livers from local inflammation and liver damage induced by hepatic IRI. This metabolic immune-modulatory approach may be a new therapeutic strategy against innate immunity-dominated liver tissue damage.
CITATION INFORMATION: Kobayashi A., Wanchoo A., Farhadi S., Simonovich J., Duarte S., Boominathan V., Shrestha S., Hudalla G., Keselowsky B., Zarrinpar A. An Immune-modulatory Strategy to Mitigate Hepatic Ischemia/reperfusion Injury in a Murine Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Kobayashi: None. **A. Wanchoo:** None. **S. Farhadi:** None. **J. Simonovich:** None. **S. Duarte:** None. **V. Boominathan:** None. **S. Shrestha:** None. **G. Hudalla:** None. **B.G. Keselowsky:** None. **A. Zarrinpar:** None.

Abstract# 603

Nanodiamond-doxorubicin Complexes Improve Hepatic Ischemia/reperfusion Injury

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Purpose: Hepatic ischemia/reperfusion injury (IRI) is a major inflammatory event in liver transplantation that is mediated by oxidative stress. Doxorubicin (DOX) can mitigate oxidative stress by inducing the expression of heme oxygenase-1; however its clinical use in IRI has been hampered by significant systemic toxicity. Nanodiamonds (ND) are carbon nanoparticles with potential to be high-affinity carriers for the selective delivery of anthracyclines, such as DOX, and thus mitigate the negative effects of systemic delivery. Here, we use ND-adsorbed DOX (NDX) and evaluate its efficacy in a mouse model of hepatic IRI.
Methods: We used a well-established mouse model of partial hepatic IRI. Partial hepatic ischemia was produced in the left and median lobes for 90 minutes followed by 6 hours reperfusion. Male 8-12 week old Balb/c mice were separated into 6 cohorts; High-DOX (1mg/kg), Low-DOX (0.5mg/kg), ND, High-NDX (1mg/kg equivalent of DOX), Low-NDX (0.5mg/kg equivalent of DOX) and phosphate buffered saline (PBS) were intravenously administered 48 hours prior to inducing ischemic injury.
Results: Plasma levels of aspartate alanine aminotransferase (AST) and alanine aminotransferase (ALT) at 6 hours after reperfusion were significantly lower in High-DOX and Low-NDX treated mice, when compared with those in PBS treated mice ($P<0.05$ and $P<0.05$, respectively). AST and ALT levels of the High-DOX and Low-NDX treated mice were comparable. Histological analysis showed significantly less congestion, necrosis, and vacuolization in the High-DOX and Low-NDX group compared with those in PBS groups as assessed by Suzuki score ($P<0.05$ and $P<0.01$, respectively). High-DOX and Low-DOX decreased the local infiltration of the inflammatory cells such as T cells, neutrophils, and macrophages, and it reduced the expression of proinflammatory cytokines and chemokines.Furthermore, apoptosis, as measured by the number of TUNEL positive hepatocytes, was also suppressed in PEG-IDO treated mice.
Conclusions: The results in this study indicate that NDX complexes protects mice from local inflammation and liver damage induced by hepatic IRI with half the DOX dose. These results support the development of a more clinically effective strategy for DOX in liver transplantation.
CITATION INFORMATION: Kobayashi A., Grady C., Duarte S., Boominathan V., Shrestha S., Zarrinpar A. Nanodiamond-doxorubicin Complexes Improve Hepatic Ischemia/reperfusion Injury *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Kobayashi: None. **C. Grady:** None. **S. Duarte:** None. **V. Boominathan:** None. **S. Shrestha:** None. **A. Zarrinpar:** None.

Abstract# 604

Hepatic Ferroptosis in Cold Stress and Warm Ischemia-reperfusion: A Novel Therapeutic Target in Liver Transplantation

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Purpose: Ferroptosis, a newly discovered programmed cell death platform, due to iron-dependent accumulation of lipid peroxides, has been reported to aggravate ischemia-reperfusion (IR) injury in various organs, including heart, kidney, and intestine. Nevertheless, little is known about the contribution of ferroptosis in liver transplantation. In the current study, we investigated the functional role of ferroptosis signaling during liver cold storage and warm IR, and evaluated its pathogenic effects in mouse and human orthotopic liver transplantation (OLT).
Methods: Fifty adult human OLT patients were recruited under IRB protocol. Liver graft biopsies (pre-reperfusion and 2h post-reperfusion) were screened based on levels of glutathione peroxidase 4 (GPX4), the key ferroptosis regulator. Hepatocytes and liver sinusoidal endothelial cells (LSECs) isolated from C57BL/6 mice were subjected to cold stress or warm hypoxia/reoxygeneration (H/R). Further, we used ferroptosis inhibitor (ferrostatin-1) in the liver storage solution or in mouse recipients to evaluate its therapeutic effect in OLT settings.
Results: The GPX4 expression in human liver biopsies negatively correlated with pro-inflammatory host immune cell activation markers. The anti-inflammatory phenotype in high GPX4 recipient group coincided with improved hepatocellular function (decreased AST levels) post-OLT, suggesting ferroptosis inhibition might reduce OLT injury in humans.During cold stress, increased GPX4 expression was observed in cultured murine LSECs but not hepatocytes. In contrast, the hepatocyte GPX4 expression increased during warm H/R, coinciding with increased hypoxia-inducible factor 1-alpha (HIF-1α) levels. In mouse OLT model, the hepatocellular damage was mitigated in liver grafts preserved with ferrostatin-1, a ferroptosis inhibitor. In addition, systemic administration of ferrostatin-1 to recipient mice reduced OLT injury.
Conclusions: Inhibition of ferroptosis during donor liver cold preservation protected LSECs, resulting in alleviation of hepatic IR-stress after OLT. The beneficial effects of ferroptosis inhibition during warm IR resulted from hepatocyte cytoprotection. This study provides the basis for novel therapeutic strategies by targeting ferroptosis cell death during both, cold liver preservation and in OLT recipients.
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DISCLOSURES: H. Kojima: None. **H. Hirao:** None. **K. Kadono:** None. **T. Ito:** None. **K.J. Dery:** None. **S. Kageyama:** None. **K. Nakamura:** None. **F.M. Kaldas:** None. **D.G. Farmer:** None. **J.W. Kupiec-Weglinski:** None.

Abstract# 605

Augmented Responses of Donor Kidney Tubular Cells to TLR Signaling Correlate with Ameliorated Ischemia/reperfusion Injury and Long-term Allograft Protection

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Purpose: We have previously demonstrated that donor genetic background and kidney-intrinsic innate immunity were key determinants of delayed graft function in kidney transplantation. However, the long-term effect and mechanism of ischemia/reperfusion injury (IRI) on graft rejection remains unclear.
Methods: Kidneys from C57BL/6 (B6) or Balb/c mice were harvested and stored in cold UW solution for 3 hours, and then were transplanted into bi-nephrectomized C3H mice. Graft survival, renal function, pathological change of grafts, immunophenotypic analysis, and expression of involved genes, were determined. Renal tubular epithelial cells (RTECs) isolated from B6 or BALB/c mouse kidneys were stimulated by lipopolysaccharide (LPS) or Pam3CSK4, and cytokines and kidney injury molecule-1 (KIM-1) in supernatant were measured.
Results: We found that when cold ischemia time was prolonged to 3 hours, rejection occurred earlier in kidney grafts from B6 mice compared with grafts from Balb/c mice. Correspondingly, recipients received B6 kidneys exhibited more severe impaired renal function, higher hematocrit level and more weight loss than recipients received Balb/c kidneys within 14 days post transplantation. Furthermore, B6 kidney grafts showed more severe histological impairment, increased $Ly6C^{+}CCR2^{+}CX3CR1^{+/-}$ inflammatory monocyte and CD8 memory T cell infiltration, accompanying by upregulation of IL-6 and endoplasmic reticulum stress genes. *In vitro* studies revealed that, in responding to either LPS (TLR4 agonist) or Pam3CSK4 (TLR1/TLR2 agonist) stimulation, RTECs from B6 mice produced lower level of cytokines including IL-6, IL-10, TNFα and MCP-1, but significantly higher level of the tubular cell injury marker KIM-1, in comparison with RTECs from Balb/c mice. Taken together, these results indicate that Balb/c kidneys were less vulnerable to IRI-induced rejection than B6 kidneys, which involves in activation of TLR depending innate immunity.
Conclusions: We conclude that augmented responses of donor kidney tubular cells to TLR signaling plays a pivotal role in ameliorated ischemia/reperfusion injury and long-term allograft protection.
CITATION INFORMATION: Lai X., Wang J., Qiu L., Han S., Shen K., Zhang Z. Augmented Responses of Donor Kidney Tubular Cells to TLR Signaling Correlate with Ameliorated Ischemia/reperfusion Injury and Long-term Allograft Protection *AJT, Volume 21 Supplement 3*
DISCLOSURES: X. Lai: None. **J. Wang:** None. **L. Qiu:** None. **S. Han:** None. **K. Shen:** None. **Z. Zhang:** None.

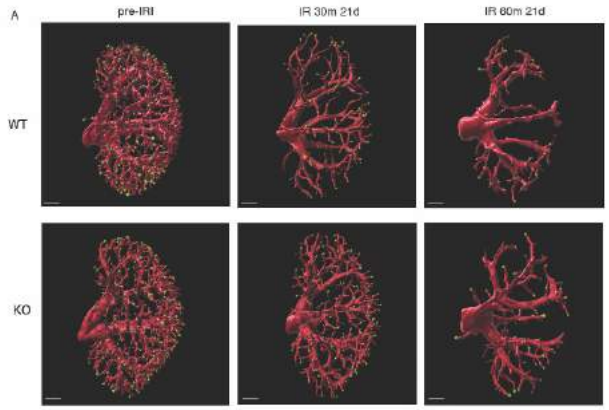
Abstract# 606

Caspase-3 is a Predominant Regulator of Microvascular Dysfunction and Aki-ckd Transition Post Renal Ischemia-reperfusion Injury

S. Lan, F. Migneault, J. Turgeon, M. Bourgault, M. Dieudé, N. Patey, H. Cardinal, M. Hébert, *CRCHUM, University of Montreal, Montreal, QC, Canada*

Purpose: Ischemia-reperfusion injury (IRI) is a major risk factor for chronic renal failure. Caspase-3, an effector responsible for apoptosis execution, is activated within tubular epithelial structure and peritubular capillaries (PTC) in the early stage of IRI-induced acute kidney injury (AKI). We previously characterized the different cell deaths in tubular and microvascular compartments of IRI-induced acute kidney

injury (AKI) and their relative importance on microvascular rarefaction and renal fibrogenesis in mild AKI. Here, we further characterize the role of caspase-3 in microvascular dysfunction and progressive renal failure in both mild and severe AKI.
Methods: Unilateral renal artery clamping for 60 minutes with contralateral nephrectomy was performed in both wild-type (C57BL/6) or caspase-3-/- mice.
Results: In the severe AKI model (60 minutes clamping), caspase-3-/- mice showed reduced PTC endothelial cell loss, decreased PTC collagen deposition, and α-SMA expression, and lower tubular injury scores on the long-term when compared to wild-type animals. Preservation of the peritubular microvasculature in caspase-3-/- mice led to reduced tubular ischemia, with lower hypoxia-inducible factor 1α (HIF1α) expression. Besides, intra-vital imaging and micro Computed Tomography (microCT) revealed preserved PTC permeability and better terminal capillary density in caspase-3-/- mice. Caspase-3-/- mice with severe IRI also showed better preservation of long-term renal function.
Conclusions: Collectively, these results demonstrate the pivotal importance of caspase-3 in regulating long-term renal function after IRI and establish the predominant role of PTC dysfunction as a major contributor to progressive renal dysfunction.



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DISCLOSURES: S. Lan: None. **F. Migneault:** None. **J. Turgeon:** None. **M. Bourgault:** None. **M. Dieudé:** None. **N. Patey:** None. **H. Cardinal:** None. **M. Hébert:** None.

Abstract# 607

Combining Oxygenated Cold Perfusion with Normothermic Ex-vivo Perfusion Improves the Outcome of DCD Porcine Kidney Transplantation

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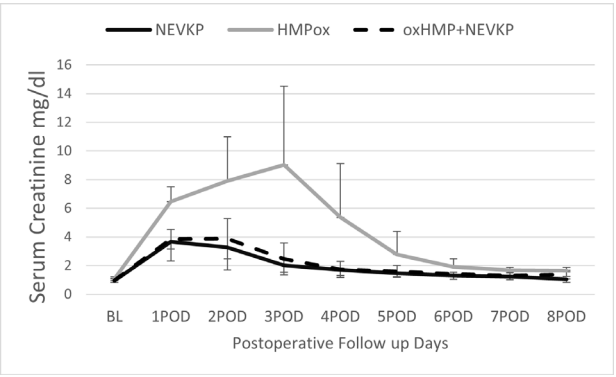
Purpose: Ex-vivo machine perfusion is a novel preservation technique for the storage and assessment of marginal kidney grafts. Normothermic (NEVKP) as well as hypothermic machine perfusion (HMP) with and without oxygen have been developed in the recent past. All ex-vivo perfusion techniques have advantages and shortcomings. NEVKP reduces cold ischemic injury with opportunities for graft assessment. In contrast, HMP is easier to perform during transportation, but graft assessment is limited. In the current study, we assessed if a combination of oxygenated HMP (oxHMP) followed by a short NEVKP period could combine the advantages of both preservation techniques.
Methods: All pig kidneys were exposed to 30min of warm ischemia followed by ex-vivo perfusion. Three ex-vivo perfusion techniques were compared. Kidneys either underwent 16hr NEVKP or were preserved by 16hr oxHMP. The third group was treated with 16hr oxHMP followed by 3hr NEVKP (oxHMP+NEVKP group). After contralateral nephrectomy, grafts were autotransplanted and animals were followed for 8 days. Kidney function and injury markers were compared between groups.
Results: All animals survived the follow-up period. Grafts preserved by continuous NEVKP showed improved function with lower peak serum creatinine (SrCrea) and more rapid recovery compared to the other two groups (peak SrCrea NEVKP vs oxHMP vs oxHMP+NEVKP: 3.7±1.3mg/dl vs 9±5.5mg/dl vs 3.9±1.4mg/dl). The differences in daily SrCrea levels reached significance between NEVKP and oxHMP on POD 7 and 8 (both $p<0.05$) and between NEVKP and oxHMP+NEVKP on POD1 ($p=0.04$). Similarly, there was a significant difference in daily SrCrea between oxHMP+NEVKP and oxHMP on POD1, 2 and 7 (all $p<0.05$). On POD3, creatinine clearance was increased in the NEVKP and oxHMP+NEVKP group (NEVKP vs oxHMP vs oxHMP+NEVKP: 41±19mL/min vs 13±13mL/min vs 29.4±11.5mL/min, $p=0.034$). Urine neutrophil gelatinase-associated lipocalin, as a marker of kidney injury, was significantly lower on POD 3 in the oxHMP+NEVKP group compared the other two groups ($p=0.0021$).
Conclusions: A short period of NEVKP following oxHMP provides the same outcomes as prolonged NEVKP in DCD kidney transplantation and is superior to oxHMP alone. A combination of oxHMP with end-ischemic NEVKP could be an attractive practical strategy to combine the advantages of both preservation techniques.



CITATION INFORMATION: Mazilescu L., Goto T., Rosales R., Noguchi Y., Urbanellis P., Robinson L., Selzner M. Combining Oxygenated Cold Perfusion with Normothermic Ex-vivo Perfusion Improves the Outcome of DCD Porcine Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: L.I. Mazilescu: None. **T. Goto:** None. **R. Rosales:** None. **Y. Noguchi:** None. **P. Urbanellis:** None. **L.A. Robinson:** None. **M. Selzner:** None.

Abstract# 608

Tubastatin-a Mediated Protection from Liver Injury is Preserved in a Lymphocyte Deficient Model

C. S. O'Brien[1], P. Hernandez[1], Z. Wang[1], G. Ge[1], A. Kozikowski[2], W. Hancock[1], M. H. Levine[1], *[1]University of Pennsylvania, Philadelphia, PA, [2]University of Illinois at Chicago, Chicago, IL*

Purpose: Liver Ischemia reperfusion injury (IRI) and Acetaminophen (APAP) toxicity are important causes of acute liver failure in the United States, that lack effective therapy. Histone deacetylases (HDACs) are enzymes that alter gene expression, regulating diverse cellular processes. We have previously shown that Tubastatin-A (TubA), an HDAC6 inhibitor, provides protection from hepatic IRI and APAP toxicity. We now report that the protective effect of TubA is preserved in a lymphocyte deficient model.
Methods: Female Rag-1 -/- mice were treated with vehicle or TubA, at 16 hours and one hour prior to either 60 minutes of warm IRI or administration of APAP (500 mg/kg). Serum ALT and AST were measured in each group 24 hours after IRI or APAP administration.
Results: Liver IRI in Rag-1 -/- mice resulted in a significant injury (AST 13,196 +/-2410, ALT 6851 +/-2953), with TubA treatment resulting in significantly lower AST (AST 4272 +/-3411, $p=0.02$, ALT 2991 +/-2309, $p=0.06$) (Figure 1). APAP toxicity in Rag-1 -/- mice resulted in significant injury as well (AST 16,251 +/- 6142, ALT 9363 +/- 2899). TubA treatment resulted in significantly lower AST/ALT (AST 778 +/-600, $p=0.008$ ALT 889 +/- 834, $p=0.008$) (Figure2).
Conclusions: TubA provides protection from both liver IRI and APAP toxicity. This protection is maintained in lymphocyte deficient mice, suggesting that TubAs mechanism of action is not via the lymphocytes. Further understanding of the mechanism of TubA will assist in the treatment of liver injury.

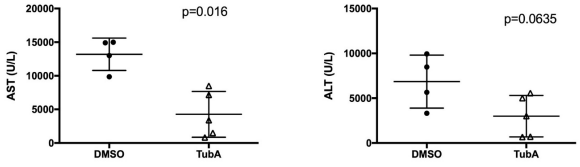


Figure 1. AST and ALT for Rag-1 -/- mice 24 hours after 60 minutes of liver IRI

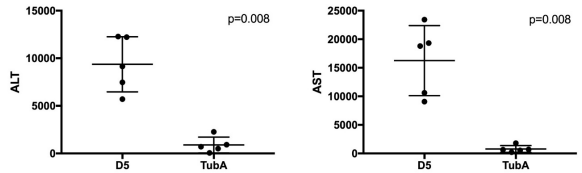


Figure 2. ALT and AST in Rag-1 -/- mice 24 hours following APAP toxicity

CITATION INFORMATION: O'Brien C., Hernandez P., Wang Z., Ge G., Kozikowski A., Hancock W., Levine M. Tubastatin-a Mediated Protection from Liver Injury is Preserved in a Lymphocyte Deficient Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: C.S. O'Brien: None. **P. Hernandez:** None. **Z. Wang:** None. **G. Ge:** None. **A. Kozikowski:** None. **W. Hancock:** None. **M.H. Levine:** None.

Abstract# 609

Effect of Defibrotide on Kidney Ischemia Reperfusion Injury in a Preclinical Renal Transplant Model

P. Pine[1], Z. Sun[2], A. Matas[3], J. Shi[1], A. Ebrahimnejad[1], M. Zanette[4], P. Halloran[5], J. S. Bromberg[6], R. Hanvesakul[7], *[1]Jazz Pharmaceuticals, Palo Alto, CA, [2]Johns Hopkins Medicine, Baltimore, MD, [3]Univ of Minnesota, Minneapolis, MN, [4]Jazz Pharmaceuticals, Philadelphia, PA, [5]Univ of Alberta, Edmonton, AB, Canada, [6]Univ of Maryland School of Medicine, Baltimore, MD, [7]Jazz Pharmaceuticals, Oxford, United Kingdom*

Purpose: Ischemia reperfusion injury (IRI) is a major contributor to graft failure. During organ removal and preservation, ischemia results in anaerobic respiration and cellular damage. At time of renal transplant (tx), oxygen is restored in aerobic respiration; injury is caused by generation of reactive oxygen species and inflammatory cytokines. Cellular activation caused by IRI results in an immune response, leading to further kidney damage. *In vitro* studies have shown that defibrotide (DF) stabilizes and protects endothelial cells through anti-inflammatory and antioxidant mechanisms. This study investigated the potential of DF to prevent kidney damage from IRI.

Methods: A beagle dog autologous renal tx model was used to evaluate DF on kidney IRI without immunosuppression. For all dogs, on Day 0, the left kidney was removed, flushed, placed in cold preservation solution (CPS) for 32h, and then transplanted to the same dog. At tx, the right kidney was removed. Control dogs (Group [Gp]1, n=8) received intravenous (IV) saline (4 mL/kg/h). Gp2 (n=8) received IV DF (50 mg/kg/dose q.i.d.) 2h before tx and immediately after tx, continuing until study end (Day 8). For Gp3 (n=8), the kidney was flushed with DF in CPS at removal and IV DF was given as in Gp2. Assessments included histology and daily clinical chemistry. Mixed effects models with repeated measures were used; nominal *P* values are comparing each DF Gp with control. Histology was assessed qualitatively.

Results: The combination of DF in CPS flush and IV DF pre-/post-tx reduced elevations of serum creatinine (P=0.0058), urea (P=0.0061), and potassium (P<0.0001), and stabilized urine output (P=0.0124) post-tx compared to controls. Results for IV DF alone were not significant compared to control. Histology revealed that kidneys from Grp 3 DF-treated dogs had reduced tubular necrosis, interstitial fibroplasia, and hemorrhage vs controls.

Conclusions: In this preclinical dog model, when DF was in flush/CPS and given pre-/post-tx, there was reduced renal impairment, tubular necrosis, interstitial fibroplasia, and hemorrhage vs controls. These results support further DF evaluation in preventing kidney IRI.

CITATION INFORMATION: Pine P., Sun Z., Matas A., Shi J., Ebrahimnejad A., Zanette M., Halloran P., Bromberg J., Hanvesakul R. Effect of Defibrotide on Kidney Ischemia Reperfusion Injury in a Preclinical Renal Transplant Model *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Pine: Ownership Interest; Name of Commercial Interest; Jazz Pharmaceuticals. Ownership Interest; Nature of Relationship; Holds stock ownership and/or stock options. Salary; Name of Commercial Interest; Jazz Pharmaceuticals. Salary; Nature of Relationship; Employee. **Z. Sun:** Consulting Fee; Name of Commercial Interest; MedRegan LLC. Consulting Fee; Nature of Relationship; Consultant. Ownership Interest; Name of Commercial Interest; MedRegan LLC. Ownership Interest; Nature of Relationship; Holds equity. Other; Name of Commercial Interest; MedRegan LLC. Other; Nature of Relationship; Advisor. **A. Matas:** Consulting Fee; Name of Commercial Interest; Jazz Pharmaceuticals. Consulting Fee; Nature of Relationship; Consultant. Honoraria; Name of Commercial Interest; Jazz Pharmaceuticals. Honoraria; Nature of Relationship; Received Honoraria. Other; Name of Commercial Interest; Jazz Pharmaceuticals. Other; Nature of Relationship; Advisory Board Member. **J. Shi:** Ownership Interest; Name of Commercial Interest; Jazz Pharmaceuticals. Ownership Interest; Nature of Relationship; Holds stock ownership and/or stock options. Salary; Name of Commercial Interest; Jazz Pharmaceuticals. Salary; Nature of Relationship; Employee. **A. Ebrahimnejad:** Ownership Interest; Name of Commercial Interest; Jazz Pharmaceuticals. Ownership Interest; Nature of Relationship; Holds stock ownership and/or stock options. Salary; Name of Commercial Interest; Jazz Pharmaceuticals. Salary; Nature of Relationship; Employee. **M. Zanette:** Ownership Interest; Name of Commercial Interest; Jazz Pharmaceuticals. Ownership Interest; Nature of Relationship; Holds stock ownership and/or stock options. Salary; Name of Commercial Interest; Jazz Pharmaceuticals. Salary; Nature of Relationship; Employee. **P. Halloran:** Consulting Fee; Name of Commercial Interest; Natera. Consulting Fee; Nature of Relationship; Consultant and speaker. Ownership Interest; Name of Commercial Interest; TSI, a university of Alberta company. Ownership Interest; Nature of Relationship; Holds stock. Other; Name of Commercial Interest; One Lambda. Other; Nature of Relationship; Speaker. **J.S. Bromberg:** Consulting Fee; Name of Commercial Interest; Jazz Pharmaceuticals. Consulting Fee; Nature of Relationship; Consultant. **R. Hanvesakul:** Ownership Interest; Name of Commercial Interest; Jazz Pharmaceuticals. Ownership Interest; Nature of Relationship; Holds stock ownership and/or stock options. Salary; Name of Commercial Interest; Jazz Pharmaceuticals. Salary; Nature of Relationship; Employee.

Abstract# 610

Composition of Ex Vivo Lung Perfusion Solutions and Kinetics Define Differential Cytokine and Chemokine Secretion in a Porcine Cardiac Arrest Model of Lung Preservation

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Purpose: Ex vivo lung perfusion is an innovative technique to evaluate marginal lung organs especially after DCD. Normothermic continuous perfusion should reduce ischemic damage and improve the outcome of lung transplantation. However, the optimal protocol for EVLP has not been defined so far. The aim of our study was to compare cytokine/chemokine concentrations in perfusion solutions using different kinetics and solution compounds of EVLP in a porcine cardiac arrest model and to correlate the inflammatory parameters to oxygenation capacity values (ΔpO2).

Methods: Following cardiac arrest and 1h of warm ischemia, lungs were harvested and flushed. Groups were processed as immediate (I-EVLP) 1h cold static preservation (CSP) and delayed (D-EVLP; 9h CSP). D-EVLP lungs were perfused with different solutions: Steen vs. modified Custodiol-N containing dextran (CD) or dextran/albumin (CDA). Cytokine/chemokine levels were analyzed at baseline (0h), after 1h, 4h using multiplex protein arrays.

Results: Concentrations of TNF-α, IL-6, CXCL8, IFN-γ, IL-1α and IL-1β increased significantly ($p<0.05$) in all four groups. CD-solution contained lower levels of these proteins and IL-2, IL-12, IL-10, IL-4, IL-1RA and IL-18 ($p<0.05$) compared to SteenSolution samples. Protein concentrations correlate negatively with ΔpO2 values ($p<0.05$). No significant differences could be detected between I- vs. D-EVLP lungs and CD vs.CDA solutions.

Conclusions: In a non-heart beating porcine cardiac arrest model with relevant IRI, lungs were perfused with normothermic EVLP. Longer CSP prior to EVLP did not result in enhanced cytokine secretion, but the first hours of reperfusion seem crucial for tissue damage. CD-solution dampens the cytokine/chemokine secretion probably by iron chelators and, possibly, protecting effects of dextran. Addition of albumin had no further effect on inflammation. Cytokine/chemokine concentrations correlated negatively with the oxygenation capacity, an important parameter for organ acceptance. These finding may help to optimize the ex vivo preservation procedure and possibly, more organs could reach the clinically relevant threshold for transplantation, thus, the pool of marginal donor lungs could be enlarged.

CITATION INFORMATION: Radomsky L., Koch A., Olbertz C., Kuehne J., Liu Y., Keil J., Beushausen K., Rauen U., Falk C., Kamler M. Composition of Ex Vivo Lung Perfusion Solutions and Kinetics Define Differential Cytokine and Chemokine Secretion in a Porcine Cardiac Arrest Model of Lung Preservation *AJT, Volume 21 Supplement 3*

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Abstract# 611

Inhibition of Apoptosis During Ex Situ Liver Normothermic Machine Perfusion Decreases Reperfusion Injury and Improves Viability

S. Raigani[1], S. Baptista[1], A. Ohman[2], J. Santiago[2], I. Rosales[1], M. Heaney[2], J. Boylan[2], T. Coe[1], K. Uygun[1], J. Sanders[2], H. Yeh[1], *[1]Transplant Surgery, Massachusetts General Hospital, Boston, MA, [2]Pediatric Endocrinology, Brown University, Providence, RI*

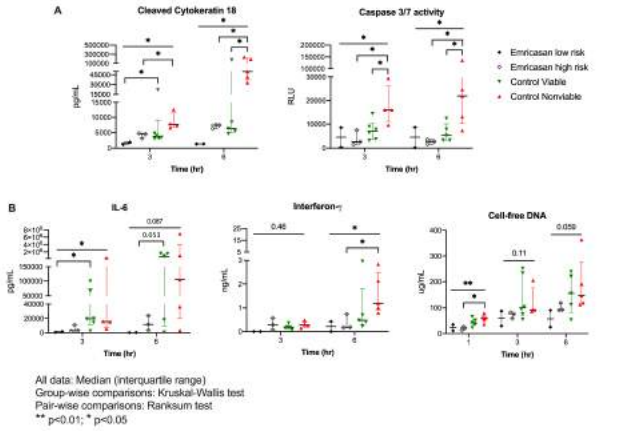
Purpose: Normothermic machine perfusion (NMP) is an ideal platform for delivery of novel therapeutics aimed at rehabilitation of discarded or marginal livers. We examined the efficacy of inhibiting apoptosis during NMP as a means of mitigating ischemia-reperfusion injury (IRI) and improving liver viability.

Methods: 5 human livers from donation after circulatory death (DCD), turned down by all regional transplant centers, underwent 12 hours of NMP with the addition of an irreversible pan-caspase inhibitor, emricasan, at a dose of 5mg/kg liver. Liver viability during NMP was assessed using criteria established by Mergental et al. Outcomes

were compared to two control groups of discarded DCD livers stratified by viability (Table 1). Subgroup analysis was performed by stratifying the treatment group into low and high donor risk index (DRI) groups. RNA sequencing was performed on sequential liver biopsies. Median with interquartile range (IQR) reported for all data.
Results: Nonviable control livers demonstrated significantly higher markers of apoptosis (cleaved cytokeratin 18, caspase-3/7 activity) than viable control livers during NMP (Fig. 1A). Addition of emricasan significantly decreased apoptosis. Emricasan-treated livers further demonstrated decreased IRI markers (Interleukin-6, interferon-gamma, cell-free DNA, Fig. 1B). Median DRI in the high DRI treated group was 3.0 (IQR 2.8,3.6) compared to 2.4 (2.2,2.4) in nonviable control livers (p=0.099). Despite the increased ischemic injury, 2 of 3 high DRI treated livers met viability criteria compared to 0/5 (p=0.035). There was no evidence of deleterious drug effect in the low DRI treated livers.
Conclusions: The magnitude of apoptosis appears to be associated with graft viability during NMP. A single dose of the pan-caspase inhibitor, emricasan, decreased apoptosis and markers of IRI and appeared to improve graft viability within 6 hours of NMP. Therapeutic inhibition of apoptosis may be a simple and effective method for improving graft utilization and minimizing graft dysfunction.

Table 1 - Donor Liver Demographics

	Emricasan		Control Viable	Control Nonviable
	Low DRI (n=2)	High DRI (n=3)	(n=6)	(n=5)
Warm ischemic time (min)	22.5 (22-23)	32 (23-53)	27.5 (24-28)	24 (23-34)
Cold ischemic time (min)	450 (347-553)	703 (679-758)	625.5 (458-697)	358 (357-367)
Age	27 (26-28)	59 (50-60)	58.5 (40-60)	56 (55-59)
Donor risk index	1.6 (1.5-1.7)	3.0 (2.8-3.6)	2.1 (1.9-2.2)	2.4 (2.2-2.4)



CITATION INFORMATION: Raigani S., Baptista S., Ohman A., Santiago J., Rosales I., Heaney M., Boylan J., Coe T., Uygun K., Sanders J., Yeh H. Inhibition of Apoptosis During Ex Situ Liver Normothermic Machine Perfusion Decreases Reperfusion Injury and Improves Viability *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Raigani: None. **S. Baptista:** None. **A. Ohman:** None. **J. Santiago:** None. **I. Rosales:** None. **M. Heaney:** None. **J. Boylan:** None. **T. Coe:** None. **K. Uygun:** None. **J. Sanders:** None. **H. Yeh:** None.

Abstract# 612

The Contribution of Disulfide-hmgb1 Released During Ischemia-reperfusion Injury to Pro-inflammatory Macrophage Polarization Following Liver Transplantation

A. Q. Terry, R. A. Sosa, M. Rossetti, J. Nevarez-Mejia, B. V. Naini, F. Kaldas, V. Groysberg, S. Younan, R. Busuttil, D. W. Gjertson, J. W. Kupiec-Weglinski, E. Reed, *Pathology and Lab Medicine, UCLA, Los Angeles, CA*

Purpose: Ischemia-reperfusion injury (IRI) during liver transplantation (LT) is a pro-inflammatory response linked to poorer outcomes, including increased alloimmunity, post-LT. We previously showed that post-reperfusion portal vein blood (liver flush; LF) from IRI+ LT patients activates TLR4 and induces pro-inflammatory macrophages and that disulfide HMGB1 (diS HMGB1), whose receptors include TLR4, is increased in IRI+ patients. This study aimed to determine the contribution of diS HMGB1-TLR4 signaling to pro-inflammatory macrophage polarization and function and to the previously-observed IRI+ polarized macrophage phenotype.
Methods: Third-party monocytes were exposed to diS HMGB1 or LPS with or without TAK-242, a TLR4 inhibitor, for 5 days. Surface markers (CD66a, CD86, HLA-DR, PD-L1, TIM-3) and ROS production were analyzed by flow cytometry. Secreted cytokines were analyzed via 38-plex Luminex. Surface marker expression was compared to phenotypes induced by LF from LT patients during previous studies.
Results: diS HMGB1 mirrored the IRI+ LF macrophage phenotype in 4/5 markers (high HLA-DR, CD86; low PD-L1, CD66a). diS HMGB1 trended with LPS for 1/5 markers (CD66a). High TIM-3 induced by diS HMGB1 mirrored TIM-3 expression induced by IRI- LF. TAK-242 had a dose-dependent effect on 4/5 markers (all but CD66a) for the LPS phenotype but only 1/5 markers (HLA-DR) for the diS HMGB1 phenotype. diS HMGB1 induced higher ROS production than LPS; TAK-242 only affected LPS-induced ROS production. TAK-242 also had a dose-dependent inhibition on 35 LPS-induced cytokines, but only inhibited 4 diS HMGB1-induced cytokines (IL-6, FGF2, MIP1a, and MIP1b).
Conclusions: diS HMGB1 induces a pro-inflammatory macrophage phenotype with increased antigen presentation (high CD86 and HLA-DR), decreased T-cell inhibition (low PD-L1 and CD66a), high ROS production, and pro-inflammatory cytokine secretion capabilities. However, only HLA-DR expression and IL-6, FGF2, MIP1a, and MIP1b secretion were affected by inhibition of TLR4 signaling. This data suggests that 1) diS HMGB1 contributes to the post-LT immune response in IRI+ patients, 2) these macrophages can contribute to inflammation and alloimmunity post-LT, and 3) the observed diS HMGB1 phenotype is not completely dependent on TLR4. This study reveals that diS HMGB1 released during IRI can polarize macrophages to become pro-inflammatory and contribute post-LT inflammation in IRI+ patients.
CITATION INFORMATION: Terry A., Sosa R., Rossetti M., Nevarez-Mejia J., Naini B., Kaldas F., Groysberg V., Younan S., Busuttil R., Gjertson D., Kupiec-Weglinski J., Reed E. The Contribution of Disulfide-hmgb1 Released During Ischemia-reperfusion Injury to Pro-inflammatory Macrophage Polarization Following Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.Q. Terry: None. **R.A. Sosa:** None. **M. Rossetti:** None. **J. Nevarez-Mejia:** None. **B.V. Naini:** None. **F. Kaldas:** None. **V. Groysberg:** None. **S. Younan:** None. **R. Busuttil:** None. **D.W. Gjertson:** None. **J.W. Kupiec-Weglinski:** None. **E. Reed:** None.

Abstract# 613

Myeloid YAP-HSF1 Signaling Inhibits NLRP3 Function and RIPK3-mediated Hepatocyte Necroptosis in Liver Ischemia and Reperfusion Injury

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Purpose: Yes-associated protein (YAP), a downstream effector of the Hippo pathway, tightly regulates cell growth, survival, and tissue inflammation. Activation of heat shock factor 1 (HSF1) has a profound impact on innate immunity during liver inflammatory response. However, it remains unknown as to whether and how the myeloid YAP-HSF1 signaling may control NLRP3 activation in sterile inflammation during liver injury. This study investigated the mechanistic link between YAP and HSF1 in the modulation NLRP3-mediated innate immune response in liver ischemia and reperfusion injury (IRI).
Methods: Myeloid-specific YAP knockout ($YAP^{M\text{-}KO}$) and floxed YAP ($YAP^{FL/FL}$) mice (n=6/group) were subjected to 90 min partial liver warm ischemia followed by 6 h of reperfusion. In parallel *in vitro* study, bone marrow-derived macrophages (BMMs) were isolated from these conditional knockout mice and transfected with CRISPR/Cas9-mediated HSF1 knockout (KO) vector followed by LPS (100 ng/ml) stimulation.
Results: Ischemia/reperfusion (IR) stress induced YAP and HSF1 activation evidenced by increased nuclear YAP and HSF1 expression in hepatic Kupffer cells. Myeloid YAP deficiency exacerbated IR-induced liver damage, with increased serum ALT levels, macrophage/neutrophil accumulation, and pro-inflammatory cytokine/chemokine production compared to the $YAP^{FL/FL}$ controls. Unlike in the $YAP^{FL/FL}$ controls, $YAP^{M\text{-}KO}$ enhanced TXNIP, RIPK3, p-MLKL, NEK7, NLRP3, ASC, cleaved caspase-1 activation in ischemic livers. However, adoptive transfer of lentivirus HSF1-modified macrophages into mice markedly improved liver function with reduced TXNIP, RIPK3, p-MLKL, and NEK7/NLRP3 but augmented TRX1 in IR-challenged livers. Moreover, disruption of RIPK3 in $YAP^{M\text{-}KO}$ mice with an *in vivo* mannose-mediated RIPK3 siRNA delivery system diminished IR-triggered hepatocyte death. *In vitro* studies showed that macrophage YAP and HSF1 co-localized in the nucleus whereby HSF1 interacted with YAP in response to LPS stimulation. Disruption of HSF1 with a CRISPR/Cas9 HSF1 KO transfection in $YAP^{FL/FL}$ macrophage augmented TXNIP and RIPK3 activation leading to enhanced NEK7/NLRP3 function and RIPK3-mediated hepatocyte necroptosis after macrophage/hepatocyte co-culture.
Conclusions: Myeloid-specific YAP controls NLRP3-triggered liver inflammation and RIPK3-mediated hepatocyte necroptosis through interaction with HSF1. HSF1

is required for the myeloid YAP-mediated immune regulation in liver IRI. Our findings demonstrate the key mechanistic role of myeloid YAP in liver inflammatory injury, and provide novel therapeutic potential in organ IRI and transplant recipients.
CITATION INFORMATION: Tian Y., Xu D., Sheng M., Zhan Y., Lin Y., Li C., Coito A., Busuttil R., Farmer D., Kupiec-Weglinski J., Ke B. Myeloid YAP-HSF1 Signaling Inhibits NLRP3 Function and RIPK3-mediated Hepatocyte Necroptosis in Liver Ischemia and Reperfusion Injury *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Tian: None. D. Xu: None. **M. Sheng:** None. **Y. Zhan:** None. **Y. Lin:** None. **C. Li:** None. **A.J. Coito:** None. **R.W. Busuttil:** None. **D.G. Farmer:** None. **J.W. Kupiec-Weglinski:** None. **B. Ke:** None.

Abstract# 614

Single-cell Rna Sequencing of Latent Murine Cytomegalovirus Infected Lung Transplants

L. A. VanOsdol[1], S. Han[1], M. Kandpul[2], J. J. Wang[1], L. Qiu[3], Z. J. Zhang[1], *[1]Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]Department of Surgery, Northwestern University, Chicago, IL, [3]School of Medicine, University of California, San Fransisco, San Fransisco, CA*
Purpose: Analyze the transcriptomics of mouse lung cells with and without latent infection of cytomegalovirus (CMV) before and after transplantation and identify key cell types and molecular pathways responsible for CMV reactivation and dissemination.
Methods: Orthotropic left lung transplants were performed using Balb/c recipients and donors with or without latent CMV infection. Lung tissues from transplants and naïve controls were harvested for viral RNA analysis and single cell isolation at day 2 post-transplant. After isolating CD31+ and CD45+ cells using fluorescence-activated cell sorting, single cell suspensions were processed using 10X Genomics for barcoding and cDNA library construction for four different conditions at an average of 15500 cells and 41000 reads per cell. The sequenced data were processed using standard 10X Genomics Cell Ranger pipeline and preliminary analyses were carried out using the Loupe browser where cell clusters were identified using well-accepted surface markers. Pathway analyses were done for bulk differences and for different cell types as defined by markers. Additional transplants were treated with small molecule Myd88 inhibitor to determine whether innate immunity plays a role in transplant induced CMV reactivation.
Results: At 2 days post-transplant, CMV IE-1 mRNA was detected in lung grafts but not in latent lungs not transplanted, suggesting transcriptional activation in the early phase of transplant and ischemia and reperfusion injury as an important contributing factor. Preliminary analysis of clusters show CD31+ lung cells expressing Myd88 increase in number following organ transplant both with and without latent CMV infection. CD31+ lung cells expressing c-Fos are also heightened following transplant. CD11b+ lung cells expressing Myd88 increase in latent CMV infected organs following transplant. CD11b+ lung cells expressing c-Fos were increased following transplantation in CMV infected animals. Pathway analysis of differentiating genes for myeloid cell types shows a number of significant immune response pathways including MIF regulation of innate immunity and communication between innate and adaptive immune cells. Treatment with Myd88 inhibitor decreased the viral DNA copy numbers.
Conclusions: Results indicate an enhanced innate immune response. The heightened expression of c-Fos suggests possible reactivation and dissemination of CMV in transplanted tissue. Pathway analysis of differentiating genes elucidated a number of significant immune response pathways, including both innate response and communication between innate and adaptive immune cells, suggesting reactivation and dissemination of CMV in these cells following transplantation.
CITATION INFORMATION: VanOsdol L., Han S., Kandpul M., Wang J., Qiu L., Zhang Z. Single-cell Rna Sequencing of Latent Murine Cytomegalovirus Infected Lung Transplants *AJT, Volume 21 Supplement 3*
DISCLOSURES: L.A. VanOsdol: None. **S. Han:** None. **M. Kandpul:** None. **J.J. Wang:** None. **L. Qiu:** None. **Z.J. Zhang:** None.

Abstract# 615

Galectin-3 Blockade Can Decrease Reperfusion Injury in Response to Ischemia in a Rat Hind Limb Transplant Model

Z. Wang[1], Y. Wang[1], D. Yoeli[1], B. Li[1], A. Su[1], D. Mathes[1], K. Washington[1], E. Farkash[2], C. A. Huang[1], *[1]University of Colorado, Aurora, CO, [2]University of Michigan, Ann Arbor, Ann Arbor, MI*
Purpose: Vascularized composite allograft (VCA) transplant is technically feasible and results in successful clinical outcomes. However, skin and muscle containing VCA is highly susceptible to ischemic injury. Ischemia reperfusion injury (IRI) caused inflammation negatively impacts VCA survival. Galectin-3 (Gal3), an endogenous β-galactoside binding lectin released by macrophages and fibroblasts under hypoxia, can drive inflammation. Here we developed a syngeneic rat hind limb transplant model to reduce IRI and improve VCA transplant outcomes by targeting Gal3.
Methods: Right hind limb of Brown Norway (BN) donor is removed, flushed with heparinized lactated ringers, wrapped in wet gauze and stored at 4 °C for 6 or 24 hours prior to transplant. Recipient animals were provided with either Gal3 blocker, modified citrus pectin (MCP) in drinking water or control untreated water since Day -7. Skin and muscle were obtained at post-operative day (POD) 6 and examined histologically using H&E to quantify injury and inflammation. Serum was collected on POD 6 to measure circulating Gal3.
Results: All transplanted limb grafts exposed to 6 or 24 hours cold ischemia showed dermal and interstitial edema, myocyte necrosis and myofiber disorganization on POD6. In non-MCP recipients, neutrophil and macrophage infiltration was also observed by POD 6 consistent with reperfusion injury. In contrast, in the MCP recipients, inflammation was greatly reduced (Figure 1). ELISA data shows, with 6 hours cold ischemia, Gal3 is 8.17±1.53 ng/ml from MCP recipient and 12.86±1.29 ng/ml from Non-MCP recipient, respectively. With 24 hours cold ischemia, Gal3 is 11.09±1.94 ng/ml (MCP) and 18.64±2.04 ng/ml (Non-MCP). Gal3 is significantly decreased (Figure 2) with MCP treatment.
Conclusions: The syngeneic BN rat hind limb transplant model is a reliable platform to study VCA IRI and evaluate preventative strategies. In this model 6 hours or 24 hours cold ischemia consistently yields extensive inflammation throughout the dermis and endomysium on POD 6. Blocking Gal3 using MCP in drinking water significantly decreases circulating Gal3 and reduces inflammation.

Figure 1. H&E staining for skin and muscle from graft limb from MCP or non-MCP recipient, with 24hours cold ischemia

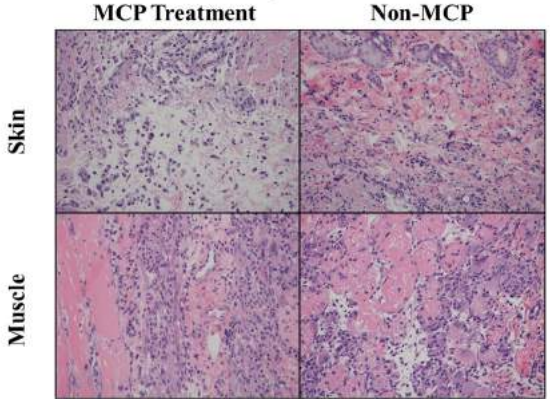
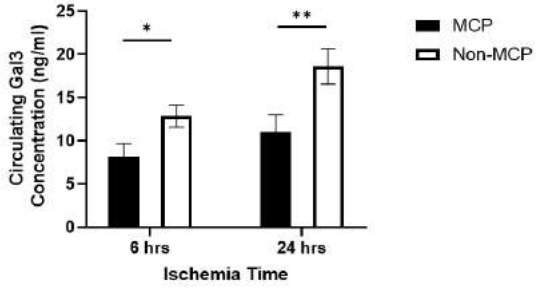


Figure 2. Circulating Gal3 level on POD 6



CITATION INFORMATION: Wang Z., Wang Y., Yoeli D., Li B., Su A., Mathes D., Washington K., Farkash E., Huang C. Galectin-3 Blockade Can Decrease Reperfusion Injury in Response to Ischemia in a Rat Hind Limb Transplant Model *AJT, Volume 21 Supplement 3*
DISCLOSURES: Z. Wang: None. Y. Wang: None. **D. Yoeli:** None. **B. Li:** None. **A. Su:** None. **D. Mathes:** None. **K. Washington:** None. **E. Farkash:** None. **C.A. Huang:** None.

Abstract# 616

Mitochondrial Transplant Minimizes Liver Ischemia Reperfusion Injury in Lean and Obese Mice

C. Watkins[1], G. Lamanilao[1], C. Kuscu[1], C. Kuscu[1], J. F. Pierre[2], J. Eason[1], A. Bajwa[1], *[1]Transplant Research Institute, James D. Eason Transplant Institute, Department of Surgery, The University of Tennessee Health Science Center, Memphis, TN, [2]Department of Pediatrics - Divisions of Neonatology and Pediatric Obesity, The University of Tennessee Health Science Center, Memphis, TN*
Purpose: Ischemia induces altered bioenergetics within cells with increased mitochondrial swelling and reactive oxygen species and that ultimately degrade of cellular function. Ischemia reperfusion injury IRI induces mitochondrial fragmentation resulting in cell death and injury. Additionally, energetically related injuries are worse in metabolically stressed tissues such as steatotic liver, making them more susceptible

to ischemia. Therapeutic interventions that target to improve mitochondrial health to repair, reprogram or replace mitochondria to restore respiratory functions are beneficial for prevention of disease.

Methods: *In Vivo* studies: Liver injury was assessed by serum alanine aminotransferase (ALT; mU/ml) after 60 mins of ischemia and 24 hrs of reperfusion. 20-wk old C57BL/6 (lean and diet induced obese, DIO) mice were i.v. injected with Mitochondria (Mito), isolated from healthy mouse liver (Mito; 50 mcg protein equivalent) 1 day before (-1d) or at time of reperfusion (@R). Along with functional (ALT), histological (H&E) and molecular (RTPCR) analysis were done. *In Vitro* studies: Huh7 and HepG2 human hepatocytes cell lines were used to evaluate uptake and therapeutic use of mitochondria using Seahorse analyzer. Palmitic and Oleic, PA/OA were used to induce lipid accumulation in hepatocytes to mimic steatotic liver. Mitochondria for *in vitro* studies were isolated from human (HEK293) cells.
Results: DIO mice had significantly worse liver function compared to lean mice after IRI (ALT: 4090±236 vs 10308±304, p<0.001). Mito (-1d or @R) treated lean (ALT: -1d, 2288±157; @R, 1548±134, p<0.01) and DIO (ALT: -1d, 6811±656; @R, 2201±183, p<0.001) mice were significantly protected compared to vehicle treated mice after IRI. Mice treated with mitochondria had higher liver gene expression of *Pgc1a* and lower levels of proinflammatory cytokines like (*Tnfa* and *Il1b*) compared to vehicle treated mice. Histology of Mito treated mice had lower Suzuki score. Mito treated cells had significantly higher levels of extra- and intracellular ATP, higher basal oxygen consumption rate (OCR) and spare respiratory capacity measured by seahorse analyzer.
Conclusions: Our data demonstrates that treatment with healthy mitochondria enhances recipient cells energy production to help replace damaged mitochondria by inducing Pgc*1a* to rescue cellular functions. Our current study demonstrates that treatment with healthy mitochondria can be used as therapeutic modality for treatment and/or prevention of liver IRI.
CITATION INFORMATION: Watkins C., Lamanilao G., Kuscu C., Kuscu C., Pierre J., Eason J., Bajwa A. Mitochondrial Transplant Minimizes Liver Ischemia Reperfusion Injury in Lean and Obese Mice *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Watkins: None. **G. Lamanilao:** None. **C. Kuscu:** None. **C. Kuscu:** None. **J.F. Pierre:** None. **J. Eason:** None. **A. Bajwa:** None.

Abstract# 617

Characterization of Kidney Small Extracellular Vesicles Released During Normothermic Machine Perfusion

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Purpose: By characterizing and quantifying the dynamical release of kidney Extracellular Vesicles (EVs) during Normothermic Machine Perfusion (NMP), we aim to gain a better understanding of the value of EVs in 1) kidney quality pre-transplantation and 2) as potential biomarker in recipient's circulation post transplantation.
Methods: Eight discarded Extended Criteria Donor kidneys (6 DCD, 2 DBD, mean warm ischemia times of 12 ± 8 minutes followed by ~13 ± 5 hours of cold ischemia, age 68 ± 7, all male) were perfused in a closed system at 37 ^{0}C for 6 hours. Perfusate samples were taken before and at 1/3/6 hours intervals, stained with a mix of common EV markers (tetraspanins CD9/CD63/CD81) or one of these tetraspanins in combination with either CFSE (enzymatic activity) or HLA-A2. Samples were measured using Imaging Flow Cytometry to identify, quantify and characterize single small EVs (< 300 nm, ssEVs).
Results: CFSE and tetraspanin double-positive ssEVs were quantified at each of the collected time points. We observed a ~700 / 740 / 560 fold increase compared to ssEV levels before perfusion at 1/3/6 hours of NMP, respectively. ssEVs levels were found to be positively correlated with donor age and kidney weight, whilst negative correlations were found for ischemia times. Tetraspanin CD81 was found to represent the majority (~70%) of the excreted ssEVs (CD9: ~15% / CD63 <5%). Furthermore, using HLA-A2 mAbs we were able to discriminate and quantify ssEV populations between NMP samples on the basis of HLA phenotype. Again, the majority of ssEVs expressing HLA-A2 was found to be colocalized with CD81.
Conclusions: During NMP small EVs are excreted and this excretion is highest during the first hour of perfusion. The characterization of excreted small EVs, especially in combination with an HLA phenotype marker, provides a starting point to identify allograft specific EVs and map their clinical implications.
CITATION INFORMATION: Woud W., Arykbaeva A., de Vries D., Alwayn I., Boer K., Baan C., Hoogduijn M., Minnee R. Characterization of Kidney Small Extracellular Vesicles Released During Normothermic Machine Perfusion *AJT, Volume 21 Supplement 3*
DISCLOSURES: W.W. Woud: None. **A. Arykbaeva:** None. **D. de Vries:** None. **I. Alwayn:** None. **K. Boer:** None. **C. Baan:** None. **M. Hoogduijn:** None. **R. Minnee:** None.

Abstract# 618

Myeloid Yap Signaling is Required for Hepatic Cytoprotection in Liver Ischemia-reperfusion Injury

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Purpose: Liver ischemia-reperfusion injury (IRI) is recognized as an innate immunity-driven local inflammation response during hemorrhagic shock, liver resection and transplantation. Yes-associate protein 1 (YAP) is the major downstream effector of hippo pathway.
Methods: This study evaluated the pivotal role of myeloid YAP signaling in a murine model of liver warm IRI.
Results: In our previous study, we found that YAP expression was triggered in human orthotopic liver transplantation (OLT). High post-OLT YAP expression was correlated with well-preserved histology and improved hepatocellular function at post-operative day 1-7. In a mouse model of liver warm ischemia (90min) followed by reperfusion (0-24h), YAP was readily triggered in WT mice after the ischemia insult. Interestingly, unlike in flox control mates, IR stress exacerbated significant liver damage in myeloid YAP deficient mice ($YAP^{M\text{-}KO}$), as evidenced by elevated serum alanine aminotransferase (sALT) level and damaged hepatic architecture. Myeloid YAP deficiency promoted liver IRI deteriorated liver pathology (more severe lobular edema, widespread hemorrhage, and congestion/hepatocellular necrosis), and enhanced hepatic ROS accumulation. On the other hand, compared with YAP-proficient ($YAP^{FL/FL}$) mice, Myeloid specific YAP deficiency exacerbated innate immune responses, as shown by amplified CD68+ macrophages and Ly6G+ neutrophils sequestration in liver IR-livers, and enhanced pro-inflammatory cytokine profile (TNF-α, IL-1β, IFN-β, and CXCL-10).
Conclusions: Our novel findings document the critical role of myeloid YAP signaling in hepatic homeostasis and cytoprotection in liver IRI. Because the enhancement of YAP signaling differentially regulates local innate inflammation and hepatocyte survival, these results provide the rationale for emerging approaches to manage liver IRI in transplant patients.
CITATION INFORMATION: Yang B., Xue Z., Zhang C., Zhang Y., Liu Y., Kupiec-Weglinski J., Ji H. Myeloid Yap Signaling is Required for Hepatic Cytoprotection in Liver Ischemia-reperfusion Injury *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Yang: None. **Z. Xue:** None. **C. Zhang:** None. **Y. Zhang:** None. **Y. Liu:** None. **J. Kupiec-Weglinski:** None. **H. Ji:** None.

Abstract# 619

The Inflammatory Response in the Context of Tissue Injury: Roles of Tyro3, Axl, and Mer (TAM) Receptor Tyrosine Kinases in Liver Ischemia/reperfusion Injury

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Purpose: Although the inflammatory response in liver ischemia reperfusion injury has been studied extensively, how the context of tissue injury (presence of necrotic/apoptotic cells) regulates the DAMP-initiated innate immune reaction remains an open question. As macrophages are the dominant innate immune cells in livers and they recognize apoptotic cells mainly by phosphatidylserine (PS)-binding Tyro3-Axl-Mer (TAM) receptor tyrosine kinases (RTKs), we analyze roles of TAM RTKs in liver ischemia/reperfusion injury at both the inflammation activation and resolution stages.
Methods: In a murine liver partial ischemia model (90m), we compared WT and myeloid-specific Axl/MerTK double or single deficient mice in their response to liver IRI (Tyro3 is not expressed in livers). Liver inflammation activation and resolution were evaluated at the peak of liver injury (6-24h) or during the course of tissue repair (3-7 days), respectively.
Results: IR downregulated MerTK, but induced Axl, expression in IR livers at the peak of injury (6-24h). The Axl level was declined, while the MerTK level increased at the resolution of liver IRI (day 3-7 post reperfusion). Compared with WT controls, myeloid Axl/MerTK double or single deficient mice developed significantly more severe liver IRI with enhanced pro-inflammatory activation, as evidenced by elevated sALT levels, worse damaged liver architecture (H/E staining) with higher Suzuki scores, and upregulated pro- but downregulated anti-inflammatory gene expressions in IR livers. Interestingly, liver recovery from IRI was significantly delayed only in Axl/MerTK double and MerTK single KO, but not Axl single KO mice, as documented by histological and molecular analysis of IR livers at day 7 post reperfusion. In vitro, although there were no differences in the response to simple TLR stimulation between WT and Axl/MerTK deficient macrophages (KCs and bone marrow-derived macrophages), the presence of apoptotic cells during inflammatory activation downregulated TNF-a and upregulated IL-10 productions in WT, but not Axl/MerTK deficient, macrophages. Indeed, these TAM RTK deficient macrophages were defective in their abilities of efferocytosis. Furthermore, The regulatory effect of TAM RTKs on inflammatory activation was specific for DAMP- (context of tissue damages), but not PAMP-initiated response, as no differences were found in the zymosan-induced peritoneal inflammatory activation. MerTK only regulated the resolution of zymosan-induced peritonitis

Conclusions: TAM RTKs play critical roles in both the activation and resolution of liver IRI. Both Axl and MerTK regulate the activation, but only MerTK regulates the resolution of liver inflammatory response in IRI. TAM RTKs dampen liver macrophage activation via efferocytosis.

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Abstract# 620

Glycogen Synthase Kinase 3 Beta Regulates Distinctive Macrophage Subsets in the Activation and Resolution of Liver Ischemia Reperfusion Injury

H. Zhang[1], M. Ni[2], J. Zhang[1], H. Wang[2], R. Busuttil[1], J. Kupiec-Weglinski[1], Y. Zhai[1], *[1]Dumont-UCLA Transplant Center, Los Angeles, CA, [2]The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

Purpose: Glycogen synthase kinase 3β (Gsk3β) differentially regulates pro- and anti-inflammatory programs in macrophages upon TLR stimulations. We have documented in a murine liver partial warm ischemia model that both Gsk3 inhibition in WT mice and myeloid Gsk3β deficiency protected livers from IRI. As liver macrophages (MΦs) are heterogenous in their origin and function and the outcome of liver IRI is dependent on not only inflammation activation, but also its resolution, we determined how Gsk3β regulated liver IRI in MΦ-specific and disease stage-specific manner.

Methods: We compared both liver inflammation activation (6-24h) and resolution (3-7d) between WT and myeloid Gsk3β deficient mice. KCs or CD11b+ MΦs were selectively depleted by low-dose clodronate liposomes (CL, 1x 200ul, i.p.,-48h) or by diphtheria toxin (DT, 2x10μg/g, i.v.) in CD11b-DTR mice. WT or Gsk3β deficient KCs or bone marrow-derived MΦs (BMMs) were used to reconstitute CL- or DT-treated hosts.

Results: When KCs were depleted prior to the onset of liver ischemia, the protection of livers from IRI at 6h post reperfusion was abolished in Gsk3β deficient mice. However, livers still recovered from IRI significantly better in these mice, as compared with the WT counterparts. The hepatocellular damages were fully repaired, neutrophils were cleared and infiltrating MΦs were reprogrammed to F4/80+CD11b- KC-like cells in IR livers of the Gsk3β deficient mice at day 7 post reperfusion, while these resolution processes were significantly delayed in WT controls until day 14. To further establish that Gsk3β deficiency in KCs were sufficient to protect livers from IRI, we reconstituted KC-depleted WT hosts (by CLs) with either WT or Gsk3β deficient KCs. Indeed, Gsk3β deficient KCs were much more potent to protect livers: sALT levels were significantly lower with much better preserved liver architectures; liver pro-inflammatory activation was also inhibited more significantly, at 6h post reperfusion. Mechanistically, Gsk3β deficient KCs were protected from necroptotic depletion by IR that significantly higher numbers of Clec4F+ KCs (by immune histochemical staining) were detected in IR livers of Gsk3β deficient vs. WT mice. In vitro analysis of KCs and BMMs revealed that Gsk3β deficiency did not enhance KC efferocytosis, but rather promoted IL-10/inhibited TNF-a induction upon TLR stimulation in both types of MΦs. Importantly, Gsk3β deficiency facilitated the induction of Axl, MerTK and TIM-4 expressions in BMMs upon inflammatory stimulations, which were critical for their reparative functions.

Conclusions: Gsk3β regulates distinctive MΦ subsets at different stages of liver IRI. It promotes KC pro-inflammatory activation, while facilitates infiltrating MΦ reprogramming into reparative type in the resolution of liver IRI.

CITATION INFORMATION: Zhang H., Ni M., Zhang J., Wang H., Busuttil R., Kupiec-Weglinski J., Zhai Y. Glycogen Synthase Kinase 3 Beta Regulates Distinctive Macrophage Subsets in the Activation and Resolution of Liver Ischemia Reperfusion Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Zhang: None. **M. Ni:** None. **J. Zhang:** None. **H. Wang:** None. **R. Busuttil:** None. **J. Kupiec-Weglinski:** None. **Y. Zhai:** None.

Abstract# 621

Normothermic-Hyperthermic Machine Perfusion Could Increase Response to Pharmacological Intervention in Mitigation of Liver Steatosis

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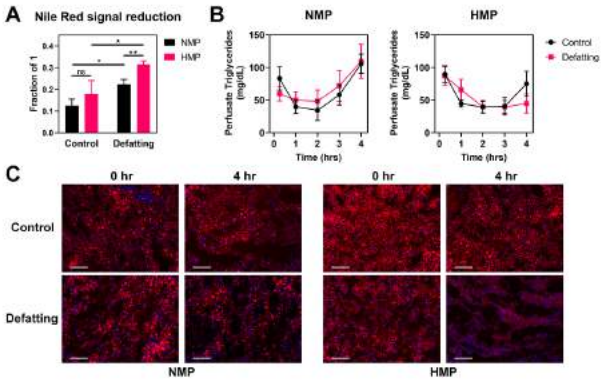
Purpose: To study the feasibility of mitigating rat liver steatosis with ex-situ normothermic-hyperthermic machine perfusion using a multi-drug 'defatting' combination.

Methods: 16 male Zucker obese rats were randomized into 4 groups: Normothermic (NMP) control, NMP defatting, normothermic-hyperthermic (HMP) control and HMP defatting. Livers were procured and flushed with ice-cold HTK solution, placed in cold storage for less than 2 hours. Perfusate was prepared from rat full blood and buffered with bicarbonate solution under 95% O_2 and 5% CO_2 ventilation, additives include heparin, insulin, cefazolin, bile salt and epoprostenol. Machine perfusion was initiated and maintained at 37°C for 1 hour, after which defatting drugs (GW501516, GW7467, forskolin, hypericin, scoparone, and L-carnitine) were injected and temperature was increased to 40°C until a total course of 4 hours was reached. Perfusate samples were taken at 15min and hourly marks. Liver biopsies were taken before and after machine perfusion. Quantification of steatosis was done by calculating Nile Red relative fluorescence intensity from stained frozen section slides in ImageJ. Statistical analysis was done in GraphPad Prism.

Results: In either NMP or HMP, defatting resulted in significant reduction of Nile Red fluorescence signal (NMP: **p*=0.027, HMP: **p*=0.046). While HMP alone did not show improvement in reducing steatosis (control, HMP vs. NMP: *p*=0.46), defatting drugs yielded increased efficacy under higher perfusion temperature (***p*=0.007, Fig.1A). Nile Red staining images showed similar results (red: Nile Red, blue: DAPI, Fig.1C, scale bar 200μm): Red fluorescence decreased in defatting groups, with HMP being more pronounced, while control groups displayed no noticeable decrease. Additionally, perfusate triglycerides in NMP started increasing after 2 hours, while in HMP such trend was absent (Fig.1B).

Conclusions: This study showed increased efficacy of defatting drugs using normothermic-hyperthermic machine perfusion. While HMP alone increases lipid metabolism, defatting drugs are key to reducing steatosis. This technique might be further improved to optimize for the benefit of accelerated metabolism and lowering the amount of injury and potential drug toxicity under prolonged exposure to hyperthermia.



CITATION INFORMATION: Zhou F., Xu M., Upadhya G., Lin Y., Chapman W. Normothermic-Hyperthermic Machine Perfusion Could Increase Response to Pharmacological Intervention in Mitigation of Liver Steatosis *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Zhou: None. **M. Xu:** None. **G.A. Upadhya:** None. **Y. Lin:** None. **W.C. Chapman:** None.

Abstract# LB 38

Identification and Comprehensive Validation of Prognostic Genes After Ischemic and Reperfusion Injury Across Different Donor Types in Renal Transplantation

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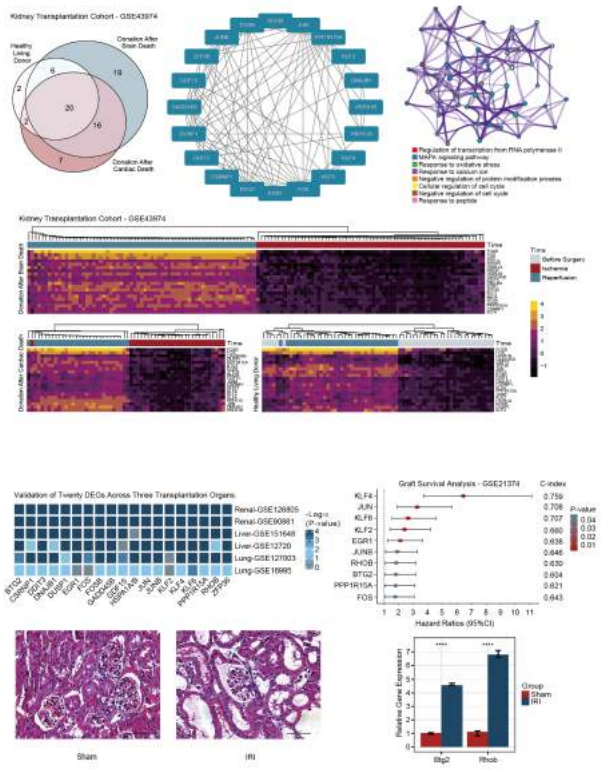
Purpose: Ischemic and reperfusion injury (IRI) remains an inevitable and major challenge for renal transplant patients. The current study aims to obtain overall insights into potential mechanisms and seek prognostic molecular as biomarkers and potential therapeutic targets of IRI for transplantation patients.

Methods: After systematically screened the database, we collected gene expression profiles of over 1000 samples after IRI from eight independent cohorts in the Gene Expression Omnibus (GEO) database. Differentially expressed genes (DEGs) of IRI across different donor types (living donor, cardiac death and brain death) were identified in the discovery cohort of renal transplantation and validated in six independent cohorts including renal, liver and lung transplantations. Additionally, protein-protein interaction (PPI) network and functional enrichment analyses were performed. Then, the above DEGs were further applied to graft survival analysis in a renal transplantation cohort to investigate their prognostic value. Finally, two novel genes of renal IRI were verified in mice renal IRI model using quantitative real-time polymerase chain reaction (qRT-PCR).

Results: Twenty DEGs upregulated after IRI across different donor types and multiple organs were successfully identified and validated. The PPI network showed that these DEGs were strongly connected and enriched in multiple biological processes about transcription and cell cycle. Among DEGs, upregulation of ten genes was found to be associated with poor long-term kidney allograft survival. Finally, two novel prognostic genes were successfully verified by qRT-PCR in the mice renal IRI model.

Conclusions: We successfully identified and validated twenty IRI-associated genes throughout different donor types and transplant organs. Besides, ten of them were significantly associated with renal graft survival, which offered promising and novel therapeutic targets for transplantation patients to treat IRI.



CITATION INFORMATION: Zhang D., Wang Y., Wang Y., Hu X. Identification and Comprehensive Validation of Prognostic Genes After Ischemic and Reperfusion Injury Across Different Donor Types in Renal Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Zhang: None. **Y. Wang:** None. **Y. Wang:** None. **X. Hu:** None.

VCA

VCA

Abstract# 622

Donor-derived Cell-free DNA in Upper Extremity Vascular Composite Allograft Recipients

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Purpose: Diagnosing rejection in VCA recipients relies on clinical exam and biopsy which are both easily confounded by common causes of skin irritation. dd-cfDNA in recipient plasma originating from injured or apoptotic donor allograft cells is a proven non-invasive indicator of allograft rejection in renal transplant recipients but has not been evaluated in VCA recipients.

Methods: VCA patients presenting for evaluation at the outpatient plastic surgery clinic during periods of graft stability without clinical or histologic evidence of rejection, and/or during episodes of suspected clinical and/or biopsy proven rejection were included in this study. dd-cfDNA levels were collected prospectively at each visit with two commercially available kits. Based on established values in renal transplant, a dd-cfDNA level > 1% was considered suggestive of a rejection event.

Results: 5 VCA recipients (3 bilateral and 1 unilateral upper limb, 1 lower abdominal wall, penis, and scrotum) were enrolled in this study. One patient had no clinical or biopsy evidence of rejection with dd-cfDNA level <1% and 1 patient had dd-cfDNA levels >4% at three time points surrounding an episode of biopsy proven BANFF CTA 2007 Grade III rejection. 1 patient with a stable graft and no clinical concern for rejection had a routine dd-cfDNA level >1%. A final patient with non-specific skin changes but biopsy evidence of severe acute cell mediated rejection had dd-cfDNA level <1%.

Conclusions: These data reflect the first attempt to characterize dd-cfDNA in human upper extremity VCA recipients. Although these early results are conflicting, larger cohorts with careful correlation with biopsy findings are needed to fully characterize dd-cfDNA level trends in extremity VCA recipients.

CITATION INFORMATION: Kalsi R., Abuzeineh M., Littleton J., Shores J., Cooney D., Cooney C., Redett R., Brandacher G., Brennan D. Donor-derived Cell-free DNA in Upper Extremity Vascular Composite Allograft Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Kalsi: None. **M. Abuzeineh:** None. **J. Littleton:** None. **J.T. Shores:** None. **D.S. Cooney:** None. **C. Cooney:** None. **R.J. Redett:** None. **G. Brandacher:** None. **D.C. Brennan:** Consulting Fee; Name of Commercial Interest; Allovir, Amplyx, CareDx, Medeor, Natera, Sanofi, Veloxis. Grant/Research Support; Name of Commercial Interest; CareDx, Allovir, Amplyx, Natera. Honoraria; Name of Commercial Interest; CareDx, Veloxis. Other; Name of Commercial Interest; Editorial Board Transplantation, UptoDate.

Abstract# 623

General Public Attitude Toward Vascularized Composite Allografts (VCA) Donation?

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Purpose: To analyze factors associated with affirmative authorization for VCA donation from public opinion.

Methods: KnowledgePanel is the largest online panel that relies on probability-based sampling techniques for recruitment. This panel provides samples with the highest level of representativeness available in online research for the measurement of public opinions, attitudes, and behaviors. For the selection of general population samples from KnowledgePanel, a patented methodology has been developed that ensures all samples behave as the equal probability selection method (EPSEM) samples. This methodology starts by weighting the pool of active members to the geodemographic benchmarks. Using the resulting weights as measures of size, a probability-proportional-to-size (PPS) procedure is used to select study-specific samples. The geodemographic benchmarks used to weight the active panel members for computation of size measures include: gender, age, race, education, census region, household income, homeownership status, metropolitan area, and Hispanic origin.

Results: A total of (n = 260) responded to the survey that included eight sections; Demographics, Familiarity with Donation, Face and Hand Donation, Consent, Reasons, Medical Trust/Distrust and Funeral Plans. After answering these questions, the respondents were exposed to a stimulus that tells the story of a fire fighter who received a face transplant and his subsequent life. Respondents then answered stimulus questions (4 questions) to determine whether the stimulus affected their responses about face and hand donation. At the end, three In-Depth questions are asked. After data collection and analysis, we tested the significance among different groups of respondents. Our results show that after reading the stimulus, there is a significance difference in respondents' willingness to register and to consent for face and hand donation for themselves and their family members. In addition, there is a significant difference in the participants' willingness to register for face and hand donation. This significance is observed among different age groups, between both genders, among participants with income more than or less than 50k, and among different ethnic groups. Other influential factors are region, religious, spirituality, belief in God and military background.

Conclusions: This comprehensive survey provided profound insights into the factors associated with organ donation, and the likely authorization for VCA donation. The favorable response rate after reading the stimulus story emphasizes the importance of awareness and familiarity with the issue of face and hand donation. Touching the impact this transplant would make in one's quality of life is another contributing factor in increasing the registration and consent rate for donation. This study is funded by the Department of Defense (W81XWH-17-1-0646).

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DISCLOSURES: M.S. S Gharibdousti: None. **M. T Khasawneh:** None. **A. L Friedman:** None.

Abstract# LB 40

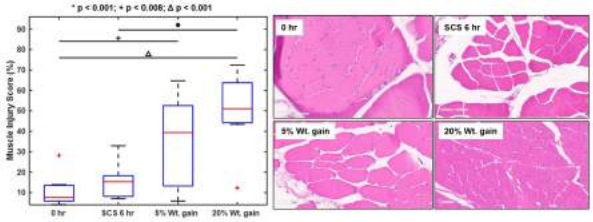
Determining Endpoint Criteria in Ex Vivo Normothermic Limb Perfusion (EVNLP)

S. K. Pandey[1], A. Meyers[1], P. Sadeghi[1], V. Kopparthy[1], T. Xia[1], H. Brunengraber[2], S. Dasarathy[3], A. Rampazzo[1], B. Bassiri Gharb[1], *[1]Plastic Surgery, Cleveland Clinic, Cleveland, OH, [2]Department of Nutrition, School of Medicine, Case Western Reserve University, Cleveland, OH, [3]Department of Gastroenterology, Cleveland Clinic, Cleveland, OH*

Purpose: There are no established criteria for discontinuing EVNLP before irreversible muscle and endothelial cell damage occur. This study aimed to evaluate weight gain as a real-time clinical indicator of injury during EVNLP

Methods: Sixteen forelimbs were procured from Yorkshire pigs and preserved using EVNLP (37°C) (n=8) or static cold storage (SCS 4°C) (n=8). An oxygenated perfusate containing oxygen carrier HBOC-201 was used. EVNLP continued for 24 hours or until systolic perfusate pressure was ≥115 mmHg, fullness of compartments or a reduction of tissue oxygen saturation by 20% were observed. Limb weight, contractility, hemodynamic parameters, perfusate electrolytes, metabolites and gases

were recorded and analysed. Biopsies of biceps muscles were collected 6 hourly, and muscle injury scores (MIS) calculated. Outcomes were compared at 2%, 5%, 10%, and 20% limb weight gain. Pearson's correlation between parameters, t-test or ANOVA followed by Tukey post hoc pairwise comparisons were performed.
Results: EVNLP lasted 20±3 hours. Weight gain was observed after 13±5 h (2%), 15±6 h (5%), 16±6 h (10%), and 19±4 h (20%). Weight gain correlated positively with MIS ($r=0.92$, $p<0.01$), perfusate potassium ($r=0.81$, $p<0.01$) and mean perfusate pressure ($r=0.63$, $p<0.01$). Weight correlated negatively with contractility ($r=-0.71$, $p<0.01$). At 5% weight gain, significantly higher MIS ($p<0.01$), perfusate potassium ($p=0.03$), and lactate ($p=0.02$) were recorded compared to the baseline. Mean MIS at 5% weight gain was not significantly different from SCS limbs at 6 hours ($p=0.07$). Arterial resistance increased over time ($r=0.55$, $p<0.05$) and at 20% weight gain was significantly higher ($p=0.02$) than at 5% weight gain, the latter being not significantly different from baseline ($p=0.28$). No significant difference was observed between glucose consumption ($p=0.48$), oxygen uptake rate ($p=0.94$) or creatine kinase ($p=0.30$) at the different weight levels. Median muscle contractility was 4 (1-5) at 5% weight gain, which decreased to 3 (0-4) and 2 (0-2) at 10% ($p=0.32$) and 20% ($p=0.24$), respectively.
Conclusions: Weight gain precedes increasing arterial resistance. Muscle injury in limbs at 5% weight gain is similar to that of limbs preserved at 4°C for 6 h (standard cold ischemia time) and therefore 5% weight increase may serve as a criterion for discontinuation of EVNLP.



CITATION INFORMATION: Pandey S., Meyers A., Sadeghi P., Kopparthy V., Xia T., Brunengraber H., Dasarathy S., Rampazzo A., Bassiri Gharb B. Determining Endpoint Criteria in Ex Vivo Normothermic Limb Perfusion (EVNLP) *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.K. Pandey: None. **A. Meyers:** None. **P. Sadeghi:** None. **V. Kopparthy:** None. **T. Xia:** None. **H. Brunengraber:** None. **S. Dasarathy:** None. **A. Rampazzo:** None. **B. Bassiri Gharb:** None.

Abstract# LB 41

Efficacy of Ex Vivo Normothermic Limb Perfusion in Maintaining Cellular Viability and Muscle Function

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Purpose: The purpose of this study was to evaluate cellular injury and myocyte function of amputated limbs following ex vivo normothermic limb perfusion (EVNLP) compared to traditional cold storage.
Methods: Twenty human upper extremities were procured from organ donors after brain death. Ten were perfused with an oxygenated colloid solution containing packed red blood cells at 38°C for 48 hours or until the termination criteria were met (maximum arterial pressure >115 mmHg, weight increase >20%, compartment pressure >30 mmHg, tissue oxygen saturation decrease >20%). Electrolyte derangements were managed with partial perfusate exchanges every 3 hours beginning at hour 6 of perfusion. Contralateral upper limbs (controls) were preserved at 4°C. Limb viability was assessed through contractility testing, tissue oxygen saturation, infrared thermography, and indocyanine green (ICG) angiography. H&E and caspase-3 staining were performed. Myocyte injury scores (MIS) and caspase-3 positivity were assessed using the Aperio ImageScope software by two investigators blinded to the experimental group and time. Myocytes were classified as damaged if there was nuclei extravasation, disrupted cell membrane, or distinct fissures within the cytoplasm. Statistical analysis was performed with Kruskal-Wallis and paired t-test.
Results: Limbs were perfused for 41.6 ± 9.4 hours. For the EVNLP limbs, contractility was observed for a median of 30.5 hours (range 16-40 hours), and maximum contractility was maintained for a median of 8 hours (range 1-15 hours). Control limbs had a contractility score of 0 after procurement. The final weight change was +0.4 ± 12.2% and 0 ± 0% in the EVNLP group and control group, respectively. One limb developed compartment syndrome after 6 hours. Thermography and ICG angiography demonstrated uniform peripheral perfusion of the experimental limbs throughout. Average MIS was 24.7 ± 13.0% and 44.3 ± 30.6% for the EVNLP and control groups, respectively. In the EVNLP group, MIS did not significantly differ among time-points 0, 12, 24, 36, and 48 hours ($p=0.46$). In the control group, MIS was significantly higher at end time-points (mean = 44.8 ± 4.8 hours) compared to time-point 0 ($p=0.009$).
Conclusions: In contrast to hypothermic preservation, EVNLP can halt the progression of myocyte injury for up to 48 hours and maintain normal muscle function beyond 24 hours.

CITATION INFORMATION: Xia T., Sadeghi P., Kopparthy V., Pandey S., Rampazzo A., Bassiri Gharb B. Efficacy of Ex Vivo Normothermic Limb Perfusion in Maintaining Cellular Viability and Muscle Function *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Xia: None. **P. Sadeghi:** None. **V. Kopparthy:** None. **S. Pandey:** None. **A. Rampazzo:** None. **B. Bassiri Gharb:** None.

Abstract# LB 42

Tissue Specific Antigen-presentation in VCA Transplantation

B. Kern[1], J. Mengwasser[1], A. Reutzel-Selke[1], M. I. Ashraf[1], D. Polenz[1], K. Fuehrer[1], S. Lippert[1], P. Tang[1], F. Martin[1], C. Witzel[1], I. M. Sauer[1], J. Pratschke[1], S. G. Tullius[2], *[1]Dept. of Surgery, Charité Campus CCM|CVK, Universitaetsmedizin Berlin, Germany, Berlin, Germany, [2]Division of Transplant Surgery and Transplant Surgery Research Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA*

Purpose: Vascular Composite Tissue Allotransplantation (VCA) has become a clinical reality. High frequencies of acute rejections remain an unsolved problem. Here, we delineated components of VCA for their contribution to graft immunogenicity, antigen presentation and early immune responses.
Methods: Early immune responses following skin and orthotopic hind limb (HL) Tx in allogeneic mouse models dissected the role of antigen presenting cells (APC) with a focus on classical dendritic cells (DC). Using standard depletion protocols, grafts of zDC-DTR (diphteria toxin receptor) transgenic and C57BL/6 wild type (WT) mice, pretreated with DT or clodronate liposomes (CL) for APC/DC depletion, respectively (CL), were transplanted into DBA2 recipients. Grafts from untreated WT mice served as controls. Immune cell phenotyping was performed by flow cytometry in blood, spleen and lymph nodes (LN) of recipients. Intragraft gene expression of relevant cytokines was analyzed by qPCR, serum cytokine levels by Luminex assays. Rejections were assessed serially (POD 1,3,5) based on the BANFF criteria (hair loss, erythema, edema, desquamation, mummification, grading 0-4).
Results: Both, WT hindlimb and skin grafts showed increased signs of acute rejection by POD 5 (grade 3) compared to DC-depleted HL groups (grade 2). DC counts ($CD11c^+$, $CD11c^+MHCII^+/CD40^+$) were markedly increased in recipients of skin WT grafts compared to HL WT grafts (blood, spleen, LN, POD6, $p<0.0001$). Depletion of donor DC or APC significantly reduced DC counts in skin graft recipients ($p<0.05$ vs. WT), but had no impact on DC numbers following HL Tx. Recipients of HL grafts showed significantly higher cDC1 subset counts ($CD11b^-B220^-CD11c^+CD8^+$) compared to skin Tx (blood, spleen, LN, $p<0.05$); cDC2 subset counts ($CD11b^+CD11c^{high}MHCII^{high}$) were significantly increased in recipients of skin grafts ($p<0.01$). Numbers of $CD4^+IL17A^+$ T cells were augmented significantly following skin Tx ($p<0.0001$ vs. HL) while IL-6, TNF-α, IL-17, and TNF-β protein levels were elevated in WT recipients of HL grafts ($p<0.05$ vs. skin Tx).
Conclusions: Early immune responses including DC activation differed significantly between skin and hindlimb transplant recipients. Focusing on DC and Th17 immune responses may provide specific therapeutic targets in VCA transplantation.

CITATION INFORMATION: Kern B., Mengwasser J., Reutzel-Selke A., Ashraf M., Polenz D., Fuehrer K., Lippert S., Tang P., Martin F., Witzel C., Sauer I., Pratschke J., Tullius S. Tissue Specific Antigen-presentation in VCA Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Kern: None. **J. Mengwasser:** None. **A. Reutzel-Selke:** None. **M.I. Ashraf:** None. **D. Polenz:** None. **K. Fuehrer:** None. **S. Lippert:** None. **P. Tang:** None. **F. Martin:** None. **C. Witzel:** None. **I.M. Sauer:** None. **J. Pratschke:** None. **S.G. Tullius:** None.

Basic

Biomarkers, Immune Assessment and Clinical Outcomes

Abstract# 624

Cardiac Outcomes in Isolated Heart and Simultaneous Kidney and Heart Transplants in the US

K. A. Agarwal[1], H. Patel[1], N. Agrawal[1], F. Cardarelli[1], N. Goyal[2], *[1]Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [2]Nephrology, Tufts Medical Center, Boston, MA*

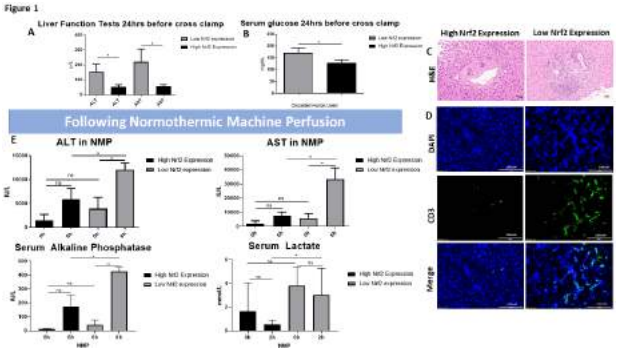
Purpose: Kidney dysfunction is not uncommon in patients with advanced heart failure. Simultaneous kidney and heart transplants (SKHT) have gained acceptance as treatment for patients with end-stage heart failure (ESHF) and severe kidney dysfunction. US saw a rise of 650% in SKHT from 2000 to 2019. Despite increasing number of SKHT, the selection criteria remain poorly defined and vary across transplant centers. We wanted to identify heart transplant candidates who may benefit from a simultaneous kidney-heart transplant.
Methods: In this retrospective cohort study, we examined the patient and cardiac allograft survival for SKHT and heart transplant alone (HTA) recipients between 1987 and 2019 using the United Network for Organ Sharing (UNOS) database. We then performed a subgroup analysis in recipients with post-transplant Acute Kidney Injury (AKI) requiring renal replacement therapy (RRT) and compared outcomes between SKHT and HTA recipients.

Results: A total of 61,410 HTA and 1,507 SKHT recipients were included in the final analysis. While patient survival was comparable between SKHT and HTA groups (12.4 vs. 11.3 years), pretransplant dialysis-dependent patients derived a significant survival benefit from SKHT (12.4 years vs. 9.9 years). Cardiac graft survival was better in SKHT (12.5 vs. 11.2 years). Age less than 30 years (OR 1.27), higher BMI (OR 1.02), reduced GFR (OR 9.46 for GFR<30, OR 2.68 for 30-44, OR 1.99 for GFR 45-59), mechanical cardiac support (OR 1.28), recipient diabetes (OR 1.15), inotropic support (OR 1.11) and prior sternotomy (OR 1.61) were significant risk factors for AKI requiring dialysis post-transplant. Among these patients, SKHT recipients had a significantly better survival as compared to HTA recipients (11.9 vs. 2.7 years).
Conclusions: Our data supports consideration of SKHT in dialysis-dependent heart transplant candidates and suggests that patients who are at increased risk of requiring RRT post heart transplant may also benefit from SKHT.
CITATION INFORMATION: Agarwal K., Patel H., Agrawal N., Cardarelli F., Goyal N. Cardiac Outcomes in Isolated Heart and Simultaneous Kidney and Heart Transplants in the US *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.A. Agarwal: None. **H. Patel:** None. **N. Agrawal:** None. **F. Cardarelli:** Salary; Name of Commercial Interest; Allovir. Salary; Nature of Relationship; Employed by. **N. Goyal:** None.

Abstract# 625

Nrf2 Assessment in Discarded Liver Allografts: A Role in Allograft Function and Salvage

O. Ahmed, M. Xu, F. Zhou, A. N. Wein, G. Upadhya, Y. Lin, W. Chapman,
Surgery, Washington University School of Medicine, Saint Louis, MO
Purpose: With mounting pressures to optimize organ availability for transplantation, there is a focus on reducing organ discard and attempting to resuscitate declined grafts for later use. The nuclear factor erythroid 2-related factor-2 (Nrf2) axis may be an important mediator in allograft function. This study aimed to determine the functional expression and clinical relevance of Nrf2 in discarded human livers.
Methods: Biopsies from 40 discarded liver allografts were studied. Nrf2 expression was quantified by immunoblotting and patients were stratified into a high Nrf2 and low Nrf2 group. Relevant donor clinical and biochemical data were compiled. The modified Suzuki scoring system and Banff criteria were used for histological grading of hepatic injury. Inflammatory infiltration was quantified by immunofluorescence for CD3-positive cells. Allografts (n = 8) were exposed to 6 hours of normothermic machine perfusion (NMP). Liver function (LFT) and lactate clearance were recorded pre- and post NMP to determine viability. Advanced CellSens and GraphPad software were used for biostatistical analysis.
Results: Livers with greater Nrf2 levels demonstrated lower ALT (mean 53 IU/L vs 152 IU/L, p = 0.049) and AST (58 IU/L vs 220 IU/L, p =0.045) prior to organ procurement (Figure 1A). Serum glucose (mean 171 mg/dL vs 126 mg/dL, p = 0.046) (Figure 1B) and hepatic glycogen content were both higher in the low Nrf2 group. Greater vascular endothelial inflammation (Figure 1C) around the hepatic artery (p = 0.01) and portal vein (p = 0.003) was observed in livers with lower Nrf2 expression and these organs also demonstrated increased periportal CD3 infiltration (p < 0.01) (Figure 1D). Following 6 hours of NMP, livers with higher Nrf2 expression demonstrated lower LFT derangements (ALT 5919 IU/L vs 12000 IU/L; AST 7817 vs 33405 IU/L) and healthier lactate clearance (0.5 mmol/L vs 2.98mmol/L) compared to allografts with lower Nrf2 expression (p < 0.05) (Figure 1E).
Conclusions: This study highlighted the association of a rich Nrf2 environment with more favourable clinical parameters and its potential impact on the functionality of discarded liver allografts. Nrf2 expression may act as a useful marker to differentiate between salvageable discarded allografts and targeting the Nrf2 axis could have a rationale in future studies.



CITATION INFORMATION: Ahmed O., Xu M., Zhou F., Wein A., Upadhya G., Lin Y., Chapman W. Nrf2 Assessment in Discarded Liver Allografts: A Role in Allograft Function and Salvage *AJT, Volume 21 Supplement 3*
DISCLOSURES: O. Ahmed: None. **M. Xu:** None. **F. Zhou:** None. **A.N. Wein:** None. **G. Upadhya:** None. **Y. Lin:** None. **W. Chapman:** None.

Abstract# 626

Biomarkers of Kidney Injury and Repair in Expanded-Criteria Deceased Donor Kidney Transplant Recipients: A Prospective Study

A. Al Jurdi[1], O. Efe[1], B. Aoyama[2], M. Lima[2], H. Silva[2], I. Schmidt[3], S. Waikar[3], V. Sabbisetti[4], L. V. Riella[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Escola Paulista de Medicina, UNIFESP, São Paulo, Brazil, [3]Boston Medical Center, Boston, MA, [4]Brigham and Women's Hospital, Boston, MA*
Purpose: Expanded-criteria donor (ECD) kidney transplants are at higher risk of kidney injury. Biomarkers that better predict short and long-term outcomes in ECD kidney transplant recipients are needed.
Methods: In this prospective study, we evaluated the prognostic value of seven biomarkers of kidney injury (KIM-1, SuPAR), repair (MCP-1, YKL-40) and inflammation (MCP-1, TNFR1, TNFR2 and CXCL9) in 50 ECD kidney transplant recipients at a single center. Blood samples were collected on days 0, 7, 30, 90, 180 and 360 after transplantation (Fig. 1A). Plasma biomarker levels were measured using a Meso Scale Discovery platform. Biomarker tertiles and mean estimated glomerular filtration rate (eGFR) of different groups were compared using one-way analysis of variance (ANOVA). Linear and logistic regression analyses of biomarkers were performed to assess their predictivity of allograft outcomes.
Results: The median age of recipients was 51 years, 74% were male, and the most common etiology of end-stage kidney disease was diabetic nephropathy. One-year patient and allograft survival were both 100%. Five patients developed biopsy-proven acute rejection. Higher day 7 tertiles of KIM-1, SuPAR, TNFR1 and TNFR2 were associated with lower eGFR at days 7 and 30 but not at day 360 (Fig. 1B). Combining day 30 eGFR and change in biomarker levels from day 7-30, we developed a multivariate logistic regression model that was able to predict stability vs. decline in eGFR from day 30-360 with an area under the receiver operating characteristic (ROC) curve of 0.85 (Fig. 1C).
Conclusions: Single biomarker values provide a cross-sectional view of allograft status but have limited predictive value for allograft outcomes. Changes in biomarker levels over time can give a more dynamic picture of allograft status and better predict one-year outcomes.

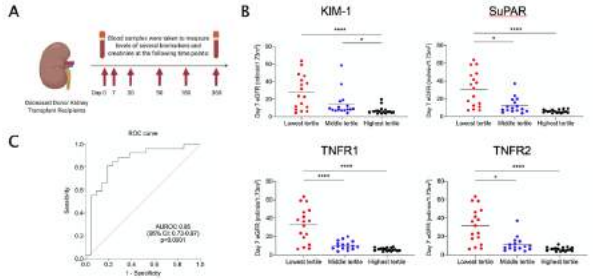


Figure 1. Longitudinal kidney biomarker levels post-transplantation. (A) Study design. (B) Analyses of biomarker levels at day 7 according to tertiles and eGFR for 50 ECD kidney transplant recipients. Differences assessed by one-way ANOVA followed by Bonferroni correction. (C) ROC curve for logistic regression model using changes in biomarker levels from day 7-30 to predict stable vs. decline in eGFR from day 30-360.

CITATION INFORMATION: Al Jurdi A., Efe O., Aoyama B., Lima M., Silva H., Schmidt I., Waikar S., Sabbisetti V., Riella L. Biomarkers of Kidney Injury and Repair in Expanded-Criteria Deceased Donor Kidney Transplant Recipients: A Prospective Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Al Jurdi: None. **O. Efe:** None. **B. Aoyama:** None. **M. Lima:** None. **H. Silva:** None. **I. Schmidt:** None. **S. Waikar:** None. **V. Sabbisetti:** None. **L.V. Riella:** None.

Abstract# 627

Remote Monitoring Using Mobile Phlebotomy and Donor-derived Cell-free DNA in Kidney Transplant Recipients During the Covid-19 Pandemic

N. Ali[1], J. Miles[2], V. Tatapudi[1], R. Montgomery[1], *[1]NYU Langone, New York, NY, [2]Medical Science Liason, CareDx, Brisbane, CA*
Purpose: The rapid shift to telemedicine and remote monitoring of kidney transplant recipients (KTRs) during COVID-19 aimed to mitigate exposure risk for this vulnerable population. dd-cfDNA (AlloSure, CareDx Brisbane) is a well-established biomarker for surveillance of KTRs and is associated with allograft tissue injury, including immunological events such as acute rejection. Here we describe an innovative approach to remote surveillance for KTRs using mobile home phlebotomy during the pandemic.
Methods: Pilot program of KTRs enrolled into the mobile home phlebotomy (RemoTraC) from March - November 2020. AlloSure dd-cfDNA was concomitantly performed with routine post-transplant laboratory studies at regular time intervals as per standard of care.
Results: 159 KTRs were enrolled in the mobile phlebotomy program with 1421 draws completed during the surveillance period. Patient demographics are sum-

marized in Table 1. The median AlloSure dd-cfDNA level was 0.21% (IQR 0.12 - 0.42%). 25 for-cause biopsies were performed in patients monitored with mobile phlebotomy. 12 patients had biopsy proven rejections paired with AlloSure dd-cfDNA (1 borderline, 2 TCMR1A, 4 TCMR2A, 2 TCMR1B, 2 chronic active TCMR and 1 mixed AMR/TCMR). The median AlloSure dd-cfDNA was 0.5% (IQR 0.2-3.26%) in patients with active rejection compared to 0.14% (IQR 0.12-0.56%) in patients with no rejection (p=0.03). There was no difference in serum creatinine between the two groups (p=0.3). The median AlloSure dd-cfDNA levels in TCMR2A/1B and mixed AMR/TCR were 0.72 and 7.7% respectively.

Conclusions: AlloSure dd-cfDNA can optimize post-transplant care by identifying patients at risk of allograft injury and rejection. This analysis demonstrates the feasibility of mobile phlebotomy for routine surveillance in combination with telehealth strategies during the unprecedented COVID-19 pandemic. In addition, utilization of dd-cfDNA helped clinicians direct limited resources during the pandemic for allograft biopsies when paired with standard clinical markers such as creatinine.

Table 1: Patient demographics.

Median age (years)	59 (range: 22-79)
Gender	
Male	94 (59%)
Female	65 (41%)
Race	
African American	58 (36%)
White	52 (33%)
Asian	28 (18%)
Hispanic	16 (10%)
Other	5 (3%)
Transplant type	
Deceased donor	112 (70%)
Living donor	44 (28%)
Pancreas/kidney	3 (2%)
Median draws per patient	8 (IQR 5 -13)

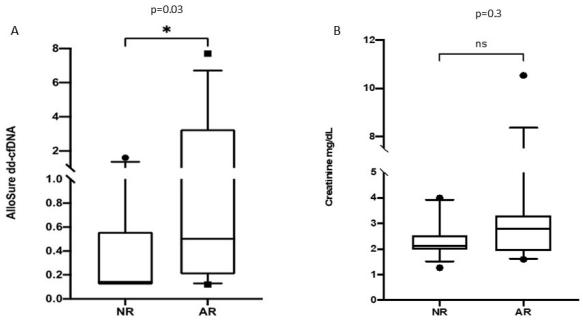


Figure 1: A) Fraction of AlloSure dd-cfDNA in no rejection (NR) versus active rejection (AR). B) Serum creatinine in NR versus AR.

CITATION INFORMATION: Ali N., Miles J., Tatapudi V., Montgomery R. Remote Monitoring Using Mobile Phlebotomy and Donor-derived Cell-free DNA in Kidney Transplant Recipients During the Covid-19 Pandemic *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Ali: Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Advisory Board Attendee. **J. Miles:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **V. Tatapudi:** None. **R. Montgomery:** Grant/Research Support; Name of Commercial Interest; HANSA Pharma. Grant/Research Support; Nature of Relationship; clinical research grant. Other; Name of Commercial Interest; Viela Bio/CTI, CSL Behring, eGenesis, RMEI, Takeda, and Regeneron. Other; Nature of Relationship; member of advisory board.

Abstract# 628

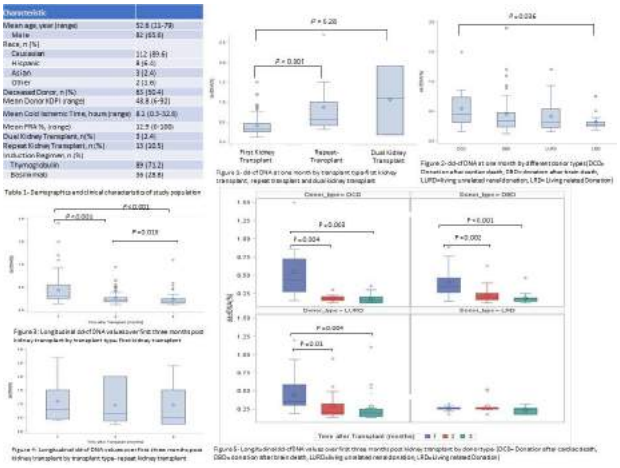
Longitudinal Variance of Donor Derived Cell Free DNA (dd-cf DNA) in Stable Kidney Transplant (Tx) Patients are Influenced by Donor/ Recipient Variables

S. Anand, F. Lopez-Verdugo, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*

Purpose: The limits and cut offs of dd-cfDNA as an injury biomarker in kidney transplant (KTx) are based on coupled single event (biopsy) measurements. It represents an oversimplification that extrapolates from a single measurement to prospective repeat measures. Meaningful interpretation of repeat measures of dd-cfDNA demands : 1) factors determining biologic variability; 2) time variance of dd-cfDNA levels post-Tx; and 3) relationship to donor and recipient characteristics. We hypothesized that incorporating knowledge of the above factors would refine the clinical utility of the use of dd-cfDNA as an injury biomarker by better selection of patients for further intervention.

Methods: After excluding patients with biopsy proven acute rejection, a total of 125 patients who underwent kidney transplantation between 1st June 2016 to 31st December 2019 had serial dd-cfDNA samples obtained at months 1, 2, 3, 4, 6, 9 and 12 post-transplant as part of their standard of care.

Results: 82 (65.6%) participants were male, with a mean age of 52.6 (Table 1). Median dd-cfDNA at 1 month post-Tx was higher in repeat KTx (0.57%, $p < 0.001$), and dual KTx (1.10%, $p = 0.28$) versus a single KTx (0.31%) (Fig 1). A decreasing and significant trend was observed in median dd-cfDNA at 1 month post-Tx for patients receiving a kidney from donor after cardiac death (DCD [0.45%]), donor after brain death (DBD [0.37%]), living unrelated (LURD [0.34%]) or living related (LRD [0.27%]) donors (p=0.036)(Fig 2). Longitudinal, repeated dd-cfDNA measurements showed a significant decrease over time during the first three months after transplantation for first KTx (p<0.001) (Fig 3). For re-Tx (n=7), there was a non-significant downtrend of dd-cfDNA over time (Fig 4). Sub-group analysis, by donor-type, showed a significant downtrend in dd-cfDNA values recipients with DCD, DBD, LUKT showed from one month to three months (p<0.05) (Fig 5). Panel-reactive antibodies (PRA) were positively correlated with dd-cfDNA ($R2 = 0.113$, $p < 0.001$).



Conclusions: Repeat Tx, Dual Tx and higher PRA are associated with a higher dd-cfDNA likely a function of the size of the dd-DNA source. Values of dd-cf DNA at one month are likely higher at baseline, attributable to initial ischemia reperfusion injury. dd-cfDNA should be interpreted with caution in certain donor types (DCD, DBD, LUKT). Incorporation of donor/recipient variables and time down dependent evolution post transplant is material for rational interpretation of ddcfDNA cutoffs in clinical decision making.

CITATION INFORMATION: Anand S., Lopez-Verdugo F., Sanchez-Garcia J., Dong L., Fife M., Krong J., Morris D., Srinivas T. Longitudinal Variance of Donor Derived Cell Free DNA (dd-cf DNA) in Stable Kidney Transplant (Tx) Patients are Influenced by Donor/Recipient Variables *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Anand: None. **F. Lopez-Verdugo:** None. **J. Sanchez-Garcia:** None. **L. Dong:** None. **M. Fife:** None. **J. Krong:** None. **D. Morris:** None. **T. Srinivas:** None.

Abstract# 629

Longitudinal Surveillance, Relative Change Value (RCV) Improve Diagnostic Test Accuracy (DTA) of Donor-Derived Cell Free DNA (dd-cfDNA)

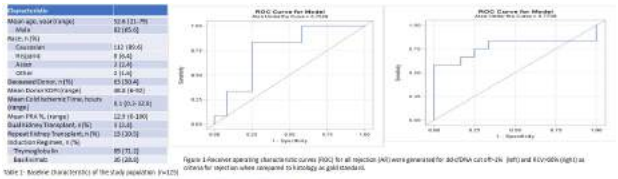
S. Anand, F. Lopez-Verdugo, J. Sanchez-Garcia, L. Dong, M. Fife, J. Krong, D. Morris, T. Srinivas, *Intermountain Medical Center, Murray, UT*

Purpose: dd-cfDNA, an injury biomarker in kidney transplant (KTx), is emerging as a trigger for biopsy (Bx) and superior to the traditional trigger of change in renal function. This is based on single event/Bx bracketing measurement of dd-cfDNA.

Rational interpretation of serial dd-cfDNA, as an injury biomarker demands assessment of variability (intra- and Interindividual) and RCV of dd-cfDNA. We hypothesized that incorporating RCV vs. single cutoff value improves DTA of dd-cfDNA for rejection.

Methods: After excluding patients with biopsy proven acute rejection and CMV/BK viremia, patients with serial dd-cfDNA at 1,2,3,4, 6, 9, 12-months post Tx were included. We computed the intra-individual change value(CVI), inter-individual or group change value (CVG), from dd-cfDNA values with more than or equal to 3 sequential results within the first 12 months of renal transplant. We also calculated index of individuality (II) as the CVI/CVG ratio and the relative change value (RCV). RCV is defined as the difference that must be exceeded between 2 sequential results for a significant change to occur. In a subset analysis of 24 patients with rejection, receiver operating characteristic curves (ROC) for all rejection (AR) were generated for dd-cfDNA cut off>1% and RCV>66% as criteria for rejection when compared to histology as gold standard.

Results: Of 125 patients, 82 (65.6%) participants were male, with a mean age of 52.6 (Table 1).CVI was 34.7%, CVG was 93.2%., II was calculated at 0.37, and RCV was 98% (Table 2). After excluding one month values, due to largely higher values at one month in part of ischemia reperfusion injury, RCV changed to 66%. For dd-cfDNA>1%, discrimination for all rejection (AR), AUC was 0.7569 versus 0.7708 when compared to RCV >66% as criteria (Fig 1). Utilizing RCV as a criteria resulted in increase of 28% and 21% for positive predictive value (PPV) and negative predictive value (NPV) respectively (Table 3).



Conclusions: 1) Our study reports performance of RCV in 'real world' stable KTx population outside of a clinical trial. 2) An RCV of 66% in 'real world' Ktx population is similar to clinical trial results of 61%. We propose:1) Longitudinal surveillance of dd-cfDNA and RCV should supplant a single cutoff value for dd-cfDNA at biopsy 2) Clinical decision making using dd-cfDNA should be personalized at the patient level, taking into account both baseline values and longitudinal intra-individual trends.

CITATION INFORMATION: Anand S., Lopez-Verdugo F., Sanchez-Garcia J., Dong L., Fife M., Krong J., Morris D., Srinivas T. Longitudinal Surveillance, Relative Change Value (RCV) Improve Diagnostic Test Accuracy (DTA) of Donor-Derived Cell Free DNA (dd-cfDNA) *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Anand: None. **F. Lopez-Verdugo:** None. **J. Sanchez-Garcia:** None. **L. Dong:** None. **M. Fife:** None. **J. Krong:** None. **D. Morris:** None. **T. Srinivas:** None.

Abstract# 630

Evaluation of Meningococcal Vaccine Response Among Solid Organ Transplant Recipients Receiving Eculizumab

R. Arora[1], C. Kane[1], K. Cunningham[1], M. Ison[2], *[1]Pharmacy, Northwestern Memorial Hospital, Chicago, IL, [2]Divisions of Infectious Diseases and Organ Transplantation, Northwestern Memorial Hospital, Chicago, IL*

Purpose: Patients receiving eculizumab are at a 1,000-2,000-fold increased risk of invasive meningococcal infections. Therefore, the Advisory Committee for Immunization Practices recommends that these patients receive meningococcal vaccination at least 2 weeks prior to the start of therapy. However, despite adequate vaccination, multiple reports of breakthrough meningococcal disease have been reported. Solid organ transplant (SOT) recipients are a unique population with notoriously diminished vaccine response due to chronic immunosuppression, potentially placing them at increased risk for breakthrough meningococcal disease while receiving eculizumab. Therefore, the purpose of this study is to evaluate meningococcal vaccine response in this patient population.

Methods: This is a single-center, retrospective evaluation of all solid organ transplant recipients 18 years of age or older that underwent eculizumab therapy between January 1, 2014 and June 1, 2020. All patients that received both doses of the meningococcal vaccines and had subsequent N. *meningitidis* IgG concentrations available within 6 months of vaccination were included. The primary outcome was the meningococcal vaccine response rate, which was measured using N. *meningitidis* IgG concentrations against serogroups A, C, Y, and W-135.

Results: A total of 17 patients met the pre-specified inclusion criteria and was primarily composed of lung transplant recipients. Preliminary results indicated that N. *meningitidis* IgG serologic response occurred in only 41.2% of patients against serogroup A, 58.8% against serogroup C, 47.0% against group Y, and 70.6% to serogroup W-135 following vaccination. Further results to follow.

Conclusions: Meningococcal IgG vaccine response varied against the different meningococcal serogroups. Consideration should be given towards repeat vaccination and prolonged antimicrobial prophylaxis in vaccine non-responders undergoing eculizumab therapy.

CITATION INFORMATION: Arora R., Kane C., Cunningham K., Ison M. Evaluation of Meningococcal Vaccine Response Among Solid Organ Transplant Recipients Receiving Eculizumab *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Arora: None. **C. Kane:** None. **K. Cunningham:** None. **M. Ison:** None.

Abstract# 631

Single Center Experience Comparing Two Clinically Available Donor Derived Cell Free DNA Tests

S. Bunnapradist[1], S. Lee[2], P. Homkrailas[3], G. Danovitch[3], *[1]UCLA, Los Angeles, CA, [2]Pharmacy, David Geffen School of Medicine at UCLA, Los Angeles, CA, [3]David Geffen School of Medicine at UCLA, Los Angeles, CA*

Purpose: Donor derived cell-free DNA (dd cf-DNA), this new technology allows for non-invasive monitoring of graft function. Two most commonly used assays are Prospera (Natera®, San Carlos, California) and AlloSure (CareDx®, Brisbane, California). We report our experience in comparing simultaneous use of these tests.

Methods: A series of 15 paired-samples from individual kidney transplant recipients using Prospera and AlloSure test were included. We used the company cut off of >1% to indicate active rejection for Prospera, and 0.5% or 1% for Allosure. Acute rejections were all defined by kidney histology.

Results: The paired-results are shown in Table 1. There were concordant results for all 15 paired-samples when using Allosure cut off level of 0.5%. A single discordant result was observed when using Allosure cut off level of 1%. Kidney biopsies were performed in seven of the cases where dd cf-DNA was elevated. Rejection was found in six of biopsy results (see in table 2). When cut off level of 1% was used, Prospera identified 80% (4/5) of T-cell mediated rejections (TCMR) compared to 60% for Allosure (3/5). Both assays recognized the single case of antibody mediated rejection. When using cut off level of 0.5% for Allosure, all 6/6 rejections were identified.

Conclusions: There were concordant results between the two using cut off of 1% for Prospera and 0.5% for Allosure. The accuracy of the result was confirmed by the kidney biopsy (5 active rejection diagnosis + 1 non-rejection). Prospective, head-to-head trials are needed to compare the accuracy and predictive values of these two clinically available dd-cfDNA assays.

Table 1 Comparing between 2 donor derived cell free DNA test results

Patients	Prospera results	Allosure results
1	0.08%	0.15%
2	0.26%	0.22%
3	0.25%	0.23%
4	0.65%	0.57%
5	0.90%	0.62%
6	2.06%	0.98%
7	2.55%	2.10%
8	4.72%	3.60%
9	4.40%	3.70%
10	4.47%	3.80%
11	7.56%	4.80%
12	<0.08%	0.16%
13	<0.08%	<0.12%
14	<0.08%	<0.12%
15	0.28%	<0.26%

Table 2 Donor derived cell free DNA levels and kidney biopsy results

Prospera results		Allosure results			Kidney biopsy results
Levels	Cut off level 1%	Levels	Cut off level 1%	Cut off level 0.5%	
0.90%	Negative	0.62%	Negative	Positive	TCMR IA
2.06%	Positive	0.98%	Negative	Positive	TCMR IA
2.55%	Positive	2.10%	Positive	Positive	ABMR
4.72%	Positive	3.60%	Positive	Positive	TCMR IIB
4.40%	Positive	3.70%	Positive	Positive	Suspicious for TCMR
4.47%	Positive	3.80%	Positive	Positive	TCMR IB

Abbreviations: TCMR, T-cell mediated rejection; ABMR, B-cell mediated rejection

CITATION INFORMATION: Bunnapradist S., Lee S., Homkrailas P., Danovitch G. Single Center Experience Comparing Two Clinically Available Donor Derived Cell Free DNA Tests *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Bunnapradist: Grant/Research Support; Name of Commercial Interest; FDA, NIDDK, NIAID, NIH, Astellas, Mallinckrodt, BMS, CareDx, Natera, Merck, Vitaeris, OneLegacy. Grant/Research Support; Nature of Relationship; grant. Honoraria; Name of Commercial Interest; Sanofi, Natera, CareDx, Veloxis. Honoraria; Nature of Relationship; speaker, advisory board. **S. Lee:** None. **P. Homkrailas:** None. **G. Danovitch:** Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; advisory board. Other; Name of Commercial Interest; OneLegacy. Other; Nature of Relationship; medical directyor.

Abstract# 632

Comparative Proteomics Analysis Identifies the Biomarker of Ischemia-Reperfusion Injury During Liver Transplantation

M. Chen[1], L. Xiaohong[2], H. Xitao[1], J. Weiqiang[1], *[1]Transplant Center, Sun Yat-sen University, Guangzhou, China, [2]Sun Yat-sen University, Guangzhou, China*

Purpose: To a large extent the success of liver transplantation depends on quality of allografts. The molecular basis of the susceptibility of different liver allografts to transplant injury remains undefined. We investigated the proteomic alterations in liver grafts of different qualities by isobaric Tags for Relative and Absolute Quantification (iTRAQ).

Methods: Transplanted liver samples were collected and divided into three groups: the optimal graft (OG) group, early allograft dysfunction (EAD) group, and primary nonfunction (PNF) group. Comparative quantitative proteomic analysis and multiple reaction monitoring (MRM) verification was performed. Samples from human IRI model were collected for further investigation at three different time points during liver transplantation.

Results: A total of 6505 proteins were preliminarily identified in human liver. Specific proteins associated with IRI were identified by comparing the 3 groups at three different time points. In the IRI phase, more than 160 expressed differentially proteins were detected in the PNF group, compared to 54 and 36 proteins in the EAD and OG groups respectively. However, they are 56:52:22 at the cold preservation stage. There are 22 and 17 commonly differentially expressed proteins at IRI phase and cold preservation stage respectively in 3 groups. Among them Liver-type fatty acid-binding protein (L-FABP) and F10A1 are differentially expressed during two liver injury time points. The tissue expression of L-FABP is negatively correlated and the serum levels of L-FABP is positively correlated with the degree of IRI.

Conclusions: The molecular basis of the susceptibility of different liver allografts to transplant injury is very complicated and we have made preliminary explorations and proved the biomarkers related to IRI.

CITATION INFORMATION: Chen M., Xiaohong L., Xitao H., Weiqiang J. Comparative Proteomics Analysis Identifies the Biomarker of Ischemia-Reperfusion Injury During Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Chen: None. **L. Xiaohong:** None. **H. Xitao:** None. **J. Weiqiang:** None.

Abstract# 633

Association of Immune Cell Markers with Adverse Outcomes in the First 6 Months Post-pediatric Heart Transplantation

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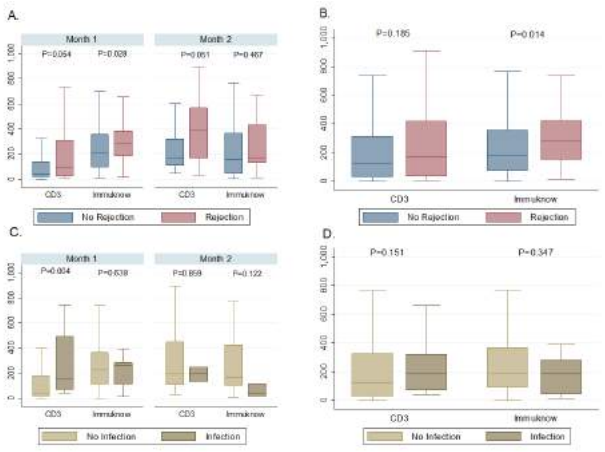
Purpose: Immunosuppression titration post-orthotopic heart transplant (OHT) is limited to trough level monitoring and does not provide data pertaining to overall state of immunosuppression. Additional tests of immune cell function assay (ICFA; ImmuKnow®) and CD3 count may be useful in discerning intensity of immunosuppression to avoid adverse outcomes.

Methods: Retrospective analysis identified OHT recipients 0-21 years of age transplanted at a large pediatric heart transplant center from 1/2018 to 12/2019. The co-primary outcome was difference in the median CD3 and ICFA within 30 days of either acute rejection or infection (defined as CMV/EBV DNAemia > 100 copies) within the first 6 months post-OHT. Patients received rabbit antithymocyte globulin (rATG) induction and maintenance immunosuppression with tacrolimus, mycophenolate mofetil, and rapid steroid withdrawal.

Results: A total of 57 patients were included comprising a combined 550 ICFA and CD3 values within the follow-up period. Age at transplant was 8.4 (IQR, 3-14.9) years, 59.7% were male, and median dosing of induction rATG used was 7.4 (IQR, 5.6-7.7) mg/kg total. There were 26 episodes of rejection and 17 episodes of infection, with the majority being in the first 2 months post-OHT. ICFA values preceding rejection were 282 (IQR, 152-419) ng/mL versus rejection-free periods of 174 (IQR, 71-356) ng/mL (p=0.014). CD3 counts preceding rejection were 169 (IQR, 32-418) cells/uL whereas rejection-free periods were 117.5 (IQR, 28-313) cells/uL (p=0.185). ICFA values were 184.5 (IQR, 46-280) ng/mL in those with infection and 191.5 (IQR, 88-366) ng/mL without infection (p=0.347). CD3 counts preceding infection were 186 (IQR, 73-321) cells/uL and 119 (28-327) cells/uL in those without infection (p=0.151) [Figure 1].

Conclusions: ICFA values preceding episodes of rejection were higher than in rejection-free periods. This association needs further investigation in clinical trials. CD3 values were neither associated with infection or rejection within the first 6 months post-OHT.



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Abstract# 634

Impact of Deceased Donor Mode of Death and Kidney Donor Profile Index on Baseline Donor Derived Cell Free DNA in Kidney Transplant Recipients

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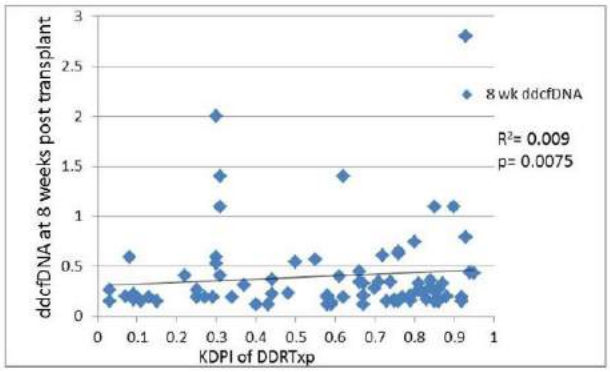
Purpose: Donor derived-cell free DNA (dd-cfDNA) is a novel serum biomarker available for earlier prediction of acute rejection in renal allograft. Baseline dd-cfDNA values are <1% in 96% of kidney transplant recipients (KTRs). We aimed to explore any differences in baseline dd-cfDNA levels among deceased donor KTRs stratified by the mode of donor death: donation after brain death (DBD) vs. donation after cardiac death (DCD). We also aimed to stratify baseline dd-cfDNA values according to different levels of kidney donor profile index (KDPI).

Methods: Our center has been checking dd-cfDNA levels (AlloSure, CareDx, Brisbane, CA) as for-cause and as surveillance in high immunological risk KTRs since 2018. We identified deceased donor KTRs at our center between April 2018 and June 2020 who had dd-cfDNA measured between 4 and 12 weeks post-transplant. A dd-cfDNA value ≥1.0% prompted allograft biopsy. Patient with biopsy evidence of rejection were excluded from the analysis since our aim was to compare baseline values. The average dd-cfDNA levels for each patient between 4 and 12 weeks post-transplant were compared between DBD and DCD KTRs and among the following KDPI groups: 0-20%, 21-50%, 51-84% and ≥85% using t test. A linear regression was constructed comparing dd-cfDNA levels with increasing KDPI.

Results: We identified 80 deceased donor KTRs with 189 dd-cfDNAA levels during the study period. There was no significant difference between average values of dd-cfDNA levels between DBD (n=59) and DCD (n=21) KTRs (0.45±0.39 vs.0.47±0.26, p=0.84). The average dd-cfDNA levels stratified by KDPI categories were as follows: 0-20% (n=11): 0.30±0.15; 21-50% (n=21): 0.49±0.30; 51-84% (n=34): 0.38±0.23 and ≥85% (n=14): 0.72±0.61. There was significant linear correlation between dd-cfDNA levels and increasing KDPI as shown in figure 1.



Conclusions: Mode of donor death did not impact baseline dd-cfDNA levels despite increased risk for ischemia-reperfusion injury and delayed graft function with DCD kidney transplantation. Significant linear correlation between baseline dd-cfDNA levels and increasing KDPI could be reflective of higher levels of ongoing intra-graft inflammation with increasing KDPI. Our study indicates that baseline dd-cfDNA could be influenced by different donor characteristics that define KDPI.

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Abstract# 635

Gene Expression Profiles Assessed by the Nanostring nCounter® Platform May Differentiate Different Types of Rejection, and Importantly, T-Cell Mediated Rejection from BK Virus Nephropathy

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Purpose: Allograft biopsies are considered the gold standard for diagnosis and therapeutic guidance in kidney transplant recipients. Expanding current biopsy assessments to include gene expression signatures may further improve post-transplant monitoring and diagnosis; however, identification and validation of gene subsets for clinical use is required.

Methods: In this retrospective study, formalin-fixed paraffin embedded kidney allograft tissues from patients with confirmed antibody mediated rejection (ABMR, n=12), T-cell mediated rejection (TCMR, n=8) or BK virus nephropathy (BKVN, n=9) were analyzed using the Nanostring nCounter® platform (Nanostring Technologies, Inc., Seattle, WA). A panel of 758 immune related genes was assessed. Differentially expressed genes were rank-ordered using the Student's T-test and key genes identified as those with the greatest fold change (FC) and biological significance.

Results: Patients (n=28) were mostly white men (67%) with a mean age of 51 ± 14 years. Allograft biopsies were primarily for-cause biopsies (80%) performed due to de novo DSA or allograft dysfunction. Preliminary analysis revealed 60 genes differentially expressed between ABMR and BKVN (12 genes), TCMR and BKVN (32 genes) and ABMR and TCMR (16 genes). The strongest up- (FC≥2) or down (FC<0.5) regulated genes of the 60 genes that were identified are shown in Table 1. Upregulated genes helped characterize TCMR vs ABMR (15 genes, mean FC=6.8, range=5.2-13.9), and importantly TCMR vs BKVN (7 genes, mean FC= 2.6, range 2.4-3.7). Notably, *AIM2* and *BTLA* showed upregulation in TCMR compared to both ABMR (FC 5.2 and 6.1, respectively) and BKVN, although the change was more moderate in BK nephropathy (FC 2.5 and 3.4, respectively).

Table 1: Genes with Strongest Differential Expression

	TCMR vs ABMR	TCMR vs BKVN	BKVN vs. ABMR
Strongly upregulated (FC ≥ 2.0)	*AIM2, SELL, GBP5, LILRB4, ICOS, ANKRD22, FCGR1A, BTLA, C3, CALHM6, CD72, CTLA4, FPR1, LAG3, CCL18*	*PSTPIP1, CD48, NFAM1, CIITA, TNFSF8, CD86, STAT4*	None
Strongly downregulated (FC < 0.5)	*UMOD*	None	*HSD11B1, CXCL13*

Conclusions: Gene expression profiles assessed by Nanostring nCounter® platform may help differentiate ABMR from TCMR, and importantly, TCMR from BKVN. Additional studies are required to validate and confirm these findings

CITATION INFORMATION: Degner K., Swanson K., Parajuli S., Mandelbrot D., Garg N., Aziz F., Mohamed M., Zhong W., Ptak L., Wilson N., Woodward R., Djamali A. Gene Expression Profiles Assessed by the Nanostring nCounter® Platform May Differentiate Different Types of Rejection, and Importantly, T-Cell Mediated Rejection from BK Virus Nephropathy *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.R. Degner: None. **K.J. Swanson:** None. **S. Parajuli:** None. **D. Mandelbrot:** None. **N. Garg:** None. **F. Aziz:** None. **M. Mohamed:** None. **W. Zhong:** None. **L. Ptak:** None. **N.A. Wilson:** None. **R. Woodward:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; CareDx. Other; Nature of Relationship; Stockholder. **A. Djamali:** None.

Abstract# 636

Combined Donor Derived Cell Free DNA (AlloSure) and Peripheral Immune Cell Gene Expression (AlloMap) Testing for the Diagnosis of Rejection in Kidney Transplant Recipients with De Novo Donor Specific Antibodies

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Purpose: Combined donor-derived cell-free DNA (dd-cfDNA, AlloSure) and peripheral immune cell gene expression (AlloMap) may increase the predictive value of de novo DSA (dnDSA) for the diagnosis of rejection in kidney transplant recipients.

Methods: Kidney transplant recipients undergoing an indication biopsy for dnDSA were eligible to participate. AlloSure and AlloMap testing was performed at the time of biopsy. Relationships between AlloSure, AlloMap, kidney function (serum creatinine, blood urea nitrogen, estimated glomerular filtration rate, urine protein creatinine ratio) and histopathology were assessed using Pearson correlation and logistic regression analyses.

Results: Participants (n=12) presented at a mean transplant to biopsy interval of 8.1±5.2 years with a mean DSA MFI of 15,356±16,076 (Class I-1,883±1,129 Class II-16,238±15,753). The majority of dnDSA were Class II DSA (75%), but Class I (8%) and combined Class I + Class II (17%) dnDSA were also observed. Rejection was diagnosed in 50% of patients. Of those, 67% were diagnosed with antibody mediated rejection (ABMR) and 33% with T-cell mediated rejection (TCMR). AlloSure results (threshold 1%) correlated with glomerulitis (r= 0.72, p=0.008), sum microvascular inflammation (r= 0.68, p=0.02), C4d (r= 0.72, p=0.01), vascular intimal thickening (r=0.58, p=0.05), basement membrane double contours (r=0.79, p=0.003), and mesangial matrix expansion (r=0.83, p=0.001) scores. There were no correlations between AlloSure and kidney function. AlloMap did not correlate with kidney function or histopathology. The negative predictive value (NPV) of AlloSure for rejection was 80% and the positive predictive value (PPV) was 71% [AUC = 0.75, 95% CI: 0.5-1.0, p=0.1]. The NPV of AlloMap (threshold set at population median score = 12.8) for rejection in patients with dnDSA was 67% and the PPV was 67% [AUC= 0.67, 95% CI: 0.3-1.0, p=0.3]. There were two patients with both AlloSure and AlloMap greater than the predefined thresholds who were diagnosed with rejection.

Table 1: Performance of AlloSure and AlloMap for Prediction of Rejection

	AlloSure (1%)	AlloMap (12.8)	AlloSure (1%) + AlloMap (12.8)
Sensitivity	67%	67%	33%
Specificity	83%	67%	100%
PPV	71%	67%	100%
NPV	80%	67%	60%

Conclusions: When combined with dnDSA, AlloSure correlated with disease activity and showed a relatively high NPV**.** The addition of AlloMap might improve the clinical value of dnDSA and AlloSure but additional studies are needed.

CITATION INFORMATION: Degner K., Parajuli S., Aziz F., Garg N., Mandelbrot D., Mohamed M., Van Hyfte K., Reese S., Wilson N., Djamali A. Combined Donor Derived Cell Free DNA (AlloSure) and Peripheral Immune Cell Gene Expression (AlloMap) Testing for the Diagnosis of Rejection in Kidney Transplant Recipients with De Novo Donor Specific Antibodies *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.R. Degner: None. **S. Parajuli:** None. **F. Aziz:** None. **N. Garg:** None. **D. Mandelbrot:** None. **M. Mohamed:** None. **K. Van Hyfte:** None. **S.R. Reese:** None. **N.A. Wilson:** None. **A. Djamali:** None.

Abstract# 637

Renal Tubular-cell-specific Urinary Extracellular Vesicles: A Novel Biomarker for Diabetic Nephropathy After Kidney Transplantation

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Purpose: Diabetes(DM) is a leading cause of ESRD among renal transplant recipients(RTRs). However, the kinetics of diabetic nephropathy recurrence after renal transplantation(RT) remains unclear. Currently, diabetic nephropathy, which involves damages to renal tubular cells, is diagnosed by allograft biopsy. Non-invasive methods that can detect renal tubular cell injury post RT may provide early diagnosis and guide prompt management to enhance graft survival. Urinary extracellular vesicles (UEVs) secreted by various types of renal cells contain cell-specific molecular cargos that may serve as an attractive source of diagnostic biomarkers for kidney diseases. This study aims to measure the level of renal tubular-cell-specific UEVs in RTRs with DM to determine whether renal tubular cell damage could be detected before clinical presentation.

Methods: UEVs from urine samples of healthy control RTRs (CTL, n=4), RTRs with DM without insulin dependency (NI-DM, n=4), RTRs with DM with insulin dependency (I-DM, n=4) were isolated within 24 hours. All patient's serum creatinine was in their baseline range. Insulin dependency was defined as the need for exogenous insulin therapy within 1 month of urine collection date. Isolated UEVs were stained with Annexin V, CD63, and Megalin antibody, and then analyzed by flow cytometry.

Results: The number of Annexin V- and CD63- positive UEVs was higher for I-DM ($1.4\pm0.43x10^5$UEVs) compared to CTL ($1.0\pm0.62 \times 10^4$UEVs, $p<0.5$) and NI-DM ($2.2\pm0.61 \times 10^4$UEVs, $p<0.5$). The number of renal-tubular-cell-specific UEVs were also significantly elevated in the I-DM group ($2.6 \pm1 \times 10^4$UEVs) compared to the CTL ($1.1\pm0.6 \times 10^3$UEVs, $p<0.5$) and NI-DM ($1.5\pm0.2 \times 10^3$UEVs, $p<0.5$) groups.

Conclusions: There is significantly higher numbers of renal-tubular-cell-specific UEVs present in I-DM group compared to CTL and NI-DM groups, suggesting that cell-specific UEVs may serve as a novel biomarker for renal tubular cell damage in RTRs with potential progression towards diabetic nephropathy.

CITATION INFORMATION: Eguchi N., Lau H., Zaldivar F., Reddy U., Tantisattamo E., Ferrey A., Dafoe D., Ichii H. Renal Tubular-cell-specific Urinary Extracellular Vesicles: A Novel Biomarker for Diabetic Nephropathy After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Eguchi: None. **H. Lau:** None. **F. Zaldivar:** None. **U.G. Reddy:** None. **E. Tantisattamo:** None. **A. Ferrey:** None. **D. Dafoe:** None. **H. Ichii:** None.

Abstract# 638

Should We Worry About Covid-19 Infection in Pediatric SOT?

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Purpose: We describe the clinical presentation & immune response to COVID-19 infection in pediatric SOT.

Methods: Medical records of COVID-19 PCR+ or seropositive patients were reviewed for details of their disease course. Blood was obtained during PCR or seropositivity for immunophenotyping & PlexCOVID-19 test. PlexCOVID-19 measures frequencies of spike Ag reactive T cells that express CD154. A pre-established algorithm predicts likelihood of COVID-19 severity. Controls were peds SOT patients with negative COVID-19 status. RNA isolated from liver tissue for PCR using the Lyra SARS CoV-2 Assay. As induction of immunological memory is central to anti-pathogen adaptive immunity induced by infection, IHC of liver tissue for tissue resident memory cells (T_{RM}) (defined as $CD69^+$ expressing CD4 or CD8 T cells) was performed.

Results: 4 patients had COVID-19 & 5 patients were seropositive between March & Nov 2020 (Table 1). The 2 symptomatic PCR+ patients were hospitalized for 24-48-hours & the symptomatic seropositive patient had a prolonged PICU stay. Steroid was discontinued in 1 symptomatic PCR+ patient; & target CNI goal & steroid dose decreased in the symptomatic seropositive patient due to concurrent BK viremia. 8 patients remain well at home. Histology on 1 symptomatic PCR+ patient with elevated LFT's revealed lymphocytic portal inflammation & *SARS CoV-2* PCR on the liver was negative; histology on 1 asymptomatic seropositive patient was normal. Infrequent T_{RM} were seen on liver biopsies but were increased in PCR+ & seropositive biopsies vs. biopsies from same patients that pre-date a COVID-19+ status. $CD4^+$ T cells in PCR+ & seropositive patients had a phenotype consistent with activation, including expression of HLA-DR ($p = 0.008$); Further, BST2 was constitutively expressed on a subset of CD4+ T cells in PCR+ patients reflecting a history of IFN-alpha induced signals ($p=0.01$). The frequencies of spike Ag-reactive CD3 (0.95 ± 0.35 vs 2.73 ± 0.35, $p= 0.037$) and CD8 cells (1.10 ± 0.70 vs 5.03 ± 0.80, $p= 0.034$) were lower in symptomatic PCR+ patients compared with asymptomatic seropositive subjects.

Conclusions: A small number of our SOT patients had mild or asymptomatic CO-VID-19 infection, with notable activation of $CD4^+$ T cells, & constitutive expression of BST2 reflecting IFN-alpha induced signals. Spike-antigen-reactive T-cells was lower during symptomatic vs. asymptomatic infection.

Table 1. Patient demographics.

Subject ID	COVID-19 Status	Transplant Type	Duration from TX at diagnosis (years) Median (range)	Tacrolimus level (ng/ml) at diagnosis Median (range)	Absolute lymphocyte count at diagnosis Median (range)	Past corona (not COVID-19) virus infection
001	NP- PCR positive: asymptomatic	MVTx	2.1 (0.6 – 5.7)	7.5 (4.2 – 13.1)	3135 (1220 – 5039)	Type OC43
002	NP- PCR positive: asymptomatic	SLK Tx				None
003	NP- PCR positive: symptomatic	Isolated LT				Type HKU1
004	NP- PCR positive: symptomatic	Isolated LT				None
005	*Seropositive: asymptomatic	Isolated LT	5.1 (1 – 8.2)	7.4 (2.1 – 12.6)	2800 (813.4 – 3429)	None
006	Seropositive: asymptomatic	Isolated LT				None
007	Seropositive: asymptomatic	Isolated LT				None
008	Seropositive: symptomatic	MVTx				Type HKU1
009	Seropositive: asymptomatic	Isolated SB Tx				None

*Liver biopsy performed. NP: nasopharyngeal. MVTx: multivisceral transplant. SLK: simultaneous liver kidney transplant.

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Abstract# 639

Urinary Exosome Mrna Signature for the Diagnosis of Human Kidney Transplant Rejection

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Purpose: Traditional biomarkers currently used to monitor the kidney allograft, such as creatinine and proteinuria, are late markers of injury and lack sensitivity, specificity and predictive abilities. The stability of urinary exosomes makes them a potentially powerful tool for liquid-biopsy and an ideal non-invasive diagnostic biomarker for kidney-transplant rejection

Methods: We collected 220 urine samples from 175 patients who underwent a clinically indicated kidney-transplant biopsy. Urinary exosomal mRNA were isolated using Exosome Diagnostics' EXOPRO Urine Clinical Sample Concentrator Kit and a differential gene-expression was used to develop rejection signatures. An initial panel of 586 TaqMan assays *(TaqMan® OpenArray® Human Inflammation)* for genes that have been studied as targets for a range of inflammatory diseases, and a subset 112 TaqMan assays were used to analyze the urine samples. The Boruta algorithm was used for feature selection. We used a repeated K-fold cross-validation (K=10, repeats=10) to generate the rejection probabilities. This allowed us to identify a 15-gene signature that distinguished biopsy with any cause rejection from no rejection. Furthermore, using the same approach, we have identified a 5-genes signature that distinguished TCMR from ABMR

Results: We have identified a 15-gene signature that discriminated biopsies with any-cause rejection from no-rejection. The area under the curve (AUC) was 0.90 (95% CI 0.85 - 0.96). Negative predictive value (NPV) for active rejection was 93.3% (95% CI 87.7% - 96.4%) and the sensitivity was 84.7% (95% CI 73.5% - 91.8%). The AUC for delta eGFR, was 0.57 (95% CI 0.49 - 0.65), which was significantly inferior ($p < 0.001$) to the performance of the multi-gene signature. A 5-gene signature that could distinguish TCMR from ABMR, was subsequently identified. The AUC for this signature was 0.87 (95% CI 0.76 - 0.97). If the second signature is negative, the patient has TCMR, and ABMR is ruled out with an NPV of 90.6% (95% CI 75.8% - 96.8%) and a sensitivity of 87.5% (95% CI 69.0% - 95.7%).

Conclusions: We show here that mRNA signatures derived from urinary exosomes represent a powerful and non-invasive tool to screen for kidney allograft rejection. This finding has the potential to assist clinicians in therapeutic decision-making

CITATION INFORMATION: El Fekih R., Hurley J., Tadigotla V., Alghamdi A., Srivastava A., Coticchia C., Choi J., Allos H., yatim k., Alhaddad J., Eskandari S.,

Chu P., Mihali A., Lape I., Lima Filho M., Ayoma B., Chandraker A., Safa K., Markmann J., Riella L., Formica R., Skog J., Azzi J. Urinary Exosome Mrna Signature for the Diagnosis of Human Kidney Transplant Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. El Fekih: None. **J. Hurley:** Intellectual Property Rights; Name of Commercial Interest; Exosome Diagnostics, a Bio-Techne brand.. Salary; Name of Commercial Interest; Exosome Diagnostics, a Bio-Techne brand. **V. Tadigotla:** Intellectual Property Rights; Name of Commercial Interest; Exosome Diagnostics, Bio-Techne brand. Salary; Name of Commercial Interest; Exosome Diagnostics, Bio-Techne brand. **A. Alghamdi:** None. **A. Srivastava:** Grant/Research Support; Name of Commercial Interest; NIH grant F32DK11106. **C. Coticchia:** Intellectual Property Rights; Name of Commercial Interest; Exosome Diagnostics, Bio-Techne brand. Salary; Name of Commercial Interest; Exosome Diagnostics, Bio-Techne brand. **J. Choi:** None. **H. Allos:** None. **K. yatim:** None. **J. Alhaddad:** None. **S. Eskandari:** None. **P. Chu:** None. **A. Mihali:** None. **I. Lape:** None. **M. Lima Filho:** None. **B. Ayoma:** None. **A. Chandraker:** None. **K. Safa:** None. **J. Markmann:** None. **L. Riella:** None. **R. Formica:** None. **J. Skog:** Intellectual Property Rights; Name of Commercial Interest; Exosome Diagnostics, Bio-Techne brand. Salary; Name of Commercial Interest; Exosome Diagnostics,Bio-Techne brand. **J. Azzi:** Grant/Research Support; Name of Commercial Interest; AHA Award 13FTF17000018, ADA Award 1-17-IBS-206, RO1 AI134842. Intellectual Property Rights; Name of Commercial Interest; Exosome Diagnostics, Bio-Techne brand.

Abstract# 640

Intraoperative Fluid Management and Kidney Transplantation Outcomes: A Retrospective Review

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Purpose: Patients undergoing kidney transplantation have traditionally received liberal amounts of fluid during surgery to ensure adequate fluid volume and flow to the transplanted kidney. However, excessive fluids can lead to postoperative complications such as fluid overload, ileus, or pulmonary edema. Restrictive fluid strategies in other operations have been shown to be advantageous in shorter length of stays and faster return of bowel function. In this retrospective review, we compared the effect of restrictive versus liberal fluid therapy on kidney transplantation outcomes.

Methods: All patients who underwent deceased donor kidney transplantation at the Mayo Clinic Arizona between January 2014 and March 2019 were included in the study. Those who received less than 3 liters total intravenous fluids were considered "restrictive," whereas those who received 3 liters and greater were considered as receiving "liberal fluid therapy." The primary outcome was incidence of delayed graft function (DGF), which was defined as the need for dialysis within 7 days of transplant. Secondary outcomes included hospital length of stay, readmission within 30 days, return to the operating room, need for postoperative ventilation, need for intensive care unit level of care, time to return of bowel function, incidence of postoperative complications (myocardial infarction, arrhythmia, pulmonary edema, and pneumonia).

Results: 1171 patients were included in this study; 557 in the restrictive group and 614 in the liberal group. There were no differences in demographic or baseline characteristics between the two groups. The mean fluid intake in the restrictive group was 2.12 ± 0.55 L and was 3.56 ± 0.65 L in the liberal group. There was no difference in DGF (61.9% vs. 60.3%, p=0.557), length of stay (p = 0.342), readmission (p= 0.795), return of bowel function (p=0.707), or other postoperative complications in the restrictive and liberal fluid therapy groups.

Conclusions: Restrictive fluid therapy in deceased donor kidney transplantation was not associated with delayed graft function or worse outcomes compared to liberal fluid therapy. Restrictive fluid administration could be considered as part of enhanced recovery protocols for kidney transplantation without compromising kidney graft function.

CITATION INFORMATION: Harbell M., Kraus M., Buckner Petty S., Harbell J. Intraoperative Fluid Management and Kidney Transplantation Outcomes: A Retrospective Review *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.W. Harbell: None. **M.B. Kraus:** None. **S.A. Buckner Petty:** None. **J.W. Harbell:** None.

Abstract# 641

Real-time Donor-derived Cell-free Dna Kinetics Indicate Decreased "Molecular Injury" During Treatment of Acute Renal Allograft Rejection

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Purpose: Dd-cfDNA is a validated plasma analyte ($t_{½}$~30 min) for surveillance of renal transplant (KT) rejection with limited reports characterizing response to acute allograft rejection treatment.

Methods: Prospective, serial dd-cfDNA plasma levels (AlloSure®) were collected at renal allograft biopsy & prior to each treatment throughout the course of therapy for KTs with biopsy-proven acute rejection (BPAR). Kinetics during treatment for Δdd-cfDNA(%) & ΔSCr(mg/dL) were analyzed from time of biopsy (T_0) to treatment completion (T_1) by *Wilcoxon matched pairs signed rank* (p<0.05). *Simple linear regression* (p<0.05) was performed for Δdd-cfDNA *vs* ΔSCr. Individual treatment responses were determined 4 - 12 weeks later & deemed "successful" if ΔSCr<20%.

Results: Twelve KTs were analyzed median age 32 years (range 3-54). BPAR diagnoses included mixed [TCMR(1B-2B) + AbMR] (n=7), mixed [TCMR 1B+TMA] (n=1), AbMR (n=2), and TCMR 1B (n=2). Treatment included TPE (n=6), rATG(n=8), IVIG(n=6), rituximab(n=1), eculizumab(n=1), and steroids(n=12). A median of 6 (4 to 15) "treatment" dd-cfDNA levels were obtained per patient. Dd-cfDNA T_0-T_1 median of difference was 0.580% [p=0.007, median IQR 1.20% (0.245-3.575) το (T_1) 0.665% (0.175-1.075)]. SCr T_0-T_1 median of difference was 0.075 mg/dL [p=0.11, median IQR (T_0) 1.72 mg/dL (1.260-2.038) το (T_1) 1.56 (0.965-1.78)]. ΔSCr *vs* Δdd-cfDNA revealed no statistical correlation (R2=0.165; p=0.17). Of subjects with f/u: 7/9 (77.8%) had *"*successful*"* ΔSCr responses at a median of 4 weeks (2 - 12); and although no correlation was determined, 8/9 (88.9%) treatment-related Δdd-cfDNA achieved T_1 dd-cfDNA <1.0%, and 1/9 (11.1%) retained elevated SCr and dd-cfDNA. Four patients with stable SCr demonstrated worsening dd-cfDNA kinetics post-treatment of their initial rejection and revealed BPAR upon repeat biopsy. Early intervention in these patients did not allow progression to HLA-DSA formation or AbMR months after repeat treatment.

Conclusions: This novel analysis of dd-cfDNA kinetics links decreasing dd-cfDNA levels with resolving "molecular injury" during effective immunomodulatory treatment of BPAR, despite a lack of significant ΔSCr improvement. The T_1 dd-cfDNA levels had fallen to <1.0% for most subjects. Continued study is needed to investigate whether dd-cfDNA "treatment" kinetics can predict clinical outcomes of HLA-DSA escalation and/or chronic allograft loss. Dynamic kinetics of dd-cfDNA may present opportunity for patient-specific approaches to rejection treatment and earlier intervention that appears meaningful in preventing alloimmune response maturation to AbMR.

CITATION INFORMATION: Hinojosa R., Hitchman K., Ross D., Hall R., Nelson J., Kincaide E., Klein K., Bell A. Real-time Donor-derived Cell-free Dna Kinetics Indicate Decreased "Molecular Injury" During Treatment of Acute Renal Allograft Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Hinojosa: Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Advisory board participant. Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Investigator. Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Clinical speaker. **K.M. Hitchman:** None. **D.J. Ross:** Salary; Name of Commercial Interest; CareDx. Salary; Nature of Relationship; Employee. **R.C. Hall:** None. **J.E. Nelson:** None. **E.L. Kincaide:** None. **K. Klein:** None. **A.M. Bell:** Salary; Name of Commercial Interest; CareDx.

Abstract# 642

The Impact of Maintenance Immunosuppression Withdrawal on Sensitization Status After Renal Graft Failure

R. Hod Dvorai, A. Almonte, C. Hubbell, M. Laftavi, R. Shahbazov, R. Saidi, O. Pankewycz, J. Leggat, M. Hanlon, B. Gallay, *SUNY Upstate Medical University, Syracuse, NY*

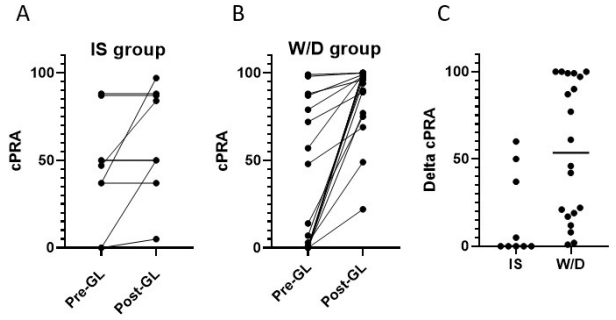
Purpose: Maintaining immunosuppression (IS) following failed renal transplant may lead to increased risk for infections and malignancies; on the other hand, withdrawal can lead to sensitization and decreased chances for re-transplant. Our goal in this study was to assess the impact of immunosuppression withdrawal on sensitization status following renal graft failure.

Methods: We performed a retrospective analysis of patients who lost their renal graft between 1/1/2015 and 6/30/2020. Patients with no calculated Panel Reactive Antibody (cPRA) data prior and/or post graft loss (GL) and HLA-identical donor-recipients pairs were excluded from analysis. Demographic, HLA and biopsy data were extracted from patients' medical record. cPRA was calculated by assigning unacceptable antigens based on the Single Antigen Bead assay using a cut-off of 1000 MFI.

Results: Of the 29 patients who lost their graft during the study period, 9 (31%) were maintained on IS (IS group) and 20 (69%) were withdrawn (W/D group). Baseline

characteristics (Age at transplant, sex, donor source and HLA mismatch) were similar between the two groups. An increase in cPRA was noted in only 4 of the 9 patients in the IS group while cPRA rose in all 20 W/D group patients (p=0.001, Figure 1A and 1B). Interestingly, delta cPRA (calculated as the increase in cPRA from pre- to post-GL) was significantly higher in the W/D group than in the IS group (a median of 53.5% increase in cPRA vs 0%, p=0.003, Figure 1C). 8 of 11 patients in the W/D group with cPRA <10% prior to GL increased to cPRA >90% post-GL. 6 (30%) patients in the W/D group underwent nephrectomy (all 6 experienced an increase of >20% in cPRA following nephrectomy) versus no patients in the IS group, and 30% of the patients in the W/D group were re-transplanted versus 55.6% in the IS group, although, due to the small numbers this did not reach statistical significance (p=0.23).
Conclusions: Immunosuppression withdrawal after renal graft failure is associated with a significant increase in cPRA, potentially hindering the chance for a second transplant in these patients. Therefore, patients with a potential living donor or patients who are likely to be re-transplanted from a deceased donor may benefit from maintenance IS following graft loss.

Figure 1



CITATION INFORMATION: Hod Dvorai R., Almonte A., Hubbell C., Laftavi M., Shahbazov R., Saidi R., Pankewycz O., Leggat J., Hanlon M., Gallay B. The Impact of Maintenance Immunosuppression Withdrawal on Sensitization Status After Renal Graft Failure *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Hod Dvorai: None. **A. Almonte:** None. **C. Hubbell:** None. **M. Laftavi:** Grant/Research Support; Name of Commercial Interest; Astellas, Medeor pharma, Shire pharmaceutical. Grant/Research Support; Nature of Relationship; Research grants. **R. Shahbazov:** None. **R. Saidi:** None. **O. Pankewycz:** None. **J. Leggat:** None. **M. Hanlon:** None. **B. Gallay:** None.

Abstract# 643

Outcomes of Novel Coronavirus 2019 in Solid Organ Transplant Recipients: Yet Again, Race and Payor Status Matters

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Purpose: By the early spring of 2020, the United States has become the global epicenter of the coronavirus 2019 (COVID-19) pandemic. Little is known if immunocompromised hosts such as solid organ transplant recipients are affected differently by COVID-19 - in terms of their presentation, their laboratory values, the management of their immunosuppression, and their outcomes. We describe a cohort of 25 solid organ transplant patients who were symptomatic and infected with COVID- 19 at a single institution at Baylor St. Luke's in Houston, Texas.
Methods: Using the electronic medical record, 25 solid organ transplant recipients (18 kidney, 2 liver/kidney, 2 liver, 2 heart, and 1 lung transplant) were identified with SARS-CoV2 infection from March 19th, 2020 until July 14th, 2020 at Baylor St Luke's Medical Center in Houston, Texas. We then cataloged their hospitalization course to include changes in immunosuppression therapy, need for intensive care, ventilator support, as well as COVID-19 directed therapy and report their outcomes.
Results: These patients have many comorbidities (96% with hypertension, 60% with heart failure or ischemic heart disease, and 60% with diabetes) alongside their immunocompromised status. Immunosuppression therapy was weaned in all but 2 stable liver transplant patients on minimal maintenance immunosuppression. Kidney SOTR patients often had atypical symptoms such as diarrhea (39%). Overall SOTR patients frequently presented with AKI (44%), frequently required ICU stay (52%), and frequently required intubation (36%). Notably, we discovered a large racial/ethnic disparity in COVID-19 infection as all our patients are minorities and 24 of 25 patients are of Hispanic ethnicity or African American race. In addition, 72% of our infected patients had Medicare or Medicaid as their primary health insurance - compared to our baseline of 46%.
Conclusions: We have found solid organ transplant patients had more atypical symptoms such as diarrhea and CT imaging can be more accurate and timely in diagnosis. In regards to clinical management, a stepwise reduction/discontinuation of immunosuppression based on disease severity appears to be a safe and pragmatic model of care. Furthermore, we too have found that a significant racial and ethnic disparity exists for African-American and Hispanic transplant recipients becoming infected with COVID-19. Yet again, minorities and those more socioeconomically disadvantaged continue to bear the brunt of chronic disease, even after they receive their transplantation.
CITATION INFORMATION: Huang C., Hemmersbach-Miller M., Goss M., Moreno N., Rana A., Goss J., Galvan N. Outcomes of Novel Coronavirus 2019 in Solid Organ Transplant Recipients: Yet Again, Race and Payor Status Matters *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Huang: None. **M. Hemmersbach-Miller:** None. **M. Goss:** None. **N. Moreno:** None. **A. Rana:** None. **J. Goss:** None. **N. Galvan:** None.

Abstract# 644

A Reliable Non Invasive Alternative to Surveillance Renal Allograft Biopsy

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Purpose: Surveillance Renal Allograft Biopsy (SAVB) is the standard of care to identify subclinical immunological injury(SCI). However fewer than 25% of transplant centers in the US perform SVAB, as it has a low rate of positive results, involves procedure risks, and has logistical issues. Donor derived cell free DNA (dd-cfDNA) is gaining acceptance as a non-invasive biomarker of immunological injury in renal allografts with a negative predictive value (NPV) exceeding 84%. We propose using a combination of dd-cfDNA and DSA to enhance the NPV as an alternative to SVAB .
Methods: Retrospective, single center chart review of 174 consecutive patients undergoing SVAB between 02/02/2019 to 09/20/2020 with paired results of dd-cfDNA and DSA.Data regarding patient demographics, induction agents, etiology of ESRD and CPRA status was collected.

Criteria for Positive Test Results	
dd-cf DNA	>1%
DSA	>1500 Mfi
Biopsy	Cellular Rejection(Banff Borderline or higher) and/or Antibody Mediated Rejection

Results: Patient characteristics were comparable to most Renal Transplant centres in the US.Using dd-cf DNA for diagnoses has a higher specificity of 93% at the expense of missing 2.29% patients who could have SCI on SVAB.

Comparing SVAB to dd- cf DNA alone		
	SVAB Positive	SVAB Negative
dd-cf DNA Positive	4 TP	11 FP
dd-cf DNA Negative	7 FN(2%)	152 TN(87%)

Combination of dd-cf DNA with DSA has NPV of 98% and could safely avoid SVAB in up to 77% of the population with a chance of missing SCI in only 1.72% of patients

Comparing SVAB to dd-cf DNA and DSA		
	SVAB Positive	SVAB Negative
dd-cf DNA or DSA Positive	8 TP	29 FP
dd-cf DNA and DSA Negative	3 FN(1.72%)	134 TN(77%)

Identification of SCI					
	Sensitivity	Specificity	PPV	NPV	Accuracy
dd-cf DNA	36%	93%	27%	96%	90%
dd-cf DNA + DSA	73%	82%	22%	98%	82%

Conclusions: Use of dd-cfDNA is a useful screen for SCI after transplant with a high NPV. Adding DSA to dd-cfDNA further improves the NPV to 98%. Thus, a combination of negative dd-cfDNA & DSA can be used as a safe non invasive alternative to SVAB.
CITATION INFORMATION: Jain R., Thaduri S., Kumar V., Kew C., Julian B., Towns G., Ong S., Ahmed F., Mehta S., Agarwal G. A Reliable Non Invasive Alternative to Surveillance Renal Allograft Biopsy *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Jain: None. **S. Thaduri:** None. **V. Kumar:** None. **C. Kew:** None. **B. Julian:** None. **G. Towns:** None. **S. Ong:** None. **F. Ahmed:** None. **S. Mehta:** Honoraria; Name of Commercial Interest; Care Diagnostics. Honoraria; Nature of Relationship; Advisory Board Meeting. **G. Agarwal:** None.

BASIC

Abstract# 645

Characteristics, Risk Factors, and Outcomes of Neutropenia for the First Year After Liver or Kidney Transplantation in Children

C. Jarasvaraparn[1], S. Choudhury[2], C. Rusch[2], K. Liss[1], J. Stoll[1], S. Hmiel[3], S. Kulkarni[1], *[1]Pediatric Gastroenterology, Washington University School in St Louis, Saint Louis, MO, [2]Pediatric, Washington University School in St Louis, Saint Louis, MO, [3]Pediatric Nephrology, Washington University School in St Louis, Saint Louis, MO*

Purpose: Prior studies in adults have shown that approximately 20-38 % of subjects undergoing solid organ transplant develop neutropenia. In the current study, we characterized the incidence, risk factors and morbidity of neutropenia in pediatric (≤ 18 years at transplant) recipient of liver (LT) and kidney (KT) allografts.

Methods: We conducted a retrospective chart review of LT and KT recipients at our center during the period 2008-18. All of the KT and none of the LT subjects during this time period had induction with either ATG or basiliximab at time of transplant. Neutropenia was defined as absolute neutrophil count (ANC) value ≤ 1,000/mm^3.

Results: Ninety-eight subjects with LT and 82 subjects with KT were included. Despite the mean ANC being significantly lower in neutropenic LT (3±2.5) subjects compared to neutropenic KT subjects (4.2±2.5) at the time of transplant (p=0.04), the incidence of neutropenia within the first year of transplant in KT (57.3%) was higher compared to LT (38.8%) (p=0.01).The mean number of hospitalizations (p=0.001) and infectious complications (p=0.03) were significantly higher only in the KT subjects who developed neutropenia (compared to those who did not), but not in LT subjects. Binary logistic regression analysis revealed that prior upper gastrointestinal bleed (p=0.03), weight deficit before transplant (p=0.01), CMV infection (p=0.04) and ANC before transplantation (p=0.02) predicted neutropenia in LT subjects, while female gender (p=0.04) and BK virus infection (p=0.04) predicted neutropenia in KT subjects. Surprisingly, the doses of valgancyclovir, mycophenolate and TMP/SMX were not associated with neutropenia in either LT or KT subjects.

Conclusions: The incidence of, and morbidity associated with neutropenia within 1 year post transplant is higher in KT subjects compared to LT subjects. Factors which indicate more severe liver disease at transplantation and CMV infection after transplantation were associated with neutropenia. Similar to our finding, BK virus infection has been shown by a prior study to be associated with neutropenia.

Table Patient demographics and baseline characteristics

Characteristics	Liver Transplantation			Kidney Transplantation			Neutropenia group in LT and KT
	Non-Neutropenia N = 60	Neutropenia N = 38	P value	Non-Neutropenia N = 35	Neutropenia N = 47	P value	P value
Gender -Male (%) -Female (%)	 29 (48.3) 31 (51.7)	 17 (44.7) 21 (55.3)	 0.73	 23 (65.7) 12 (34.3)	 20 (42.6) 27 (57.4)	 **0.04**	 0.84
Age at transplant (years, mean ± SD)	4.9 ± 5.8	5.4 ± 6.2	0.69	11.5 ± 5.5	11.3 ± 5.4	0.83	**0.001**
Weight velocity deficit (%)	11 (18.3)	16 (42.1)	**0.01**	5 (14.3)	12 (25.5)	0.21	0.12
Height velocity deficit (%)	11 (18.3)	12 (31.6)	0.13	8 (22.8)	17 (36.2)	0.19	0.82
Wight for height or BMI deficit (%)	5 (8.3)	4 (10.5)	0.71	2 (5.7)	3 (6.4)	0.9	0.70
Risk of CMV status prior to transplant (%) - High/Moderate - Low	 36 (60) 24 (40)	 31 (81.6) 7 (18.4)	 **0.03**	 24 (68.6) 11 (31.4)	 37 (78.7) 10 (21.3)	 0.29	 0.79
CMV disease (%)	7 (11.7)	12 (31.6)	**0.02**	1 (2.8)	2 (4.3)	0.74	**0.001**
BK infection (%)	0	0	0	7 (20)	20 (42.6)	**0.03**	NA
Numbers of hospitalizations within 1 year after transplantation (mean ± SD)	1.5 ± 1.8	1.2 ± 1.3	0.27	0.66 ± 0.8	1.7 ± 1.64	**0.001**	0.07
Total numbers of infectious complication (mean ± SD)	0.5 ± 0.9	0.3 ± 0.5	0.18	0.49 ± 0.74	1 ± 1.1	**0.01**	**0.001**

CITATION INFORMATION: Jarasvaraparn C., Choudhury S., Rusch C., Liss K., Stoll J., Hmiel S., Kulkarni S. Characteristics, Risk Factors, and Outcomes of Neutropenia for the First Year After Liver or Kidney Transplantation in Children *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Jarasvaraparn: None. **S. Choudhury:** None. **C. Rusch:** None. **K. Liss:** None. **J. Stoll:** None. **S. Hmiel:** None. **S. Kulkarni:** None.

Abstract# 646

Leukopenia in the Renal Transplant Population

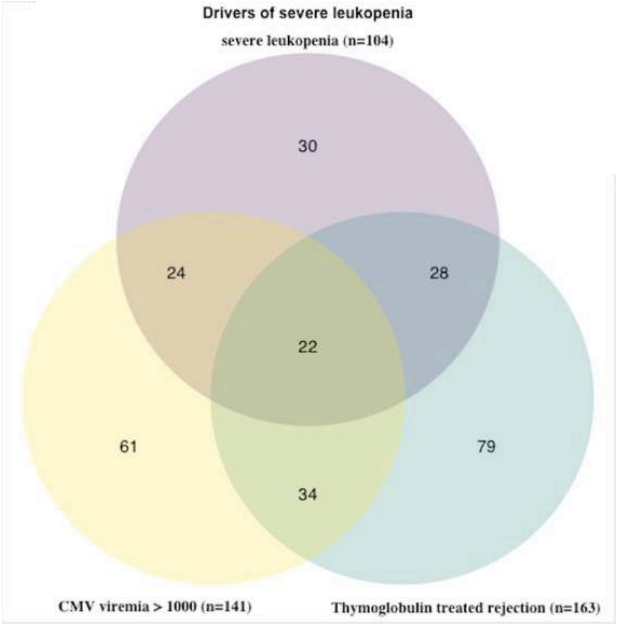
A. Johnson[1], G. Karadkhele[2], C. Larsen[1], *[1]Emory University, Atlanta, GA, [2]Surgery, Emory University, Atlanta, GA*

Purpose: Leukopenia is a common complication for transplant patients on immunosuppression, but etiologies, timing, and outcomes are only superficially understood.

Methods: All patients undergoing kidney transplant at Emory University Hospital between the years 2009 and 2019 were included. Using CTCAE definitions, moderate leukopenia was defined as lowest white blood cell (wbc) value between 1 and 2, and severe leukopenia was defined as lowest wbc <1. We explored longitudinal measures of leukopenia to determine the relevance of patterns of wbc levels. Longitudinal leukopenia was measured by the integral of 2-wbc over the first year post transplant, representing the amount of time the patient spent with a white blood cell count of less than 2. This AUC (area under the curve) was adjusted for length of follow-up, multiplying by a factor of 365/days of follow-up. Survival and graft loss at 3 years post transplant was analyzed in the context of these two different measures.

Results: Of 2059 patients, 61% were on belatacept and 39% on tacrolimus immunosuppression. 104 patients had severe and 367 had significant leukopenia. Age, sex, race, and etiology of renal disease were equally balanced between groups. Patients with significant or severe leukopenia were more likely to have received a kidney from a deceased donor, to be CMV high risk, and to be on immunosuppression with tacrolimus or azathioprine. On multivariate regression controlling for donor type, azathioprine use, and cmv risk status, immunosuppression with tacrolimus was no longer associated with leukopenia. 62% of patients with severe leukopenia experienced CMV viremia, while 48% had undergone treatment with thymoglobulin. Thirty patients had severe leukopenia not explained by CMV viremia or prior thymoglobulin treatment. When quantified using CTCAE definitions, 24% of patients with severe leukopenia versus 19% of patients with significant leukopenia, and 8% of patients without leukopenia experienced graft loss or death at 3 years. Surprisingly, for significant and severe patients, AUC was not significantly associated with graft loss or death.

Conclusions: While there are significant differences in protective immunity for patients on belatacept and tacrolimus, the incidence of leukopenia in these populations does not appear to be different. In our patients, leukopenia in the first year transplant was associated with increased rates of graft loss and death, underscoring the need to develop management pathways for these at-risk patients. Further study is warranted to understand this population.



CITATION INFORMATION: Johnson A., Karadkhele G., Larsen C. Leukopenia in the Renal Transplant Population *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Johnson: None. **G. Karadkhele:** None. **C. Larsen:** None.

Abstract# 648

Incidence of Pancreatic Exocrine Insufficiency in Patients Undergoing Liver Transplantation

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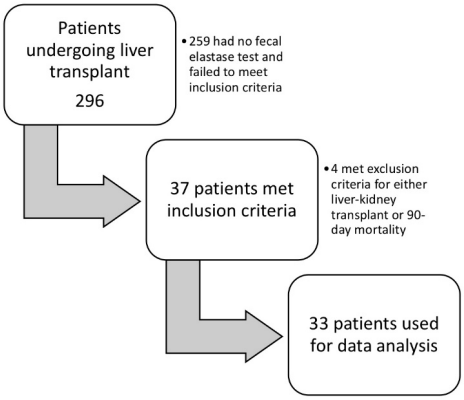
Purpose: The purpose of this study was to determine the incidence of Pancreatic Exocrine Insufficiency (PEI) in patients undergoing liver transplantation. Furthermore, patient-specific risk factors were identified, allowing for early recognition of PEI and treatment in order to improve malnutrition and post-transplant outcomes.

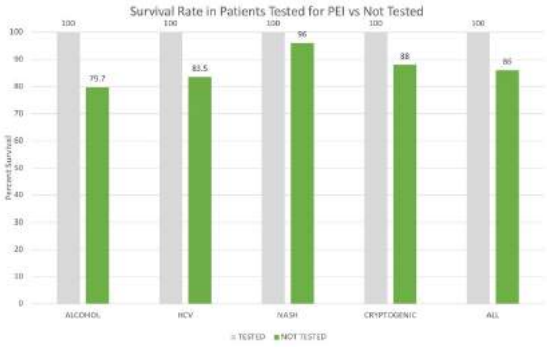
Methods: A retrospective chart review of 296 consecutive patients undergoing liver transplantation at a single institution over 5 years was performed. After inclusion and exclusion criteria were applied, 33 patients were used for data analysis (Figure 1). Data collected included age, etiology, presence of diabetes, nutritional status prior to transplantation, and result of fecal elastase test. Survival data were compared to a control group (n=263) not receiving pancreatic enzymes.

Results: 33 charts were reviewed after having met inclusion criteria. The etiology of cirrhosis for transplant included NASH (5/33, 15.2%), alcoholic cirrhosis (17/33, 51.5%), hepatitis C (7/33, 21.2%) and cryptogenic (4/33, 12.1%). 18 patients (54.5%) were noted to have PEI, defined as fecal elastase <200 ug/g. There was a difference in rate of PEI (p=0.0059) when comparing different etiologies of cirrhosis. Rate of PEI in included patients with Hepatitis C (7/7, 100%) was highest, followed by cryptogenic (3/4, 75%), NASH (3/5, 60%) and alcohol (5/17, 29.4%). There was a significant difference in 1-year mortality among patients tested for PEI and those who weren't (p=0.009). For comparison by etiology see Figure 2.

Conclusions: Symptomatic patients who were screened for PEI had a positivity rate of 54.5% (18/33). The cause of their cirrhosis played a significant role in the develop-

ment of PEI, with Hepatitis C as the etiology most frequently associated with PEI and alcohol the least. Survival in general was significantly better for patients tested for PEI, suggesting a survival benefit of patient screening before transplantation. Further investigation into additional risk factors, as well as differences in outcomes with early supplementation, seems warranted.





CITATION INFORMATION: Klein J., Rangel M., Ifearulundu I., Gely Y., Spigel Z., Janardhan S., Hertl M., Chan E. Incidence of Pancreatic Exocrine Insufficiency in Patients Undergoing Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Klein: None. **M. Rangel:** None. **I. Ifearulundu:** None. **Y. Gely:** None. **Z. Spigel:** None. **S. Janardhan:** None. **M. Hertl:** None. **E. Chan:** None.

Abstract# 649

De Novo Donor Specific Antibodies After Heart Transplantation in Fontan Patients with Protein Losing Enteropathy

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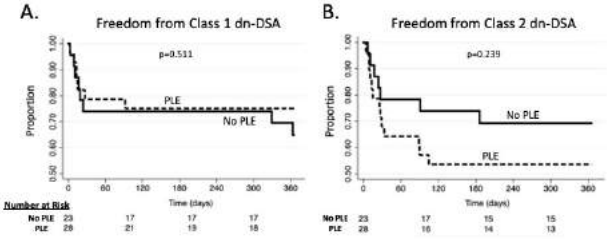
Purpose: Protein Losing Enteropathy (PLE) complicates Fontan physiology and can be an indication for heart transplantation (HT). PLE is accompanied by immune dysregulation, potentially impacting antibody production; the impact of PLE on the development of donor specific antibodies (DSAs) is unclear. De novo DSAs (dnDSAs) incur graft damage, increasing risk for rejection and coronary artery vasculopathy. We investigated the development of dnDSAs in the first year after HT in Fontan patients with and without PLE.

Methods: A retrospective chart review was conducted of Fontan patients who underwent HT at our institution. Diagnosis of PLE was based on clinical features and/or laboratory data. Patients were excluded if they lacked pre-transplant or post-transplant DSA data. Characteristics between the two groups were compared using Wilcoxon Rank Sum and Fisher's Exact Test as appropriate. Freedom from dnDSAs and 1 year graft survival were assessed using Kaplan Meier curves and compared using the Log Rank Test.

Results: Over the 12 years, 51 Fontan patients underwent HT and had sufficient antibody data. Twenty-eight (55%) had PLE and 23 (45%) did not. Baseline demographics were similar between those with and without PLE. Peak panel of reactive antibodies (PRA) prior to HT was similar for both Class 1 (no PLE: 4[0-41%] vs PLE: 6[0-48%], p=0.61) and Class 2 (no PLE: 0[0-19%] vs PLE: 0[0-25%], p=0.55) antibodies. Freedom from class 1 dnDSA post-HT was the same between two groups (Figure 1A). Though not statistically different, there was a trend towards lower freedom from class 2 dnDSA in the PLE group (Figure 1B). Graft survival was similar between the two groups.

Conclusions: Despite similar pre-HT PRA, Fontan patients with PLE trended towards earlier class 2 dnDSAs, however this study may have been underpowered to detect true differences. Early graft survival did not differ between the groups. A larger scale analysis would offer insight into the risk of dnDSA production and long term graft failure in Fontan patients transplanted for PLE.

Figure 1



CITATION INFORMATION: Magnetta D., Hoch V., Pinelli D., Monge M., Pahl E., Thrush P. De Novo Donor Specific Antibodies After Heart Transplantation in Fontan Patients with Protein Losing Enteropathy *AJT, Volume 21 Supplement 3*
DISCLOSURES: D.A. Magnetta: None. **V. Hoch:** None. **D. Pinelli:** None. **M. Monge:** None. **E. Pahl:** None. **P.T. Thrush:** None.

Abstract# 650

Brain Natriuretic Peptide and Pedometer Activity are Most Predictive of Poor Kidney Transplant Waitlist Outcomes

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Purpose: Tools for indicating which patients are most at risk for complications and death after transplant listing would allow for a rational approach to targeted waitlist management.

Methods: Following IRB approval, demographics, frailty metrics, pedometer, treadmill ability (METS), troponin, and BNP were collected on 314 patients listed for kidney transplant between July 2015 and March 2020 and three subsequent listing update visits. Frailty metrics included handgrip, chair sit/stand, 8 foot up-and-go, sit/reach, and exhaustion questions. Calibrated pedometer activity was recorded over several days and measured as steps/time. After patients with missing data were eliminated, univariate and multivariate logistic regression models were fit to assess the association of measures with delisting for death or medical complications in 283 remaining patients. Model fits of the predictor subsets for each outcome were compared using the Akaike information criterion (AIC). Additional logistic modeling was conducted on 84 patients with multiple visits and included change in metrics over time to test if progression and time between visits was predictive of waitlist outcomes. AIC was used to identify optimal covariate sets considered in our modeling. We assessed the significance of individual predictors at the alpha = 0.05 level.

Results: Mean age was 59.9 years, 95% male, 57% White, 30% Black, 9.5% Hispanic. Mean BMI was 29.6. Diabetes was the primary cause of ESRD (45%), followed by HTN (15%), FSGS (9%), and ADPKD (7.6%). Reasons for delisting were medical (DLM, n=43), death on list (DOL, n=20) and other (n=9). The mean (SD) time between first and last follow-up was 2.09 (0.84) years. BNP was the most consistent univariate predictor of DLM and DOL (both $p<0.0001$). Factors at initial listing significantly associated with DOL on multivariate analysis included higher BNP ($p<0.0001$) and lower steps/time ($p=0.015$). Lower METS and steps/time, and high BNP were associated with delisting for medical reasons on multivariate analysis ($p<0.05$). Considering change in metrics over time, declining steps/time was associated with DLM ($p<0.0001$) and DOL ($p=0.0127$). Worse performance on treadmill (METS) and chair sit/stand were associated with DLM ($p=0.0086$) and DOL ($p=0.048$), respectively. Increase in BNP values consistently predicted DLM ($p<0.0001$) and death at any time after listing ($p<0.0001$).

Conclusions: BNP and pedometer activity at time of listing and changes in BNP over time were significantly associated with kidney transplant waitlist outcomes. Functional metrics and BNP screening can identify patients in need of more intense waitlist management.

CITATION INFORMATION: Manay P., TenEyck P., Kalil R., Sanders M., Swee M., Binns G., Hornikel J., Katz D. Brain Natriuretic Peptide and Pedometer Activity are Most Predictive of Poor Kidney Transplant Waitlist Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Manay: None. **P. TenEyck:** None. **R. Kalil:** None. **M. Sanders:** None. **M. Swee:** None. **G. Binns:** None. **J. Hornikel:** None. **D. Katz:** Grant/Research Support; Name of Commercial Interest; Bristol-Myers-Squibb. Grant/Research Support; Nature of Relationship; Grant/Research.

Abstract# 651

The Assesment of Pre-transplant Donor-reactive IL-21 Producing T Cells as a Tool to Identify Patients at Risk for Acute Rejection

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Purpose: The measurement of panel-reactive antibodies (PRA) has proven valuable in the transplant setting but it does not account for the presence of donor-reactive memory T cells. Previous studies have shown that these cells are associated with the development of acute rejection. The aim of this study, was to assess whether pre-transplant memory T and B cell alloreactivity are associated with increased rejection risk of kidney transplant recipients.

Methods: Peripheral blood mononuclear cell (PBMC) samples from 114 kidney transplant recipients (transplanted between 2010-2013) were obtained pre-transplantation. The number of donor-reactive IL-21 (cytokine known to provide help to B cells) producing T cells was analyzed by enzyme-linked immunospot assay (Elispot). Patient cells were stimulated with irradiated donor cells. Historical PRA and/or the presence of serum anti-HLA antibodies were used to determine the presence of B cell alloreactivity before transplantation.

Results: A total of 30 patients developed acute rejection within 6 months after transplantation. Pre-transplant B cell alloreactivity was present in 16/30 (53%) patients with rejection and 33/84 (39%) patients with no rejection. The number of donor-reactive IL-21 producing T cells was significantly higher in patients with rejection (p=0.03). A ROC curve to assess the reliability of donor-reactive IL-21 producing T cells in predicting rejection, resulted in an AUC of 0.638 with a sensitivity of 0.63 and specificity of 0.60 (PPV: 21.5% and NPV: 90.1%). Multivariate binary logistic regression showed that donor age (OR: 1.057, 95% CI 1.017- 1.098) and number of donor-reactive IL-21 producing T cells (OR 1.015, 95% CI 1.003- 1.026) were indicators of an increased risk for the development of rejection (p=0.008).

Conclusions: The number of pre-transplant donor-reactive IL-21 producing T-cells is an independent predictor for the development of acute rejection within the first 6 months after kidney transplantation. In contrast, pre-transplant B cell alloreactivity was not significantly related to incidence of rejection. Our data form a good starting point for research into the added value of monitoring pre-transplant donor-reactive IL-21 producing T-cells for assessment of immunological risk.

CITATION INFORMATION: Mendoza Rojas A., van Gelder T., de Kuiper R., Reijerkerk D., Clahsen-van Groningen M., Hesselink D., Baan C., van Besouw N. The Assesment of Pre-transplant Donor-reactive IL-21 Producing T Cells as a Tool to Identify Patients at Risk for Acute Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Mendoza Rojas: None. **T. van Gelder:** None. **R. de Kuiper:** None. **D. Reijerkerk:** None. **M.C. Clahsen-van Groningen:** None. **D.A. Hesselink:** None. **C.C. Baan:** None. **N.M. van Besouw:** None.

Abstract# 652

Immunosuppression is Not Associated with High-risk Immunologic Parameters in Transplant Recipients with the Sars-cov2 Virus

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Purpose: The factors associated with severe COVID-19 disease in transplant patients are poorly understood. Despite concern that patients with weakened immune responses have increased risk of infectious complications, we hypothesized that immunosuppression might attenuate the inflammatory cascade that characterizes severe disease. We therefore evaluated whether disease severity is associated with various immune parameters.

Methods: We characterized lymphocyte phenotypes using flow cytometry and measured cytokines by Luminex in 5 transplant recipients with the SARS-CoV2 virus. The ImmuKnow assay, which measures ATP in stimulated CD4 cells, was utilized to assess cell-mediated immunocompetence.

Results: Higher ImmuKnow levels correlated with more severe clinical course. We found a significant linear correlation between ImmuKnow level and percentage of activated effector (CCR7-/CD69+) CD4 (p=0.042) and CD8 (p=0.003) cells in the blood as well as the CD4:CD8 ratio (p=0.001) (Table 1). In two lung secretion samples, higher ImmuKnow level correlated with a higher percentage of resident memory (CCR7-/CD69+/CD103+) CD8 T cells. Concentrations of G-CSF, IL-10, IL-6, TNF-a and MCP1 were elevated in at least 50% of our cohort and highest in the patient with the highest ImmuKnow level.

Conclusions: Higher ImmuKnow levels correlated with more severe clinical course, higher percentages of activated effector CD4 and CD8 cells and CD4:CD8 ratio in the blood, higher percent of resident memory CD8 cells in the lung secretions, and higher levels of inflammatory cytokines. These are all factors described in patients with more severe disease, suggesting that increased immunosuppression does not increase the risk of severe COVID-19 outcomes in transplant patients.

Table 1

	Clinical Course	ImmuKnow	% CCR7-/69+ of Blood CD4+	% CCR7-/69+ of Blood CD8+	Blood CD4:CD8 Ratio	% CCR7-/69+/103+ of Lung Secretion CD8+
Patient 1	Severe disease, discharged to facility with trach	341	15.2	63.6	0.7	36.6
Patient 2	Severe disease, died	223	18	33.1	0.5	Not Available
Patient 3	Never intubated, benign course, discharged home	126	7	25.8	Not Available	Not Available
Patient 4	Brief intubation, discharged home	82	4.1	13.6	0.2	23.2
Patient 5	Alive, trach then, decannulated, rehab	23	0.38	2.6	0.1	Not Available
		R	0.86209715	0.99320022	0.99871594	
		R^2	0.79683733	0.98668267	0.99743353	
		p	0.0419	0.0026	0.0013	

CITATION INFORMATION: Merl S., Jones R., Shonts B., Rust D., Sykes M., Weiner J. Immunosuppression is Not Associated with High-risk Immunologic Parameters in Transplant Recipients with the Sars-cov2 Virus *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Merl: None. **R. Jones:** None. **B. Shonts:** None. **D. Rust:** None. **M. Sykes:** None. **J. Weiner:** None.

Abstract# 653

Endothelial Glycocalyx Shedding is Associated with Graft Quality During Ex Vivo Lung Perfusion

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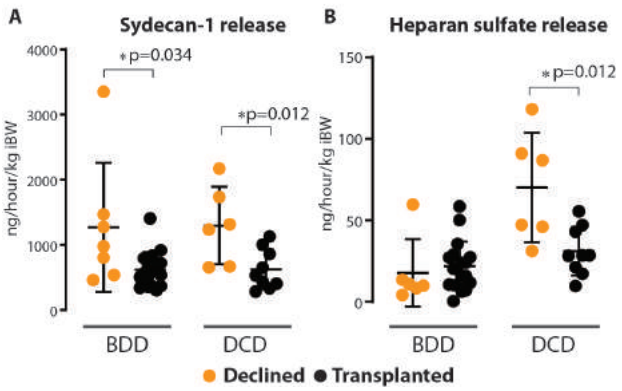
Purpose: Endothelial glycocalyx is the surface protective layer of the endothelial cells and its damage is known to be strongly associated with organ dysfunction. However, the impact of endothelial glycocalyx integrity and donor lung quality are unknown. In this study, we investigated the association between glycocalyx integrity and graft quality using an *ex vivo* lung perfusion (EVLP) platform.

Methods: We analyzed perfusate obtained from clinical EVLP using marginal lungs from brain death (BD) donor and donor after circulatory determination of death (DCD). Heparan sulfate and syndecan-1 levels were defined as markers of endothelial glycocalyx degradation. Graft transplantability was comprehensively defined based on graft function, physiology, radiographic, bronchoscopic and surgical assessments. Data were compared between graft quality (transplanted or declined) and/or donor type.

Results: Of 39 total EVLP cases analyzed (24 BD and 15 DCD), seventeen BD lungs and nine DCD lungs were transplanted after EVLP. Declined for transplant lungs showed radiographic, bronchoscopic and surgical assessments signs of edema/bogginess. In addition, declined lungs displayed increased EVLP perfusate levels of syndecan-1 (Figure 1A). Overall, no significant physiologic EVLP parameter differences were observed between transplanted and declined lungs. While no association was found between EVLP perfusate heparan sulfate concentrations and graft transplantability in BD lungs, perfusate heparan sulfate levels were significantly higher in declined DCD lungs compared to transplanted DCD lungs (Figure 1B).

Conclusions: Our data demonstrate that endothelial glycocalyx shedding during EVLP is associated with the decision to transplant or not transplant. In particular, increased fragility of the glycocalyx was observed in DCD lungs. These findings suggest that strategies for preserving and repairing the vascular endothelial glycocalyx may improve graft quality. Further investigation is required to demonstrate a clear association between glycocalyx shedding and posttransplant outcomes.

Figure 1



CITATION INFORMATION: Noda K., Philips B., Harano T., Luketich J., Sanchez P. Endothelial Glycocalyx Shedding is Associated with Graft Quality During Ex Vivo Lung Perfusion *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Noda: None. **B.J. Philips:** None. **T. Harano:** None. **J.D. Luketich:** None. **P.G. Sanchez:** None.

Abstract# 654

Hla-dq Epitope Mismatch Predicts De Novo Donor-Specific Antibody Formation and Acute Cellular Rejection After Living Donor Liver Transplantation

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Purpose: Epitope mismatch (MM) effect on living donor liver transplantation (LDLT) has not been studied in detail. This study aimed to investigate the role of epitope MM in predicting de novo donor-specific antibody (dn-DSA) formation and the relationship between epitope MM and T cell immune response in LDLT.

Methods: Forty-five recipients (39 ABO-blood-type compatible, 6 ABO incompatible) were enrolled. Epitope MM levels for HLA class I (A, B, C) and class II (DRB1, DQB1) were determined by HLAMatchmaker. For all recipients, anti-HLA antibodies were analyzed before and annually after transplantation. Mean fluorescence intensity (MFI) above 1,000 for DSAs against HLA-A, -B, -C, -DRB1, and -DQB1 was considered positive. Recipient T-cell responses to allostimulation were evaluated by MLR assay before LDLT. $CD4^+$ and $CD8^+$ T-cell stimulation index (SI) and CD25 expression in proliferating $CD8^+$ T-cells were quantified using multiparameter FCM analysis.

Results: Nine patients (20%) developed dn-DSAs; almost all dn-DSAs were against HLA class II antigens. Total HLA allele MM and HLA-A, -B, -C, -DRB1 and -DQB1 allele MM were not associated with dn-DSAs. Patients with dn-DSAs had a significantly higher number of HLA-DQ epitope MMs (7.8 ± 3.0 vs. 4.6 ± 5.4, $P<0.05$). The probability of dn-HLA-DQB1 DSA formation was higher for the patients with >9 HLA-DQ epitope MMs. A receiver operating characteristic (ROC) analysis showed that the number of HLA-DQB1 epitope MMs was strongly predictive of dn-HLA-DQ DSA (area under the curve [AUC], 0.771; $P<0.01$). Patients with ACR in the first month had a higher number of HLA-DQ epitope MMs (8.7 ± 6.7 vs. 4.6 ± 4.6; $P<0.05$). The probability of ACR was higher for HLA-DQB1 epitope MMs >7. ROC analysis for ACR showed strong predictive values of HLA-DQB1 epitope MMs (AUC, 0.728; $P<0.05$). There was no significant difference in the SI for the $CD4^+$ and $CD8^+$ T-cell responses in patients with low-(<7) and high-load (≥7) of HLA-DQB1 epitope MM. However, the CD25 expression in proliferating $CD8^+$ T-cells was higher in the high-load patients.

Conclusions: HLA-DQB1 epitope MM is associated with dn-DSA formation and ACR after LDLT. Further studies are required to evaluate the clinical utility of epitope matching.

CITATION INFORMATION: Ono K., Ide K., Tanaka Y., Ohira M., Tahara H., Tanimine N., Akimoto S., Imaoka Y., Sato K., Yamane H., Tsukiyama N., Ide R., Mochizuki T., Ohdan H. Hla-dq Epitope Mismatch Predicts De Novo Donor-Specific Antibody Formation and Acute Cellular Rejection After Living Donor Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Ono: None. **K. Ide:** None. **Y. Tanaka:** None. **M. Ohira:** None. **H. Tahara:** None. **N. Tanimine:** None. **S. Akimoto:** None. **Y. Imaoka:** None. **K. Sato:** None. **H. Yamane:** None. **N. Tsukiyama:** None. **R. Ide:** None. **T. Mochizuki:** None. **H. Ohdan:** None.

Abstract# 655

Dietary Intake and Mycophenolate Mofetil-related Diarrhea Following Kidney Transplantation

G. Onyeaghala[1], L. Teigen[2], B. Guo[2], Y. Doronin[1], M. Al-Kofahi[2], B. Wu[2], W. Guan[2], C. Staley[2], S. Riad[2], A. Matas[2], R. Remmel[2], W. Oetting[2], C. Dorr[1], P. Jacobson[2], A. Israni[1], *[1]Nephrology, Hennepin Healthcare Research Institute, Minneapolis, MN, [2]University of Minnesota, Minneapolis, MN*

Purpose: The treatment of Mycophenolate mofetil (MMF) related diarrhea in kidney transplants recipients involves providing lower MMF doses more frequently to maintain the same daily dose. However, this fractionated dosing regimen is associated with reduced adherence to immunosuppression and poor outcomes. We hypothesized that dietary fiber or polyols intake post-transplantation would be associated with MMF-related diarrhea.

Methods: The Microbiome and Immunosuppression in Kidney Transplantation (MISSION) study used Mosio, Inc (Seattle, WA) to implement a HIPPA compliant text-based survey. The survey was sent for up to 6 months post-transplant on a bi-weekly basis, to collect diarrhea information from 8 participants receiving MMF and Tacrolimus. Diarrhea events were defined using the V 5.0 definition of the National Cancer Institute's Common Terminology Criteria for Adverse Events (CTCAE). The cohort was dichotomized based on development of diarrhea events of CTCAE grade 2 (increase of 4-6 stools per day compared to the previous week). Baseline 48-hour food recalls were collected one-week post-transplant for 7 of the 8 participants using the Nutrition Data System for Research.

Results: Over 4 months of follow up, 242 diarrhea surveys were completed and 15 diarrhea events were reported (**Figure 1**). The median time to the first reported diarrhea event was 17.5 days post-transplant (range: 2-79 days). We did not observe a difference in dietary fiber intake based on diarrhea outcomes. However, participants who developed diarrhea appeared to have higher intake of the polyols mannitol (median: 0.45g, range: 0.43-0.47g) and sorbitol (median: 0.03g, range: 0.02-0.1g), compared to participants who did not (median: 0.04g, range:0.02-0.24g and median 0g, range: 0-0.01g for mannitol and sorbitol, respectively) (**Table 1**).

Conclusions: These preliminary findings suggest an increased dietary intake of polyols may contribute to the development of MMF related diarrhea. Mannitol and sorbitol have an osmotic action in the small intestine and are readily fermented by colonic bacteria, leading to altered bowel habits. The prospective collection of diarrhea, nutrition and microbiome data will contribute to future interventions to reduce incidence of MMF-related diarrhea in kidney transplantation.

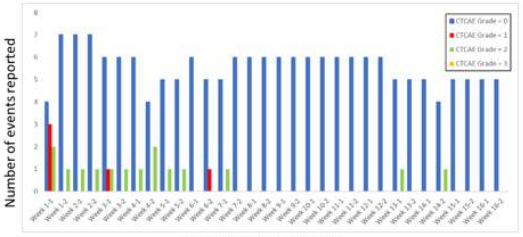

Figure 1. Frequency of MMF-related diarrhea during the first 4 months of follow up

Table 1: Dietary intake between patients with and without diarrhea

	No diarrhea (n=4) Median (Min, Max)	Developed diarrhea (n=3) Median (Min, Max)
Fiber	13.5 (3.8, 55.6)	20.8 (18.1, 22)
Soluble Fiber	5.2 (0.9, 14.4)	6.5 (5.2, 7.0)
Mannitol	0.04 (0.02, 0.24)	0.45 (0.43, 0.47)
Sorbitol	0 (0, 0.01)	0.03 (0.02, 0.1)

CITATION INFORMATION: Onyeaghala G., Teigen L., Guo B., Doronin Y., Al-Kofahi M., Wu B., Guan W., Staley C., Riad S., Matas A., Remmel R., Oetting W., Dorr C., Jacobson P., Israni A. Dietary Intake and Mycophenolate Mofetil-related Diarrhea Following Kidney Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 656

Comparison of Donor-derived Cell Free Dna Between Recipients with First Solitary Allograft and Regrafts

S. Paluri[1], S. Muthusamy[1], M. Shinbashi[1], G. Gupta[1], B. Dale[2], Z. Kashi[3], P. Halloran[4], D. Kumar[1], *[1]Virginia Commonwealth University, Richmond, VA, [2]CareDx, Brisbane, CA, [3]Kashi Clinical Laboratories, Portland, OR, [4]ATAGC, Edmonton, AB, Canada*

Purpose: Donor derived-cell free DNA (dd-cfDNA) is a biomarker of immunological injury. Multiple studies have validated its utility in recipients of first solitary kidney transplants (s-KT) while its utility in regrafts with previous in-situ failed kidney transplants (r-KT) who conceivable have a second source of dd-cfDNA is not yet fully defined. Here we present our findings and comparison of values in patients with no rejection, any rejection or ABMR by both histology and molecular microscope.

Methods: In our center all KT biopsies in addition to histological assessment also undergo dd-cfDNA (Allosure, CareDx) and molecular microscope (MMDx; ATAGC; Canada) analysis. We evaluated eighty-seven KT biopsies with no rejection, by histology and MMDx. Seventy-eight KT biopsies with evidence of any rejection by histology and MMDx. Finally, we evaluated fifty-three KT biopsies with evidence of only ABMR by both histology and MMDx.

Results: KT biopsies with no rejection, seventy (70/87; 80%) biopsies were performed on s-KT and seventeen (17/87; 20%) were on r-KT. The main indication for biopsy in each group was surveillance (s-KT 30/70; 42% vs r-KT 12/17; 70%) followed by AKI (s-KT 22/70; 31% vs r-KT 4/17; 24%) The median dd-cfDNA in the r-KT group was 0.30% (IQR: 0.21-0.54) which was not different than 0.35% (IQR: 0.18-0.54) in the s-KT group ($p=0.78$). KT biopsies with any rejection on both platforms, fifty-one (51/78; 65%) of the biopsies were performed on s-KT and twenty-seven (27/78; 35%) were performed on r-KT. The major indication for biopsy in each group was surveillance (s-KT 30/51; 59% vs r-KT 22/27; 81%). The median dd-cfDNA in the r-KT group was 1.5% (IQR: 0.91-2.0) which was not different than 2.1% (IQR: 0.86-3.3) in the s-KT group ($p=0.27$). KT biopsies with only ABMR by

both histology and MMDx, thirty-four (34/53; 64%) of the biopsies were performed on s-KT and nineteen (19/53; 36%) were on r-KT. The main indication for biopsy in each group was surveillance (s-KT 25/34; 74% vs r-KT 16/19; 84%) The median dd-cfDNA in the r-KT group was 1.5% (IQR: 0.86-2.0) which was not different than 2.0% (IQR: 0.86-3.6) in the s-KT group (p=0.57).

Conclusions: Here we report that there is no difference in dd-cfDNA in recipients s-KT versus r-KT in the setting of no rejection, any rejection or isolated ABMR confirmed by both by histology and molecular signature. We were able to increase the precision of the diagnosis with addition of the molecular microscope analysis. We hypothesize that despite presence of a second source of dd-cfDNA, the lack of nephron mass in the failed allograft prevents it from being a clinically significant source of dd-cfDNA. Further studies will allow this noninvasive biomarker of allograft injury to be used in the ever growing regraft patient population that are commonly sensitized and hence subjected to invasive surveillance biopsies.

CITATION INFORMATION: Paluri S., Muthusamy S., Shinbashi M., Gupta G., Dale B., Kashi Z., Halloran P., Kumar D. Comparison of Donor-derived Cell Free Dna Between Recipients with First Solitary Allograft and Regrafts *AJT, Volume 21 Supplement 3*

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Abstract# 657

Dysregulation of Immune Cell Glycolysis and Oxidative Phosphorylation Correlates with Development of Pre-liver Transplant Immune Dysfunction and Post-transplant Mortality

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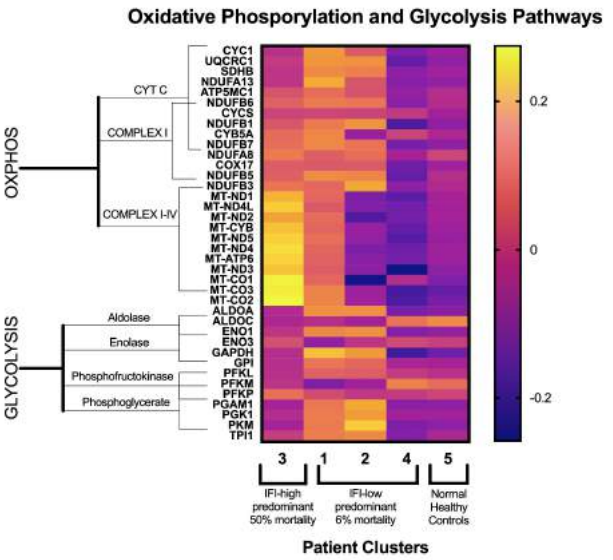
Purpose: Cirrhosis-related immune dysfunction contributes to early morbidity and mortality following liver transplant (LT). We have previously identified a pre-LT biomarker panel, the immune frailty index (IFI), which accurately stratifies patients at high risk for post-transplant morbidity and mortality due to immune dysfunction. Prior work shows that impaired immune cell differentiation is central to this process. Here, we evaluate the genetic mechanisms responsible for these immunophenotypic alterations.

Methods: IFI was calculated from pre-transplant HCV viremia, Eotaxin, MMP3, and Fractalkine. Pts with low IFI (Score 0-2) have a 95.5% 1yr survival compared with 46.2% for high IFI (Score 3-4). IFI-high were matched 1:2 with IFI-low based on age, sex, and cause of liver disease and were compared to healthy controls (NHC). RNA-seq was performed on PBMCs (d-1) and gene expression was used for principal component analysis (PCA) and clustering.

Results: Gene expression analysis was performed on 22 LT recipients (n=7 IFI-high, n=15 IFI-low) and 8 NHCs. Donor and recipient characteristics were similar between groups. IFI-high had more positive cultures within 1yr post-op (4 vs 1, p<0.01) and lower 2yr survival (56% vs 100%, p<0.01). PCA analysis demonstrated 4 patterns of gene expression (clusters 1, 2, 3, and 4) with IFI-high predominantly in cluster 3; NHCs grouped together (cluster 5), **Figure 1.** Four patients died during median follow up of two years, all within the IFI-high cohort. Among these, 3/4 (75%) died secondary to infection-related complications (i.e. immune dysfunction), all in cluster 3. Gene analysis revealed mitochondrial function and oxidative phosphorylation genes were comparatively upregulated and glycolysis was comparatively down-regulated in this patient group.

Conclusions: Pre-transplant immune dysfunction in LT recipients is associated with significant alterations in immune cell metabolic pathways, including oxidative phosphorylation and glycolysis. Such metabolic dysregulation is known to abrogate immune cell differentiation into functional effectors. These alteration may direct immune frailty and increase LT recipients' susceptibility to complications and death. Further evaluation of these pathways may offer a potential novel target to interrupt pre-transplant immune dysfunction and improve LT outcomes.



CITATION INFORMATION: Panayotova G., Jin L., Lemenze A., Simonishvili S., Qin Y., Minze L., Dikdan G., Paterno F., Li X., Ghobrial M., Guarrera J., Lunsford K. Dysregulation of Immune Cell Glycolysis and Oxidative Phosphorylation Correlates with Development of Pre-liver Transplant Immune Dysfunction and Post-transplant Mortality *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Panayotova: None. **L. Jin:** None. **A. Lemenze:** None. **S. Simonishvili:** None. **Y. Qin:** None. **L. Minze:** None. **G. Dikdan:** None. **F. Paterno:** None. **X.C. Li:** None. **M. Ghobrial:** None. **J.V. Guarrera:** Consulting Fee; Name of Commercial Interest; Organ Recovery Systems. Consulting Fee; Nature of Relationship; Consultant. Consulting Fee; If "Other" Please Explain; Principal Investigator in Industry Sponsored Clinical Trial. **K.E. Lunsford:** None.

Abstract# 658

Kidney Graft Biopsy for Indication Proteinuria: Finding, and Outcomes

S. Parajuli, K. Swanson, J. Alstott, F. Aziz, N. Garg, W. Zhong, A. Djamali, D. Mandelbrot, *University of Wisconsin, Madison, WI*

Purpose: Proteinuria is common in kidney transplant recipients (KTRs), and is associated with an increased risk of graft failure. A rise in serum creatinine (SCr) is the most common indication for kidney graft biopsies. But there is limited information about biopsy findings and outcomes when the indication for biopsy is isolated proteinuria with stable Scr in KTRs.

Methods: We analyzed all KTRs who underwent biopsy for isolated proteinuria with stable SCr between 01/2016 and 06/2020. Protocol biopsies and biopsy for other indications (research, guided by DSA etc) were excluded. Patients were divided into two groups based on the biopsy findings, Active Rejection (AR) and Other. We defined new proteinuria as urine protein to SCr ratio (UPC) > 0.5 gm/gm and worsening proteinuria as UPC doubled and more than 1. Risk factors for the AR and graft survival were outcomes of interest.

Results: A total of 130 KTRs fulfilled our selection criteria;38 (29%) were in the AR group and 92 in the Other group. Most baseline characteristics were similar between the groups, including indication for biopsy as worsening or new proteinuria. The mean interval from transplant to biopsy in the AR group was 9.1±6. compared to 7.4±6.3 years (p=0.17) in the Other group. SCr, eGFR, and UPC at the time of biopsy were also similar between the groups. Not surprisingly, microvascular inflammation, tubulitis, and sum chronicity scores were higher in the AR group. In multivariate analysis (MV) model 1, only higher HLA mismatch (HR: 1.30; 95% CI: 1.06-1.59; p=0.01) was associated with AR and in model 2, male gender (HR: 0.45; 95% CI 0.23-0.89; p=0.02) was associated with a lower risk for AR. The degree of proteinuria was not associated with AR in either model. At last follow-up, 18% of grafts failed in the AR group (11% death censored), and 17% in the Other group (9% death censored) without significant difference. This was further confirmed by the K-M analysis.

Conclusions: 29% of the patients were diagnosed with AR exclusively based on the proteinuria. Likely due to the early diagnosis without a significant rise in SCr, outcomes were similar in the rejection group compared to the Other group. Routine monitoring for proteinuria in KTRs followed by a biopsy for worsening or new proteinuria may help to identify early rejection.

CITATION INFORMATION: Parajuli S., Swanson K., Alstott J., Aziz F., Garg N., Zhong W., Djamali A., Mandelbrot D. Kidney Graft Biopsy for Indication Proteinuria: Finding, and Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Parajuli: None. **K. Swanson:** None. **J. Alstott:** None. **F. Aziz:** None. **N. Garg:** None. **W. Zhong:** None. **A. Djamali:** None. **D. Mandelbrot:** None.

Abstract# 659

Initial Experience with Trugraf™ Gene Expression Profile and Trac™ Dd-cfdna Testing in Kidney Transplant Recipients Suggests Synergy and Enhanced Management within the First Year Post-transplant and Beyond

V. Paramasivam, B. Greco, M. Germain, *Nephrology, Baystate Medical Center, Springfield, MA*

Purpose: Non-invasive validated rejection biomarkers are now available to monitor kidney transplant patients (KTRs). Two such biomarkers are; TruGraf™ (TG) gene expression profile validated to rule out subclinical acute rejection(subAR) and TRAC™ (donor derived cell free DNA) as a marker of allograft injury in KTRs. The purpose of this study is to describe the initial single center experience of TruGraf GEP and TRAC dd-cfDNA surveillance for KTR within the first year post-txp and greater than one year post-txp. Our program has done 3 and 12 month protocol biopsies for many years. We have now replaced biopsies with biomarker surveillance.

Methods: TG and TRAC was done in all KTRs at 3 and 12 months post-txp. Additionally, all patients being followed by this nephrology group (total n=170) are to be tested once post-txp to determine baseline status (immune quiescence). A positive TG and/or TRAC prompted further evaluation including focused lab review. Biopsies were done only in cases where there was equipoise. Donor specific antibodies (DSA) were done in all patients.

Results: To date, 55 KTRs have been surveilled with TG and/or TRAC; total of 72 TG and 47 TRAC. 9 of 10 new transplants were spared 3 month biopsies, the one biopsy was for DGF; was normal and had a negative TG. An additional 14 were tested one year post tx and 11 of them avoided one year protocol biopsy. A total of 31 patients were tested at > one year post tx. Overall, a total of 2 episodes of subAR were identified. Table 1 and Table 2 showsresults of TG and TRAC testing in lieu of 3 month and 1 year protocol biopsy. Table 3 shows testing concordance. 49% (23/47) confirmed in immune quiescence (rule out subAR) with no allograft injury (GEP negative, dd-cfDNA negative). 5% had positive GEP and dd-cfDNA prompting biopsy and diagnosis (DX) and/or treatment of subAR. The remaining 46% had either GEP or dd-cfDNA positive, prompting further clinical evaluation and correlation with other findings such as DSA, proteinuria, and renal function.

Conclusions: Non-invasive TruGraf GEP surveillance with synergy from TRAC dd-cfDNA ruling out allograft injury spared unnecessary protocol biopsies in KTR at 3 months and provided enhanced surveillance at 12 months and further post-txp, assuring adequacy of immunosuppression and ruling out subAR. Combined TruGraf GEP and TRAC dd-cfDNA is promising, warranting larger studies to determine the optimal synergy with serial testing, especially beyond the first year post-txp where KTR continue to be at risk for subAR

Concordance between TG and TRAC in all tests		
KTRs with both GEP/dd-cfDNA (n=47)	TruGraf GEP negative (TX)	TruGraf GEP positive (not-TX)
TRAC dd-cfDNA negative	23	11
TRAC dd-cfDNA positive	11	2

CITATION INFORMATION: Paramasivam V., Greco B., Germain M. Initial Experience with Trugraf™ Gene Expression Profile and Trac™ Dd-cfdna Testing in Kidney Transplant Recipients Suggests Synergy and Enhanced Management within the First Year Post-transplant and Beyond *AJT, Volume 21 Supplement 3*

DISCLOSURES: V. Paramasivam: None. **B. Greco:** None. **M. Germain:** Consulting Fee; Name of Commercial Interest; Transplant Genomics. Grant/Research Support; Name of Commercial Interest; Registry Trulo.

Abstract# 660

Blood Gene Expression and Donor-derived Cell Free DNA for Diagnosing Subclinical Acute Rejection in Stable Kidney Transplant Recipients

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Purpose: A blood gene expression profile (GEP) has been established as a non-invasive screen for subclinical acute rejection (subAR). For patients with allograft dysfunction, donor-derived cell-free DNA (dd-cfDNA) has been used for acute rejection detection but not been studied extensively in patients with stable renal function. We hypothesized that we could improve diagnostic performance for subAR by combining a dd-cfDNA assay with a GEP assay.

Methods: The study cohort consisted of 208 subjects with stable kidney function from a previously reported prospective, multicenter study. 429 blood samples were paired with surveillance biopsies. A GEP assay was performed using a DNA microarray-based gene expression. The dd-cfDNA results were reported as a proportion of the dd-cfDNA over a total cfDNA. We evaluated the diagnostic performance using the area under the receiver operating characteristic (AUC) on GEP and dd-cfDNA alone, and logistic regression with combination of the two tests.

Results: Of 429 samples, 346 (80.7%) and 83 (19.3%) were diagnosed by histologic phenotype as no-rejection and subAR, respectively. The 83 subAR samples consisted of borderline 61.4% (n=51), Banff 1A 6% (n=5), and antibody-mediated rejection (AMR) 32.5% (n=27). The AUC of GEP and dd-cfDNA alone were 0.81 and 0.67, respectively. When two tests were combined, the AUC was increased to 0.83 with prevalence-adjusted negative predictive value (NPV) of 0.86 and prevalence-adjusted positive predictive value (PPV) of 0.62 in the training set (Figure 1A). In the testing set, the AUC was similar as 0.83 with prevalence adjusted NPV and PPV, 0.84 and 0.67, respectively (Figure 1B).

Conclusions: A combination of blood-based biomarkers can improve detection for and provide less invasive monitoring of subclinical acute rejection.

Figure 1A. Logistic regression model combining the GEP and dd-cfDNA in training set

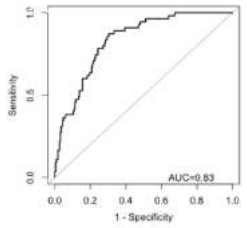
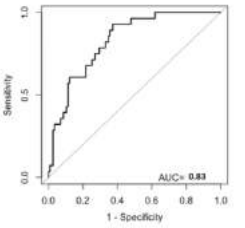


Figure 1B. Logistic regression model combining GEP and dd-cfDNA in testing set



CITATION INFORMATION: Park S., Guo K., Raymond H., Poggio E., Taber D., Marsh C., Kurian S., Kleiboeker S., Weems J., Holman J., Zhao L., Sinha R., Brietigam S., Rebello C., Abecassis M., Friedewald J. Blood Gene Expression and Donor-derived Cell Free DNA for Diagnosing Subclinical Acute Rejection in Stable Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Park: None. **K. Guo:** None. **H. Raymond:** None. **E. Poggio:** Honoraria; Name of Commercial Interest; CareDX. Honoraria; Nature of Relationship; honorarium and served on the Advisory Board. **D. Taber:** Grant/Research Support; Name of Commercial Interest; CareDX, Veloxis, Astellas, Novartis. Grant/Research Support; Nature of Relationship; research grant, research grant, research grant, research grant. Other; Name of Commercial Interest; Sanofi-Aventis. Other; Nature of Relationship; the Advisory Board. **C. Marsh:** None. **S. Kurian:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant. **S. Kleiboeker:** Other; Name of Commercial Interest; Eurofins – Viracor. Other; Nature of Relationship; employed. **J. Weems:** Other; Name of Commercial Interest; Eurofins Transplant Genomics Inc. Other; Nature of Relationship; employed. **J. Holman:** Other; Name of Commercial Interest; Eurofins Transplant Genomics Inc. Other; Nature of Relationship; employed. **L. Zhao:** None. **R. Sinha:** Other; Name of Commercial Interest; Eurofins – Viracor. Other; Nature of Relationship; employed. **S. Brietigam:** None. **C. Rebello:** None. **M. Abecassis:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant. **J. Friedewald:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant.

Abstract# 661

Immunosuppression Impacts Panel Reactive Antibody Status in Second Solid Organ Transplant Recipients - A Single Center Experience

J. Patel[1], S. Ali[2], M. L. Sanders[1], C. P. Thomas[1], D. Axelrod[1], M. Bilal[3], E. H. Field[3], S. Kuppachi[1], *[1]University of Iowa Hospitals & Clinics, Iowa city, IA, [2]Louis A. Johnson VA Medical Center, Clarksburg, WV, [3]Iowa City VA Health Care System, Iowa city, IA*

Purpose: Patients who require a second solid organ transplantation are significantly disadvantaged due to the event of sensitization due to the first transplant. We hypothesized that patients who remained on immunosuppression (IS) would have lower levels of calculated panel reactive antibodies (cPRA) prior to a second solid organ (kidney or pancreas) transplantation.

Methods: We retrospectively analyzed cPRA levels in kidney transplant (KT) recipients at our center from January 2009 to December 2019 who had previously undergone a non-liver solid organ transplant (SOT). Patients with three or more transplants were excluded. We compared sensitization between those who remained on IS, and those who did not, based on cPRA, using odds ratio (OR) and Chi-square or Fisher's exact test for statistical significance.

Results: A total of 108 patients met the inclusion criteria. 88 had a prior KT, 12 simultaneous kidney-pancreas, 1 pancreas, 2 lung, and 5 heart before receiving their second solid organ transplant. In 44 out of 108 patients (40.7%), IS was continued before a kidney transplant. In 21 out of 44 patients (47.7%), cPRA was less than 20%, compared to 6 out of 64 patients (9.4%) in whom IS was discontinued. Even the percentage of highly sensitized patients (cPRA >80%) was significantly higher in patients who were not on IS (56.2%) compared to those who remained on IS (13.64%). The OR of having cPRA more than 20% was 8.8 (confidence interval 3.15-24.67) in patients who were not on IS. (Chi-square and Fisher exact p-value < .0001).
Conclusions: In our single center analysis, patients who were not on any IS prior to a second solid organ transplant (kidney or pancreas) had a much higher risk of being sensitized compared to patients who were on IS. The number of highly sensitized patients (cPRA >80) was also significantly higher in those who were not on any IS. Additional prospective studies on a large scale are needed to confirm the benefit of the continuation of IS as well as the associated risk with an extended immunocompromised state.

Comparison of cPRA at second transplant in cases continuing verses stopping IS					
cPRA at Second Transplant	**<20 %**	**20-49 %**	**50-80 %**	**>80 %**	Total
IS continued	21	8	9	6	44
IS stopped	6	9	13	36	64
	27	17	22	42	108

CITATION INFORMATION: Patel J., Ali S., Sanders M., Thomas C., Axelrod D., Bilal M., Field E., Kuppachi S. Immunosuppression Impacts Panel Reactive Antibody Status in Second Solid Organ Transplant Recipients - A Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Patel: None. **S. Ali:** None. **M.L. Sanders:** None. **C.P. Thomas:** None. **D. Axelrod:** None. **M. Bilal:** None. **E.H. Field:** None. **S. Kuppachi:** None.

Abstract# 662

Continuation of Immunosuppression After the First Renal Allograft Failure Impacts Panel Reactive Antibody Status During Subsequent Renal Transplantation

J. Patel[1], S. Ali[2], M. L. Sanders[3], C. P. Thomas[3], D. Axelrod[3], M. Bilal[4], E. H. Field[4], S. Kuppachi[3], *[1]University of Iowa Hospitals & Clinics, Iowa CIty, IA, [2]Louis A. Johnson VA Medical Center, Clarksburg, WV, [3]University of Iowa Hospitals & Clinics, Iowa City, IA, [4]Iowa City VA Health Care System, Iowa City, IA*

Purpose: The standard of care following renal allograft failure is to discontinue immunosuppression (IS) to limit risks from further IS. We hypothesized that continuation of IS after kidney transplant (KT) allograft failure would prevent worsening of sensitization status as reflected by calculated panel reactive antibodies (cPRA) before second KT.
Methods: We retrospectively analyzed cPRA of KT recipients at our center from January 2009 to December 2019 who had previously undergone KT or simultaneous kidney-pancreas transplantation (KPT). Patients with more than two KT were excluded. We compared sensitization status based on cPRA analysis at the time of first and second KT, between those who remained on IS, and those who did not, using odds risk ratio (OR) and Fisher's exact test for statistical significance.
Results: Out of 47 patients who met the inclusion criteria, 42 had received a prior KT, while 5 patients had prior KPT. In 17 out of 47 patients (36.1%), IS was continued after allograft failure. In 9 out of 17 patients (52.9%), cPRA remained unchanged between the first and second KT. IS was discontinued in 30 out of 47 patients (63.8%). Among these patients, 27 (90%) experienced an increase in their cPRA. The odds of having an increased cPRA at the time of second KT in patients after stopping IS compared to continuing IS was 10.1 (confidence interval 2.2-46.59, Fisher exact p-value = 0.002).
Conclusions: In our single center analysis, the discontinuation of IS after renal allograft failure significantly increased the OR for increased cPRA at the time of a second KT. Prospective, multicenter studies on a larger scale are necessary to confirm these findings as well as study the risks of infection and malignancy with continued IS.

cPRA status at the time of second kidney transplant in cases continuing verses stopping IS			
cPRA at time of second transplant	**Unchanged**	**Increased**	**Total**
IS continued	9	8	17
IS stopped	3	27	30
	12	35	47

CITATION INFORMATION: Patel J., Ali S., Sanders M., Thomas C., Axelrod D., Bilal M., Field E., Kuppachi S. Continuation of Immunosuppression After the First Renal Allograft Failure Impacts Panel Reactive Antibody Status During Subsequent Renal Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Patel: None. **S. Ali:** None. **M.L. Sanders:** None. **C.P. Thomas:** None. **D. Axelrod:** None. **M. Bilal:** None. **E.H. Field:** None. **S. Kuppachi:** None.

Abstract# 663

Donor-Derived Cell-Free DNA Performance Characteristics are Similar for Repeat and Primary Kidney Transplant Recipients

V. R. Peddi[1], S. Akkina[2], S. C. Jordan[3], W. Tian[4], Y. Qazi[5], *[1]California Pacific Medical Center, San Francisco, CA, [2]Loyola University Medical Center, Maywood, IL, [3]Cedars-Sinai Medical Center, Los Angeles, CA, [4]CareDx, Brisbane, CA, [5]University of Southern California, Los Angeles, CA*

Purpose: Repeat kidney transplants (RKT) represent 12.4% of kidney transplants (KT) (10.9% of all living donor and 13.6% of all deceased donor). Most RKT are performed >5 years following the primary kidney transplant (PKT). Inferior RKT outcomes are identified among patients having experienced graft loss after less than 5 years and are also considered higher immunological risk. Donor-derived cell-free DNA (dd-cfDNA) has established utility in diagnosing the probability of active rejection in PKTs, however utility in RKTs published in two small series - Mehta, *et al.* (N=12 RKT) from the Diagnosing Acute Rejection in Kidney Transplant Recipients (DART study; ClinicalTrials.gov Identifier: NCT02424227) that demonstrated higher dd-cfDNA baseline than PKT; and Sureshkumar, *et al.* (N=12 RKT) whereupon no statistical difference in baseline was reported.
Methods: 753 patients with PKT were compared with 260 RKT recipients, all having surveillance with dd-cfDNA (AlloSure®; CareDx) as part of the KOAR study. The lowest - referred to as baseline - dd-cfDNA levels within the first year of transplant were examined. The cohort included patients from both surveillance and clinical for cause testing as well as biopsy schedules.
Results: The median baseline AlloSure dd-cfDNA for PKT was 0.20% (mean: 0.27%, variance:0.05), for RKT median was 0.19% (mean:0.35%, variance:0.24) with no significant difference (p = 0.66 with balanced sampling between groups) [**FIGURE 1**]. For the subset of patients who had an allograft rejection - PKT (n=80) and RKT (n=14) - a shift was observed in the mean baseline levels. For PKT and RKT it was 0.34% (variance:0.18) and 0.72% (variance:1.19), respectively (p = 0.35). In this cohort, elevated dd-cfDNA levels were observed at the time of the event. A median of 0.5% (mean: 1.06%, variance:3.05) was observed in PKT compared to median of 0.8% (mean:1.47%, variance:2.58) in RKT [**FIGURE 2**]. The observed differential trend was not statistically significant (p=0.503).

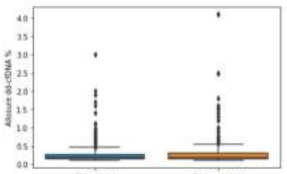


Figure 1: Baseline AlloSure dd-cfDNA levels

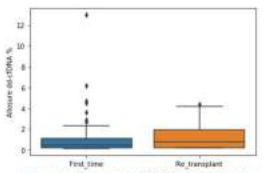


Figure 2: Elevation of dd-cfDNA in Rejection

Conclusions: RKT have equivalent baseline and dd-cfDNA elevations during allograft injury and rejection events as those observed with PKT. The similar performance characteristics of dd-cfDNA in RKT should support utility of this surveillance tool in the repeat kidney transplant population.
CITATION INFORMATION: Peddi V., Akkina S., Jordan S., Tian W., Qazi Y. Donor-Derived Cell-Free DNA Performance Characteristics are Similar for Repeat and Primary Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: V.R. Peddi: Consulting Fee; Name of Commercial Interest; CareDx (consultant/advisory board). Grant/Research Support; Name of Commercial Interest; CareDx, Transplant Genomics. **S. Akkina:** Grant/Research Support; Name of Commercial Interest; Natera. Honoraria; Name of Commercial Interest; CareDx, Natera. **S.C. Jordan:** Consulting Fee; Name of Commercial Interest; CareDx, CSL Behring, Hansa Biopharma. Grant/Research Support; Name of Commercial Interest; CareDx, CSL Behring, Hansa Biopharma. **W. Tian:** Salary; Name of Commercial Interest; CareDx (employee). **Y. Qazi:** Grant/Research Support; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Alexion (speaker), Acthar (speaker), Astra Zeneca (speaker), Relypsa (speaker), Veloxis (speaker).

Abstract# 664

The Role of the B2 Microglobulin Trend in Patients with Delayed Graft Function After Kidney Transplant

A. Perez-Gutierrez, P. J. Bachul, B. Juengel, P. Witkowski, D. DiSabato, R. Barth, J. Fung, Y. Becker, *Surgery, University of Chicago, Chicago, IL*

Purpose: Delayed graft function (DGF) is associated with worse short and long-term outcomes after kidney transplantation. There is a lack of biomarkers to predict outcomes in patients with DGF. Serum β2 microglobulin is a low-molecular-weight protein. It strongly correlates with serum cystatin C and creatinine; with the advantage of measuring residual renal in dialysis patients. In kidney transplant patients predicts cardiovascular events, overall mortality and graft failure. The role of the β2 microglobulin trend in patients with DGF has not been explored.

Methods: This is a retrospective study of all kidney transplants from deceased donors at our institution from 2014 to 2017. Pediatric and multiple organ transplants were excluded. Only patients with serum levels of β2 microglobulin (postoperative day 1 to 5) were included. β2 microglobulin trend was defined as the difference between β2 on postoperative day four and β2 on postoperative day one. We used univariate and multivariate logistic regression models with level of significance of α=0.05.
Results: A total of 150 kidney recipients were reviewed, 68 (45%) had delayed graft function (median 7.5 days, 1 - 51); 50% of the patients with DGF received dialysis for one week only. Three patients had primary non function. The demographic and clinical characteristics of the patients with and without DGF are shown in tables 1 and 2. β2 microglobulin strongly correlated with the presence of DGF ($p<0.001$) and significantly correlated with eGFR at 1, 6 and 12 months in all patients ($p<0.05$). In DGF group, β2 microglobulin trend correlated with the duration of DGF with p=0.05 (95% CI 0.004 - 6.66). This was independent of donors after circulatory death and type of kidney storage. In our cohort, β2 microglobulin was not associated with mortality or rejection.
Conclusions: The β2 microglobulin trend is a marker of kidney function useful particularly in patients with DGF, because measures the residual kidney function in the setting of dialysis. Following the trend of β2 microglobulin in patients with DGF is informative about the duration of the DGF and may help to make clinical decisions. Validation of this marker in a larger population of patients with DGF is needed.

Table 1. Patients characteristics

	Without DGF, N=82	With DGF, N=68
Age (median)	52.7	53.1
Male	61%	68%
African American	72%	74%
BMI (median)	27.5	27.6
Cause of kidney failure - HTN	37%	24%
Cause of kidney failure - DM2	23%	21%
Time on dialysis, years	6.4 +/- 3.6	7 +/- 2.8

Table 2. Clinical data

	Without DGF, N=82	With DGF, N=68
KDPI	49 +/- 23	63 +/- 21
DCD Donor	30%	50%
Pump	29%	41%
Warm ischemia (min)	41	42.5
Cold ischemia (hours)	13.1	14.6
Rejection	17%	13%
Death	9%	18%

CITATION INFORMATION: Perez-Gutierrez A., Bachul P., Juengel B., Witkowski P., DiSabato D., Barth R., Fung J., Becker Y. The Role of the B2 Microglobulin Trend in Patients with Delayed Graft Function After Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Perez-Gutierrez: None. **P.J. Bachul:** None. **B. Juengel:** None. **P. Witkowski:** None. **D. DiSabato:** None. **R. Barth:** None. **J. Fung:** None. **Y. Becker:** None.

Abstract# 665

Does the Timing of Subclinical Acute Rejection After Kidney Transplant Matter?

P. Portocarrero[1], S. Park[2], K. Guo[3], L. Zhao[3], J. Friedewald[2], *[1]Nephrology, Northwestern University, Chicago, IL, [2]Transplant Nephrology, Northwestern University, Chicago, IL, [3]Feinberg School of Medicine, Northwestern University, Chicago, IL*

Purpose: We hypothesized that the timing of subclinical acute rejection (subAR) diagnosed with biopsy, gene expression profile or donor-derived cell-free DNA is associated with poor graft outcomes.
Methods: The surveillance biopsy samples from a previously selected cohort were paired with a gene expression profile (GEP) and a donor-derived cell-free DNA (dd-cfDNA) results. 2- year composite endpoints (2Y-CCE) were defined as 1) any evidence of ≥ Banff grade II IFTA at 24-month biopsy, 2) biopsy-proven rejection on "for-cause biopsy," 3) a decrease in estimated glomerular infiltration rate (eGFR) by >10 m/min/1.3m^2. We used logistic regression to analyze the timing of subAR (histology, GEP, dd-cfDNA) and 2Y-CCE.
Results: 349 samples were studied (histology, GEP, dd-cfDNA), derived from 161 subjects. Of 161 subjects, 70 reached the 2Y-CCE. SubAR within 6 months post-transplant by histology was significantly associated with more 2Y-CCE than the no rejection group (odds ratio [OR] 4.25, 95% CI 1.04-17.36, p=0.04). Patients with biopsy-proven subAR within 12 months did not associate with 2Y- CCE (OR 2.08, 95% CI 1-4.35, p=0.052). SubAR by GEP at 12 months (OR 2.81, 95% CI 1.11 - 7.09, p=0.03) was associated with 2 Y-CCE. We found that subAR diagnosed with dd-cfDNA within 6 months and 12 months was not associated with 2Y-CCE. However, any positive GEP (OR 2.23, 95% confidence interval [CI] 1.16-4.29, p=0.02) or dd-cfDNA (OR 2.25, 95% CI 1.04 - 4.84, p=0.04) for subAR within the first 12 months were significantly associated with 2Y-CCE as the sample size increased (Table 1).
Conclusions: We found that subAR diagnosed by GEP and dd-cfDNA at different times post kidney transplant was associated with poor graft outcomes. Further protocols using early genetic and serologic markers of subAR need to be established in post-transplant follow-up.

Table 1) Association of SubAR within 6 months, at 12 months, or within 12-months post-transplant by a GEP, dd-cfDNA, and histology with 2Y-CCE

Time of SubAR post-transplant	Histology OR (95% CI, p value)	GEP OR (95% CI, p value)	dd-cfDNA OR (95% CI, p value)
Within 6 M	4.25 (1.04 -17.36, p=0.04*)	1.80 (0.71 - 4.57, p=0.22)	2.33 (0.80 - 6.76, p=0.12)
At 12M	1.60 (0.63 - 4.05, p=0.32)	2.81(1.11 - 7.09, p=0.03*)	2.17 (0.72 - 6.57, p=0.17)
6 M or 12 M	2.08 (1 - 4.35, p= 0.052)	2.23 (1.16 - 4.29, p= 0.02*)	2.25 (1.04 - 4.84, p=0.04*)

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DISCLOSURES: P. Portocarrero: None. **S. Park:** None. **K. Guo:** None. **L. Zhao:** None. **J. Friedewald:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant.

Abstract# 666

GENiE in a Bottle - Renasight Testing in the Kidney Transplant Setting - A Single Center Experience

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Purpose: Renasight™(Natera), a recently available genetic test provides analysis on 382 genes associated with adult-onset kidney disease, covering clinical categories (cystic, tubular, glomerular, complement-related, congenital disorders,and nephrolithiasis).The purpose of our study was to perform genetic testing on ESRD patients in the transplant setting- to diagnose, confirm or reclassify the etiology of ESRD and to determine if the testing impacted management.
Methods: Renasight testing has been used at our center in the pre and post-transplant settings since spring 2020. Following were the criteria used to test individuals for Renasight: Family history of ESRD, atypical presentations of ESRD, young individuals with ESRD of unclear etiology.
Results: 50 patients have been tested, 32 resulted and 18 still pending. 17/32 (53%) had some genes identified during testing while 15/32(46 %) had none. 8/17 were identified as positive ; 1 Alport's syndrome with ADMATS 13 mutation, 2 Alport's,1 PKD with Jouberts, Bardet BIedel, Meckel, Senior Loken syndrome, 1 with HNF 4A with Fanconi's syndrome, MODY Type1, Apol1, 1 renal agenesis/RET, 1 with 2 with ApoL 1. 9/18 patients had variants of unknown significance genes (VUS) including NPHS2 Nephrotic Syndrome, Type 2 /Short-Rib Thoracic Dysplasia Complement Factor I Deficiency, Familial Mediterranean Fever, PRODH Hyperprolinemia Type 1, Cystinosis. Genetic testing altered management as follows; 3 with Col4 A gene abnormalities were referred to other specialists, testing of anti GBM ab and informing family members who had donated in the past. 1 patient is being observed for complement activation conditions, 1 patient is being worked up for hylerprolinenia 1 for cystinosis. 1with RET gene abnormality is being worked up for MEN2 syndrome, 1 for amyloid, 1 with pre transplant MODY type 1 variant for Diabetes.
Conclusions: Renasight testing in the kidney transplant setting can confirm or identify the pre transplant diagnosis of ESRD when etiology is unclear or biopsies are unavailable, initiate appropriate referrals and facilitate appropriate therapeutic interventions . It can also facilitates early diagnosis of familial conditions,allowing families to intervene early and be better educated on organ donation. Renasight testing influenced diagnosis and management in our study Prospective data is being collected.
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DISCLOSURES: Y.A. Qazi: Consulting Fee; Name of Commercial Interest; ALEXION RELYPSA ACTHAR. **W. Mon:** None. **N. Ioannou:** Salary; Name of Commercial Interest; natera. **M. Smogorzewski:** None.

BASIC

Abstract# 667

Role of Trugraf Testing in Kidney Allografts Previously Biopsied for Dysfunction

Y. A. Qazi[1], W. Mon[1], C. Choi[1], S. Qazi[2], M. Smogorzewski[1], *[1]Keck Medical Center at USC, Los Angeles, CA, [2]Keck Medical Center at USC, La Canada Flt, CA*

Purpose: TruGraf®, can be used as an alternative to surveillance biopsies for ruling out "silent" subclinical acute rejections in transplant patients with stable graft function. However, its role in patients with graft dysfunction is unclear. The purpose of our study was to analyze the significance of Trugraf testing in kidney transplant previously biopsied for allograft dysfunction.

Methods: Serum creatinines of kidney transplant recipients who had previously undergone a for cause allograft biopsy and subsequent Trugraf were analyzed. The patient's were divided into four groups based on BPAR and Trugraf result: 1.BPAR+/NotTx, 2.BPAR-/NonTx , 3.BPAR-/Tx, 4. BPAR-/Tx-

Results: 23 patients who had undergone a kidney transplant biopsy for allograft dysfunction followed by a subsequent Trugraf test were analyzed. Donor type: 4 LTx and 19 DDTx, Avg. Mismatches; 5.03(1-6mm), Induction I/S; rATG 21, Simulect 2, mean duration between the biopsy and trugraf testing; 9.21 months (1-43 months). The number of BPAR+=15, BPAR- = 7, Not Tx = 12 and Tx were 11. The mean serum Cr for BPAR+/NotTx, BPAR-/NonTx , BPAR-/Tx, BPAR-/Tx- were 2.25 mg/dl(1.8-2.7 mg/dl), 1.90 mg/dl(1.2-3.34 mg/dl), 1.36 mg/dl(0.65mg/dl-2.43 mg/dl), 1.14 mg/dl(0.92-1.29mg/dl).

Conclusions: In this small observational study of allografts previously biopsied for dysfunction, the renal function was worse for allografts with previous BPAR and a subsequent NonTx Trugraf results and best in allografts with no BPAR and a Tx Trugraf. Trugraf surveillance of allografts with previous history of dysfunction may help to identify and stratify ones at a higher risk of deteriorating renal function. More data is being collected prospectively.

CITATION INFORMATION: Qazi Y., Mon W., Choi C., Qazi S., Smogorzewski M. Role of Trugraf Testing in Kidney Allografts Previously Biopsied for Dysfunction *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y.A. Qazi: None. **W. Mon:** None. **C. Choi:** None. **S. Qazi:** None. **M. Smogorzewski:** None.

Abstract# 668

Tru and Sure -A Tale of Two Cities! Can Allosure Predict and Enhance Trugraf Results?

Y. A. Qazi[1], W. Mon[1], S. Qazi[2], C. Choi[1], M. Smogorzewski[1], *[1]Keck Medical Center at USC, Los Angeles, CA, [2]Keck Medical Center at USC, La Canada Flt, CA*

Purpose: With the introduction of Cell free DNA(cfDNA) technology in transplantation a few years ago, and a more recent addition of genomic testing with TruGraf -surveillance of the renal allograft is moving beyond the serum creatinine. The purpose of our study were two fold- 1. To see if previously performed serial cfDNA levels could predict TruGraf results. 2. To see if collective interpretation of the two tests could help in predicting the overall trend in renal function.

Methods: Kidney transplant recipients who had undergone serial cell-free DNA testing (Allosure) and at least one TruGraf test were enrolled in the study. An Allosure test had to be have been performed within 5 days of the TruGraf. The following were collected ; mean of serial Allosure levels tested prior to Trugraf (cfDbaseln), Allosure on the day of Trugraf testing (cfDTruG), cfDNA change (Chng) [(cFDbaseln)- (cfDTruG)], Trugraf results as NotTX and Tx and the overall trend of renal function(CrTrnd) based on serum creatinines was classified as ;stable(s) , worsening(w) or improving(i).

Results: 10 patients met the inclusion criteria. TruGraft results; 10 Not-Tx and 6 TX. The mean number of cfDNA testing done prior to the TruGraf test was Not-Tx 4 (1-6) and 4.6 for the Tx (2-9). The mean **cfDbaseln** ; Not-Tx :0.54% (0.13%-1.5%) vs TX: 1.39%(0.37%-3%), the mean **cfDTruG** ; Not-Tx :0.68% (0.12% to 2.7%) vs Tx 1.25% (0.26%-4.8%) , mean **Chng;** Not-Tx : -0.142% (-2.12% to 0.68%) vs Tx 0.14%(-1.8% to 1.93%), **CrTrnd ; Not-Tx:** 1 **s,** 7 **w**, 2 **i** vs Tx: **s 4**, **w 0** ,**i** 2.

Conclusions: In our small observational study, it appears that serial cell-free DNA may not predict the outcome of TruGraf results, and that when used together provide complimentary insights into grafts at higher risk of deteriorating renal function. Our study suggests that cfDNA is likely most meaningful when interpreted in the context of change from a baseline. A rise of cfDNA from baseline accompanied with a Non-tx TruGraf result was associated with graft instability. Current ongoing prospective registry studies may confirm our observations. Whether the mechanistic differences in injury account for these observations and can be validated by molecular microscopy remains undetermined.

CITATION INFORMATION: Qazi Y., Mon W., Qazi S., Choi C., Smogorzewski M. Tru and Sure -A Tale of Two Cities! Can Allosure Predict and Enhance Trugraf Results? *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y.A. Qazi: Grant/Research Support; Name of Commercial Interest; CAREDX. **W. Mon:** None. **S. Qazi:** None. **C. Choi:** None. **M. Smogorzewski:** None.

Abstract# 669

Core Signature of Rejection-Specific Cytokines and Chemokines in Heart Biopsies After Transplantation

L. M. Radomsky[1], Y. Scheibner[2], J. F. Kuehne[1], J. Keil[1], K. Beushausen[1], K. Ludmilla[2], A. Schick[2], F. Ius[2], G. Warnecke[3], C. Bara[2], C. S. Falk[1], *[1]Institute of Transplant Immunology, Hannover Medical School, Hannover, Germany, [2]Department of Cardiothoracic, Transplantation and Vascular Surgery, Hannover Medical School, Hannover, Germany, [3]Clinic for Cardiac Surgery, University of Heidelberg, Heidelberg, Germany*

Purpose: Allograft rejection remains one of the limiting factors for survival after HTX. The aim of this project was to characterize the cytokine/chemokine network in heart biopsies and peripheral blood plasma after TX. The quantified cytokine/chemokine concentrations could reflect the ischemia/reperfusion response as well as rejection status of the allograft. Therefore we hypothesize that in heart biopsies with histopathological proven rejection the microenvironment is significantly altered and potentially specific cytokine/chemokine patterns could predict allograft rejection.

Methods: Heart biopsies (N=181 biopsies; 52 patients) and peripheral blood samples (N=35 patients) were obtained at different time points after HTX. Using luminex-based multiplex assays 50 cytokines/chemokines in tissue lysates and peripheral blood plasma were quantified. Concentrations of samples with rejection and no-rejection were compared in lysates and plasma. Moreover correlation of tissue and plasma levels and comparison of cold static versus normothermic machine preservation were performed.

Results: With regard to the rejection status we identified significant differences in lysate concentrations. Especially CXCL9/MIG, CXCL4/MIP-1β and CXCL10/IP-10 showed significantly elevated concentrations in biopsies with proven rejection ($p<0.001$). In addition, we identified individual long-term changes of single patients after transplantation and significant differences comparing tissue lysates with plasma concentrations. Interestingly, we found no strong correlation between plasma and lysate concentrations. Moreover significantly elevated concentrations of MIF, M-CSF, FGF basic and ICAM-1 ($p<0.05$) in the first biopsies after HTX were found by comparing cold static preservation and normothermic machine perfusion.

Conclusions: We could detect a core signature for biopsies with pathologically secured rejection consisting of increased concentrations of the chemokines CXCL9/MIG, CXCL3/ MIP-1α, CXCL4/MIP-1β and CXCL10/IP-10. This signature is clearly distinguished from the pattern of the ischemia/reperfusion response (i.e. elevated levels of IL-6, CXCL8, IL-10) suggesting differences in the underlying inflammatory mechanisms. Importantly, since there was no correlation between the measured protein concentrations in plasma and tissue lysates, biopsies remain indispensable for the diagnosis of heart rejection.

CITATION INFORMATION: Radomsky L., Scheibner Y., Kuehne J., Keil J., Beushausen K., Ludmilla K., Schick A., Ius F., Warnecke G., Bara C., Falk C. Core Signature of Rejection-Specific Cytokines and Chemokines in Heart Biopsies After Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.M. Radomsky: None. **Y. Scheibner:** None. **J.F. Kuehne:** None. **J. Keil:** None. **K. Beushausen:** None. **K. Ludmilla:** None. **A. Schick:** None. **F. Ius:** None. **G. Warnecke:** None. **C. Bara:** None. **C.S. Falk:** None.

Abstract# 670

Analysis of Single Cell RNA Sequencing Data to Define Biomarkers of Human Liver Immune Tolerance

B. Rocque[1], A. Barbetta[1], P. Singh[1], C. Goldbeck[1], D. G. Helou[2], E. Loh[3], N. Ung[4], J. S. Lee[4], O. Akbari[2], J. Emamaullee[1], *[1]Surgery, University of Southern California Keck School of Medicine, Los Angeles, CA, [2]Molecular Microbiology and Immunology, University of Southern California, Los Angeles, CA, [3]Norris Medical Library, University of Southern California Keck School of Medicine, Los Angeles, CA, [4]Ellison Institute, University of Southern California, Los Angeles, CA*

Purpose: The liver is unique in its ability to maintain immune homeostasis and promote operational tolerance following solid organ transplantation. Single-cell RNA sequencing (scRNA seq) is a powerful approach to generate highly dimensional transcriptome data to understand cellular phenotypes. However, when scRNA data is produced by different groups, with different data models, different standards, and samples processed in different ways, it can be extremely challenging to draw meaningful conclusions from the aggregated data. The goal of this study was to establish a method to combine 'human liver' scRNA seq datasets by 1. characterizing the heterogeneity between studies and 2. using the meta-dataset to define the immunotolerant phenotypes across immune cell subpopulations in healthy human liver.

Methods: Publicly available scRNA seq data generated from liver samples obtained from a combined total of 17 patients were analyzed. Liver-specific immune cells (CD45+) were extracted from each dataset, and immune cell subpopulations (myeloid cells, NK and T cells, plasma cells, and B cells) were examined using dimensionality reduction (UMAP), differential gene expression, and ingenuity pathway analysis.

Results: All datasets co-clustered, but cell proportions differed across studies. Gene expression correlation demonstrated similarity across all studies, and canonical pathways that differed between datasets were related to cell stress and oxidative phosphorylation rather than immune-related function. Detailed analysis of differential gene expression identified concordant gene signatures for each hepatic immune

subpopulation (Fig 1). Expression levels across all immune cellular functions including immune response, activation, phagocytosis and adhesion were globally low indicating a tolerogenic state.

Conclusions: This method for meta-analysis of scRNA sequencing datasets provides a novel approach to define the features of immune homeostasis in human liver. Pathways and cellular phenotypes involved in liver immune cell tolerance provide a critical reference point as clinical tolerance strategies are explored in liver transplant recipients.

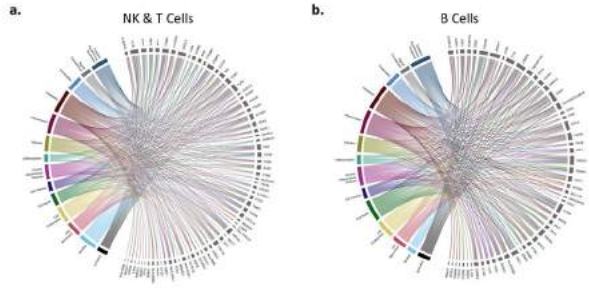

Figure 1. Chord diagrams demonstrating the overlap between differentially expressed genes for each cellular function across NK and T (A) and B-cell (B) phenotypes in healthy human liver.

CITATION INFORMATION: Rocque B., Barbetta A., Singh P., Goldbeck C., Helou D., Loh E., Ung N., Lee J., Akbari O., Emamaullee J. Analysis of Single Cell RNA Sequencing Data to Define Biomarkers of Human Liver Immune Tolerance *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Rocque: None. **A. Barbetta:** None. **P. Singh:** None. **C. Goldbeck:** None. **D.G. Helou:** None. **E. Loh:** None. **N. Ung:** None. **J.S. Lee:** None. **O. Akbari:** None. **J. Emamaullee:** None.

Abstract# 671

Kidney Injury in Hematopoietic Cell Transplant (HCT) Recipients: Urinary Biomarkers to the Rescue

T. Salinas[1], C. Snopkowski[1], C. Li[1], K. Chen[1], M. Lubetzky[1], S. Salvatore[1], K. Van Besien[1], E. Jaimes[2], S. Hingorani[3], S. Seshan[1], T. Muthukumar[1], *[1]NY Presbyterian- Weill Cornell Medical College, New York, NY, [2]Memorial Sloan Kettering Cancer Center, New York, NY, [3]University of Washington School of Medicine, Seattle, WA*

Purpose: Kidney injury is common in HCT recipients and can be the result of graft versus host/kidney disease. However, this has not been well characterized, mainly due to limitations in performing kidney biopsies in these patients. Alloimmune injury in solid organ transplants is a host versus graft disease whereas in HCT is a graft versus host disease. Urinary cell mRNA has been validated as a noninvasive biomarker for the diagnosis of acute rejection in kidney transplant recipients. In an analogous fashion, urinary biomarkers may help in the noninvasive diagnosis of native kidney injury in HCT recipients.

Methods: We obtained urine samples from 9 HCT recipients: 3 with acute kidney injury (AKI) and native kidney biopsy showing tubulitis and interstitial inflammation (Figure 1), 2 with AKI that resolved spontaneously, and 4 with normal kidney function. We also obtained urine samples from 40 kidney allograft recipients: (i) 20 with biopsy diagnosis of acute cellular rejection (ACR) and (ii) 20 with stable graft function and normal/no rejection biopsies. We isolated total RNA from urinary cells, reverse transcribed to cDNA, and measured the absolute quantity of mRNA level of CXCL10 (chemokine) and CD3e (T cell marker), and 18S rRNA by qRT-PCR assay. We calculated the CTOT-04 urinary cell mRNA signature score for each recipient (Suthanthiran et al, N Engl J Med 2013).

Results: Of the 3 HCT recipients with AKI who had a kidney biopsy, 2 had significant inflammation that stained positive for CD3 and/or Granzyme B in the interstitium and tubules (Figure 1). The urinary cell CTOT-04 signature score was higher in HCT recipients with AKI/tubulitis and interstitial inflammation in the native kidney and resembled ACR of kidney allograft recipients (Figure 2).

Conclusions: We herein confirm our hypothesis and demonstrate the feasibility and utility of urinary cell molecular profiling as a noninvasive tool for the diagnosis of kidney injury in recipients of HCT.

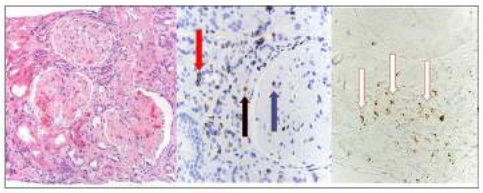

Figure 1. Kidney biopsy of a HCT recipient with systemic graft versus host disease and acute kidney injury showing inflammation and tubulitis (left panel). The inflammatory infiltrate was predominantly comprised of CD3+ T cells (middle panel) causing tubulitis (red arrow), interstitial inflammation (black arrow), and glomerulitis (blue arrow). Granzyme B+ cytotoxic T cells were abundant (right panel, white arrows). Alloimmune injury in solid organ transplants is a host versus graft disease whereas in HCT is a graft versus host disease. Histology of this native kidney biopsy in an HCT recipient resembles acute rejection in kidney transplant recipients, providing a strong rationale for testing the hypothesis that urinary biomarkers may similarly help in the noninvasive differential diagnosis of native kidney injury in HCT recipients.

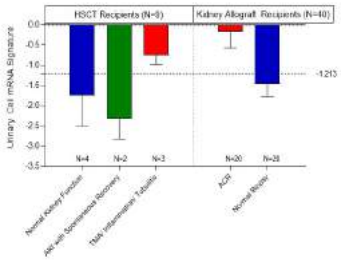

Figure 2. Urinary cell mRNA signature score (mean±SE) in HCT recipients and kidney transplant recipients. CTOT-04 urinary cell mRNA signature score (Suthanthiran et al., N Engl J Med 2013) was calculated by measuring the absolute quantity of mRNA level of CXCL10 (chemokine) and CD3e (T cell marker), and 18S rRNA by qRT-PCR assay. Urine samples were obtained from HCT recipients (N=9) and kidney transplant recipients (N=40). The dotted line represents the cut point value (-1.213) for the diagnosis of ACR in kidney transplant recipients.

CITATION INFORMATION: Salinas T., Snopkowski C., Li C., Chen K., Lubetzky M., Salvatore S., Van Besien K., Jaimes E., Hingorani S., Seshan S., Muthukumar T. Kidney Injury in Hematopoietic Cell Transplant (HCT) Recipients: Urinary Biomarkers to the Rescue *AJT, Volume 21 Supplement 3*

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Abstract# 672

Nonadherence Post-kidney Transplant is Associated with Increased Immune Activation Detected by Peripheral Blood Gene Expression Assay

N. Singh[1], A. Palermini[1], M. S. Naseer[1], T. Le[1], S. Tandukar[1], D. Aultman[2], H. Shokouh-Amiri[2], G. Zibari[2], *[1]Transplant, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [2]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA*

Purpose: Nonadherence to immunosuppression medications is common post-transplantation. We hypothesize that nonadherence results in a heightened alloimmune response in kidney transplant recipients (KTRs) which in turn may lead to adverse graft outcomes post-transplant. AlloMap (CareDx®) is a non-invasive peripheral blood gene expression assay associated with genes involved in immune response. Our center has been using cell-free DNA (Allosure; CareDx®) and gene expression assay (AlloMap; CareDx®) for immune monitoring in KTRs enrolled in OKRA registry since Nov 2019.

Methods: We assessed the stable KTRs in the outpatient transplant clinic for self-reported adherence using the Morisky Medication Adherence Scale (MMAS-8), a structured eight-question survey from Sep 15 to Nov 15, 2020. The baseline demographics, number of medications, eGFR, BK viremia, medication side effects, graft rejection, cell-free DNA (Allosure; CareDx®), and gene expression assay (AlloMap; CareDx®) were compared between the non-adherent and adherent patients.

Results: There were no statistically significant differences in baseline demographics (age, gender, and race), BK viremia, time post-transplant, medication side effects, and eGFR at 1-year post-transplant in adherent and non-adherent patients. The non-adherent patients, as compared with adherent patients, were on a lower number of medications (9.26 ± 2.70 vs 11.39 ± 3.79, p = 0.02), had more graft rejection (17.39% vs 15.25%, p = 0.01), and depicted higher AlloMap values on immunosurveillance post-transplant (10.85 ± 2.03 vs 8.05 ± 3.49, p = 0.01) [Table 1].

Table 1: Results			
	Non-adherent (MMAS-8 score ≤6), [n=23]	Adherent (MMAS-8 score ≥7), [n=59]	P-Value
MMAS-8 Score, mean ± SD	5.43 ± 0.79	7.51 ± 0.50	<0.01
Time Post-Transplant (Years), mean ± SD	4.01 ± 4.75	4.12 ± 7.34	0.95
Number of Medications, mean ± SD	9.26 ± 2.70	11.39 ± 3.79	0.02
eGFR (ml/min/1.73m2) at 1-Year Post-Transplant, mean ± SD	53.63 ± 14.25	61.12 ± 21.35	0.19
Graft Rejection, % [n]	17.39 [4]	15.25 [9]	0.01
AlloSure, mean ± SD	0.87 ± 1.18	0.46 ± 0.87	0.07
AlloMap, mean ± SD	10.85 ± 2.03	8.05 ± 3.49	0.01

Conclusions: Nonadherence as measured by MMAS-8 is associated with increased immune activation and a higher risk of graft rejection in KTRs.

CITATION INFORMATION: Singh N., Palermini A., Naseer M., Le T., Tandukar S., Aultman D., Shokouh-Amiri H., Zibari G. Nonadherence Post-kidney Transplant is Associated with Increased Immune Activation Detected by Peripheral Blood Gene Expression Assay *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Singh: Grant/Research Support; Name of Commercial Interest; CareDx, Transplant Genomics. Grant/Research Support; Nature of Relationship; PI on studies. Honoraria; Name of Commercial Interest; CareDx, Transplant Genomics, Viracor, Mallincrokdt, Veloxis. Honoraria; Nature of Relationship; Speaker Bureau. **A. Palermini:** None. **M.S. Naseer:** None. **T. Le:** None. **S. Tandukar:** None. **D. Aultman:** None. **H. Shokouh-Amiri:** None. **G. Zibari:** None.

Abstract# 673

Trugraf Gene Expression Testing Can Discriminate Rejection in the Setting of Acute Kidney Injury

N. Singh[1], M. S. Naseer[1], D. Aultman[2], H. Shokouh-Amiri[2], G. Zibari[2], *[1]Nephrology, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA, [2]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Medical Center, Shreveport, LA*

Purpose: The TruGraf kidney blood gene expression test is a well-validated non-invasive biomarker to detect immune quiescence thus ruling out silent subclinical rejection in stable kidney transplant recipients, eliminating the need for a surveillance biopsy. The TruGraf test is a microarray-based assay that analyzes the peripheral blood gene expression profile (GEP) and provides a binary result of either TX (Transplant eXcellence) or not-TX (not Transplant eXcellence). A TruGraf TX result correlates with a high degree of confidence (NPV 89%) to a surveillance biopsy result showing no evidence of rejection. Given this intended context of use, TruGraf validation was performed exclusively in cohorts of patients that have a stable renal function defined as SCr <2.3 or <20% increase as compared to the average of previous 3 SCr results. The intent of this study was to evaluate performance in the setting of unstable kidney function (AKI) and for-cause biopsies.

Methods: This is a retrospective evaluation of serial TruGraf gene expression testing done on 10 patients with evidence of AKI (SCr >2.3 or >20% increase over the average of previous 3 SCr values). From Dec 2019 to Jun 2020, a total of 23 tests were drawn on these patients as an adjunct to clinical and laboratory assessment.

Results: Of the 23 TruGraf tests done, 13 (56%) were a TX result while 10 (43%) were a not-TX result. There was a total of 11 biopsies done on 9 patients with the majority of biopsies (n=9) being done within 2 weeks of the TruGraf test date. One patient with a TX result did not have a biopsy done during this observation period. The GEP result of TX or Not-TX correlated with biopsy results in 10 of the 11 samples. Of these 10 biopsy results, a TX result was consistent with no rejection on biopsy (n=4). The Not-TX result (n=6) correlated with positive biopsies with histology for borderline rejection (n=1), mixed TCRM/AMR (n=2), AMR (n=2), and TCMR (n=1). In the single sample with a false negative TX result, the patient's biopsy was positive for AMR with C4d2, PTC-. The performance metrics in this patient population were: sensitivity 85.71%, specificity 100%, and accuracy 90.91%.

Conclusions: As expected, the TruGraf GEP analysis is consistent along the continuum of rejection and is inclusive of both subclinical and clinical acute rejection. While limited by a small sample size, the TruGraf test has a high degree of accuracy in the setting of AKI and appears to have stronger performance as compared to the context of stable kidney function.

CITATION INFORMATION: Singh N., Naseer M., Aultman D., Shokouh-Amiri H., Zibari G. Trugraf Gene Expression Testing Can Discriminate Rejection in the Setting of Acute Kidney Injury *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Singh: Grant/Research Support; Name of Commercial Interest; CareDx, Transplant Genomics. Grant/Research Support; Nature of Relationship; PI on studies. Honoraria; Name of Commercial Interest; CareDx, Transplant Genomics, Viracor, Mallincrokdt, Veloxis. Honoraria; Nature of Relationship; Speaker Bureau. **M.S. Naseer:** None. **D. Aultman:** None. **H. Shokouh-Amiri:** None. **G. Zibari:** None.

Abstract# 675

Analysis of the Difference of the Monitoring Results of Tcr High Variable Area in Renal Transplant Recipients After Treatment with Different Immune Induction Schemes

P. Tian, F. Han, M. Dou, B. Zheng, G. Deng, X. Ding, W. Xue, *The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China*

Purpose: To observe and summarize the effect of different induction schemes on the highly variable region of T-lymphocyte receptor (TCR) in living relative renal transplant recipients.

Methods: According to the early use of immune-induced antibody, 12 living relative kidney transplant recipients were divided into three groups: baliximab group (BLX group, 4 cases), Rabbit anti human thymus immunoglobulin group (rATG group, 4 cases) and methylprednisolone group (MP group, 4 cases). The immune group library was established to analyze the three days before operation (before administration) and one week, two weeks and one month after operation Blood TCR-CDR3 Clone Diversity, clone frequency, clone change mode and other differences, and through the correlation with the expression of immune related markers, analyze the differences of results in each group and the possible clinical significance.

Results: There were no acute rejection and 2 cases of mild infection in rATG group. The clonal diversity, clonal frequency, clonal change mode and some immune markers of TCR-CDR3 were changed in all groups and groups, especially in rATG group.

Conclusions: The expression profile of TCR-CDR3 in the peripheral blood of recipients showed different expression characteristics after the application of different immune induction schemes, which was related to the change of immune status to a certain extent. It may become a detection method with predictive value for infection or rejection in living relative kidney transplant recipients.

CITATION INFORMATION: Tian P., Han F., Dou M., Zheng B., Deng G., Ding X., Xue W. Analysis of the Difference of the Monitoring Results of Tcr High Variable Area in Renal Transplant Recipients After Treatment with Different Immune Induction Schemes *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Tian: None. **F. Han:** None. **M. Dou:** None. **B. Zheng:** None. **G. Deng:** None. **X. Ding:** None. **W. Xue:** None.

Abstract# 676

Donor Derived Cell-free-dna (dd-cfdna) as a Surrogate Marker for Kidney Biopsy- Indiana University Transplant Nephrology Experience

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Purpose: Patient monitoring after kidney transplantation (KT) for early detection of allograft rejection remains key in preventing allograft loss. Donor-derived cell-free DNA (dd-cfDNA), a noninvasive surrogate for kidney biopsy is now widely used in several kidney transplant in USA in view of the reported ease of early diagnosis of acute rejection as well as avoidance of potential complications associated with kidney biopsy. More importantly, many transplant practitioners now use dd-cfDNA as a noninvasive monitor of immunological status of kidney allografts. Since January 2019, Indiana University transplant program has adopted the use of dd-cfDNA as part of diagnostic tool to evaluate kidney rejection and hereby report our experience.

Methods: Study was a retrospective chart review of patients who received a kidney biopsy and dd-cfDNA as part of diagnostic work up for suspect acute rejection. Adult patients (>18 y/o) who underwent dd-cfDNA and Allogaft biopsy within a time a frame of 2 weeks or less between tests were included. Acute rejection was determined either by pathology has confirmed in report of kidney biopsy or by report of >1 % dd-cfDNA screen. Results were analyzed to correlate the findings on the kidney biopsy with the reports on dd-cfDNA screen.

Results: 29 Patients with suspected rejection who underwent both donor-derived cell-free DNA (dd-cfDNA) met the inclusion criteria. 23 out of 29 patients underwent dd-cfDNA and Allograft biopsy within a time frame of 1 week. Results of our findings are presented in Table 1.

Overall, findings on kidney biopsy and dd-cfDNA report correlated in only 7 out of 29 patients (24%) included in the study. The limitation to our study includes the small sample size and the use of single point dd-cfDNA in acute rejection diagnosis.

Conclusions: Our findings suggest negative dd-cfDNA alone should not be considered to have "rule out" rejection when pre-test probability for rejection is high especially in cases where the pretest probability for rejection is very high. Likewise, serial screen of dd-cfDNA at specific intervals may be a of a better tool either for acute rejection diagnosis or monitoring tool compared to single point screens.

Table 1: Correlation between Kidney Transplant Biopsy and dd-cfDNA report

Groups	Biopsy Rejection	dd-cfDNA Rejection	Number of Patients	Acute Cellular Rejection	Acute Antibody Mediated Rejection
Group 1	Yes	Yes	6	Yes (6 Patients)	Yes (1 patient)
Group 2	Yes	No	17	Yes (17 Patients)	Yes (1 Patient)
Group 3	No	Yes	5	NA	NA
Group 4	No	No	1	NA	NA

CITATION INFORMATION: Valavoor S., Sharfuddin A., William G., Yaqub M., Mishler D., Adebiyi O. Donor Derived Cell-free-dna (dd-cfdna) as a Surrogate Marker for Kidney Biopsy- Indiana University Transplant Nephrology Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Valavoor: None. **A. Sharfuddin:** None. **G. William:** None. **M. Yaqub:** None. **D. Mishler:** None. **O. Adebiyi:** None.

Abstract# 677

Evaluation of Serum Klotho Levels at Early Kidney Post-Transplant

T. Vazquez-Sanchez[1], J. Alonso-Titos[1], M. Sánchez-Niño[2], E. Sola[1], M. Leon[3], V. Lopez[1], P. Ruiz-Esteban[1], E. Porrini[4], A. Ortiz[5], D. Hernández[1], *[1]Nephrology, Instituto de Investigación Biomédica de Málaga (IBIMA). Hospital Universitario Regional de Málaga and University of Málaga. REDinREN (RD16/0009/0006). Málaga. (Spain), Malaga, Spain, [2]Nephrology, Instituto de InvestigaciónSanitaria de la FundaciónJiménez Díaz,UniversidadAutónoma de Madrid. REDINREN, Madrid, Spain, [3]Pathology, Instituto de Investigación Biomédica de Málaga (IBIMA). Hospital Universitario Regional de Málaga and University of Málaga. REDinREN (RD16/0009/0006). Málaga. (Spain), Malaga, Spain, [4]Nephrology, Hospital Universitario de Canarias, CIBICAN, Universidadde laLaguna, REDinREN (RD16/0009/0031) Tenerife e Instituto Reina Sofía de Investigación Renal (IRSIN), Malaga, Spain, [5]Nephrology, Instituto de InvestigaciónSanitaria de la FundaciónJiménez Díaz,UniversidadAutónoma de Madrid. REDINREN, Malaga, Spain*

Purpose: Klotho expression is lowered in patients with chronic kidney disease (CKD). After kidney transplant (KT), serum Klotho levels could be significantly increased compared to the level recorded in uremic patients. However, some factors related to KT might reduce serum Klotho levels leading to an early ageing of the organ.The aim of our study was to evaluate serum Klotho levels in early kidney post-trasplantation patients and its relationship to delayed graft function (DGF) and the histologic data at third month post-KT.

Methods: We determined Klotho levels in 15 KT patients at baseline and third month after KT and we performed a protocol biopsy (PB) at third month post-transplant. For the determination of soluble Klotho, peripheral blood was extracted pre-TX and 3 months after KT and serum levels were analyzed by ELISA, using soluble human α-Klotho. PB were assessed following the Banff 2017 Classification and inflammation was defined as the sum of interstitial inflammation (i), tubulitis (t), glomerulitis (g) and arteritis (v) scores.

Results: The recipients were 55.2±14.7 years old on average; 46.7% were men; 93.3% received induction therapy; cold ischemia time was 13.9±2.9 hours and 46.7% had DGF. All the patients were on standard therapy with Tacrolimus, MMF and Prednisone.Soluble Klotho levels decreased significantly from pre-KT to third month post-KT (575.7±263.0 vs 429.1±171.5 pg/ml; p=0,001). 7 patients developed DGF and Klotho levels were considerably lower to those with DGF (575.6±291.5 vs 438.8±189 pg/ml; p=0,06). Soluble Klotho levels at third month after-KT showed a non-significant decrease in patients who had inflammatory graft lesions (i+t+g+v>0) compared to those who did not have inflammatory data (i+t+g+v=0) in PB (355.3±114.7 vs 518±206.2 pg/ml; p=0.078).

Conclusions: Klotho levels decrease significantly at third month post-KT. DGF and subclinical inflammation could contribute to a lower production of klotho by the graft. This could accelerate the senescence of KT in the future term. Long-term follow-up longitudinal studies will clarify these hypotheses

CITATION INFORMATION: Vazquez-Sanchez T., Alonso-Titos J., Sánchez-Niño M., Sola E., Leon M., Lopez V., Ruiz-Esteban P., Porrini E., Ortiz A., Hernández D. Evaluation of Serum Klotho Levels at Early Kidney Post-Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Vazquez-Sanchez: None. **J. Alonso-Titos:** None. **M. Sánchez-Niño:** None. **E. Sola:** None. **M. Leon:** None. **V. Lopez:** None. **P. Ruiz-Esteban:** None. **E. Porrini:** None. **A. Ortiz:** None. **D. Hernández:** None.

Abstract# 678

Is Subclinical Allograft Rejection by 2019 Banff Criteria Associated with Worse Kidney Allograft Outcomes? Comparison Between 2007 and 2019 Banff Criteria

M. T. Victor[1], S. Park[2], K. Guo[1], L. Zhao[1], J. Friedewald[3], *[1]Feinberg School of Medicine, Northwestern University, Chicago, IL, [2]Transplant Nephrology, Northwestern Univeristy, Chicago, IL, [3]Transplant Nephrology, Northwestern University, Chicago, IL*

Purpose: We hypothesize that Subclinical Acute Rejection (SubAR) under the new Banff 2019 criteria will be more strongly associated with a 2-year composite endpoint (2Y-CCE) than previous criteria.

Methods: SubAR and 2Y-CCE were assessed in a previously studied patient cohort. SubAR was defined as histology on a surveillance biopsy consistent with acute rejection (≥Banff borderline changes and/or antibody-mediated rejection). Transplant excellent (TX) was defined as negative histology for acute rejection. 2Y-CCE was defined as any of the following: evidence of ≥ Banff grade II IFTA at 2-year biopsy, biopsy-proven rejection on "for-cause biopsy," or a decrease in eGFR by >10 m/min/1.73m^2. For logistic regression analysis, subjects were divided into three groups (because subjects had more than one biopsy in the trial) based on biopsy sample classification under 2019 and 2007 criteria: 1) subAR-only, 2) TX-only, 3) subAR and TX (mixed).

Results: 253 unique subjects with 551 biopsy samples were assessed. Of these, 192 subjects with 444 samples had 2Y-CCE results and were eligible for analysis, 1) subAR only (2019 Banff: n=13; 2007 Banff: n=21), 2) TX only (n=141; n=106), 3) mixed (episodes of both subAR and TX) (n=38; n=65) (Figure 1). A total of 82 subjects reached 2Y-CCE under either set of criteria (n=82). 65 borderline samples were reclassified to TX by the 2019 Banff criteria (Table1). The subAR-only group was found to have a significantly higher odds ratio (OR) for developing 2Y-CCE than the TX-only group under both 2007 (OR = 19.27 (95% CI [4.25, 87.42], p =0.001)) and 2019 (OR = 19.33 (CI [2.44, 152.92], p =0.01) Banff criteria. The SubAR only group by 2019 Banff criteria had a slightly stronger association with 2Y-CCE than by 2007 criteria. There was no significant association with developing 2Y-CCE between the TX-only group and the mixed group under 2007 and 2019 Banff criteria.

Conclusions: The subAR only group classified by 2019 Banff criteria, which brought an increase in the diagnostic threshold for borderline changes, showed slightly stronger association with developing 2Y-CCE than by 2007 Banff criteria. The subAR group classified with either criteria are significantly associated with 2Y-CCE compared to the Tx only group. Further investigation is warranted with a larger cohort and longer follow-up to evaluate the impact of the prognostic ability of the new 2019 Banff criteria.

Figure 1) Distribution of patients amongst groups based on biopsy results, for both 2007 and 2019 Banff criteria.

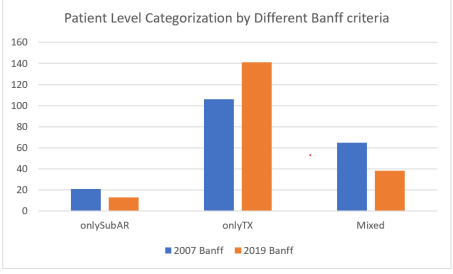


Table 1) Sample level distribution between Banff 2007 and 2019 criteria

	Banff 2007 (n=136)	Banff 2019 (n=71)
Borderline	99 (72.8%)	34 (47.9%)
≥ 1A	7(1A=6, 1B=1) (5.1%)	11 (1A=9, 1B=2) (15.5%)
AMR	30 (22.1%)	26 (36.6%)

CITATION INFORMATION: Victor M., Park S., Guo K., Zhao L., Friedewald J. Is Subclinical Allograft Rejection by 2019 Banff Criteria Associated with Worse Kidney Allograft Outcomes? Comparison Between 2007 and 2019 Banff Criteria *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.T. Victor: None. **S. Park:** None. **K. Guo:** None. **L. Zhao:** None. **J. Friedewald:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant.

BASIC

Abstract# 679

Long-term Outcomes of Early Steroid Withdrawal (SW) After Kidney Transplant

D. Vock[1], A. Matas[2], [1]*University of Minnesota School of Public Health, Minneapolis, MN,* [2]*University of Minnesota Medical School, Minneapolis, MN*

Purpose: Early SW (<7 days posttransplant) has been associated with minimization of steroid-related side effects and improved cardiovascular risk profile. Yet, in the U.S., only ~30% new kidney tx recipients are treated with early SW due to concern about increased acute rejection rates and long-term outcomes.

Methods: To assess long-term outcomes, 1123 kidney recipients (762 LD; 361 DD) undergoing early SW between 1999 and 2009 at a single center were matched (see Table) using sparse, optimal matching with refined covariate balance constraints - using SRTR data - to recipients at large volume centers receiving maintenance prednisone at hospital discharge (5:1 matching ratio). Graft (GS) and patient (PS) survival were estimated by donor type and steroid group using Kaplan-Meier (KM) estimators, and compared between groups using log-rank tests. Due to small residual imbalances among covariates after matching, we estimated the hazard ratio (HR) of maintenance prednisone vs SW using proportional hazards models adjusting for common recipient, donor, and surgical characteristics.

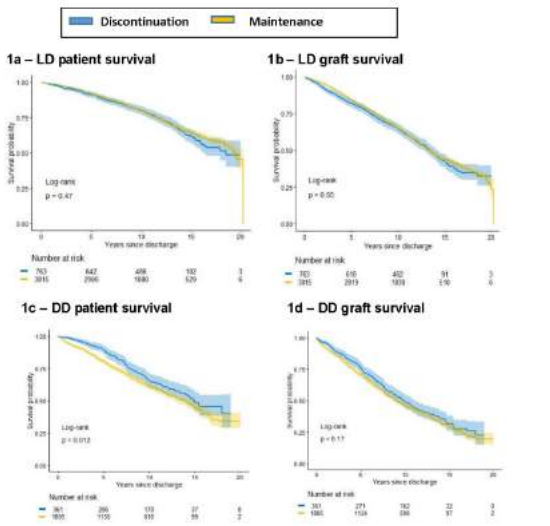
Results: Median (IQR) followup was 10.3 (5.4 - 13.4) and 7.6 (3.8 - 11.6) years for LD and DD, respectively. By KM, compared to maintenance prednisone, DD receiving SW had significantly better PS throughout 20-yr f/u (adjusted HR, 1.46; 95% CI, 1.18-1.80) (Figure). There was no difference in DD GS, or in LD PS or GS; and no evidence of increased long-term (>10 years) graft failure associated with early SW.

Conclusions: We conclude that early SW has similar or better long-term outcomes than maintenance prednisone.

Table – Groups were matched on:

Recipient	
Age	Race
Gender	Transplant #
Primary disease	Preemptive
Diabetes	BMI
PRA	Cold ischemia time
HLA mm	Transplant year
Donor	
Age	Race
Gender	Hypertension
Creatinine	Cause of death
Donation after circulatory death	
Immunosuppression	
Induction	Maintenance

Figure – Patient and graft survival: Maintenance prednisone vs discontinuation



CITATION INFORMATION: Vock D., Matas A. Long-term Outcomes of Early Steroid Withdrawal (SW) After Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Vock: None. **A. Matas:** Consulting Fee; Name of Commercial Interest; CSL Behring, CareDX, Veloxis, Jazz Pharma. Consulting Fee; Nature of Relationship; Advisory Board, Advisory Board, Consultant, Advisory Board.

Abstract# 680

Identification and Validation of a Prognostic Index for Renal Allograft Survival Based on the Geo Database

X. Zhang, Z. Wang, Z. Han, J. Tao, X. Ju, R. Tan, M. Gu, *The First Affiliated Hospital of Nanjing Medical University, Nanjing, China*

Purpose: Chronic allograft injury (CAI) following kidney transplantation is still a threat to the allograft long-term survival. This study was designed to explore and analyze the data extracted from GEO (Gene Expression Omnibus) database and sort out the identification of allograft prognosis of kidney tranplanted patients by transcriptome.

Methods: Three high quality arrays from GEO database, GSE25902 (n =24), GSE57387 (n =86) and GSE21374 (n =282), were obtained, which contained the whole transcriptome sequencing information of allograft biopsies within one year. Differential expressed genes (DEGs) were selected in common from GSE25902 and GSE57387 arrays. Then, the univariate and multivariate Cox regression model identified the independent graft-prognostic genes and a graft-prognostic index (PI). The diagnostic efficacy of this PI was validated by GSE21374 array. Finally, gene set enrichment analysis (GSEA) and Cibersort analysis were performed to screen key enriched pathways and biological process.

Results: A total of 41 DEGs were identified and four DEGs, including ABI3BP, PALMD, TW4SF18, and WFDC, were selected as prognostic genes for allograft survival. A PI containing these four prognostic genes was established and good test power was validated in GSE21374 array. Moreover, the PI was found to be related with the occurrence of acute rejection, enriched in graft-associated and immune-associated biological processes or pathways, as well as in Wnt/beta-catenin pathway, which was confirmed by immunofluorescence in tissues from kidney transplanted recipients with CAI. In addition, The Cibersort analysis suggested macrophage polarization as a crucial mediator during CAI.

Conclusions: We analyzed transcriptome data from three GSE arrays and established a graft-prognostic index, which showed a good test power to predict the allograft survival following renal transplant. This PI was also suggested to be correlated with a variety of immune-related biological processes and signaling, especially the Wnt/beta-catenin pathway, and macrophage polarization may contribute to the pathogenesis of CAI.

CITATION INFORMATION: Zhang X., Wang Z., Han Z., Tao J., Ju X., Tan R., Gu M. Identification and Validation of a Prognostic Index for Renal Allograft Survival Based on the Geo Database *AJT, Volume 21 Supplement 3*

DISCLOSURES: X. Zhang: None. **Z. Wang:** None. **Z. Han:** None. **J. Tao:** None. **X. Ju:** None. **R. Tan:** None. **M. Gu:** None.

Abstract# 681

Nomogram of Quantity of Peripheral Cxcr5$^+$Cd8$^+$ T Cells, Aims to Predict Risk of De Novo Dsa in First-time Kidney Transplant Recipients

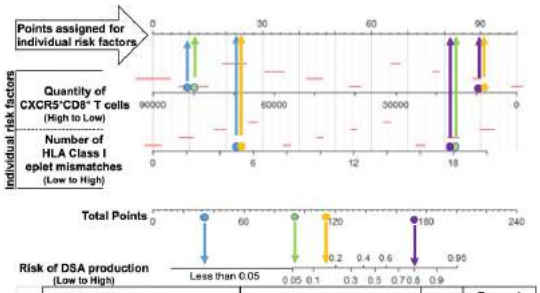
J. Zimmerer[1], M. Abdel-Rasoul[2], G. Bumgardner[1], [1]*OSU, Columbus, OH,* [2]*Center for Biostatistics, OSU, Columbus, OH*

Purpose: We recently reported that peripheral CXCR5$^+$CD8$^+$ T cells are inversely associated with the risk of developing *de novo* DSA (*dn*DSA) in the first year after kidney transplantation (Tx). Using data from our single center study we aimed to develop a pilot nomogram as a tool to determine risk of developing *dn*DSA.

Methods: We prospectively monitored 95 first-time KTx recipients (53.3±11.8 years old, 41% female, 21% African American, 32.6% deceased donor recipients) for development of *dn*DSA for 1 year posttransplant using single antigen beads (MFI >2000). All recipients received the same immunosuppression (IS) regimen [ATG induction therapy, 5-day steroid taper, and dual maintenance IS with a calcineurin inhibitor (CNi) and mTORi]. In addition to the detection of *dn*DSA, we prospectively and serially analyzed recipients for IS levels, HLA and eplet mismatch, and peripheral blood mononuclear cell (PBMC) subsets.

Results: Twenty-three recipients (24.2%) developed *dn*DSA within 1-year postTx. There was no difference in IS levels throughout the first-year postTx between DSA-positive and DSA-negative recipients. PreTx quantities of peripheral blood CXCR5$^+$CD8$^+$ T cells were inversely associated with the incidence of *dn*DSA (DSA+= 15,200±11,600 CXCR5$^+$CD8$^+$ T cells per million PBMCs vs. DSA-=26,300±17,600; p=0.04). PreTx quantity of CD4$^+$ T cell subsets (Th1, Th2, Treg) were not associated with the incidence of *de novo* DSA. Although we did not find a significant difference in HLA mismatch between the DSA+ vs. DSA- KTx recipients (6.8±2.1 vs. 6.0±2.1; p>0.05), when we compared the more precise Ab-verified HLA eplet mismatches we found that the number of HLA class I eplet mismatches significantly associated with development of *dn*DSA at one year postTx (DSA+= 12.4±4.4 mismatches vs. DSA-= 8.6±4.1; p=0.006). In **Figure 1**, we use theoretical patient profiles for quantity of CXCR5$^+$CD8$^+$ T cells and number of HLA I eplet mismatches to demonstrate how the independent risk factors (IRF) used to develop this nomogram would influence the estimated percent risk for postTx DSA. Theoretical preTx quantity of CXCR5$^+$CD8$^+$ T cells and number of HLA I eplet mismatches were used to assign IRF points and total (combined risk factor) points that predict percent risk of developing *dn*DSA after KTx. This exercise demonstrates how patients with the same HLA related risk (HLA I eplet mismatch) could have disparate risk of *dn*DSA based on their preTx quantity of CXCR5$^+$CD8$^+$ T cells.

Conclusions: Future prospective clinical studies are planned to assess and validate the accuracy of the nomogram.



	Quantity of CXCR5⁺CD8⁺ T cells per million PBMC		HLA Class I eplet mismatch		Total points	Percent Risk of DSA production
Pt 1	80,000 (10 points)	"high" CD8, low risk	5 (23 points)	"low" HLA, low risk	33	< 5%
Pt 2	10,000 (90 points)	"low" CD8, high risk	5 (23 points)	"low" HLA, low risk	113	15%
Pt 3	80,000 (10 points)	"high" CD8, low risk	18 (82 points)	"high" HLA, high risk	92	5%
Pt 4	10,000 (90 points)	"low" CD8, high risk	18 (82 points)	"high" HLA, high risk	172	80%

Fig. 2. "Pilot" Nomogram to Quantify Risk of de novo DSA Production after Kidney Transplant (KTx). In our single center study of 95 KTx recipients, results were used to create a pilot nomogram using the quantity of CXCR5⁺CD8⁺ T cells (pretransplant; per million PBMCs) and antibody-verified HLA class I (A,B,C) eplet mismatches (HLAMatchmaker). Width of red lines indicate the confidence intervals (CI) for individual risks factors at the assigned points. For a given patient, individual risk factor (IRF) points are assigned for quantity of CXCR5⁺CD8⁺ T cells and number of HLA class I eplet mismatches (see hypothetical results for patients (Pt 1 to Pt 4 and corresponding blue, yellow, green, purple arrows). The sum of IRF points (Total Points) is associated with a relative risk of DSA production after KTx. The nomograms AUC score is 0.80 (CI of 0.64 to 0.96).

CITATION INFORMATION: Zimmerer J., Abdel-Rasoul M., Bumgardner G. Nomogram of Quantity of Peripheral Cxcr5⁺Cd8⁺ T Cells, Aims to Predict Risk of De Novo Dsa in First-time Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Zimmerer: None. **M. Abdel-Rasoul:** None. **G. Bumgardner:** None.

Abstract# LB 29

Torque Teno Virus Load Predicts Allograft Rejection but Not Viral Infection After Kidney Transplantation; A Cohort Joint Modelling Study

A. L. van Rijn[1], H. F. Wunderink[2], I. A. Sidorov[1], C. S. de Brouwer[1], A. C. Kroes[1], H. Putter[3], A. P. de Vries[4], J. I. Rotmans[4], M. C. Feltkamp[1], *[1]Medical Microbiology, Leiden University Medical Center, Leiden, Netherlands, [2]Medical Microbiology, University Medical Center Utrecht, Utrecht, Netherlands, [3]Medical Statistics, Leiden University Medical Center, Leiden, Netherlands, [4]Internal Medicine, Leiden University Medical Center, Leiden, Netherlands*

Purpose: The main challenge of immunosuppressive therapy after solid organ transplantation is to find the optimal dose regimen, and prevent allograft rejection as well as opportunistic infection. Torque teno virus (TTV; ubiquitous and non-pathogenic) has been proposed as a marker of functional immunity in immunocompromised patients. We investigate whether TTV loads predict the risk of common viral infection and allograft rejection in kidney transplantation (KTx) recipients.
Methods: In a retrospective cohort of 389 KTx recipients, individual TTV loads in were measured by qPCR in consecutive plasma samples during one year follow-up. The endpoints were allograft rejection, BK polyomavirus (BKPyV) viremia and cytomegalovirus (CMV) viremia. Repeated measures and survival data were analysed in a joint model.
Results: During follow-up TTV was detected in 100% of KTx recipients. The median viral load increased to 10^7 genome copies/ml 3 months after KTx. Rejection, BKPyV viremia and CMV viremia occurred in 23%, 27% and 17% of the patients, respectively. With every 10-fold TTV load-increase, the risk of rejection decreased considerably (HR: 0.74, CI 95%: 0.71-0.76), while the risk of BKPyV and CMV viremia remained the same (HR: 1.03, CI 95%: 1.03-1.04 and HR: 1.01, CI 95%: 1.01-1.01).
Conclusions: In conclusion, TTV load kinetics predict allograft rejection in KTx recipients, but not the BKPyV and CMV infection. The potential use of TTV load levels as a guide for optimal immunosuppressive drug dosage to prevent allograft rejection deserves further validation.

CITATION INFORMATION: van Rijn A., Wunderink H., Sidorov I., de Brouwer C., Kroes A., Putter H., de Vries A., Rotmans J., Feltkamp M. Torque Teno Virus Load Predicts Allograft Rejection but Not Viral Infection After Kidney Transplantation; A Cohort Joint Modelling Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.L. van Rijn: None. **H.F. Wunderink:** None. **I.A. Sidorov:** None. **C.S. de Brouwer:** None. **A.C. Kroes:** None. **H. Putter:** None. **A.P. de Vries:** None. **J.I. Rotmans:** None. **M.C. Feltkamp:** None.

Abstract# LB 30

Cellular and Genetic Signatures of Operational Tolerance in Kidney Transplant Recipients Through Single Cell R N A Sequencing Analysis

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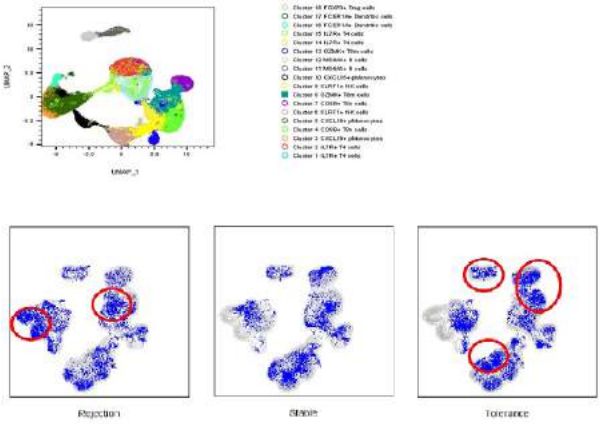
Purpose: Patients with operational tolerance do not use immunosuppressants after renal transplantation, but they show stable post-transplant results. We analyzed differently expressed mRNAs and proteins by targeting immune genes to single cells in patients with rejection, stable, and tolerance after kidney transplantation to see the relation of post-KT stability and genetic signatures.
Methods: This experiment was conducted with peripheral blood mononuclear cells (PBMC) of 7 post-KT rejection patients, 4 post-KT stable patients, and 5 post-KT tolerance patients. Through targeted multi-omic analysis, 16595 (rejection group), 7189 (stable group), and 16725 (tolerance group) single-cell transcriptomes were analyzed. We added 20 different types of ab-seq to the targeted panel to complement for the relationship between proteins and transcripts.
Results: We found 18 subclusters in the PBMC samples of three groups and confirmed the expression of mRNA and protein targeted by the immune panel among the subpopulations. We found the difference in the expression level of each group of NK cells, CD4 T cells, CD8 T cells, B cells, Treg cells, B memory cells and B naive cell populations. And significantly different mRNA expression was confirmed in the same cell population of different groups. In tolerance patients, CD56(Ab) was highly expressed in B cells, CD4 T cells, and Treg cells, and CD196(Ab) was highly expressed in B memory cells and B naive cells. CD8(Ab) was highly expressed in NK cells. Rejection group showed increased expression of HLA-DRA and CD74 in CD4 T cells, S100A10 in B memory cells, and CD38(Ab) in CD8 T cells. In stable patients, the expression of CD127(Ab) on CD8 T cells, PASK in CD4 T cells, and CD24, CCR7and CCL22 in B memory cells for each group.
Conclusions: Analysis of transcript expression at the single cell level characterizes the phenotype of cells and defines their functional properties. We found that the operational tolerance group expressed markers that differed from the rejection and stable group.



CITATION INFORMATION: BAE H., Lee H., Ryu J., Chung B., Oh E. Cellular and Genetic Signatures of Operational Tolerance in Kidney Transplant Recipients Through Single Cell R N A Sequencing Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Bae: None. **H. Lee:** None. **J. Ryu:** None. **B. Chung:** None. **E. Oh:** None.

Abstract# LB 31

Estimated GFR by Serum Myo-inositol, Valine, Creatinine, and Cystatin-c Outperforms Current CKD-epi Equations in Renal Transplant Recipients

J. W. Meeusen[1], F. Stammler[2], J. Lieske[3], M. Grassi[2], M. Shah[4], E. Schiffer[2], *[1]Cardiovascular Laboratory Medicine, Mayo Clinic, Rochester, MA, [2]Research and Development, Numares, Boston, MA, [3]Division of Nephrology and Hypertension, Mayo Clinic, Rochester, MN, [4]Clinical Research, Numares, Boston, MA*

Purpose: Current estimated GFR (eGFR) equations using creatinine and/or cystatin C do no perform well in kidney transplant (KTx) recipients. Therefore, some large transplant programs instead measure GFR as part of their routine pre and post-transplant protocols. However, these methods are expensive and not readily

available in many areas. Recently, we developed a novel GFR equation, which utilizes serum myo-inositol, valine and creatinine quantified by nuclear magnetic resonance spectroscopy (NMR) in combination with Cystatin-C measured by immunoturbidometric assay, age and sex (GFR_{NMR}). In the current study we evaluated performance of this equation in a cohort of KTx recipients.

Methods: GFR was measured (mGFR) by renal Iothalamate clearance in 109 post KTx patients that scheduled visits as part of routine clinical care (573 days; range 2-5217 days). mGFR was compared to $eGFR_{NMR}$, as well as the CKD EPI equations using creatinine ($eGFR_{Cr}$), Cystatin C ($eGFR_{CyC}$), or both ($eGFR_{Cr\ CyC}$).

Results: $CKD\text{-}EPI_{cys}$ was the least accurate with a P_{30} value of 0.73 and a MAE of 10.7 ml/min/1.73m². $CKD\text{-}EPI_{cr}$, was better with a P_{30} of 0.81 and a MAE of 9.53 ml/min/1.73m². The $CKD\text{-}EPI_{cr\text{-}cys}$, which has been established to lessen the effects of age, sex and race to improve GFR estimation, had a P_{30} value of 0.87 and a MAE of 9.41 ml/min/1.73m². Subgroup analysis of individuals with GFR < 60ml/min/1.73m² showed that this formula significantly underestimates renal reserve in renal transplant recipients. In contrast, GFR_{NMR} across the entire range of GFR showed good accuracy to measured GFR with a P_{30} of 0.92 and a MAE of 7.45 ml/min/1.73m². Further subgroup analysis of individuals with a GFR < 60 ml/min/1.73m² showed minimal bias with mGFR.

Conclusions: Our study demonstrates the potential utility of a novel $eGFR_{NMR}$ method for assessing kidney function in post KTx patients. This equation has improved performance compared to the established and widely utilize CKDEPI equations. Thus, $eGFR_{NMR}$ has great potential as a cost effective and non-invasive alternative to mGFR that could be widely available as a referral laboratory test. Further studies are necessary to validate this novel equation in additional post Tx and other CKD and non CKD cohort.

Comparison of GFR Equation Performance to mGFR				
	mean GFR (SD)	**MAE (95%CI)**	**P30 (95%CI)**	**RMSE (95%CI)**
mGFR	55.83 (20.28)	Ref	Ref	Ref
$eGFR_{NMR}$	55.74 (19.12)	7.45 [6.3-8.47]	91.74 [87.16-97.25]	9.42 [8.31 -10.58]
$eGFR_{cr}$	51.75 (19.83)	9.53 [8.11 -10.93]	80.73 (74.31-88.07)	12.23 (10.65-13.93)
$eGFR_{CyC}$	48.14 (20.98)	10.74 (9.26-12.26)	72.48 (64.22-80.73)	13.61 (12.01-15.39)
$eGFR_{CRCyC}$	48.99 (19.87)	9.41 (8.09-10.75)	87.16 (80.73-93.55)	11.78 (10.39-13.22)

CITATION INFORMATION: Meeusen J., Stammler F., Lieske J., Grassi M., Shah M., Schiffer E. Estimated GFR by Serum Myo-inositol, Valine, Creatinine, and Cystatin-c Outperforms Current CKD-epi Equations in Renal Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.W. Meeusen: None. **F. Stammler:** Salary; Name of Commercial Interest; numares. **J. Lieske:** None. **M. Grassi:** Salary; Name of Commercial Interest; numares. **M. Shah:** None. **E. Schiffer:** Salary; Name of Commercial Interest; numares.

Abstract# LB 32

AlloMap Kidney Gene Expression Profiling Discriminates Rejection from Immuno-Quiescence in Renal Transplant Recipients

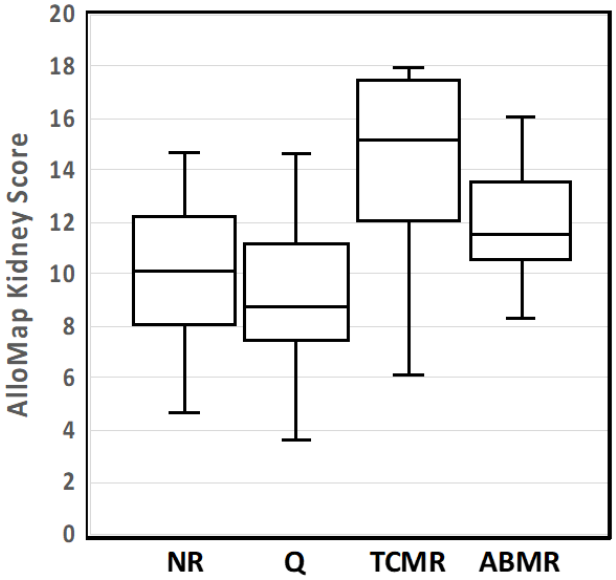
E. Akalin[1], A. Djamali[2], H. Xu[3], X. Jin[3], R. N. Woodward[3], S. Dholakia[3], J. S. Bromberg[4], *[1]Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY, [2]University of Wisconsin, Madison, WI, [3]CareDx, Brisbane, CA, [4]University of Maryland School of Medicine, Baltimore, MD*

Purpose: Assessment of immune activation is important when considering pathologies such as allograft rejection as well as potential interventions that may extend allograft survival. Optimizing interventions by assessing impact through quantifiable measures such as biomarker changes can drive the paradigm shift from reactive to proactive care. Here we describe validation of a blood gene expression profile (GEP) to inform on both T cell-mediated (TCMR) and antibody-mediated (ABMR) rejection.

Methods: A classifier using 5 informative genes was developed to discriminate quiescence from rejection using 21 samples from healthy, stable patients (HS, no clinical signs or symptoms) and 18 active rejection samples from the DART study (NCT02424227) patients. The "AlloMap Kidney" GEP signature was validated in an independent set of samples from the DART study using the targeted RNA sequencing. The validation samples comprised 45 non-rejection (NR, negative for-cause biopsy); 28 quiescent (Q, negative protocol biopsy); 27 HS; 7 T cell-mediated rejection (TCMR), 10 antibody-mediated rejection (ABMR), and 1 mixed rejection. In addition to AlloMap Kidney GEP, AlloSure dd-cfDNA was also performed.

Results: AlloMap Kidney scores (range 0-20) were significantly different between the control groups (Q, NR, HS) and rejection groups (ABMR, TCMR, Combined Rejections) (Figure). Median (IQR) results: Q=8.77 (7.52-11.11), NR=10.12 (8.15-12.17), HS=9.45 (8.26-11.55), ABMR = 11.50 (10.84-13.15), TCMR=15.14 (12.93-16.69). The scores of the combined rejection group were statistically significant from that of both the NR (p=0.003) and Q groups (p=0.001); and the ROC analysis demonstrated an AUC of 0.77 (95% CI 0.70-0.84) and 0.81 (95% CI 0.74-0.88), respectively. Sub-study assessment of the TCMR results showed that higher grade rejection samples have generally higher AlloMap scores.

Conclusions: Validation of AlloMap Kidney GEP provides a strong indication of the ability to distinguish graft rejection from immune quiescence. Quantification across a range of scores allows dynamic assessment compared to binary outputs and supports the applicability observed in heart transplantation. AlloMap Kidney has a strong association with TCMR and also identifies AMR. The performance suggests a complementary use with AlloSure for dd-cfDNA, combining immunological assessment with informative data on allograft injury.



CITATION INFORMATION: Akalin E., Djamali A., Xu H., Jin X., Woodward R., Dholakia S., Bromberg J. AlloMap Kidney Gene Expression Profiling Discriminates Rejection from Immuno-Quiescence in Renal Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Akalin: Consulting Fee; Name of Commercial Interest; CareDx. **A. Djamali:** Consulting Fee; Name of Commercial Interest; CareDx, CSL Behring. **H. Xu:** Salary; Name of Commercial Interest; CareDx (employee). **X. Jin:** Salary; Name of Commercial Interest; CareDx (employee). **R.N. Woodward:** Salary; Name of Commercial Interest; CareDx (employee). **S. Dholakia:** Salary; Name of Commercial Interest; CareDx (employee). **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx.

Abstract# LB 33

Precision Medicine in Renal Transplantation: T-cell Repertoire Sequencing to Define Donor-specific Clones for Post-transplant Monitoring

K. R. Sherwood[1], P. Wong[1], F. Fenninger[1], V. Wu[1], J. Beckrud[2], D. P. Cina[3], L. Allan[2], J. Lan[2], P. A. Keown[2], *[1]University of British Columbia, Vancouver, BC, Canada, [2]Vancouver General Hospital, Vancouver, BC, Canada, [3]Urologic Sciences, Vancouver General Hospital, Vancouver, BC, Canada*

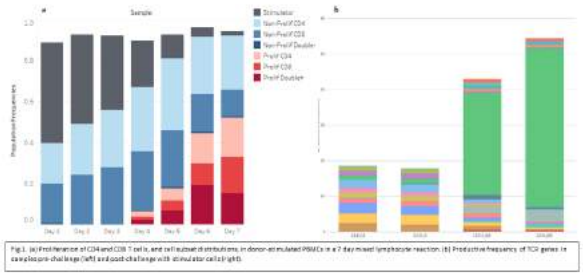
Purpose: Measuring donor-specific clonal responses offers a precise, sensitive and specific biomarker of immune recognition and activation. Combining deep immunophenotyping (DI) and T-cell receptor (TCR) sequencing, we have developed an in vitro platform to define the cellular proliferation response and the T cell clonal repertoire during stimulation by donor antigen as a prelude for clinical post-Tx monitoring.

Methods: A matrix design with repeated measures over time was employed using one-to-many and many-to-one stimulator/responder combinations in mixed lymphocyte culture (MLC). Donor and responder PBMC (stained respectively with Cell Trace CFSE and Violet) were cultured for 7 days in MLC. DI was performed daily with α-CD3, α-CD4, α-CD8, α-CD197, α-CD45RA, α-HLA-DR, α-CD127,

α-CD25 and α-CD152. For TCR sequencing genomic DNA was isolated, library preparation performed using ImmunoSeq, sequenced on an Illumina MiSeq System and analyzed on the ImmunoSEQ 3.0 portal.

Results: Expansion of T cell subsets are clearly observed from day 4 onwards (Fig.1a). In the proliferating T cells, a significant number were CD4 and CD8 positive (double+) and by day 7 most had become effector memory T cells (not shown). Sequence results of post-challenge samples reveals both an increase in relative diversity and maximum productive frequencies of CDR3 rearrangements. Expansion of few specific clones at high frequency post-challenge were frequently observed and were easily identified from a background of low frequency clones (Fig. 1b). Proliferation may also occur through a mechanism of polyclonal expansion (not shown). Repeated measures over time for control samples showed considerably more overlap than other pairwise comparisons. Clones that emerge in MLC response were also consistently detected at multiple time-points (not shown).

Conclusions: This robust in vitro assay provides deep insight into the proliferating T-cell populations and TCR gene utilization following allogeneic stimulation. Baseline and stimulated TCR gene utilization varies within individual over repeated measures indicating heterogeneous clonal proliferation, but high frequency clones are identified which provide the focus for monitoring of the allogeneic response in the transplant recipient.



CITATION INFORMATION: Sherwood K., Wong P., Fenninger F., Wu V., Beckrud J., Cina D., Allan L., Lan J., Keown P. Precision Medicine in Renal Transplantation: T-cell Repertoire Sequencing to Define Donor-specific Clones for Post-transplant Monitoring *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.R. Sherwood: None. **P. Wong:** None. **F. Fenninger:** None. **V. Wu:** None. **J. Beckrud:** None. **D.P. Cina:** None. **L. Allan:** None. **J. Lan:** None. **P.A. Keown:** None.

Basic

Tolerance: Clinical Studies

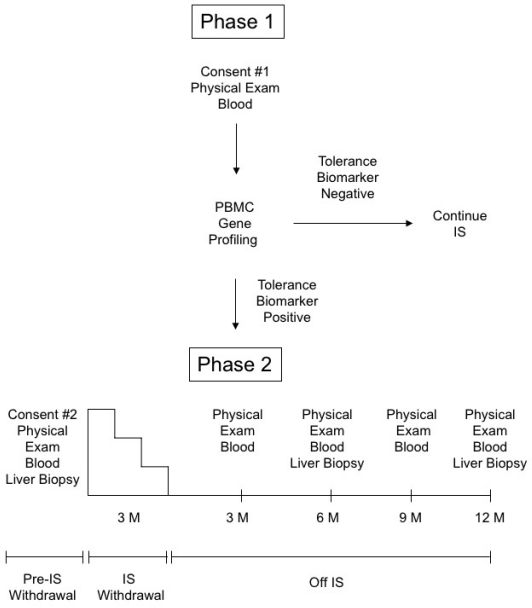
Abstract# 682

Results of Litmus (nct 02541916): The Liver Immune Tolerance Bio Marker Utilization Study

A. Chruscinski[1], V. Rojas-Luengas[1], A. Issacher[1], L. Lilly[1], E. Renner[1], M. Epstein[1], O. Adeyi[1], S. Fischer[1], Z. Galvin[1], S. Moshkelgosha[1], E. Jaeckel[2], S. Juvet[1], N. Selzner[1], G. Levy[1], *[1]Multi-Organ Transplantation, University Health Network, Toronto, ON, Canada, [2]Hannover Medical School, Hannover, Germany*

Purpose: Although it is known that some liver transplant recipients are operationally tolerant and can be weaned off immunosuppression (IS), there is not currently a validated biomarker platform to identify these patients. Here we investigated if a gene biomarker profile predictive of tolerance in preclinical studies could identify operationally tolerant recipients.

Methods: We developed GeXP RT-PCR assay to monitor expression of eight target genes (*FGL2, FOXP3, TGF*-β1, *LAG3*, *TIGIT*, *IL-10*, *IFN-γ*, and *GZMB*) previously identified to corelate with tolerance in pre-clinical models. Gene expression was measured in peripheral blood mononuclear cells (PBMC) from adult liver transplant recipients who were a minimum of six months post-transplant and had no biochemical evidence of rejection. Patients who positive for a putative tolerance biomarker (*FGL2*/*IFN-γ* ≥1) underwent a liver biopsy. If the liver biopsy was normal, patients underwent IS withdrawal over a three-month period. The primary aim of the study was the development of operational tolerance. Secondary endpoints were mortality, graft loss and changes in adverse effects associated with cessation of immunosuppression.



Results: Sixty-nine patients enrolled in the study, and 28 (41%) were positive for the tolerance biomarker. Of these 28 patients, 23 had evaluable outcomes including 8 patients who were successfully withdrawn from IS, 6 patients who developed rejection during IS withdrawal, and 9 patients who had abnormal baseline liver biopsies. Six of eight of the patients successfully withdrawn from IS are now designated as operationally tolerant as they are off IS greater than one year. GeXP analysis of baseline liver biopsies revealed that 8/8 (100%) of patients in the successful withdrawal group had a liver gene ratio of *FOXP3*/*IFN-γ* ≥1, whereas only 1/6 (17%) patient in the rejector group had this gene ratio. Additional immunologic studies demonstrated increased regulatory T cells (Treg) in the peripheral blood and in the liver allograft of operationally tolerant patients post-IS withdrawal.

Conclusions: These data suggest that a combination of gene expression monitoring in PBMC and in the liver allograft may identify operationally tolerant liver transplant recipients, allowing for successful withdrawal of immunosuppression.

CITATION INFORMATION: Chruscinski A., Rojas-Luengas V., Issacher A., Lilly L., Renner E., Epstein M., Adeyi O., Fischer S., Galvin Z., Moshkelgosha S., Jaeckel E., Juvet S., Selzner N., Levy G. Results of Litmus (nct 02541916): The Liver Immune Tolerance Bio Marker Utilization Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Chruscinski: None. **V. Rojas-Luengas:** None. **A. Issacher:** None. **L. Lilly:** None. **E. Renner:** None. **M. Epstein:** None. **O. Adeyi:** None. **S. Fischer:** None. **Z. Galvin:** None. **S. Moshkelgosha:** None. **E. Jaeckel:** None. **S. Juvet:** None. **N. Selzner:** None. **G. Levy:** Consulting Fee; Name of Commercial Interest; Novartis. Ownership Interest; Name of Commercial Interest; Veritas. Ownership Interest; Nature of Relationship; CEO.

Abstract# 683

Expansion of Cd45ra-foxp3hi Activated Regulatory T Cells Predict Immune Tolerance in Patients with Combined Kidney and Bone Marrow Transplantation

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Purpose: Simultaneous transplantation of a solid organ and bone marrow from an identical donor is a possible means of achieving transplant tolerance. Here, we attempted to identify biomarkers that indicate transplant tolerance for discontinuation of immunosuppressants in combined kidney and bone marrow transplantation (CKBMT).

Methods: We compared various immunological parameters that evaluate the transplant tolerance status between conventional kidney transplanted (KT) recipients (n = 20) and CKBMT recipients (n = 6) by using flow cytometry. To measure the anti-donor responses, mixed lymphocyte reaction (MLR) assays were performed with responder peripheral blood mononuclear cells (PBMCs) of CKBMT recipients and stimulator PBMCs of autologous, donor, and third party.

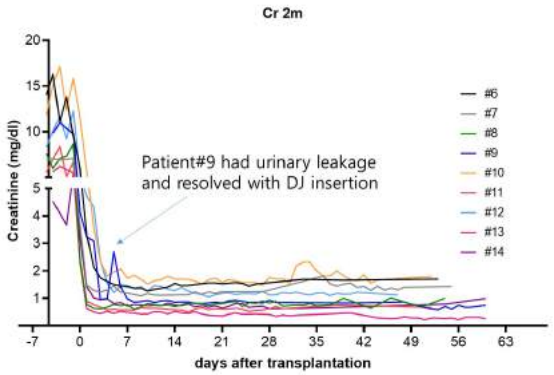
Results: Among six CKBMT recipients, three successfully discontinued immunosuppressants (tolerant group) and three could not (non-tolerant group). The $CD45RA^{-}FoxP3^{hi}$ activated regulatory T (Treg) cell subpopulation was expanded in CKBMT recipients compared to conventional kidney transplant patients, and this was more

obvious in the tolerant group than the non-tolerant group. The ratio of CD45RA$^-$FoxP3^{hi} activated Treg cells to CD45RA$^-$FoxP3^{lo} non-suppressive cells showed good discrimination between the tolerant and non-tolerant groups.
Conclusions: Thus, our findings propose a biomarker that can distinguish CKBMT patients who achieve transplant tolerance and are eligible for discontinuation of immunosuppressants and may provide insight into tolerance mechanisms in CKBMT.
CITATION INFORMATION: Kwon Y., Lee K., Park J. Expansion of Cd45ra-foxp3hi Activated Regulatory T Cells Predict Immune Tolerance in Patients with Combined Kidney and Bone Marrow Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Kwon: None. **K. Lee:** None. **J. Park:** None.

Abstract# 684

Inducing Transient Mixed Chimerism without Chimeric Transition Syndrome for Tolerance Induction After Kidney Transplantation

K. Lee, J. Park, *Samsung Medical Center, Seoul, Korea, Republic of*
Purpose: Immunological or operational tolerance, defined as the absence of a destructive immune response to a transplanted tissue without ongoing immunosuppression, is one strategy that may improve the long-term results of organ transplantation; avoiding the morbidity associated with chronic immunosuppression and graft dysfunction. Inducing transient mixed chimerism is one of the way to operational tolerance after kidney transplantation (KT). Kawai and colleagues have reported on their experience about the inducing transient mixed chimerism and operational tolerance after KT. However, they reported that almost all patients experienced an early engraftment syndrome-like condition termed chimeric transition syndrome (CTS). This CTS is considered as a major hurdle to be overcame in this group.
Methods: At first, we developed our protocol for combined kidney and bone marrow transplantation (CKBMT) based on the protocol of MGH. The only difference from the MGH regimen was the substitution of rATG for anti-CD2 mAb, which was not available in Korea. After experiencing side effects of preconditioning regimen including CTS, cyclophosphamide toxicity, and uncontrolled BK virus infection, we have revised protocol by reducing dose of cyclophosphamide (22.5 mg/kg x 2 doses) and adding fludarabine (10 mg/kg x 4 doses).
Results: By far, we applied our latest revised protocol for 9 patients. Among them four patients successfully discontinued immunosuppression (IS) and five patients are on the process of IS weaning. All of them showed sufficient bone marrow suppression after preconditioning and transient mixed chimerism (2~24wk) after CKBMT. None of these patients showed unexplainable serum creatinine elevation in early post-operative period. (Figure. 1) Protocol biopsy performed at 2 week after CKBMT showed no abnormal findings in all patients. None of patients suffered from uncontrolled BK virus infection or side effect cyclophosphamide which were observed in patients treated with previous protocols.
Conclusions: With the revised protocol, transient mixed chimerism can be induced without CTS. Further follow up is necessary to ensure the efficacy of this protocol in the aspect of inducing operational tolerance.



CITATION INFORMATION: Lee K., Park J. Inducing Transient Mixed Chimerism without Chimeric Transition Syndrome for Tolerance Induction After Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Lee: None. **J. Park:** None.

Abstract# 685

Long-Term Follow-Up of a Phase 2 Clinical Trial to Induce Tolerance in Living Donor Renal Transplant Recipients

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Purpose: 37 subjects were transplanted in a phase 2 protocol based upon tolerogenic CD8+/TCR-facilitating cells (FCR001) to induce tolerance in recipients of living donor renal allografts (KTx).
Methods: Recipients were conditioned with fludarabine (30mg/m2/dose, days -5,-4,-3), cyclophosphamide (50mg/kg/dose, day-3 and+3), 200 cGy TBI (day-1) followed by KTx (day0). A G-CSF mobilized product was apheresed from the donor, processed to remove graft-versus-host disease (GVHD)-producing cells yet retain CD34 + cells and FC, and cryopreserved until administration day+1 post-KTx. Follow up is 48 - 136 months. Pts ranged in age from 18-64 yrs and were 6/6 HLA matched related to 0/6 matched unrelated. MMF and tacrolimus immunosuppression (IS) was weaned and discontinued at 1 yr if post-Tx chimerism, normal renal fcn and normal KTx biopsy were noted.
Results: Durable chimerism allowing for full IS withdrawal developed in 26 pts (time off IS 37- 124 months); the majority (23/26) showed full (>95%) donor whole blood/T cell chimerism. Transient chimerism was seen in 8 pts. All stable chimeric subjects retained chimerism after removal of IS and remain rejection-free. Long term chimeric subjects off IS have no clinical evidence of immune defect: they show robust T, B, and NK cell reconstitution, can be safely vaccinated and develop protective immunity. Transiently chimeric pts resumed endogenous hematopoiesis and were maintained on low-dose IS. There were two cases of GVHD. 1 subject exhibited grade 1-2 acute GI GVHD that responded to corticosteroids, followed by mild chronic GVHD. The second pt presented late and died of treatment resistant GI GVHD with CMV 11 months post-Tx. There have been three graft losses, related to infections in subjects on IS. Two additional deaths have occurred in pts off IS: one in a heavy (>100 pack year) smoker from advanced stage lung cancer 4.5 years after KTx, the second in a pt 3.5 years after KTx who developed pneumococcal sepsis after noncompliance with recommended vaccinations. Overall survival is 91.8% and death censored graft survival 94.1%. Tolerant FCR001 subjects have significantly better renal function than comparable KTx on SOC IS. Hypertension and hyperlipidemia is more common in SOC than tolerant FCR001 pts.
Conclusions: In summary, high levels of durable chimerism and tolerance with a low (5.5%) incidence of GVHD has been achieved in mismatched recipients of KTx. There are significant long term medical benefits to establishing tolerance in KTx recipients using the FCR001 approach.
CITATION INFORMATION: Leventhal J., Galvin J., Mathew J., Gallon L., Belshe D., Gibson M., Ravindra K., Horwitz M., Ildstad S. Long-Term Follow-Up of a Phase 2 Clinical Trial to Induce Tolerance in Living Donor Renal Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Leventhal: Grant/Research Support; Name of Commercial Interest; TALARIS. Grant/Research Support; Nature of Relationship; GRANT FUNDING. Ownership Interest; Name of Commercial Interest; TRACT THERAPEUTICS. Ownership Interest; Nature of Relationship; FOUNDER. **J. Galvin:** Salary; Name of Commercial Interest; INCYTE. Salary; Nature of Relationship; EMPLOYEE. **J. Mathew:** None. **L. Gallon:** None. **D. Belshe:** None. **M. Gibson:** None. **K. Ravindra:** None. **M. Horwitz:** None. **S. Ildstad:** Ownership Interest; Name of Commercial Interest; TALARIS THERAPEUTICS. Ownership Interest; Nature of Relationship; CO-FOUNDER/CSO.

Ethics

Psychosocial and Treatment Adherence

Abstract# 706

Posttraumatic Stress and Medication Adherence in Pediatric Transplant Recipients

S. Duncan-Park[1], L. Danziger-Isakov[2], B. Armstrong[3], N. Williams[4], J. Odim[4], E. Shemesh[5], S. Sweet[6], R. Annunziato[1], *[1]Icahn School of Medicine at Mount Sinai and Fordham University, New York, NY, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, [3]Rho Inc., Durham, NC, [4]NIAID, Bethesda, MD, [5]Icahn School of Medicine at Mount Sinai, New York, NY, [6]Washington University in St. Louis, St. Louis, MO*
Purpose: We investigated the relationship between posttraumatic stress symptoms (PTSS), medication adherence, and quality of life (QoL) in adolescent transplant recipients.
Methods: This protocol of the Clinical Trials in Organ Transplantation in Children Consortium (CTOTC-11, NCT02892266) included solid organ transplant recipients 12 to 17 years old who were prescribed tacrolimus and had received a transplant ≥ 18 months prior to enrollment. Patients and caregivers rated PTSS using the UCLA PTSD Reaction Index (threshold ≥ 35) and Impact of Event Scale (threshold ≥ 18),

respectively, at enrollment. Outpatient tacrolimus trough level data were collected for one year (6 months pre- and post-enrollment) to calculate the Medication Level Variability Index (MLVI), a measure of medication adherence.

Results: MLVI and PTSS were examined in the full sample (n=119, 118 with sufficient levels to calculate MLVI) and a pre-defined subgroup of liver recipients (n=48), as MLVI threshold has been validated in liver recipients only. The sample included liver (39.5%), kidney (28.6%), heart (16.8%), lung (14.3%), and intestine/liver (0.8%) recipients. Nonadherence (MLVI ≥ 2) was identified in 35.6% of patients and 27.1% of liver recipients. Most patients (80.7%) reported exposure to at least one potentially traumatic event (PTE), including illness/medical trauma (53.8%), bereavement (46.2%), bullying (24.4%), and serious accidental injury (15.1%). Above-threshold PTSS was endorsed by 9.2% of the full sample, 12.5% of liver recipients, and 43.7% of caregivers. PTSS and MLVI were significantly correlated only in the liver subgroup (r=0.31, p=.03). In multivariable regression analyses, patient and caregiver posttraumatic stress avoidance symptoms predicted lower QoL (F=12.94, p<.001), but not MLVI (F=0.70, p=0.50); however, only total patient PTSS, rather than avoidance symptoms specifically, were significant in subsequent hierarchical multivariable linear regression analyses (B=-0.78, *B*=-0.78, p<.001).

Conclusions: PTEs are common in adolescent transplant recipients; a minority may meet criteria for PTSD. Screening for PTSS to identify nonadherence risk is not warranted; however, addressing PTSS may help improve quality of life. Caregivers are at greater risk for PTSD than patients, and therefore may require their own supports during the post-transplant period.

The writing team acknowledges the important contributions of investigators from participating CTOTC-11 sites.

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Abstract# 707

A Psychosocial Clinician Rating Scale is Used Differently Across Solid Organ Teams within a Single Transplant Center

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Purpose: Transplant psychosocial clinician rating scales like the Stanford Integrated Psychosocial Assessment for Transplant (SIPAT) are widely used tools to standardize subjective patient data, stratify risk, supplement clinician decision-making, and facilitate research. Psychosocial clinicians within a single center often evaluate candidates and assign SIPAT scores across diverse transplant patient populations. The goal of this study was to describe how different solid organ teams use and apply the SIPAT despite the uniformity of the instrument's criteria and interpretation. In 2015, Michigan Medicine deployed the SIPAT for use on all its solid organ transplant teams.

Methods: Adult solid organ transplant candidates between 2015-18 were queried for SIPAT score at the time of transplant evaluation. For patients who were evaluated multiple times or for multiple organs, the first evaluation was used. Rates of SIPAT use were compared among the organ teams. SIPAT scores range in categories from excellent (0-6) to poor (> 70). Mean SIPAT scores were compared between listed, non-listed, transplanted and non-transplanted candidates. Chi-square tests were used for categorical data; ANOVA was used for continuous data.

Results: A total of 5108 patients were evaluated during the study period. The majority of patients were male (60%), Caucasian (73.7%), and married (46.0%). Age at first evaluation varied significantly across organs. 2630 of 5106 (51.5%) patients received a SIPAT score, with scores ranging from 0 to 87. Kidney and liver were the most avid SIPAT users followed by kidney-pancreas and pancreas, lung, and heart (see Table 1). Mean scores of listed, non-listed, transplanted, and non-transplanted patients, were all statistically different across the organ teams. Intuitively, SIPAT scores trended higher for non-listed and non-transplanted patients.

Conclusions: These cross-organ differences in SIPAT frequency and mean scores are relevant to all psychosocial clinicians, particularly those evaluating candidates for separate organs and interacting with different transplant teams.

Table 1.

	Heart	Kidney	Kidney-Pancreas & Pancreas	Liver	Lung	
Number of patients evaluated	308	2661	196	1486	486	
Mean age at first organ evaluation (Standard Error)	48.95 (0.758)	53.95 (0.203)	41.42 (0.840)	54.87 (0.326)	54.30 (0.493)	$p < 0.001$, $F = 50.407$
Number patients who received SIPAT (%)	24 (7.79)	1934 (69.83)	77 (40.36)	771 (52.59)	154 (31.11)	$p < 0.001$, Pearson coeff. = 392.399
Mean SIPAT scores of listed patients (S.E.)	12.21 (2.921)	16.84 (0.282)	16.10 (0.912)	17.63 (0.660)	12.03 (0.981)	$p < 0.001$, $F = 7.727$
N	14	777	50	293	93	
Mean SIPAT scores of non-listed pts (S.E.)	25.00 (4.514)	23.71 (0.404)	25.13 (2.222)	31.37 (0.788)	19.54 (2.067)	$p < 0.001$, $F = 26.275$
N	10	827	27	478	61	
Mean SIPAT scores of transplanted pts. (S.E.)	11.50 (4.463)	14.35 (0.507)	17.23 (1.466)	17.80 (0.923)	12.07 (1.071)	$p < 0.001$, $F = 5.751$
N	6	227	26	156	56	
Mean SIPAT scores of listed, non-transplanted pts (S.E.)	12.75 (3.806)	16.46 (0.336)	14.88 (1.017)	17.42 (0.943)	11.97 (1.879)	$p < 0.01$, $F = 3.468$
N	8	950	24	139	37	

CITATION INFORMATION: Entenman S., Chaffee T., Pienta M., Young B., Clifton E., Mellinger J., McElroy L., Winder G. A Psychosocial Clinician Rating Scale is Used Differently Across Solid Organ Teams within a Single Transplant Center *AJT, Volume 21 Supplement 3*

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Abstract# 708

Development of a Question Prompt Sheet for Upper Extremity Vascularized Composite Allotransplantation

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Purpose: Upper extremity (UE) vascularized composite allotransplantation (VCA) is an innovative option for people with UE amputations. Individuals with limb loss commonly receive little information about treatment options and have limited communication with healthcare providers about their condition. Making informed treatment decisions can be difficult when information needs are unmet. Question prompt sheets (QPS) are structured lists of questions that can facilitate communication with providers by empowering patients to ask questions and acquire relevant information. No QPS is available for VCA. This study aimed to develop an UE VCA-specific QPS.

Methods: We conducted in-depth interviews among people with acquired UE amputations. Participants were asked about information needs about UE VCA to inform the initial QPS draft. A qualitative thematic approach was used to analyze open-ended responses. The multidisciplinary research team reviewed the QPS draft to improve organization, clarify question wording, and remove repetitive items.

Results: Thus far, 12 individuals completed an in-depth interview (75% participation rate). Most were male (71%), with a mean age of 49 years, and had a unilateral amputation (75%). Most participants (75%) reported being 'completely' or 'a lot' likely to use a QPS if they were considering UE VCA. The initial QPS draft included 77 items grouped into 16 topics. UE VCA topics and sample questions included: Eligibility (What makes a good candidate?); Matching (How does the donor matching process work?); Surgery (How is the hand or arm surgically connected to my body?); Function (How much hand function can I regain?); Risks (What happens if my body rejects the hand/arm? Is it removed?); Appearance (Will the new hand look noticeably different from my arm?); and Rehabilitation (What does rehabilitation involve?).

Conclusions: Preliminary findings suggest people with UE amputations desire information about VCA. The UE VCA-QPS draft will be refined via semi-structured interviews and team review for content validity, comprehensiveness, and readability. Future research should assess the impact of the UE VCA-QPS on communication and informed decision making about UE VCA.

CITATION INFORMATION: Gacki-Smith J., Kuramitsu B., Ferzola A., Vanterpool K., Kunkle C., Hewitt M., Schultheis A., Riggleman T., Taylor J., Cooney C., Levan M., Tintle S., Brandacher G., Gordon E. Development of a Question Prompt Sheet for Upper Extremity Vascularized Composite Allotransplantation *AJT, Volume 21 Supplement 3*

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Abstract# 709

"A New Lease on Life": Patient Perceptions After Early Liver Transplantation for Alcohol-Related Liver Disease

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Purpose: At some centers, alcohol-related liver disease (ARLD) patients, who are unlikely to survive six months without a liver transplant (LT), are selected to receive life-saving early liver transplantation (ELT) despite zero to minimal sobriety. ELT recipients' perceptions of their LT experiences have not been previously examined and can help inform ARLD transplant policies.

Methods: We conducted a preliminary thematic analysis of in-depth semi-structured interviews with 17 ELT recipients transplanted between December 2013 and July 2020, at a single center. Interviews focus on the ELT experience, alcohol use, and the six-month wait period guideline and will continue until thematic saturation is reached.

Results: A common participant perception was feeling thankful for a new liver. Participants expressed various motivations for taking care of their new livers and their health, characterizing the transplant as a "new lease on life." Participants described their changed attitudes towards alcohol post-LT and disclosed ongoing challenges, such as maintaining sobriety, "fighting" for self-identity, navigating stressors, and redefining their relationships. Regarding the six-month wait period, participants expressed a range of perspectives, from beliefs that a guideline may be helpful in some cases to criticisms that the guideline groups patients into "black

and white categor[ies]" and ignores their circumstances. Participants discussed the stigma of being perceived as an "alcoholic" and highlighted the struggle of trying to demonstrate sobriety while dealing with a "dead liver." Participants expressed a desire for specific supports for ARLD LT patients.
Conclusions: ELT recipients' perceptions illuminate the struggles and stigma associated with ARLD, as well as the direct impact of the six-month wait period on ARLD patients in need of an LT. These findings can help inform an ethical and evidence-based policy for transplanting ARLD patients.
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Abstract# 710

Anonymous Live Liver Donor Perspectives on Anonymity in the Donation Process

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Purpose: Anonymous living organ donation has recently become a more regular practice in select transplant programs, with donors coming forward voluntarily to give their organs to those in need. These donors may be directed or non-directed, and anonymity may be one-way or reciprocal. There is limited literature focusing on the psychosocial aspects of anonymity in living liver donors. Given the unique situation of these donors, we interviewed a sample of 26 anonymous live liver donors and explored their opinions surrounding the idea of anonymity and its implications in living liver donation.
Methods: Anonymous donors completed a semi-structured qualitative interview consisting of questions regarding their experiences as a donor. Donors were at least 18 years of age, fluent in English, and had donated at least 3 months prior to participating. Living donation surgeries had occurred between 2005 and 2016. Interviews were conducted over the telephone or in person by an experienced qualitative researcher during the time period September 2016 to April 2017. All interviews, ranging from 41 to 135 minutes in length, were audio-recorded, transcribed, and quality-checked. They were analyzed and categorized into common themes, specifically those pertaining to the donor's perceptions and experiences with anonymity.
Results: Of 40 eligible anonymous donors, 26 (65%) anonymous donors were interviewed. Out of the donors interviewed, 4/26 (15.4%) participated in a directed donation, meaning they had knowledge of the recipient's identity. In these cases, anonymity was one-way. The remainder were non-directed (two-way anonymity). The views of the directed donors did not appear to have any significant differences from the views of non-directed donors. Five main themes related to anonymity were identified as follows: (1) Ethical issues related to coercion and recipient indebtedness; the majority expressed that the recipient should not feel like they owe the donor anything in return; (2) Wanting internal satisfaction rather than seeking accolades—donation was a purely altruistic act; (3) Not wanting to be emotionally attached to the outcome in the recipient, thus avoiding the guilt and responsibility if the recipient had a complication; (4) Concerns about negative perceptions amongst their own friends and family, such as being referred to as "selfish" for risking their life; (5) Feelings of ambivalence towards meeting the recipient; although most donors were not opposed to meeting the recipient, they would not seek them out themselves.
Conclusions: These findings provide unique insight into living donor opinions on several aspects related to anonymity in the donation process. We identified five key drivers related to decisions surrounding anonymity. Knowledge of the donor's mindset and attitudes on the topic will help improve awareness and provide the best possible mental and physical care for the anonymous donor.
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DISCLOSURES: S.S. Humar: None. **N. Selzner:** None. **J. Jung:** None. **S. Krause:** None. **S. Abbey:** None.

Abstract# 711

The Lived Experience of Older Adult Kidney Transplant Recipients: Reflections on Embodied Selfhood in Later Life

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Purpose: Although the number of older adults who might benefit from kidney transplantation continues to increase in the United states, little is known about older adults' lived experience of transplantation and the impact of transplant on their sense of embodied selfhood.
Methods: Employing a phenomenological research design, this study explored the lived experience of 10 deceased donor kidney transplant recipients aged 65 to 72 years old. Participants completed one to two in-depth phenomenological interviews lasting approximately one hour each, for a total of 15 interviews. The sample was drawn from a transplant center in an urban location in the United States. Interview transcripts and field notes were analyzed following the processes of phenomenological reduction, imaginative variation and synthesis.
Results: Analyses illuminated older adults' perceptions of the impact of kidney transplantation on their sense of physical, psychological and social selfhood. Participants reported experiencing physical and psychosocial challenges as they adjusted to their transplants, yet they also constructed powerful narratives of resilience and coping that were rooted in a deeply held sense of identity developed over the life course. This sense of continuity of the embodied self over time enabled most participants to better navigate the corporeal disruption and re-integration of transplantation. Participants expressed profound appreciation for their transplants and reported substantial improvement in quality of life as compared to their pre-transplant experience on dialysis. Most participants perceived their older age as playing a protective role in the recovery process.
Conclusions: These findings shed light on benefits of older age for kidney transplant recipients that may not be fully integrated into standard approaches to patient selection and assessment of transplant outcomes. As such, findings may help to address age-related bias in transplant policy and clinical practice, with the ultimate goal of improving wellbeing and quality of life for older adults.
CITATION INFORMATION: Kimberly L. The Lived Experience of Older Adult Kidney Transplant Recipients: Reflections on Embodied Selfhood in Later Life *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Kimberly: None.

Abstract# 712

Two Step Screening for Anxiety Symptoms in Solid Organ Transplant Recipients

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Purpose: Patients with end-stage organ failure who receive organ transplants often experience anxiety symptoms. Currently, however, these symptoms frequently remain un-detected. Systematic screening for anxiety may help identify patients with moderate/severe symptoms, who may benefit from multidimensional assessment and support. The purpose of this study is to assess a 2-step approach, where an ultra-brief screening tool (Edmonton Symptom Assessment Survey-revised- Anxiety item (ESASr-A) or Generalized Anxiety Disorder-2 (GAD-2)) is followed by a more precise tool (Patient Reported Outcomes Measurement Information System Anxiety Computer Adaptive Test (PROMIS-A-CAT)), to screen for anxiety symptoms in solid organ transplant recipients.
Methods: In a multicenter cross-sectional study, we administered multiple symptom screening questionnaires to solid organ transplant recipients. Using data from patients who completed ESASr-A, GAD-7 and PROMIS-A-CAT, we compared screening performance and efficiency between the scenario in which patients completed PROMIS-A-CAT and hypothetical scenarios where only patients above the pre-screening cut-off would have completed PROMIS-A-CAT. Screening performance was evaluated by sensitivity and specificity. Efficiency was characterized by the average number of questions completed by subjects in the different scenarios.
Results: A total of 126 kidney transplant recipients, 71 liver transplant recipients, and 12 kidney pancreas recipients were included in this analysis. The mean (SD) age of the entire cohort was 54 (13) years and 61% of the subjects were male. For the 2-step method, using a cut-off of $\geq$1 and $\geq$2 for ESASr-A and GAD-2, respectively, produced the best combination of sensitivity and specificity (ESASr-A sensitivity 0.73, specificity 0.91; GAD-2 sensitivity 0.73, specificity 0.94). Most patients who completed more than 5 PROMIS-A-CAT items scored <3 on GAD-7. Compared to administering only PROMIS-A-CAT to all patients, the 2-step method reduced the average number of questions patients had to complete from 6 to 4 for both 2-step screening scenarios.
Conclusions: A 2-step anxiety screening method using either ESASr-A or GAD-2 followed by PROMIS-A-CAT has acceptable specificity and sensitivity, and can be most helpful to reduce questionnaire burden among patients with no symptoms. Screened in patients will need clinical assessment to establish diagnosis and decide on appropriate psychosocial support.
CITATION INFORMATION: Lan H., Jamil F., Al Kaabi N., Aser R., Gyatso K., Habbal H., Macanovic S., Dano S., Novak M., Mucsi I. Two Step Screening for Anxiety Symptoms in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Lan: None. **F. Jamil:** None. **N. Al Kaabi:** None. **R. Aser:** None. **K. Gyatso:** None. **H. Habbal:** None. **S. Macanovic:** None. **S. Dano:** None. **M. Novak:** None. **I. Mucsi:** None.

Abstract# 713

Impact of Rejection in Pediatric and Young Adult Kidney Transplant Recipients on the Use of Mental Health Resources

E. Ruzicka[1], E. Lyons[2], C. Naclerio[2], A. Sikora[2], K. McKinnon[2], E. Blanchette[2], M. Chandran[2], M. Bock[2], E. Christofferson[2], *[1]Children's Hospital Colorado, Aurora, CO, [2]University of Colorado, Aurora, CO*
Purpose: Allograft rejection often results in increased hospital and medical resource utilization. Pediatric kidney transplant recipients (KTR) are at risk for psychoso-

cial stressors, nonadherence to their medical regimen, and rejection episodes. We investigated allograft rejection in a pediatric and young adult KTR cohort and the related use of transplant psychologist resources.
Methods: This retrospective cohort study investigated pediatric KTR transplanted between January 2016 and November 2020. Data collected included baseline demographic and clinical information, immunosuppression regimen (induction and maintenance), rejection episodes (classification and severity), graft survival, and number of patient visits (in-person or virtually) with the transplant psychology team. Cost per psychologist visit was estimated based on average billing reimbursements at our institution.
Results: 111 pediatric/young adult KTR were included during the 5-year study period (M_{age}=12.32, 55% female, 71.2% White). 20 (18%) patients experienced 30 acute rejection episodes (median time to first rejection 369 days; IQR 245-669). Eight (7.2%) patients experienced 2 or more rejections. 106 (95.5%) patients were seen post-transplant (after hospital discharge) by transplant psychology. Patients who experienced acute rejection utilized significantly more mental health resources than those who did not reject (median 3 vs 8.5 transplant psychology sessions; IQR 2-10.2, p: 0.001), resulting in an increased cost of $2,321 and 220 minutes in direct patient care per patient, plus additional time required to coordinate the unique mental health needs of each patient.
Conclusions: Integrated behavioral health support, specifically targeting nonadherence and post-transplant stressors, is critical for successful transplant outcomes among pediatric KTR. Acute rejection among pediatric KTR may result in increased stress in a patient population already prone to psychosocial instability. Further, the cost of acute rejection extends beyond the economic and social impact of treating just its medical sequelae, to allocation of scarce mental health resources within transplant. Availability of transplant psychologists improves accessibility of psychological supports in this high-risk population, and programs should ensure their patients have access to this important service.
CITATION INFORMATION: Ruzicka E., Lyons E., Naclerio C., Sikora A., McKinnon K., Blanchette E., Chandran M., Bock M., Christofferson E. Impact of Rejection in Pediatric and Young Adult Kidney Transplant Recipients on the Use of Mental Health Resources *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Ruzicka: None. **E. Lyons:** None. **C. Naclerio:** None. **A. Sikora:** None. **K. McKinnon:** None. **E. Blanchette:** None. **M. Chandran:** None. **M. Bock:** None. **E. Christofferson:** None.

Abstract# LB 72

Death and Loss to Follow-up in Pediatric Liver Transplant Recipients Transferred to Adult Care: Who is at Risk?

J. P. Stevens[1], S. Gillespie[1], M. Katz[1], L. Hall[2], V. Kolachala[1], R. Ford[3], N. A. Gupta[1], *[1]Pediatrics, Emory University School of Medicine, Atlanta, GA, [2]Transplant Services, Children's Healthcare of Atlanta, Atlanta, GA, [3]Internal Medicine, Emory University School of Medicine, Atlanta, GA*
Purpose: With improvements in surgical technique and immunosuppressive regimens, many pediatric liver transplant recipients are surviving to adulthood. Successful transition to an adult provider is key to a patient's continued well-being. Mortality rates remain high in young adults with chronic medical conditions in the years following transfer. The purpose of our study is to analyze the relationship between demographic, psychosocial and clinical factors in children who received a liver transplant to assess risk of death or loss to follow-up in adulthood.
Methods: Retrospective, single center cohort study of patients who underwent pediatric liver transplantation between 1990-2015 at a large tertiary transplant center. Patient data was collected via electronic medical records, a national transplant database, telephone interview, and public death records.
Results: 120 patients were transferred to adult care, of which 101 met inclusion criteria. Sixty-four patients (63%) transferred to an affiliated adult facility, 29 (29%) were followed by another healthcare system, and 8 (8%) were lost to follow-up. In all, 23 patients died after transfer (25%). Several childhood factors were associated with higher rates of adult death: African American (AA) race (OR 6.59, p<0.001); psychiatric illness or substance use (OR 2.81, p=0.039); not obtaining a high school (HS) diploma (OR 9.59, p<0.001); medication non-adherence (OR 4.72, p=0.02); pediatric acute cellular rejection (OR 4.44, p=0.025); and co-morbidities of diabetes mellitus (DM) (OR 5.71, p=0.001) or renal insufficiency (OR 2.82, p=0.043). Not graduating HS was also associated with loss to follow-up (p<0.001). On multivariate analysis, AA race, substance use, and DM retained the highest association with adult death (OR 7.47, 9.16, and 3.76 respectively, all p<0.05). Not graduating HS was collinear with these factors, with an OR 9.65, p=0.011.
Conclusions: Complex, intertwined demographic, psychosocial and clinical factors are associated with increased rates of death in pediatric liver transplant recipients after transfer to adult care. Early recognition of high-risk patients, individualized transition processes, and further investigation into underlying causes of health disparities may improve long-term outcomes.
CITATION INFORMATION: Stevens J., Gillespie S., Katz M., Hall L., Kolachala V., Ford R., Gupta N. Death and Loss to Follow-up in Pediatric Liver Transplant Recipients Transferred to Adult Care: Who is at Risk? *AJT, Volume 21 Supplement 3*
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Non-Organ Specific: Economics & Ethics

Abstract# 714

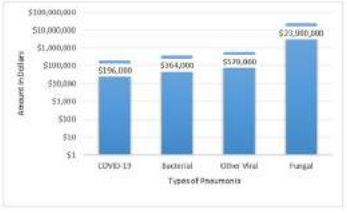
Solid Organ Transplant Recipients and Healthcare Burden in Covid19 Era

A. Basu, N. Sharma, R. Subramanian, L. Sridharan, S. Pastan, T. Pearson, *Emory Healthcare, Atlanta, GA*
Purpose: Pneumonia(PNA)- Acute inflammation of the lung parenchyma from an infection, is a frequent cause for hospitalization among Solid Organ Transplant Recipients (SOTRs), adversely effecting patient survival and healthcare costs. We assessed the healthcare impact associated with intensive care unit (ICU) hospitalization amongst SOTRs with COVID19 PNA or other serious PNAs.
Methods: We performed a single center retrospective analysis of SOTRs admitted to the ICU with any PNA during March 2019-October 2019 or with COVID19 PNA during March 2020-October 2020. Using t-tests and Chi Square tests we compared SOTRs with severe COVID19 PNA to those with other severe PNAs.
Results: 53 SOTRs with severe PNAs were included: 26 with COVID19 PNA and 27 with other PNAs (Bacterial 56%, Fungal 30%, Viral 14%). Both the groups were similar in demographics, time since transplant, length of stay and acute dialysis needs (Table 1). Mortality was higher in SOTRs with COVID19 PNA compared to other PNAs (46% Vs 22%; p 0.07). Hospitalization costs was greater in those with other PNAs compared to COVID19 PNAs ($553,000 VS $196,000; **p 0.006**) with fungal PNAs being associated with greatest costs (Figure1).
Conclusions: Critically ill SOTRs have substantially burdened the healthcare system with COVID19 associated mortality and healthcare expenses with other infections of equal severity. Every effort must be made to ensure timely assessment and diagnosis to minimize healthcare strains during this pandemic.

Table 1. Characteristics of critically ill SOTRs with COVID-19 PNAs Vs other PNAs

	COVID-19 PNA(n=26)	Other PNA (n=27)	P-value
Age	60(60-68)	62(50-70)	0.47
Male	19(73%)	15(56%)	0.18
Blacks	17(65%)	10(37%)	0.03
Kidney Recipients	18(69%)	15(58%)	0.3
Time since transplant(IQR) years	11(5-16)	7(4-11)	0.2
Length of Stay (IQR) days	16(7-23)	9(4-21)	0.19
ICU stay(IQR) days	9(3-16)	4(3-13)	0.2
Acute Dialysis	8(31%)	5(19%)	0.3
Deaths	12(46%)	6(22%)	0.07
Hospitalization Cost(IQR)	196,000(74,000- 350,000)	553,000(240,000-3,954,00)	**0.006**

Figure 1. Median Hospitalization Cost with Severe Pneumonia in SOTRs



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Abstract# 715

Utilization of Living Donor Liver Transplant for Patients Who Travel for Transplant in the United States

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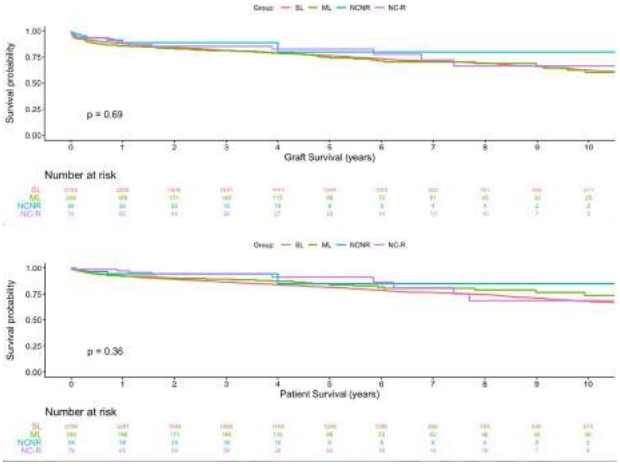
Purpose: We have previously shown that United States (US) liver transplant (LT) candidates listed at a single center (SL) are disadvantaged compared with patients who travel for transplant—SL wait longer and have poorer post-transplant outcomes. SL compete for LT with multiply listed (ML) who are US citizens listed at more than one center, non-citizen, non-residents (NCNR) who travel to the US temporarily,

and non-citizen, residents (NC-R) who travel to and reside in the US. This study aimed to examine living donor liver transplant (LDLT) recipients only in order to determine the impact of traveler status on outcomes in this subset of LT recipients.
Methods: UNOS LT recipients from January 1, 2003-June 10, 2019 were reviewed, excluding re-transplant, pediatric, and multiple organ recipients. SL patients had one listing. ML patients had overlapping listing dates prior to transplant. NCNR and NC-R patients were defined by citizenship. Demographics were compared using descriptive statistics. Graft and patient survival were evaluated using the Kaplan Meier method and Cox PH.
Results: 75, 955 LT were performed during the study period, of which 3174 (4.1%) were LDLT. LDLT utilization in the four groups was significantly different (4.1% SL, 5.6% ML, 8.3% NCNR, 3.2% NC-R, p<0.001). There were significant demographic differences across the four groups in all variables except sex and match MELD (Figure 1). There was no significant difference in graft or patient survival when stratified by travel group (Figure 2). In a multivariable Cox model examining patient survival, only increasing age (HR 1.02, p-value<0.001) and presence of HCC (HR 1.59, p-value <0.001) were associated with increased risk of death after transplant.
Conclusions: LDLT is most frequently utilized in NCNR and ML. Our findings suggest that LDLT may serve a dual purpose: 1) enabling LT in patients who travel for transplant while supporting self sufficiency by leaving the deceased donor pool intact, 2) equalizing post-transplant outcomes among all groups. These results highlight a need to identify barriers to LDLT among SL, and remind us that live donor protection and safety remains of paramount importance as we advocate for expanded use of LDLT.

	Singly Listed (n=2790)	Multiply Listed (n=249)	NCNR (n=59)	NC-R (n=76)	Overall (n=3174)	P-Value
Age at Transplant						0.001
Mean (SD)	52.7 (12.2)	49.8 (13.1)	56.2 (8.29)	52.5 (12.3)	52.6 (12.3)	
Median [Min, Max]	55.0 [18.0, 78.0]	52.0 [18.0, 75.0]	58.0 [27.0, 69.0]	55.0 [18.0, 72.0]	55.0 [18.0, 78.0]	
Sex						0.65
M	1557 (55.8%)	134 (53.8%)	35 (59.3%)	38 (50.0%)	1764 (55.6%)	
F	1233 (44.2%)	115 (46.2%)	24 (40.7%)	38 (50.0%)	1410 (44.4%)	
Race/Ethnicity						<0.001
White	2328 (83.4%)	209 (83.9%)	50 (84.7%)	21 (27.6%)	2608 (82.2%)	
Asian	59 (2.1%)	6 (2.4%)	2 (3.4%)	19 (25.0%)	86 (2.7%)	
Black	100 (3.6%)	7 (2.8%)	0 (0%)	2 (2.6%)	109 (3.4%)	
Hispanic	274 (9.8%)	26 (10.4%)	7 (11.9%)	34 (44.7%)	341 (10.7%)	
Other	29 (1.0%)	1 (0.4%)	0 (0%)	0 (0%)	30 (0.9%)	
Match MELD						0.28
Mean (SD)	16.0 (6.10)	15.8 (5.76)	16.5 (5.29)	17.3 (6.69)	16.0 (6.08)	
Median [Min, Max]	16.0 [6.00, 40.0]	15.0 [6.00, 32.0]	16.0 [6.00, 29.0]	16.5 [6.00, 31.0]	16.0 [6.00, 40.0]	
Missing	15 (0.5%)	1 (0.4%)	0 (0%)	0 (0%)	16 (0.5%)	
Education						0.01
College or more	1461 (52.4%)	152 (61.0%)	30 (50.8%)	34 (44.7%)	1677 (52.8%)	
High School or less	942 (33.8%)	69 (27.7%)	19 (32.2%)	37 (48.7%)	1067 (33.6%)	
Unknown	387 (13.9%)	28 (11.2%)	10 (16.9%)	5 (6.6%)	430 (13.5%)	
Insurance						<0.001
Public	735 (26.3%)	55 (22.1%)	5 (8.5%)	39 (51.3%)	834 (26.3%)	
Private	2047 (73.4%)	193 (77.5%)	11 (18.6%)	34 (44.7%)	2285 (72.0%)	
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Foreign govt	2 (0.1%)	0 (0%)	38 (64.4%)	1 (1.3%)	41 (1.3%)	
US govt	1 (0.0%)	0 (0%)	0 (0%)	0 (0%)	1 (0.0%)	
Self	4 (0.1%)	1 (0.4%)	5 (8.5%)	2 (2.6%)	12 (0.4%)	
HCC						0.002
No	2402 (86.1%)	227 (91.2%)	46 (78.0%)	55 (72.4%)	2730 (86.0%)	
Yes	388 (13.9%)	22 (8.8%)	13 (22.0%)	21 (27.6%)	444 (14.0%)	
Diagnosis						<0.001
HCV	655 (23.5%)	52 (20.9%)	18 (30.5%)	18 (23.7%)	743 (23.4%)	
ALD	319 (11.4%)	12 (4.8%)	4 (6.8%)	14 (18.4%)	349 (11.0%)	
Autoimmune	768 (27.5%)	101 (40.6%)	4 (6.8%)	8 (10.5%)	881 (27.8%)	
Cryptogenic	186 (6.7%)	16 (6.4%)	6 (10.2%)	3 (3.9%)	211 (6.6%)	
Fulminant	31 (1.1%)	1 (0.4%)	2 (3.4%)	1 (1.3%)	35 (1.1%)	
HBV	37 (1.3%)	5 (2.0%)	3 (5.1%)	6 (7.9%)	51 (1.6%)	
NASH	284 (10.2%)	15 (6.0%)	12 (20.3%)	4 (5.3%)	315 (9.9%)	
Other	510 (18.3%)	47 (18.9%)	10 (16.9%)	22 (28.9%)	589 (18.6%)	
Center Volume						0.003
<50 LDLT	789 (28.3%)	79 (31.7%)	10 (16.9%)	17 (22.4%)	895 (28.2%)	
50-150 LDLT	808 (29.0%)	79 (31.7%)	19 (32.2%)	37 (48.7%)	943 (29.7%)	
>150 LDLT	1193 (42.8%)	91 (36.5%)	30 (50.8%)	22 (28.9%)	1336 (42.1%)	



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Abstract# 716

Medical Costs in the Year Following Kidney Transplantation: Relationships with Renal Function and Graft Failure

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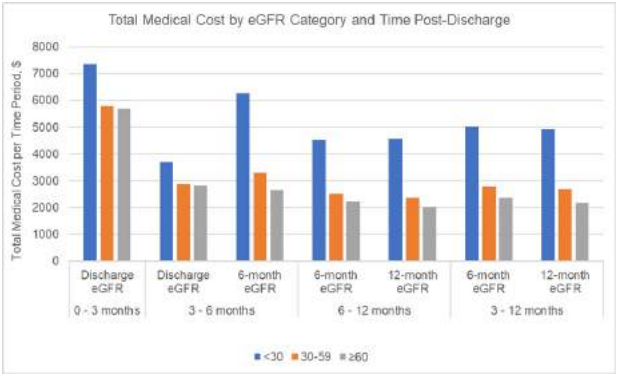
Purpose: We describe relationships between total medical costs in the first year following kidney transplant with overall renal function as measured by: 1) estimated glomerular filtration rate (eGFR) at different time point during the first year, and; 2) early graft failure.
Methods: The United States Renal Data System was used to identify adults receiving single-organ deceased donor kidney transplants 2012-2015. Recipients without Medicare as primary payer were excluded. Costs derived from Parts A and B claims including inpatient, emergency, outpatient, and skilled nursing facility costs. eGFRs were available at discharge, 6-months, and 12 months. Thus, eGFR:Cost relationships are described for several month-based time periods post-discharge: 0-3, 3-6, 6-12, and 3-12. For recipients with graft failure a time-history of medical costs was constructed with failure as the index date. Descriptive analyses were conducted.
Results: For those without graft failure in the first year, total medical costs exhibit strong trends with eGFR in the post-discharge period. In the 3-6 months post-discharge, recipients with 6-month eGFRs of 30-59 mL/min/1.73m^2 have total costs 48% lower than those with <30 mL/min/1.73m^2. Both 6- and 12-month eGFRs correlate well with costs from 3 to 12 months post-discharge. Recipients with graft failure in the first year, monthly costs begin to rise 3-4 months prior to failure, with a spike of over $38,000 during the month of failure. Costs appear to stabilize 2-3 months post failure suggesting a months-long failure process.
Conclusions: Total medical costs in the first year post-transplant are strongly correlated with eGFR at various times post-discharge. Time histories of resource utilization indicate that graft failure in the first year is a very expensive process unfolding over several months.



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Abstract# 717

A Payer's Perspective: The Cost of Hemodialysis versus Living Donor Kidney Transplant for Kidney Failure Patients in Nigeria

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Purpose: To primarily quantify the costs of LDKT and HD in Nigeria from a 'payer's perspective' and secondarily inform future cost-effectiveness studies to guide health care decision-making of kidney disease management in the country.

Methods: This study was conducted from a payer (the ESRD patient) perspective in Nigeria. Due to scarcity of aggregate costing data, direct costs were determined through expert consultation, supplier pricing, and patient utilization data. Data was obtained from 53 patients who underwent HD at centers across Nigeria from July 2014 to June 2020, and 20 patients with ESRD who received a LDKT between June 2017 and May 2020. Due to limited availability of services within Nigeria, costs are mostly fixed with little variation. A transplantation specialist, transplant nephrologist, and transplant coordinator were consulted to verify input variables and costs, as well as clinical pathways in ESRD. One year and yearly recurring costs of LDKT and HD were determined, with HD costs projected for both three sessions per week and two sessions per week. Cost of transplant rejection was also quantified but not included in one-year or recurring costs. Costs were converted to USD.

Results: This cost comparison study demonstrated one-year costs of US $23,096.32 for HD (3 sessions per week) and $37,271.00 for LDKT. Yearly recurring costs were $22,394.32 for HD and $6,709.30 for LDKT. Costs of acute rejection for LDKT were $2,418.00 for antibody-mediated rejection and $1,170.00 for cell-mediated rejection. One-time costs dominated the one-year cost of LDKT at 82.0%, while alternatively 97.0% of one-year costs of HD were recurring costs. A discounted simulation (6% discount rate) of three-year costs when survival was assumed yielded a cost-savings of US $12,421.23 for LDKT in comparison to HD.

Conclusions: Costs of LDKT in Nigeria are higher than that of HD in the first year but are markedly decreased in subsequent years. The cost of HD and LDKT is primarily an out-of-pocket expense paid by patients with kidney failure in Nigeria. The maintenance cost of HD is three times more than the maintenance cost of immunosuppression post kidney transplantation. Our data demonstrates favorable long-term cost profile of LDKT vs. HD in Nigeria when cost is borne directly by patients. Further study of the comparative cost-effectiveness of these RRT modalities using survival data and outcomes is necessary.

Treatment Modality	Input	Description		Yearly Cost (N)		Yearly Cost (USD)
Hemodialysis	Dialysis Treatment (3 sessions per week)	30,000 N per session	N	4680000	$	12,168.00
	Dialysis Treatment (2 sessions per week)	30,000 N per session	N	3120000	$	8,112.00
	Labs (Pre Dialysis)	Once per session	N	800800	$	2,082.08
	Labs (Post Dialysis)	Once per session	N	572000	$	1,487.20
	CVC Placement	One time	N	150000	$	390.00
	AV Fistula Creation	One time	N	120000	$	312.00
	Epogen Injection	Per protocol	N	1560000	$	4,056.00
	Iron Injection	Per protocol	N	312000	$	811.20
	Vitamin D	Per protocol	N	48000	$	124.80
	Phosphorus Binders	Per protocol	N	80000	$	208.00
	B-Complex Vitamin & Folic Acid	Per protocol	N	10400	$	27.04
	Nephrologist Consultation	Per protocol	N	300000	$	780.00
	Nutritionist Consultation	Once per year	N	250000	$	650.00
	First Year Total (3 Sessions Per Week)		**N**	**8883200**	**$**	**23,096.32**
	Recurring Costs (3 Sessions Per Week)		**N**	**8363200**	**$**	**22,394.32**
	3 Year Total (3 Sessions Per Week)		**N**	**26109600**	**$**	**67,884.96**
	First Year Total (2 Sessions Per Week)		**N**	**7323200**	**$**	**19,040.32**
	Recurring Costs (2 Sessions Per Week)		**N**	**7053200**	**$**	**18,338.32**
	3 Year Total (2 Sessions Per Week)		**N**	**21429600**	**$**	**55,716.96**
Living Donor Kidney Transplant	Work Up	One time	N	1500000	$	3,900.00
	Transplant Surgery	One time	N	10000000	$	26,000.00
	Follow-Up Labs	One time	N	528000	$	1,372.80
	Tacrolimus (1mg x100 caps)	45,000 per unit	N	1296000	$	3,369.60
	Cellcept (500mg x 100 caps)	50,000 per unit	N	720000	$	1,872.00
	Prednisone (5mg x100 tabs)	10,000 per unit	N	36500	$	94.90
	Anti-Viral	Valcyte	N	180000	$	468.00
	Anti-Fungal	Fluconazole	N	36500	$	94.90
	Anti-Bacterial	Bactrim	N	38000	$	98.80
	First Year Total		**N**	**14335000**	**$**	**37,271.00**
	Recurring Costs		**N**	**2580580**	**$**	**6,709.30**
	3 Year Total		**N**	**19496600**	**$**	**50,689.60**
Acute Rejection	Kidney Biopsy	Per protocol	N	200000	$	520.00
	Anti-Thymocyte Globulin	Per protocol (cell-mediated)	N	250000	$	650.00
	IV Immunoglobulin	Per protocol (antibody-mediated)	N	250000	$	650.00
	Plasmapheresis	Per protocol (antibody-mediated)	N	480000	$	1,248.00
	Total (Cell-Mediated)		**N**	**450000**	**$**	**1,170.00**
	Total (Antibody-Mediated)		**N**	**930000**	**$**	**2,418.00**

Note: 3 year totals are not discounted

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Heart and VADs: All Topics

Abstract# 1183

Association Between Cumulative Antithymocyte Globulin Dosing and Adverse Outcomes in Pediatric Heart Transplant Recipients

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Purpose: Lymphocyte depletion via rabbit antithymocyte globulin (rATG) is the most frequently used induction immunosuppressive in pediatric orthotopic heart transplant (OHT). Although outcomes are often reported based on the receipt of rATG or not, patient outcomes correlated to cumulative dosing of rATG are lacking.

Methods: Retrospective review of OHT recipients aged 0-21 years transplanted at a large pediatric transplant center from 1/2018-12/2019. rATG induction dosing was stratified into groups; Group 1 (<4.5 mg/kg), Group 2 (4.5-7.5 mg/kg), and Group 3 (>7.5 mg/kg). The primary outcome was cumulative incidence of acute cellular rejection (ACR) at 6 months. Secondary outcomes included cumulative incidence of infection (defined as CMV or EBV DNAemia > 100 copies), incidence of antibody-mediated rejection (AMR), and malignancy at 6 months post-OHT.

Results: 54 OHT recipients were identified who received rATG induction. Baseline demographics were similar between groups [Table 1]. The median age of the cohort was 8.8 (IQR, 3 - 15) years, 57.4% were male and 53.7% were Caucasian. In groups 1, 2, and 3, the cumulative incidence of ACR was 67.3%, 33.1% and 26.1%, respectively (P= 0.07) [Figure 1A]. The cumulative incidence of infection was 14.3%, 25.3%, 35.1% in groups 1, 2, and 3, respectively (P=0.792) [Figure 1B]. There was one episode of AMR in group 1 and one malignancy in group 2.

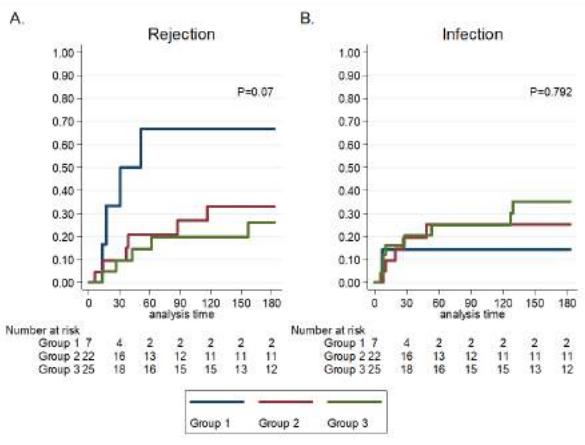
Conclusions: No associations between rATG dosing and acute rejection or infection were found. The cumulative incidence of rejection was numerically higher in the low-dose group 1. Further investigation into total weight-based rATG is warranted.

Table 1: Baseline Demographics

Characteristic	<4.5 mg/kg (n=7)	4.5 – 7.5 mg/kg (n=22)	>7.5 mg/kg (n=25)	P value
Age, years, median (IQR)	15 (1.3 – 15.7)	9.6 (2.1 – 14.3)	8.4 (3.2 – 14.4)	0.826
Male, n (%)	5 (71.4)	13 (59.1)	12 (48)	0.699
Ethnicity, n (%)				0.149
White	2 (28.6)	14 (63.6)	13 (52)	
Black	3 (42.9)	2 (9.1)	4 (16)	
Asian	0 (0)	3 (13.6)	0 (0)	
Other	0 (0)	0 (0)	1 (4)	
Not Recorded	2 (28.6)	3 (13.6)	7 (28)	
Weight (kg), median (IQR)	50 (14 – 69.8)	25.6 (10.3 – 48.5)	25.2 (12.6 – 45.2)	0.597
Indication, n (%)				0.23
Congenital Heart Disease	4 (57.1)	8 (36.4)	6 (24)	
Dilated CM	1 (14.3)	11 (50)	14 (56)	
Hypertrophic CM	1 (14.3)	0 (0)	1 (4)	
LV Noncompaction CM	0 (0)	0 (0)	2 (8)	
Restrictive CM	1 (14.3)	3 (13.6)	2 (8)	
Cumulative rATG, mg/kg (IQR)	3.4 (2.3 – 4.5)	6.8 (5.8 – 7.3)	7.9 (7.6 – 8.3)	**<0.001**
Maintenance Immunosuppression				
Tacrolimus, n (%)	7 (100)	21 (95.5)	25 (100)	0.537
Mycophenolate Mofetil, n (%)	6 (85.7)	22 (100)	23 (92)	0.253
Prednisone Use at Discharge, n (%)	1 (14.3)	4 (18.2)	5 (20)	0.737
Positive Crossmatch	1 (14.3)	1 (4.6)	2 (8)	0.621
ABO-Incompatible	0 (0)	2 (9.1)	1 (4)	0.734

CM = cardiomyopathy, LV = left ventricular, rATG = rabbit antithymocyte globulin

Figure 1: Cumulative Incidence of Acute Rejection and Infection



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Abstract# 1184

The Perfect Candidate? The Stanford Integrated Psychosocial Assessment for Transplant

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Purpose: The Stanford Integrated Psychosocial Assessment for Transplant (SIPAT) is a tool used to objectify and enhance the pre-transplant psychosocial evaluation. We sought to assess whether the SIPAT score was associated with outcomes of acute cellular rejection (ACR), antibody mediated rejection (AMR) and graft survival after heart transplantation (HTx).

Methods: This was a retrospective analysis of HTx recipients from 01/2012 to 12/2019 at a single institution. Patients were excluded if a SIPAT was not performed prior to transplant or moved to a different transplant center within the first-year post HTx. Post transplant outcomes analyzed included ACR (2R or greater), AMR and graft survival, stratified by a SIPAT score under 20 (acceptable) versus 20 or greater (minimally acceptable). Kaplan-Meier estimator was performed for ACR, AMR and graft survival. Chi-square and t-test were performed to analyze differences in demographics between SIPAT categories.

Results: Overall 218 heart transplant recipients had a SIPAT evaluation. The median (IQR) SIPAT score was 15 (10-20.75) and 66 patients (30.3%) had a SIPAT score of 20 or greater. A SIPAT score of 20 or greater was not associated with an increased risk of graft loss (p-value = 0.6), ACR (p-value = 1), nor AMR (p-value = 0.2) (Figure 1). Female candidates (85.5% vs. 63.4%, p-value = 0.002) were more likely to have a SIPAT score under 20. Caucasians were also more likely to have a SIPAT score less than 20 (75.6% vs. 61.5%, p-value = 0.04). There was no difference in SIPAT scores for other baseline demographics.

Conclusions: Carefully selected patients with a "minimally acceptable" SIPAT score did not experienced an increased risk of graft loss, AMR or ACR. While the SIPAT tool has become an integral part of the HTx evaluation, a high SIPAT score alone may not be sufficient to decline HTx candidates.

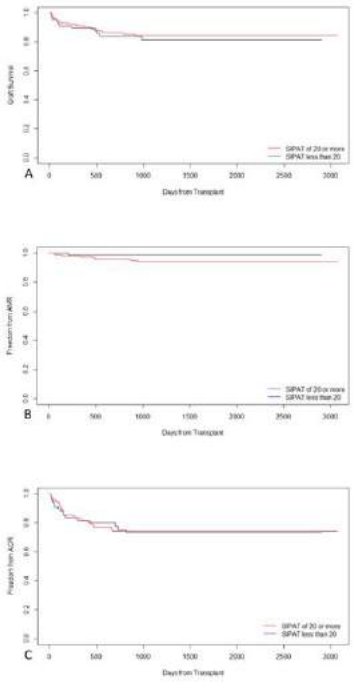

Figure 1. Comparison of SIPAT score of <20 (acceptable) vs. ≥20 (minimally acceptable candidate) for freedom from (A) graft failure, (B) antibody mediated rejection, and (C) acute cellular rejection 2R or greater.

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Abstract# 1185

Intravenous Immunoglobulin in Heart Transplant Recipients with Hypogammaglobulinemia and Infection

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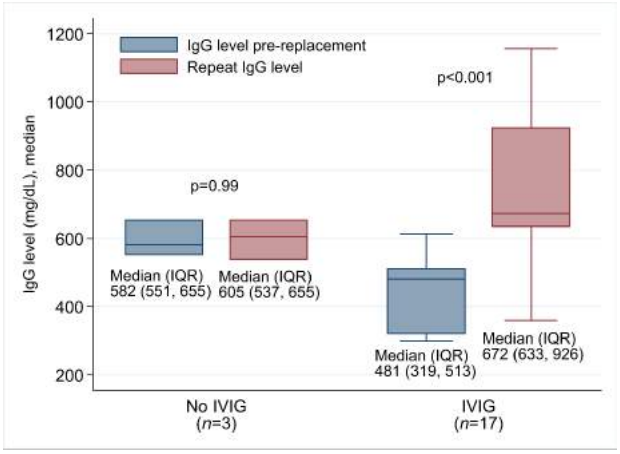
Purpose: Hypogammaglobulinemia (HGG) is a complication of solid organ transplantation which has been associated with increased risk of infections. HGG is commonly defined as a serum immunoglobulin G (IgG) level <700 mg/dL. Intravenous immunoglobulin G (IVIG) replacement in patients with HGG may be able to reduce rates of infection; however, few studies have assessed the use of IVIG to reduce risk of recurrent infection for heart transplant recipients with HGG. The primary objective of this study is to describe the effect of using IVIG in patients with HGG and documented infections on the recurrence of infections within 6 months of the initial infection compared to patients with a documented infection who did not receive IVIG.

Methods: A single center, retrospective study was performed assessing heart transplant recipients transplanted from 2011 to 2020 admitted inpatient between October 2017 to May 2020 with a documented infection and serum IgG level <700. Patients were grouped based on those who did or did not receive IVIG during hospital admission. Patients were excluded if they received IVIG or other immune globulin products for indications other than HGG one month prior to the use of IVIG and HGG.

Results: Thirty-six patients were included in this study. Patients in the IVIG group received on average 1 dose of IVIG at 0.5 g/kg. Use of IVIG resulted in a significant median increase in serum IgG levels of 481 to 672 (p<0.001). Despite this observed increase, there were no differences in the primary outcome of recurrent infections at 6 months (4 vs 0, p=0.19) and similar recurrence when grouped based on severity of HGG. Additionally, there were no differences in the rate of recurrent and new infections at 3 and 12 months (see table). Severity of HGG was not a factor associated with recurrent infections within 6 months (p=0.32).

Conclusions: This cohort had a low number of recurrent infections. There were no differences observed between those who did or did not receive IVIG. Larger prospective studies are needed to confirm these findings.

	IVIG (n=26)	No IVIG (n=10)	p-value
Time from transplant to infection (days), median (IQR)	238.5 (88.4, 484.0)	183.0 (74.0, 638.0)	0.89
Initial infection type at admission, n (%)			
Viral	17 (65.4)	9 (90.0)	0.22
Bacterial	9 (34.6)	2 (20.0)	0.69
Fungal	4 (15.4)	0 (0.0)	0.56
Primary Outcome			
Recurrent infections 6 months, n (%)	4 (15.4)	0 (0.0)	0.19
Mild HGG (IgG 500-699)	1 (3.8)	0 (0.0)	
Moderate HGG (IgG 400-499)	2 (7.7)	0 (0.0)	
Severe HGG (IgG <400)	1 (3.8)	0 (0.0)	
Secondary Outcomes			
Recurrent infections, n (%)			
3 months	3 (11.5)	0 (0.0)	0.19
12 months	5 (19.2)	0 (0.0)	0.14
New infections, n (%)			
3 months	8 (30.8)	2 (20.0)	0.52
6 months	10 (38.5)	2 (20.0)	0.29
12 months	13 (50.0)	2 (20.0)	0.10
HGG severity, n (%)			0.02
Mild (IgG 500-699)	9 (34.6)	8 (32.0)	
Moderate (IgG 400-499)	6 (23.1)	2 (8.0)	
Severe (IgG <400)	11 (42.3)	0 (0.0)	



CITATION INFORMATION: Hoang J., Nguyen D., Graviss E., Moaddab M., Guha A., Krisl J. Intravenous Immunoglobulin in Heart Transplant Recipients with Hypogammaglobulinemia and Infection *AJT, Volume 21 Supplement 3*

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Abstract# 1187

Right Ventricular Dysfunction After Heart Transplantation: When to Worry?

S. Kim, J. Patel, M. Kittleson, T. Singer-Englar, N. Patel, R. Skorka, D. Chang, E. Kransdorf, M. Hamilton, B. Azarbal, L. Czer, D. Ramzy, J. A. Kobashigawa, *Cedars-Sinai Smidt Heart Institute, Los Angeles, CA*

Purpose: Right ventricular (RV) dysfunction after heart transplantation (HTx) is not uncommon. The cause of RV dysfunction may be due to inadequate preservation, high pulmonary artery pressures, and extensive bleeding where high volumes of fluid are administered to the RV which begins to dilate. Recovery of RV dysfunction after HTx is not clear. There does not appear to be good biomarkers or hemodynamics that can predict easy recovery. The use of the pulmonary artery pulsatility index (PAPi) is defined as [(systolic pulmonary artery pressure - diastolic pulmonary artery pressure)/central venous pressure]. This is a novel hemodynamic index that can predict the severity of RV failure. It is not clear whether the use of PAPi can predict which patients would recover more rapidly from RV dysfunction.

Methods: Between 2010 and 2019, we assessed 33 HTx patients who developed RV failure, characterized by central venous pressure greater than 15 mmHg, pulmonary capillary wedge less than 15 mmHg, and echocardiographic RV function or dysfunction noted as moderate to severe. These patients were assessed for PAPi and followed by serial echocardiograms until RV function normalized. Correlation of PAPi to duration of RV dysfunction was recorded. PAPi was calculated at the time of established RV dysfunction, where PAPi value ≤1 was defined as abnormal. The time to recovery of RV function was correlated to PAPi as defined as normal versus abnormal.

Results: Abnormal PAPi patients compared to normal PAPi patients revealed a trend in longer time to recovery of RV dysfunction (111.3 vs. 36.3 days, p=0.071). This longer recovery time in the abnormal PAPi group persisted despite fewer patients with pulmonary hypertension. (See table.)

Conclusions: In HTx patients with RV dysfunction, the use of PAPi may be a prognostic marker for RV recovery and may even be a benchmark to determine if RV unloading with sildenafil may be appropriate.

Endpoints	Normal PAPi (n=24)	Abnormal PAPi (n=9)	P-Value
PAPi, mean ± SD	4.3 ± 3.5	0.33 ± 1.4	0.002
Recovery Time in Days, mean ± SD	36.3 ± 52.1	111.3 ± 182.0	0.071
Pulmonary Hypertension (%)	41.7% (10)	22.2% (2)	0.301

CITATION INFORMATION: Kim S., Patel J., Kittleson M., Singer-Englar T., Patel N., Skorka R., Chang D., Kransdorf E., Hamilton M., Azarbal B., Czer L., Ramzy D., Kobashigawa J. Right Ventricular Dysfunction After Heart Transplantation: When to Worry? *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Kim: None. **J. Patel:** Consulting Fee; Name of Commercial Interest; Pfizer, Akcea. Grant/Research Support; Name of Commercial Interest; Alexion Pharmaceuticals, Astra Zeneca. Other; Name of Commercial Interest; Alnylam Pharmaceuticals, Mallinckrodt Pharmaceuticals. **M. Kittleson:** None. **T. Singer-Englar:** None. **N. Patel:** None. **R. Skorka:** None. **D. Chang:** Grant/Research Support; Name of Commercial Interest; Mesoblast, Amgen, Biocardia. Other; Name of Commercial Interest; Abbott Laboratories, AbbVie Inc., Repligen, Portola Pharmaceuticals, Amarin Corp. **E. Kransdorf:** None. **M. Hamilton:** Consulting Fee; Name of Commercial Interest; Abbott Laboratories. **B. Azarbal:** None. **L. Czer:** Grant/Research Support; Name of Commercial Interest; Abbott Laboratories. **D. Ramzy:** Consulting Fee; Name of Commercial Interest; Abbott Laboratories, LivaNova. Honoraria; Name of Commercial Interest; Abiomed. Travel; Name of Commercial Interest; Medtronic Vascular Inc. **J.A. Kobashigawa:** Consulting Fee; Name of Commercial Interest; Novartis, Sana Biotechnology, Sanofi-Aventis, TransMedics. Grant/Research Support; Name of Commercial Interest; CareDx Inc., Sanofi-Genzyme. Honoraria; Name of Commercial Interest; One Lambda Inc..

Abstract# 1188

Impact of Donor and Recipient Age Difference: Outcomes within the First Year of Orthotopic Heart Transplant

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Purpose: In recent history, the number of patients listed as eligible to receive a heart transplant has increased by nearly 40%. However, not all hearts that are offered for donation are acceptable organs to be placed in recipients and the highest rates of rejected hearts were those from older donors. This study aims to determine whether donor and recipient age differences have an impact on transplant-associated adverse events within the first year post-transplant.

Methods: This was a retrospective, single-center, observational study conducted at CHI St. Luke's Health Baylor St. Luke's Medical Center (BSLMC) to determine incidence of graft survival one year post-heart transplant and transplant-related morbidity. Data were collected on adult patients who were transplanted at BSLMC from January 2012 to July 2019. Patients were excluded if they were lost to follow-up less than one year post-transplant, had a prior transplant or received dual organ transplantation. Patients were grouped based on differences in age between donor and recipient. Group 1 had donors older than recipients, Group 2 had donors 0 to 20 years younger than recipients, Group 3 had donors 21 to 40 years younger than recipients and Group 4 had donors over 40 years younger than recipients. Rejection was defined as biopsy-proven grades of at least 2R or greater or C4D positive based on the International Society for Heart and Lung Transplantation criteria.

Results: Information for 106 donors and recipients was included in this study, shown in Table 1 below. Results were considered significant for p-values less than 0.05. The only significant outcome was found in rates of antibody mediated rejection (AMR), with 25% of patients in Group 1 positive for AMR, compared to 27% in Group 2, 11% in Group 3 and 0% in Group 4. Of note, rates of death one year post-transplant were highest in Group 1 patients at 25% compared to only 6% in Group 2, 9% in Group 3 and 3% in Group 4.

Conclusions: This study demonstrated higher rates of rejection within the first year after a heart transplant in those recipients with older donors (Group 1) and recipients with donors less than 20 years younger (Group 2). Additionally, although not statistically significant, Group 1 patients demonstrated numerically higher death rates versus other recipient groups. However, given the limited sample size of Group 1, this study indicates that further research needs to be completed.

Table 1	Group 1 (n = 4)	Group 2 (n = 18)	Group 3 (n = 56)	Group 4 (n = 28)	Overall (n = 106)	p-value@
Biopsy Proven Rejection, n (%)#						
AMR	1 (25)	5 (27)	6 (11)	0 (0)	12 (11)	0.013
ACR	3 (75)	8 (45)	21 (38)	9 (32)	41 (39)	0.432
CAV, n (%)	0 (0)	1 (6)	2 (4)	1 (4)	4 (4)	0.844
Rejection Treatment, n (%)*	**n = 3**	**n = 10**	**n = 29**	**n = 12**	**n = 54**	
Pulse steroids	3 (100)	10 (100)	27 (93)	10 (83)	50 (93)	0.592
Antithymocyte globulin	1 (33)	6 (60)	5 (17)	2 (17)	14 (26)	0.06
TPE	2 (67)	4 (40)	5 (17)	1 (8)	12 (22)	0.06
IVIg	0 (0)	1 (10)	5 (17)	1 (8)	6 (13)	0.911
Disposition at 1 year, n (%)						
Home	3 (75)	14 (78)	48 (86)	27 (97)	92 (86)	0.154
Acute Hospitalization	0 (0)	3 (17)	3 (5)	0 (0)	6 (6)	0.124
Deceased	1 (25)	1 (6)	5 (9)	1 (3)	8 (8)	0.051

Group 1: Donors older than recipients, **Group 2**: Donors 0 to 20 years younger than recipients, **Group 3:** Donors 21 to 40 years younger than recipients, **Group 4**: Donors more than 40 years younger than recipients
AMR: antibody mediated rejection, **ACR:** acute cellular rejection, **CAV:** cardiac allograft vasculopathy, **TPE:** therapeutic plasma exchange, **IVIg:** intravenous immunoglobulin
@Fischer exact probability test used for statistical calculations
#6 patients had both AMR and ACR (1 patient in Group 1, 3 patients in Group 2 and 2 patients in Group 3)
*Includes all patients treated for rejection (4 patients in Group 3 and 3 patients in Group 4 were treated without biopsy-proven rejections) where n = number of patients treated for rejection

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DISCLOSURES: M. Mascetti: None. **M. Manson:** None. **Z. Truman:** None.

Abstract# 1189

Outcomes of HLA Antibody Surveillance Protocol in Heart Transplant Patients - A Single-Center Retrospective Analysis

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Purpose: Post-transplant care is multifaceted with protocols to provide oversight and maintain the standard of care. While institutional protocols for post-transplant HLA antibody surveillance after a positive virtual crossmatch (VXM) are often implemented, the impact on outcomes and survival is unclear. Our program implemented a protocol for antibody mediated rejection (AMR) surveillance for HLA donor specific antibodies (DSA) on post-transplant day 3 and 7 for patients with positive retrospective flow crossmatch (FXM), positive virtual crossmatch (VXM), DSAs present on VXM within 3 months, or DSAs newly detected on the serum sample tested for FXM.

Methods: Patients who received cardiac transplant between January 2018 and September 2020 in our center were retrospectively reviewed. Data was compiled to evaluate our protocol for DSA surveillance and survival at one-year post transplant. Multi-organ and re-transplant patients were excluded from the study.

Results: Of 143 eligible patients, 38 (27%) were positive for DSA at VXM. Of the 105 patients with negative VXM, 9 tested positive for DSA on sample used for FXM. Of those negative for DSAs on either crossmatch, only 8% developed DSAs by days 3 and 15% by day 7. Of those with DSAs on either crossmatch, 38% remained positive on days 3 and 7. Out of these patients, one was positive at day 3 with MFI increasing on day 7. Treatment for AMR was initiated on day 8. Only 18% of initially positive patients remained positive at 1 year. 21% were treated for rejection despite only 3% showing biopsy evidence of rejection. At 1 year, 91% of positive patients were alive.

Conclusions: Our findings suggest that patients positive for DSAs do not have inferior short-term outcomes compared to those negative for DSAs when early and serial HLA antibody testing was performed. This protocol allows early detection of DSAs and prompt management of potential rejection which could improve overall survival.
CITATION INFORMATION: Patlolla S., Bhattad V., McKean S., Askar M., Hall S. Outcomes of HLA Antibody Surveillance Protocol in Heart Transplant Patients - A Single-Center Retrospective Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.S. Patlolla: None. **V. Bhattad:** None. **S. McKean:** None. **M. Askar:** None. **S. Hall:** None.

Abstract# 1190

Impact of a Pharmacist in an Outpatient Heart Transplant Clinic

A. Prom[1], D. Ricciuti[1], J. Newman[2], C. Doligalski[1], *[1]UNC Health Care, Chapel Hill, NC, [2]Eshelman School of Pharmacy, Chapel Hill, NC*

Purpose: Data describing the impact of a pharmacist in ambulatory medication management of heart transplant recipients (HTRs) is lacking. Following the addition of an ambulatory clinical pharmacist to the heart transplant team in 1/2017 we assessed outcomes at 1 year post-transplant of HTRs seen by a pharmacist compared to those not seen by a pharmacist at a single center.
Methods: A retrospective unpaired analysis of de novo HTRs from 1/2015-12/2019 was conducted. Dual organ, pediatric and HTRs who did not survive to discharge were excluded. Incidence of cardiac allograft vasculopathy (CAV), cellular and antibody-mediated rejection, all-cause rehospitalizations, all-cause mortality, attainment of goal blood pressure, hemoglobin A1c (A1c), tacrolimus level variability (CV) and use of aspirin and statin therapy were compared between pre and post pharmacist groups at 1 year post-transplant. No other personnel or protocol changes occurred during the study period. Chi-square and unpaired t-tests were used to conduct the analysis.
Results: 59 HTRs were included with an average of 12.2 ± 3.5 pharmacist visits per HTR in the pharmacist group. No differences in baseline demographics (Table 1) or maintenance immunosuppression (Table 2) were identified. At 1 year, the pharmacist cohort had a higher percentage of HTRs at goal blood pressure, on a statin, and on appropriate intensity statin (Figure 1), as well as fewer HTRs with any readmission and fewer total readmissions (Table 2). No differences in 1 year A1c control, tacrolimus CV, aspirin use, CAV, donor specific antibodies (DSAs), rejection or all-cause mortality were seen.
Conclusions: Based on this single center limited cohort study, pharmacist integration into an ambulatory heart transplant team has the potential to improve 1 year outcomes by targeting goal-directed medication therapy and reducing hospital readmissions.

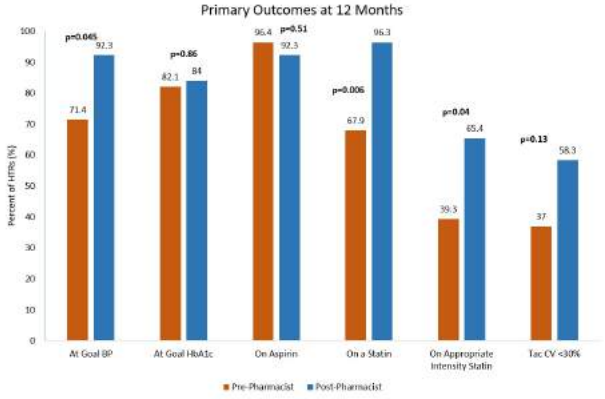

Table 1. Baseline Demographics

	Entire Cohort (N=59)	Pre-Pharmacist (N=28)	Post-Pharmacist (N=31)	P Value
Age at Transplant, mean (SD)	53.1 (10.6)	53.4 (10.8)	52.8 (10.6)	0.81
Male Sex, N (%)	41 (69.5)	18 (64.3)	23 (74.2)	0.65
Caucasian Race, N (%)	29 (49.2)	12 (42.9)	17 (54.8)	0.52
BMI at Transplant, mean (SD)	28.2 (4.8)	28.1 (4.7)	28.3 (5.0)	0.86
Native Heart Primary Diagnosis				
Ischemic, N (%)	19 (32)	13 (46)	6 (19)	0.07
Non-ischemic, N (%)	40 (68)	15 (54)	25 (81)	
Median Waitlist Time, Days (Range)	124 (3-1574)	126 (15-1021)	124 (3-1574)	0.37
Pre-Transplant Support				
MCS, N (%)	33 (55.9)	12 (42.9)	21 (67.7)	0.20
Inotropes, N (%)	26 (44.1)	16 (57.1)	10 (32.3)	
Median Post-Transplant LOS, Days (Range)	20 (10-66)	19 (11-37)	20 (10-66)	0.18
Induction Agent				
Corticosteroids only, N (%)	53 (89.8)	26 (92.9)	27 (87.1)	0.82
Thymoglobulin, N (%)	6 (10.2)	2 (7.1)	4 (12.9)	
Mean Pre-Transplant SCr in mg/dL (SD)	1.1 (0.3)	1.1 (0.3)	1.1 (0.4)	0.63
Pre-Transplant Diabetes, N (%)	12 (20)	4 (14)	8 (26)	0.33
Median Pre-Transplant HbA1c (Range)	5.6 (4.1-11.9)	5.5 (4.1-7.3)	5.6 (4.7-11.9)	0.29
Mean Pre-Transplant LDL (SD)	82.6 (39.9)	92.4 (40.3)	76.0 (38.8)	0.15

Table 2. Primary Outcomes at 12 Months and Summary of Immunosuppression

	Pre-Pharmacist (n=28)	Post-Pharmacist (n=31)	P-Value
12 Month Clinical Outcomes			
CAV, N (%)	2 (7.1)	2 (6.5)	1.00
Positive DSAs, N (%)	7 (25.0)	8 (25.8)	0.94
Median Time to first positive DSA, Days (Range)	27 (7-256)	21 (5-115)	0.42
Median Peak MFIs (Range)	2534 (1067-10726)	6524.5 (1218-10521)	0.14
Treated Rejection, N (%)	13 (46.4)	13 (41.9)	0.73
Thymoglobulin Treated Rejection, N (%)	1 (7.7)	2 (15.4)	0.54
Median Time to Treated Rejection, Days (Range)	28 (7-349)	46.5 (1-317)	0.91
Patients Readmitted, N (%)	18 (64.3)	12 (38.7)	0.05
Total Number of Readmissions, N	55	21	0.02
All-Cause Mortality, N (%)	0 (0.0)	1 (3.2)	0.34
Immunosuppression			
Median Tacrolimus level in ng/mL (range)			
3 months	10.35 (5.8-14.9)	10.65 (5-14.7)	0.72
6 months	9.35 (4.3-13.2)	9.18 (5-12.9)	0.87
9 months	9.35 (5.8-12.2)	9.3 (3.8-13.6)	0.69
12 months	7.6 (3.5-12.4)	8 (4.1-15.7)	0.51
Median Tacrolimus Variability (CV), % (range)			
3 months	33 (11-60.1)	31.7 (16.8-65.9)	0.9
6 months	28.2 (8.7-70.6)	25 (11.7-83.5)	0.95
9 months	28.2 (9.1-58.2)	31.8 (16.4-69.1)	0.74
12 months	31.6 (2.5-58)	24 (10.4-62.7)	0.92
mTOR inhibitor use, N (%)			
3 months	0 (0)	1 (3.23)	0.34
6 months	0 (0)	3 (10)	0.09
9 months	2 (7.14)	6 (20)	0.16
12 months	2 (7.14)	6 (23)	0.10
Mean Prednisone total daily dose, mg (SD)			
3 months	13.1 (1.46)	12.3 (2.13)	0.11
6 months	6.2 (2.59)	5.3 (3.87)	0.35
9 months	1.1 (2.09)	2 (3.79)	0.26
12 months	0.89 (1.55)	0.87 (2.34)	0.96
Mean mycophenolate mofetil total daily dose, mg (SD)			
3 months	2035.7 (637.2)	2032.3 (729.6)	0.98
6 months	1785.7 (865.3)	1310.3 (958.2)	0.06
9 months	1339.3 (981.8)	899.3 (880.6)	0.08
12 months	1107.1 (762)	1008.8 (985.9)	0.68

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DISCLOSURES: A. Prom: None. **D. Ricciuti:** None. **J. Newman:** None. **C. Doligalski:** None.

Abstract# 1191

Geographic Variation in Candidate Listing Behavior Under the New Heart Allocation Policy

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Purpose: Describe and explain variations in listing practice among U.S. transplant centers in response to the new allocation policy.
Methods: We performed an observational cohort study comparing adult, heart-alone transplant candidates listed post-policy (December 2018 - February 2020) to a seasonally matched, pre-policy cohort (December 2016 - February 2018). We used mixed-effect logistic regression models to estimate each transplant center's expected and observed rate of high-priority status listing, and the association of pre-policy organ procurement organization (OPO) characteristics with the policy effect.
Results: Similar numbers of candidates were listed by U.S. transplant centers (N = 96) in each policy period (4,472 vs. 4,498). The average transplant center had greater odds of utilizing high-priority status than expected (OR: 6.34; 95% CI: 5.08-7.91), after adjusting for candidate characteristics. Ninety-one of 96 (94.8%) centers listed significantly more candidates at high-priority status than expected, with the unexpected increase varying from 4.8% to 50.4% (IQR: 14.0% - 23.3%). Compared with the average center, centers in OPOs with high rate of transplantation among high-priority candidates under the previous allocation scheme were significantly more likely to list candidates at high-priority status under the new policy (OR: 9.73, p = 0.01).
Conclusions: While listing behavior varied substantially between transplant centers in response to the new allocation policy, the utilization of high-priority statuses exceeded expectations in almost all centers. Widespread changes in transplant center practices may undermine the effectiveness of the new heart allocation policy.
CITATION INFORMATION: Ran G., Chung K., Anderson A., Gibbons R., Narang N., Churpek M., Parker W. Geographic Variation in Candidate Listing Behavior Under the New Heart Allocation Policy *AJT, Volume 21 Supplement 3*
DISCLOSURES: G. Ran: None. **K. Chung:** None. **A.S. Anderson:** None. **R. Gibbons:** None. **N. Narang:** None. **M. Churpek:** Grant/Research Support; Name of Commercial Interest; Tel Aviv. Grant/Research Support; Nature of Relationship; Other. Grant/Research Support; If "Other" Please Explain; Matthew Churpek has received research support from EarlySense (Tel Aviv, Israel). **W.F. Parker:** None.

Abstract# 1192

Combined Heart-liver Transplantation in Patients with Familial Amyloidosis - Analysis of Optn/Unos Database

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Purpose: We compared the outcomes after combined heart-liver transplant (CHLT) for patients with Familial Amyloidosis (FA) versus other indications (primary cardiac:congenital heart disease and idiopathic dilated cardiomyopathy; primary liver: cardiac cirrhosis and hepatitis C) in the United States.

Methods: We performed a retrospective review of the OPTN/UNOS database for patients who had undergone CHLT from October 1987 through April 2020. Patient survival and graft survival analyses (FA versus non-FA) were done using the R package ComparisonSurv, using the cloglog-transformed survival test of difference. Continuous variables were reported as mean (± standard deviation) or median (± IQR) and categorical variables were reported as counts/percentages. A p-value < 0.05 was considered significant.

Results: Between 1987 and 2020, 344 CHLT were performed [74 (21.5%) FA and 270 (78.4%) non-FA]. The FA patients were significantly older (58.7 vs 42.8 years, p<0.0001) and a majority were males (85% vs. 65.6%, p = *0.001).* FA patients trended towards shorter waitlist times (90.5 vs. 131 days, p = 0.07). There was no significant difference in the need for pre-transplant mechanical or ionotropic support. The 1- and 5-year patient survival for FA patients trended to be better than non-FA patients (91.6% vs 86.5%, p = 0.26 and 85.9% vs 79.5%, p = 0.27, respectively). However, this trend reversed towards inferior survival at 10-years (55.3% vs 68.6%, p = 0.16). Graft survival for both heart and liver followed similar trends at 1-, 5-, and 10-years, though not statistically significant.

Conclusions: In USA, CHLT recipients with familial amyloidosis are older but have excellent short-term outcomes compared to recipients transplanted for other indications. More research is needed to outline the reasons for a trend towards inferior long-term survival in CHLT recipients with FA.

CITATION INFORMATION: Sharma A., Sickels A., Ruch B., Carli M., Levy M. Combined Heart-liver Transplantation in Patients with Familial Amyloidosis - Analysis of Optn/Unos Database *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Sharma: None. **A. Sickels:** None. **B. Ruch:** None. **M. Carli:** None. **M. Levy:** None.

Abstract# 1193

Simultaneous Heart-Liver-Kidney Transplantation Survival: National and Single-Center Outcomes

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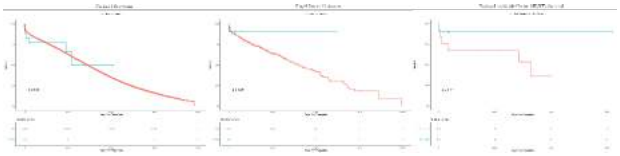
Purpose: Simultaneous Heart-Liver-Kidney transplantation (SHLKTx) is an incredibly rare, high-risk operation undergone by well-selected patients presenting with multi-organ failure. Our center has performed 10 of the 23 SHLKTxs to date. We compared survival and all-cause mortality in SHLKTx patients to those undergoing single- or double-organ heart transplants (HTx) on a national and single-center scale.

Methods: We performed a retrospective analysis of SHLKTx and HTx recipients from October 1987 to September 2020, using the UNOS Standard Transplant Analysis and Research database. A total of 80,039 HTx patients and 23 SHLKTx patients were included in our analysis. Of these, 660 and 10, respectively, were transplanted at our center. Survival and all-cause mortality were compared using Kaplan-Meier analysis and Cox regression.

Results: SHLKTx patients had worse baseline clinical status as they were more likely to be diabetic and possess elevated creatinine and serum total bilirubin levels (p <0.05 for all). These three factors were significant predictors of mortality in univariate and multivariate analyses (Multivariate HR: 1.215, 1.044, 1.015, respectively; p <0.0001 for all). However, post-transplant survival was comparable between patients undergoing SHLKTx and those undergoing single- or double-organ HTx on both national and single-center scales (p = 0.85 and p = 0.29, respectively). Furthermore, SHLKTx was not significantly associated with mortality in either national or single-center data, and there was a non-significant trend towards improved survival in our center's SHLKTx patients compared to our center's HTx patients and SHLKTx patients from other centers.

Conclusions: Current data indicates that patients undergoing SHLKTx experience survival and mortality outcomes comparable to those undergoing single- or double-organ heart transplants at both national and single-center levels. Our findings are limited by a lack of long-term follow-up and the rarity of SHLKTx. Further studies are needed to investigate other clinically significant outcomes such as rejection and infection.



CITATION INFORMATION: Siddiqi U., Combs P., Kim G., Baker T., Becker Y., Jeevanandam V. Simultaneous Heart-Liver-Kidney Transplantation Survival: National and Single-Center Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: U.A. Siddiqi: None. **P.S. Combs:** None. **G. Kim:** None. **T. Baker:** None. **Y. Becker:** None. **V. Jeevanandam:** Consulting Fee; Name of Commercial Interest; Abbott.

Abstract# 1194

Primary Graft Dysfunction in a Risk-Stratified vs. Routine Induction Protocol in Heart Transplant Recipients

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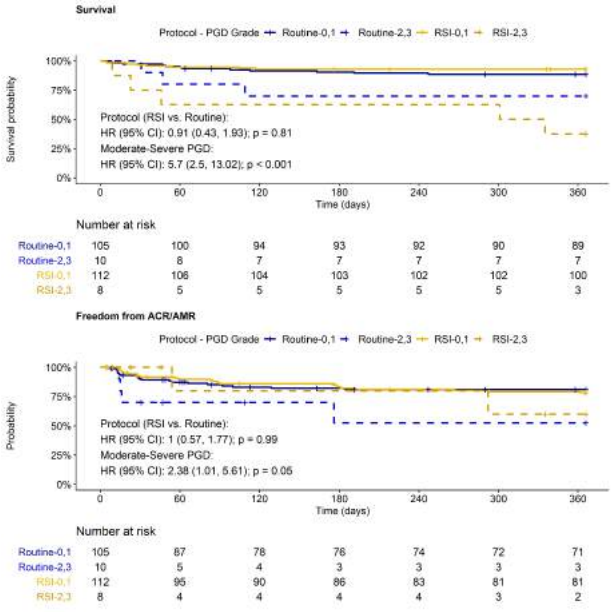
Purpose: Treatment of left ventricular primary graft dysfunction (PGD-LV) is supportive in nature. We aim to evaluate whether a change in induction protocol from a routine to risk stratified (RSI) approach resulted in a change in prevalence of PGD-LV or inotrope score.

Methods: We retrospectively reviewed consecutive first-time heart transplant recipients between January 2015 and February 2019. PGD-LV was graded according to the ISHLT-2014 criteria. Survival and biopsy-proven acute cellular (ACR≥2R) and antibody-mediated rejection (pAMR>0) were assessed to 1 year post-transplant. Baseline recipient and donor characteristics, and PGD-LV were compared between protocols using chi-square, Fisher Exact, Wilcoxon, and t-tests. Rank-based analysis of covariance was used to compare inotrope score adjusted for confounders. Time to event outcomes were analyzed using Cox proportional hazard models adjusted for moderate-severe PGD-LV.

Results: Of 235 recipients, 115 followed a routine induction protocol and 120 the RSI protocol implemented in 2017. In the routine group, 111 (97%) were treated with Basiliximab and 4 (3%) with Anti-thymocyte globulin (ATG); whereas 17 (14%) received Basiliximab, 2 (2%) ATG and 101 (84%) no induction therapy in the RSI group. Baseline recipient and donor characteristics were similar, except significantly higher mean arterial pressure (median [Q1-Q3]: 87 [81 - 97] vs. 83 [76 - 90] mmHg; p=0.01), fewer donors with left ventricular hypertrophy (LVH) (11% vs. 26%; p=0.008) and lower ischemic time (median [Q1 - Q3]: 179 [136, 225] vs. 209 [169, 247] min; p<0.001) in the RSI cohort. The prevalence of PGD-LV was similar (RSI vs. routine: 17% vs. 18%; p=0.88) and was composed of 23 mild, 6 moderate and 12 severe cases. In contrast, the median [Q1-Q3] inotrope score of 11 [7-14] in the RSI group was lower compared to 12 [9-17] in the routine group (p=0.02) which remained significant adjusting for donor LVH and ischemic time. The risk of mortality and of rejection between RSI and routine cohorts were similar when adjusting for moderate-severe PGD (p=0.81 and p=0.99; Fig.1).

Conclusions: The RSI approach was associated with a reduction in induction therapy usage without an increase in PGD-LV. Risk of rejection and mortality adjusting for PGD-LV severity appears comparable between induction strategies. Moreover, a small reduction in the inotrope score was observed in the RSI cohort warranting further investigation.



CITATION INFORMATION: van Zyl J., Zafar H., Nguyen P., Felius J., Sam T., Hall S. Primary Graft Dysfunction in a Risk-Stratified vs. Routine Induction Protocol in Heart Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.S. van Zyl: None. **H. Zafar:** None. **P.M. Nguyen:** None. **J. Felius:** None. **T. Sam:** None. **S.A. Hall:** None.

ID

All Infections (Excluding Kidney & Viral Hepatitis)

Abstract# 718

Risk Factors Associated with Severe COVID19 Illness in Kidney Transplant Recipients

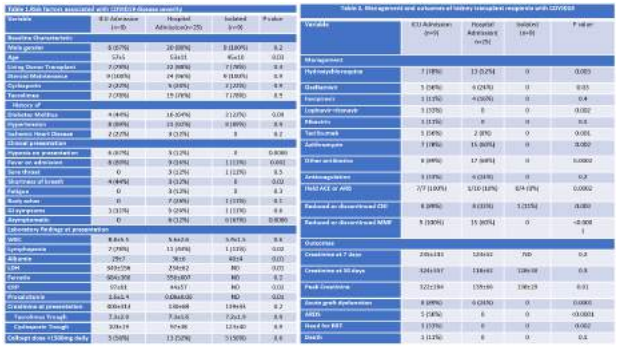
E. Abuhelaiqa, M. Alkadi, H. Tohid, R. Elidrisi, R. Abdul Rahiman, M. F. Elshirbeny, T. A. Ghonaimi, A. I. Hamad, A. Nauman, A. A Aziz, O. Fituri, M. Asim, M. A. Othman, H. Al-Malki, *Hamad Medical Corporation, Doha, Qatar*

Purpose: COVID19 is an acute respiratory infection that is caused by the SARS-COV-2 that has been shown to be highly contagious and poses a significant mortality risk. Kidney transplant recipients are shown to be at increased risk of acquiring and developing a severe form of the disease compared to the general population. There is limited evidence to guide the transplant community on methods to reduce disease severity. We aim to evaluate risk factors associated with severe [requiring hospitalization] or critical [requiring ICU care] COVID-19 illness in kidney transplant recipients.

Methods: We evaluated kidney transplant recipients with COVID19 between February to August 2020. Among 748 recipients followed at our center, 43 recipients (5.7%) were diagnosed with COVID19 infection through nasopharyngeal swab PCR. Of those, 9 patients were treated within an isolation facility, 25 patients admitted to the hospital and 9 patients were admitted to the intensive care unit (ICU). We evaluated demographic, clinical and laboratory factors to evaluate severity of illness by using Kruskal-Wallis for continuous variables and chi square test for categorical.

Results: Older age was associated with ICU admission (57 vs. 53 vs. 45 P=0.03) while gender, ethnicity and type of transplant were similar between the three groups (Table 1). In addition, CNI level, MMF dose or base line creatinine was not significantly different between the three groups. Presentation with fever, shortness of breath and hypoxia were more frequent in ICU group. Laboratory findings of lymphopenia, low Albumin, high CRP and high procalcitonin at presentation were also more frequent in ICU group. Treatment with hydroxychloroquine, Oseltamivir, Ritonavir, Azithromycin, and reduction of immunosuppression were more frequent in ICU (table 2). We observed 14 patients with graft dysfunction and majority were in ICU group. Furthermore, in the ICU group, 3 recipients required renal replacement therapy and of those there was a single death.

Conclusions: Severity of COVID19 infection is variable among our transplant population. Prognostication of COVID19 severity in kidney transplant recipient is crucial for early recognition of critical illness and may offer the benefit of early therapy such as antiviral or immunosuppression reduction in this high-risk group.



CITATION INFORMATION: Abuhelaiqa E., Alkadi M., Tohid H., Elidrisi R., Abdul Rahiman R., Elshirbeny M., Ghonaimi T., Hamad A., Nauman A., A Aziz A., Fituri O., Asim M., Othman M., Al-Malki H. Risk Factors Associated with Severe COVID19 Illness in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Abuhelaiqa: None. **M. Alkadi:** None. **H. Tohid:** None. **R. Elidrisi:** None. **R. Abdul Rahiman:** None. **M.F. Elshirbeny:** None. **T.A. Ghonaimi:** None. **A.I. Hamad:** None. **A. Nauman:** None. **A. A Aziz:** None. **O. Fituri:** None. **M. Asim:** None. **M.A. Othman:** None. **H. Al-Malki:** None.

Abstract# 719

Clinical Outcomes of Solid Organ Transplant Recipients with Severe Acute Respiratory Syndrome Coronavirus 2

R. Adekunle, D. Jandhyala, J. Lewis, *Medicine, Division of Infectious Diseases, Medical University of South Carolina, Charleston, SC*

Purpose: The Centers for Disease Control and Prevention identified solid organ transplant (SOT) recipients as persons at high risk to develop severe illness secondary to Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). We reviewed the clinical characteristics and outcomes of SOT recipients who had SARS-CoV-2 at our center.

Methods: This was a retrospective review of SOT recipients diagnosed with SARS-CoV-2 between March 1st 2020 and September 31st 2020 in the Medical University of South Carolina (MUSC) Health Care system. Subjects were included if they had undergone SOT at any time prior to a positive SARS-CoV-2 PCR. Descriptive statistics were used to analyze demographic and clinical characteristics. Primary outcomes included need for hospitalization, complications, and estimated all-cause mortality.

Results: 51 SOT recipients were diagnosed with SARS-CoV-2. Five patients were excluded as they initially tested positive and were admitted to another facility. 46 SOT recipients were analyzed, of which, 31 (67%) were hospitalized. Of those hospitalized, 45% were males, 68% were black and 71% were kidney transplant recipients. Median length of stay was three days (range 0.6-108.6). 10 (32%) patients required supplemental oxygen and 6 (19%) received care in the intensive care unit. Complications, including bacterial infections (16%), fungal infections (3%), CMV reactivation (6%), and rejection (3%) were rare. One patient (2%) died during the study time period.

Conclusions: The majority of SOT recipients with SARS-CoV-2 in our cohort required admission, however they experienced few complications and a low mortality, despite their high-risk status.

Table 1. Clinical data for 31 hospitalized solid organ transplant recipients

Age at diagnosis, years, median (range)	53 (15-74)
Sex	
Male	17 (55)
Female	14 (45)
Race	
Black	21 (68)
White	7 (23)
Other	3 (10)
Organ type	
Kidney	22 (71)
Kidney-liver	1 (3)
Kidney-pancreas	4 (13)
Liver	1 (3)
Heart	1 (3)
Lung	2 (6)
LOS, days, median (range)	3.0 (1-109)
Required supplemental O2, n (%)	10 (32)
Nasal cannula	6 (19)
High flow nasal cannula	1 (3)
Mechanical ventilation	3 (10)
ICU admission, n (%)	6 (19)
Treatments received, n (%)	
Remdesivir	5 (16)
Convalescent plasma	6 (19)
Dexamethasone	5 (16)
Complications, n (%)	
Rejection	1 (3)
CMV reactivation	2 (6)
Bacterial infection	5 (16)
Fungal infection	1 (3)
Death	1 (3)

Abbreviations: ICU: Intensive Care Unit; LOS: Length of stay; O2: Oxygen

CITATION INFORMATION: Adekunle R., Jandhyala D., Lewis J. Clinical Outcomes of Solid Organ Transplant Recipients with Severe Acute Respiratory Syndrome Coronavirus 2 *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Adekunle: None. **D. Jandhyala:** None. **J. Lewis:** None.

Abstract# 720

Outcomes of Lung Transplantation with Multi Drug Resistant Colonized Grafts, Retrospective Cohort Study in a Tertiary Care Hospital

N. Al-Ashi, *Pharmacy, King Fahad Specialist Hospital -Dammam, Khobar, Saudi Arabia*

Purpose: Infections are the primary cause of morbidity and mortality after solid organ transplantation. Due to high incidence of lung graft colonization with multi drug resistant organisms, King Faisal Specialist Hospital & Research Center upgraded their antibacterial prophylaxis protocol to include colistin, meropenem and vancomycin. Our aim is to evaluate the safety and efficacy of this regimen in reducing the incidence of donor derived infections and improving patient and graft survival post lung transplantation.
Methods: Retrospective case control study, included all adult lung transplant recipients with multi drug resistant colonized grafts who underwent lung transplantation from 2010-2019 (study group) compared to those in the same time period without multi-drug resistant colonization (control group). Pediatrics, multi-organ transplantat recipients, and patients who died within 24-hours due to technical reasons will be excluded. The primary outcome was the rate of donor derived bacterial infections in the first month post lung transplantation. Secondary outcomes included graft and patient 6- and 12-month survival, ECMO requirement post transplantation, rate of re-hospitalization in the first 6 months post transplantation, and safety outcomes (acute kidney injury, neurotoxicity and clostridium difficile infection). A non-inferiotity analysis for the differences between the groups in primary and seconday outcomes will be conducted, with regression analysis to assess the effect of different baseline variables on the outcomes.
Results: Preliminary analysis of 31 patients (16 in study group and 15 controls), patients in the study group were younger than the control group (36.75±11.34 vs. 41.60±14.85 years; p=NS). The most common indication for lung transplantation is idiopathic interstitial pneumonia (control 40% and study 31.25%). Donor-derived infections occurred in 10 patients in the study group (62.50%) vs. 8 of the control (53.33%); p= NS. Patients in the study group required approximately 5 times more ECMO post-transplantation than controls. Six- and 12- month survival was 100% in both groups.
Conclusions: As expected, numerically, the rate of donor deriver infections is higher in the study group. However, conclusions cannot be drawn until complete analysis of study cohort.
CITATION INFORMATION: Al-Ashi N. Outcomes of Lung Transplantation with Multi Drug Resistant Colonized Grafts, Retrospective Cohort Study in a Tertiary Care Hospital *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Al-Ashi: None.

Abstract# 722

Risk Factors and Outcomes of Neutropenia in Kidney Transplant Recipients

R. Avery[1], J. Motter[1], S. Sae-Tia[2], N. Lu[1], W. Cochran[1], A. Massie[1], D. Brennan[1], F. Akinwande[1], S. Shoham[1], E. Kraus[1], N. Alachkar[1], S. Alasfar[1], F. Naqvi[1], F. Al Ammary[1], K. Marr[1], S. Mehta Steinke[1], N. Desai[1], O. Ezennia[1], P. Plummer[1], C. Durand[1], W. Werbel[1], M. Y. Kim[1], D. Segev[1], J. Garonzik Wang[1], B. Trollinger[1], L. Lees[1], L. Toman[1], S. Shulder[3], K. Dzintars[1], D. Ostrander[1], *[1]Johns Hopkins, Baltimore, MD, [2]Stony Brook University, Stony Brook, NY, [3]University of Rochester, Rochester, NY*

Purpose: Neutropenia is a common side effect of valganciclovir and may pose increased risk for post-transplant infections. Medications such as mycophenolate and infections such as CMV also contribute to neutropenia risk. We sought to determine the incidence of infections in patients who did or did not develop neutropenia post-transplant.
Methods: Of 1076 kidney transplant recipients at our center from 2010-2014, we identified 393 patients (36.5%) who had developed neutropenia at any time post-transplant (ANC < 1000 cells/mm^3, "neutropenic group"), and 683 (63.5%) who never developed neutropenia ("non-neutropenic group"). Data were collected on demographics, transplant characteristics, immunosuppression, and infections over 3 years post-transplant. Mild outpatient infections were excluded. We used multivariable Poisson regression to evaluate the association between neutropenia and rate of infection.
Results: Most common infections were urinary tract (in 34.5% overall), CMV (17.8%), pulmonary (17.5%), and bloodstream (12.5)%; all of these were more common in the neutropenic group (p for all < 0.02). In the neutropenic group, 34.2% had CMV DNAemia at some point, vs. 8,4% in the non-neutropenic group (p<0.001). Neutropenic fever occurred in 3.6% of the neutropenic group. Bloodstream infections occurred in 16.8% of the neutropenic group vs 10% of the non-neutropenic group (p=0.001).
Conclusions: The development of neutropenia at any time post-transplant identifies a group with an increased incidence of infections, compared to patients who never develop neutropenia. Causality is complex since infections may either result from, and contribute to, neutropenia. Further studies will be important in designing strategies for prevention of post-transplant neutropenia and associated infections.
CITATION INFORMATION: Avery R., Motter J., Sae-Tia S., Lu N., Cochran W., Massie A., Brennan D., Akinwande F., Shoham S., Kraus E., Alachkar N., Alasfar S., Naqvi F., Al Ammary F., Marr K., Mehta Steinke S., Desai N., Ezennia O., Plummer P., Durand C., Werbel W., Kim M., Segev D., Garonzik Wang J., Trollinger B., Lees L., Toman L., Shulder S., Dzintars K., Ostrander D. Risk Factors and Outcomes of Neutropenia in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Avery: Grant/Research Support; Name of Commercial Interest; Astellas, Aicuris, Merck, Oxford Immunotec, Takeda, Qiagen, Chimerix. Grant/Research Support; Nature of Relationship; Study support. **J. Motter:** None. **S. Sae-Tia:** None. **N. Lu:** None. **W. Cochran:** None. **A. Massie:** None. **D. Brennan:** Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Study support. Honoraria; Name of Commercial Interest; Allovir, Amplyx, Argenyx, CareDx, Natera, Sanofi, Veloxis. Honoraria; Nature of Relationship; Consulting/speaking honoraria. **F. Akinwande:** None. **S. Shoham:** None. **E. Kraus:** None. **N. Alachkar:** None. **S. Alasfar:** None. **F. Naqvi:** None. **F. Al Ammary:** None. **K. Marr:** Consulting Fee; Name of Commercial Interest; Amplyx, Cidara, Merck, Sfunga Equity. Consulting Fee; Nature of Relationship; Consulting/Advisory Board. Ownership Interest; Name of Commercial Interest; MycoMed Technologies. Ownership Interest; Nature of Relationship; Licensing Revenue. **S. Mehta Steinke:** None. **N. Desai:** None. **O. Ezennia:** None. **P. Plummer:** None. **C. Durand:** None. **W. Werbel:** None. **M.Y. Kim:** None. **D. Segev:** Honoraria; Name of Commercial Interest; Sanofi, Novartis, CSL Behring, Veloxis.

Honoraria; Nature of Relationship; Consulting/speaking honoraria. **J. Garonzik Wang:** None. **B. Trollinger:** None. **L. Lees:** None. **L. Toman:** None. **S. Shulder:** None. **K. Dzintars:** None. **D. Ostrander:** None.

Abstract# 723

Practice Patterns in Pneumocystis Jirovecii Pneumonia Prophylaxis in Solid Organ and Bone Marrow Transplant Recipients

S. Cao, K. Khalil, F. Cirrone, S. Mehta, *NYU Langone Transplant Institute, New York, NY*

Purpose: Trimethoprim-sulfamethoxazole (TMP-SMX) is the preferred agent for pneumocystis jirovecii pneumonia (PJP) prophylaxis in solid organ transplant (SOT) and bone marrow transplant (BMT); however, adverse effects may lead to the use of alternative agents. We sought to characterize the rate and reason for using alternative agents for PJP prophylaxis in SOT and BMT recipients over an 18-month period at a single institution to guide stewardship.

Methods: SOT and BMT patients between 2/1/2018 and 8/1/2019 were included. 455 SOT and 126 BMT patients were identified and included in the final analysis; 1 SOT and 2 BMT patients were excluded due to expiration prior to initiation of PJP prophylaxis. Electronic medical records were retrospectively reviewed for initial PJP prophylaxis choice, change of initial prophylaxis, and reason for change.

Results: Among 454 SOT and 124 BMT recipients, most (90.1%) patients received initial prophylaxis with TMP-SMX, followed by atovaquone (9.9%). In SOT recipients, the primary reason for an initial or subsequent switch to an alternative regimen was elevated creatinine or potassium. In BMT recipients, the primary reason was cytopenias. Among patients who were switched to an alternate regimen, 34 (41%) SOT recipients and 3 (12%) BMP recipients were switched back to TMP-SMX. Among patients who were initiated on an alternate regimen, 28 (59.6%) SOT recipients and 1 (9.1%) BMT recipient were switched to TMP-SMX. Mean number of days to TMP-SMX regimen interruption was 42 days in SOT recipients and 107 days in BMT recipients (p=0.005).

Conclusions: While most SOT and BMT recipients received TMP-SMX for PJP prophylaxis, alternate agents were used primarily in the setting of concern for renal and hematologic adverse effects. Patients should be monitored for recovery of renal function and cell counts to evaluate the appropriateness of switching back to TMP-SMX.

Table 1. Demographics

Variable	N	%
Solid organ transplant	454	
Average age at transplant	56.28	
Type of transplant		
Single organ	429	94.5%
Heart	49	10.8%
Kidney	263	57.9%
Delayed graft function	78	29.7%
Liver	71	15.6%
Lung	46	10.1%
Double organ	25	5.5%
Heart-lung	2	0.4%
Heart-kidney	6	1.3%
Kidney-liver	12	2.6%
Kidney-pancreas	5	1.1%
Bone marrow transplant*	129	
Average age at transplant	56.78	
Autologous	77	59.7%
Allogeneic	52	40.3%

**5 BMT patients received a second BMT yielding total 129 BMT events*

Table 2. Pneumocystis jirovecii pneumonia prophylaxis

Initial prophylaxis regimen	N	%
Solid organ transplant	454	
TMP-SMX	408	89.9%
Switched to alternate agent	84	20.6%
Atovaquone	83	98.8%
Switched back to TMP-SMX	34	41.0%
Switched to dapsone	3	3.6%
Dapsone	1	1.2%
Reason for switch		
Elevated creatinine or hyperkalemia	55	65.5%
Allergy/adverse reaction	4	4.8%
Cytopenia	8	9.5%
LFT abnormality	5	6.0%
Other/unknown	12	14.3%
Average number of days to switch	42	
Atovaquone	47	10.4%
Reason for atovaquone		
Elevate creatinine or hyperkalemia	34	72.3%
Allergy	11	23.4%
Cytopenia	1	2.1%
Other	1	2.1%
Switched to TMP-SMX	28	59.6%
Average number of days to switch	34	
Bone marrow transplant	129	
TMP-SMX	117	90.7%
Switched to alternate agent	28	23.9%
Atovaquone	25	89.3%
Switched back to TMP-SMX	3	12.0%
Dapsone/pentamidine	2	7.1%
Reason for switch		
Elevated creatinine or hyperkalemia	1	3.6%
Allergy/adverse reaction	3	10.7%
Cytopenia	19	67.9%
LFT abnormality	1	3.6%
Other/unknown	4	14.3%
Average number of days to switch	107	
Atovaquone	11	8.5%
Reason for atovaquone		
Elevated creatinine or hyperkalemia	2	18.2%
Allergy/adverse reaction	9	81.8%
Switched to TMP-SMX	1	9.1%
Switched to dapsone/pentamidine	2	18.2%
Average number of days to switch	27	
Pentamidine	1	0.8%

Abbreviations: TMP-SMX, trimethoprim-sulfamethoxazole; LFT, liver function tests

CITATION INFORMATION: Cao S., Khalil K., Cirrone F., Mehta S. Practice Patterns in Pneumocystis Jirovecii Pneumonia Prophylaxis in Solid Organ and Bone Marrow Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Cao: None. **K. Khalil:** None. **F. Cirrone:** None. **S. Mehta:** None.

Abstract# 724

Cryptococcosis in Renal Transplant Recipients —An Analysis of United States Renal Data System Data

M. E. Cervera-Hernandez, H. A. Yoon, L. Pirofski, V. Hemmige, *Montefiore Medical Center, Bronx, NY*

Purpose: Solid organ transplant recipients are at increased risk for cryptococcosis, which is known to decrease their survival. Adherence to recommended management strategies and outcomes in this population have primarily been researched in single-center or small multicenter studies. The purpose of our study is to utilize an extensive dataset of end-stage renal disease patients in the United States, the United States Renal Data System (USRDS), to describe cryptococcosis in kidney transplant recipients.

Methods: We analyzed demographic, transplant, and hospitalization data of USRDS renal transplant recipients first hospitalization for cryptococcosis after transplantation in the period from January 2010 to December 2016.
Results: The dataset contained information for 1,204,196 hospitalizations in 213,070 kidney transplant recipients. Among them, we identified 952 patients who had 2,193 cryptococcosis hospitalizations. The median time from the earliest transplant to first cryptococcosis hospitalization was 3.5 years (IQR 1.3-8.6). The mean number of hospitalizations per patient was 2.3, and the median length of stay for the index hospitalization was 11 days. Forty-four percent of patients had admission to an intensive care unit during their first hospitalization with a mean length of stay of 5.5 days. During the index hospitalization, 66% of patients had one or more lumbar punctures. The 30- and 90-day readmission rate after index hospitalization was 33.6% and 43.2%, respectively. Seventy-seven patients (8%) died during the index hospitalization.
Conclusions: Cryptococcosis is an important contributor to morbidity and mortality among kidney transplant recipients. In future research, we intend to use provider, drug, and claims data to study patterns of care preceding cryptococcosis diagnosis and its long-term impact.

Characteristics of Renal Transplant Recipients with Cryptococcosis During First Hospitalization

Characteristic	Cryptococcosis N (%)	Alive N (%)	Died N (%)	P
Male	634 (66.6)	580 (66.2)	54 (70.1)	0.4*
Age at diagnosis, years, mean (IQR)	60.1 (53.3-68.2)	59.9 (53.2-68.1)	62.3 (55.5-69.8)	0.07**
Time posttransplant, years, median (IQR)	3.5 (1.3-8.6)			
Lumbar punctures	629 (66)	579 (66.1)	50 (65.9)	0.8*
Lung procedures	250 (26.2)	222 (25.3)	28 (36.3)	0.036*
ICU admission	424 (44.5)	359 (41)	65 (84.4)	<0.001*
Patients	952	875	77	

CITATION INFORMATION: Cervera-Hernandez M., Yoon H., Pirofski L., Hemmige V. Cryptococcosis in Renal Transplant Recipients —An Analysis of United States Renal Data System Data *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.E. Cervera-Hernandez: None. **H.A. Yoon:** None. **L. Pirofski:** None. **V. Hemmige:** None.

Abstract# 725

Use of Microbial Cell Free DNA Sequencing in Solid Organ Transplant Patients

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Purpose: Microbial cell free DNA (cfDNA) sequencing has emerged as a new noninvasive tool for the diagnosis of infectious diseases in recent years, but its diagnostic utility remains in question. We sought to assess this by characterizing its usage in solid organ transplant (SOT) patients.
Methods: We performed a retrospective chart review of all SOT patients who had microbial cfDNA sequencing done from 2016-2020.
Results: There were 17 adult SOT patients who underwent microbial cfDNA sequencing, including 6 kidney, 3 lung, 5 liver, 2 intestinal, and 1 heart transplants. Presentations that prompted testing included systemic, neurologic, sinuses, pulmonary, skin, gastrointestinal, and combinations of the above (see Table). Positivity rate for microbial cfDNA sequencing was 12/17 (70.6%), with a sensitivity of 66.7%. The highest positivity was found in patients who had systemic, neurologic, and sinus infections. Of the positive tests, 2 led to a change in either management or diagnosis (2/12, 16.7%). One of the two cases was a kidney transplant patient with disseminated histoplasmosis in which the cfDNA sequencing preceded positive cultures by 12 days. The second case was a liver transplant patient who was diagnosed with Aspergillus endocarditis based on the cfDNA sequencing result when conventional lab methods resulted negative. The remaining 10 cases with positive sequencing results did not lead to changes in management nor diagnosis due to either earlier results via conventional lab methods or lack of clinical correlation.
Conclusions: In this solid organ transplant cohort, microbial cfDNA appeared to have highest positivity rate in select group of patients, and led to clinical changes in 16.7% of cases. Given the importance of early and accurate diagnosis in immunocompromised patients, cfDNA based diagnostics hold promise as a method for noninvasive testing. Future studies will explore the strengths and limitations of this testing approach in different clinical scenarios to better delineate appropriate testing algorithms.

Table. Presentation, positivity rate, and final diagnoses of SOT patients. CMV=cytomegalovirus; VZV=Varicella zoster virus; M.=Mycobacterium.

Presentation	Positivity %	Diagnosis	Clinical Impact
Systemic + Pulmonary (2)	2/2, 100%	Disseminated histoplasmosis Aspergillus endocarditis	Change of management
Systemic + Skin (2)	1/2, 50%	Medication induced fever Disseminated *M. haemophilum*	No impact
Systemic + Cardiac (1)	1/1, 100%	Disseminated *M. tuberculosis*	No impact
Systemic (2)	2/2, 100%	Disseminated *Nocardia brasiliensis* Intraabdominal infection	No impact
Neurologic (1)	1/1, 100%	Disseminated VZV infection	No impact
Sinuses (1)	1/1, 100%	Invasive rhino-orbital fungal infection	No impact
Pulmonary (4)	2/4, 50%	Pneumonia Unspecified pulmonary infection Pleural effusion Pleural effusion	No impact
Skin (1)	0/1, 0%	*M. chimera* surgical site infection	No impact
GI (3)	2/3, 67%	Hepatic necrosis CMV hepatitis Acute cellular rejection	No impact

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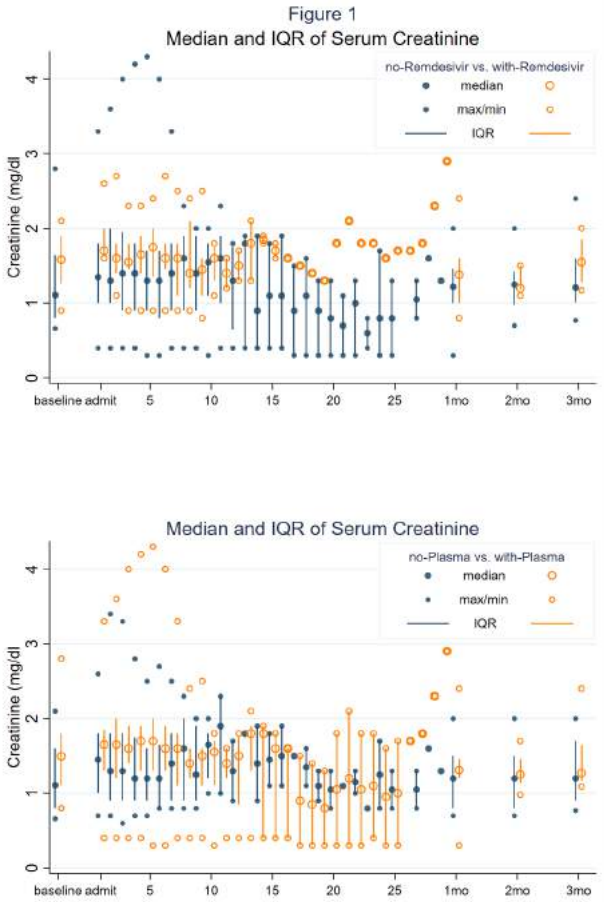
Abstract# 726

Comparison of Outcomes in Sot Recipients During Two Eras of Covid-19 Therapeutics

T. Chiang, A. Sait, A. Massie, K. Marr, D. Brennan, W. Cochran, P. Shah, T. Jain, S. Mehta Steinke, N. Desai, N. Permpalung, S. Shoham, C. Merlo, C. Durand, W. Werbel, M. Dioverti, D. Ostrander, A. Gurakar, M. Y. Kim, J. Garonzik-Wang, D. Segev, R. Avery, *Johns Hopkins University, Baltimore, MD*

Purpose: COVID-19 therapies have evolved over time, but little is known regarding outcomes in SOT recipients treated with newer therapeutic agents such as remdesivir, dexamethasone, and convalescent plasma. We sought to compare outcomes including mortality, rejection, and renal function in a retrospective cohort of SOT recipients with COVID-19 treated during two different eras of therapy.
Methods: 40 SOT recipients hospitalized for COVID-19 at our center comprised Era 1 (Mar- May 2020, 20 patients) and Era 2 (Jun - Aug 2020, 20 patients). Data were collected on demographics, comorbidities, renal function, and mortality at time points out to 90 days after COVID-19 infection.
Results: Patients in Era 1 received hydroxychloroquine (11/20, 55%), tocilizumab (5/20, 25%) and/or convalescent plasma (3/20, 15%) as targeted therapy; patients in Era 2 received primarily remdesivir (8/20, 40%), dexamethasone (6/20, 30%), and/or convalescent plasma (13/20, 65%). Mortality was 1/20 in Era 1 and 0/20 in Era 2. MMF was held in 33/35 (94%) of patients. Acute kidney injury was present on presentation in 14/40 (35%). The median (IQR) decrease in SCr (mg/dl) between admission and last followup was 0.5 (0.4-0.6) and 0.1 (0-0.4) in patients who had and had not received remdesivir, respectively (p=0.02), 0.5 (0.1-0.6) and 0.1 (0-0.3) in patients who had and had not received plasma, respectively (p=0.09). Antibody-mediated rejection (AMR) occurred in 2 patients in Era 1 and 0 patients in Era 2. Acute cellular rejection (ACR) occurred in 1 patient in Era 1 and 0 patients in Era 2.
Conclusions: SOT recipients treated in Era 2, when the major targeted therapies were remdesivir, dexamethasone, and convalescent plasma, were not at higher risk for renal dysfunction, ACR, or AMR in the aftermath of COVID-19; rejection was uncommon in both eras and mortality was low in both eras. While awaiting detailed safety studies, these results suggest against renal toxicity or triggering of alloimunity in those receiving newer therapies.

Figure 1



CITATION INFORMATION: Chiang T., Sait A., Massie A., Marr K., Brennan D., Cochran W., Shah P., Jain T., Mehta Steinke S., Desai N., Permpalung N., Shoham S., Merlo C., Durand C., Werbel W., Dioverti M., Ostrander D., Gurakar A., Kim M., Garonzik-Wang J., Segev D., Avery R. Comparison of Outcomes in Sot Recipients During Two Eras of Covid-19 Therapeutics *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Chiang: None. **A. Sait:** None. **A. Massie:** None. **K. Marr:** Consulting Fee; Name of Commercial Interest; Amplyx, Cidara, Merck, Sfunga. Grant/Research Support; Name of Commercial Interest; Merck. Intellectual Property Rights; Name of Commercial Interest; MycoMed Technologies. **D. Brennan:** Consulting Fee; Name of Commercial Interest; Allovir, Amplyx, Argenyx, CareDx, Natera, Sanofi, Veloxis. Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; If "Other" Please Explain; to Johns Hopkins. Honoraria; Name of Commercial Interest; Allovir, Amplyx, Argenyx, CareDx, Natera, Sanofi, Veloxis. **W. Cochran:** None. **P. Shah:** None. **T. Jain:** Consulting Fee; Name of Commercial Interest; CareDx, Bristol-Myers Squibb, Takeda Oncology. Honoraria; Name of Commercial Interest; Takeda Oncology. **S. Mehta Steinke:** None. **N. Desai:** None. **N. Permpalung:** Grant/Research Support; Name of Commercial Interest; Study grant support from Health Systems Research Institute, Ministry of Public Health, Thailand. **S. Shoham:** None. **C. Merlo:** None. **C. Durand:** None. **W. Werbel:** None. **M. Dioverti:** None. **D. Ostrander:** None. **A. Gurakar:** None. **M.Y. Kim:** None. **J. Garonzik-Wang:** None. **D. Segev:** Consulting Fee; Name of Commercial Interest; Sanofi, Novartis, CSL Behring, Veloxis. Honoraria; Name of Commercial Interest; Sanofi, Novartis, CSL Behring, Veloxis. **R. Avery:** Grant/Research Support; Name of Commercial Interest; Aicuris, Astellas, Chimerix, Merck, Oxford Immunotec, Qiagen, Takeda/Shire.

Abstract# 727

Clinical Consequences in Patients Experiencing Leukopenia and Neutropenia After Solid Organ Transplant

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Purpose: The incidence of leukopenia and neutropenia in solid organ transplant (SOT) recipients can be influenced by medications required after transplant for immunosuppression and infection prophylaxis. This may lead to providers altering doses of immunosuppressant and infection prophylaxis medications which may increase the risk of clinical consequences such as graft rejection, mortality, and infections. Further research is warranted to assess the incidence of clinical consequences in patients developing cytopenias within 12 months of transplant.

Methods: This retrospective, single center chart review performed at our institution included patients 18 to 89 years old who received a SOT between August 2016 to November 2017. The primary endpoint was the incidence of clinical consequences between groups within 12 months after transplant. Secondary endpoints included cumulative days of mycophenolate dose reduction or discontinuation as well as mycophenolate and valganciclovir dose adjustments in response to a cytopenic event.

Results: Out of the 179 records included, the most common type of organ transplant was lung and kidney. No differences in induction and maintenance immunosuppression were noted between groups. A trend towards lower monthly total mycophenolate doses was observed in the leukopenia only and neutropenia groups. No differences in acute rejection (13.5% vs. 13.6% vs. 14.4%; p=0.879), bacterial infection (56.8% vs. 67.8% vs. 51.8%; p=0.161), or patient survival (97% vs. 100% vs. 97%; p= 0.254) were noted between groups. Prescribers commonly held or decreased the dose of mycophenolate while continuing valganciclovir in response to an episode of cytopenia. Patients with neutropenia more frequently developed cytomegalovirus (CMV) infection than other groups (2.7% vs. 23.7% vs. 9.6%; p=0.006) after the event, however only 1 patient developed CMV infection after holding valganciclovir.

Table 1

	Leukopenia only (N= 37)	Neutropenia (N= 59)	Neither leukopenia or neutropenia (N= 83)	p-value
Age (years), median [IQR]	63 [50-69.5]	65 [57-71]	64 [52-69]	0.409
Male gender, n (%)	29 (78.4)	31 (52.5)	58 (69.9)	0.020
Type of transplant, n (%) Kidney; Single lung; Double lung	12 (32.4); 13 (35.1); 7 (18.9)	10 (16.9); 26 (44.1); 14 (23.7)	20 (24.1); 26 (31.3); 22 (26.5)	0.139
Mycophenolate held at event, n (%)	12 (32.4)	21 (35.6)	--	--
Cumulative days of mycophenolate dose reduction or discontinuation, median days	43	73	--	--
Valganciclovir continued at event, n (%)	33 (89)	39 (65)	--	--

Conclusions: This data may suggest that holding or decreasing mycophenolate for a moderate duration in our population did not increase the rate of acute rejection. The occurrence of a leukopenic or neutropenic event did not appear to increase the rate of bacterial infection, but close monitoring for CMV infection may be warranted.

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Abstract# 728

Influence of Immunosuppressant Management on Mortality in Kidney Transplant Recipients Hospitalized with COVID-19

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Purpose: Kidney transplant recipients are thought to be at high risk for mortality from COVID-19 due to the necessity for chronic immunosuppressive therapy to prevent graft rejection. However, the optimal immunosuppressant management strategy for patients with COVID-19 remains unknown.

Methods: We conducted a single-center, retrospective review of all kidney or kidney-pancreas transplant recipients with a functioning graft who were hospitalized with COVID-19 between 3/15/2020-5/15/2020. Patients were followed from the date of admission, up until 1 month following hospital discharge or study conclusion (6/15/2020). Multivariable logistic regression was used to identify potential patient or immunosuppression characteristics associated with the development of severe COVID-19 and in-hospital mortality.
Results: 69 (3.2%) patients followed longitudinally at our center were hospitalized with COVID-19 during the review period, 38 of whom were admitted to the study institution. Patients were ethnically diverse, and the majority were receiving tacrolimus (84.2%), mycophenolate (89.5%), and corticosteroids (81.6%) at baseline. Following COVID-19 diagnosis, median tacrolimus trough levels decreased by -11% (-26%-+17%) during hospitalization and mycophenolate doses were reduced by at least 50% in 33 patients. Adjunctive therapy included hydroxychloroquine (68.4%), convalescent plasma (26.3%), anticoagulation (52.6%), and participation in clinical trials (10.5%). Twenty patients developed severe disease, and 11 (28.9%) died during hospitalization. Admission characteristics associated with increased risk for mortality included age (OR=2.0; 1.0-4.0) and history of HIV (OR=22.6; 1.1-483.7). No association was found between baseline tacrolimus trough levels, mycophenolate dosing, or the number of immunosuppressants prescribed and COVID-19 mortality. Similarly, the degree of immunosuppression reduction following hospital admission was not associated with survival or severe disease progression. No differences were observed in the prescription of adjunctive therapies, with the exception of a higher daily dose of prednisone equivalents in patients who died (37.0 vs 15.4; p=0.02). Among survivors, death-censored allograft survival was 96.2% at 1-month, and no cases of biopsy proven rejection were observed during the review period.
Conclusions: The findings from our study confirm age as a significant risk factor for COVID-19 mortality in kidney transplant recipients, and suggest HIV status as an additional risk factor that may warrant further investigation. Pre-emptive immunosuppression reduction does not appear to be warranted, as baseline immunosuppression intensity and dose modulation following diagnosis of infection were not associated with hospital outcomes. However, no episodes of acute rejection were observed, so providers may wish to consider immunosuppression reduction on a case-by-case basis.
CITATION INFORMATION: Fenig Y., Santeusanio A., Menon M., Liu C., Rana M., Shapiro R. Influence of Immunosuppressant Management on Mortality in Kidney Transplant Recipients Hospitalized with COVID-19 *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Fenig: None. **A. Santeusanio:** None. **M. Menon:** Grant/Research Support; Name of Commercial Interest; NIH-NIDDK: RO1-DK122164. Grant/Research Support; Nature of Relationship; Research support. **C. Liu:** None. **M. Rana:** None. **R. Shapiro:** None.

Abstract# 729

Pulmonary Infections in Patients with Kidney Transplant: Epidemiology, Risk Factors and Impact of a Dedicated Pre-Transplant Infectious Disease Consultation

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Purpose: We aim to describe the spectrum of pulmonary infections after kidney transplant, to identify risk factors and to evaluate the impact of pre transplant infectious consultation for vaccination updates and infection prevention.
Methods: We included patients with kidney transplant performed between 2015 and 2019 in a retrospective monocentric cohort study. Multivariate analyses were performed to assess the risk factors of pulmonary infections and mortality after kidney transplant.
Results: 516 renal transplant patients were included, of which 145 had received pre-kidney transplant infectious disease consultation. We identified 123 pulmonary infections including 75 pneumonias in 95 patients at a median of 5 months post-kidney transplant. Bacterial infection was responsible for the majority of pulmonary infections (n=31), with a predominance of gram-negative bacteria (n=23). Immunosuppressive therapy had no impact on the occurrence of pulmonary infections. In contrast, independent risk factors were chronic infection with the human immunodeficiency virus (HIV) or hepatitis C virus (HCV), the presence of DSA prior to transplantation, the recipient's age, and combined transplants. Inversely, an infectious disease consultation prior to kidney transplant was found to be a pulmonary infections-independent protective factor ($p = 0.033$). Importantly, pulmonary infections had an adverse impact on patient survival ($p < 0.0001$).
Conclusions: By conducting a retrospective monocentric study, we describe the spectrum of pulmonary infections after renal transplantation. Pulmonary infections after renal transplant impact patient survival. Systematic infectious disease consultation was an independent protective factor.
CITATION INFORMATION: Feredj E. Pulmonary Infections in Patients with Kidney Transplant: Epidemiology, Risk Factors and Impact of a Dedicated Pre-Transplant Infectious Disease Consultation *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Feredj: None.

Abstract# 730

Clinical Characteristics and Outcomes of Aspergillus Infections in Intestinal Transplant Patients: Retrospective Cohort Study

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Purpose: *Aspergillus* infection is the most common mold infection in solid organ transplant recipients and its consequences can be fatal. Data in intestinal transplants (ITx) recipients is scarce. In this study, we compare the clinical characteristics and outcomes of ITx recipients with and without invasive aspergillosis (IA) at a large transplant center.
Methods: Single-center, retrospective cohort-study of ITx performed between January 2009 to October 2019. The patients were followed until October 2020. We determined the incidence of IA in our cohort. We assessed if there were any differences in demographics, type of ITx, IA risk factors (ICU stay prior to ITx, retransplantation, reoperation within 1 month of ITx), and one-year mortality and proven-biopsy rejection between those ITx recipients with and without IA. In addition, we evaluated for risk factors, treatments and outcomes for those who were diagnosed with IA.
Results: Seventy-eight adult patients underwent ITx. Seven were excluded due to peri-transplant mortality. Therefore, 71 patients were included. The incidence of IA in our cohort was 8.5 per 100 transplanted patients. There were no differences in demographics, IA risk factors and one-year mortality and rejection between both groups (Table 1). Most of the IA cases were pulmonary, occurred within 6 months of ITx and were treated with voriconazole. The IA was cured in four (66.7%) of the patients (Table 2).
Conclusions: Our ITx cohort demonstrated a high incidence of IA. Larger studies are needed to determine the risk factors associated with IA in this transplant population.

Table 1. Factors associated with Aspergillus Positivity

Variable	Aspergillus Positive N = 6 (%)*	Aspergillus Negative N = 71 (%)*	*p* value
Demographics			
Age, median [Range]	43 [30-54]	45 [18-68]	0.78
Gender, male	3 (50)	40 (56.3)	1.00
Post transplant follow up in months, median [Range]	55 [22-91]	59 [13-141]	0.78
Clinical Characteristics			
Type of transplant, multi-visceral	2 (33.3)	33 (46.5)	0.68
ICU admission before transplant	0 (0)	7 (9.9)	1.00
Retransplant	0 (0)	8 (11.3)	1.00
Re-operation within 1 month of transplant	4 (66.7)	40 (56.3)	0.70
Post transplant Antifungal prophylaxis, fluconazole	5 (83.3)	46 (64.8)	0.66
Outcomes			
1 year Proven biopsy Rejection	1 (16.7)	18 (25.4)	1.00
1 year Mortality	1 (16.7)	16 (22.5)	1.00

Table 2. Aspergillus cases Parameters and Outcomes

Pt	Age	Gender	Type of transplant	ICU before tx	Retransplantation	Reoperation w/in 1 month	Antifungal post transplant ppx	Rejection w/in 3 months	Time from tx to dx (months)	Type of Aspergillus	Location of Aspergillus	Aspergillus tx	Outcome
1	31	Male	Intestinal	No	No	Yes	Fluconazole	No	27	Possible	IPA	Voriconazole	Cured
2	34	Female	Intestinal + Pancreas	No	No	No	Micafungin	GVHD	5	Probable	IPA	Voriconazole	Death
3	51	Male	Intestinal	No	No	Yes	Fluconazole	No	12	Probable	IPA	Voriconazole	Cured
4	52	Male	MVT	No	No	Yes	Fluconazole	No	1	Probable	IPA	Voriconazole	Cured
5	30	Female	MVT	No	No	No	Fluconazole	No	4	Proven	Sinus/Skin	Posaconazole follow by isavuconazole	Cured
6	54	Female	MMV	No	No	Yes	Fluconazole	No	6	Proven	IPA	Voriconazole	Death

Abbreviations:
Tx: transplant
transplant, dx: diagnosis ppx: prophylaxis IPA: invasive pulmonary aspergillosis GVHD: graft versus host disease MVT: multi visceral
MMV modified multi-visceral transplant.

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DISCLOSURES: A. Fernandez: None. **M. Romero:** None. **Y. Natori:** None. **J. Camargo:** None. **S. Anjan:** None. **R. Vianna:** None. **J. Simkins:** None.

Abstract# 731

Utilizing Risk Factors to Guide Prevention of Invasive Fungal Infections in Liver Transplant Recipients

K. Fitton, A. Chan, C. Truax, B. Sirandas, T. Larson, L. Smith, A. Carlson, *University of Utah Health, Salt Lake City, UT*

Purpose: Invasive fungal infection (IFI) after liver transplant (LT) is associated with significant morbidity and mortality. The optimal antifungal prophylaxis regimen has

not been defined. This study assessed the efficacy of a tiered-approach antifungal prophylaxis regimen in a randomly selected sample of liver transplant recipients (LTR) within 100 days of transplant.

Methods: This retrospective study examined incidence and type of IFIs, susceptibilities, rejection, and mortality in LTRs between 6/1/14-1/31/20. Our institution uses risk factors (RF) (Table 1) to determine the antifungal agent used for prophylaxis. If 1-2 RF are present, pts receive fluconazole 200-400 mg daily based on renal function; if >2 RF are present, pts receive caspofungin 70 mg load, then 50 mg daily. Prophylaxis is initiated post-LT until improvement in clinical status and/or upon transfer out of the ICU.

Table 1: Risk Factors for Invasive Fungal Infection

- Prior liver transplant
- Acute hepatic failure
- Perioperative renal insufficiency (SCr ≥ 2 mg/dL and/or renal replacement therapy (RRT) within 48 hours prior to liver transplant)
- Candida colonization
- Choledochojejunostomy or choledochoduodenostomy anastomosis
- Return to OR within 48 hours
- Chemotherapy within 3 months of transplant
- Transfusion of > 40 units of blood intra-operatively
- OR time > 10 hours

Results: Demographics are illustrated in Table 2. No significant differences were seen in demographic data between those with and without IFIs including MELD score and CMV risk status. 63% of LTR received IFI prophylaxis with a mean duration of 5.7 days of fluconazole and 8.5 days of caspofungin. There were 8 IFI identified despite protocol adherence in these patients (Table 3). There was no significant difference in rates of rejection in LTR with IFI compared to no IFI. No deaths occurred in the 100 days post-transplant. Mortality in the 6 months post-LT was higher in LTR who developed IFIs compared to those who did not (12.5% vs 0%, p=0.001). Pts with IFI were more likely to have had RRT within 48 hours pre-LT and/or within 7 days post-LT (75% vs. 33.7%, p=0.026).

Table 2: Patient Characteristics

Characteristics	*LTRs with IFI (n = 8)*	*LTRs without IFI (n = 92)*
Age at time of transplant (years) – average ± SD	59.9 ± 6.8	53.8 ± 13.4
Male sex – n (%)	5 (62.5)	63 (68.5)
White race – n (%)	7 (87.5)	83 (90.2)
Length of ICU stay – average ± SD	6.4 ± 7.3	5.2 ± 6.9
Received fluconazole prophylaxis – n (%)	5 (62.5)	44 (47.8)
Received caspofungin prophylaxis – n (%)	1 (12.5)	4 (4.3)
Received no IFI prophylaxis – n (%)	2 (25)	35 (38.0)
Received both caspofungin and fluconazole prophylaxis – n (%)	0 (0)	9 (9.8)
Living donor transplant – n (%)	0 (0)	13 (14.1)
Prior liver transplant – n (%)	0 (0)	0 (0)
Acute hepatic failure prior to transplant – n (%)	0 (0)	14 (15.2)
SCr ≥ 2 in 48 hours prior to transplant – n (%)	2 (25)	23 (25)
RRT prior to transplant – n (%)	3 (37.5)	16 (17.4)
RRT and/or SCr ≥ 2 in 48 hours prior to transplant – n (%)	4 (50)	30 (32.6)
RRT post-transplant – n (%)	5 (62.5)	30 (32.6)
Candida colonization – n (%)	0 (0)	4 (4.3)
Choledochojejunostomy or choledochoduodenostomy anastomosis – n (%)	1 (12.5)	13 (14.1)
Return to the OR within 48 hours – n (%)	0 (0)	1 (1.1)
Intra-operative blood products > 40 units – n (%)	1 (12.5)	24 (26.1)
OR time > 10 hours – n (%)	1 (12.5)	10 (10.9)
High Risk for CMV – n (%)	0 (0)	16 (17.4)
Average MELD ± SD	29.8 ± 9.2	29.3 ± 9.0
MELD ≥ 30 – n (%)	3 (37.5)	43 (46.7)

Table 3: Invasive Fungal Infections within 100 Days of Transplant

IFI	*IFI Prophylaxis Agent*	*Number of Risk Factors*	*IFI Susceptibility to Fluconazole*
Aspergillus fumigatus sinusitis	None	0	N/A
Aspergillus fumigatus pneumonia	Caspofungin	4	N/A
Candida albicans hepatic abscess infection	Fluconazole	1	Unknown
Candida glabrata peritonitis	None	0	Susceptible Dose Dependent (SDD)
Candida albicans pneumonia	Fluconazole	1	Unknown
Candida glabrata hepatic abscess and intra-abdominal infection	Fluconazole	1	SDD
Candida glabrata urinary tract infection	Fluconazole	1	Unknown
Candida glabrata and *candida krusei* esophageal candidiasis	Fluconazole	1	*Candida glabrata* – SDD *Candida krusei* - resistant

Conclusions: Our incidence of IFI (8%) in LTR was comparable to the incidence in the reported literature of 4-7%, thus illustrating effectiveness of the antifungal prophylaxis protocol at our center. Given the higher rates of IFI in LTR who received RRT in the 48 hours pre-LT and/or 7 days post-LT, modifying the current protocol to include post-operative RRT as an additional risk factor for IFI should be considered. More studies with larger sample sizes are needed to identify the optimal IFI prophylaxis regimen.

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Abstract# 732

Outcomes in High Risk CMV Liver Transplants with Elevated MELD Scores

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Purpose: There is inconclusive evidence on the impact of MELD score on CMV viremia after liver transplantation. Following the implementation of Share 35, liver transplant allocation to patients with MELD ≥35 significantly improved. This study assessed whether the risk of CMV viremia was increased in a high MELD (≥35) cohort.

Methods: This single center, retrospective, cohort study included liver transplant recipients from 2009 to 2019 who were at high risk for CMV (D+/R-). Patients were grouped by pre-transplant MELD score of <35 (low MELD) and ≥35 (high MELD). Patients received 3 months of CMV prophylaxis with valganciclovir. The primary endpoint was quantifiable CMV viremia by 12 months after transplant. Secondary endpoints were CMV tissue invasive disease, CMV resistance, BPAR, thrombocytopenia, leukopenia, and death. The Cox proportional hazards model was used to identify independent risk factors for CMV viremia.

Results: A total of 244 patients were included. Differences in baseline characteristics (Table 1) were not predictive of CMV viremia, except for alcoholic cirrhosis (HR, 1.76; 95% CI, 1.09-2.85; p=0.02). More patients in the high MELD group developed CMV viremia (37% vs 26%); however, this was not statistically significant (HR, 1.6; 95% CI, 0.99-2.62; p=0.054). Following completion of valganciclovir prophylaxis, the mean time to CMV viremia was 162 ± 61 and 139 ± 62 in the low and high MELD groups, respectively (Figure 1). High rates of leukopenia and thrombocytopenia persisted through 6 months post-transplant (Table 2). Additionally, BPAR occurred early post-transplant in both the low and high MELD groups (median 31 days (13-62) vs 18 days (11-66); p=0.48) and was associated with an increased risk of CMV viremia (HR, 1.94; 95% CI, 1.2-3.15; p=0.007).

Table 1. Baseline Characteristics	Low MELD (n=163)	High MELD (n=81)	p-value
MELD score, median (IQR)	25 (21-29)	39 (37-40)	< 0.001
Age (years), mean ± SD	56 ± 10	49 ± 13	< 0.001
Male, n (%)	126 (77)	48 (59)	0.005
Race, n (%)			0.50
White	138 (85)	67 (83)	
Black	23 (14)	11 (14)	
Other	2 (1.2)	3 (3.7)	
Deceased donor, n (%)	149 (91)	81 (100)	0.006
Transplant indication, n (%)			< 0.001
Alcohol	48 (29)	41 (51)	
HCC	42 (26)	0 (0)	
HBV/HCV hepatitis	20 (12)	6 (7)	
Fulminant	0 (0)	9 (11)	
NASH	27 (17)	7 (9)	
Other	26 (16)	18 (22)	
Induction, n (%)			0.14
Methylprednisolone	147 (90)	67 (83)	
Basiliximab	16 (10)	14 (17)	

Table 2. Clinical Outcomes	Low MELD (n=163)	High MELD (n=81)	p-value
12-month CMV viremia, n (%)	43 (26)	30 (37)	0.12
CMV tissue disease, n (%)	15 (9)	9 (11)	0.65
CMV resistance, n (%)	1 (1)	1 (1)	1.00
Leukopenia (WBC <4x10^3/μL), n (%)			
Month 3	68/144 (47)	35/76 (46)	0.98
Month 6	56/135 (41)	28/70 (40)	0.96
Thrombocytopenia (PLT <150x10^3/μL), n (%)			
Month 3	74/144 (51)	24/76 (32)	0.008
Month 6	76/134 (57)	34/70 (49)	0.34
BPAR, n (%)	45 (28)	21 (26)	0.90
Mortality, n (%)	11 (7)	10 (12)	0.15

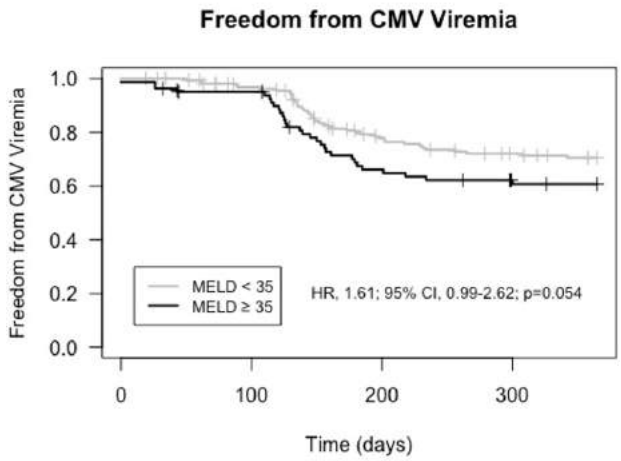

Figure 1. Time to CMV viremia by 12 months post-transplant

Conclusions: Regardless of MELD score, 3 months of CMV prophylaxis results in high rates of CMV viremia, especially after BPAR episodes. Given persistent leukopenia and thrombocytopenia, improved surveillance strategies with routine monitoring of CMV may be preferred over extending the prophylaxis duration in this population.

CITATION INFORMATION: Freedman S., Saunders K., Sparkes T., Masters B., Plazak M., Saharia K., Maluf D., Ravichandran B. Outcomes in High Risk CMV Liver Transplants with Elevated MELD Scores *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Freedman: None. **K. Saunders:** None. **T. Sparkes:** None. **B. Masters:** None. **M. Plazak:** None. **K. Saharia:** None. **D. Maluf:** None. **B. Ravichandran:** None.

Abstract# 733

Covid Studies in 208 Patients with Consent for Donation

A. L. Friedman, C. Ezzell, K. Delli Carpini, *LiveOnNY, New York, NY*

Purpose: To prevent transmission of SARS CoV 2 via solid organ donation from deceased donors.

Methods: Comprehensive medical and psychosocial evaluation of potential deceased organ donors included a risk assessment for active infection w2ith SARS CoV 2 which was considered an absolute contraindication. Patients lacking active infection for whom authorization for donation was present, underwent testing for detectable SARS CoV 2 in specimens from the nasopharynx (PCR), bronchoalveolar lavage (PCR) and blood (antibody).

Results: From 3/16/2020 - 12/2/2020 a total of 828 specimens were collected from 208 patients. Nearly all samples were negative for SARS CoV 2. 7 patients were confirmed to have antibody to SARS CoV 2; 6 became donors and 1 was ruled out. Nasopharyngeal specimens were PCR positive in 7 patients, 6 pf them were ruled out. The 7th patient was remotely infected and also was antibody positive; this patient did become a donor.No reports of donor transmission of SARS CoV 2 have been mreport3ed to us.

Conclusions: Active evolution of the evaluation of SARS CoV 2 in deceased organ donor candidates has taken place during the initial phase of the pandemic. Systematic testing of nasopharyngeal, bronchoalveolar lavage and antibody status whenever feasible, facilitated donation by most authorized donors. This strategy has resulted in multiple organ transplants without evidence of SARS CoV -2 transmission.

CITATION INFORMATION: Friedman A., Ezzell C., Delli Carpini K. Covid Studies in 208 Patients with Consent for Donation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.L. Friedman: None. **C. Ezzell:** None. **K. Delli Carpini:** None.

Abstract# 734

Impact of Valganciclovir Prophylaxis Dosing in High Risk Cytomegalovirus Kidney and Pancreas Transplant Recipients with Delayed Graft Function

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Purpose: We sought to compare outcomes of cytomegalovirus (CMV) prophylaxis in high risk CMV (donor +/recipient -) kidney and pancreas transplant recipients who received different valganciclovir (VGC) renal dosing strategies and experienced delayed graft function (DGF) or had immediate graft function (IGF).

Methods: This retrospective, single-center cohort review screened all high risk CMV kidney and kidney-pancreas (SPK) transplants from January 1, 2015 through May 1, 2020. Patients were excluded if they did not receive induction with rabbit anti-thymocyte globulin (rATG), required dialysis post-transplant solely for hyperkalemia, or received a prior non-kidney solid organ transplant. Patients received induction with rATG (1.5 - 6 mg/kg), standard triple maintenance immunosuppression, and CMV prophylaxis with VGC. 6-month follow up was completed and 1-year outcomes reported as able.

Results: Baseline characteristics were well-balanced between cohorts with exception to age. No significant differences in rejection or graft loss were observed between transplant recipients with or without DGF. However, resistant CMV, CMV viremia, and death occurred at a higher rate in the DGF cohort. No significant differences were seen among patients with DGF on differing VGC regimens.

Table 1. Baseline Characteristics

Characteristic	DGF (N = 37)	IGF (N = 78)	P-value
Age (years)	57.1	51.3	0.022
Male Gender n (%)	27 (73)	46 (59)	0.145
Organ n (%)	--	--	0.58
Kidney	36 (97.3)	66 (84.6)	--
SPK	1 (2.7)	12 (15.4)	--
Donor Status n (%)	--	--	0.53
DCD	8 (21.6)	10 (12.8)	--
DBD	28 (75.7)	54 (69.2)	--
Living	1 (2.7)	14 (17.9)	--
rATG (mg/kg)	4.36	4.38	0.937

Table 2. CMV Incidence and Transplant Outcomes

Outcomes	DGF (N = 37)	IGF (N = 78)	P-value
CMV Infection n (%)	19 (51.4)	25 (32.1)	0.064
Viremia	18 (48.7)	23 (29.5)	0.045
Syndrome	1 (2.7)	0 (0)	0.3246
Disease	0 (0)	2 (2.6)	NS
Peak Viral Load (copies/mL)	44889	521242	0.348
Resistance n (%)	4 (10.8)	0 (0)	0.0096
Rejection n (%)	2 (5.4)	8 (10.3)	0.497
ACR	2 (5.4)	4 (5.2)	--
AMR	0 (0)	3 (3.9)	--
Mixed	0 (0)	1 (1.3)	--
Graft Loss n (%)	3 (8.1)	1 (1.3)	0.097
Death n (%)	3 (8.1)	0 (0)	0.031

Table 3. VGC Dosing Outcomes

Outcomes	450 mg 2x/week (N = 15)	450 mg 3x/week (N = 16)	P-value
CMV Infection n (%)	9 (60)	8 (50)	0.722
Viremia	8 (53.3)	8 (50)	0.853
Syndrome	1 (6.7)	0 (0)	0.484
Disease	0 (0)	0 (0)	NS
Peak Viral Load (copies/mL)	35168	27310	0.787
Resistance n (%)	0 (0)	3 (18.9)	0.226
Rejection n (%)	1 (6.7)	0 (0)	0.484
Graft Loss n (%)	1 (6.7)	1 (6.3)	NS
Death n (%)	2 (13.3)	1 (6.3)	0.60

Conclusions: Our data suggests that incidence of CMV viremia, CMV resistance, and all-cause death are higher in patients with DGF, but that outcomes are similar between different VGC dosing strategies employed in DGF.

CITATION INFORMATION: Gharabagi A., Geyston J., Agarwal A., Rao S., Doyle A., Dann J. Impact of Valganciclovir Prophylaxis Dosing in High Risk Cytomegalovirus Kidney and Pancreas Transplant Recipients with Delayed Graft Function *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gharabagi: None. **J. Geyston:** None. **A. Agarwal:** None. **S. Rao:** None. **A. Doyle:** None. **J. Dann:** None.

Abstract# 735

Clinical Signs Predictive of Covid-19 Mortality Among Transplant Recipients

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Purpose: The presentation of Coronavirus disease 2019 (COVID-19) ranges from mild illness to severe respiratory failure. Disease progression may differ in immunocompromised patients and immunocompetent hosts. Therefore, we aim to characterize COVID-19 clinical presentation and outcomes in solid organ transplant recipients (SOTRs) to identify initial clinical factors that may predict COVID-19 associated mortality.

Methods: We prospectively reviewed baseline demographic and clinical characteristics among adult kidney, pancreas, liver, heart and lung transplant recipients diagnosed with COVID-19 between March 1, 2020 and May 5, 2020 at our transplant center in New York City. A series of chi-square and Fisher's exact tests

were conducted to investigate the relationship between several predictor variables (baseline characteristics, symptoms at presentation, and baseline immunosuppression regimen) and 30-day mortality.

Results: 73 SOTRs (53 kidney, 8 liver, 7 heart, 3 lung, 2 heart/kidney) with SARS-CoV-2 PCR-confirmed COVID-19 were included in the final analysis. Median age was 59 years (IQR 54-68) and 34.2% were female. Median time since transplant was 21 months (IQR 13-46.5). All patients were on baseline immunosuppresion as shown in table 1. The majority of patients were diagnosed in the Emergency Department. Most common presenting symptoms were cough (68.5%), gastrointestinal symptoms (54.8%) and dyspnea (45.2%) with median of 5 days from symptom onset to hospitalization. All patients had elevated inflammatory markers at time of diagnosis (median CRP 54 mg/L, median ferritin 704 ng/mL, median procalcitonin 0.11 ng/mL, median D-dimer 311 ng/mL). 84.1% of patients required supplemental oxygen, including intubation in 19.7%. 13 of 63 (21%) hospitalized patients died. Dyspnea on presentation was the only baseline or presenting patient factor found to be predictive of death (p =.004). When stratified by initial chest X-ray findings, dyspnea combined with abnormal chest X-ray predicted mortality (p=.021) while dyspnea with normal chest X-ray did not.

Conclusions: Presenting symptoms of dyspnea and radiographic signs of pneumonia on initial imaging predicted mortality among SOTRs with COVID-19 in our cohort. These findings can inform allocation of limited resources in COVID-19 management, including the triage and timing of COVID-19 directed therapies early in the illness course among different patient populations.

Table 1 Baseline Patient Characteristics

	All Solid Organ Transplants	Kidney	Liver	Heart	Lung	Heart/Kidney	Kidney/Pancreas
	n= 73	n= 55	n =8	n=9	n=3	n=2	n=1
Age (median; IQR), years	59; (54-68)	59; (54-68)	65; (59.5-68)	57; (48-62)	58; (58-66)	61; (60-62)	37
Gender (female) N/%	25/34.2%	19/34.6%	4/50%	1/11.1%	1/33.3%	0/0%	0/0%
Race N/%							
White	14/19.2%	9/16.4%	3/37.5%	1/11.1%	1/33.3%	0/0%	1/100%
Black	26/35.6%	20/36.4%	1/12.5%	5/55.6%	1/33.3%	1/50%	0/0%
Asian	3/4.1%	3/5.5%	0/0%	0/0%	0/0%	0/0%	0/0%
Others	14/19.2%	9/16.4%	3/37.5%	1/11.1%	1/33.3%	0/0%	0/0%
Unknown	16/21.9%	14/25.5%	1/12.5%	2/22.2%	0/0%	1/50%	0/0%
Ethnicity (Hispanic) N/%	22/30.1%	17/30.9%	3/37.5%	2/22.2%	1/33.3%	1/50%	0/0%
Months since transplant (median; IQR)	21; (13-46.5)	22; (13-60)	34.5; (11.5-60.9)	13.8; (10.5-18.2)	16.5; (16.5-21.8)	14.8; (13-16.5)	13
Body Mass Index (BMI) (median; IQR kg/m)	26.5; (24.2-31.5)	26.5; (24-33.3)	27.9; (24.8-31.2)	25.9; (24-29.9)	26.1; (24.2-28)	24.8; (24-25.5)	31.1
Co-morbid conditions							
Hypertension N/%	63/86.3%	52/94.6%	5/62.5%	6/66.7%	2/66.7%	2/100%	1/100%
Diabetes Mellitus N/%	36/49.3%	29/52.7%	3/37.5%	4/44.4%	0/0%	0/0%	1/100%
Lung disease (COPD/Asthma) - N/%	13/ 17.8%	11/20%	1/12.5%	1/11.1%	1/33.3%	1/50%	0/0%
Chronic Kidney Disease N/%	25/34.3%	18/32.7%	3/37.5%	2/22.2%	2/66.7%	0/0%	0/0%
Liver disease - abnormal liver function tests (N/%)	35/48%	26/47.3%	5/62.5%	4/44.4%	2/66.7%	2/100%	0/0%
Active or past malignancy	17/23.3%	10/18.2%	7/87.5%	0/0%	0/0%	0/0%	0/0%
History of rejection in prior 30 days							
Acute cellular rejection (N/%)	1/1.4%	0/0%	1/12.5%	0/0%	0/0%	0/0%	0/0%
Antibody mediated rejection (N/%)	1/1.4%	1/1.9%	0/0%	0/0%	0/0%	0/0%	0/0%
Induction therapy within 90 days (N/%)	9/12.3%	7/12.7%	1/12.5%	1/11.1%	0/0%	0/0%	0/0%
Baseline Immunosuppression therapy							
Mycophenolate mofetil (N/%)	55/75.3%	43/78.2%	2/25%	7/77.8%	3/100%	0/0%	1/100%
Steroids - prednisone (N/%)	59/80.8%	51/92.7%	4/50%	3/33.3%	3/100%	2/100%	1/100%
Calcineurin inhibitors (CNI) (N/%)	66/90.4%	49/89.9%	8/100%	9/100%	2/66.7%	2/100%	1/100%
Mammalian Target of Rapamycin (mTOR) inhibitors (N/%)	2/2.7%	0/0%	1/12.5%	1/11.1%	0/0%	0/0%	0/0%

CITATION INFORMATION: Ginzberg D., Pierce K., Kreiger-Benson E., Graves M., Neumann H., Ali N., Gidea C., Park J., Mehta S. Clinical Signs Predictive of Covid-19 Mortality Among Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Ginzberg: None. **K. Pierce:** None. **E. Kreiger-Benson:** None. **M. Graves:** None. **H. Neumann:** None. **N. Ali:** None. **C. Gidea:** None. **J. Park:** None. **S. Mehta:** None.

Abstract# 736

Observational Study of the Clinical Characteristics and Short-term Outcomes of Kidney Transplant Recipients Diagnosed with Coronavirus-19 Infection (sars-cov2) Requiring Hospitalization in New Orleans

S. Giusti[1], S. Chazin[2], P. Vaitla[3], K. Atiemo[4], M. Atari[1], A. Paramesh[4], H. Jeon[4], A. Vijay[4], A. Torres[5], M. Killackey[4], R. Thimmisetty[6], J. Garces[6], *[1]Tulane University Section of Nephrology & Hypertension, New Orleans, LA, [2]Tulane University School of Medicine, New Orleans, LA, [3]University of Mississippi Medical Center, Jackson, MS, [4]Tulane Transplant Institute, New Orleans, LA, [5]Ochsner Medical Center, New Orleans, LA, [6]Ochsner Multi-Organ Transplant Institute, New Orleans, LA*

Purpose: Kidney transplant recipients are at increased risk of severe disease and death caused by Coronavirus-19 infection. The role of immunosuppressive medications in the clinical presentation, disease course, and outcomes is not well understood.

Methods: We analyzed kidney transplant recipients diagnosed with Coronarvirus-19 infection during the initial infection surge requiring hospitalization at two large transplant centers in New Orleans, LA, between February 1, 2020, and April 30, 2020. Patient presentation, clinical course, kidney transplant function, and post-discharge details were included in this analysis.

Results: Twenty-three kidney transplant recipients hospitalized with Coronavirus-19 infection were included in the study. The majority of the patients were black (95.7%). Diabetes, hypertension, and obesity were present in at least 50% of the patients. The most common presenting symptom was fever, present in 52.2% of patients. All patients were managed with a reduction in immunosuppression. 60.9% of patients received azithromycin, 47.8% received hydroxychloroquine, 8.7% received remdesivir, and 8.7% received IV methylprednisolone pulse. The average length of stay was approximately 4.5 days (range 2 to 18 days). 73.9% of the patients sustained acute kidney injury, with an average peak serum creatinine of 3.81 mg/dL. 26% of the patients required renal replacement therapy. 77% of patients developed proteinuria (at least +1 proteinuria on urinalysis). 37.5% of patients required mechanical ventilation, and of these, 77.8% died. Overall, 30.4% of patients died of Coronavirus-19 infection-related complications during admission. Of the 16 patients discharged, the average serum creatinine during the first follow-up visit was 2.09 mg/dL compared with an average preadmission serum creatinine of 1.76 mg/dL.

Conclusions: During the initial Coronavirus-19 infection surge in New Orleans, we noted that kidney transplant recipients had initial symptoms similar to the general population. However, we recorded a high incidence of acute kidney injury and the need for renal replacement therapy. Patients who required mechanical ventilation had a high mortality rate. There was an over-representation of black patients.

CITATION INFORMATION: Giusti S., Chazin S., Vaitla P., Atiemo K., Atari M., Paramesh A., Jeon H., Vijay A., Torres A., Killackey M., Thimmisetty R., Garces J. Observational Study of the Clinical Characteristics and Short-term Outcomes of Kidney Transplant Recipients Diagnosed with Coronavirus-19 Infection (sars-cov2) Requiring Hospitalization in New Orleans *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Giusti: None. **S. Chazin:** None. **P. Vaitla:** None. **K. Atiemo:** None. **M. Atari:** None. **A. Paramesh:** None. **H. Jeon:** None. **A. Vijay:** None. **A. Torres:** None. **M. Killackey:** None. **R. Thimmisetty:** None. **J. Garces:** None.

Abstract# 737

Infection Rates in Heart Transplant Recipients With Combined Tacrolimus and Sirolimus at High versus Low Concentrations

S. Goyal, J. Lyons, J. Negrelli, M. Liebo, A. Heroux, *Loyola University Medical Center, Maywood, IL*

Purpose: Assess the impact of tacrolimus-sirolimus (TAC/SRL) concentration on infection rate in heart transplant recipients (HTR).

Methods: A retrospective review of HTR on TAC/SRL for ≥ 1 year from 01/2006-08/2019 was conducted. Drug concentrations were defined as high (≥ 15 ng/mL) or low (< 15 ng/mL), calculated as the summation of individual medication's annual average concentration for every year of therapy. For patients on TAC/SRL for > 1 year, each year of therapy was considered its own discrete case. The primary outcome was median rate of infection, defined as positive culture or other documented clinical finding treated with a full course of antimicrobial. Secondary outcomes included the incidence of any, bacterial, viral, and fungal infections as well as acute rejection, defined as clinically evident cellular rejection (Grade 0R, 1R, 2R or 3R) treated with high-dose corticosteroids.

Results: A total of 60 individual case years were analyzed from 22 patients. There were 21 vs 39 cases in the high and low TAC/SRL groups, respectively. The average TAC/SRL concentration was 18.5 ± 2.5 ng/mL in the high and 13.0 ± 1.3 ng/mL in the low group. Median infection rates were significantly greater in the high vs low TAC/SRL group (2 vs 0, p<0.0001). The incidence of any infection, bacterial infections and acute rejection were significantly greater in the high vs low group (Table 1). There were no cases of antibody mediated rejection in either group.

Table 1. Outcome results between case years with high and low TAC/SRL concentrations

	High TAC/ SRL (n=21)	Low TAC/ SRL (n=39)	P-value
Rate of infection, median (IQR)*	2 (1-2)	0 (0-1)	**P<0.0001**
Any infection incidence, n (%)	18 (86)	17 (44)	**0.002**
Bacterial infection incidence, n (%)	18 (86)	15 (38)	**P<0.0001**
Viral infection incidence, n (%)	5 (24)	4 (10)	0.164
Fungal infection incidence, n (%)	1 (5)	2 (5)	0.984
Acute rejection incidence, n (%)	14 (67)	9 (23)	**0.001**
**Some case years had ≥ 1 recorded infection*			

Conclusions: Higher combined concentrations of TAC/SRL in HTR were associated with increased infections per year. Targeting TAC/SRL concentrations of < 15 ng/mL is reasonable to decrease the risk of infection, however the risk of rejection should be considered. Given the retrospective nature of the study, it is unknown if target concentrations were increased before or after a rejection episode was experienced. Prospective studies are warranted to confirm findings and to further assess the association of combined TAC/SRL concentrations on allograft rejection.

CITATION INFORMATION: Goyal S., Lyons J., Negrelli J., Liebo M., Heroux A. Infection Rates in Heart Transplant Recipients With Combined Tacrolimus and Sirolimus at High versus Low Concentrations *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Goyal: None. **J. Lyons:** None. **J. Negrelli:** None. **M. Liebo:** None. **A. Heroux:** None.

Abstract# 738

An Evaluation of Pjp Prophylaxis and Anemia Among Renal Transplant Recipients

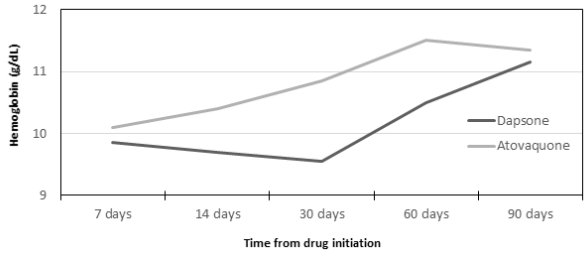
J. Hedvat, N. Poladi, D. Salerno, G. Dube, N. Lange, *NewYork-Presbyterian Hospital, New York, NY*

Purpose: Dapone and atovaquone are therapeutic options for PJP prophylaxis in renal transplant recipients. The objective of this study was to evaluate the incidence of anemia in renal transplant recipients receiving these agents.

Methods: This was an IRB-approved, single-center retrospective analysis of adult renal transplant recipients who received either dapsone or atovaquone for PJP prophylaxis between July 2012 and August 2019. The primary endpoint was the change in hemoglobin within 90 days of drug initiation. Other endpoints of interest included incidence and management of anemia at multiple time points post-transplant. Categorical variables were compared with Pearson's chi-squared or Fischer's exact test and continuous data were compared utilizing Wilcoxon rank-sum test. Statistical analyses were performed using Stata 14.2.

Results: 100 patients were included in the final cohort; 50 patients in each the dapsone and atovaquone groups. In the dapsone and atovaquone groups, the median age was 52 and 50.5 years, 44% and 42% were Caucasian, and median time to treatment initiation was 27 and 39 days post-transplant, respectively. All patients receiving dapsone had normal G6PD function. There was no difference in baseline hemoglobin between groups (9.7 g/dL versus 9.8 g/dL, p=0.83). The median nadir hemoglobin values were 8.6 g/dL and 9.6 g/dL in the dapsone and atovaquone groups, respectively (p=0.047). The median decrease in hemoglobin from baseline to nadir was 1.3 g/dL in dapsone patients and 0.2 g/dL in atovaquone patients (p=0.001). Dapsone was discontinued in 46% of patients, whereas atovaquone was discontinued in 18% (p=0.001).

Conclusions: Among renal transplant recipients with normal G6PD activity, dapsone is associated with greater hemoglobin reductions and rates of drug discontinuation as compared to atovaquone.



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DISCLOSURES: J. Hedvat: None. **N. Poladi:** None. **D. Salerno:** Honoraria; Name of Commercial Interest; Dova Pharmaceuticals. Honoraria; Nature of Relationship; Advisory Board. **G. Dube:** None. **N. Lange:** None.

Abstract# 739

Covid-19 in a Kidney Transplant Patient Associated with Collapsing Glomerulopathy

W. Hninn, M. Merzkani, H. Murad, A. Malone, A. Java, G. Rajashekar, R. Delos Santos, T. Alhamad, *Washington University School of Medicine, St. Louis, MO*

Purpose: Coronavirus- 19 is a novel virus with various clinical presentations ranging from a cold to severe acute respiratory syndrome. However, little is known about it's association with glomerulonephritis. We present a case of COVID-19 in a kidney transplant recipient who developed collapsing Focal segmental glomerulosclerosis (FSGS).

Methods: A 49-year-old African American female who had end stage kidney disease secondary to lupus nephritis received a deceased donor kidney transplant. Post-transplant course was complicated with delayed graft function for 12 days. At 4 months after her transplant, she presented to the hospital with malaise, nausea, vomiting, diarrhea and fever of 101 F. Initially treated empirically for urinary tract infection due to pyuria and lack of respiratory symptoms. However because of a persistent fever, Covid-19 PCR test was performed that resulted positive.

Results: Chest X ray showed right middle and right lower lobe opacities. She was treated in March 2020 with hydroxychloroquine and we held her mycophenolic acid while continuing tacrolimus and prednisone. Patient was subsequently found to have new onset nephrotic range proteinuria without nephrotic syndrome as well as an AKI with creatinine going to 2. Labs showed negative donor specific antibodies as well as negative DsDNA and normal complement C3 and C4 levels. Urinalysis showed hematuria and proteinuria. Kidney allograft biopsy showed collapsing glomerulopathy with severe podocyte foot process effacement affecting approximately 90-100% of the capillary loop surface area. There was no evidence of cellular or antibody-mediated rejection and c4d was negative. She was treated with plasma exchange and rituximab. Patient was maintained with plasmapheresis every week. Creatinine slowly improved and proteinuria gradually decreased to subnephrotic range as shown in Figure 1.

Conclusions: COVID-19 infection may result in a wide range of kidney injuries including collapsing FSGS. COVID-19 may serve as an immunologic trigger for FSGS. The mechanism can be similar to other viral infections such as parvovirus B19, HIV and cytomegalovirus. Large number of cases are needed to examine the best treatment option.

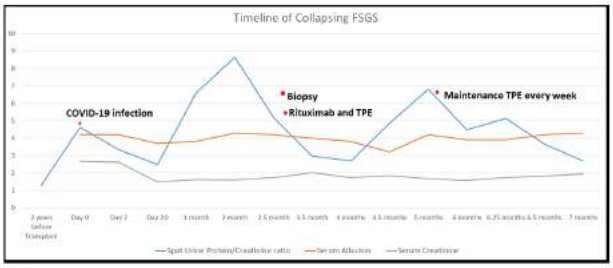
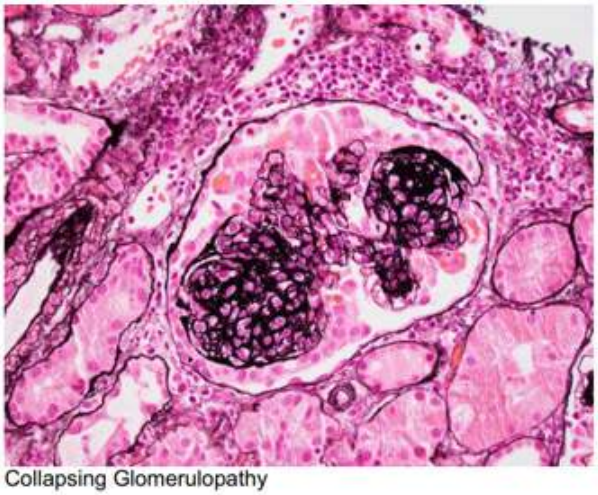
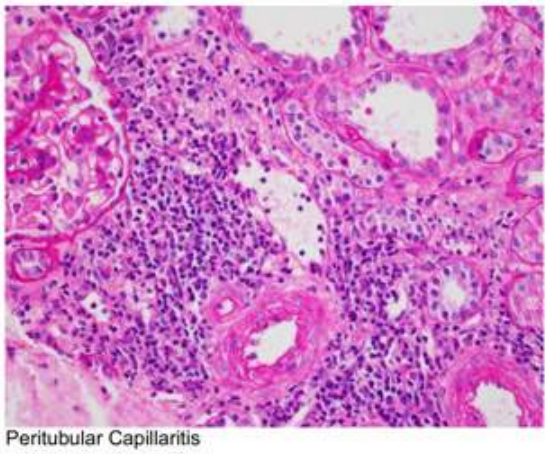


Figure 1.



Collapsing Glomerulopathy



Peritubular Capillaritis

CITATION INFORMATION: Hninn W., Merzkani M., Murad H., Malone A., Java A., Rajashekar G., Delos Santos R., Alhamad T. Covid-19 in a Kidney Transplant Patient Associated with Collapsing Glomerulopathy *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Hninn: None. **M. Merzkani:** None. **H. Murad:** None. **A. Malone:** None. **A. Java:** None. **G. Rajashekar:** None. **R. Delos Santos:** None. **T. Alhamad:** None.

ID

Abstract# 740

Breakthrough Cytomegalovirus DNAemia in High vs Intermediate Risk Heart Transplant Recipients

G. Huang[1], O. E. Beaird[1], M. Davis[2], M. Carlson[1], S. Chang[1], P. Gaynor[1], A. Fan[2], M. Deng[3], A. Multani[1], A. Nsair[3], J. Schaenman[1], *[1]Infectious Diseases, UCLA, Los Angeles, CA, [2]Pharmacy, UCLA, Los Angeles, CA, [3]Cardiology, UCLA, Los Angeles, CA*

Purpose: Cytomegalovirus (CMV) is one of the most common infections after transplantation and continues to cause significant morbidity and mortality despite prophylaxis and screening strategies. Guidelines recommend 3-6 months of post-transplant prophylaxis with 900mg daily of valganciclovir (VGC) in intermediate (R+) and high risk (D+/R-) heart transplant recipients. At our institution, R+ patients receive 450mg daily of VGC for 6 months and for high risk (D+/R-) patients 900 mg daily for 12 months. In this study we aim to determine rates of CMV DNAemia among these 2 groups and to examine if the 450 mg dose is effective at preventing CMV DNAemia.

Methods: Retrospective chart review of adult patients (>= 18 yo) undergoing heart transplantation at a single center from January 2017-December 2019.

Results: One-hundred and thirty-nine patients received a heart transplant between January 2017 and December 2019. Of those, 16 were identified as "low risk" (CMV D-/R-) and excluded. Of the 123 remaining patients, 83 were male and the median age at time of transplantation was 56. Thirty-six patients (29.3%) of patients experienced CMV DNAemia within 1 year of transplantation and 17 (13.8%) had a CMV DNA above the detectable threshold. Age, induction with anti-thymocyte globulin, rejection at 1 year, and mortality at 1 year did not differ between the groups. CMV DNAemia above the quantifiable threshold along with discharge on the equivalent of 900mg daily of VGC was significantly higher in the high-risk group (Table). In the high-risk group, 6 (21.4%) were discharged on lower doses of VGC due to renal dysfunction. Of the patients with breakthrough CMV DNAemia, 4 of 9 patients were on prophylaxis at the time in the high-risk group (44.4%) and 2 of 8 patients in the intermediate group (25%).

Conclusions: Despite having a larger proportion of patients on 900mg daily of valganciclovir, the high-risk patients developed a higher incidence of CMV DNAemia at 1 year compared to the intermediate risk population. The rate of CMV DNAemia in the intermediate risk group was low. Whether adherence to the 900 mg daily dose can decrease rates of DNAemia is currently under investigation in a larger patient cohort.

	High risk (n = 28)	Intermediate risk (n = 95)	p-value
Male	20 (71.4%)	63 (66.3%)	0.61
Age (IQR)	55 (34-71)	56 (41-63)	0.96
Anti-thymocyte globulin Induction	6 (21.4%)	17 (17.8%)	0.67
Discharged with 900mg valganciclovir prophylaxis during transplant hospitalization	9 (32.1%)	8 (8.4%)	0.01
DNAemia at 1 year	9 (32.1%)	8 (8.4%)	<0.01
CMV DNA level, IU/mL	856 (304.25-2231.5)	436 (231.5-1632.5)	0.403
Rejection at 1 year	4 (14.3%)	11 (11.5%)	0.53
Death at 1 year	2 (7.1%)	8 (8.4%)	1

Table 1. Comparison of high vs intermediate risk heart transplant recipients.

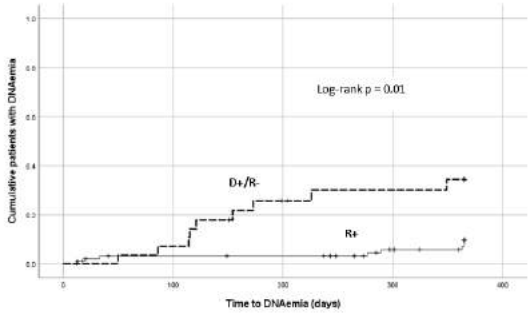


Figure 1. Cumulative patients with CMV DNAemia in the high vs intermediate risk groups

CITATION INFORMATION: Huang G., Beaird O., Davis M., Carlson M., Chang S., Gaynor P., Fan A., Deng M., Multani A., Nsair A., Schaenman J. Breakthrough Cytomegalovirus DNAemia in High vs Intermediate Risk Heart Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Huang: None. **O.E. Beaird:** None. **M. Davis:** None. **M. Carlson:** None. **S. Chang:** None. **P. Gaynor:** None. **A. Fan:** None. **M. Deng:** None. **A. Multani:** None. **A. Nsair:** None. **J. Schaenman:** None.

Abstract# 741

Relationship Between Tacrolimus Blood Levels and Covid-19 Pandemic in Kidney Transplant Recipients

T. Inoue[1], K. Unagami,[2], A. Ishiwatari[3], T. Kanzawa[3], T. Shimizu[3], K. Omoto[3], M. Inui[3], T. Suzuki[1], H. Ishida[4], K. Tanabe[3], *[1]Department of Nephrology, Kameda Medical Center, Chiba Kamogawa, Japan, [2]Department of Organ Transplant Medicine, Tokyo Women's Medical University, Tokyo, Japan, [3]Department of Urology, Tokyo Women's Medical University, Tokyo, Japan, [4]Department of Organ transplant medicine, Tokyo Women's Medical University, Tokyo, Japan*

Purpose: The novel coronavirus 2019 infection (COVID-19) caused a pandemic, prompting Tokyo, Japan, to restrict on the free movement of people in March 2020. Kidney transplant recipients are at high risk for critical COVID-19 due to chronic immunosuppression and coexisting conditions. For the follow-up of kidney transplant recipients during this pandemic, the number of hospital visits or use remote counseling should be reduced to minimize the risk of infection. However, the management of kidney transplant recipients during the COVID-19 pandemic is uncertain.

Methods: This single-center retrospective observational study included 980 patients who, more than a year previously, had undergone kidney transplantation and were taking extended-release tacrolimus once a day, with a target trough level of 4 to 6 ng/ml. We evaluated the effects of coronavirus pandemic on clinical outcomes such as tacrolimus blood level, renal function, and rejection in kidney transplant recipients, comparing pandemic data with non-pandemic data obtained between September 2019 and August 2020 in our hospital.

Results: Comparing pandemic data with non-pandemic data, the mean interval between hospital visits was 5.5±2.6 vs. 7.3±4.5 weeks (P=2.68×10-14). Serum Cr levels and rejection rates after kidney transplant showed no significant differences between both groups. There were no significantly differences in the coefficient of variation (CV) in tacrolimus blood levels, the rate of changes in oral medication, and the rate of deviation from the target trough level during the pandemic.

Conclusions: In kidney transplant recipients, blood levels of tacrolimus were maintained at target trough levels during the COVID-19 pandemic.

Clinical features in kidney transplant patients	
number	980
age	54.7±12.5
male,n,%	603(61.5%)
elapsed time after transplantation, years	9.1±6.3年
diabetic mellitus,n,%	130(13.2%)
living kidney transplantation,n.%	935(95.4%)
ABO incompatible, n , %	120(12.2%)
Cr , mg/dl	1.56±1.02

Clinical outcome between pandemic and non-pandemic			
	non-pandemic	pandemic	P value
interval between hospital visit ,week.	5.5±2.6	7.3±4.5	2.68^{x-14}
rate of changes in oral medication	0.077 ±0.34	0.06 ±0.67	0.450
rate of deviation from the target trough level	0.35±0.28	0.38±0.27	0.134
coefficient of variation	15.4±7.2	14.8±7.6	0.162
Cr	1.56±1.0	1.60±1.1	0.481
rejection	0	3	0.084

CITATION INFORMATION: Inoue T., Unagami, K., Ishiwatari A., Kanzawa T., Shimizu T., Omoto K., Inui M., Suzuki T., Ishida H., Tanabe K. Relationship Between Tacrolimus Blood Levels and Covid-19 Pandemic in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Inoue: None. **K. Unagami,:** None. **A. Ishiwatari:** None. **T. Kanzawa:** None. **T. Shimizu:** None. **K. Omoto:** None. **M. Inui:** None. **T. Suzuki:** None. **H. Ishida:** None. **K. Tanabe:** None.

Abstract# 742

Clinical Course and Outcomes in Solid Organ Transplant Recipients with Covid-19

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Purpose: We characterized the outcomes of COVID-19 in our population of solid organ transplant recipients (SOTRs). Since these individuals are immunocompromised, with multiple comorbidities, we hypothesized that they would be at increased risk of COVID-19 related complications and manifest delayed viral clearance.

Methods: A single-center retrospective chart review was conducted of all COVID-19 positive SOTRs in our hospital system from March to November 2020. Variables of interest included demographic data, clinical course, virologic assays, clinical suspicion for graft dysfunction, and biopsy results. Re-admissions within 60 days of discharge were recorded, as were persisting positive SARS-CoV2 PCR tests >4 weeks from initial diagnosis.

Results: We identified 60 SOTRs who tested positive for COVID-19 by nasopharyngeal swab PCR. This included 40 renal, 17 liver, and 9 heart, lung, pancreas, or small bowel transplant recipients ("other"). 7 patients had received dual organs. 66.6% were men and 63% African American. The most common comorbidities were hypertension (88%), chronic kidney disease as defined by an abnormal Cr (68%), diabetes (50%), and obesity defined by BMI >30 (33%). Forty patients required hospitalization, with a median 6.5-day length of stay. 15 were admitted to an ICU, including 8 who required mechanical ventilation and 3 who required oxygen via high flow nasal cannula. Other outcomes are summarized in the Table. The readmission rate was high, and a 9.3% mortality rate was found in non-liver transplant recipients. In general, immunosuppression management consisted of antimetabolite and calcineurin inhibitor dose reduction. However, graft rejection was not proven on biopsy, despite being suspected in 3 cases (2 kidney, 1 liver).

Conclusions: COVID-19 in SOTRs results in higher rates of hospitalization, ICU admission, and death, as compared to reported outcomes in the general population. Our series showed clinical variability depending on type of organ transplant, with worse outcomes in non-liver transplant recipients. As we move toward the approval and distribution of effective vaccines, it is important to recognize that SOTRs represent a group that is particularly vulnerable to this virus, and would benefit from early access to preventive strategies.

Demographics and COVID-19 outcomes in SOTRs by organ transplant type

	Kidney	Liver	Other
Sample size (N)	40	17	9
Average age (years)	53.6	57.2	55.2
Sex (% male)	75	52.9	66.7
Median LOS (days)	6	9.5	6
Readmissions (%)	22.5	11.8	66.7
Persistent + PCR (%)	15	29.4	0
Deaths (%)	10	0	11.1

CITATION INFORMATION: Jackson R., Challa S., Halim A., Kelly N., Maluf D., Shetty K., Lominadze Z. Clinical Course and Outcomes in Solid Organ Transplant Recipients with Covid-19 *AJT, Volume 21 Supplement 3*

DISCLOSURES: R.C. Jackson: None. **S. Challa:** None. **A. Halim:** None. **N. Kelly:** None. **D. Maluf:** None. **K. Shetty:** None. **Z. Lominadze:** None.

Abstract# 743

Immune Response to Covid-19 in Kidney Transplant Waitlist Patients

P. T. Jindra[1], C. M. Foye[1], I. Sharf[2], A. Rana[1], T. N. Galvan[1], A. Awan[1], C. A. O'Mahony[1], B. V. Murthy[1], *[1]Baylor College of Medicine, Houston, TX, [2]Baylor St. Luke's Medical Center, Houston, TX*

Purpose: The purpose of this study was to determine the effect of SARS-CoV-2 infection on the immune response in Kidney Transplant Waitlist Candidates (KTWC) and its clinical impact on their ability to get transplanted.

Methods: Initial kidney transplant work-ups were performed including high resolution HLA typing, Flow PRA and single antigen bead assessment of anti-HLA antibody specificities pre-COVID-19 pandemic. Our study group contained 12 KTWC with known positive COVID tests ranging in age from 29-71 years, predominantly Hispanic (75%) and all were male gender. Serum samples were tested pre COVID-19 pandemic and at the time of a positive COVID-19 test using the Luminex based LABScreen COVID Plus assay (One Lambda). IgM and IgG immune responses to SARS-CoV-2 were assessed for a panel of spike, RBD and nucleocapsid determinants as well as other common coronaviruses.

Results: KTWC who tested positive for SARS-CoV-2 by RT-PCR (92%) developed robust IgG responses to all five SARS-CoV-2 antigens expressed in the bead panel. Furthermore, 66% additionally produced IgM responses to SARS-CoV-2 antigens with predominance towards spike proteins and only 17% positive for nucleocapsid protein. 33% of KTWC lost their IgM antibody positivity to SARS-CoV-2 antigens while maintaining significantly strong IgG reactivity suggesting patients were in various phases of SARS-CoV-2 infection. Within other coronaviruses tested KTWC produced strong responses to the spike proteins from common human coronaviruses 229E, NL63, OC43 and HKU1. Surprisingly, 67% of KTWC also had significant IgG immunity to the SARS-CoV Spike S1 protein. Pre-pandemic sera did not show any antibody responses to SARS-CoV-2 proteins however, immunity to common coronaviruses remained high. We did not observe a change in KTWC PRA levels or subsequent rise in anti-HLA antibodies in post SARS CoV-2 infection. There was no association between HLA antigens and degree of either IgM or IgG responses to SARS-CoV-2 or common coronaviruses.

Conclusions: During the COVID-19 pandemic it is critical to have the tools to accurately detect immunity to the SARS-CoV-2 virus. The unintended consequences of SARS-CoV-2 infection in patients awaiting transplant needed to be explored. KTWP were able to mount an effective immune response to 5 distinct protein domains on SARS-CoV-2. Patients with active infection produced both IgM and IgG antibodies against SARS-CoV-2. Despite mounting a stong immune response to SARS-CoV-2 no additional HLA sensitization was observed. Tracking how long these IgG antibodies to SARS-CoV-2 domains persist in patient sera will continue to inform us in how long a patient might remain protected and the effectiveness of a SARS-CoV-2 vaccine once administered.

CITATION INFORMATION: Jindra P., Foye C., Sharf I., Rana A., Galvan T., Awan A., O'Mahony C., Murthy B. Immune Response to Covid-19 in Kidney Transplant Waitlist Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: P.T. Jindra: None. **C.M. Foye:** None. **I. Sharf:** None. **A. Rana:** None. **T.N. Galvan:** None. **A. Awan:** None. **C.A. O'Mahony:** None. **B.V. Murthy:** None.

Abstract# 744

Probiotic Protocol to Reduce Perioperative Infection After Liver Transplantation

M. Jorgenson[1], Q. Yang[2], D. Yang[2], G. Leverson[2], C. Saddler[2], J. Smith[2], N. Safdar[2], L. Fernandez[2], D. Al-Adra[2], *[1]UW Health, Madison, WI, [2]UW School of Medicine and Public Health, Madison, WI*

Purpose: Evaluate efficacy and safety of a probiotic preparation to reduce perioperative infection in patients undergoing liver transplant surgery

Methods: Adult patients receiving liver transplantation from 5/7/2019- 9/30/2019 received a probiotic preparation of lactobacillus + guar gum prebiotic fibers given perioperatively for 14 days (POD 0- POD 14). These patients were compared to a standard of care (SOC) cohort who received liver transplant in the year prior to implementation of the protocol (3/1/2018-3/1/2019). In a power analysis using the 7% and 35% infectious incidence from prior literature, at least 33 subjects per group were needed to have at least 80% power for finding a significant difference in 30-day infection rates using a test of proportions. All patients received perioperative surgical prophylaxis and standard transplant infection prophylaxis per institutional protocol. Primary objective was incidence of perioperative bacterial infection. Secondary objectives were safety/toxicity as measured by lactobacillus-associated infectious events and one year rates of rejection, graft and patient survival

Results: 144 patients met inclusion criteria; 33 in the probiotic cohort, 111 in the SOC cohort. Clinical characteristics were similar in the two groups (Table 1). Patients who received the probiotic preparation had a similar incidence of perioperative infective events (probiotic 13.4% vs SOC 14.5%, p=0.82). There were no lactobacillus-associated infectious events in the probiotic cohort (probiotic 0% vs SOC 1.8%, p>0.99). Rates of rejection, graft and patient survival were not different between groups (Table 2).

Conclusions: An early interim analysis of the probiotic protocol suggests safety based on lack of lactobacillus-associated infections in the probiotic group. While rates of bacterial infection were not different, it is possible our sample size was not adequate to detect a more modest difference in infection rates. Ongoing evaluation of the benefits of perioperative probiotics in the current era of liver transplantation is warranted.

Table 1. Baseline characteristics of participants

	Comparator (n=111)	Probiotics (n=33)	P value
Race=NHW	105 (94.6%)	31 (93.9%)	0.78
Age at Transplant (mean (SD))	53.6 ± 12.9	54.4 ± 11.7	0.75
Recipient; Male (%)	77 (69.4%)	22 (66.7%)	0.83
Primary Liver Disease (%)			0.83
Alcoholic Cirrhosis	33 (29.7%)	12 (36.4%)	
Alcoholic Cirrhosis with Hepatitis C	7 (6.3%)	2 (6.1%)	
HCC	11 (9.9%)	5 (15.2%)	
NASH	23 (20.7%)	4 (12.1%)	
Other	24 (21.6%)	7 (21.2%)	
PSC/PBC	13 (11.7%)	3 (9.1%)	
Recipient BMI	29.8 ± 6.9	31.3 ± 6.9	0.27
Allocation MELD (mean (SD))	27.8 ± 9.4	31.8 ± 15.9	0.07
Allograft type (%)			0.13
DBD	94 (84.7%)	24 (72.7%)	
DCD	17 (15.3%)	9 (27.3%)	
Donor CMV POS (%)	57 (51.4%)	16 (48.5%)	0.84
Recipient CMV POS (%)	47 (42.3%)	19 (57.6%)	0.12
Cold Time (min, mean (SD))	6.1 ± 1.9	6.2 ± 1.7	0.59
Biliary Anastomosis Type (%)			0.73
End to end	101 (91.0%)	31 (93.9%)	
Roux-en-Y	10 (9.0%)	2 (6.1%)	
ICU LOS (days, median (IQR))	4.9 ± 15.1	3.6 ± 2.7	0.62
Admission LOS (days, mean (SD))	22.6 ± 41.9	15.8 ± 11.4	0.36
Induction (%)			0.11
None	95 (85.6%)	24 (72.7%)	
Thymoglobulin	16 (14.4%)	9 (27.3%)	
Maintenance IS (%)			>0.99
Steroids	110 (99.1%)	33 (100%)	
MPA	108 (97.3%)	33 (100%)	
Tacrolimus	110 (99.1%)	33 (100%)	

Table 2. Efficacy Outcomes

	Comparator (n=111)	Probiotic (n=33)	P value
Bacterial infection 30 days	14.5%	13.4%	0.82
Acute Rejection; biopsy 90 days	22.9%	18.8%	0.35
Graft survival 1 year	95.5%	93.9%	0.91
Patient survival 1 year	97.3%	100%	0.34

CITATION INFORMATION: Jorgenson M., Yang Q., Yang D., Leverson G., Saddler C., Smith J., Safdar N., Fernandez L., Al-Adra D. Probiotic Protocol to Reduce Perioperative Infection After Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Jorgenson: None. **Q. Yang:** None. **D. Yang:** None. **G. Leverson:** None. **C. Saddler:** None. **J. Smith:** None. **N. Safdar:** None. **L. Fernandez:** None. **D. Al-Adra:** None.

Abstract# 745

Analyzing the Impact of Covid-19 in the Hospitalized Cohort of Liver Transplant Recipients: An Early Systematic Review and Meta-Analysis

J. Kumar[1], I. Reccia[2], P. Bachul[1], D. DiSabato,[1], R. Barth[1], J. Fung[1], T. Baker[1], P. Witkowski[1], *[1]University of Chicago, Chicago, IL, [2]Imperial College, London, United Kingdom*

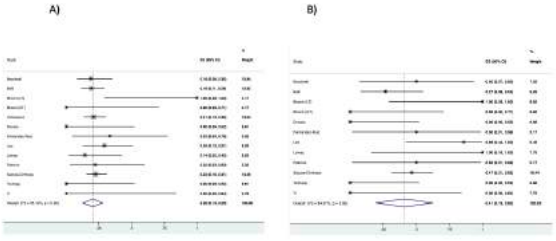
Purpose: To determine pooled prevalence of outcomes among hospitalized liver transplant recipients with COVID-19 through meta-analysis.
Methods: A database search was completed between Dec1, 2019-Nov15, 2020, as PRISMA guidelines and random-effect analysis performed. Twelve studies, 517 hospitalized liver transplant patients with COVID-19 were included.
Results: Common presenting symptoms were fever(71%), cough(62%), dyspnea(48%), and gastrointestinal symptoms(28%). 77%(95%CI, 61%-93%) transplant were due to cirrhosis. The most prevalent co-morbidities were hypertension(55%), diabetes(45%) and cardiac disease(21%)(Table-1,2). In-hospital mortality was 20%(95%CI, 13%-28%); which arose significantly in ICU group 41% (95%CI, 19%-63%)(P value<0.00)(Fig1:A,B). Further, analysis showed significantly increased mortality-risk in elderly(OR=4.26)(95%CI, 13%-28%) but no significant effect in terms of gender or time since transplant(Fig1:C-E).
Conclusions: We observed a higher prevalence of dyspnea, gastrointestinal symptoms than general population. In-hospital mortality was congruent with non-transplant population with multiple co-morbidities but appeared to be less than decompensated cirrhotic patients(26-40%) as reported in literature. Further, higher mortality risk observed in elderly could be attributed to age-associated co-morbidities.

Table 1: Summary statistics outlined as pooled estimate of outcomes of interests

Attributes	Events	Total	Studies	Pooled prevalence (95%)
Age (yrs)	NA	502	9	63.58 (59.66 - 67.48)
Diabetes	211	486	8	0.45 (0.38 - 0.53)
Hypertension	251	486	8	0.55 (0.47 - 0.64)
Cardiac disease	88	472	7	0.21 (0.13 - 0.30)
Lung disease	42	352	6	0.14 (0.06 - 0.22)
ARDS	81	146	5	0.56 (0.26 - 0.86)
ITU admissions	95	417	12	0.22 (0.12 - 0.32)

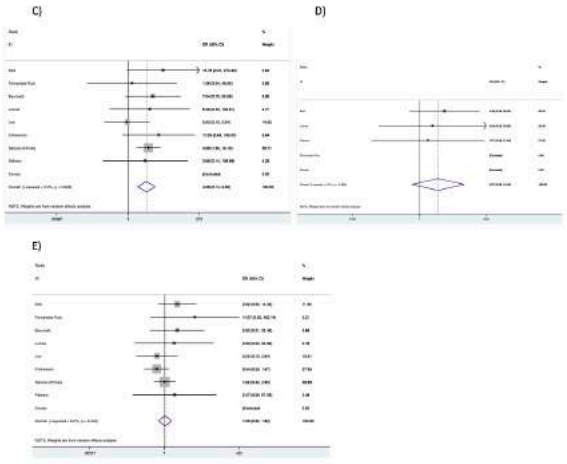
Table 2: Summary statistics outlined as pooled estimate of outcomes of interests

Attributes	Events	Total	Studies	Pooled prevalence (95%)
Fever	240	350	8	0.71 (0.61-0.81)
Cough	213	342	7	0.62 (0.53-0.72)
Dyspnea	144	353	9	0.48 (0.36-0.61)
Gastrointestinal symptoms	87	293	6	0.28 (0.20-0.35)
CNI withheld/ reduced	39	91	4	0.38 (0.09-0.67)
MMF withheld/ reduced	28	55	5	0.60 (0.17-0.90)
Increase/pulse steroid	59	283	7	0.22 (0.13-0.31)



1.A) Hospital mortality was 20% with ES of 0.20 (95%CI 0.13 - 0.28). (ES = Effect Size)

1.B) Intensive care mortality was 41% with ES of 0.41 (95%CI 0.19 - 0.63).



1.C) Figure shows significantly higher risk in ≥60/65 years group (red dotted line) with OR of 4.26 (95% CI 2.14-8.49).

1.D) Figure shows that both post-transplant period (>2 years) and (≤2 years) are comparable (red dotted line) with OR of 3.07 (95% CI 0.65-14.46).

1.E) Figure shows that both genders are comparable (red dotted line) with OR of 1.05 (95% CI 0.62-1.80).

CITATION INFORMATION: Kumar J., Reccia I., Bachul P., DiSabato, D., Barth R., Fung J., Baker T., Witkowski P. Analyzing the Impact of Covid-19 in the Hospitalized Cohort of Liver Transplant Recipients: An Early Systematic Review and Meta-Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Kumar: None. **I. Reccia:** None. **P. Bachul:** None. **D. DiSabato,:** None. **R. Barth:** None. **J. Fung:** None. **T. Baker:** None. **P. Witkowski:** None.

Abstract# 746

COVID-19 in Kidney Transplant Recipients in the Southeastern United States: A Single Center Experience

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Purpose: The novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) or COVID-19, has emerged as a viral pandemic and brought unprecedented challenges worldwide on health care systems, including our transplantation community. Data on the clinical characteristics and outcomes of patients with COVID-19 infection in kidney transplant recipients (KTRs) remain uncertain. Here we describe the clinical characteristics and outcomes of KTRs in the Southeastern US who contracted COVID-19.

Methods: A retrospective review of KTRs who tested positive for COVID-19 from March 15th, 2020 until November 25th, 2020 and followed at our institution were included. Data including patient demographics, history, laboratory results, radiological findings, and clinical outcomes was collected from the electronic medical record. Summary statistics using Kruskal-Wallis and Chi-square tests were performed. Multivariable logistic regression was used to identify risk factors for inpatient admission.

Results: There were 104 patients who tested positive for COVID-19 either at our institution or a referring hospital (Table 1). Fifty-six (54%) patients required hospitalization. Labs on admission were: mean WBC 6.6±2.8 (x10^3/mcL), serum creatinine 2.3±1.7 (mg/dL), CRP 96±84 (mg/L), ferritin 1093±1052 (ng/mL), procalcitonin 0.62±1.0 (ng/mL), lactate 1.2±0.4 (mEq/L). Admitted patients were treated with dexamethasone (54%) and remdesivir (23%), and the anti-metabolite was held in 71%. Nineteen patients required ICU stay, 13 were intubated, 25 developed AKI and 12 died related to COVID-19 (11%). Mean length of inpatient stay was 11±13 days. After adjustment for age, DM and CAD status, the risk of admission due to COVID-19 was higher in those presenting with fever (OR 3.12, 95% CI 1.23-7.92, P-Value 0.017), and SOB (OR 7.64,95% CI 1.89-30.9, P-Value 0.004) (Table 2).

Conclusions: The majority of KTRs with COVID-19 in our cohort required hospital admission. The mortality rate was 11% which is at the lower end of the spectrum of what has been previously reported. Despite this, COVID-19 remains a significant risk for our kidney transplant recipients with a high rate of hospital admission.

TABLE 1: Characteristics of KTRs with COVID-19 Infection

	All patients N=104	Admitted N=56	Not admitted N=48	P-value
Age, years	53 ± 12	56 ± 11	49 ± 12	0.002
Male Sex	56 (54%)	28 (50%)	28 (58%)	0.395
Race				0.517
White	58 (56%)	28 (50%)	30 (62%)	
Black	36 (35%)	22 (39%)	14 (29%)	
Other	10 (9%)	6 (11%)	4 (8%)	
BMI, kg/m^2	32 ± 8	31 ± 7	33 ± 8	0.267
Time from transplant, months	191 ± 194	209 ± 201	170 ± 185	0.261
Living donor	33 (32%)	17 (30%)	16 (33%)	0.690
Comorbidities				
HTN	99 (95%)	55 (98%)	44 (92%)	0.120
DM	40 (38%)	27 (48%)	13 (27%)	0.027
COPD/asthma	11 (11%)	4 (7%)	7 (15%)	0.219
CAD	30 (29%)	24 (43%)	6 (13%)	0.001
Presenting symptoms				
Fever	52 (50%)	34 (61%)	18 (38%)	0.018
Cough	50 (48%)	24 (43%)	26 (54%)	0.250
SOB	24 (23%)	21 (38%)	3 (6%)	<0.001
Hypoxia	18 (17%)	18 (32%)	0 (0)	<0.001
Diarrhea	26 (25%)	17 (30%)	9 (19%)	0.173
Baseline serum Cr, mg/dl	1.45	1.54	1.36	0.152

TABLE 2: Factors Associated with Inpatient Admission

	Odds ratio	95% confidence interval	P-value
Age	1.04	0.99-1.08	0.106
Diabetes (ref: no diabetes)	1.96	0.75-5.14	0.172
CAD (ref: no CAD)	2.72	0.82-9.10	0.103
Fever (ref: no fever)	3.12	1.23-7.92	0.017
SOB (ref: no SOB)	7.64	1.89-30.9	0.004

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DISCLOSURES: K.R. Kumm: None. **S.H. Shawar:** None. **R.C. Forbes:** None. **B.P. Concepcion:** None.

Abstract# 747

The Gut Microbiota Diversity and Metabolite Production is Reduced in Liver Transplant Recipients and Associated with Post-Operative Infection

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Purpose: Liver transplant (LT) recipients have abnormal microbiota before and after transplantation. (1,2) The association between fecal microbiota, metabolites, and clinical outcomes in liver transplantation are not well established. We correlated the microbiota composition and metabolite production in fecal samples with early post-operative outcomes, including infection.

Methods: In a prospective observational study, we collected fecal samples and determined microbiota composition by 16S ribosomal RNA sequencing in LT recipients. Fecal short chain fatty acid (SCFA), primary, and secondary bile acid concentrations were determined by targeted metabolomic analyses. Inverse Simpson index was used to compare diversity between enrolled subjects and healthy controls. These data were compared to length of stay following transplantation, MELD-Na score at the time of transplant, and post-operative infection. The organisms causing clinical infection were compared to the microbiota of the subjects.

Results: 13 LT patients were enrolled, and 40 stool samples were collected in the peri-transplant period. In addition to LT, 3 patients received a kidney transplant, 1 patient received a heart transplant, 1 patient is listed for a heart, liver, and kidney transplant. Compared to healthy controls, the microbiota of LT recipients had reduced diversity ($p<0.001$). [Fig1] The health promoting taxa *Bacteroidetes*, *Ruminococcaceae*, and *Lachnospiraceae*, and microbiota derived SCFAs were markedly diminished.

Conclusions: The microbiota and metabolome of LT recipients are markedly abnormal and appear to be associated with clinically relevant and microbiologically predictable post-operative infection. Patient recruitment, sample collection, analysis, correlation with outcomes and potential interventional studies are ongoing.

ID

Patient	Infection	Organism	Dominant Organism	Butyrate (mM)*
UC-001	Cystitis	VRE	*Enterococcus*	1.34
	Cystitis	VRE	*Enterococcus*	
	Colitis	*C. diff*	*Enterococcus*	
UC-003	Surgical Site	VRE, *Pseudomonas*	None	4.4
UC-006	Surgical Site	*Klebsiella* ESBL	*Enterococcus->Klebsiella*	0
UC-008	Surgical Site	VRE	*Enterococcus*	0
UC-010	Surgical Site	*Pseudomonas*, MSSA, *Enterococcus*	*Lactobacillus>Enterococcus >Enterobacter*	0
UC-011	VAP	*Pseudomonas*, *E coli*	None	0
UC-012	Surgical Bed	VRE, *H. paraflu*, *Prevotella*	*Enterococcus*	0
	Abscess	VRE, *Citrobacter*	*Enterococcus*	
UC-013	Peritonitis	No organism	*Lactobacillus*	0
	VAP	*Enterobacter* ESLB	*Lactobacillus*	

Post-operative infections, compared to microbiota domination and SCFA concentration.

Abbr. VRE-Vancomycin Resistant *Enterococcus* ESBL-Extended Spectrum β-lactamase MSSA-Methicillin Resistant *Staphylococcus aureus* VAP-Ventilator Associated Pneumonia

*Concentration in first collected Stool

16s rRNA sequencing, SCFA concentration, and InvSimpson Diversity of Healthy Donor vs first stool LT recipients

*Patients who developed post-operative infection

CITATION INFORMATION: Lehmann C., Keskey R., Nayak R., Littmann E., Pamer E., Baker T. The Gut Microbiota Diversity and Metabolite Production is Reduced in Liver Transplant Recipients and Associated with Post-Operative Infection *AJT, Volume 21 Supplement 3*
DISCLOSURES: C.J. Lehmann: None. **R. Keskey:** None. **R. Nayak:** None. **E. Littmann:** None. **E. Pamer:** None. **T. Baker:** None.

Abstract# 748

COVID-19 in Hospitalized Kidney Transplant Recipients: Clinical Course, Prognostic Factors and Differences Between First and Second Waves

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Purpose: The aim was to describe the clinical course and management of SARS-CoV-2 infection in kidney transplant recipients (KTR) hospitalized with COVID-19, identify risk factors for severity, and analyze the differences between first (March-June) and second (Aug-Nov,2020) waves.
Methods: Retrospective, single-center study in 48 KTR (24 in each wave) admitted with COVID-19. Baseline features, immunosuppression, clinical findings, laboratory and radiological data and therapies were analyzed to identify risk factors for "severe COVID" (requiring oxygen reservoir bag, high-flow nasal cannula and/or invasive mechanical ventilation).
Results: Age was 58.9 ± 13 years, 75% were male, 60.5 (24 - 143) months after KT. 20.8% were nosocomial and there were 2 "reinfections". Main symptoms were fever (71%), dyspnea (56%), cough (48%) and diarrhea (40%). 87.5% developed pneumonia, 77% needed supplemental oxygen, 14.6% were admitted to ICU (12.5% for invasive ventilation) and 8.3% died.
Table 1 shows main differences in KTR with severe COVID. In multivariable regression analysis with different models including age, sex, blood group, comorbidity, immunosuppression, RAS blockers and:1) SatO2, platelets and LDH at admission: only everolimus (adjusted OR: 204, p 0.047) as independent predictor for severity.2) clinical course: everolimus (adjusted OR: 61.7, p 0.021) and poor clinical course at one week (adjusted OR: 546, p 0.015) were associated with severe COVID.In the second wave the patients consulted earlier (p 0.029) and SARS-CoV-2 infection was less severe (p 0.001) with less use of reservoir (p 0.008), lower inflammatory markers at admission [CRP (p 0.010), IL-6 (p 0.048) and ferritin (p 0.045)], and more mild cases without oxygen need (p 0.048). There were fewer pneumonia at admission and 48h after, but no differences at one-week, and more patients were treated with steroids (79% vs 42%, p 0.017).
Conclusions: Everolimus could represent a risk factor for severity in KTR hospitalized with COVID-19. In the second wave there was a wider use of steroids, though SARS-CoV-2 infection was less severe.

	Severe COVID n=20 (%)	Not severe n=28 (%)	p (Sig.)
BASELINE FEATURES			
Age (years)	57.2 ± 11.2	60.2 ±14.6	0.440
Gender: male	18 (90)	18 (64.3)	0.051
Weight (Kg)	81.6 ± 14.4	71.9 ± 17.5	**0.049**
Blood group: A	13 (65)	9 (32.1)	**0.039**
Comorbidities: Sleep apnea	7 (35)	2 (7.1)	**0.024**
Charlson Comorbidity Index	5.25 ± 2.8	5.43 ± 2.5	0.818
***Immunosuppression*:**			
· Prednisone, Mycophenolate, Tacrolimus	8 (40)	19 (67.8)	0.079
· Prednisone, Tacrolimus, Everolimus	8 (40)	3 (10.7)	**0.034**
Drugs:			
· Tacrolimus	18 (90)	26 (92.9)	1.000
· Mycophenolate	10 (50)	22 (78.6)	0.062
· Everolimus	9 (45)	3 (10.7)	**0.016**
· Cyclosporine	1 (5)	2 (7.1)	1.000
· Prednisone	19 (95)	27 (96.4)	1.000
RAS blockers	15 (75)	9 (32.1)	**0.008**
CLINICAL COURSE			
SatO2 (%) at admission	91.7 ± 3.7	94.6 ± 2.1	**0.004**
Pneumonia	20 (100)	22 (78.6)	**0.046**
Poor clinical course at 48-72 hours	18 (90)	9 (32.1)	**<0.001**
Poor clinical course at 7 days	12 (60)	1 (3.6)	**<0.001**
Radiological worsening at 48-72 hours	18 (90)	8 (28.5)	**<0.001**
Radiological worsening at 7 days	10 (50)	7 (25)	0.125
ICU admission	7 (35)	-	**0.001**
Mortality	4 (20)	-	**0.025**
LABORATORY			
At admission:			
· Platelets (·10^3/mL)	142 ± 67	202 ± 92	**0.016**
· LDH (UI/mL)	349 ± 190	221 ± 67	**0.010**
· Ferritin (mg/dL)	2203 ± 2803	505 ± 421	**0.050**
At one week:			
· Platelets (·10^3/mL)	155 ± 85	220 ± 98	**0.022**
· LDH (UI/mL)	471 ± 240	251 ± 87	**0.002**
· Albumin (g/dL)	3.09 ± 0.49	3.56 ± 0.37	**0.001**
· C-reactive protein (mg/dL)	5.9 (2.6 – 20.5)	2.1 (0.5 – 5.1)	**0.009**
Creatinine (mg/dL):			
· baseline	2.24 ± 1.52	2.02 ± 1.26	0.585
· at admission	2.92 ± 1.62	2.26 ± 1.04	0.126
· maximum Cr	3.81 ± 2.15	2.69 ± 1.87	0.062
· at discharge (n=41)	2.21 ± 1.15	1.81 ± 0.82	0.194
AKI (Cr +0.3 mg/dL or eGFR -25%):	17 (85)	21 (75)	0.722
· Acute dialysis	5 / 20	0 / 18	**0.009**
IMMUNOSUPPRESSION			
· Tacrolimus > 10 ng/mL	12 (60)	13 (46.4)	0.359
· Everolimus > 8 ng/mL	3 / 9	-	0.332
Days without tacrolimus (discontinued)	12.7 ± 7.8	6.3 ± 4.0	**0.045**
COVID-19 THERAPIES			
· Hydroxychloroquine	13 (65)	10 (35.7)	0.078
· Azithromycin	9 (45)	6 (21.4)	0.117
· Lopinavir/ritonavir	2 (10)	-	0.168
· Remdesivir	-	-	-
· Antibiotics since admission	17 (85)	14 (50)	**0.016**
· Antibiotics (anytime)	19 (95)	23 (82.1)	0.191
· Steroids	14 (70)	15 (53.6)	0.370
· cumulative dose (mg/Kg prednisone)	12.2 ± 7.9	6.2 ± 5.5	**0.024**
· days of treatment	11.9 ± 6.4	8.1 ± 4.9	0.085
· Tocilizumab	4 (20)	-	**0.025**
· Heparin	18 (90)	23 (82.1)	0.683

CITATION INFORMATION: Macías N., Rodríguez Ferrero M., Acosta A., Carbayo J., González Rojas Á., Muñoz de Morales A., García Prieto A., Goicoechea M. COVID-19 in Hospitalized Kidney Transplant Recipients: Clinical Course, Prognostic Factors and Differences Between First and Second Waves *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Macías: None. **M. Rodríguez Ferrero:** None. **A. Acosta:** None. **J. Carbayo:** None. **Á. González Rojas:** None. **A. Muñoz de Morales:** None. **A. García Prieto:** None. **M. Goicoechea:** None.

Abstract# 749

Weathering the Cytokine Storm: Therapeutic Plasma Exchange for the Management of Severe Covid19 in Solid Organ Transplant Recipients

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Purpose: The treatment of SARS-CoV-2 associated pneumonia in solid organ transplant recipients (SOTr) continues to be under investigation. Timely control of the cytokine release storm (CRS) in its early stage is of essence to improving treatment of adult respiratory distress syndrome (ARDS). We report here the results of the use of therapeutic plasma exchange (TPE) as adjunct therapy for the management of SOTr.

Methods: Single-center, retrospective cohort study of SOTr diagnosed with SARS-CoV-2 infection from March 1st to September 30th, 2020. All patients received severity stratified institutional protocolized treatment and TPE was started based on clinical and inflammatory parameters of CRS and ARDS. CRP, Ferritin, D-Dimer IL-6, IL10, TNF-A, IFN-G and TGF-A were measured pre and after completion of the treatment.

Results: Of the 129 COVID-19 positive SOTr during the study period, 27 (21%) developed ARDS requiring the use of TPE. Baseline characteristics are shown in Table 1. The median time from transplant to infection was 287 (12-3593) days and the mean ICU stay was 13.5 (8-57) days. All patients had ARDS and reduction of baseline Immunosuppression. The management and results are shown in Table 2. The mean dose of TPE was 5 (3-20) sessions. Our data showed a down trend in measured cytokines achieved at the end of the TPE treatment. The mean ± SD pre and post TPE CRP level were 15.95 ± 9.4 and 2.30 ± 5.80. The post treatment CRP correlated with improvement in oxygen requirements with HR of death of 1.35. Patient and graft survival were 62.9 and 96.3% respectively.

Conclusions: The supportive use of TPE in severe SARS-CoV-2 associated CRS and ARDS appears to improve oxygen requirements and prognosis. More research is warranted to confirmed our findings.

Table.1 Characteristics of SOT recipients with COVID-19 treated with Therapeutic Plasma Exchange (TPE)

Variable	All Patients. N = 27 (%)
Demographics	
Age, median (IQR)	58 (28-69)
Gender, male	15 (55.5%)
Race, White	14 (51.8%)
Ethnicity, Hispanic	13 (48.1 %)
COVID stage base WHO critical scale	
Mild	2 (7.4%)
Moderate	2 (7.4%)
Severe	12 (44.4%)
Critical	11 (40.7%)
Types of SOT	
Decease Donor Kidney Transplant	21 (77.7%)
Simultaneous Liver-Kidney Transplant	3 (11.1%)
Orthotopic Heart Transplant	1 (3.7%)
Single Lung Transplant	1 (3.7.%)
Simultaneous Pancreas-Kidney Transplant	1 (3.7%)
Maintenance Immunosuppression	
Tacrolimus	22 (81.4%)
Sirolimus	1 (3.7%)
Belatacept	4 (14.8.%)
Mycophenolate mofetil	25 (92.5%)
Prednisone	17 (62.9%)

Table 2. Management and outcomes

Variable	All Patients N = 27 (%)
Management	
Immunosuppression	
Reduction in overall immunosuppression	27/27 (100%)
Mycophenolate mofetil held	2/27 (7.4%)
Belatacept held	4 /4 (100%)
TPE after other treatment	
Hydroxychloroquine	2 (7.4%)
Tocilizumab	2 (7.4%)
Remdesivir	25 (89.2%)
High dose of steroids	27 (100%)
Convalescent Plasma	9 (33.3%)
Therapeutic Anticoagulation (D-Dimer ≥ 2)	23 (85.1%)
Oxygen requirement post TPE	
Decrease	20 (74%)
Worsening	4 (18.4%)
Unchanged	3 (11.1%)
Complications	
Septic shock	11 (40.7%)
Mechanical ventilation	12 (44.4%)
Mechanical ventilation, (days), median (IQR)	8 (1-25)
Acute kidney injury	18 (66.6%)
CRRT	10 (37%)
Biopsy proven Acute Rejection	2 (7.4%)
Co-infections	19 (70%)
Bacterial infections	17 (62.9%)
Fungal infections	6 (22.2%)
Viral infections	5 (18.5%)
Survival	
Patient survival	17/27 (62.9%)
Graft survival	26/27 (96.3%)

CITATION INFORMATION: Mattiazzi A., Pagan J., Mendez Castaner L., Fernandez A., Zamora Gonzalez R., Simkins J., Preczewski L., Natori Y., Anjan S., Guerra G. Weathering the Cytokine Storm: Therapeutic Plasma Exchange for the Management of Severe Covid19 in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

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Abstract# 750

Sars-cov-2 versus Non-sars-cov-2 Infection Among Solid Organ Transplant Recipients: Case Control Study

M. A. Mendoza[1], M. Raja[1], S. Anjan[1], S. C. Curel[2], G. Rosello[3], A. Fernandez[1], A. Chandorkar[4], C. O'Brien[5], A. Phancao[5], N. Sinha[1], R. Vianna[1], M. Loebe[1], C. Gaetano[1], J. Simkins[1], M. Morris[1], L. Abbo[1], J. Camargo[1], G. Guerra[1], Y. Natori[1], *[1]Department of Medicine, University of Miami, Miami, FL, [2]Miller School of Medicine, University of Miami, Miami, FL, [3]University of Miami, Miami, FL, [4]University of Minnesota, Minneapolis, MN, [5]Miami Transplant Institute, University of Miami, Miami, FL*

Purpose: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has been raging since the end of 2019. The clinical differences between non-SARS-CoV-2 coronavirus and SARS-CoV-2 in solid organ transplant recipients (SOTR) are not well defined.

Methods: This is a case control study of adult SOTR with PCR positive nasopharyngeal sample or bronchoalveolar lavage, for either SARS-CoV-2 or non-SARS-CoV-2 coronavirus, from 1/2017 to 10/2020. Follow up period was up to three months. Secondary infections were diagnosed by culture or viral PCR from a sterile specimen. Clinical outcomes were compared amongst both groups.

Results: Seventy-two non-SARS-CoV-2 coronavirus and 129 SARS-CoV-2 infections were identified. Patient's demographic information and outcomes are shown in table 1 and 2 respectively. Secondary infections and ICU admissions were statistically

significantly different between both groups, and higher mortality was observed in the SARS-CoV-2 group. With time to event analysis, there was trend to higher mortality with SARS-CoV-2 infection as compared to non- SARS-CoV-2 (p=0.06)(figure).
Conclusions: Our study shows SOTR with SARS-CoV-2 infection may have a significant worse outcome as compared to non-SARS-CoV-2. Secondary infection was also common after this respiratory viral infection in both groups.

Table 1. Patient's characteristics and laboratory findings

Data in median, IQR	SARS-CoV-2 (129)	non-SARS-CoV-2 (72)	p-value
Gender (female)	54	33	0.59
Age	53 (45-62)	60.5 (42.3-66)	0.17
Time to infection post- SOT (months)	27.7 (8.2-74.3)	15 (7.3-40.2)	0.11
Kidney transplant	91	27	
Liver transplant	16	8	
Neutrophil to Lymphocyte ratio	1.7 (1.8-6.7)	5.6 (2.8-13.4)	0.08

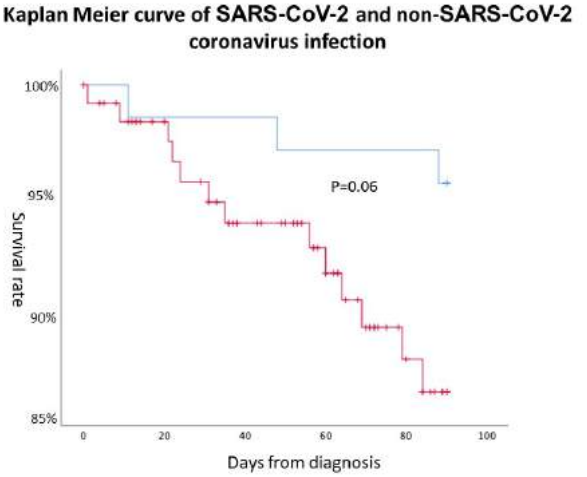

Table 2. Outcomes

	SARS-CoV-2 (129)	non-SARS-CoV-2 (72)	p-value
Lower respiratory tract infection	115 (89.1%)	38 (52.8%)	0.10
Secondary infection	50 (38.8%)	17 (23.6%)	0.028
Intensive care unit admission	34 (26.3%)	9 (12.5%)	0.04
Rejection	12 (9.3%)	4 (5.6%)	0.35

CITATION INFORMATION: Mendoza M., Raja M., Anjan S., Curel S., Rosello G., Fernandez A., Chandorkar A., O'Brien C., Phancao A., Sinha N., Vianna R., Loebe M., Gaetano C., Simkins J., Morris M., Abbo L., Camargo J., Guerra G., Natori Y. Sars-cov-2 versus Non-sars-cov-2 Infection Among Solid Organ Transplant Recipients: Case Control Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.A. Mendoza: None. **M. Raja:** None. **S. Anjan:** None. **S.C. Curel:** None. **G. Rosello:** None. **A. Fernandez:** None. **A. Chandorkar:** None. **C. O'Brien:** None. **A. Phancao:** None. **N. Sinha:** None. **R. Vianna:** None. **M. Loebe:** None. **C. Gaetano:** None. **J. Simkins:** None. **M. Morris:** None. **L. Abbo:** None. **J. Camargo:** None. **G. Guerra:** None. **Y. Natori:** None.

Abstract# 751

Multi-drug Resistant Infections in Solid Organ Transplant Recipients, a New Era of Risk

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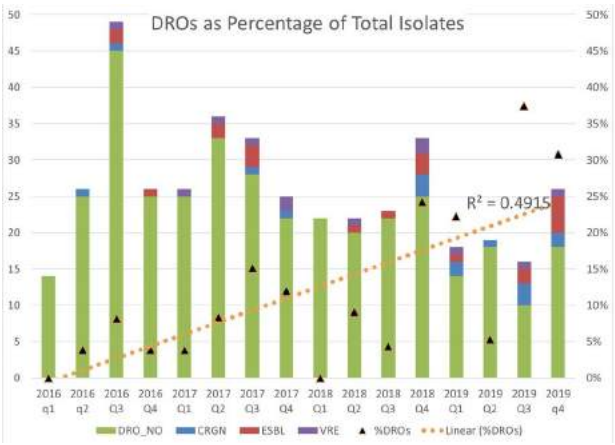
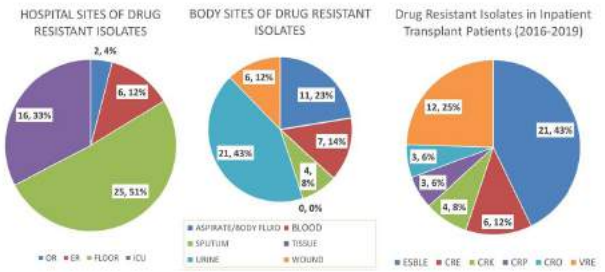
Purpose: Antibiotic drug resistant organisms (DRO) [extended spectrum beta-lactamase (ESBL), vancomycin-resistant enterococcus (VRE), and carbapenem resistant bacteria (CRB)] are becoming more prevalent and pose a significant healthcare burden. As immunocompromised transplant patients are particularly susceptible to nosocomial infection, we sought to examine hospital-wide patterns of DRO in abdominal organ transplant recipients.
Methods: All cultures from index- and re-admissions for abdominal organ transplant recipients at our institution from 2016 to 2019 were included in a retrospective analysis. The presence of DRO were analyzed to ascertain correlation among: patient age, organ, hospital site where the culture was drawn, length of stay (LOS), days since transplant, and infection rate.
Results: A total of 571 culture isolates were obtained from 181 solid organ recipients during the study period, including 49 drug resistant bacterial isolates from 31 patients. Over the study period, DROs as a percentage of total cultures increased (R^2=0.49, p<0.05). DROs were collected from non-ICU- (63%) nearly twice as frequently as from ICU-sites (33%). 59% of DRO cultures were obtained greater than 90 days after transplant. 1- and 3-yr survivals were similar for those that did and did not experience a DRO infection (DRO vs non-DRO: 1-yr, 90 vs 96%; 3-yr, 87 vs 91%, p=0.77). 30-day readmissions were more common in patients that developed a DRO (35 vs 58%, p<0.05).
Conclusions: The incidence of DROs has been increasing and, although rare, now includes carbapenem resistance. Contrary to expected, DRO infections were detected more often in the non-ICU setting and often greater than 90 days post transplant. These data suggest that antibiotic stewardship is paramount and require hospital-wide vigilance.





CITATION INFORMATION: Morais L., Reynoso D., Lea A., Mujtaba M., Merwat S., Kulkarni R., Fair J., Kueht M. Multi-drug Resistant Infections in Solid Organ Transplant Recipients, a New Era of Risk *AJT, Volume 21 Supplement 3*
DISCLOSURES: L.A. Morais: None. **D. Reynoso:** None. **A. Lea:** None. **M. Mujtaba:** None. **S. Merwat:** None. **R. Kulkarni:** None. **J. Fair:** None. **M. Kueht:** Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Advisory Committee Member.

Abstract# 752

Seroprevalence of SARS-CoV-2 Antibodies in Transplant Recipients in a Croatian Transplant Center

A. Mrzljak[1], Z. Jurekovic[1], J. Pavicic Saric[2], L. Antolasic[3], L. Milasincic[3], I. Tabain[3], T. Vilibic Cavlek[3], *[1]Department of Internal Medicine, Merkur University Hospital, Zagreb, Croatia, [2]Department of Anesthesiology, Merkur University Hospital, Zagreb, Croatia, [3]Department of Microbiology, Croatian Institute of Public Health, Zagreb, Croatia*
Purpose: In Croatia, the first case of coronavirus disease (COVID-19) has been reported on 25 February 2020; however, the COVID-19 seroprevalence in the liver (LTR) and kidney transplant recipients (KTR) is presently unknown.
Methods: From 9 September to 13 November 2020, at the beginning of the second wave COVID-19 epidemic curve in Croatia, we performed a systematic screening for COVID-19 in outpatient solid organ transplant recipients (n=495).

Serum samples were tested for the presence of SARS-CoV-2 IgG antibodies. Serological tests were performed by a commercial enzyme-linked immunosorbent assay (ELISA) using spike glycoprotein (S) and nucleocapsid protein (N) antigens (Vircell, Granada, Spain).
Results: LTR (n=265) were older than KTR (n=230) (59.8±10.7 vs 51.8±12.1 years, p<0.01). Out of 495 transplant recipients, 97 (19.6%) were positive for anti-SARS-CoV-2-IgG. There was no difference in the seroprevalence between LTR and KTR, 20.4% vs. 18.7%, respectively, p>0.05. Anti-SARS-CoV-2-IgG were found in both symptomatic and asymptomatic patients. However, seropositive patients reported a significantly higher incidence of fever (25.3% vs. 12.8%, p=0.011) and anosmia (5.2% vs 0.9% p=0.023). Out of 97 anti-SARS-CoV-2-IgG positives, only 22% reported previous nasal-throat swabs RT-PCR testing, with 28.6% of them being SARS-CoV-2 RNA positive.
Conclusions: In Croatia, the SARS-CoV-2 seroprevalence in LTR and KTR is 19.6% with seropositivity documented in both symptomatic and asymptomatic patients. The presence of specific symptoms increases the likelihood of SARS-CoV-2 seropositivity. The COVID-19 screening program should be increased in Croatia.
CITATION INFORMATION: Mrzljak A., Jurekovic Z., Pavicic Saric J., Antolasic L., Milasincic L., Tabain I., Vilibic Cavlek T. Seroprevalence of SARS-CoV-2 Antibodies in Transplant Recipients in a Croatian Transplant Center *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Mrzljak: None. **Z. Jurekovic:** None. **J. Pavicic Saric:** None. **L. Antolasic:** None. **L. Milasincic:** None. **I. Tabain:** None. **T. Vilibic Cavlek:** None.

Abstract# 753

Current Practices for Management and Treatment of COVID-19 in Immunocompromised Adults: A Survey of Institutions

H. H. Nam[1], S. Aslam[2], O. Beaird[3], G. Forrest[4], M. Fung[5], A. Limaye[6], A. Multani[3], J. Nelson[7], R. Rakita[6], L. Strasfeld[8], J. Schaenman[3], *[1]Medicine, University of California - Irvine, Orange, CA, [2]Division of Infectious Diseases and Global Public Health, University of California - San Diego, San Diego, CA, [3]Medicine, University of California - Los Angeles, Los Angeles, CA, [4]Medicine, Rush University, Chicago, IL, [5]Medicine, University of California - San Francisco, San Francisco, CA, [6]Medicine, University of Washington, Seattle, WA, [7]Medicine, Stanford University, Palo Alto, CA, [8]Medicine, Oregon Health and Science University, Portland, OR*
Purpose: The optimal testing strategy for solid organ transplantation (SOT) donor and recipient evaluation, as well as treatment for COVID-19 is unknown. We assessed the management strategy of COVID-19 within the West Coast Transplant Infectious Disease group.
Methods: A survey assessing strategies for COVID-19 management was sent to 11 Transplant Infectious Diseases providers from 8 centers.
Results: For both living and deceased donor clearance, 81.8% (n=9) providers utilize one negative PCR within 72 hours of transplantation. However, when a living donor tests positive for SARS-COV-2, 36.4% (n=4) will require two negative PCR tests >24 hours apart for donor clearance, with 90.9% (n=10) requiring at least a 28-day wait period prior to retesting. Amongst providers caring for lung transplant recipients, 77.7% (7/9) utilized negative PCR from donor BAL as part of pre-transplant evaluation. For transplant candidates, all providers required both the absence of COVID-19 symptoms with only one negative PCR test. In candidates that tested positive for SARS-COV-2, 54.5% (n=6) required at least two negative PCRs prior to transplantation. For positive candidates, 63.6% (n=7) considered re-testing for PCR negativity at 20 days. When a transplant recipient tested positive for SARS-CoV-2, all providers would reduce antimetabolites and utilized dexamethasone for patients requiring oxygen therapy. Remdesivir was prescribed by all providers with variability in the timing of administration.
Conclusions: Management and treatment of COVID-19 for SOT donors, candidates, and recipients was heterogeneous. While all providers require at least one negative COVID-19 test as both donor and recipient evaluation prior to transplantation, the number of negative tests sent varied amongst providers, geographical region, and clinical scenario. The significant diversity of COVID-19 management strategies for immunocompromised adults seen in this study highlights the further need for studies defining the optimal management of COVID-19.

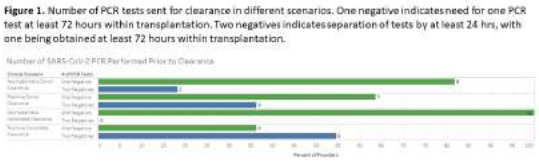


Figure 1. Number of PCR tests sent for clearance in different scenarios. One negative indicates need for one PCR test at least 72 hours within transplantation. Two negatives indicates separation of tests by at least 24 hrs, with one being obtained at least 72 hours within transplantation.

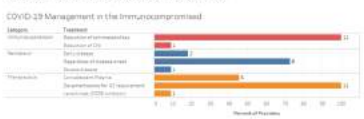


Figure 2. Therapeutic options and management

CITATION INFORMATION: Nam H., Aslam S., Beaird O., Forrest G., Fung M., Limaye A., Multani A., Nelson J., Rakita R., Strasfeld L., Schaenman J. Current Practices for Management and Treatment of COVID-19 in Immunocompromised Adults: A Survey of Institutions *AJT, Volume 21 Supplement 3*
DISCLOSURES: H.H. Nam: None. **S. Aslam:** None. **O. Beaird:** None. **G. Forrest:** None. **M. Fung:** None. **A. Limaye:** None. **A. Multani:** None. **J. Nelson:** None. **R. Rakita:** None. **L. Strasfeld:** None. **J. Schaenman:** None.

Abstract# 754

Evaluation of High-versus Low-Dose Valganciclovir for Cytomegalovirus Prevention in Adult Liver Transplant Recipients: A Single Center Experience

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Purpose: Cytomegalovirus (CMV) is the most common infection after solid organ transplantation and is associated with increased morbidity and mortality. CMV prophylaxis is widely considered as standard of care after liver transplantation, and valganciclovir (VGCV) 900 mg daily (adjusted for renal function) is currently the preferred regimen. While effective in preventing CMV infection, this dosing strategy is associated with profound leukopenia, which poses a barrier to optimal immunosuppression management post-transplant and consequently increases risk of rejection. Literature in kidney transplantation has demonstrated that a lower dose of VGCV 450 mg daily (adjusted for renal function) is equally effective in preventing CMV disease and causes less leukopenia. There is a paucity of literature on the use of such reduced dose strategy in liver transplantation. The purpose of this study is to evaluate the safety and efficacy of high-versus low-dose valganciclovir in adult liver transplant recipients.
Methods: This is a single-center retrospective chart review study of high (D+/R-) and intermediate (R+) risk adult liver transplant recipients who received low-dose valganciclovir (VGCV) 450 mg daily (adjusted for renal function) at our center. Patients were compared to a historical cohort of liver transplant recipients who received high-dose VGCV 900 mg daily (adjusted for renal function). The primary outcome was the incidence of CMV infection or disease within 12 months post-transplantation. Safety outcomes include the incidence of leukopenia at specific time intervals up to 12 months and the need for granulocyte colony stimulating factor (GCSF) at any point while on VGCV therapy.
Results: Baseline patient demographics and transplant characteristics were found to be comparable across both groups. CMV infection occurred in 13.8% (n=8) and 9% (n=3) in the high-dose and low-dose groups respectively (p=0.302). In the high-dose VGCV group, 75% (6/8) of patients that developed CMV infections were CMV D+/R- and infections mostly occurred after completion of prophylaxis. In the low-dose group, 33% (1/3) of patients were CMV high risk. Patients receiving high-dose VGCV experienced more leukopenia at 1 month post-transplant, than those in the low dose group (5.8 K/uL vs 7.5 K/uL; p = 0.0114). The use of GCSF while on VGCV therapy was also higher in the high- versus low-dose group (7 patients vs 1 patient). There was no difference in acute rejection, resistant CMV infections, biopsy confirmed tissue invasive disease, breakthrough CMV or VGCV duration of therapy. Patient and graft survival outcomes were also similar between groups.
Conclusions: Low-dose valganciclovir is associated with similar outcomes to high-dose valganciclovir when used for CMV disease prophylaxis in liver transplant recipients. There was a higher use of G-CSF in patients on high-dose valganciclovir.
CITATION INFORMATION: Parikh P., Siddiqui M., De La Cruz O., Gupta G., Kumar D., Yakubu I. Evaluation of High-versus Low-Dose Valganciclovir for Cytomegalovirus Prevention in Adult Liver Transplant Recipients: A Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Parikh: None. **M. Siddiqui:** None. **O. De La Cruz:** None. **G. Gupta:** None. **D. Kumar:** None. **I. Yakubu:** None.

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Abstract# 755

Beta-lactam Allergies Among Solid Organ Transplant Recipients: Prevalence and Association with Transplant Admission Length of Stay

N. N. Pettit[1], V. Nguyen[2], C. T. Nguyen[1], A. Lew[1], J. Pisano[1], L. M. Potter[1], *[1]University of Chicago Medicine, Chicago, IL, [2]University of Michigan College of Pharmacy, Ann Arbor, MI*

Purpose: Previous studies have identified that 14-27% of solid organ transplant (SOT) recipients report a beta lactam allergy (BLA). Patients with BLAs often receive less effective and more toxic antibiotics, and often have worse clinical outcomes such as prolonged length of hospital stay. This is of particular concern for patients undergoing SOT given their high risk for developing post-transplant infections, including those caused by multi-drug resistant pathogens, given their frequent exposure to the healthcare setting and antibiotics. We sought to identify the prevalence of BLA among SOT recipients at our medical center and evaluate the impact of BLAs on transplant admission length of stay (LOS).

Methods: All patients undergoing SOT from 1/1/2017 to 12/31/18 were included in this retrospective review. Baseline characteristics include age, gender, race/ethnicity, and type of transplant. Allergy data included allergen, reaction, and date documented. LOS was calculated based on admit and discharge dates for the transplant admission.

Results: During the time period, 54 (16.4%) patients had a documented BLA out of a total of 329 patients undergoing a SOT. Table 1 summarizes the baseline characteristics. The prevalence of BLA was 23% in lung (12 of 52), 19% in liver (11 of 58), 15% in kidney (19 of 130), 15% in heart (10 of 65), 17% in pancreas/islet (1 of 6), and 6% in multiorgan recipients (1 of 18). The most common type of reaction was rash (26%), followed by hives/urticaria (22%). Table 2 provides a summary of the reactions documented. The mean LOS among patients with a BLA vs. without was 26.7 days and 33.4 days, respectively.

Conclusions: Similar to previous studies, we observed an overall prevalence of BLAs among SOT recipients of 16.4%. We did not observe a prolonged transplant admission LOS among those with a BLA vs. without. Further evaluation to assess the impact of BLA labels among SOT recipients on additional outcomes such as antibiotic prescribing, post-transplant readmissions, rates of multi-drug resistant and Clostridioides difficile infections, and mortality is needed.

Table 1: Baseline Characteristics

	BLA (N=54)	Without BLA (N=275)
Age, mean ± st dev	56 ± 15	51 ± 15
Gender, M (%)	31 (57)	180 (65)
Race/Ethnicity		
Black/African American (%)	9 (17)	100 (36)
Hispanic/Latino (%)	2 (4)	25 (9)
White (%)	41 (76)	124 (45)
Other (%)	2 (4)	26 (9)

Table 2: Documented BLA types/reactions

Reaction	Number (%)
GI Intolerance	4 (7)
Pruritus	5 (9)
Rash	14 (26)
Anaphylaxis/angioedema	6 (11)
Urticaria/hives	12 (22)
Bronchospasm, SOB, loss of consciousness	6 (12)
Unknown childhood reaction, other	8 (15)

CITATION INFORMATION: Pettit N., Nguyen V., Nguyen C., Lew A., Pisano J., Potter L. Beta-lactam Allergies Among Solid Organ Transplant Recipients: Prevalence and Association with Transplant Admission Length of Stay *AJT, Volume 21 Supplement 3*

DISCLOSURES: N.N. Pettit: None. **V. Nguyen:** None. **C.T. Nguyen:** None. **A. Lew:** None. **J. Pisano:** None. **L.M. Potter:** Grant/Research Support; Name of Commercial Interest; Astellas. Grant/Research Support; Nature of Relationship; Research support. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Advisory board.

Abstract# 756

Covid vs Non Covid Pneumonia in Kidney Transplant Recipients

R. Prashar, N. Khoury, P. Shrivastava, S. Yeddula, T. Kitajima, E. Ulrich, M. Ramesh, A. Patel, S. Nagai, M. Samaniego-Picota, *Henry Ford Hospital, Detroit, MI*

Purpose: Compare clinical characteristics and outcomes in kidney transplant recipients (KTRs) hospitalized with COVID vs Non COVID Pneumonia.

Methods: This is a retrospective case-control study examining epidemiologic, laboratory and clinical characteristics of KTRs hospitalized with COVID vs Non COVID pneumonia. Cases were determined by consecutive KTRs diagnosed with COVID-19 from March 20, 2020 through April 25, 2020. Data were censored on April 30th, 2020. 39 patients had COVID, 11 were excluded because they did not have pneumonia. All patients with pneumonia were hospitalized. Controls were determined by searching the EMR for hospital admissions by diagnosis codes for pneumonia and kidney transplant status from January 1,2019 to October 30, 2019. 49 patients were identified, out of which 22 were excluded due to misclassification of pneumonia, dual organ transplantation and failed kidney transplant. Primary end point was progression to respiratory failure requiring mechanical ventilation, ICU admission or in-hospital all-cause mortality. Secondary end points were ARDS, shock and AKI requiring RRT.

Results: Demographics, comorbidities and laboratory findings in 28 KTRs with COVID and 27 KTRs with Non COVID pneumonia are shown in

Characteristics	Non COVID patients	COVID patients	*P* value
Demographics			
Age (median [IQR])	63.00 [48.00, 68.50]	62.00 [53.75, 67.50]	0.98
Female sex - no. (%)	10 (37.0)	11 (39.3)	0.86
Black race - no. (%)	17 (63.0)	24 (85.7)	0.06
BMI (median [IQR])	26.70 [23.75, 32.80]	28.30 [25.95, 33.28]	0.32
Coexisting conditions - no. (%)			
Atrial Fibrillation	4 (14.8)	8 (28.6)	0.33
Peripheral Vascular Disease	7 (25.9)	6 (21.4)	0.07
Coronary artery disease	7 (25.9)	6 (22.2)	1
Diabetes	14 (51.9)	19 (67.9)	0.28
Hypertension	27 (100.0)	27 (96.4)	1
Laboratory Findings -no. (%)			
Anemia	23 (85.2)	19 (67.9)	0.20
Leukopenia	0 (0.0)	7 (25.0)	0.01
Leukocytosis	8 (29.6)	5 (17.9)	0.35
Lymphopenia	17 (63.0)	26 (92.9)	0.01
Imaging of lungs -no. (%)			
Unilateral infiltrates	17 (63.0)	9 (32.1)	0.03
Bilateral Infiltrates	10 (37.0)	19 (67.0)	
QSofa -no. (%)			
0	14(51.9)	9(32.1)	0.28
1	9(33.3)	15(53.6)	
2	4(14.8)	4(14.3)	

Patients with COVID pneumonia were more likely to be leukopenic, lymphopenic and present with bilateral infiltrates. KTRs with COVID were more likely to be black. (trend towards significance p=0.058).

Outcomes are summarized in

	Non COVID	COVID	Odds ratio (95% CI)	*P* value
Death – no. (%)	2 (7.4)	10 (35.7)	6.94(1.35,35.60)	0.02
ICU admission – no. (%)	5 (18.5)	14 (50.0)	4.4(1.29,14.92)	0.02
Mechanical ventilation – no. (%)	3 (11.1)	10 (35.7)	4.44(1.07,18.52)	0.05
ARDS – no. (%)	1 (3.7)	13 (46.4)	22.53(2.67,189.78)	<0.001
Shock – no. (%)	2 (7.4)	9 (32.1)	5.92(1.14,30.65)	0.04
Acute kidney injury requiring RRT – no. (%)	1 (3)	6 (21)	7.09(0.79,63.47)	0.10

KTRs with COVID pneumonia had higher odds of death (OR=6.94), ICU admission (OR=4.44), developing ARDS(OR=22.53) and shock(OR=5.92) as compared to KTRs with Non-COVID pneumonia.

Conclusions: KTRs with COVID 19 pneumonia present with more leukopenia, lymphopenia , bilateral infiltrates , and tend to have higher mortality , ICU admission, ARDS and shock as compared to non COVID pneumonia. These results help us have a higher index of suspicion for COVID-19 pneumonia in KTRs who present with leukopenia, lymphopenia and bilateral infiltrates, in the setting of negative RT-PCR (95% sensitivity)or in KTRs in whom results are still awaited, so that timely treatment can be provided.

CITATION INFORMATION: Prashar R., Khoury N., Shrivastava P., Yeddula S., Kitajima T., Ulrich E., Ramesh M., Patel A., Nagai S., Samaniego-Picota M. Covid vs Non Covid Pneumonia in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Prashar: None. **N. Khoury:** None. **P. Shrivastava:** None. **S. Yeddula:** None. **T. Kitajima:** None. **E. Ulrich:** None. **M. Ramesh:** None. **A. Patel:** None. **S. Nagai:** None. **M. Samaniego-Picota:** None.

Abstract# 757

PDSA Model to Improve Pneumococcal Vaccine Adherence Among Kidney Transplant Candidates

J. M. Ramakrishna, L. Brumble, C. R. Libertin, *Division of Infectious Diseases, Mayo Clinic, Florida, Jacksonville, FL*

Purpose: Streptococcus pneumoniae infections occur in solid organ transplant patients at a rate of 146 per 100,000 persons per year versus 11.5 per 100,000 persons per year in general population. Despite CDC and AST recommendations, studies report suboptimal pneumococcal immunzation in the KT candidates. Our objective was to develop a quality improvement (QI) intervention at Mayo Clinic Florida's (MCF) Transplant Center to increase the number of KT candidates screened for prior pneumococcal immunizations and improve vaccine adherence.

Methods: A QI process to improve pneumococcal vaccine adherence in KT candidates at MCF was implemented using Plan-Do-Study-Act (PDSA) methodology. After IRB approval was obtained, data was obtained by retrospective electronic health record review and interventions were designed and implemented over six-week periods based on observed quality gaps. Baseline cohort consisted of patients evaluated for KT at MCF's transplant center from December 2, 2019-January 14, 2020 baseline. Interventions for PDSA cycle 1 (February 11, 2020-March 25, 2020) and PDSA cycle 2 (August 11, 2020 - September 22, 2020) included sharing baseline data findings enterprise wide, distributing education materials to all ID MCF transplant center staff, and providing ID MCF advanced care practitioners and physicians with a standard pneumococcal vaccine question set to include in their consultation note. Outcomes included documentation rates of prior pneumococcal vaccinations, pneumococcal vaccine order frequency, and Prevnar 13 order completion rate. Data were analyzed using simple descriptive statistics and Pearson's chi-square.

Results: Study subjects totaled 214 (baseline n=61, PDSA 1 n=103, PDSA 2 n=50). Pneumococcal immunization history documentation rates improved from baseline 96.7% to 100% post-PDSA cycle 2 ($p<0.001$). Percentages of patients with a history of Prevnar 13 in baseline, PDSA 1 and PDSA 2 cohorts were 32.8%, 23.3%, and 12.0%, respectively ($p<0.001$). Percentages of patients with a history of Pneumovax 23 in baseline, PDSA 1 and PDSA 2 cohorts were 32.8%, 34.0%, and 46.0%, respectively ($p=0.001$). Prevnar 13 and Pneumovax 23 were ordered in the baseline cohort of 92.7% and 100% of patients, respectively. These order rates dropped to 88.6% for Prevnar 13 and 96.8% for Pneumovax 23 post-PDSA likely due to care providers factoring in logistical implications of COVID-19 ($p<0.001$). Prevnar 13 order completion documentation rates were 41.5%, 38.0%, and 43.6% in baseline, PDSA 1 and PDSA 2 cohorts, respectively ($p<0.001$).

Conclusions: The data reflect that improving pneumococcal vaccine adherence in KT candidates is not a simple process and QI requires ongoing effort by all team members. While pneumococcal vaccines were usually ordered by care providers when appropriate, follow-up with patients who chose to complete their vaccines at a site other than MCF remains a gap in care practices.

CITATION INFORMATION: Ramakrishna J., Brumble L., Libertin C. PDSA Model to Improve Pneumococcal Vaccine Adherence Among Kidney Transplant Candidates *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.M. Ramakrishna: None. **L. Brumble:** None. **C.R. Libertin:** Grant/Research Support; Name of Commercial Interest; Pfizer, Inc.. Grant/Research Support; Nature of Relationship; Grant Recipient.

Abstract# 758

Covid-19 in Hiv-infected Solid Organ Transplant Recipients: A Case Series

M. Ramanathan, A. Fernandez, Y. Natori, J. Simkins, J. Camargo, M. Morris, N. Rivera, M. Loebe, G. Ciancio, L. Abbo, A. Mattiazzi, G. Guerra, S. Anjan, *University of Miami, Miami, FL*

Purpose: Coronavirus disease 2019 (COVID-19) is associated with increased mortality and morbidity in immunosuppressed patients. Data on management and outcomes in HIV-infected solid organ transplant (SOT) recipients is lacking.

Methods: Single center, retrospective case series of HIV-infected SOT recipients who were diagnosed with COVID-19 by nasopharyngeal reverse transcriptase-polymerase chain reaction (RT-PCR) between April to November 2020. All patients had anti-retroviral therapy (ART) induced HIV viral load suppression at diagnosis.

Results: Six consecutive patients were identified (**Table.1**). Four patients required hospitalization; 2 were managed outpatient. Four were symptomatic with fever (75%), cough (50%), dyspnea (50%) and diarrhea (25%). An increase in inflammatory markers was seen in all patients, however only 4 (66%) required supplemental oxygen. Median time of follow up was 75 (range, 14-205) days. On diagnosis, first mycophenolate mofetil was discontinued or dose decreased by half. Calcineurin inhibitors and prednisone were continued. In addition, investigational therapies hydroxychloroquine, tocilizumab, remdesivir, dexamethasone were used in 3 (50%), 1 (17%), 1 (17%), 1 (17%), respectively (**Table 2**). All patients were on protease inhibitor sparing ART. A decrease in CD4 count from baseline was seen at the time of diagnosis which recovered over time. Overall, 5 (83%) survived, 1 (17%) died, 1 (17%) kidney transplant recipient had biopsy-proven acute T-cell mediated rejection 9 days after diagnosis with subsequent graft loss. Secondary infections were diagnosed with positive blood or respiratory cultures in 3 (50%). Death reported was due to septic shock from a secondary infection. Three patients had a negative SARS-CoV-2 RT-PCR at a median of 25 (range, 20-56) days from diagnosis.

Conclusions: We report good outcomes in this unique, high risk cohort of HIV-infected SOT recipients. Balancing a decrease in immunosuppression and monitoring graft function to avoid graft loss is extremely important. Further studies are needed to determine the cumulative effect of HIV infection and organ transplant status on the severity of COVID-19.

Variable	Patients N = 6 (%)
Age, median (range)	39 (27-62)
Race, African American	5 (83%)
Hypertension	4 (66%)
Overweight (BMI >25)	3 (50%)
Kidney	4 (66%)
Heart	1 (17%)
Exposure	
Nosocomial	1 (17%)
While blood cells, cells/µL	6 (4.8-15.8)
C-reactive protein, mg/dL*	3.9 (1-34.5)
Lactate dehydrogenase, U/L	646 (321-758)
CD4 count, cells/ µL, on diagnosis	83.81 (36.2-200)
Radiographic findings	

Data presented as absolute number (percentage), unless specified otherwise. Abbreviations: BMI, body mass index

Table 2: Characteristics of HIV-infected SOT recipients with COVID-19

Variable	Patients N = 6 (%)
Management	
Maintenance Immunosuppression	
Tacrolimus	4 (66%)
Sirolimus	1 (17%)
Mycophenolate Mofetil	6 (100%)
Prednisone	5 (83%)
Belatacept	1 (17%)
ART Regimen	
Abacavir + Dolutegravir + Lamivudine	3 (50%)
Emtricitabine + TAF + Dolutegravir	2 (33%)
Emtricitabine + TAF + Dolutegravir + Ibalizumab	1 (17%)
Immunosuppression	
Reduction in immunosuppression	6 (100%)
Mycophenolate mofetil held	5 (83%)
Mycophenolate mofetil dose reduction	1 (17%)
Belatacept held	1 (17%)
Therapeutic anticoagulation	4 (66%)
Investigational treatment given	
Hydroxychloroquine	2 (33%)
Tocilizumab	1 (17%)
Remdesivir	2 (33%)
Dexamethasone	1 (17%)
Outcomes	
Overall Survival	5 (83%)
Overall Mortality	1 (17%)
Graft Loss	1 (17%)
Secondary Infections	3 (50%)
Time to SARS-CoV-2 PCR negativity (days), median (range), (n=3)	25 (20-56)

Data presented as absolute number (percentage), unless specified otherwise. Abbreviations: ART, antiretroviral therapy; TAF, tenofovir alafenamide

CITATION INFORMATION: Ramanathan M., Fernandez A., Natori Y., Simkins J., Camargo J., Morris M., Rivera N., Loebe M., Ciancio G., Abbo L., Mattiazzi A., Guerra G., Anjan S. Covid-19 in Hiv-infected Solid Organ Transplant Recipients: A Case Series *AJT, Volume 21 Supplement 3*

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Abstract# 759

Clinical Outcomes of Culture-Positive Pneumonia in Solid Organ Transplant Recipients

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Purpose: The purpose of this study is to determine the differences in clinical outcomes of culture-positive pneumonia in solid organ transplant (SOT) recipients compared to non-SOT patients.

Methods: This retrospective cohort study included adult inpatients with positive bronchoalveolar lavage (BAL) or sputum cultures. SOT patients were matched 1:2 to non-SOT patients based on age and gender. The primary outcome was in-hospital mortality. Secondary outcomes included 90-day mortality, time-to-appropriate antibiotics, antibiotic duration, days on ventilator, hospital length of stay (LOS), and hospital readmission.

Results: This study included 73 SOT and 146 matched non-SOT patients. The average age was 54.7 years; 67.6% were male. The majority were Caucasian (87.7% vs 82.2%, p=0.3). Of the SOT patients, the majority were kidney (30.1%) and liver (20.6%) recipients. Average time post-transplant was 6.4±8 years. Regarding baseline characteristics, SOT recipients were more likely to have hypertension (72.6% vs 58.2%, p=0.04), diabetes (43.8% vs 29.5%, p=0.03), and end-stage renal disease (12.3% vs 0.7%, p=0.0001). In-hospital mortality for SOT recipients was not statistically significantly different compared to non-SOT (27.4% vs 18.5%, p=0.13). Hospital LOS was longer for SOT recipients (34.9 vs 25.3 days, p=0.03) and time to readmission was shorter (19.6 vs 26.6 days, p=0.03). Other secondary outcomes were similar between groups. In terms of cultures, SOT recipients were more likely to have BAL cultures (42.5% vs 28.1%, p=0.03). The most common organisms were *Pseudomonas aeruginosa* (31.5% vs 23.3%, p=0.09), Methicillin-sensitive *Staphylococcus aureus* (9.6% vs 22.6%, p=0.045), Methicillin-resistant *S. aureus* (13% vs 13.7%, p=0.68), *Klebsiella pneumonia* (6.8% vs 11%, p=0.45), and *Escherichia coli* (9.6% vs 8.9%, p=0.69). The most common initial and appropriate antibiotics were vancomycin, piperacillin-tazobactam, and cefepime. Combination antibiotics were initiated in most patients (64.4 vs 63.7%, p=0.92). Appropriate antibiotic duration was similar (9.1 vs 13.2 days, p=0.31), but SOT recipients were more likely to not receive appropriate antibiotics (21.9% vs 11.6%, p=0.03).

Conclusions: In-hospital mortality in SOT recipients was not significantly different from that in non-SOT patients. SOT recipients had a significantly longer hospital LOS, shorter time to readmission and were less likely to receive appropriate antibiotics.

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Abstract# 760

Donor-Derived Tuberculosis in Lung Transplant Recipients, a Single Center Experience

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Purpose: Donor-derived (DD) tuberculosis (TB) in solid-organ transplantation (SOT) is rare with the largest review to date identifying only 25 cases of proven or probable DD-TB.

Methods: We describe the largest case-series of DD-TB to date, including four cases among lung transplant recipients between 2015-2020 with a focus on identifying risk factors for transmission and characterizing clinical presentations.

Results: All affected recipients were Canadian-born non-Indigenous lung transplant recipients with negative tuberculin skin tests (TST) and without epidemiologic risks for TB infection. In terms of donors, 3/4 were foreign-born with the fourth being Canadian-born but with epidemiologic risks for TB including Indigenous status, homelessness and alcohol abuse. One donor had a prior reactive TST (unknown at donation) and one donor had prior imaging demonstrating a small calcified pulmonary granuloma. All cases presented within three months post-transplant (range 7-12 weeks) with fever and dyspnea in all recipients. Imaging revealed nodular opacities and mediastinal lymphadenopathy in all. One recipient was both smear and culture positive, while the other three recipients were smear negative and culture positive. Three presented with isolated pulmonary TB while the fourth was diagnosed with disseminated TB. Treatment in one case included isoniazid (INH), rifabutin (RFB), and pyrazinamide (PYR) induction followed by INH and RFB maintenance for a total of 12 months with clinical cure. The second case was treated with RFB, PYR, and moxifloxacin induction followed by RFB and moxifloxacin maintenance for a total of nine months with clinical cure. The third was treated with INH, RFP, ethambutol, and moxifloxacin induction followed by INH and RFP maintenance for a total of 9 months. The fourth case was initiated on INH, RFB, and moxifloxacin but died within one week of treatment initiation.

Conclusions: In summary, DD-TB remains an uncommon complication following SOT. Our case series confirms donor TST reactivity, presence of lung granulomata, and epidemiologic risks including country of origin, Indigenous status, homelessness, and alcohol abuse are associated with increased risk of DD-TB. This suggests enhanced communication between jurisdictions with respect to prior LTBI testing and chest imaging may improve identification of donors with LTBI. However, some donors may still pose a risk of TB transmission, suggesting a possible role for enhanced screening or pre-emptive LTBI therapy in this group.

Table 1. Description donor and recipient epidemiology and investigations among DD-TB cases.

	Patient 1	Patient 2	Patient 3	Patient 4
R- Age/sex	23F	60M	58 M	61M
R- Demographic group	CBNI	CBNI	CBNI	CBNI
R-TST pre-transplant	0 mm	0 mm	0 mm	0 mm
D – Demographic group	FB (Philippines)	FB (India)	FB (Philippines)	Indigenous **
D-TST	Reactive *	ND	ND	ND
D- CXR	No LTBI changes	No LTBI changes	No LTBI changes	No LTBI changes
D- CT chest	ND	Small calcified granuloma in RLL	ND	ND
D- Pre-transplant bronchoscopy	AFB negative, TB culture negative	AFB negative, TB culture negative	AFB negative, TB culture negative	AFB negative, TB culture negative

- R=recipient, D=donor, CBNI=Canadian-born non-Indigenous, FB=foreign-born, ND=not done
- * not known at transplantation
- ** with risk factors

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Abstract# 761

Pregnancy After CMV Infection Following Uterus Transplantation: A Case Report

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Purpose: Uterus transplantation (UTx) is a repeatedly proven treatment for women with absolute uterine factor infertility who wish to carry a pregnancy. One aspect of UTx is the potential for transmission of cytomegalovirus (CMV) from the donor to the recipient. CMV infection is not only a frequent complication after solid organ transplantation but also poses a risk to the fetus during pregnancy after UTx. To date, there have been no reported cases of pregnancy following UTx from CMV positive donors into CMV negative recipients.

Methods: Chart review of a case in which a CMV negative UTx recipient received a CMV positive living donor uterine graft and developed active CMV infection prior to embryo transfer.

Results: The UTx recipient was treated with 3 months of prophylactic Valcyte after transplantation and was monitored with CMV serum PCR every week. She developed an asymptomatic CMV infection 5 months post-transplant and was successfully treated with ganciclovir and cleared the virus. Single embryo transfer was performed 8 months post UTx. She did not have recurrence of CMV during pregnancy. She delivered a healthy baby at 37 weeks gestation.

Conclusions: This case shows that CMV positive donors may be used for CMV negative recipients in UTx. However, these patients should be closely monitored for CMV infection during the post-transplant course and subsequent pregnancy.

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Abstract# 762

Covid-19 Reinfection in a Kidney Transplant Patient

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Purpose: Several cases have demonstrated positive SARS-CoV-2 PCR testing in patients who were initially shown to have cleared the infection. These reinfections may represent new strains of SARS-CoV-2 that can have significant clinical implications in the transplant population and affect public health initiatives aimed at controlling this pandemic. The purpose of this case is to highlight the presentation of COVID-19 reinfection in a kidney transplant recipient.

Methods: We present a 66-year-old male patient with a history of ESRD due to lithium toxicity, status post deceased donor kidney transplant, maintained on Belatacept, prednisone and mycophenolate mofetil. He was first diagnosed with

COVID-19 in March 2020 after presenting with cough, fever and hypoxia. Chest x-ray revealed bilateral infiltrates. Treatment included atazanavir, hydroxychloroquine and tocilizumab. Mycophenolate was withheld for the duration of his treatment. Despite resolution of all symptoms, nasopharyngeal PCR testing remained positive for SARS-CoV-2 even on discharge. He subsequently cleared his infection and tested negative twice, 3 months apart. He was later found to have AKI and a biopsy showed Banff 2A Acute Cellular Rejection which was treated with steroids and thymoglobulin. He was readmitted in November with fatigue and shortness of breath and tested positive again for SARS-CoV-2 by nasopharyngeal swab PCR. There was no hypoxia and chest x-ray did not show any infiltrates. Prerenal azotemia resolved with IV hydration. Serological studies showed presence of SARS-CoV2 IgG antibodies. Mycophenolate was again held. There was concern that this could be prolonged intermittent shedding from his previous infection. However genetic sequencing from samples of his first and current infection were compared and revealed a different strain consistent with a new infection. He recovered and was discharged.
Results: COVID-19 reinfection in the transplant population is of significant interest as these patients may be susceptible to prolonged recovery. Several points of interest can be derived from this case. Firstly, the clinical significance of different viral strains and its effect on vaccination efforts may provide significant public health information. Second, the utility and importance of SARS-COV2 antibody testing may provide insight into the course of reinfection and degree of protection conferred by antibodies thereby providing guidance about the appropriate management of immunosuppression. Our patient had SARS-CoV-2 antibodies and his mild course allowed us to re-institute his immunosuppression early. Lastly, the potential for reinfection may necessitate continued testing and protective measures beyond vaccination efforts.
Conclusions: To the best of our knowledge this is the first reported case of COVID-19 reinfection in a kidney transplant recipient with a different viral strain confirmed by genetic sequencing.
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Abstract# 763

Kidney Transplant Outcomes in HIV+ Recipients: A Single-Center Study

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Purpose: HIV+ patients are eligible to recieve a kidney transplant (KT) provided they meet criteria of undetectable viral load (VL) and CD4 count ≥200. We compare the long term transplant outcomes between HIV+ and HIV-kidney transplant reciepients (KTRs).
Methods: This is a retrospective analysis of HIV+ patients who received a KT from 2005 to 2018 at an urban academic center. Allograft and patient survival between HIV + and HIV - KTRs using Kaplan-Meier survival estimates at one-, three-, and five-year were compared. Secondary outcomes including incidence of biopsy proven acute rejection (BPAR) and BK virus associated nephropathy (BKVAN) and cytomegalovirus (CMV) disease were reviewed.
Results: We identified 21 HIV+ KTRs, 86% African American, 9% Hispanic, and 5% Caucasian. The median age was 47 years (interquartile range [IQR], 36-53),a median BMI of 27 (IQR, 23-33),dialysis vintage median period of 5.5 years (IQR, 1.4-7.6) and 67% were male. Of the 13 living donor KTs, 2 were ABO incompatible and 2 were crossmatch positive. Nine KTRs received an antiretroviral combination including nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs) with a non-nucleoside reverse transcriptase inhibitor, 7 received NRTIs with a protease inhibitor, and 6 received NRTIs with an integrase inhibitor. Five (24%) KTRs were co-infected with HCV. **PRIMARY OUTCOMES:** There was no difference in the 1- and 3 year graft and patient survival between HIV+ and HIV- KTRs, but the 5-year patient survival was significantly lower in the HIV+ KTRs ($P < 0.05$). Table.
SECONDARY OUTCOMES: The incidence of BPAR was 25% at 1 year and 20% at 3 years. There were no new cases of BPAR at the 5-year follow-up. All BPARs, were T-cell mediated except one case of mixed cellular and antibody-mediated rejection. Of the five HIV+ recipients co-infected with HCV, the incidence of BPAR was 60% within 1-year of KT. The incidence of BKVAN was 19.7 per 100 person-years and 7.9 per 100 person-years for CMV disease during the five-year follow-up.
Conclusions: The mandate of undetectable VL may explain the comparable graft and patient survival rates among HIV+ and HIV- KTRs in the early years post-KT. The lower patient survival at 5 years in HIV+ KTRs compared to HIV-KTRs should be further analyzed. This may be associated with the increased morbidity associated with HIV+ status. Rates of infection were not different between the 2 groups. HIV replication was well controlled in all but one patient due to medication non-adherence. No recurrence of HIVAN was reported. Studies of a larger cohort with a longer follow up periods are needed.

Survival Data							
			GS(%)			PS(%)	
KTR		1year	3 year	5 year	1 year	3 year	5 year
HIV+	21	90	83	75	100	90	86
HIV-	233	91	83	78	99	95	93

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Abstract# 764

Covid-19 Caseload and Management Practices Vary by Program-Level Factors: A Multinational Survey Study

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Purpose: During the pandemic, the COVID-19 patient caseload (CPC) is thought to be highly variable and likely dependant on the cumulative COVID-19 incidence (CCI) of the region. We aimed to capture this variability and COVID-19 treatment practices during the early months of the pandemic.
Methods: From June-September 2020, we conducted a multinational survey of transplant physicians. Of 1,267 physicians contacted, 40.5% from 71 countries participated. CCI was calculated in person per million population (ppm) from March-July and divide into tertiles for the entire cohort (low: <2031ppm, medium: 2032-5400ppm, high: >5400ppm). The primary outcome of interest was a CPC of ≥5 transplant recipients. Logistic regression was used to conduct a comparative analysis. We also asked centers to report their treatment practices by patient symptoms, and rate the likelihood of recommending these treatments on a scale of 1-5 (1 being very unlikely and 5 being very likely).
Results: 70.6% of programs reported seeing recipients with COVID-19 (31.0% <5, 16.2% 5-10, 13.5% 11-20, 6.4% 21-50, and 3.5% >50 cases). When compared with transplant programs from areas with low CCI, those from medium and high CCI areas had 7- and 10-times higher odds of ≥5 CPC, respectively. When compared with low/lower-middle-income countries, upper-middle-income countries and high-income countries had 68% and 71% lower odds for this outcome. More importantly, performing a transplant during this time was associated with 54% lower odds of a higher COVID-19 caseload. In terms of treatments, while reducing immunosuppression was the mainstay, in patients with mild and moderate symptoms, supportive care only (59.3% vs. 23.2%), azithromycin (14.8% vs. 22.8%), and hydroxychloroquine/chloroquine (11.3% vs.17.2%) were the top three choices. In patients with severe symptoms, a wide range of treatments was reported. Supportive care only (4.13±1.22) and Remdesivir (4.13±0.94) were strongly recommended by those that used them.
Conclusions: The CPC is strongly associated with the CCI and income level of a region. But performing a transplant during the early days of the pandemic was not associated with seeing more patients with COVID-19. In transplant recipients with COVID-19, supportive care only and decreasing maintenance immunosuppression are the mainstays of therapy. Should there be a second wave of the pandemic, our findings may help guide clinical practice.

Table 1: Odds of seeing/treating ≥5 transplant recipients with suspected or confirmed COVID-19

Characteristic	Univariable analysis	Multivariable analysis
Cumulative COVID-19 incidence [#] (Ref: low)		
Medium	$_{2.14}$**3.39**$_{5.38}$	$_{3.58}$**7.01**$_{13.72}$
High	$_{2.49}$**4.05**$_{6.59}$	$_{5.08}$**10.17**$_{20.37}$
Transplant during the ramp down phase (Ref: no)		
Yes	$_{0.50}$0.76$_{1.16}$	$_{0.25}$**0.43**$_{0.74}$
Income-level[*] (Ref: low/lower-middle)		
Upper-middle	$_{0.47}$0.83$_{1.46}$	$_{0.14}$**0.32**$_{0.72}$
High	$_{0.46}$0.74$_{1.21}$	$_{0.14}$**0.29**$_{0.60}$
Health system (Ref: Mixed or private)		
Public	$_{0.22}$0.82$_{3.10}$	$_{0.21}$0.96$_{4.29}$
Baseline transplant volume (Ref: low volume)[^]		
Moderate	$_{1.43}$**2.36**$_{3.91}$	$_{1.11}$**1.99**$_{3.57}$
High	$_{5.27}$**9.18**$_{15.98}$	$_{4.56}$**8.84**$_{17.14}$
Age group (Ref: pediatric only)		
Adult only	$_{3.02}$**7.70**$_{19.68}$	$_{1.78}$**4.91**$_{13.60}$

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Abstract# 765

Perioperative Anidulafungin Combined with Triazole Prophylaxis for the Prevention of Early Invasive Candidiasis in Lung Transplant Recipients

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Purpose: Invasive candidiasis (IC) is a substantial cause of morbidity and mortality in lung transplant recipients (LTRs). Post-operative factors, such as prolonged hospital stay, central lines, delayed chest closure, and dehiscence increase early IC risk. Guidelines propose targeted IC coverage in the first 2-4 weeks with fluconazole or an echinocandin. To our knowledge, this is the first study investigating combination triazole/echinocandin use in the early post-LT period.

Methods: We retrospectively assessed a recent protocol at our center. LTRs from 1/2016 to 1/2020 receiving in-hospital anidulafungin and triazole prophylaxis (protocol) were compared to LTRs receiving triazole prophylaxis alone (pre-protocol). Itraconazole was the preferred triazole and was started once tolerating oral medications and continued for at least one year in both cohorts. The primary outcome was IC at 90 days.

Results: A total of 144 LTRs were analyzed. Baseline characteristics were similar, except lower lung allocation score (LAS) and more alternative triazole antifungal use in the protocol group (Table 1). Median duration of anidulafungin was 12 days. There was a numerically lower incidence of IC in the protocol group, although not statistically significant (6% vs 13%, Table 2). Incidence of IFI was lower in the protocol group. However, when controlling for LAS, donor fungal colonization, and dehiscence in multivariable analysis, protocol cohort was not significantly associated with IFI. Triazole antifungal type was not included in this model as a univariate analysis did not reveal a meaningful association with IFI. There was no difference in bacterial infections or all-cause mortality.

Conclusions: In-hospital anidulafungin for early IC prevention offers unclear benefit when used in combination with triazole prophylaxis among LTRs. LAS, donor fungal colonization, and dehiscence were significantly associated with overall IFI; however, protocol cohort assignment was not. Overall, the findings of this single-center study do not support the use of universal triazole/echinocandin prophylaxis in LTRs. Further studies of alternate strategies for early IC prevention in lung transplant recipients are warranted.

Table 1. Baseline Characteristics

	Pre-protocol (n=77)	Protocol (n=67)	P-value
Age, y, median (IQR)	62 (57-65)	61 (56-65)	0.84
Male	41 (53%)	44 (66%)	0.13
Caucasian race	67 (87%)	60 (90%)	0.31
Transplant diagnosis			0.56
CF	7 (9%)	4 (6%)	
COPD and/or A_1AT	31 (40%)	38 (57%)	
IPF	27 (35%)	18 (27%)	
Other	12 (16%)	7 (10%)	
LAS, median (IQR)	38.2 (33.7-45.0)	34.7 (33.2-38.8)	**0.006**
Bilateral lung transplant	50 (65%)	53 (79%)	0.06
Antifungal agent at index discharge			**0.002**
Itraconazole	67 (87%)	44 (66%)	
Posaconazole	0 (0.0)	1 (2%)	
Voriconazole	3 (4%)	1 (2%)	
Isavuconazonium	0 (0%)	10 (15%)	
Fluconazole	1 (1%)	5 (8%)	
Highest itraconazole level within 90 days, mcg/mL, median	0.075	0.095	0.89
Positive perioperative fungal growth			
Recipient culture	8 (11%)	15 (22%)	0.06
Donor culture	27 (36%)	26 (39%)	0.69
ECMO at time of transplant	10 (13%)	6 (9%)	0.44
TPN use during index admission	6 (8%)	2 (3%)	0.29
Hospitalized at time of transplant	8 (10%)	4 (6%)	0.34
Anastomotic dehiscence	10 (13%)	8 (12%)	0.85
Sternal wound dehiscence	8 (10%)	3 (5%)	0.18
Treatment for rejection within 90 days	38 (49%)	28 (42%)	0.36

Table 2. Outcomes at 90 Days

	Pre-protocol (n=77)	Protocol (n=67)	P-value
Invasive candidiasis	10 (13%)	4 (6%)	0.16
Time to IC, d, median (IQR)	24 (19-30)	21 (13-49)	0.95
Proven or probable IFI	15 (20%)	5 (8%)	**0.04**
Time to IFI, d, median (IQR)	23 (17-29)	26 (14-27)	0.87
All-cause mortality	6 (8%)	7 (10%)	0.58
Treatment for confirmed bacterial infection	33 (43%)	19 (28%)	0.07

Table 3. Multivariable Logistic Regression Model of IFI

Variable	Odds Ratio	95% CI	P-value
Protocol cohort	0.41	0.12 – 1.23	0.13
LAS, median	1.04	1.01 – 1.08	**0.02**
Donor perioperative culture with fungal growth	2.92	1.02 – 8.92	**0.05**
Anastomotic or sternal dehiscence	3.54	1.14 – 10.85	**0.03**

CF, cystic fibrosis; COPD, chronic obstructive pulmonary disease; A_1At, α_1-antitrypsin; IPF, idiopathic pulmonary fibrosis; ECMO, extracorporeal membrane oxygenation; TPN, total parenteral nutrition

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Abstract# 766

COVID-19 Infection in Kidney versus Non-kidney Solid Organ Transplant Recipients: A Single Center Study

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Purpose: The COVID-19 pandemic has caused significant morbidity and mortality in patients around the world. A significant impact has been observed in immunocompromised patients such as solid organ transplant (SOT) recipients, with increased rates of intubation and mortality compared to non-transplant patients. Our aim was to analyze risk factors, clinical presentation, and outcomes at a single high volume transplant center.

Methods: We reviewed the records of adult SOT recipients during the COVID-19 pandemic from March to October 2020 to identify 143 SOT recipients diagnosed with COVID-19 by SARS-CoV-2 PCR testing, the majority of whom required hospitalization. 12 cases were from pediatric patients and were excluded from further analysis, leaving 131 adult patients for analysis. Recipient demographics, clinical presentation, and outcomes were compared by transplant type.

Results: Kidney transplant recipients comprised the majority of COVID-19 cases (n=87), followed by liver (n=18), lung (n=18), heart (n=7), and intestinal (n=1) transplants. Non-kidney transplant recipients were significantly older than kidney transplant recipients (n=0.005), while kidney transplant recipients were more likely

to be overweight or obese (p=0.007) and have a diagnosis of hypertension (p<0.001) (**Table**). Time between transplant and positive COVID-19 PCR test, sex, ethnicity, incidence of diabetes, and coronary artery disease were similar across transplant types. Presenting symptoms were also comparable, with similar incidence of shortness of breath, cough, fever, nausea and vomiting, diarrhea, and loss of smell or taste. Mortality rates were not significantly different in the kidney compared with the non-kidney transplant recipients (p=0.478).

Conclusions: Although presenting symptoms were similar, kidney transplant recipients with COVID-19 had significant differences in comorbidities compared with non-kidney transplant recipients. Future studies will compare mortality rate in transplant patients compared with non-transplant patients with COVID-19 at our center after adjusting for comorbidities, including diabetes, hypertension and obesity.

Table: Demographic and clinical characteristics of transplant patients with COVID-19

	Kidney transplant recipients (n=87)	Non-kidney transplant recipients (n=44)	p-value
Median age	53	61	**0.005**
Female sex	41.4%	40.9%	1
Median BMI	27.7	25.7	**0.007**
Median months post transplant	52.9	58.8	0.591
Diabetes	58.6%	72.7%	0.114
Hypertension	89.5%	62.2%	**<0.001**
Coronary artery disease	10.3%	18.9%	0.242
Died	11.5%	15.9%	0.478

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Abstract# 767

Impact of Sars-cov-2 Infection in Waiting List for Liver Transplantation: A Cohort Study on Clinical Outcomes

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Purpose: Infections in cirrhotic patients are associated with an increased risk of liver-related complications (LRC) and mortality. Limited data regarding the prevalence of Coronavirus disease (COVID-19) in cirrhotic patients' awaiting liver transplantation (LT) are available. The aim of this study was to evaluate the prevalence of Sars-cov2 in a cohort of cirrhotic patients and its impact on LRC rate and on LT.

Methods: We retrospectively included 187 waitlist patients for LT from 24-January-2020 (2020-cohort) and 123 patients from 24-January-2019 (2019-cohort). All 2020-cohort patients were screened for COVID-19 symptoms with a survey. COVID-19 infection was defined by a positive PCR assay for SARS-CoV-2 on nasopharyngeal swab or the positivity for specific antibodies or typical lung lesions on CT scan. We also assessed the indirect impact of Sars-Cov2 infection on LRC and LT rate, estimated by competitive risk survival analyses in 2020-cohort vs. 2019-cohort (Fine and Gray method).

Results: In 2020-cohort, 72.7% (n=136) of patients were male with mean age of 55.5±12, 47.2% (n=85) patients have alcohol and/or NASH related cirrhosis, with a median MELD score of 14.1±7.4. 45.5% (n=71), 38.5% (n=60) and 14.8% (n=23) of patients were A, B and C for Child-Pugh-score, respectively. 172 patients responded to survey and 22% (n= 38) had symptoms. 20/38 patients were tested for Sars-Cov2 and 4 patients were positive. 3/4 patients with COVID-19 disease needed hospitalization and 1 intensive care support. No death was reported and 1 patient was LT. The 2020-cohort and 2019-cohort were comparable for sex (p=0,6), age (p=0.7), comorbidities (p=0.2) and Child-Pugh-score (p=0.2). The cumulative incidence of LRC was not significantly higher in the 2020-cohort vs. 2019-cohort (SHR 0.65, 95% CI 0.36-1.15, p=0.138). The cumulative incidence of LT was significantly lower in the 2020-cohort than in the 2019-cohort (SHR0.21, 95% CI 0.13-0.33, p<0.001).

Conclusions: Our study reported a low prevalence rate of Sars-Cov2 infection in a cohort of cirrhotic patients waiting for LT. No Sars-Cov2 infection direct or indirect impact on mortality and LRC rate was reported. However, a significant shortage of LT was found in 2020 cohort.

CITATION INFORMATION: Sessa A., Mazzola A., Granger B., Wakselman D., Atif M., Martinez V., Mallet Maxime M., Thabut D., Scatton O., Conti F. Impact of Sars-cov-2 Infection in Waiting List for Liver Transplantation: A Cohort Study on Clinical Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Sessa: None. **A. Mazzola:** None. **B. Granger:** None. **D. Wakselman:** None. **M. Atif:** None. **V. Martinez:** None. **M. Mallet Maxime:** None. **D. Thabut:** None. **O. Scatton:** None. **F. Conti:** None.

Abstract# 768

Delayed Valganciclovir Initiation and the Incidence of Cytomegalovirus Infection in Liver Transplant Recipients

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Purpose: Opportunistic infections remain a significant burden after liver transplantation, particularly cytomegalovirus (CMV) infection. With the use of valganciclovir (VGCV), the incidence of CMV infection post-liver transplantation has reduced significantly, however the optimal time to initiate CMV prophylaxis (ppx) in liver transplant recipients is unclear and VGCV use is limited by cost and side effects including leukopenia and thrombocytopenia. This study evaluates timing to CMV ppx initiation and outcomes in liver transplant recipients.

Methods: In this single center retrospective cohort study of adult liver transplant recipients between August 2018 and May 2019, patients who received immediate VGCV (within 6 days post-transplantation) were compared to those who received delayed VGCV (7-10 days post-transplantation) for CMV ppx. Patients included in this study received VGCV within 10 days of transplant and continued through at least 3 months. Exclusion criteria included patients with a prior history of transplantation, simultaneous kidney and liver transplantation, VGCV initiation greater than 10 days after liver transplant, and patients with unknown recipient CMV serologies. The primary outcome evaluated was the incidence of CMV viremia. Secondary endpoints included CMV syndrome, CMV tissue-invasive disease, biopsy proven acute rejection episodes (BPAR), allograft loss, and 6-month all-cause mortality.

Results: The average time to initiation of VGCV ppx in the immediate group was 3.71 days ± 1.65, compared to 7.76 days ± 0.96 in the delayed group. CMV viremia occurred in 14.3% and 12.1% of patients in the immediate and delayed ppx groups respectively (p > 0.99). No differences were found in secondary outcomes. We estimated a cost savings of $429.62 per patient.

Conclusions: Our study demonstrates that timing to CMV ppx initiation with valganciclovir does not influence the incidence of CMV viremia in adult patients after liver transplantation, and is an area for cost containment for transplant centers.

Table 1. Primary Outcome

Outcome	Immediate ppx (n=21)	Delayed ppx (n=33)	p-value
CMV Viremia	2 (14.2%)	4 (12.1%)	>0.99

Table 2. Secondary Outcomes

Outcome	Immediate ppx (n=21)	Delayed ppx (n=33)	p-value
CMV Syndrome	2 (9.5%)	3 (9.1%)	>0.99
Tissue-invasive disease	0	1 (3.0%)	>0.99
BPAR	1 (4.7%)	4 (12.1%)	0.63
Allograft loss	0	1 (3.0%)	>0.99
Death	0	1 (3.0%)	>0.99

CITATION INFORMATION: Shaikh S., Kawewat-Ho P., Genyk Y., Sher L., Kahn J., Rivera L. Delayed Valganciclovir Initiation and the Incidence of Cytomegalovirus Infection in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Shaikh: None. **P. Kawewat-Ho:** None. **Y. Genyk:** None. **L. Sher:** None. **J. Kahn:** None. **L. Rivera:** None.

Abstract# 769

Quantiferon-tb Gold Plus in Liver Transplant Candidates: Single-center Experience

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Purpose: QuantiFERON-TB (QFT) is the preferred diagnostic test for latent tuberculosis infection (LTBI). The QFT-Gold Plus (QFT-Plus) data in OLT candidates is limited.

Methods: Our hospital replaced QFT-Gold In-Tube (QFT-GIT) with QFT-Plus in 3/2019. We assessed QFT-Plus results performed prior to OLT among patients that were transplanted between 4/2019 and 8/2020 at a large transplant center. We obtained previous QFT-GIT results if available to assess for discordant results. Chest-x-rays (CXR) and chest CT scans performed within 1 year prior to OLT were obtained to assess for LTBI signs (nodules, pleural thickening, and scarring). The plan by the infectious diseases (ID) team for those OLT patients with positive or indeterminate QFT-Plus was evaluated.

ID

Results: We assessed 170 OLT recipients [122(72%) Male, 94(55%) Hispanic]. Median age was 58 (range: 21-75) years. QFT-Plus was performed in 124(73%) patients [86(69%) were tested once, 28(23%) twice, 8(6%) thrice and 2(2%) four times]. Eight out of 124(6%) had positive, 20(16%) indeterminate and 96 (77%) negative QFT-Plus. One of the QFT-Plus-positive patients, tested negative 9 days after testing positive, and 9(45%) of the QFT-Plus-indeterminate patients converted to negative (Table 1). Previous QFT-GIT were performed in three QFT-Plus-positive patients (it was positive in 2 and negative in 1), in two QFT-Plus-indeterminate patients (it was negative in both), and in 16 QFT-Plus-negative patients (it was positive in 1 and negative in 15). There was no difference in the prevalence of LTBI-suggestive radiographic findings between patients with positive and negative QFT-Plus [CXR: 1/8(13%) vs. 8/96(8%), P=0.53 and CT scan: 4/5(80%) vs. 32/35(91%), P=0.43]. ID team recommended isoniazid for 9 months for 7(88%) and 9(45%) patients with positive and indeterminate QFT-Plus, respectively. Isoniazid was not recommended in 1 case of positive QFT-Plus (previously treated).

Conclusions: QFT-Plus appears to be an acceptable test for LTBI diagnosis in OLT candidates. In our cohort, indeterminate QFT-Plus was common. QFT-Plus conversion from indeterminate to negative was frequent.

Table 1. Liver transplant recipients with positive and indeterminate QFT-Plus

N° Patients	1st test	2nd test	3rd test	4th test
1 patient	Positive	Negative	X	X
7 patients	Positive	X	X	X
8 patients	IND	Negative	X	X
1 patient	IND	Negative	IND	X
2 patients	IND	IND	IND	IND
2 patients	IND	IND	IND	X
1 patient	IND	IND	X	X
4 patients	IND	X	X	X
1 patient	Negative	IND	X	X
1 patient	Negative	IND	IND	X

IND: Indeterminate

CITATION INFORMATION: Simkins J., Mendoza M., Chandorkar A., Natori Y., Anjan S., Arosemena L., Vianna R. Quantiferon-tb Gold Plus in Liver Transplant Candidates: Single-center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Simkins: None. **M.A. Mendoza:** None. **A. Chandorkar:** None. **Y. Natori:** None. **S. Anjan:** None. **L.R. Arosemena:** None. **R. Vianna:** None.

Abstract# 770

Nosocomial COVID-19 Among Hospitalized Solid Organ Transplant Recipients

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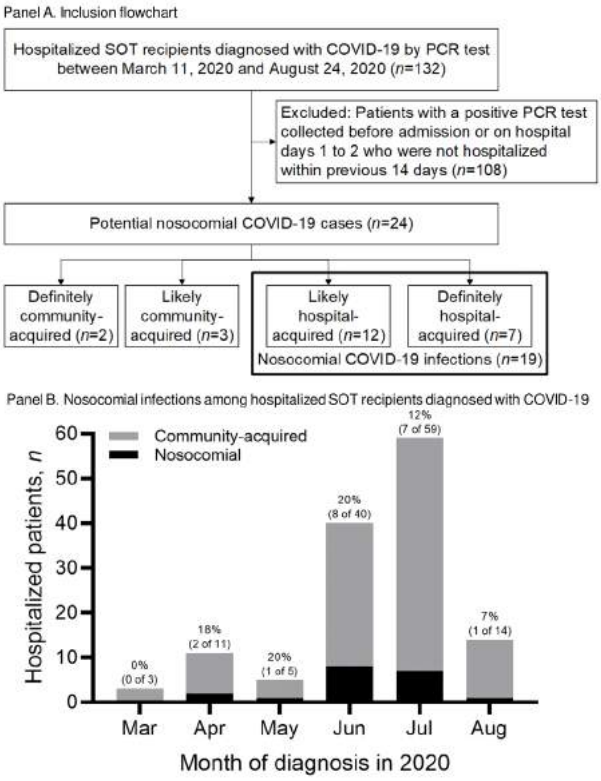
Purpose: This study aimed to identify probable cases of nosocomial Coronavirus Disease 2019 (COVID-19) among hospitalized solid organ transplant (SOT) recipients.

Methods: All hospitalized SOT recipients diagnosed with COVID-19 by polymerase chain reaction (PCR) from March 11, 2020 to August 24, 2020 were evaluated. Potential nosocomial cases included admissions where the first positive PCR occurred on hospital day 3 or later (intra-admission) or within 14 days of a previous hospital discharge (inter-admission). Two infectious disease specialists independently adjudicated all potential cases into four categories (definitely community-acquired, likely community-acquired, likely hospital-acquired, and definitely hospital-acquired) using systematic chart review of symptom onset, radiographic findings, and community risk factors. Discrepancies were resolved by a third investigator.

Results: Of 132 hospitalized SOT recipients diagnosed with COVID-19, nosocomial infections were apparent in 19 (14%; Figure 1). Intra-admission cases (n=11, 4 likely hospital-acquired and 7 definitely hospital-acquired) were diagnosed a median (IQR) of 43 (8 to 53) days after admission. Inter-admission cases (n=8, all likely hospital-acquired) had 5 (3 to 10) days of hospital care in the 14 days preceding diagnosis. The proportion of COVID-19 infections classified as nosocomial varied by time from most recent transplant until diagnosis (P<0.001) and transplant type (P<0.001; Table 1). Probable nosocomial infections peaked in June and gradually declined.

Conclusions: Despite infection control measures to sequester SOT recipients and their nurses on dedicated transplant floors and provide patients and healthcare workers with screening, COVID-19 may have been acquired during healthcare interactions in 14% of hospitalized SOT recipients diagnosed with COVID-19. Vaccination against COVID-19 for front-line healthcare workers is important for protection of SOT recipients.

Proportion of COVID-19 infections that were nosocomial			
		Patients with COVID-19, *n*	Patients with nosocomial COVID-19, *n* (row %)
Transplant type	Heart only	9	4 (44%)
	Lung only	15	6 (40%)
	History of >1 organ	17	3 (18%)
	Liver only	17	3 (18%)
	Kidney only	74	3 (4%)
Time from the last transplant to COVID-19 diagnosis	≤ 1 year	23	9 (39%)
	> 1 year	109	10 (9%)



CITATION INFORMATION: Swan J., Tran A., Rizk E., Graviss E., Drews A., Grimes K., Nguyen D., Yi S., McMillan R., Yuan F., Carrillo I., Book G., Zabaneh F., Moore L., Gaber A. Nosocomial COVID-19 Among Hospitalized Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.T. Swan: ; Research funding from CareDx, CSL Behring, Genentech, Grifols, Heron Therapeutics, Kedrion, La Jolla Pharmaceutical, Pacira, Pfizer, and VigiLanz. Advisor for Kedrion. **A. Tran:** Travel; Name of Commercial Interest; Heron Therapeutics. Travel; Nature of Relationship; Travel to investigator meeting. **E. Rizk:** Travel; Name of Commercial Interest; Heron Therapeutics. Travel; Nature of Relationship; Travel to investigator meeting. **E.A. Graviss:** None. **A. Drews:** None. **K.A. Grimes:** Consulting Fee; Name of Commercial Interest; AbbVie. Consulting Fee; Nature of Relationship; Advisor board. Grant/Research Support; Name of Commercial Interest; Gilead Sciences. Grant/Research Support; Nature of Relationship; Research funding. **D.T. Nguyen:** None. **S.G. Yi:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Advisor board. Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Research funding. **R.R. McMillan:** None. **F. Yuan:** None. **I. Carrillo:** None. **G. Book:** None. **F.R. Zabaneh:** None. **L.W. Moore:** None. **A.O. Gaber:** None.

Abstract# 771

Cytomegalovirus Nephritis: Epidemiology and Outcomes of an Uncommon Diagnosis

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Purpose: Cytomegalovirus (CMV) nephritis is an uncommon end-organ manifestation of CMV disease. Due to this, associated outcomes have not been completely elucidated.

Methods: This was a single-center case-series of adult kidney transplant recipients (KTR)s diagnosed with biopsy-proven CMV nephritis from 1997 to 2020. Primary objective was to describe epidemiology and outcomes associated with this diagnosis.

Results: 12 KTRs had biopsy-proven CMV nephritis within the study period, with mean interval from transplant to diagnosis of 6.8 ± 4.3 mos. 5 KTRs (42%) were high risk for CMV (D+/R-); the remaining 7 intermediate. Median interval from transplant to first detectable CMV was 3.5 mos (IQR = 3.9 mos). As CMV detection has evolved over time, only 3 KTRs underwent quantitative PCR testing. Mean CMV level at biopsy in these patients was 2.4 million ± 3.5 million IU/mL. Most KTRs were symptomatic (n =10, 83%) mainly with diarrhea (n = 7, 70%), fever, fatigue, and nausea (all n =3, 30%). The most common lab findings were AKI (n=10, 83%) and leukopenia (n = 4, 33%). Main biopsy features were glomerular CMV inclusions (n = 7, 58%) followed by the tubulointerstitial inclusions (n = 6, 50%). The most common concomitant end-organ CMV manifestations were gastrointestinal, with 2 cases of biopsy-proven CMV colitis (16%) followed by esophagitis (n=1, 8%). No cases of CMV retinitis, hepatitis or pneumonitis were seen. 11 KTRs were treated with IV ganciclovir. 6 (55%) received IVIG. Antimetabolite discontinuation occurred in 83% (n= 10) in response to CMV diagnosis. A renal biopsy of one patient is presented below in Figure 1. 11 KTRs (92%) experienced graft failure, of which 5 (42%) were death-censored. 5 KTRS (42%) had rejection: 3 patients having concurrent rejection at the time of index biopsy, 2 had rejection at 2 and 3 months post biopsy. Mean SCr at 12 mos post-index biopsy was 1.8 ± 0.6 mg/dL (n = 8) compared to a mean SCr at the time of biopsy of 3.0 ± 1.5 mg/dL.

Conclusions: CMV nephritis is rare but can cause significant graft dysfunction associated with poor patient/allograft outcomes. Unifying characteristics include CMV high risk status, high viral load, AKI and leukopenia in the setting of symptomatic disease. Early identification and prompt treatment of CMV infection may prevent end organ manifestations and improve outcomes.

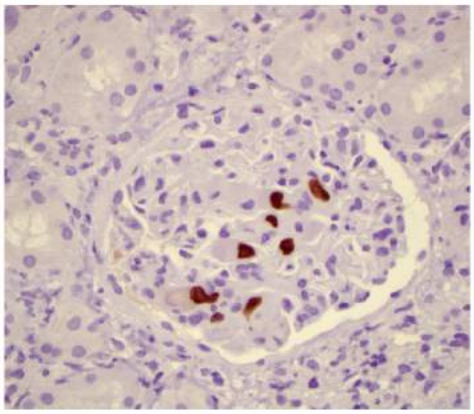

Figure 1. Cytomegalovirus nephritis. Kidney allograft biopsy with segmental intracapillary CMV-positive cells in a representative glomerulus. In total, eight glomeruli had these findings. Immunohistochemical stain (IHC).

CITATION INFORMATION: Swanson K., Djamali A., Ghaffar A., Aziz F., Garg N., Mohamed M., Mandelbrot D., Jorgensen M., Parajuli S. Cytomegalovirus Nephritis: Epidemiology and Outcomes of an Uncommon Diagnosis *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.J. Swanson: None. **A. Djamali:** None. **A. Ghaffar:** None. **F. Aziz:** None. **N. Garg:** None. **M. Mohamed:** None. **D.A. Mandelbrot:** None. **M. Jorgensen:** None. **S. Parajuli:** None.

Abstract# 772

Changes in Cytomegalovirus Specific T Cell Immunity With Immunomodulation in Serodiscordant High Risk Transplant Recipients

T. Tinkham, C. Song, R. Winstead, I. Yakubu, A. Brown, S. Sterling, G. Gupta, D. Kumar, *Virginia Commonwealth University Health, Richmond, VA*

Purpose: Cytomegalovirus (CMV) infections cause significant morbidity and mortality among all solid organ transplant recipients. CMV discordant (D+/R-) recipients are at higher risk of developing CMV viremia after cessation of prophylaxis. CMV specific T cell immunity has been shown in many publications to predict those at highest risk for CMV associated events. However it is unknown if changes in maintenance immunosuppression guided by CMV T cell immunity may lead to fewer CMV events as a result of improved immunity.

Methods: This is a retrospective single center analysis of 38 CMV discordant recipients between October 2018 and June 2020 that received a CMV T cell immunity assay prior to cessation of universal prophylaxis. 32 (84%) were kidney recipients, 3 (8%) liver, 3 (8%) simultaneous liver-kidney and 1 (3%) simultaneous pancreas-kidney. CMV viremia was defined by positive CMV PCR (>137 U/mL) and/or symptomatic disease. Recipients who had low T cell immunity (CMV CD4/CD8 < 0.20) on initial testing underwent reduction of antimetabolite (MMF) dose if deemed appropriate based on immunological and hematological parameters. Subsequent CMV T cell immunity was tested after reduction of immunosuppression.

Results: The majority of CMV discordant recipients were male (N=26, 68%), African American (N=22, 58%), and received rabbit anti-thymocyte globulin induction (N=32, 84%). At a median follow-up of 9 months (IQR 4, 24), six (16%) episodes of CMV viremia were observed. Those who developed viremia had significantly lower CMV CD8 specific T cell immunity compared to those who did not develop viremia (0.14±0.20 vs. 1.54±4.09, p=0.03) with a similar though non-statistically significant CD4 specific T cell immunity (0.057±0.03 vs. 0.33±1.07, p=0.08). Thirteen (34%) recipients underwent repeat testing at an average of 78±44 days after initial test. Of the 13, nine (69%) had a median MMF dose reduction of 500 mg (IQR 500,750) while four (31%) had no dose reduction. On subsequent testing those with reduction of MMF had an improvement in both CD8 [0.01 (IQR 0, 0.04) to 0.05 (IQR 0, 1.17) p=0.07] and CD4 [0.04 (IQR 0.02, 0.09) to 0.1 (IQR 0.06, 0.25) p=0.007] specific T cell immunity. Conversely, those with no change in MMF dose had no discernable improvement in both CD4 [0.02 (IQR 0, 0.09) to 0.06 (IQR 0.01, 0.25), p=0.11] and CD8 [0.03 (IQR 0.02, 0.04) to 0.04 (IQR 0.02, 0.12) p=0.17] specific T cell immunity. No significant difference in acute rejection episodes occurred between groups.

Conclusions: This single center study confirms previous findings that CMV high-risk recipients with low CMV T cell immunity had higher rates of CMV viremia. More importantly, we demonstrated that CMV specific T cell immunity may improve with changes to maintenance immunosuppression. Further studies are required to see if serial T cell immunity assays may be used as adjunctive data to adjust maintenance immunosuppression to reduce the risk of CMV events.

CITATION INFORMATION: Tinkham T., Song C., Winstead R., Yakubu I., Brown A., Sterling S., Gupta G., Kumar D. Changes in Cytomegalovirus Specific T Cell Immunity With Immunomodulation in Serodiscordant High Risk Transplant Recipients *AJT, Volume 21 Supplement 3*

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Abstract# 773

Ganciclovir Therapeutic Drug Monitoring in Obese Adults Patients - Opportunity for Clinical Utility

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Purpose: Ganciclovir (GCV) is the drug of choice for the treatment of cytomegalovirus (CMV) infection; optimal dosing of GCV in the obese patient population is unknown. The primary objective of this study is to assess the frequency of ganciclovir therapeutic drug monitoring (TDM) obtained in obese patients with prolonged use. Secondary objectives are to explore the role of GCV TDM and its associated clinical outcomes, understand barriers to clinical utilization of GCV TDM, and improve our institutional protocol.

Methods: This was a retrospective, multicenter chart review spanning Jan 2014-Jun 2020. Patients were included if they were adults with obesity (BMI ≥ 40 kg/m^2 and/or actual body weight ≥ 120 kg) and GCV therapy indicated for treatment of CMV viremia, CMV syndrome, suspected or biopsy-proven CMV invasive disease, or other viruses. A qualitative survey among clinical pharmacists was also completed to assess the perspective and practices with regards to GCV TDM.

Results: This study screened 447 patients receiving GCV. A total of 23 (5%) were obese, with 2 patients having 2 separate courses of induction (Figure 1). Baseline characteristics are in Table 1. The majority of episodes were indicated for the treatment of CMV viremia (n=9, 36%) or suspected CMV-tissue-invasive disease (n=7, 28%). Among the 18 patients with duration of therapy ≥ 14 days, GCV TDM was completed for 3 patients (17%) (Figure 2) and time from treatment initiation to TDM ranged from 21 to 18 days (Table 3). The pharmacist survey revealed support for use of GCV TDM; however, additional evidence was desired (Table 4).

Conclusions: GCV TDM in obese patients is potentially underutilized at our institution. This is complicated by a limited number of obese patients contracting CMV. This topic requires further study with additional patients undergoing GCV TDM to explore safety and efficacy outcomes relevant to GCV TDM in the obese patient population.

Table 1. Baseline patient characteristics	
Parameters	Results (n =23)
Age (years) median, range	47 (20 – 78)
Male n, (%)	12 (52%)
Weight (kg) median, range	121 (96 – 155)
BMI (kg/m^2) median, range	41.7 (34.7 – 55.0)
Associated conditions n, (%)	
Hematologic malignancy	2 (9%)
Allogeneic stem cell transplant	8 (35%)
Autologous stem cell transplant	0 (0%)
Solid organ transplant	
Heart	2 (9%)
Lung	0 (0%)
Kidney	6 (26%)
Liver	2 (9%)
Kidney/pancreas	0 (0%)
Kidney/liver	0 (0%)
Heart/Lung	1 (4%)
Other	
Psoriasis	1 (4%)
Ulcerative colitis	1 (4%)

Table 2. Ganciclovir indications, dosing, and duration of therapy	
Parameters	Results
Total course of treatment n	25
Ganciclovir indications n, (%)	
CMV	
Viremia	9 (36%)
Syndrome	4 (16%)
Suspected invasive disease	7 (28%)
Biopsy-proven invasive disease	3 (12%)
Other virus	
HHV – 6	2 (8%)
CMV viral load	Undetectable – 159,000
Ganciclovir dosing n, (%)	
Actual body weight based dose	9 (36%)
Adjusted body weight based dose	16 (64%)
Duration of ganciclovir therapy n, (%)	
Ganciclovir therapy ≥ 14 days	13 (52%)
Ganciclovir therapy < 14 days	
Transitioned to valganciclovir	
With total duration ≥ 14 days	5 (20%)
Unclear duration	3 (12%)
Not transitioned to valganciclovir	4 (16%)

Table 3. Ganciclovir TDM results			
Ganciclovir TDM result	Patient 1	Patient 2	Patient 3
Time from treatment initiation to TDM (days)	126	186	21
Trough serum concentration			
Below target (< 1 mcg/ml)		< 1.0	
Within target (1.0 - 3.0 mcg/ml)	1.2		
Above target (> 3.0 mcg/ml)			7.7
Peak serum concentration		N/A	N/A
Below target (< 3.0 mcg/ml)			
Within target (3.0 - 12.5 mcg/ml)	6.6		
Above target (> 12.5 mcg/ml)			

Table 4. Pharmacists survey results
Benefits of ganciclovir TDM among obese patients
• Appropriate dosing to balance between efficacy and safety
• Prevention of toxicity
• Get therapeutic levels
• Achieve treatment goal in viral clearance
Challenges in ganciclovir TDM implementation
• Lack of supporting evidence about the relationship of ganciclovir level and efficacy
• Unclear guidance with the term "consider"
• Unfamiliarity with ganciclovir TDM among pharmacists
• Coordination between outpatient clinic and lab operation

Figure 1. Patient screening

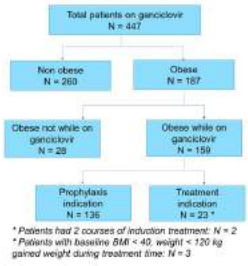
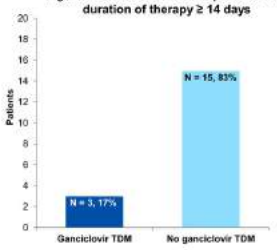


Figure 2. Ganciclovir TDM in patients with duration of therapy ≥ 14 days



CITATION INFORMATION: Tran Y., Bernard S., Stevens R., Myhre L., Razonable R. Ganciclovir Therapeutic Drug Monitoring in Obese Adults Patients - Opportunity for Clinical Utility *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Tran: None. **S. Bernard:** None. **R.W. Stevens:** None. **L. Myhre:** None. **R. Razonable:** None.

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Kidney Infectious Non-Polyoma & Non-Viral Hepatitis

Abstract# 774

Variation of Mortality from SARS-CoV-2 Infection in Kidney Transplant Recipients Over the Course of the Pandemic

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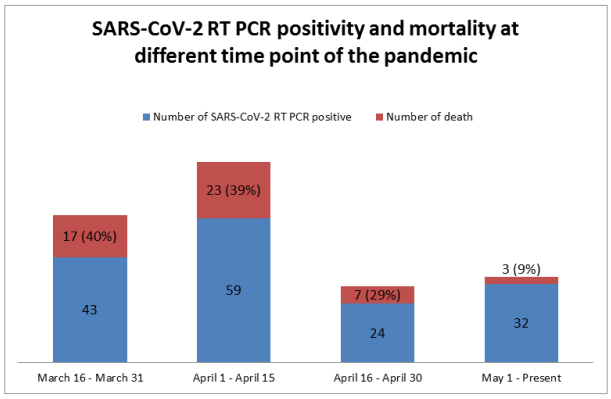
Purpose: We aimed to investigate the mortality from SARS-CoV-2 in kidney transplant recipients in the Bronx, New York, one of the epicenters of the pandemic over the period of the pandemic.
Methods: Between March 16 and November 30, 2020, 158 patients were tested positive by SARS-CoV-2 RT-PCR.
Results: 94 (59.5%) were male, at a median age of 62 years old (IQR: 51-71), predominantly Hispanic (54.4%) and African American (29.7%). 127 patients were admitted to the hospital and 29 were observed at home. 75.3% received a deceased-donor renal transplant, 57% received anti-thymocyte globulin induction. Most patients were on triple immunosuppression (94.3% on calcineurin inhibitors, 86.7% on anti-metabolite, 96.7% on prednisone). Hypertension was present in 96.2%, diabetes mellitus in 62.7%, heart disease in 19.6% and lung disease in 8.9% of the patients. The figure shows the number of RT-PCR positivity and mortality over the course of the pandemic starting on March 16, 2020. A total of 50 (31.6%) died as of November 30, 2020. The mortality rate was 40% (17/43) in patients diagnosed between March 16 and 31,2020, 39% (23/59) in patients diagnosed between April 1 and 15,2020 and 29% (7/24) in patients diagnosed between April 16 and 30, 2020. Since May 1st 2020, the mortality rate has significantly decreased to 9% (3/32).
Conclusions: In summary, mortality from SARS-CoV-2 infection in kidney transplant recipients was higher during the first 6 weeks of the pandemic and has significantly decreased over time. This could be explained by initial exposure of the patients with higher viral load due to lack of personal protection and social distancing due to the fact that there is no current proven treatment for SARS-CoV-2 infection and clinical approach to patients has not been changed since the beginning of the pandemic.



CITATION INFORMATION: Al Azzi Y., Pynadath C., Loarte P., Alani O., Liriano-Ward L., Ajaimy M., Bartash R., Graham J., Le M., Yaffe H., Greenstein S., Rocca J., Kinkhabwala M., Akalin E. Variation of Mortality from SARS-CoV-2 Infection in Kidney Transplant Recipients Over the Course of the Pandemic *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Al Azzi: None. **C. Pynadath:** None. **P. Loarte:** None. **O. Alani:** None. **L. Liriano-Ward:** None. **M. Ajaimy:** None. **R. Bartash:** None. **J. Graham:** None. **M. Le:** None. **H. Yaffe:** None. **S. Greenstein:** None. **J. Rocca:** None. **M. Kinkhabwala:** None. **E. Akalin:** None.

Abstract# 775

Risk Factors of COVID-19 in Kidney Transplant Recipients

M. M. Alkadi, E. Abuhelaiqa, M. Asim, O. Fituri, R. Elidrisi, R. Abdul Rahiman, M. Elshirbeny, M. Othman, A. Hamad, A. Ashour, A. Hamdi, A. Nauman, H. Tohid, M. Jarman, H. Al-Malki, *Nephrology-Medicine, Hamad Medical Corporation, Doha, Qatar*

Purpose: Kidney transplant recipients have been shown to develop a severe form of coronavirus disease (COVID-19) that poses a significant mortality risk. The aim of this study was to evaluate risk factors associated with acquiring COVID-19 in our kidney transplant population.
Methods: We retrospectively reviewed the medical records of all kidney transplant recipients in our national transplant registry. There were 249 out of 693 kidney transplant recipients who underwent SARS-CoV-2 infection testing by August 1st, 2020. All testing was done by government using RT-PCR of throat and nasal swabs. Forty-three of the tested patients had positive COVID-19 (17%), while the remaining 206 were negative. Mann-Whitney and Fisher's exact tests were used to study the different continuous and categorical variables, respectively.
Results: Among patients tested for COVID-19, Asian ethnicity (37% vs. 16%, P=0.003), history of hypertensive nephropathy (23% vs. 9%, P=0.01) and deep vein thrombosis (12% vs.1%, P=0.002) were statistically significant in COVID-19 positive group compared to COVID-19 negative group. Tacrolimus trough level at the time of COVID-19 testing was also significantly higher in COVID-19 positive patients (7.7 ng/mL vs. 6.6 ng/mL, P=0.03). Recipient age, gender, year of transplant, donor type, maintenance immunosuppression, flu vaccine within 1 year and use of ACE inhibitors or ARBs were all similar in both groups. Most patients with positive COVID-19 were symptomatic at the time of testing compared to negative patients (84% vs. 18%, P=0.0001). However, close contact with positive COVID-19 people was similar in both groups (14% vs. 14%, P=1).
Conclusions: Prevention and reduction of COVID-19 infection development is crucial in kidney transplant recipients to avoid unfavorable outcomes. With the widespread of COVID-19 worldwide, avoiding exposure might not be possible. Our results suggest that targeting lower tacrolimus trough levels may reduce the risk of acquiring SARS-CoV-2 infection.

Variable	Positive N = 43	Negative N = 206	P value
Number of years since transplant, n (%):			
Less than 1 year	1 (2)	12 (6)	0.70
1-5 years	14 (33)	71 (34)	0.86
More than 5 years	28 (65)	123(60)	0.61
Age, years, mean ± SD	52 ± 10.6	53.7 ± 13.9	0.23
Male Recipient, n (%):	35 (81)	143 (69)	0.14
Race, n (%):			
Middle East	26 (60)	149 (72)	0.14
Asian	16 (37)	33 (16)	0.003
Other	1 (2)	24 (12)	0.09
Native Kidney Disease, n (%):			
Diabetic kidney disease	8 (19)	66 (32)	0.10
Hypertensive kidney disease	10 (23)	18 (9)	0.01
Glomerulonephritis	8 (19)	44 (21)	0.84
Retransplantation	3 (7)	7 (3)	0.38
Others	14 (33)	71 (34)	0.86
Comorbid conditions, n (%):			
Diabetes mellitus	22 (51)	126 (61)	0.24
Hypertension	39 (91)	182 (88)	0.80
Cardiovascular disease	7 (16)	48 (23)	0.42
Pulmonary disease	4 (9)	13(6)	0.51
Deep vein thrombosis	5 (12)	2 (1)	0.002
Deceased Donor, n (%):	7 (16)	20 (10)	0.28
Other transplanted organs, n (%)	1 (2)	3 (1)	0.53
Maintenance Immunosuppression, n (%):			
Prednisolone	42 (98)	192 (93)	0.48
Tacrolimus	33 (77)	164 (80)	0.68
Mycophenolate	40 (93)	168 (82)	0.07
Others	11	55	1.0
Tacrolimus trough level, ng/mL, mean ± SD	7.7 ± 3.1	6.6 ± 1.7	0.03
Mycophenolate daily dosage, mg, mean ± SD	1388 ± 431	1280 ± 492	0.22
ACEI or ARB use, n (%)	21 (49)	87 (42)	0.50
Flu vaccine within 1 year, n (%)	30 (70)	156 (76)	0.44
Reason for COVID-19 Testing, n (%):			
Symptomatic	36 (84)	38 (18)	0.0001
Contact with positive COVID-19 patient	6 (14)	28 (14)	1.0
Prior to Medical or surgical procedure	0	28 (14)	0.006
Others	1 (2)	112 (54)	0.0001

Table 1: Risk factors for acquiring COVID-19

CITATION INFORMATION: Alkadi M., Abuhelaiqa E., Asim M., Fituri O., Elidrisi R., Abdul Rahiman R., Elshirbeny M., Othman M., Hamad A., Ashour A., Hamdi A., Nauman A., Tohid H., Jarman M., Al-Malki H. Risk Factors of COVID-19 in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.M. Alkadi: None. **E. Abuhelaiqa:** None. **M. Asim:** None. **O. Fituri:** None. **R. Elidrisi:** None. **R. Abdul Rahiman:** None. **M. Elshirbeny:** None. **M. Othman:** None. **A. Hamad:** None. **A. Ashour:** None. **A. Hamdi:** None. **A. Nauman:** None. **H. Tohid:** None. **M. Jarman:** None. **H. Al-Malki:** None.

Abstract# 776

Impact of Early versus Late Ureteric Stent Removal and Antibiotic Prophylaxis on Urinary Tract Infection Incidence in Kidney Transplant Adult Recipients

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Purpose: To investigate the impact of early Vs. late ureteric stent removal while utilizing various antibiotic prophylaxis regimens on UTI in renal transplant recipients.

Methods: A retrospective study of 279 renal transplantation from January 2017 to May 2020 with 6 months follow-up, that was conducted at King Abdulaziz Medical City, Riyadh, Saudi Arabia. Patients were divided into two groups: early stent removal group (<3 weeks) or late stent removal group (>3 weeks). Peri-transplant antibiotic prophylaxis included Cefazolin or Ampicillin plus Cefotaxime while the post-transplant included single strength Bactrim or double strength Bactrim plus Norfloxacin.

Results: Ninety-seven (35%) patients developed UTI (mean age 45.8±16.0 years; 60 [61.9%] women). The mean stent removal time was 15.3±4.8 days in the 1st group and 49.7±25.9 days in the second. Among 114 patients in the 1st group, 32% had UTI Vs 37% of 165 in the second. The rate of UTI before removing the stent was 20% and 80% in the early and late group, respectively. Asymptomatic UTI was observed in 70% and 34% before stent removal in the early and late group, respectively (*P*=0.037), and in 27% and 33% after stent removal in the early and late group, respectively (*P*=0.692). No difference in the distribution of multidrug resistant organisms among the early and late groups (47.50% Vs 33.30%, respectively; *P*=0.205), and before or after stent removal (65.90%% Vs 51.80%, respectively; *P*=0.213). Predictors for UTI were age > 40 years (odds ratio, 2.028; 95% CI, 1.098-3.745; P=0.024), female gender (odds ratio, 5.165; 95% CI, 2.768-9.636; *P*<0.001), and type II diabetes (odds ratio, 2.023; 95% CI, 1.003-4.08; *P*=0.049). Type of post-transplant antibiotic prophylaxis was not a significant predictor for UTI (odds ratio, 1.507; 95% CI, 0.735-3.091; *P*=0.263).

Conclusions: Early stent removal is associated with lower rate of UTI without significant effect form the choice of prophylactic antibiotics.

CITATION INFORMATION: Althiab K., Alqahtani B., Alotaibi R., Alhussein R., Almuhiteb R., Alnajjar L., Alqahtani M., Bin Saad K., Ohali W., Tamimi A., Almarastani M., Kashkoush S., Aboalsameh G., Shaheen M., Tawhari M., Altheaby A., Arabi Z. Impact of Early versus Late Ureteric Stent Removal and Antibiotic Prophylaxis on Urinary Tract Infection Incidence in Kidney Transplant Adult Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Althiab: None. **B. Alqahtani:** None. **R. Alotaibi:** None. **R. Alhussein:** None. **R. Almuhiteb:** None. **L. Alnajjar:** None. **M. Alqahtani:** None. **K. Bin Saad:** None. **W. Ohali:** None. **A. Tamimi:** None. **M.N. Almarastani:** None. **S. Kashkoush:** None. **G. Aboalsameh:** None. **M. Shaheen:** None. **M. Tawhari:** None. **A. Altheaby:** None. **Z. Arabi:** None.

Abstract# 777

Methenamine for the Prevention of Recurrent UTIs Post-Renal Transplant

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Purpose: Urinary tract infections (UTIs) are a highly prevalent postoperative complication in kidney transplant recipients (KTRs), occurring in approximately 34% of patients. The common method for UTI prophylaxis is systemic antibiotics; however, this practice is associated with an increased risk of drug resistance. Methenamine has been proposed as a bacteriostatic alternative for the prevention of recurrent UTIs, but data is limited in the KTR population. The purpose of this study was to evaluate differences in outcomes in kidney transplant patients before and after the implementation of methenamine for recurrent UTIs.

Methods: A retrospective, single-center, pre-post cohort study of adult (>18 years old) KTRs transplanted from 2012-2019 who received methenamine for the prevention of recurrent UTIs was conducted. The primary endpoint was the change in UTI incidence after methenamine initiation.

Results: A total of 902 patients received a kidney transplant during the study period, of which, 38 patients received methenamine for the prevention of recurrent UTIs. After initiation of methenamine, there was a significant decrease in the incidence of UTIs (2.42 vs 0.77, p<0.0001). Additionally, there were significantly fewer overall admissions (3.39 vs 1.5, p<0.001) and admissions for UTIs (1.47 vs 0.44, p<0.0001) post-methenamine initiation. Methenamine had one reported adverse event (rate of 2.8%) with no increase in crystalluria (p= 0.995).

Conclusions: Methenamine boasts a low-risk profile and was shown to have no increased incidence of crystalluria. There was an associated decrease in the average number of UTIs, admissions, and admissions for UTI after patients were initiated on methenamine. This study adds to the paucity of data on methenamine for the prevention of recurrent UTIs in KTRs. Methenamine is a promising prophylactic agent that should be considered for use in KTRs. Future studies like a randomized controlled trial are necessary to ascertain methenamine's full prophylactic capabilities in a prospective trial.

CITATION INFORMATION: Bigness A., Mohamed S., Mandala S., Khodieva N., Robichaux K., Mohammed H., Buggs J., Kumar A., Brueckner A., Bowman L. Methenamine for the Prevention of Recurrent UTIs Post-Renal Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Bigness: None. **S. Mohamed:** None. **S. Mandala:** None. **N. Khodieva:** None. **K. Robichaux:** None. **H. Mohammed:** None. **J. Buggs:** None. **A. Kumar:** None. **A. Brueckner:** None. **L. Bowman:** None.

Abstract# 778

Outcomes Among CMV Mismatched and Highly Sensitized Kidney Transplant Recipients Who Develop Leukopenia or Neutropenia

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Purpose: Kidney transplant recipients (KTRs) who receive antiproliferative agents for immunosuppression and valganciclovir for CMV prophylaxis are at high risk of

developing leukopenia and neutropenia. Limited data exist on the extent to which this results in a dose reduction or discontinuation of mycophenolate acid and/or valganciclovir.

Methods: This is a retrospective cohort study of 573 KTRs at University of California, San Francisco Medical Center between 2012 and 2018, who were CMV mismatched (D+/R-) or had a PRA ≥ 80%. Individuals with HIV, Hepatitis B and C, and primary non-function were excluded. KTRs were followed for ≥ 1-year post-transplant. Neutropenia and leukopenia were defined as an absolute neutrophil count < 1000 cells/microliter and an absolute white blood cell count < 3500 cells/microliter, respectively. Cox proportional hazards regression models using leukopenia or neutropenia as a time-varying predictor were used to determine the risk of mycophenolate acid and valganciclovir dose reduction or discontinuation and use of granulocyte colony stimulating factor (G-CSF). Models were adjusted for recipient demographics, transplant characteristics, and duration of valganciclovir prophylaxis.

Results: Study cohort consisted of 233 and 379 KTRs who were CMV mismatched and/or were highly sensitized, respectively. Mean follow-up was 3.7 (SD, 1.8) years. The mean age of the cohort was 50.4 (13.1) years and 57.6% were female. A total of 468 (81.7%) of the participants had leukopenia, 208 (36.3%) had neutropenia and 108 (18.8%) had CMV viremia. Neutropenia modeled as a time varying predictor was associated with an increased risk of both valganciclovir [adjusted hazard ratio, aHR: 13.0, 95% CI: 7.9-21.6] and mycophenolate acid [aHR 10.8, 95% CI: 6.9-17.0] discontinuation. Neutropenia was also associated with more G-CSF use [aHR 45.5, 95% CI: 27.9-74.0] and hospitalizations [aHR 3.3, 95% CI: 2.1-5.1]. Similar findings were shown for leukopenia.

Conclusions: Leukopenia and neutropenia occur frequently after kidney transplantation in patients who are CMV mismatched or highly sensitized, and this leads to discontinuation of mycophenolate acid and/or valganciclovir and increases the utilization of G-CSF. Early modification of antiproliferative immunosuppression and/or antiviral drugs for CMV may lead to long-term adverse outcomes.

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DISCLOSURES: S. Brar: None. **R. Berry:** None. **A. Raval:** Salary; Name of Commercial Interest; Employee of Merck & Co., Inc. **Y. Tang:** Salary; Name of Commercial Interest; Employee and stockholder of Merck & Co., Inc.;. Other; Name of Commercial Interest; Spouse is employee and stockholder of GSK.. **F. Vincenti:** None. **N. Skartsis:** None.

Abstract# 779

Clinical Characteristics, Risk Factors and Outcomes of Norovirus Infection in Renal Transplant Patients: A Retrospective Single Center Study

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Purpose: Norovirus gastrointestinal infection has been identified as a cause of significant morbidity among immunocompromised hosts, particularly hematopoietic stem cell transplant (HSCT) and solid organ transplant (SOT) recipients. It can cause severe disease with prolonged diarrhea, which is often complicated by dehydration, malnutrition, kidney injury, rejection, and mortality. We describe the clinical characteristics and outcomes of this infection in a large cohort of kidney transplant patients.

Methods: We conducted a single center, retrospective chart review study of adult patients (age >18 years) who were recipients of kidney or kidney-pancreas transplant and had norovirus infection, diagnosed by positive PCR testing during the time period from January 2015 through March 2020.

Results: A total of 72 renal transplant recipients were reviewed. 37(51%) patients were female. Median age was 53 years. 26% allografts were from living donors. 11% had simultaneous pancreas kidney transplant. Most patients (95%) received T cell depleting agents for induction. 28% had other concomitant infections at the time of diagnosis. The mean duration of diarrhea was 54 days (0-771) and 24 (33.3%) patients had diarrhea for longer than 30 days. 47 patients (65%) were hospitalized, of which 14.9% required ICU level of care. 70% required administration of IV fluids. Average length of stay was 7.5 days (1-111). Immunosuppression was reduced in 64% of the patients. 12 (17%) patients received nitazoxanide. Renal failure (defined as > 20% reduction in baseline GFR) occurred in 24 (35.3%) patients, of which 16.7% required renal replacement therapy. The average weight loss was 2.3% and 0.3% of total body weight(TBW) at 1 and 6 months post diagnosis respectively. In patients with diarrhea for longer than 30 days, average weight loss was 3.7% and 2% of TBW at 1 and 6 months respectively. 5 patients had biopsy proven allograft rejection by 1 year of diagnosis and 8 received treatment for rejection. 6 (9.1%) patients died by 1 year and one was attributed to norovirus infection.

Conclusions: Norovirus infection led to severe diarrheal disease in our cohort. Significant number of patients developed prolonged diarrhea, acute kidney injury, and required hospitalization. Reduction of immunosuppression was the most commonly implemented strategy.Clinicians must have a high suspicion for this illness and obtain PCR testing for timely diagnosis and appropriate management.

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DISCLOSURES: T. Brooks: None. **T. Crilley:** None. **B. Gaglani:** None. **N. Jakharia:** None.

Abstract# 780

Evaluation of Low Dose Famciclovir as Herpes Simplex Virus and Varicella Zoster Virus Prophylaxis in Cytomegalovirus Low Risk Solid Organ Transplant Recipients

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Purpose: Famciclovir is recommended for herpes simplex virus (HSV) and varicella-zoster virus (VZV) prophylaxis in cytomegalovirus (CMV) low risk (both donor and recipient CMV seronegative) solid organ transplant (SOT) recipients in current guidelines, however there is no data evaluating its use in SOT recipients. At our institution, we use famciclovir dosed at 500 mg daily for 3 months as a convenient option, with the lowest pill burden, for HSV/VZV prophylaxis. We aimed to evaluate the efficacy and safety of once daily famciclovir for antiviral prophylaxis, in addition to conducting a multicenter provider survey on antiviral prophylaxis in CMV low risk SOT recipients.

Methods: Two-part analysis was done, consisting of a retrospective chart review of kidney transplant recipients discharged on famciclovir between April 2, 2016 and August 31, 2018 and a national provider survey. The primary outcome of the chart review was the incidence of HSV, VZV or CMV infection at 12 months post-transplant. Secondary outcomes included immunosuppression doses and levels, famciclovir dose, hematology cell counts, and renal function at predetermined time points post-transplant. Rates of acute rejection, graft loss/failure, and incidence of famciclovir premature discontinuation were also collected.

Results: Of the 78 patients included in our retrospective chart review, one patient (1.3%) developed a VZV infection at 12 months post-transplant after completing prophylaxis (Table 1). One patient (1.3%) required premature discontinuation of famciclovir due to concern for acute interstitial nephritis. There was a low incidence of additional safety endpoints including graft loss, rejection, death with functioning graft and filgrastim administration. Providers from forty-five transplant centers within the United States responded to the survey. Across all organs, acyclovir 400 mg twice daily was utilized by most respondents (70.4%) for a duration of 3 months (68.8%). No respondents reported use of famciclovir at their institution (Table 2).

Conclusions: Among our patients receiving the novel regimen of famciclovir 500mg once daily for CMV low risk antiviral prophylaxis, there were no documented cases of HSV/VZV/CMV infection while on prophylaxis. Nationwide, the most common antiviral prophylaxis used in CMV low risk SOT recipients is acyclovir 400 mg twice daily. Once daily famciclovir may provide an effective and convenient once daily dosing regimen for antiviral prophylaxis in CMV low risk SOT recipients.

Table 1

Demographics	
Age, mean ± SD	52.41 ± 13.98
Male, n (%)	55 (70.5)
Race, n (%)	
Caucasian	72 (92.3)
African American	3 (3.8)
Cause of Kidney Disease	
Diabetes, n (%)	20 (25.6)
IgA Nephropathy, n (%)	17 (21.8)
Polycystic Kidney Disease, n (%)	9 (11.5)
Hypertension, n (%)	7 (9)
Focal Glomerular Sclerosis, n (%)	6 (7.7)
Unknown, n (%)	4 (5.1)
Other, n (%)	15 (19.2)
Transplant Data	
Living Donor, n (%)	49 (62.8)
Induction Agent, n (%)	
Rabbit anti-thymocyte globulin	66 (84.6)
Basiliximab	12 (15.4)
Discharge Immunosuppression, n (%)	
Tacrolimus	72 (92.3)
Belatacept	7 (9.0)
Everolimus	1 (1.3)
Mycophenolate	77 (98.7)
Prednisone	68 (87.2)
Pre-Transplant Recipient Viral History	
Available Recipient Serology, n (%)	
VZV Positive	71 (91)
HSV Positive	1 (1.3)*
Post-Transplant Viral Infection	
VZV Infection	1 (1.3)†

*HSV serologies not routinely checked pre-transplant as we assume most are positive
† Observed at 12 months post-transplant, off prophylaxis

Table 2

45 TOTAL RESPONDENTS		KIDNEY (N=41)	LIVER (N=34)	HEART (N=15)	LUNG (N=18)
Agent Used, n (%)	Acyclovir	28 (68.29)	25 (73.5)	12 (80)	11 (64.7)
	Valganciclovir	7 (17.0)	6 (17.6)	2 (13.3)	3 (17.6)
	Valacyclovir	6 (14.6)	3 (8.8)	1 (6.7)	3 (17.6)
	Famciclovir	0 (0)	0 (0)	0 (0)	0 (0)

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DISCLOSURES: M. Cote: None. **A. Cubley:** None. **C. Rogers:** None. **S. Shao:** None. **C.N. Kotton:** None.

Abstract# 781

Relationship Between Diabetes Mellitus and Covid-19 Prognosis in Kidney Transplant Patients

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Purpose: A high number of comorbidities associated with the severity of the disease caused by SARS-CoV-2 (COVID-19) has been reported, such as systemic arterial hypertension (SAH), diabetes mellitus (DM), cerebrovascular and cardiovascular diseases, obesity, chronic kidney disease, among others. Importantly, poor glycemic control in diabetic individuals and hyperglycemia at admission are associated to COVID-19 progression. To evaluate whether kidney transplant recipients with DM have worse outcomes in COVID-19 setting when compared to non-diabetics, as well as to verify whether the poor glycemic control contributes to COVID-19 progression.

Methods: Retrospective analyses of 590 kidney transplant recipients who were diagnosed with COVID-19 at one single Brazilian center. We used DM, SAH and poor glycemic control as dependent variables in univariate analyses to determinant the risk factors for COVID-19 progression.

Results: 60% male, 64.4% white, average age 51.6 years-old, 192 (32.6%) DM and 158 (26.8%) SAH. COVID-19-related symptoms included: fever (63.4%), chills (63.4%), cough (60.3%), dyspnea (49.3%), myalgia (46.3 %), diarrhea (32.4%), anosmia (31.2%), headache (23.7%) and runny nose (21.7%). DM was associated with acute respiratory distress syndrome (ARDS) (P=0.0001), use of supplemental oxygen (P=0.001), intensive care unit (ICU) admission (P=0.0001), mechanical ventilation (MV) (P=0.001), acute graft dysfunction (P=0.0001), hemodialysis (P=0.009), and death (P=0.0001). Fasting blood glucose prior to hospitalization was related to the risk of death (130 vs 112 mg/dL, P=0.002), MV (130 vs 119 mg/dl, P=0.0001) and ICU admission (127 vs 109 mg/dl, P=0.0001). HbA1c values were associated with the risk of MV (7.2 vs 6.9%, P =0.031) and ICU admission (7.1 vs 6.6%, P=0.025). SAH was associated with ARDS (P=0.044), ICU admission (P=0.028), MV (P=0.018), graft dysfunction (P=0.006), HD (P=0.007) and death (P=0.037). ACE inhibitors or ARBs were not associated with the risk of death (P=0.792 and P=0.138, respectively).

Conclusions: DM and poor glycemic control, as well as SAH were associated with worse outcomes in COVID-19. These findings highlight the importance of adequate management of comorbidities in transplant patients, especially in relation to DM, since poor glycemic control contributes to the worst outcomes in COVID-19. ACE inhibitors and ARBs should not be discontinued during COVID-19 pandemic, as they do not increase the risk of death.

CITATION INFORMATION: de Lucena D., de Brito I., Cristelli M., Medina-Pestana J., Tedesco-Silva H., Rangel É. Relationship Between Diabetes Mellitus and Covid-19 Prognosis in Kidney Transplant Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.D. de Lucena: None. **I.A. de Brito:** None. **M.P. Cristelli:** None. **J.O. Medina-Pestana:** None. **H. Tedesco-Silva:** None. **É.B. Rangel:** None.

Abstract# 782

Management of Asymptomatic Bacteriuria in Kidney Transplant Recipients

A. Diamond, *Pharmacy, Temple University Hospital, Philadelphia, PA*

Purpose: Asymptomatic bacteriuria (ASB) is the presence of bacteriuria with no symptoms. Recent guidelines recommend against treatment of ASB in kidney transplant (KT) recipients more than 2 months post-transplant. These recommendations stem from clinical studies that have demonstrated minimal effect on graft function and low risk of progression to symptomatic urinary tract infection (UTI) if ASB is untreated. The risk of unnecessary antibiotic exposure may exceed the potential treatment benefits. The purpose of this study is to evaluate trends in treatment and clinical outcomes in KT recipients with ASB. In addition, current literature and guidelines only address urine culture growth of ≥ 10^5 CFU/mL and this study aimed to broaden that definition to include urine culture growth of ≥ 10^4 CFU/mL.

Methods: This was a retrospective chart review that included all patients 18 years and older with a KT at our institution between 1/20/2016 and 2/28/2019. Patients with multi-organ transplantation were excluded. The primary endpoint was the incidence of at least 1 episode of ASB between 2-12 months post-KT. ASB was defined based on two different yields of urine culture growth, ≥10^4 CFU/mL (noted as total ASB) and ≥10^5 CFU/mL (noted as guideline concordant (GC) ASB) with no symptoms. Secondary endpoints, evaluated for all ASB episodes, include treatment rate, progression rate to symptomatic UTI, ASB treatment agent and duration, and development of resistance (6 months from treated ASB). Graft function and patient survival were also assessed.

Results: 134 KT recipients were included. Incidence of at least 1 episode of ASB (per patient) for total and GC ASB was 29% and 16%, respectively. Treatment rates of total ASB and GC ASB cultures were 40% and 64%, respectively. Fluoroquinolones were the most common agents prescribed (61.7% of treated cultures). The median treatment duration of an ASB episode was 10 days. Progression rate of untreated ASB episodes to symptomatic UTI was 7.7% and for treated ASB episodes was 11.8% (P=0.71). Antibiotic resistance developed in 7.7% of treated cultures. Graft function was similar between the ASB population and the non-ASB population, with a median serum creatinine of 1.4 mg/dL for both groups at 12 months post-KT. Mortality was similar in both groups.

Conclusions: Overall, this study found that prescribers chose to treat 40% of ASB episodes, including cultures with less CFU/mL than the GC definition. With a low incidence of progression to symptomatic UTI identified and no difference in graft function, this study supports the guideline recommendations to routinely refrain from treatment of ASB episodes. Future studies are needed to further explore the association of treatment of ASB and development of antimicrobial resistance.

CITATION INFORMATION: Diamond A. Management of Asymptomatic Bacteriuria in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Diamond: None.

Abstract# 783

Survival Outcomes in Kidney Transplant Recipients Aged 18-60 Years by CMV Discordance Status: A Multivariable Analysis

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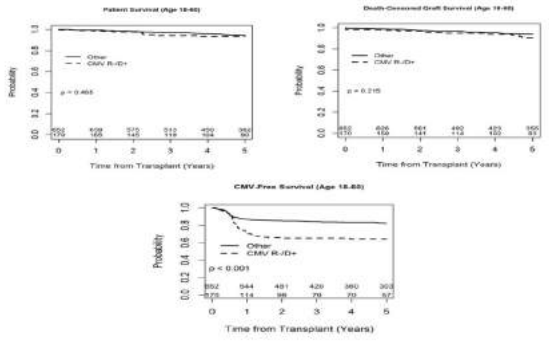
Purpose: Despite advances in CMV therapeutics, CMV infection can pose significant comorbidity after transplantation. We sought to examine the impact of high-risk CMV discordance in our primary kidney transplant recipient population aged 18-60.

Methods: We retrospectively reviewed all primary kidney transplant recipients aged 18-60 years from 2008-2019. At our institution, we use Thymoglobulin (r-ATG) as induction with early steroid withdrawal followed by CNI plus MMF maintenance, and typically patients receive CMV prophylaxis with Valganciclovir for 90 days for low-risk (CMV IgG R+/D+, R+/D- or R-/D-) and 180 days for high-risk (CMV IgG R-/D+) status. We stratified our study population into clinically high-risk status recipients (CMV IgG R-/D+) (n=170) and low-risk status recipients (CMV IgG R+/D+, R+/D- or R-/D-) (n=652). Kaplan-Meier curves were generated for recipient survival, death-censored graft survival, and CMV-infection-free survival with follow-up censored at 5 years post-transplant. We examined the effect of CMV high-risk status on outcomes of interest in a multivariable Cox proportional hazards model adjusted for age, gender, race, BMI, maintenance immunosuppression, donor type, and donor age. CMV-free survival was not modeled due to severe proportional hazard violations.

Results: In univariate analysis, no difference was noted in patient survival (log-rank, p=0.465) or death-censored graft survival (log-rank, p=0.215) between low and high-risk groups. However, CMV-free survival was significantly lower in the high-risk group (log-rank, p<0.001). High-risk recipients had a 35% cumulative incidence of CMV infection at two years post-transplant, compared to 15% in the low-risk group. In the multivariable model, CMV status was not a predictor of patient survival (HR=0.71, 95% C.I. (0.26-1.90), p=0.50) or graft survival (HR=1.01, 95% C.I. (0.40-2.57), p=0.98).

Conclusions: In primary kidney transplant recipients aged 18-60 years, receiving r-ATG induction immunosuppression followed by CNI plus MMF maintenance with early steroid withdrawal, the incidence of post-transplant CMV viremia is significantly higher in high-risk CMV discordant recipients. However, it did not predict the patient or graft survival.



CITATION INFORMATION: Dinesh A., Shaker T., Jackson S., Riad S., Pruett T. Survival Outcomes in Kidney Transplant Recipients Aged 18-60 Years by CMV Discordance Status: A Multivariable Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Dinesh: None. **T. Shaker:** None. **S. Jackson:** None. **S. Riad:** None. **T.L. Pruett:** None.

ID

Abstract# 784

Does High-Risk CMV Discordance Affect Elderly Kidney Transplant Recipient Survival? A Multivariable Analysis

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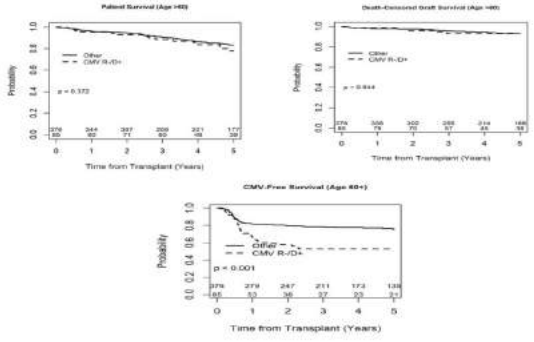
Purpose: High-risk CMV discordance (R-/D+) has often been linked to deleterious outcomes after kidney transplantation. The elderly transplant population is more susceptible to CMV infections due to severe immunosenescence. We sought to examine the survival outcomes in our elderly kidney transplant recipients (≥60years) by CMV concordance status.

Methods: We retrospectively reviewed all primary kidney transplant recipients ≥60 years of age from 2008-2019. We use Thymoglobulin (r-ATG) as induction with early steroid withdrawal followed by CNI plus MMF maintenance, and typically, patients receive CMV prophylaxis with Valganciclovir for 90 days for low-risk (CMV IgG R+/D+, R+/D- or R-/D-) and 180 days for high-risk (CMV IgG R-/D+) status. We stratified our study population into clinically high-risk (CMV IgG R-/D+) (n=85) and low-risk status recipients (CMV IgG R+/D+, R+/D- or R-/D-) (n=376). Kaplan-Meier curves were generated for recipient survival, death-censored graft survival, and CMV-infection-free survival with follow-up censored at five years post-transplant. We examined the effect of CMV high-risk status on outcomes of interest in a multivariable Cox proportional hazards model adjusted for age, gender, race, BMI, maintenance immunosuppression, donor type, and donor age. CMV-free survival was not modeled due to severe proportional hazard violations.

Results: In univariate analysis, no difference was noted in patient survival (log-rank, p=0.372) or death-censored graft survival (log-rank, p=0.844) between low and high-risk groups. However, CMV-free survival was significantly lower in the high-risk group (log-rank, p<0.001). At two years from engraftment, the cumulative incidence of CMV infection was 42% of the high-risk recipients vs. 21% of the low-risk recipients. In the multivariable model, CMV status was not a predictor of patient survival (HR=1.10, 95% C.I. (0.54-2.23), p=0.80) or graft survival (HR=0.90, 95% C.I. (0.28-2.86), p=0.86).

Conclusions: In primary kidney transplant recipients ≥60 years of age, receiving r-ATG induction immunosuppression followed by CNI plus MMF maintenance with early steroid withdrawal, the incidence of post-transplant CMV viremia is significantly higher in the high-risk CMV discordant recipients. However, we did not detect an association between CMV discordance and patient or graft survival.



CITATION INFORMATION: Dinesh A., Jackson S., Riad S., Pruett T. Does High-Risk CMV Discordance Affect Elderly Kidney Transplant Recipient Survival? A Multivariable Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Dinesh: None. **S. Jackson:** None. **S. Riad:** None. **T.L. Pruett:** None.

Abstract# 785

Outcomes of Kidney Transplantation at the Epicenter of the Covid-19 Pandemic: The Experience of the Ospedale Maggiore Policlinico

E. Favi[1], C. Alfieri[2], M. Gandolfo[2], A. Brescacin[1], M. Bilato[3], R. Cacciola[4], P. Messa[2], M. Ferraresso[5], *[1]Renal Transplantation, Ospedale Maggiore Policlinico, Milan, Italy, [2]Nephrology, Ospedale Maggiore Policlinico, Milan, Italy, [3]Urology, Ospedale Maggiore Policlinico, Milan, Italy, [4]HBP Surgery, Policlinico Tor Vergata, Rome, Italy, [5]Department of Clinical Sciences and Community Health, University of Milan, Milan, Italy*

Purpose: To evaluate patient- and allograft-related outcomes following living and deceased donor kidney transplantation (KTx) in a unit operating at the epicentrum of the COVID-19 pandemic.

Methods: Single-centre observational study comparing results of patients transplanted during the COVID-19 pandemic (SARS2-Tx group; 71#) with those remaining on the transplant waiting list (TWL) during the same period (SARS2-TWL group; 142#) or receiving a kidney in 2019 (CONTROL group; 75#) at the Ospedale Maggiore Policlinico, Milan, Italy. Data refer to latest follow-up available. Donor and recipient screening included: real-time reverse transcriptase polymerase chain reaction based molecular assay on nasal swab and BAL (at induction of anesthesia), serologic test, CRP, and chest high-resolution CT scan.

Results: Demographic and clinical characteristics of the three groups were similar with an equivalent proportion of high immunological and surgical risk subjects. Patient survival was 98.6% in SARS2-Tx, 96% in CONTROL, and 97.2% in SARS2-TWL (P=ns) whereas death-censored transplant survival was 97% in SARS2-Tx and 96% in CONTROL (P=ns). There were 3 episodes of COVID-19 infection in SARS2-Tx (4.2%; 2 asymptomatic and 1 with moderate respiratory symptoms), 6 in CONTROL (8%; 5 asymptomatic and 1 fatal), and 3 in SARS2-TWL (97.9%; all fatal). The vast majority of COVID-19 infections were acquired during transplant-related hospital stay or dialysis sessions. Rejection rates before and during the pandemic were comparable (6% vs 4.2%; P=ns) reflecting the fact that we did not change our immunosuppression strategy. In fact, median tacrolimus C0 as well as MMF and steroid daily doses in SARS2-Tx and CONTROL were not significantly different at any time point of the study.

Conclusions: Overall, our data seem to reassure centres worldwide willing to effectively continue their KTx program despite the COVID-19 crisis as no clinically relevant differences were observed among patients transplanted before and during the pandemic. The perceived increased risk of SARS-CoV-2 infection and virus-related death among patients remaining on dialysis further supports this point of view as long as strict and rigorous infection control strategies are embraced. A national multicentre study with larger population and longer follow-up is warranted to confirm these findings and help clinicians offer their patients adequate counselling.

CITATION INFORMATION: Favi E., Alfieri C., Gandolfo M., Brescacin A., Bilato M., Cacciola R., Messa P., Ferraresso M. Outcomes of Kidney Transplantation at the Epicenter of the Covid-19 Pandemic: The Experience of the Ospedale Maggiore Policlinico *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Favi: None. **C. Alfieri:** None. **M. Gandolfo:** None. **A. Brescacin:** None. **M. Bilato:** None. **R. Cacciola:** None. **P. Messa:** None. **M. Ferraresso:** None.

Abstract# 786

Delay in Pediatric Kidney Transplantation Due to Infection: A Single Center Study

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Purpose: The infectious risks of immunosuppression following pediatric kidney transplant are well described but little is known about the impact of infections on patients with advanced chronic kidney disease awaiting kidney transplant. We hypothesized that infections were a common cause of delays in anticipated living donor transplants (LDKT) and accounted for increased periods of inactivation from the UNOS deceased donor (DDKT) waiting list.

Methods: We conducted a retrospective review of all pediatric kidney transplants completed at our institution between July 2015 and November 2020 to assess for infections as a cause of LDKT re-scheduling and / or inactivations on the UNOS waitlist. Patients that underwent multiple kidney transplants were included if both transplants were conducted at our center within the given time frame.

Results: A total of 86 pediatric kidney transplants (40% living donor) were performed at our institution (average age at transplant 11 years, range 1-20). Of the 4 (11%) LDKT that were delayed after an initial surgical date had been scheduled, two were due to active infections noted at the time of admission for transplant, one due to COVID-19 restrictions at the hospital, and one was not documented. In the 52 DDKT, 17 patients had 24 periods of inactivation from the UNOS waiting list that ranged in duration from 6 - 156 days (mean 27 days). Eleven (46%) of inactivation periods were due to infectious illnesses: 1 urinary tract infection, 1 disseminated varicella, 1 line infection, 3 peritonitis, 5 respiratory infections (two complicated with concurrent bacterial infections).

Conclusions: Infections during the pre-transplant period resulted in multiple delays of both living and deceased donor pediatric kidney transplants. Multicenter studies should be performed to assess the risk of infectious complications for children on the kidney transplant waiting list in order to evaluate risk mitigation strategies.

CITATION INFORMATION: Heald-Sargent T., Manz S., Verghese P. Delay in Pediatric Kidney Transplantation Due to Infection: A Single Center Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: T.A. Heald-Sargent: None. **S. Manz:** None. **P. Verghese:** None.

Abstract# 787

Clinical Outcomes and Management of Covid-19 Patients Among Kidney Transplant Recipients: A Systematic Review

S. Ismail[1], A. Babonj[2], S. Al Harbi[3], A. Babonj[2], A. Almalki[1], E. J. Murray[4], *[1]King Khalid hospital, MNGHA, Jeddah, Saudi Arabia, [2]King Abdulaziz University, Jeddah, Saudi Arabia, [3]King Faisal Specialist Hospital, Jeddah, Saudi Arabia, [4]Boston University School of Public Health, Boston, MA*

Purpose: We aim to systematically review published literature and synthesize the evidence available on therapeutic interventions and clinical outcomes used in the management of COVID-19 among adults' kidney transplant recipients (KTRs).

Methods: We searched PubMed, EMBase, the Cochrane registry for systematic reviews, and ClinicalTrials.gov with no language restrictions for articles published from November 1st, 2019 to August 13th, 2020 on adult KTRs diagnosed with COVID-19 infections in the inpatient and the outpatient settings. We excluded studies of other organ transplants or dual organ transplants. Two independent reviewers assessed articles for study selection and five researchers extracted data. Our primary outcome was to describe the use of therapeutics for the treatment of COVID-19, assess the alterations of the immunosuppressive regimens and the clinical progression of this patient group.

Results: We identified ninety eligible study (1052 KTRs), of which, 68 (155 KTRs) were case reports or cases series and 23 aggregate-level studies (897 KTRs) of descriptive observational data. Among the 155 patients described in case reports or case series, 44 received intravenous steroids while 55% continued their oral maintenance steroid doses. Aminoquinolines, azithromycin, antivirals, tocilizumab were used for 100, 64, 38, 24 KTRs respectively. Acute kidney injury (AKI) occurred in 56.6% , of whom 15 KTRs required renal replacement therapy (RRT). Twenty-five patients were admitted to intensive care units (ICU) and had a median ICU stay of 10 days,IQR (5-14). The median length of hospital stay was 17 days, IQR (11-29) and death occurred in 22.6% of patients. Antimetabolites were withheld or doses reduced in 90.9%. Among the 897 patients included in the aggregate-level studies, 26.5% died and 35.11% developed AKI, of whom 37 patients required RRT. The incidence of ICU admission in the aggregate-level data was 14.8%. Furthermore, Hydroxychloroquine, azithromycin and tocilizumab were used for 813, 491 and 373 KTRs respectively. Antimetabolites were stopped in 51.2%, calcineurin inhibitors were stopped or doses reduced in 320 KTRs, and 222 patients had an increase in their steroids' doses.

Conclusions: Kidney transplant recipients diagnosed with COVID-19 present a vulnerable population with high risk of severe clinical outcomes, including acute kidney injury, ICU admission, and mortality. A careful risk-benefit assessment between the use of antiviral drugs and the interruption of maintenance immunosuppressive agents including steroids is likely to be an important factor in the treatment of COVID-19 in this group.

CITATION INFORMATION: Ismail S., Babonj A., Al Harbi S., Babonj A., Almalki A., Murray E. Clinical Outcomes and Management of Covid-19 Patients Among Kidney Transplant Recipients: A Systematic Review *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Ismail: None. **A. Babonj:** None. **S. Al Harbi:** None. **A. Babonj:** None. **A. Almalki:** None. **E.J. Murray:** None.

Abstract# 788

Efficacy and Safety of a High Dose Ganciclovir Dosing Strategy in Kidney and Pancreas Transplant Recipients

M. Jorgenson[1], J. Descourouez[1], G. Leverson[2], C. Saddler[2], J. Smith[2], D. Mandelbrot[2], J. Odorico[2], *[1]UW Health, Madison, WI, [2]UW School of Medicine and Public Health, Madison, WI*

Purpose: Evaluate efficacy and safety of a strategy utilizing high dose ganciclovir in kidney and pancreas transplant recipients requiring hospital admission for CMV infection.

Methods: Adult kidney and pancreas transplant recipients admitted for CMV infection (4/29/19-7/15/20) received IV ganciclovir (10 mg/kg Q 12 hours x 7 days, renally adjusted) with step down to standard of care dosing thereafter (5 mg/kg Q12, renally adjusted). These patients were then compared to a standard of care (SOC) cohort admitted for CMV infection in a comparable time frame before implementation of the dosing strategy (10/20/16-3/2/19). Primary objective was response to the dosing strategy as measured by rate of viral clearance (delta log CMV) at day 7 of therapy. Secondary objectives were safety/toxicity as measured by leukopenia and short term (90 day) efficacy outcomes.

Results: 54 patients met inclusion criteria; 22 in the high dose cohort, 32 in the SOC cohort. Clinical characteristics were similar in the two groups, including induction type at transplant and degree of immunosuppressive modification in response to CMV diagnosis (Table). Patients who received the high-dose strategy had a significantly greater response to therapy at day 7 compared to the SOC cohort (high dose -0.92 log vs SOC -0.56 log, p=0.04). Change in WBC at day 7 was not different between groups (high-dose -0.49 vs SOC -0.45). Despite significantly more rapid clearance kinetics at day 7, the intensified dosing strategy was not associated with reduction in hospital length of stay (10.9 days high-dose vs 9.5 days SOC, p=0.52), 30 and 90 day all-cause readmission rates (30d: 4.5% high-dose vs 15.6% SOC, p=0.38, 90d: 13.6% high-dose vs 21.9% SOC, p=0.5) or clearance of viremia by day 90, as defined as achievement of CMV viral load less than lower limit of quantification (73% high-dose, 84% SOC, p=0.06).

Conclusions: A high dose strategy of IV GCV results in increased viral clearance kinetics without additional leukopenia at day 7 but does not significantly affect hospital length of stay, hospital readmission or viral clearance to <LLOQ at day 90. Future studies are needed to evaluate the effect of the rapid viral clearance kinetics induced by this strategy on outcomes of CMV infection, including persistence, resistance, recurrence as well as patient and graft survival.

Clinical characteristics

	High Dose (n=22)	Standard of Care (n=32)	P value
Age at Transplant	55.5 ± 12.3	54.4 ± 10.8	0.72
Male sex	12 (54.6%)	27 (84.4%)	0.03
Race Non-Hispanic White	19 (86.4 %)	26 (81.3%)	>0.99
BMI	26.4 ± 4.8	27.6 ± 5.0	0.39
CMV serostatus D+/R- R+ D-/R-	 19 (86.4%) 2 (9.0%) 1 (4.6%)	 25 (78.1%) 5 (15.6%) 2 (6.3%)	0.67
Transplant type Kidney Kidney-pancreas	 19 (86.4%) 3 (13.6%)	 23 (71.9%) 9 (28.1%)	0.32
Primary transplant	16 (72.7%)	25 (78.1%)	0.86
Transplant Induction Lymphocyte depleting IL-2 inhibition	 17 (77.3%) 5 (22.7%)	 23 (71.9%) 9 (28.1%)	0.14
Rejection prior to CMV	1 (4.5%)	4 (12.5%)	0.64
Age at CMV diagnosis	56.3 ± 12.4	55.1 ± 10.7	0.70

Immunosuppressive modification in response to CMV

	High Dose	Standard of care	P value
Tacrolimus trough (% change)	-18.7 ± 53.1	-15.9 ± 41.9	0.83
Mycophenolate dose (% change)	-74.2 ± 35.3	-61.2 ± 36.1	0.20
Prednisone dose (% change)	+33.3 ± 47.1	+16.1 ± 38.2	0.15

CITATION INFORMATION: Jorgenson M., Descourouez J., Leverson G., Saddler C., Smith J., Mandelbrot D., Odorico J. Efficacy and Safety of a High Dose Ganciclovir Dosing Strategy in Kidney and Pancreas Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Jorgenson: None. **J. Descourouez:** None. **G. Leverson:** None. **C. Saddler:** None. **J. Smith:** None. **D. Mandelbrot:** None. **J. Odorico:** None.

Abstract# 789

Covid 19 Re-infection versus Re-activation in Two Renal Transplant Patients

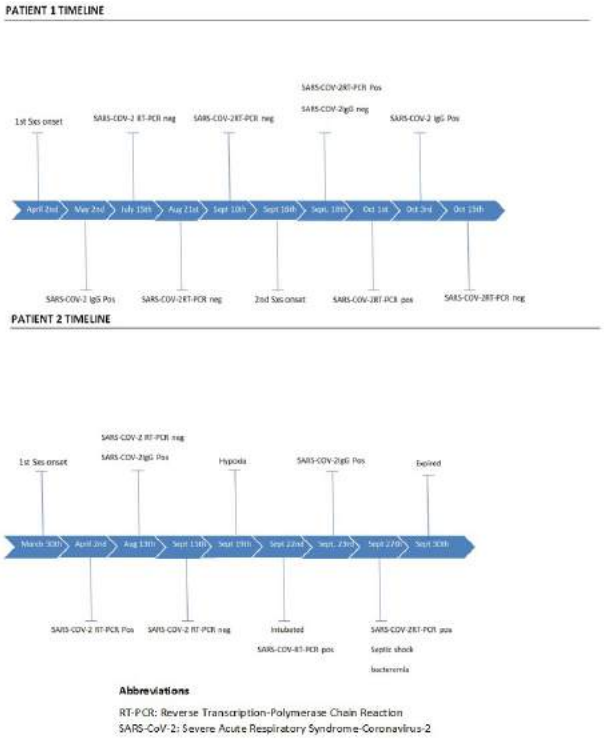
L. Liriano-Ward, Y. Al Azzi, R. Bartash, C. Pynadath, M. Ajaimy, P. Loarte, J. Graham, S. Greenstein, M. Kinkhabwala, J. Rocca, E. Akalin, *Montefiore Medical Center, New York, NY*

Purpose: Rare cases of potential COVID 19 re-infection have been reported throughout the world.

Methods: We describe two renal transplant recipients with possible SARS-COV-2 re-infection.

Results: Patient #1 is a 63-year-old man with a history of renal transplant in February 2010, who initially experienced symptoms consistent with COVID-19 in April 2020 along with several family members. Due to limitations in outpatient testing, no SARS-CoV2 testing was able to be performed but he was treated as presumed COVID-19 infection due to high community prevalence and three weeks following his symptoms, SARS-CoV2 IgG was positive. The patient subsequently had four negative PCR tests from July-September 2020. In October, he was admitted for hypoxic respiratory failure and was found to be SARS-COV-2 positive by PCR and SARS-COV- IgG was negative (Figure 1). The patient was treated with Remdesivir and recovered. Patient #2 is a 64-year-old man with history of renal transplant in 2003, who was found to be SARS-COV-2 positive by RT-PCR in April 2020 after presenting with hypoxia. The patient had an uneventful hospital course and was discharged off supplemental oxygen. He had two negative SARS-COV-2 PCR tests in August and September and his SAR-COV-2 IgG was positive. In September, he was readmitted with hypoxic respiratory failure requiring intubation and ICU admission and was again found to be SARS-COV-2 positive by PCR. The patient had a complicated hospital course and expired on September 30th (Figure 1).

Conclusions: Potential cases of SARS-COV-2 re-infection have been previously reported, but it is unclear whether these are true re-infections versus reactivation of a prior infection, prolonged viral shedding, or dynamic RT-PCR results. In our cases, we believe prolonged viral shedding from the initial infection or inaccurate testing is less likely given the prolonged time interval between the two events, the multiple negative tests in between, and the severity of the second episodes. While both of these patients were suspected of having re-infections, this could not be confirmed as genomic analysis was not performed. Future studies of similar cases are needed to determine factors contributing to re-infection.



CITATION INFORMATION: Liriano-Ward L., Al Azzi Y., Bartash R., Pynadath C., Ajaimy M., Loarte P., Graham J., Greenstein S., Kinkhabwala M., Rocca J., Akalin E. Covid 19 Re-infection versus Re-activation in Two Renal Transplant Patients *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Liriano-Ward: None. **Y. Al Azzi:** None. **R. Bartash:** None. **C. Pynadath:** None. **M. Ajaimy:** None. **P. Loarte:** None. **J. Graham:** None. **S. Greenstein:** None. **M. Kinkhabwala:** None. **J. Rocca:** None. **E. Akalin:** None.

Abstract# 790

Infectious Complications and Malignancy After Kidney Transplantation in the Elderly Population

L. Liriano-Ward, M. Parides, Y. Al Azzi, C. Pynadath, M. Ajaimy, P. Loarte, J. Graham, S. Greenstein, M. Le, H. Yaffe, M. Kinkhabwala, J. Rocca, E. Akalin, *Montefiore Medical Center, New York, NY*

Purpose: All patients, regardless of age, may benefit from renal transplantation due to improved quality of life and decreased mortality. However, elderly patients are at an increase risk of developing side effects related to immunosuppressive medications including infections and malignancy. We aim to evaluate clinical outcomes in recipients older than 65 years of age.
Methods: This is a retrospective review of all patients over the age of 18 transplanted at our center from January 2013 to December 2018. We compared clinical outcomes including allograft and patient survival, as well as the development of infections (opportunistic and non-opportunistic) malignancy in patients older than 65 compared to younger patients.
Results: Of the 806 patients analyzed, 201 (24.9%) were older than 65 years of age. The two groups had no statistically significant difference in terms of gender and race. Older patients were more likely to receive a deceased donor kidney transplant (90% vs. 80.3%, p=0.002) and less likely to receive thymoglobulin induction (<0.001). During a median follow up of 46.6 months (28, 65), as expected mortality was higher in older patients (20.4% vs. 7.1%, p=0.0001), but compared to younger patients, there was no difference in terms of death-censored graft loss (10% vs 10.4 %, p=0.85). Detailed analysis of infections revealed that there was no difference in terms of BKV and CMV viremia, pneumonia, influenza and c. diff between the two groups. However, older patients had more fungal, urinary tract infections, and malignancy. 9% of elderly patients developed a fungal infection, the most common being PJP pneumonia (44%), followed by candida infection (39%), and cryptococcal infection (17%). 27% of elderly patients developed a malignancy, which included skin cancer (37%), prostate cancer (11%), breast cancer (7%), and colon cancer (7%), Kaposi's sarcoma (7%), among others occurring less frequently.
Conclusions: While recipients older than 65 had an increase incidence of fungal, urinary tract infections, and malignancies, their graft survival was similar to that of younger patients.

Clinical outcomes	Patients with age > 65	Patients with age <=65	p-value
BKV	16.4%	17.4%	0.43
CMV	11.7%	9.2%	0.31
Influenza	8.2%	9.9%	0.48
Pneumonia	23.1%	19.0%	0.22
C. Diff	7.2%	5.9%	0.51
Urinary tract inf	45.1%	29.7%	< 0.001
Fungal infections	9.7%	5.0%	0.02
Malignancy	12.8%	5.5%	< 0.001

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Abstract# 791

Impact of Belatacept and Tacrolimus on Cmv Viral Load Control and Relapse in Moderate and High-risk Cmv Serostatus Kidney Transplant Recipients

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Purpose: We aim to evaluate the impact of belatacept and tacrolimus on CMV viral load control, remission and relapse in CMV high-risk (serostatus, D+/R-) and moderate-risk (D+/R+ or D-/R+) recipients.
Methods: We included 175 CMV recipients with at least 1 episode of viremia within 1 year after transplantation. We used a multi-state, continuous time homogenous Markov model to evaluate viral load transitions across states: state 1, undetectable or low viral load [0, 500) copies/mL; state 2, moderate viremia [500, 10^4) copies/mL; and state 3, high viremia (viral load >= 10^4).
Results: CMV high-risk belatacept-treated recipients presented an increased risk **(HR = 2.06; CI = 1.14, 3.74)** of transition from state 1 to 2 and a decreased risk **(HR = 0.365; CI = 0.164, 0.812)** of transitioning from state 2 to 3 than high-risk tacrolimus-treated recipients. Hence, state 2 emerged as a sticky state for high-risk belatacept-treated recipients. High-risk belatacept-treated recipients were predicted to persist in state 2 for a significantly longer time **(128 days, CI =110,145)** than high-risk tacrolimus-treated recipients **(70.6 days, CI = 47.6, 99.2).** Conversely, the high-risk tacrolimus group had greater persistence in state 1 compared to belatacept. In contrast, moderate-risk belatacept-treated recipients showed much better viral load control with a decreased risk of transitioning from state 2 to state 3 **(HR 0.307; CI =0.110, 0.852)** and with no other significant differences in viral load transition risks and in the short durations in viremic states when compared to moderate-risk tacrolimus-treated recipients.
Conclusions: High-risk belatacept-treated recipients showed a pattern of protracted viremia with impaired development of protective immunity. High-risk tacrolimus-treated recipients established some level of protective immunity despite blocking signaling in both naïve and memory T cells. Viral control was similar in moderate risk recipients treated with belatacept or tacrolimus. The results suggest that knowledge of viral-specific T cell response remains incomplete and that belatacept should be used with caution in CMV high-risk recipients while further strategies that can improve CMV serostatus matching are considered.
CITATION INFORMATION: Magua W., Johnson A., Karadkhele G., Badell I., Vasanth P., Lyon III M., Mehta A., Easley K., Rickert J., Larsen C. Impact of Belatacept and Tacrolimus on Cmv Viral Load Control and Relapse in Moderate and High-risk Cmv Serostatus Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: W. Magua: None. **A.C. Johnson:** None. **G.M. Karadkhele:** None. **I.R. Badell:** None. **P. Vasanth:** None. **M.G. Lyon III:** None. **A.K. Mehta:** None. **K.A. Easley:** None. **J. Rickert:** None. **C.P. Larsen:** None.

Abstract# 792

Impact of Non-active Hepatitis B on Patient Survival After Renal Transplantation

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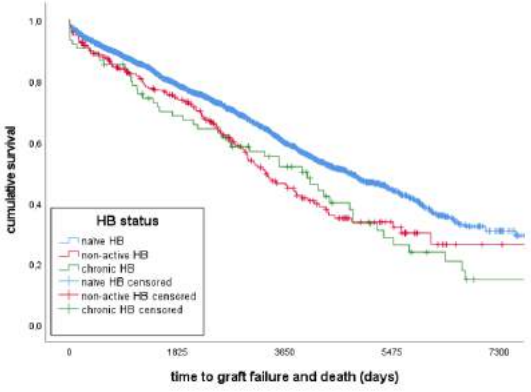
Purpose: Dialysis patients (pts) have an increased risk for hepatitis B (HB) infection and impaired response to HB vaccine compared to the general population. As shown in other studies, pts and graft survival in pts with chronic HB is worse. This study assesses the outcome of HBc-positive patients after kidney transplantation (KTx).

Methods: In our retrospective analysis we included all pts >18 years old, who underwent KTx from 01.01.1990 to 31.08.2019 in our center. Pts were grouped by their serostatus prior to KTx into "A: naïve" (HB negative), "B: HBc-positive" (non-active HB) and "C: HBsAg-positive" (chronic HB). Primary endpoints included pts and graft survival analyzed with Kaplan-Meier (KM) and log-rank test. Regression analysis (RA) was applied to determine independent risk factors for the occurrence of primary endpoints.

Results: Out of 2487 KTx pts we identified n=2198 HB naïve, n=218 non-active HB and n=75 chronic HB pts. Overall 29.1% (A:27.7%, B:37.6%, C:45.3%) pts died and 20.3% (A:19.1%, B:27.5%, C:37.3%) pts suffered from graft failure. 5-year pts survival was A: 87.0%, B: 82.8%, C: 82.2%. 10-year pts survival was A: 71.7%, B: 61.1%, C: 64.5% and 20-year pts survival was A: 43.1%, B: 26.1%, C: 40.9% (p=0.01). Pts and graft survival rate (fig. 1) was: 5 year A: 78,7%, B: 74,2%, C: 68,6%, 10 year A: 59.8%, B: 46.4%, C: 51.8%, 20 year A: 30.8%, B: 26.4%, C: 14.9% (p=<0.001). RA (fig. 2) showed that anti-HBs positivity (≥100 IE/l) was a protective factor for graft failure and death (p<0.001).

Conclusions: HB leads to earlier graft loss and inferior pts survival. Beside the known negative effect of chronic HB, also in pts with non-active HB infection overall survival was significant worse to HB naïve pts. Thus, non-active HB is an important risk factor for transplant outcome. Next, influence of antiviral and immunosuppressive regimens and incidence of HB-reactivation are to be analyzed.



variable	Exp (B) 95% CI	p
Recipient age	1,0 1,0 1,0	<0,001
Donor age	1,0 1,0 1,0	<0,001
Cold ischemia time	1,0 1,0 1,0	0,01
CMV Ab	0,9 1,0 1,1	0,8
HCV Ab	1,4 1,8 2,4	<0,001
Donor type		
Living donor		
Cadaver donor	1,1 1,6 2,2	0,01
HepB-Status		
naïve		
Non-active HB	1,0 1,2 1,5	0,1
Chronic HB	1,0 1,5 2,2	0,1
MM broad		
0		
1	1,1 1,5 2,1	0,03
2	1,2 1,5 2,0	0,002
3	1,3 1,7 2,2	<0,001
4	1,2 1,6 2,1	0,001
5	1,3 1,8 2,5	<0,001
6	2,7 2,5 3,5	<0,001
Anti-HBs		
negative		
≥10 IE/l	0,7 0,9 1,1	0,2
≥100 IE/l	0,6 0,7 0,8	<0,001
≥1000 IE/l	0,5 0,6 0,8	0,001

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Abstract# 793

Intensive Monitoring and Early Treatment for Urinary Infection in Renal Transplant Recipients Reduces Readmission and Sepsis

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Purpose: Urinary tract infection (UTI) is a common renal transplant (RT) complication that is observed in up to 60-70% of RT recipients and may affect allograft function and long-term survival. A retrospective review identified an opportunity for reduction in the adverse events related to post-RT UTI. We hypothesized that implementation of an early detection and treatment program would reduce the incidence of readmission and complications from UTI after RT.

Methods: An intensive, prospective UTI monitoring and treatment performance improvement plan (PIP) was established in April 2018. A retrospective cohort study was conducted comparing patient outcomes after PIP with cases before implementation. We defined bacteriuria as having 25,000 to 100,000 and UTI having more than 100,000 bacteria present on urine culture. Urinalysis and urine culture were sent on all RT recipients weekly for 1-month post-RT Recipients at higher risk (recurrent history of UTI before RT, urinary retention history and congenital or acquired urogenital abnormalities) for UTI were monitored for 3 months.

All symptomatic patients within 3 months and all asymptomatic patients within 1 month of RT with bacteriuria on uncontaminated urinalysis were treated empirically. High risk, asymptomatic patients within 3 months of RT with bacteriuria on uncontaminated urinalysis were treated empirically.

Results: A retrospective data analysis comparing RT case controls (N=73) and post PIP implementation (N=220) was conducted. Figure 1 shows that the prevalence of urine testing was much higher post protocol implementation. Despite a higher 3-month UTI rate most likely detected through more screening, post-RT outcomes were significantly (p<0.05) improved after PIP implementation for 90-day readmissions with UTI, diagnosis of sepsis, and rejection (Figure 2).

Conclusions: The 11% UTI rate observed within 3 months resulting from this PIP is one among the lowest observed. The reported high incidence of UTI and adverse outcomes related to this complication can be mitigated through intensive monitoring, detection, and a lower threshold for early treatment. While protocol testing identified a slightly higher incidence of UTI relative to case controls, as expected, there was a significant reduction in the severity of disease requiring a readmission for UTI or sepsis. We did not identify adverse effects of early antibiotic intervention for symptomatic or asymptomatic bacteriuria.

CITATION INFORMATION: Patel A., Desai S., Schleich B., Wynd M., Carrea T., Yushkov Y., Geatrakas S., White N., Luongo R., Sosnicki R., Wadhera V., Serur D., Goldstein M. Intensive Monitoring and Early Treatment for Urinary Infection in Renal Transplant Recipients Reduces Readmission and Sepsis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Patel: None. **S. Desai:** None. **B.R. Schleich:** None. **M. Wynd:** None. **T. Carrea:** None. **Y. Yushkov:** None. **S. Geatrakas:** None. **N. White:** None. **R. Luongo:** None. **R. Sosnicki:** None. **V. Wadhera:** None. **D. Serur:** None. **M.J. Goldstein:** Honoraria; Name of Commercial Interest; Speakers Bureau. Honoraria; Nature of Relationship; Speaker.

Abstract# 794

Unquantified Blips Lead to CMV Slips - Post Transplant CMV Monitoring in High Risk Kidney Transplant Recipients

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Purpose: Cytomegalovirus (CMV) is a significant cause of morbidity, mortality, and graft failure after solid organ transplantation, with high risk (D+/R-) patients being the highest risk for infection. While guidelines suggest using highly sensitive, quantitative NAT (QNAT) assays for CMV detection, they stipulate "there is no widely applicable viral load threshold to guide preemptive therapy". This study evaluates the progression to CMV viremia following a CMV "blip" in high risk kidney/kidney-pancreas (KP) transplant recipients.

Methods: This is a single center, retrospective study of CMV high risk kidney or KP transplant recipients from January 2015 - April 2020. A CMV "blip" was defined as a first positive QNAT assay below the level of quantification (< 1.37 x 10^2 IU/mL). Subsequent CMV QNAT assays were followed to assess the progression from blip to CMV viremia, syndrome, or tissue invasive disease. Outcomes were assessed for 1 year from the date of transplant and were evaluated using descriptive statistics and the chi-squared test.

Results: One hundred thirty-four patients were included in the study. Fifty-three (39.6%) patients had their first positive CMV QNAT value below the level of quantification and were considered a CMV "blip". Of these 53 patients, 69.8% (n=37) progressed to viremia while 30.2% (n=16) did not. The median time from transplant to the first CMV blip was 68 (46-97) days and the majority of blip patients (71.1%) were receiving anti-viral prophylaxis at the time of their blip. Median time from blip to CMV viremia was 19.5 (7-28) days. Low rates of CMV syndrome (7.5%) and resistant CMV (1.9%) were found in the blip population (n=53) or the overall population (n=134), 5.2% and 0.75% respectively. No differences were found when comparing patients who progressed from blip to viremia to those who only had a blip.

Conclusions: In CMV high risk kidney/KP transplant recipients, CMV blips progressed to CMV viremia in the majority of cases. This progression typically occurred 2-3 weeks following the initial blip. Early CMV treatment or the development of monitoring protocols after blip identification could prevent the progression to CMV viremia or syndrome.

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DISCLOSURES: A.T. Payne: None. **J.G. Timpone:** None. **A. Gilbert:** Consulting Fee; Name of Commercial Interest; Veloxis. Consulting Fee; Nature of Relationship; Advisory Board Member. **B. Thomas:** None. **B.K. Lindner:** None.

Abstract# 795

Discontinuation of Trimethoprim/sulfamethoxazole Prophylaxis Due to Hyperkalemia in Kidney Transplant Recipients

D. Pett[1], G. Malat[2], C. Domenico[1], R. Samudralwar[1], A. Forte[1], D. Sawinski[2], J. Hu[1], B. Steiner[1], J. Rashid[1], J. Trofe-Clark[2], *[1]Pharmacy, Hospital of Univ of Pennsylvania, Philadelphia, PA, [2]Penn Transplant Institute, Hospital of Univ of Pennsylvania, Philadelphia, PA*

Purpose: Trimethoprim-sulfamethoxazole (TMP-SMX) is the drug of choice for Pneumocystis jirovecii pneumonia (PJP) prophylaxis in kidney transplant recipients (KTRs), however, it can be complicated by hyperkalemia. Study aims were to assess the number of KTRs who discontinued TMP-SMX as an intervention for hyperkalemia within 6 months (mos) post-op vs those who did not, and to describe risk factors for hyperkalemia in both groups.

Methods: This IRB approved single-center retrospective case-control analysis included KTRs who were: ≥ 18 yrs, HIV negative, transplanted at our center Jan 2019-Jan 2020, initiated on tacrolimus (TAC) immunosuppression and TMP-SMX PJP prophylaxis at transplant, and had ≥ 6 mos follow-up. Hyperkalemia (defined as ≥ 2 consecutive serum potassium levels ≥ 5 mEq/L) was assessed at defined time-points: 1 week (wk), 2 wks and monthly for 6 mos post-op.

Results: This interim analysis included 100 of 200 KTRs. Overall, the majority of KTRs were male (60%), Caucasian (55%) and were deceased donor KTRs (58%). Glomerulonephritis was the primary cause of kidney failure in 27% of KTRs. TMP-SMX was discontinued in 23 KTR and held in 2 KTR (25% overall) within 6 mos post-op. Hyperkalemia was the reason for holding/discontinuing TMP-SMX in 8% of KTRs. The overall hyperkalemia incidence was 38%. Evaluated time-point where hyperkalemia was most commonly first experienced was 2 wks post-op (40% of KTRs). When comparing earlier vs later evaluated time-points, hyperkalemia occurred more frequently early on [(87%) KTRs with hyperkalemia first identified at 1 wk-2 mos vs 3-6 mos (13%), p =0.001]. A significant risk factor for hyperkalemia was pre-existing diabetes mellitus (DM) with an additional numeric trend for post-transplant DM (Table 1). There were no differences in delayed graft function (DGF) or low eGFR at wk 2 between groups (Table 1), or at other timepoints (data not shown). One yr graft loss occurred in 5 KTRs (5%) with death being the cause in 1 KTR.

Conclusions: 1) TMP-SMX, considered first-line PJP prophylaxis, was held/discontinued in a quarter of KTRs overall, with hyperkalemia being the reason in < 10% of KTRs. 2) Hyperkalemia occurred in almost 40% of KTRs, and most commonly occurred in the first 2 wks post-op. 3) A significant risk factor for hyperkalemia was pre-existing DM with a numeric trend for post-transplant DM. Data collection is ongoing, and will include data on use of potassium lowering therapies.

Risk Factors for Acute Hyperkalemia in KTRs			
Parameter Evaluated	Hyperkalemia Identified (n=38) n (%)	No Hyperkalemia Identified (n=62) n (%)	p Value
Age ≥ 60 yrs	13 (34%)	16 (26%)	0.5016
Pre-transplant DM	16 (42%)	9 (15%)	**0.0039**
Deceased donor kidney	27 (71%)	31 (50%)	0.0626
Occurrence of DGF	9 (24%)	9 (15%)	0.3734
Supra-therapeutic TAC at wk 2 (>12 ug/L)	8 (21%)	22 (36%)	0.0905
eGFR <30 ml/min/1.73 m^2 at wk 2	3 (8%)	7 (11%)	0.8368
Post-transplant DM	5 (13%)	20 (32%)	0.0570

CITATION INFORMATION: Pett D., Malat G., Domenico C., Samudralwar R., Forte A., Sawinski D., Hu J., Steiner B., Rashid J., Trofe-Clark J. Discontinuation of Trimethoprim/sulfamethoxazole Prophylaxis Due to Hyperkalemia in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Pett: None. **G. Malat:** None. **C. Domenico:** None. **R. Samudralwar:** None. **A. Forte:** None. **D. Sawinski:** Honoraria; Name of Commercial Interest; Veloxis Pharmaceuticals, CareDx, Natera. Honoraria; Nature of Relationship; Advisory Committee Member, Advisory Committee Member, Advisory Committe Member. **J. Hu:** None. **B. Steiner:** None. **J. Rashid:** None. **J. Trofe-Clark:** Consulting Fee; Name of Commercial Interest; MedActionPlan. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; Name of Commercial Interest; Veloxis Pharmaceuticals. Grant/Research Support; Nature of Relationship; Grant funding received by institution. Honoraria; Name of Commercial Interest; Veloxis Pharmaceuticals, CareDx. Honoraria; Nature of Relationship; Speaker/Speaker's Bureau, Advisory Committee Member.

Abstract# 796

Covid Infection Among Kidney Transplant Recipients: Management and Outcomes

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Purpose: COVID pandemic has posed a significant challenge among kidney transplant recipients (KTR) due to their immunocompromised state. There is uncertainty on immunosuppression management among those who have COVID infection. We sought to better understand the clinical course, management, and outcomes of our KTR who developed COVID infection.

Methods: Single-center experience of COVID infected KTR. Baseline demographics, clinical data, management, and outcomes were obtained by manual chart abstraction of the EMR.

Results: 50 KTR had COVID infection. Mean age was 53; 50% males; 74% African-Americans. Fever was the most common symptom (71%); 36 patients (71%) required hospitalization; 11 (22%) required ICU admission and 8 (16%) required mechanical ventilation. 23 developed AKI with one-third requiring RRT; 50% of patients requiring RRT eventually had renal recovery. Majority of admitted patients received dexamethasone, remdesivir, and convalescent plasma. In terms of immunosuppression, 28 of 49 (57%) had their MMF held while 8% had MMF dose reductions; one had everolimus held and one had AZA held; 7 (14%) had CNI dose reductions with none held. Six patients (12%) died. Those who died were significantly more likely to receive dexamethasone (42% vs 2%; p=0.002), remdesivir (33% vs 7%; p=0.027), and convalescent plasma (40% vs 0%; p=0.001). Mortality rates were similar across those who had immunosuppressive agents dose reduced vs held vs not adjusted (11% vs 17% vs 12%, respectively; p=0.919). CNI dose reductions tended to be more common in those who died (43% vs 7%; p=0.122). There were no subsequent acute rejections or graft losses in those who recovered.

Conclusions: KTR represent a vulnerable patient population during COVID. Due to their immunocompromised state and often more severe clinical presentation, the majority require hospitalization, with a significant number needing ICU admission and mechanical ventilation. Severe illness led to higher use of dexamethasone, remdesivir and covalescent plasma in those who ultimately died of COVID. It is unclear what impact immunosuppression dose reductions had on the COVID clinical course, but these reductions did not appear to increase risk of rejection or graft loss.

Table 1. Clinical Parameters

Parameters	
Total number of COVID episodes	N=51
Onset of COVID infection	
<3 months post-transplant	6 (12%)
3-12 months post-transplant	7 (14%)
1-3 years post-transplant	14 (27%)
>3 years post-transplant	24 (47%)
Symptoms	
fever	36 (71%)
respiratory	33 (65%)
GI	13 (25%)
asymptomatic	2 (4%)
Required hospitalization	36 (71%)
Mean length of hospital stay (days)	12
Length of hospital stay	
≤3 days	11 (30.5%)
4-6 days	11 (30.5%)
≥7 days	14 (39%)
Required ICU admission	11/36 (30.5%)
Required O2 support	16/36 (44%)
Required mechanical ventilation	8/36 (22%)
Required ECMO	1/36 (3%)
Developed AKI	23/51 (45%)
Managed outpatient	1/23
Managed inpatient but no RRT	15/23
Managed inpatient with RRT	7/23
AKI resolved	20/23(87%)
Renal recovery in those who required RRT	3/7 (43%)
Death	6 (12%)

Table 2. Management of COVID infection

Management	Number of patients
Dexamethasone	12
Remdesivir	9
Convalescent plasma	15
Reduced MMF dose	4
Held MMF	28
Reduced CNI dose	7
Other immunosuppression reduction	4

CITATION INFORMATION: Price A., Soliman K., Zayas C., Rao V., Casey M., Taber D., Posadas Salas M. Covid Infection Among Kidney Transplant Recipients: Management and Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Price: None. **K. Soliman:** None. **C. Zayas:** None. **V. Rao:** None. **M. Casey:** None. **D. Taber:** None. **M. Posadas Salas:** None.

Abstract# 797

SARS-CoV-2 Infection Among Kidney Transplant Recipients: A Multicenter Brazilian Cohort Study

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Purpose: Limited data are available on COVID-19 clinical presentation and outcomes among kidney transplant (KT) recipients.

Methods: Multicenter Brazilian cohort of KT patients with laboratory-confirmed SARS-CoV-2 infection. Patients were followed for 3 months. In this preliminary report, we included patients added to the database until 19thSep20 (40 centers, 1,145 patients).

Results: 68% received deceased donor grafts, 60% were male, the median age was 52 years (IQR 42-60), median time post-KT was 5.7 years (IQR 2.1-11.1), and 94% had comorbidities beyond chronic kidney disease. 12.6% had nosocomial-acquired COVID-19, the main signs/symptoms were fever (64%), cough (51%), dyspnea (36%), myalgia (33%), and diarrhea (29%). Main laboratory abnormalities were lymphopenia (756 cells/mm^3, IQR 446-1164), increased C-reactive protein (18.9 mg/dl, IQR 5.5-70.7), and acute kidney injury (AKI) (48%). Ground-glass opacities were the main radiological finding (55%). 68% of patients required hospitalization, 35% intensive care, 28% mechanical ventilation (MV), 26% require dialysis, 9% lost their grafts, and 24% died. Lethality rates were 36% and 82%, respectively, among hospitalized patients and among those who needed MV. Age (years)(HR 1.059), BMI (Kg/m^2)(HR 1.052), baseline creatinine (mg/dL)(HR 1.425), delta creatinine (mg/dL) (HR 1.385) and lactic dehydrogenase (LDH)(U/L)(HR 1.001) were risk factors for death.

Conclusions: Except for the higher incidence of diarrhea, lymphopenia, and AKI, clinical presentation appeared to be similar to that described for immunocompetent patients. A high percentage of patients in this cohort required hospitalization, probably because patients who sought medical care were those with more severe disease. The lethality rate was high and similar to that described in international cohorts. Older patients, obese, those with inferior baseline renal function, and graft dysfunction were at higher death risk. Higher LDH was also associated with death risk, possibly reflecting larger pulmonary injury.

CITATION INFORMATION: Sandes-Freitas T., Medina-Pestana J., COVID-19 Brazil Study Group o. SARS-CoV-2 Infection Among Kidney Transplant Recipients: A Multicenter Brazilian Cohort Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Sandes-Freitas: ; This study was partially supported by Novartis Pharma Brazil. **J. Medina-Pestana:** None. **O. COVID-19 Brazil Study Group:** None.

Abstract# 798

Risk Factors Associated with Multidrug Resistant Organism (MDRO) Infections in Kidney Transplant Recipients: A Single Center Experience

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Purpose: Risk factors for MDRO infections in kidney transplant recipients have previously been studied but limited to urinary tract infections. We sought to evaluate the rate and risk factors of all MDRO site infections.

Methods: A retrospective chart review was performed on kidney transplant recipients from 2018 to 2019 at our transplant center. Recipients were followed for 1 year post transplantation to evaluate for infection. Demographic and clinical data were abstracted from the EMR. Analysis was completed using Fisher's exact test, Student's t-test, and descriptive statistics.

Results: 300 transplant recipients were evaluated, 182/300(60.7%) were male and 118/300(39.3%) female. Mean age at transplant was 53 years. 163/300(54.3%) received a deceased donor kidney and 137/300(45.7%) received a living donor kidney. 64/300(21.3%) experienced delayed graft function, 51/300(17%) required hemodialysis post-transplant, and 13/300(4.3%) required treatment for rejection. The average duration of ureteral stents was 35.5 days. 128/300(42.7%) required readmission to the hospital. 72/300(24%) patients were treated for a total of 151 bacterial infections which included: complicated UTI/pyelonephritis 116/151(78.8%), blood stream 19/151(12.5%), intraabdominal 6/151(3.9%), gastrointestinal 5/151(3.3%), skin and soft tissue/surgical site 3/151(2.0%), and respiratory 2/151(1.3%). *C. Difficile* infection occurred in 5/300(1.7%). 5/300(1.7%) had laboratory confirmed MDRO infections. Of patients with documented infections, 5/72(6.9%) were MDRO, which included 3 gram-negatives (2 Enterobacteriaceae ESBLs, 1 MDR *Pseudomonas Aeruginosa*) and 2 gram-positives (1 VRE, 1 MRSA). No infections due to CRE Enterobacteriaceae were observed. Significant differences in patients with treated MDRO infections compared to those without are as follows; post-operative hemodialysis (60% vs 20.4%; p=0.04) and length of stay postoperatively (11.0 vs. 5.03 days; p=0.0003). There were no significant differences found between those with MDRO infections compared to those without for the following; average HbA1c(5.3 vs. 6.2; p=0.33), age(46.4 vs. 53.7; p=0.21), sex(male 1.6% vs. female 1.7%; p=1.0), delayed graft function(3.0% vs. 1.3%; p=0.29), mean duration of stents(27.6 vs. 35.6 days; p=0.1), and type donor (deceased 1.8% vs. living 1.5%; p=1.0).

Conclusions: We observed a low prevalence of MDRO infections in our kidney transplant population. MDRO infections were associated with post-transplant hemodialysis and post-transplant length of stay.

CITATION INFORMATION: Schrank S., Timpone J., Javaid B., Kumar P., Cooper M. Risk Factors Associated with Multidrug Resistant Organism (MDRO) Infections in Kidney Transplant Recipients: A Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Schrank: None. **J. Timpone:** None. **B. Javaid:** None. **P. Kumar:** None. **M. Cooper:** None.

Abstract# 799

Predictive Factors and Management of Urinary Tract Infections After Kidney Transplantation: A Retrospective Cohort Study

T. Shimizu, Y. Kinoshita, T. Shinzato, D. Iwami, *Jichi Medical University, Shimotsuke City, Japan*

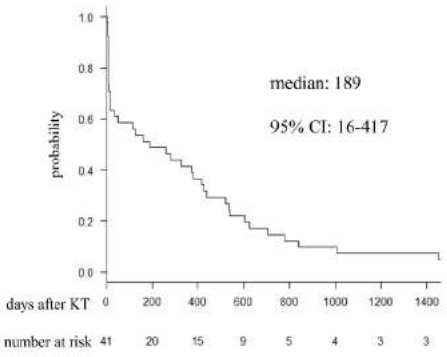
Purpose: Urinary tract infection (UTI) is one of the most common infectious complications in kidney transplant recipients. The predictive factors for UTI are controversial because of wide discrepancies in the frequency and causes of the development of posttransplant UTI. We investigate the factors that can predict the development of UTI and the type of pathogenic bacteria isolated from kidney transplant recipients to elucidate the predictive factors of UTI development, and we advocate for the proper management of posttransplant patients.

Methods: This study was a single-center retrospective cohort study of kidney transplant recipients (≥18 years old) who underwent KT from January 2013 to December 2018 at Jichi Medical University Hospital. Kidney transplant recipients were divided into two groups: UTI group and no UTI group. The primary outcome measure of this study was the incidence of UTI. UTI was defined as the detection of pathogenic bacteria in urinary culture tests and various relevant symptoms in patients. A P-value <0.05 was considered to be statistically significant.

Results: A total of 163 kidney transplant recipients were eligible during the study period and included in the analysis. Forty-one patients (25.2%) were assigned to UTI group, and 122 patients (74.8%) were assigned to no UTI group. Cox hazard regression analysis after variable selection using the stepwise method was performed for the characteristics that were significant in the univariate analysis, and urinary catheterization and small bladder capacity (<150mL) in addition to serum albumin levels at one month after KT were independent predictive factors for UTI onset. The number of patients developing their first UTI was 15 (36.6%) within one month and 24 (58.6%) within one year after KT, respectively. The median period to UTI onset (UTI-free survival) after KT was 189 days (Figure). UTI-free survival was defined as the duration from KT until the occurrence of a UTI. Urine culture led to the identification of a total of 83 UTI-related organisms, including multiple organisms in 15 patients. The microorganism most commonly identified was *Escherichia coli* (n=47), followed by *Enterococcus* spp. (n=13), and *Klebsiella* spp. (n=10).

Conclusions: Kidney transplant recipients with prolonged postoperative malnutrition, posttransplant voiding dysfunction and/or urinary storage disorder had an increased risk of UTI. Bladder function tests were needed to predict UTI. Kidney transplant recipients who develop UTI should be treated as complicated UTI patients.

Figure. Time to first UTI onset (UTI-free survival) after KT in the UTI group



CITATION INFORMATION: Shimizu T., Kinoshita Y., Shinzato T., Iwami D. Predictive Factors and Management of Urinary Tract Infections After Kidney Transplantation: A Retrospective Cohort Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Shimizu: None. **Y. Kinoshita:** None. **T. Shinzato:** None. **D. Iwami:** None.

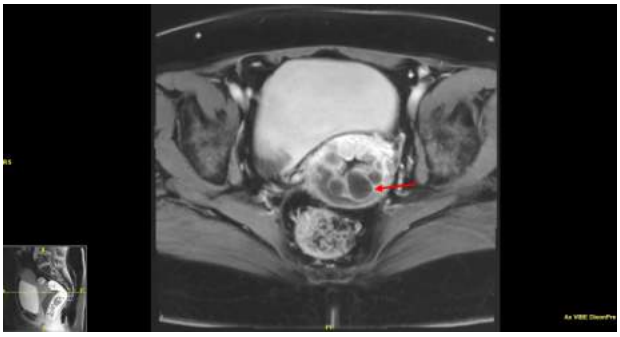
Abstract# 800

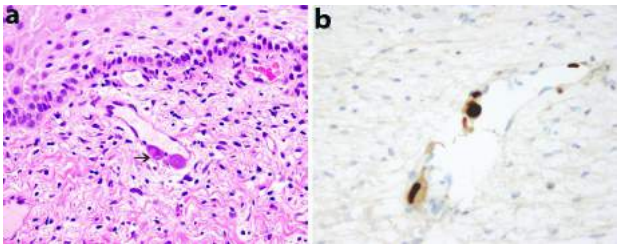
An Unusual Viral Tropism in a Solid Organ Transplant Recipient

P. Singh, A. Bentall, C. Langstraat, A. Swanson, P. Deziel, Y. Huang, R. Razonable, *Mayo Clinic, Rochester, MN*

Purpose: Cytomegalovirus (CMV) tissue-invasive disease occurs in higher proportion in CMV-mismatched kidney transplant recipients (KTxR) with no pre-existing immunity and those who are markedly immunologically-impaired. While CMV disease may affect any organ, cervicitis has not been reported in KTxR.

Methods: A 46 year old woman with end stage kidney disease due to adult polycystic kidney disease underwent a living unrelated donor kidney transplant. She received induction with thymoglobulin and was maintained on belatacept, mycophenolate mofetil (MMF) and prednisone. She was a CMV mismatch and was receiving Valganciclovir 900 mg daily prophylaxis. Patient also had a history of cryotherapy for abnormal Pap smear and endometrial ablation for abnormal uterine bleeding. Post-transplant, she developed antibody mediated rejection which was treated with plasmapheresis, intravenous immunoglobulins and eculuzimab. Eight weeks later, she developed acute cellular rejection and received thymoglobulin and methylprednisone. Serum creatinine settled down at 1.5 mg/dl. Four months post-transplant, she developed watery diarrhea while still being on valgancilovir. CMV DNA level was 123,000 IU/ml plasma. She was switched to IV ganciclovir while MMF was discontinued, and prednisone increased to 10 mg along with CytoGam infusions. CMV titers increased to up to 2 million copies and treatment was changed to IV Foscarnet because of CMV UL97 resistance confirmed by next generation sequencing.
Results: Surveillance ultrasound (US) of kidney revealed a right adnexal cyst which led to transvaginal US showing increased endometrial fluid collection. Dilation and curettage failed thus leading to an MRI of pelvis which showed multilocular cysts within cervix (Figure 1) suspicious for *adenoma malignum*. As such, a cervical biopsy was performed which showed viral inclusions consistent with CMV infection (Figure 2). These CMV-induced changes were confirmed on immunohistochemistry.
Conclusions: CMV occurs commonly in the most immunocompromised KTxR and may be manifested in atypical syndromes. Our case shows the first description of CMV cervicitis in a KTxR. The presence of an endocervical mass during episodes of CMV viremia should prompt a consideration of CMV disease of cervix.





CITATION INFORMATION: Singh P., Bentall A., Langstraat C., Swanson A., Deziel P., Huang Y., Razonable R. An Unusual Viral Tropism in a Solid Organ Transplant Recipient *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Singh: None. **A. Bentall:** None. **C. Langstraat:** None. **A. Swanson:** None. **P. Deziel:** None. **Y. Huang:** None. **R. Razonable:** None.

Abstract# 801

Incidence of Oral Candidiasis in Renal and/or Pancreas Transplant Recipients When Administering Prophylaxis versus No Prophylaxis

L. Von Stein[1], S. Patel[1], L. Wardlow[2], *[1]Transplant, The Ohio State Wexner Medical Center, Columbus, OH, [2]Pharmacy, The Ohio State Wexner Medical Center, Columbus, OH*

Purpose: Oropharyngeal candidiasis (OC), or thrush, is a fungal infection associated with immunosuppression post renal and or/pancreas transplant. Currently, the role of prophylactic oral nystatin for OC is controversial as incidence is variable. This study compares the incidence of OC within 3 months post renal and/or pancreas transplant in patients receiving 0, 1, or 3 months of oral nystatin.
Methods: This study was a retrospective analysis of patients who underwent kidney and/or pancreas transplant between August 2018 and March 2020. Exclusion criteria included: alternative antifungal agent used for prophylaxis (ie: clotrimazole, fluconazole), the use of antifungal therapy for indication other than OC, and death within 3 months post-transplant. The primary outcome compared incidence of OC development after receiving no prophylaxis, 1 month, or 3 months of nystatin prophylaxis. Secondary outcomes include time to OC, severity of OC and readmission rates due to OC.
Results: A total of 238 patients met inclusion criteria, 68 received no nystatin prophylaxis, 87 received 3 months of prophylaxis, and 83 received 1 month of prophylaxis (Table 1). Baseline characteristics were similar between groups with the majority of patients receiving ATG induction and tacrolimus with mycophenolate sodium for maintenance immunosuppression. There was a greater incidence of OC in the no prophylaxis group compared to 1 month and 3 months of prophylaxis (5.9% vs 0% vs 0%). Three out of four patients developed OC within 30 days post-transplant. Patient 2 was readmitted for OC, while Patient 3's index admission was extended due to OC (Table 2). Of the patients being treated for OC, none worsened to esophagitis.
Conclusions: Given the low incidence of OC infections post-transplant and concern for patient adherence, a shortened duration of 1 month of nystatin prophylaxis is reasonable to decrease the occurrence of OC. Given the small sample size, further evaluation of 1 month OC prophylaxis versus no prophylaxis should be considered.

Table 1. Baseline Demographics and Clinical Characteristics

	No Nystatin(n=68)	Nystatin x 3 months (n=87)	Nystatin x 1 month (n=83)
Mean age	53	54.7	54.7
Male, n (%)	46 (67.6)	57 (65.5)	57 (68.7)
Race, n (%)			
AA	20 (29.4)	21 (25.9)	21 (25.3)
Asian	0 (0)	4 (4.6)	0 (0)
Hispanic	2 (2.9)	0 (0)	0 (0)
White	44 (64.7)	58 (66.7)	61 (73.5)
Other	2 (2.9)	4 (4.6)	1 (1.2)
Native Kidney Disease, n (%)			
Diabetes	23 (33.8)	32 (36.8)	27 (32.5)
Glomerulonephritis	4 (5.88)	3 (3.4)	7 (8.4)
HTN	12 (17.6)	19 (21.8)	15 (18.1)
PCKD	5 (7.4)	7 (8.0)	12 (14.4)
IgA	8 (11.8)	10 (11.5)	5 (6.0)
FSGS	5 (7.4)	6 (6.9)	5 (6.0)
Other	11 (16.1)	10 (11.5)	12 (14.4)
Induction, n (%)			
ATG	58 (85.3)	71 (81.6)	81 (97.6)
Campath	9 (13.2)	14 (16.1)	0 (0)
Basiliximab	1 (1.47)	2 (2.3)	2 (2.4)
ATG dose, mean	4.50 mg/kg	4.82 mg/kg	4.15 mg/kg
Maintenance IS			
Tac/MPA	61 (89.7)	78 (89.7)	72 (86.7)
Tac/MPA/Pred	7 (10.3)	9 (10.3)	11 (13.3)
Rejection, n (%)	0 (0)	3 (3.4)	1 (1.2)
Thrush, n (%)	4 (5.9)	0	0
Median time to diagnosis (days)	27.5	n/a	n/a

Table 2. Patients Treated for Oral Candidiasis

Patient	rATG dose	Maintenance Immunosuppression	Time to OC	Treatment of OC	Readmission for OC
1	5.8 mg/kg	Mycophenolate sodium 720 mg BID + tacrolimus	8	Fluconazole 200 mg daily x 10 days, then 100 mg daily + nystatin x 1 month	No
2	5.1 mg/kg	Mycophenolate sodium 720 mg BID + tacrolimus	66	Nystatin oral solution x 14 days	Yes- 10 day admission for thrush, neutropenia, BK viremia, and mycophenolate induced colitis
3	4.5 mg/kg	Mycophenolate sodium 720 mg BID + tacrolimus	27	Clotrimazole troches QID x 14 days	No
4	4.9 mg/kg	Mycophenolate sodium 720 mg BID +tacrolimus	9	Fluconazole 200 mg daily x 21 days (Changed to Caspofungin last 4 days for DDI)	No, but extended initial admission for 13 days

CITATION INFORMATION: Von Stein L., Patel S., Wardlow L. Incidence of Oral Candidiasis in Renal and/or Pancreas Transplant Recipients When Administering Prophylaxis versus No Prophylaxis *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Von Stein: None. **S. Patel:** None. **L. Wardlow:** None.

Abstract# 802

Clinical and Pathological Features of Lobar Nephronia in Renal Allograft

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Purpose: Lobar nephronia (acute focal nephritis) is a rare form of nephritis which can be presented as a renal mass and misdiagnosed as renal cancer, resulting in nephrectomy. Several single case reports of this disease in renal allograft have been published. The aim of this study is to characterize the clinicopathological features of lobar nephronia in renal allograft.
Methods: Seven recipients were diagnosed with lobar nephronia in renal allografts in our hospital. The disease presentation, including clinical manifestations, imaging studies, pathological and lab data, are summarized and analyzed.
Results: The disease presentation can be divided into three phases (Table 1). Phase I: Early Urinary tract infection (UTI). Mild urinating discomfort or white blood cells in urine are found. Phase II: Acute pyogenic infection. Typical symptoms of acute pyelonephritis including hyperpyrexia, chills, discomfort in the allograft area and significant infectious index. Regional renal parenchyma is extensively involved by the inflammatory process, leading to a mass formation. Imaging investigations indicate renal enlargement with exudation. PET-CT displays consolidation and hypermetabolic foci which can be easily misdiagnosed as malignancy. Biopsy can

be performed to establish the diagnosis and exclude malignancy. Phase III: Chronic scarring after infection. Clinical symptoms ameliorate promptly after administration of antibiotics; however the renal lesions will not disappear simultaneously. Inflammation will reduce and result in fibrosis and scar. Eventually PET-CT will not detect focal lesion. (Figure 1)

Conclusions: Sufficient antibiotics and regular follow-up are of great importance for recipients with UTI after transplantation. Besides, it's crucial to distinguish lobar nephronia from malignancy and post-transplant lymphoproliferative disorders.

Table 1. Disease presentation at the patient cohort.

	Age/ Sex	Phase	Clinical manifestations	Donor	Post-KT time (mo.)	IS Ind.	IS at onset	CRP (mg/L)	WBC (G/L)	NEU (%)	Urine WBC (/hp)	Urine culture	ABX
1	69/F	II	39.0 °C, pain & tenderness in renal allograft	DCD	28	ATG IL-2R MP	TAC MMF Pred	80	17	88	2	E. coli	CPZ/SBT + Mox
2	31/F	II	39.2 °C, pain in graft area	DCD	37	ATG MP	TAC MMF Pred	9.4	17.4	79.3	7.2	Neg.	CPZ/SBT + Mox; CPZ/SBT + LVFX; LVFX + MTZ + MEPM
		II+	39 °C, swelling pain in graft area		77	ATG MP	TAC MMF Pred	203.6	25.8	85.8	245.1	K. pneumoniae	CPZ/SBT; MEPM
3	28/F	II	40 °C	LRD	9	ATG	TAC MMF Pred	—	11.7	93.4	12.8	K. pneumoniae	FMOX
		III	40 °C, rough		75	ATG	TAC MMF Pred	—	10.5	87.0	231.5	E. coli	LVFX
4	69/F	I	Mild urinary irritation	DBD	42	IL-2R MP	TAC MMF Pred	5.0	4.2	69.4	524.1	Neg.	LVFX
		III	Pain in graft area		69	IL-2R MP	TAC MMF Pred	0.6	3.2	57.2	130.4	Neg.	CPZ/SBT + MTZ; AMPC/CVA
5	52/F	III	39 °C, discomfort in renal allograft	DCD	39	ATG IL-2R	TAC MMF Pred	43.2	14.0	70.8	14.9	Proteus	CPZ/SBT + MTZ; CPZ/SBT
6	55/F	II+	39 °C, vag.se pain in renal allograft	LRD	125	MP	TAC MMF Pred	82.0	14.6	76.2	15.5	Neg.	ACT
7	46/F	II	mild tenderness in renal allograft	DBD	198	IL-2R MP	TAC MMF Pred	96.1	11.8	82.6	46.0	E. faecalis	CPZ/SBT + Mox; Mox
	69/F	III	Mild urinary irritation	DCD	3	ATG IL-2R MP	TAC MMF Pred	5.5	8.8	73.6	—	—	—

**F, Female; DCD, Donation after Cardiac Death; LRD, Living Related Donor; DBD, Donation after Brain Death; KT, Kidney transplantation; ATG, Lymphocyte Immune Globulin; IL-2R, Basiliximab; MP, Methylprednisolone; TAC, Tacrolimus; MMF, Mycophenolate mofetil; Pred, prednisolone. II+, Phase II of secondary infection; CRP, C-reactive protein; WBC, white blood cell; NEU, Neutrophils; ABX, Antibiotics; CPZ/SBT, Cefoperazone/sulbactam ; Mox, Moxifloxacin; LVFX, Levofloxacin; MTZ, Metronidazole; MEPM, Meropenem; FMOX, Flomoxef; AMPC/CVA, Amoxicillin/clavulanic acid; AZT, Aztreonam.*

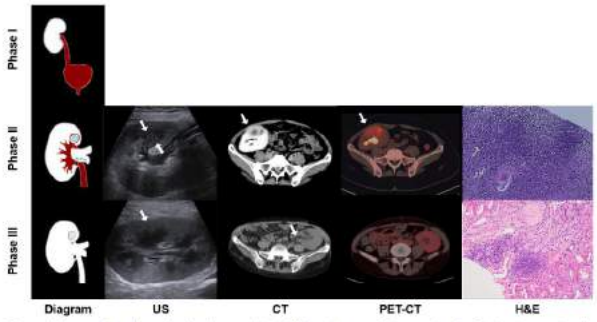

Figure 1. Diagram, imaging and pathology results at different stages of lobar nephronia. Dark red areas show the range of inflammation. Blue particles represent pathogens. Light capsules with obvious rim represent consolidations. Phase I: Early urinary tract infection. There is no abnormal imaging and pathological findings. Phase II: Acute pyogenic infection. Ultrasonography (US) shows heterogeneous liquid anechoic area mostly at the upper pole of renal parenchyma with unclear borders, while some lesions turn into solid mass. Computed Tomography (CT) reveals heterogeneous hypodense mass in renal allograft with ill-defined margins, and enhanced scanning shows moderate enhancement. PET-CT displays solid lesion and hypermetabolic foci. Pathological biopsy is beneficial to confirm the diagnosis, which presents suppurative lesions and proliferation of surrounding fibrous tissue without signs of oncogenesis and rejection. Phase III: Chronic scarring after infection. US shows increased echogenicity with inner heterogeneous hypoechoic area and ill-defined margins. CT reveals the increasing density of adipose space. There is no apparent abnormality in PET-CT images. Hematoxylin and Eosin (H&E) staining demonstrates chronic tubulointerstitial injury and fibrosis.

CITATION INFORMATION: Wang Y., Yan Z., Liu Y., Zhou Y., He Y., Zeng W., Xia R., Deng W., Xu J., Wu C., Miao Y. Clinical and Pathological Features of Lobar Nephronia in Renal Allograft *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Wang: None. **Z. Yan:** None. **Y. Liu:** None. **Y. Zhou:** None. **Y. He:** None. **W. Zeng:** None. **R. Xia:** None. **W. Deng:** None. **J. Xu:** None. **C. Wu:** None. **Y. Miao:** None.

Abstract# LB 67

Real-world Treatment Patterns of Antiviral Agents for Cytomegalovirus Among Adult Kidney Transplant Recipients: A USRDS-Medicare Linked Database Study

A. D. Raval[1], M. Ganz[2], P. Saravanan[2], Y. Tang[1], C. A. Santos[3], *[1]Merck & Co., Inc., Kenilworth, NJ, [2]Evidera, Inc., Waltham, MA, [3]Rush University Medical Center, Chicago, IL*

Purpose: Cytomegalovirus (CMV) is a common viral pathogen among kidney transplant recipients (KTRs). Although guidelines recommend the use of prophylaxis or pre-emptive antiviral (AV) therapy depending on the risk level, limited data exist on the recent national level treatment patterns of CMV antiviral agents (AV) among KTRs. We examined the real-world CMV-AV utilization patterns among adults KTRs in the United States (US) overall and by CMV serostatus of donor (D) and recipients (R).

Methods: We utilized a retrospective cohort design using the US Renal Data System registry-linked Medicare data from January 1, 2011, through December 31, 2017. The study cohort included adults undergoing their first KT during the study period with continuous medical coverage for at least 6-month pre and 12-month post KT and pharmacy benefits coverage for at least 12-month post- KT. CMV-AV prophylaxis was defined as ≥ 1 prescription fill or medical claim for either (val)acyclovir or (val)ganciclovir (VGC) therapeutic dose within 28 days post-KT. Descriptive statistics were reported by CMV prophylaxis status by CMV risk strata (low: D-/R-; medium: R+; and high: D+/R).

Results: The study cohort comprised of 23,445 KTRs of which 11%, 74% and 15% were at low, medium and high risk of CMV, respectively. The mean age (standard deviation, SD) of KTRs was 53.8 (13.9) years. The majority of KTRs were males (59%), Whites (59%) and African Americans (33%); received a graft from deceased donor (86%); and received induction with anti-thymocyte globulin (54%), mycophenolate (96%), tacrolimus (95%), and steroids (96%). CMV-AV prophylaxis was used by 35%, 83%, and 85% of low-, intermediate- and high-risk KTRs, respectively. Overall, valganciclovir was utilized in 98% of KTRs treated with CMV AV-prophylaxis. From 2011 to 2016, an increase in the use of VGC 900 mg in high-risk and a relatively stable trend of VGC 450 mg dose were noted in intermediate-risk KTRs. The mean duration of CMV prophylaxis was 102 (SD:70.4) days. Proportions of KTRs with duration of CMV prophylaxis ≥100 and ≥ 200 days were 50% and 11% of high-risk, and 25% and 5% of intermediate-risk KTRs, respectively.

Conclusions: Valganciclovir was commonly utilized as CMV-AV prophylaxis. The majority of KTRs had shorter than the guideline-recommended duration of 100 or 200 days of CMV-AV prophylaxis, especially among high-risk KTRs, which may lead to suboptimal efficacy for CMV prevention.

CITATION INFORMATION: Raval A., Ganz M., Saravanan P., Tang Y., Santos C. Real-world Treatment Patterns of Antiviral Agents for Cytomegalovirus Among Adult Kidney Transplant Recipients: A USRDS-Medicare Linked Database Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.D. Raval: Salary; Name of Commercial Interest; Merck & Co., Inc.. Salary; Nature of Relationship; Employment. **M. Ganz:** Grant/Research Support; If "Other" Please Explain; Employee of Evidera, Inc. Evidera received funding from Merck Sharp & Dohme Corp, a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA, to conduct this study. **P. Saravanan:** Grant/Research Support; If "Other" Please Explain; Employee of Evidera, Inc.Evidera received funding from Merck Sharp & Dohme Corp, a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA, to conduct this study. **Y. Tang:** Salary; Name of Commercial Interest; Merck & Co., Inc.. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Merck & Co, Inc... Other; Nature of Relationship; Stockholder. **C.A. Santos:** Consulting Fee; Nature of Relationship; Consultant for Merck & Co., Inc..

Abstract# LB 68

Cytomegalovirus Infection Among Adult Kidney Transplant Recipients: Findings From the USRDS-medicare Linked Database Study

A. Raval[1], M. Ganz[2], S. Alam[2], Y. Tang[1], C. Santos[3], *[1]Merck & Co., Inc., Rahway, NJ, [2]Evidera-PPD, Waltham, MA, [3]Rush University Medical Center, Chicago, IL*

Purpose: Cytomegalovirus infection (CMVi) is a frequent complication and significant cause of morbidity and mortality after kidney transplantation (KT). However, there are limited recent national data on the incidence of CMVi among KT recipients (KTRs). We examined the incidence of CMV infection overall and stratified by donor (D) and recipients (R) CMV serostatus pairing among adults undergoing KT in the United States (US).

Methods: A retrospective cohort design was utilized to examine the incidence of CMV infection among adult KTRs from the US Renal Data System Registry-Medicare linked data. Adults who received their first KT from July 1, 2011, through December 31, 2016, with continuous medical coverage for 6-month pre and 12-month post-KT were included. CMVi was considered as ≥ 1 medical claim with the International Classification of Disease, 9th Revision (ICD-9) codes of 078.5 or ICD-10 codes of B25.0, B25.1, B25.2, B25.8, B25.9, B27.1, H32.00, K87.00, K93.820 within 12-month post-KT. CMV antiviral (AV) prophylaxis was identified as ≥ 1 fill for (val)ganciclovir or (val) acyclovir within 28 days post-KT. Descriptive statistics were reported on the frequency and incidence of rates of CMVi for the study cohort and by D/R pairing/groups.

Results: The study cohort included 23,445 KTRs of whom 15%, 74%, and 11% had D+/R-, R+ and D-/R- CMV serostatus pairing groups, respectively. Overall, 77% received CMV AV prophylaxis, and 10% had CMVi within 12-month post-KT. KTRs with D+/R- CMV serostatus pairing had higher rates of CMVi (20%) compared to KTTs with R+ (9%) and D-/R- (2%) groups (see Table 1). The average time to first CMVi event was longer among KTRs with D+/R- in comparison to R+ or D-/R- group, and frequency of CMVi post-200 days was higher among D+/R- group.

Conclusions: Nearly one in ten KTRs had at least one medical claim for CMV infection. KTRs with D+/R- CMV serostatus pairing had a higher incidence rate of overall CMV infection and late infection post-200 days KT.

CMV Infection Among Individuals undergoing 1st KT (Overall and CMV serostaus)				
CMV Outcome	Overall	D+/R-	R+	D-/R-
Sample Size, n	23445	3,582	17,398	2,465
1st CMV infection, n(%)	2259 (9.6%)	716 (20.0%)	1,490 (8.6%)	53 (2.2%)
Time to 1st CMV infection post KT, in days, mean (SD)	125.6 (102.2)	165.9 (96.0)	107.4 (99.8)	94.2 (92.4)
1st CMV infection: 0-100 days post-KT 0-100 days, n(%)	1041 (46.0%)	211 (29.4%)	795 (53.3%)	35 (66.0%)
1st CMV infection: 100-200 days post-KT, n(%)	625 (27.7%)	219 (30.6%)	397 (26.6%)	9 (16.9%)
1st CMV infection: 200+ days post-KT, n(%)	593 (26.3%)	286 (39.9%)	298 (20.0%)	9 (16.9%)
Incidence Rate for CMV infection, in Person-Years IR (95% CI)	10.43 (10.01 - 10.87)	22.83 (21.19 - 24.56)	9.24 (8.78 - 9.72)	2.22 (1.66 - 2.90)

CITATION INFORMATION: Raval A., Ganz M., Alam S., Tang Y., Santos C. Cytomegalovirus Infection Among Adult Kidney Transplant Recipients: Findings From the USRDS-medicare Linked Database Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Raval: Salary; Name of Commercial Interest; Merck & Co., Inc.. Salary; Nature of Relationship; Employee. **M. Ganz:** Salary; Name of Commercial Interest; Evidera-PPD. Salary; Nature of Relationship; Employee. **S. Alam:** Salary; Name of Commercial Interest; Evidera-PPD. Salary; Nature of Relationship; Employee. **Y. Tang:** Salary; Name of Commercial Interest; Merck & Co., Inc.. Salary; Nature of Relationship; employee. Other; Name of Commercial Interest; Merck & Co., Inc.. Other; Nature of Relationship; stockholder. **C. Santos:** Consulting Fee; Name of Commercial Interest; Merck & Co., Inc.. Consulting Fee; Nature of Relationship; Consultant.

Abstract# LB 69

Impact of Cytomegalovirus Prophylaxis on Herpes Simplex and Varicella Zoster Virus Infections in Kidney Transplant Recipients

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Purpose: To assess the impact of cytomegalovirus (CMV) targeted antiviral prophylaxis on the development of herpes simplex (HSV) and varicella zoster (VZV) infections after kidney transplantation.

Methods: This single center retrospective analysis at a large academic medical center included 987 patients who underwent kidney transplant between 1/1/2012 and 12/31/2018. Per institutional protocol, patients who were both CMV IgG recipient (R) and donor (D) seronegative or those who did not receive T-cell depleting induction therapy at the time of transplant received no antiviral prophylaxis thereafter. Those who were CMV R+ and received T-cell depleting induction or D+/R- received 3 or 6 months of valganciclovir (VGC) prophylaxis, respectively, with a target dose of 450 mg by mouth daily with appropriate renal adjustment. The primary outcome was a composite of HSV and VZV infection within the first 3 months after transplantation, defined as a prescription order for acyclovir or valacyclovir at appropriate treatment dosing regimens with confirmed therapeutic indication via chart review.

Results: HSV or VZV infection occurred in 6/688 (0.9%) of those who received VGC and 8/299 (2.7%) of those who did not receive prophylaxis at 3 months (p=0.055). There was a significant difference in HSV infection risk at 3 months between the groups (0.3% vs. 2.0%, p=0.011) (Table 1). No difference was seen in HSV or VZV infections at 6 months (Table 2).

Conclusions: Antiviral prophylaxis with VGC was associated with a decreased risk of HSV infections within the first 3 months after kidney transplantation with little effect on the development of VZV infections. These results indicate that VGC is effective at preventing both CMV and HSV infections in the early post-transplant period, therefore kidney transplant recipients not receiving antiviral prophylaxis with VGC, acyclovir or valacyclovir prophylaxis is warranted to mitigate risk of HSV emergence.

Table 1: Primary Outcome

	Valganciclovir N=688	No prophylaxis N=299	p-value
HSV or VZV at 3 months, n (%)	6 (0.9)	8 (2.7)	0.055
HSV at 3 months, n (%)	2 (0.3)	6 (2.0)	0.011
VZV at 3 months, n (%)	4 (0.6)	2 (0.7)	1

Table 2: Secondary Outcomes

	Valganciclovir N=688	No prophylaxis N=299	p-value
HSV or VZV at 6 months, n (%)	15 (2.2)	9 (3.0)	0.57
HSV at 6 months, n (%)	9 (1.3)	7 (2.3)	0.27
VZV at 6 months, n (%)	6 (0.9)	2 (0.7)	1
Time from transplant to infection, median days (IQR)	103 (87)	27 (37)	0.17
Time from transplant to HSV, median days (IQR)	110 (30)	48 (36)	0.3
Time from transplant to VZV, median days (IQR)	58.5 (76.8)	20.5 (6.5)	0.29
Hospitalized at time of infection, n (%)	4 (0.6)	1 (0.3)	1
Hospital LOS, median (IQR)	8 (8.8)	8 (0)	1
Site of infection			
Orolabial, n (%)	6 (40.0)	5 (55.6)	
Cutaneous, n (%)	7 (46.7)	3 (33.3)	
Orbital, n (%)	1 (6.7)	0	
Genital, n (%)	2 (13.3)	1 (11.1)	
Other, n (%)	2 (13.2)	1 (11.1)	

CITATION INFORMATION: Ridgely K., Crowther B., Klem P., Schoeppler K., Schwarz K., Nadrash A., Lewis V., Benamu E. Impact of Cytomegalovirus Prophylaxis on Herpes Simplex and Varicella Zoster Virus Infections in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Ridgely: None. **B. Crowther:** None. **P. Klem:** None. **K. Schoeppler:** None. **K. Schwarz:** None. **A. Nadrash:** None. **V. Lewis:** None. **E. Benamu:** None.

ID

Kidney: Polyoma

Abstract# 803

Belatacept Pharmacokinetics in Patients with and without Infection

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Purpose: Two belatacept(BELA) fixed mg/kg dosing regimens, less intense(LI) and more intense(MI) were compared. The LI regimen was approved due to the higher risk profile of MI. Incidence of BK and herpes tended to be higher in pts with higher BELA troughs and a 17% increase in odds of serious infection was observed for every 10mcg/mL increase in the concentration average at 6 months(Cavg6mo). BEST samples were utilized to explore associations between BELA PK and infections.

Methods: Collected samples in BELA treated pts were utilized to analyze BELA troughs via validated quantitative enzyme-linked immunoassay. Clearance(Cl) was estimated using Bayesian estimation with a published population PK model as the Bayesian prior with the clinical software MWPharm++(Mediware). Allometric scaling accounted for body weight differences. Individual patient profiles were analyzed to estimate troughs, cumulative area under the curve(AUC) and Cavg. PK parameters were analyzed with clinical data of any infection, severe bacterial, fungal, or viral.

Results: 876 troughs in 191 pts showed agreement between observed concentrations and both population model-predicted and Bayesian estimated concentrations (R^2=0.84 and 0.88, respectively). BELA exposure was higher than reported previously. Inter-individual variability in Cl was low (CV=22%) and matched reports. No significant differences between allometrically standardized Cl estimates were observed. BELA AUC and Cavg were significantly higher in pts with any infection(n=132) including viral(n= 82) compared to those without(Figure 1). Logistic regression revealed increased probability of infection based on Cavg6 and 12mo exposure. No difference in exposure was observed in CMV(n=23) pts. Significant increases in AUC and Cavg were observed in BK(n=41). BK pts experienced 11.8-14.6% increase in AUC out to 12mo. The Cavg or AUC at infection event is shown in Figure 2. Mean time to BK was 190±163 days. No significant differences in exposure were observed in bacterial(n=163) or fungal infected(n=13) pts.

Conclusions: Higher BELA exposure was observed in pts with infection, particularly viral and BK . Effective CMV prophylaxis may prevent CMV in BELA treated pts regardless of exposure. BELA concentration controlled trials at lower doses may improve the overall infection, viral, and BK infection profile.

Figure 1. BEST Belatacept Model Predicted Trough Concentrations in Non-infection and Infection Patients. Dashed line Phase 3 target troughs for LI regimen

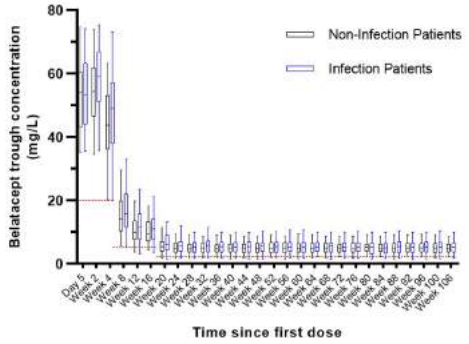
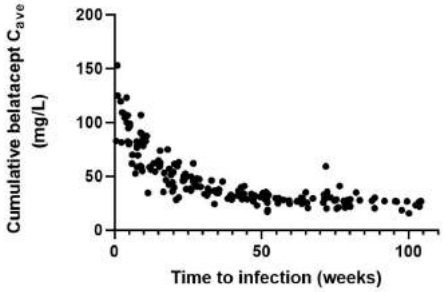


Figure 2: Cumulative Concentration Average at Time to Infection



CITATION INFORMATION: Bickenbach A., McGowan M., Miyagawa B., Mizuno T., Shields A., Christianson A., West-Thielke P., Leone J., Woodle E., Kaufman D., Wiseman A., Vinks A., Alloway R. Belatacept Pharmacokinetics in Patients with and without Infection *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Bickenbach: None. **M. McGowan:** None. **B. Miyagawa:** None. **T. Mizuno:** None. **A. Shields:** None. **A. Christianson:** None. **P. West-Thielke:** None. **J. Leone:** None. **E. Woodle:** None. **D. Kaufman:** None. **A. Wiseman:** None. **A. Vinks:** None. **R. Alloway:** None.

Abstract# 804

Significance of Detectable but Unquantifiable Viremias Post Renal Transplantation

M. Chaung, S. Puri, S. Bunin, Z. Mondal, O. Eletta, R. Pelletier, A. Bongu,
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Purpose: It is unknown whether the degree of the initial viremia following kidney (KT) or combined kidney-pancreas transplantation (SPKT) correlates with future allograft rejection or loss. We sought to characterize transplant outcomes based on initial BK virus and cytomegalovirus (CMV) level.
Methods: In this single center, retrospective, observational study 97 adult KT (88%)/ SPKT (12%) recipients (age≥18 years old) transplanted from 2018-2019 with first detectable CMV and BK viremia during their first year of transplant were included. Adults with BK or CMV viremia were divided into groups based on whether their initial PCR results were quantifiable (QL, Group1) or only detectable (DL, Group2). The primary end-points were biopsy proven acute rejection and graft loss following initial treatment for BK or CMV viremia. Initial treatment of BK viremia or CMV viremia was defined as any immunosuppression (IS) reduction (for BK viremia > 2000 copies/ml and CMV level >500 copies/ml).
Results: Demographics: Males (52%), Blacks (35%), deceased donor (68%) and thymoglobulin induction (97%). There were no differences in donor or recipient demographics between BK or CMV categories when comparing initial detectable (DL) and quantifiable (QL) groupings. Using detectability as the threshold, the incidences of BK and CMV in the first 6 months were 19% (18/97) and 41% (40/97) respectively. The median time to rejection overall was 214 (96, 373) days. 12/13 (92%) of those patients had a concurrent BK or CMV viremia. A viremia preceded a rejection in 5/6 cases with BK and 7/10 cases with CMV. Comparing DL and QL groupings, for BK/CMV there were no differences in primary end points, days to viremia, days to treatment, and percentage of patients requiring viremia targeted therapy (Table 1). 50% of BK and 40% of CMV patients with initial DL never progressed to QL.
Conclusions: Initial viremia for both BK and CMV does not seem to correlate disease severity or post-transplant outcomes.

Table 1: Outcomes for BK and CMV viremia based on initial levels

BK GROUP	Group1 (*start quantifiable*) n=9	Group2 (*start detectable*) N=14	p
Days to BK	88 (63, 231)	84 (34, 87)	.214
IS Reduction	89% (8/9)	72% (10/14)	.611
Days to IS Reduction	161 (105, 222)	168 (63, 203)	1
Any Rejection 1st year	33% (3/9)	21% (3/14)	.436
Days to 1st Rejection	315 (123, 467)	267 (105, 440)	.874
CMV GROUP	**Group1 (*start quantifiable*) n=22**	**Group2 (*start detectable*) N=27**	**p**
Days to CMV	138 (89, 162)	78 (28, 144)	.015
Days to IS reduction	158 (117, 229)	128 (70, 146)	.688
Any Rejection 1st year	18% (4/22)	19% (5/27)	.984
# Rejections	1 (0, 2)	1 (0,1)	.683
Days to 1st Rejection	318 (135, 404)	315 (123, 440)	.897

CITATION INFORMATION: Chaung M., Puri S., Bunin S., Mondal Z., Eletta O., Pelletier R., Bongu A. Significance of Detectable but Unquantifiable Viremias Post Renal Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Chaung: None. **S. Puri:** None. **S. Bunin:** None. **Z. Mondal:** None. **O. Eletta:** None. **R. Pelletier:** None. **A. Bongu:** None.

Abstract# 805

Influence of HLA Compatibility on Bk Virus Associated Nephropathy Among Japanese Living Donor Kidney Transplant Recipients

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Purpose: BK polyomavirus-associated nephropathy (BKVN) after kidney transplantation is associated with a high morbidity and higher risk of graft loss. In this study, the relationship between BKVN post-kidney transplantation and HLA, and between killer immunoglobulin-like receptor (KIR) compatibility of recipients and donors was evaluated.
Methods: We included 228 cases among patients who received a living kidney transplants at Akita University Hospital from December 2004 to November 2016. BKVN replication was evaluated by detection of decoy cells in urine cytology smears and/or immunohistochemical staining by simian virus 40 positive cells in graft biopsy. Using HLA and KIR haplotypes were determined by WAKFlow and LAB type reagents, HLA loci type and HLA match/HLA-KIR match between donor and recipient were evaluated.
Results: Eleven cases were diagnosed with BKVN infection after renal transplant (4.8% of the total). In the analysis using HLA loci type, BKVN was significantly high frequency in A24 and DR14 carriers compared with each non-carrier (8.4% vs 0.9%; p=0.011 and 12.8% vs 2.8%; p=0.011, respectively). In the analysis using HLA match, the incidence in the 2- or 1-match case group of HLA-DR14 was significantly higher than in the 0-match case group (19.0% vs. 3.4%, p=0.012) while there were no association of BKVN with other HLA match. In Kaplan-Meier analysis, HLA-A24 carrier, HLA-DR14 carrier and HLA-DR14 match were significantly high morbidity compared with non-carrier/match (p=0.009, p=0.005 and p=0.002, respectively). On the other hand, as a result of comparison among KIR haplotypes and of comparison with or without KIR-ligand match between recipient KIR and donor HLA, there were no significant different of BKVN frequency.
Conclusions: HLA and match/mismatch in kidney transplantation are important not only for suppressing alloresponse but also for predicting BKVN.
CITATION INFORMATION: Fujiyama N., Saito M., Yamamoto R., Sagehashi R., Saito T., Kashima S., Numakura K., Narita S., Habuchi T., Satoh S. Influence of HLA Compatibility on Bk Virus Associated Nephropathy Among Japanese Living Donor Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Fujiyama: None. **M. Saito:** None. **R. Yamamoto:** None. **R. Sagehashi:** None. **T. Saito:** None. **S. Kashima:** None. **K. Numakura:** None. **S. Narita:** None. **T. Habuchi:** None. **S. Satoh:** None.

Abstract# 806

Dissecting the Intrarenal Immune Response to Viral Infected Cells in Pediatric BK Virus-associated Nephropathy (BKVAN)

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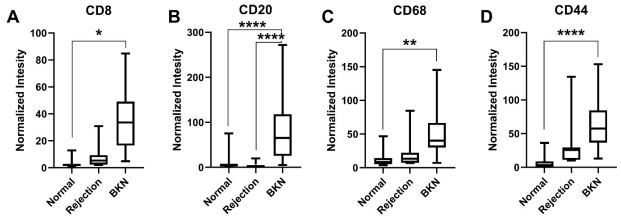
Purpose: BKVAN is not only a cause of acute renal allograft injury but is a recognized cause of chronic allograft disease and in some patients, allograft failure. Currently, there is little understanding of the intrarenal mechanisms involved in the resolution of BKVAN. To better understand these pathways, we investigated the intrarenal immune responses to BKV infected tubular cells.

Methods: We examined the course of three pediatric patients diagnosed with BKVAN: one progressive BKVAN leading to graft failure and two BKVAN with resolution of BK viremia, but with either new donor-specific antibodies (DSA) or new interstitial fibrosis/tubular atrophy (IFTA). Each patient had an initial biopsy prior to the diagnosis of BKVAN: two normal and one with Banff 1A rejection. Using digital spatial profiling with the human IO TAP panel v2 on the Nanostring GeoMX DSP, we identified regions of interest (ROI) with BK polyoma infected tubular cells in BKVAN biopsy samples and compared it with normal tubular ROI from baseline biopsy, n=8-12 ROI/biopsy. Signal intensities from equal area ROIs were normalized to host antibody levels (rabbit and mouse).

Results: Digital spatial profiling identified many upregulated proteins with significant differences between normal (n=24), rejection (n=12), and BKVAN biopsy groups (n=32) (P<0.0001). As expected, CD8 levels were approximately 13 times higher in BKVAN compared to normal (**Figure 1A**; P=0.012). There was a significant increase in CD20 levels (7.8-fold) that distinguished BKVAN from normal and rejection kidneys (**Figure 1B**, P<0.0001). Furthermore, activated macrophage markers such as CD44 and CD68 not only distinguished BKVAN from normal kidneys (**Figure 1C,D**, P<0.0001 and P=0.002, respectively) but also was associated with progressive BKVAN (P<0.01).

Conclusions: Although this study is limited by the low number of patients, it more accurately represents the intrarenal immune microenvironment of BK infected tubular cells compared to whole tissue investigations and needs further study. These results represent the first step to devise improved treatment strategies.



CITATION INFORMATION: Okamura D., Jackson S., Dharnidharka V., Smith J. Dissecting the Intrarenal Immune Response to Viral Infected Cells in Pediatric BK Virus-associated Nephropathy (BKVAN) *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.M. Okamura: Honoraria; Name of Commercial Interest; Horizon Therapeutics. Honoraria; Nature of Relationship; Advisory Board Consultant. **S.W. Jackson:** None. **V.R. Dharnidharka:** Consulting Fee; Name of Commercial Interest; Atara Bio. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx. **J.M. Smith:** None.

Abstract# 807

BKV-Associated Urothelial Carcinoma in Patients After Renal and Extrarenal Carcinoma

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Purpose: Polyomavirus BK (BKV) reactivation or transmission is a wellknown problem in renal transplant (TX) patients with BKV nephropathy and interstitial cystitis. The role of BKV-associated urothelial carcinoma is still debated.

Methods: We reviewed the clinical data of five patients with BKV-associated urothelial carcinoma to understand the difference of this severe late complication of renal and extrarenal TX compared to usual BKV-related problems in renal TX patients.

Results: Between 2014 and 2020, we saw five patients (three men and two women aged 49±17 yrs at TX) with urothelial carcinoma after renal (n=2) and extrarenal TX (heart 1, lung 1, and combined heart-lung 1). Basal immunosuppression consisted in tacrolimus, mycophenolate mofetil (MMF), and prednisolone (Predni) in 3 patients, and everolimus, MMF, and Predni as well as cyclosporine and Predni in 2 other patients. All patients had high viremia (n=5; maximum 596286±444272 copies/mL) and high viruria (n=4; maximum 7.5±5 billion copies/mL; one patient not tested) 4 to 7 years before diagnosis of urothelial carcinoma. Four of 5 patients had had BKV nephropathy 3 to 58 months after TX. Urothelial carcinoma was diagnosed 102±27.2 (71-144) months after TX. Three tumors were located mainly in the bladder, one in the TX ureter, one in both. All had carcinoma metastasis in the lymph system, 3 had also other meststases. Tumor histology was undifferentiated and grade 3 in all cases and showed distinct nuclear SV40 staining of the tumor cells. Cystectomy was performed in 3 cases, TX-ureterectomy in one renal TX and both in the other renal TX patient. Three patients died by metastatic tumor 3, 7, and 26 months after diagnosis. Two patients are alive 36 and 6 months after tumor diagnosis.

Conclusions: BKV-associated urothelial carcinoma is a late phenomenon after renal and extrarenal TX. Diagnosis occurs often delayed and at an advanced stage, since BKV problems mostly happen up to two years after renal and only rarely after extrarenal TX; therefore BKV testing usually is not done routinely late after renal and in general rarely done at all after extrarenal TX. Prognosis therefore is poor. Diagnosis may be suspected in cases of persisting high viruria, especially after preceding BKV nephropathy earlier.

CITATION INFORMATION: Schwarz A., Schmitz J., Gottlieb J., Bara C., Haller H., Braesen J. BKV-Associated Urothelial Carcinoma in Patients After Renal and Extrarenal Carcinoma *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Schwarz: None. **J. Schmitz:** None. **J. Gottlieb:** None. **C. Bara:** None. **H. Haller:** Consulting Fee; Name of Commercial Interest; Alexion Pharma, Astra Zeneca, Vifor Pharma. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; Name of Commercial Interest; Alexion Pharma, AstraZeneca, Bayer Pharma. Grant/Research Support; Nature of Relationship; Advisory Board Member. Honoraria; Name of Commercial Interest; Alexion Pharma, Astra Zeneca, Bayer Pharma, Sciarc AG. Honoraria; Nature of Relationship; Speaker. Travel; Name of Commercial Interest; Alexion Pharma, Sciarc AG, Boehringer AG. Travel; Nature of Relationship; Speaker. **J. Braesen:** None.

Abstract# 808

Polyomavirus BK-Associated Nephropathy in Patients After Renal and Extrarenal Transplantation

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Purpose: Patients with non-renal organ transplantation (TX) may suffer BK-viral nephropathy (BKVN) of their own orthotopic kidneys. We aimed to know if these patients with BKVN after non-renal organ transplantation differ from renal transplant (TX) patients with BKVN.

Methods: We followed retrospectively the clinical course of non-renal transplant patients with BKVN.

Results: Since 2001, we have seen twelve patients with biopsy-proven and one with clinically highly suggestive BKVN after non-renal organ transplantation (eight patients after lung, and two after heart TX, respectively; two after hematopoetic stem cell transplantation (HSCT); and one other patient without being transplanted at all but with biopsy-proven BKVN and interstitial renal infiltration of chronic lymphatic leucemia cells). All ten patients with lung and heart TX had calcineurin-based triple or dual immnosuppression. Four patients with chronic lung TX and both patients with HSCT and graft versus host reaction needed additional immunosuppression. Twelve of thirteen patients were men (92%); age at TX (n=12) was 39±18 yrs (5-69). Six of thirteen patients had end stage renal disease (ESRD, 46%), and the other seven had progressive renal insufficiency with eGFR <25mL/min (54%); five patients died (38%). Diagnosis by renal biopsy was established 87±107 months after TX in 12/13 patients. Maximum of viruria was 76,5±41,1 million copies/mL in 10/13 patients (3 not tested); and maximum of viremia 4,1±6,9 million copies/mL in 12/13 patients (1 not tested since no TX). First positivity of viruria and viremia PCR was measured 75±77 and 39±43 months in 9 and 12 patients, respectively, after TX.

Conclusions: In patients after non-renal Tx, BKVN of the orthotopic kidneys develops always by reactivation of their own viral population living in latency of urothelial cells. BKVN after non-renal TX occurs preferentially after lung, but also after heart TX and HSCT. Diagnosis is established late and with high viral load of long persistence. The patients develop severe renal insufficiency and often ESRD, five patients died. The course of BKVN of orthotopic kidneys after non-renal transplantation seems to be more malignant than BKVN after renal transplantation.

CITATION INFORMATION: Schwarz A., Schmitz J., Braesen J., Bara C., Sauer M., Haller H., Gottlieb J. Polyomavirus BK-Associated Nephropathy in Patients After Renal and Extrarenal Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Schwarz: None. **J. Schmitz:** None. **J. Braesen:** None. **C. Bara:** None. **M. Sauer:** None. **H. Haller:** Consulting Fee; Name of Commercial Interest; Alexion Pharma, AstaZeneca, Vior Pharma. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; Name of Commercial Interest; Alexion Pharma, AstraZeneca, Bayer Pharma. Grant/Research Support; Nature of Relationship; Advisory Committee Member. Honoraria; Name of Commercial Inter-

est; Alexion Pharma, AstraZeneca, Bayer Pharma, Sciarc AG. Honoraria; Nature of Relationship; Speaker. Travel; Name of Commercial Interest; Alexion Pharma, Boehringer AG. Travel; Nature of Relationship; Speaker. **J. Gottlieb:** None.

Abstract# 809

Conversion from Tacrolimus to Envarsus in Rapid Metabolizers for Prevention of BK Infection

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Purpose: The incidence of BK virus infection is high among rapid metabolizers (RM) in kidney transplant (KT) patients. RM can be identified using validated and clinically available information with tacrolimus concentration to dose ratio (c/d) < 1. The RM patients have high peak levels and greater tacrolimus exposure to achieve a therapeutic trough. As compared to immediate-release tacrolimus (IR-Tac), Envarsus, though its high bioavailability, has lower peak levels and overall tacrolimus exposure. This study investigated whether conversion of IR-Tac to Envarsus would reduce the incidence of BK infection among RM.

Methods: RM kidney transplant patients were identified using c/d <1, starting in March 2019, and prospectively followed for 12 months. All patients received standard of care immunosuppression with thymoglobulin induction, tacrolimus (trough level 8-12 ng/mL), mycophenolate mofetil (2000 mg daily), and prednisone at month 1. Patients met the criteria for the study if tacrolimus c/d remained < 1 at month 2 and serum BK PCR was negative at month 1. The study group was converted from IR-Tac to equivalent Envarsus at month 2. We retrospectively obtained the control group from January 2018 to February 2019 by chronologically screening every patient who underwent a KT prior to the study start date. We included everyone who met the above criteria of the standard immunosuppression and negative serum BK PCR at month 1. Control group data was collected 12 months post-transplant. Data are presented as counts and percentages or means. Significant differences between cases and controls were identified using t test and chi-square testing as indicated.

Results: We compared 35 prospective study patients with 46 historical controls. The cohort consisted of deceased donor KT (88.89%), with a mean age of 50.93 ± 10.65 years and predominantly black race (87.65%). There was no difference in baseline characteristics (Table 1). At 6 months post-transplant, there was no difference in the incidence of BK viruria or BK viremia (28 study group vs. 46 controls). As expected in an RM cohort, there was a high incidence of BK viruria (49.38%) and BK viremia (37.04%). It appears to date, at a mean follow-up of 10.43 months, there is no difference in the incidence of BK viruria, BK viremia, or BK nephropathy (Table 2) in the two groups.

Conclusions: We hypothesized that among rapid metabolizers, a lower peak level, and overall drug exposure with Envarsus would lead to a lower incidence of BK infection. There were no significant differences observed among the groups

Demographics (Table 1)

	All (n= 81)	Cases (n=35)	Controls (n=46)	p-value
Type of Tranplant %(n)				0.116
Living donor	9.88 (8)	2.86 (1)	15.22 (7)	
Deceased donor	88.89 (72)	97.14 (34)	82.61 (38)	
Simultaneous Kidney Pancreas	1.23 (1)	0 (0)	2.17 (1)	
Age at transplant, mean ± SD	50.93 ± 10.65	49.06 ± 10.79	51.83 ± 10.50	0.251
Race (Black) %(n)	87.65 (71)	91.43 (32)	84.78 (39)	0.5756
CPRA, mean ± SD	25.34 ± 10.65	17.46 ± 29.91	31.4 ± 39.4	0.075
At enrollment (month 1)				
Creatinine, mean ± SD	1.78 ± 0.67	1.77 ± 0.55	1.79 ± 0.76	0.8725
Urine protein creatine ratio, mean ± SD	0.34 ± 0.31	0.27 ± 0.26	0.39 ± 0.33	0.077
Tacrolimus dose in mg, mean ± SD (n)	16.37 ± 5.02	17.91 ± 5.63	15.2 ± 4.2	0.0197
Tacrolimus level in mg/dL, mean ± SD (n	9.21 ± 2.05	10 ± 2.18	8.6 ± 1.74	0.0028
C/D ratio	0.6 ± 0.18	0.6 ± 0.18	0.61 ± 0.19	0.8155
MMF dose	2000 ± 79.06	1985.71 ± 84.52	2010.87 ± 73.72	0.1657
BK viruria %,n	11.11% (9)	8.8 (3)	13.04 (6)	0.8161
BK viremia %,n	0 (0)	0 (0)	0 (0)	1

C/D ratio: Tacrolimus serum concentration to dose ratio

Results (Table 2)

	All (n= 81)	Cases (n=35)	Controls (n=46)	p-value
At month 6				
Creatinine, mean ± SD (n)	1.61 ± 0.54	1.59 ± 0.42 (28)	1.63 ± 0.58	0.7017
Urine protein creatine ratio, mean ± SD	0.23 ± 0.21	0.17 ± 0.12 (25)	0.27 ± 0.24	0.02567
Tacrolimus dose in mg, mean ± SD (n)	11.99 ± 5.59	12.75 ± 6.72 (28)	11.51 ± 4.78	0.3997
Tacrolimus level in mg/dL, mean ± SD (n	7.96 ± 2.68	8.68 ± 2.86 (28)	7.49 ± 2.48	0.07624
C/D ratio	0.76 ± 0.4	0.83 ± 0.43 (28)	0.72 ± 0.38	0.2992
MMF dose in mg (n)	1552.08 ± 476.45	1509.26 ± 502.31 (	1577.78 ± 464.12	0.5669
BK viruria %, n	40.3 (27 of 67)	33.33 (8 of 24)	44.18 (19 of 43)	0.5428
BK viremia %, n	27.03 (20 of 74)	27.59 (8 of 29)	26.67 (12 of 45)	1
At Last follow up				
Months of follow up	10.43 ± 2.92	8.37 ± 3.52	12 ± 0	<0.001
Creatinine, mean ± SD	1.7 ± 0.74	1.61 ± 0.43	1.77 ± 0.9	0.2645
Urine protein creatine ratio, mean ± SD	0.24 ± 0.34	0.17 ± 0.11	0.29 ± 0.43	0.08468
Tacrolimus dose in mg, mean ± SD	10.33 ± 5.17	12 ± 6.42	9.07 ± 3.56	0.02036
Tacrolimus level in mg/dL, mean ± SD	7.75 ± 2.61	8.34 ± 2.38	7.3 ± 2.71	0.07418
C/D ratio	0.87 ± 0.5	0.84 ± 0.43	0.9 ± 0.54	0.6013
MMF dose	1418.83 ± 485.72	1507.58 ± 473.87	1352.27 ± 489.18	0.1649
BK viuria %,n	49.38 (40)	40 (14)	56.52 (26)	0.2117
BK viremia %,n	37.04 (30)	31.43 (11)	41.3 (19)	0.4968
BK Viral Nephropathy %,n	6.5 (5)	12.5 (4)	2.2 (1)	0.182

C/D ratio: Tacrolimus serum concentration to dose ratio

CITATION INFORMATION: Towns G., Agarwal G., Kew C. Conversion from Tacrolimus to Envarsus in Rapid Metabolizers for Prevention of BK Infection *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Towns: Grant/Research Support; Name of Commercial Interest; Veloxis Pharmaceuticals. Grant/Research Support; Nature of Relationship; Research Support. **G. Agarwal:** Grant/Research Support; Name of Commercial Interest; Veloxis Pharmaceuticals. Grant/Research Support; Nature of Relationship; Research Support. **C. Kew:** None.

ID

Non-Organ Specific: Viral Hepatitis

Abstract# 810

Successful Single-Center Experience Using HCV+ Organs for Single and Dual-Organ Transplantation

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Purpose: National data demonstrate that increasing organ transplantation opportunities exist from hepatitis C virus (HCV)-infected individuals to HCV negative recipients.

Methods: We developed a clinical practice protocol in 2017 for the acceptance of HCV+ donors for HCV-negative patients who underwent solid organ transplantation. HCV+ donors included both viremic, i.e. HCV nucleic acid test positive (NAT+) as well as non-viremic, i.e. HCV antibody positive but NAT negative (Ab+/NAT-). Recipients were treated with direct acting antivirals (DAA) after documentation of infection transmission. After obtaining institutional review board approval, we retrospectively reviewed the outcomes at our institution.

Results: We transplanted 112 patients from HCV+ donors during the time-period 4/1/2017-10/31/2020 (Table 1). 97 patients received a single organ transplant and 15 received dual organ transplant. Median age of recipients was 59 years (IQR 49.5-65.5), 83/112 (75.5%) were male and median waitlist time was 214 days (IQR 45-902). All 88 patients receiving HCV NAT+ organs developed HCV viremia and 87 were treated in the post-operative period with 12 weeks of DAA. One recipient died soon after transplant from non-HCV related reasons and was not initiated on DAA. Additionally, 2/24 (16.7%) patients receiving HCV Ab+/NAT- organs developed HCV viremia (liver 1, heart-kidney 1) and were also treated with 12 weeks of DAA. DAA used included glecaprevir/pibrentasvir (68), sofosbuvir/velpatasvir (15), elbasvir/grazoprevir (2) and ledipasvir/sofosbuvir (4) with drug choice determined by patient's medical insurance coverage. Among patients treated with DAA, sustained virological response at 12 weeks after end of DAA therapy (SVR12), indicative of a treatment cure, was achieved in 72/74 (97.3%) recipients. 15 DAA- treated recipients are pending follow-up to assess for SVR12, two recipients failed the initial DAA course, one died prior to DAA initiation of unrelated cause and one died after completion of DAA but prior to completion of 12 weeks of follow-up to determine SVR12.

Conclusions: We report successful single-center experience using HCV+ organs for both single and dual solid organ transplant. As experience using such organs for transplant continues to increase and long term follow-up is obtained, HCV+ donors may be routinely used to increase the organ donor pool.

Table 1. Characteristics of solid-organ transplantation from HCV+ donors.

Transplanted organ(s)	HCV NAT+ n (%)	HCV Ab+/NAT- n (%)	Median waitlist time, days (IQR)	HCV outcome with additional details
Heart, n=30	24 (80%)	6 (20%)	146 (16-326)	-SVR 12: 23/24 (96.8%) -One failure -> Genotype 3, pre-treatment HCV viral load 1.4 million copies/mL. Initial DAA was 12 weeks sofosbuvir/velpatasvir -> retreated with 12 weeks sofosbuvir/velpatasvir/voxilaprevir but failed again -> currently clinically stable and on third course with glecaprevir/pibrentasvir + sofosbuvir + ribavirin
Lung, n=13	13 (100%)	0	35 (11-442)	-SVR12: 12/12 (100%) -One pending follow-up
Liver, n=30	13 (65%)	7 (35%) (1 became viremic)	184 (58-281)	-SVR12: 11/11 (100%) -3 pending follow-up
Kidney, n=84	25 (73.5%)	9 (26.5%)	1607 (941-2190.5)	-SVR12: 7/7T (100%) -8 pending follow-up
Heart-kidney, n=7	6 (85.7%)	1 (14.3% became viremic)	31 (10-76)	-SVR12: 5/6 (83.3%) -One failure -> Genotype 1a, pre-treatment HCV viral load 33.7 million copies/mL. Initial DAA was 12 weeks elbasvir/grazoprevir -> retreated with 12 weeks sofosbuvir/velpatasvir/voxilaprevir with SVR12. -One death unrelated to HCV prior to completion of follow-up
Heart-liver, n=2	2 (100%)	0	59.5 (45-74)	-SVR12: 2/2 (100%)
Heart-lung, n=1	1 (100%)	0	182 (NA)	-One pending follow-up
Liver-kidney, n=5	4 (80%)	1 (20%)	101.5 (66.5-691)	-SVR12: 2/2 (100%). -One pending follow-up, one death unrelated to HCV prior to DAA initiation.
Total, N =112	88 (78.6%)	24 (21.4%)	214 (IQR 45-902)	-SVR12: 72/ 74 (97.3%) 16 pending follow-up -Two failures -Two deaths unrelated to HCV

CITATION INFORMATION: Aslam S., Logan C., Law N., Kerr J., Kozuch J., Ajmera V., Afshar K., Khan A., Adler E., Mekeel K., Golts E., Pretorius V. Successful Single-Center Experience Using HCV+ Organs for Single and Dual-Organ Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 811

Hepatitis E Diagnosis and Management After Liver, Kidney, or Heart Transplant: A Single Center Experience

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Purpose: Transplant-related Hepatitis E virus (HEV) infection is a rarely recognized entity with significant clinical importance given potential for chronic hepatitis post-transplant. We evaluated HEV diagnosis, treatment, and outcomes after liver, kidney and heart transplant in a single center.

Methods: We evaluated all patients transplanted at a single center and identified patients diagnosed with HEV by serologic testing. We gathered data on patient outcomes, laboratory evaluation, treatment course, reduction in immunosuppression, and mortality.

Results: 13 transplant recipients developed HEV infection between 2017-2020. The average age for all patients was 62 years (range 47-74 years) with 46% male. The average time between transplantation and positive HEV IgM antibody testing was 35 months (range 3-240 months). Ten patients received a liver transplant for reasons including Hepatitis C virus, Hepatitis B virus, alcoholic cirrhosis, and Hepatocellular Carcinoma. Two patients received a kidney transplant for SLE and hypertensive nephrosclerosis respectively. One patient had a heart transplant for hypertrophic cardiomyopathy.All 13 patients presented with elevated liver enzymes and were positive for HEV IgM antibody. Nine patients had an undetectable HEV PCR Quantitative. Four patients did not have HEV PCR testing done. Three patients were treated with ribavirin for an average of 84 days (range 56-120 days) with two patients at 800mg per day and one patient at 600 mg per day. One of these patients had a recurrence of HEV but recovered after immunosuppression was reduced. All three patients' liver enzymes normalized with therapy. Eight patients had their immunosuppression reduced without anti-viral treatment. Seven of these patients' liver enzymes normalized and they recovered. One of these patients died of acute pancreatitis two months after positive HEV IgM antibody. Two patients had spontaneous reduction of liver enzymes without treatment or change to immunosuppression.

Conclusions: The gravity of active HEV infections in transplant recipients necessitates prompt diagnosis and treatment. In order to prevent ongoing hepatic inflammation and irreversible damage, HEV PCR should follow a positive HEV IgM antibody test. The PCR confirmation is vital given that HEV IgM antibody testing may have false positivity for active infection. Ribavirin and reducing immunosuppression are effective treatments. Larger multi-center studies are needed to confirm the risks and benefits of adding ribavirin therapy versus simple reduction of immunosuppression as first line therapy of HEV post-transplant.

CITATION INFORMATION: Carter M., Fitzmaurice M., Yeddula S., Singh A., Nagai S., Jafri S. Hepatitis E Diagnosis and Management After Liver, Kidney, or Heart Transplant: A Single Center Experience *AJT, Volume 21 Supplement 3*

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Abstract# 812

Processes to Successfully Utilize Hepatitis C (HCV) Infected Donor Kidneys as Standard of Care

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Purpose: Despite robust evidence supporting the safety and efficacy of HCV-infected donor kidneys, great heterogeneity continues to exist regarding centers willingness to utilize these in HCV negative recipients. In 2019, our transplant center began utilizing these kidneys as standard of care. Processes were approved by institutional and transplant quality teams. All patients received education regarding HCV-infected donors and were approached for consent during evaluation. Eligible candidates were discussed in multidisciplinary selection committee. Financial and case management verification of HCV treatment coverage is required prior to listing. Post-transplant, nephrology/pharmacy-driven monitoring/treatment were completed per center protocols. We report here the experience of our multidisciplinary comprehensive approach to utilizing HCV-infected donor kidneys.

Methods: Recipients of HCV-nucleic acid test (NAT) and/or antibody (ab) positive donors were prospectively monitored for protocol adherence. Retrospective chart review was completed for transplants between July 2019 and October 2020. Donor/recipient characteristics, clinical outcomes, and HCV treatment details were collected.

Results: During the time period, 152 kidneys were transplanted at our center, 30 (20%) were from HCV-infected donors. Donor/recipient characteristics are summarized in Table 1. Adherence to testing schedule per protocol was 100%. No HCV transmission occurred in recipients of HCVAb+/NAT- donor kidneys. HCV viremia was detected in all 20 recipients of HCVNAT+ donors. Treatments were initiated in all infected recipients within 1 month following transplant. All insurances required HCV genotype and prior authorization for medication approval. No therapy failure or resistance were reported. At last follow-up, 19 of the 20 patients completed HCV treatment, 16 patients achieved SVR-12, and 1 patient is yet to start therapy. Overall, 10 (33%) patients had transient transaminitis which resolved at last follow-up.

Conclusions: Safe and effective utilization of HCV-infected donor kidneys outside the context of clinical trials is feasible and requires center-specific protocols involving multiple disciplines. Partnership with a designated specialty pharmacy and protocolized pathways lead to prompt treatment initiation to reduce potential risk of HCV-related complications. HCV-infected donors continue to provide a significant source of kidneys to increase transplant volume and shorten wait time.

	HCV NAT+ N = 20	HCV Ab+/NAT- N = 10	Total N = 30
Donor			
Age (years), mean (SD)	45.9 (10.5)	44.5 (11.2)	49 (10.7)
KDPI (%), median (SD)	82 (22.8)	67 (22.5)	73 (22.6)
Donor after cardiac death, n (%)	7 (35)	3 (30)	10 (33.3)
PHS increased risk, n (%)	15 (75)	5 (50)	20 (66.7)
Cold ischemia time (hours), mean (SD)	19.2 (3.9)	19 (5.2)	19.2 (4.3)
Local OPO (n, %)	5 (25)	8 (80)	13 (43.3)
Recipient			
Age (years), mean (SD)	61 (10.5)	57.1 (11.2)	59.8 (10.7)
Male sex, n (%)	15 (75)	6 (60)	21 (70)
cPRA >80%, n (%)	2 (10)	0 (0)	2 (6.7)
Time on waitlist (days), median (SD)	171 (151.5)	303 (374)	258 (261.4)
Time listed for HCV-infected donor kidneys to transplant (days), median (SD)	54 (70.6)	71 (114.8)	89 (87.2)
Post-Transplant Outcomes			
Transaminitis (>2X UNL AST/ALT), n (%)	6 (30)	4 (40)	10 (33.3)
Delayed graft function, n (%)	1 (5)	1 (10)	2 (6.7)
eGFR at 4 weeks (mL/min), mean (SD)	56.5 (14.2)	44.5 (17.3)	46.7 (15.1)
HCV detection			
Time from transplant to detection (days), mean (SD)	4 (2)	-	-
Viral load at detection (IU/mL), median (SD)	5,080 (542,042)	-	-
HCV treatment			
Glecaprevir/pibrentasvir, n (%)	18 (90)	-	-
Sofosbuvir/velpatasvir, n (%)	2 (10)	-	-
HCV treatment fill location			
Partnered pharmacy, n (%)	14 (70)	-	-
Insurance-mandated pharmacy, n (%)	6 (30)	-	-
Time from transplant to initiation of therapy (days), mean (SD)	19 (4.8)	-	-
Partnered pharmacy, mean (SD)	16 (2.8)	-	-
Insurance-mandated pharmacy, mean (SD)	25.5 (3.4)	-	-

KDPI = kidney donor profile index, PHS = Public Health Service, OPO = organ procurement organization, cPRA = calculated panel reactive antibody, eGFR = estimated glomerular filtration rate

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Abstract# 813

Not Always as it Seems: Lack of Hepatitis C Virus Transmission from Nucleic Acid Testing Positive Deceased Donors

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Purpose: Hepatitis C virus (HCV) + organs are increasingly use to transplant HCV naive candidates with good short-term outcomes. HCV transmission with HCV nucleic acid test (NAT) + donor is near to 100%. HCV-seronegative NAT+ donors indicate acute infection and carry high risk for infection transmission. Here we report a case series of solid organ transplant recipients (SOTR) of HCV NAT+ organs who did not develop viremia in their post-transplant period.

Methods: Retrospective review of adult HCV naive SOTR receiving HCV NAT+ organs since 10/2018. SOTR data obtained from electronic medical record and donor data from DonorNet.

Results: Out of 118 SOTR receiving HCV-positive organs, we identified 10 HCV naive SOTR receiving organs from 9 different HCV NAT+ donors without evidence of HCV transmission. Donors had a mean age of 35±16 y, 22% females, 22% Black, 22% history of IV drug use, 44% died from CVA/stroke. All donors were HCV NAT+, 44% were HCV seropositive. Median time of NAT collection to transplant was 34.4 hours. Recipients mean age was 56±9 y, 50% females, 50% Black and 60% received a kidney or kidney-pancreas transplant. All recipients were HCV seronegative. Anti-thymocyte globulin induction was given to 60% of recipients and 90% were maintained on triple immunosuppression. Median recipient follow up was 349 days (IQR 246-423). By 1 month post-transplant, all recipients had negative HCV viral load (VL). At 3 months, most recipients (80%) remained without detectable viremia including 1 liver recipient. From 2 SOTR without 3 month data, 1 had the 3 month VL pending at the time of this abstract and 1 had died from non-HCV related complications. HCV viremia details in Table 1.

Conclusions: Despite the high risk of HCV transmission when transplanting HCV NAT+ organs into naive recipients, we identified 10 SOTR where transmission did not occur at last follow up. This finding may be due to a low HCV viral replication at time of procurement and further virion removal through post-recovery organ washout. It is also possible HCV NAT testing was falsely positive, despite its high sensitivity and specificity (>98 and 99%, respectively). In conclusion, the infectivity of all HCV NAT+ donors may not be the same and thus, HCV NAT+ organs should continue to be used with confidence to expand access to a scarce resource.

Table | HCV NAT-positive recipients viremia progression over time

Recipient	Organ Type	Time since transplant (days)	HCV VL 2 weeks	HCV VL 1 month	HCV VL 3 months	HCV VL - Last negative (months)
N° 1	Kidney	583	Negative	Negative	Negative	Negative (12)
N° 2	Lung	471	Negative	Negative	Negative	Negative (12)
N° 3	Kidney	429	Negative	NA	Negative	Negative (6)
N° 4	Kidney-Pancreas	407	Negative	Negative	Negative	Negative (12)
N° 5	Kidney	348	Negative	Negative	Negative	Negative (12)
N° 6	Kidney	322	Negative	Negative	Negative	Negative (6)
N° 7	Kidney	94	NA	Negative	Negative	Negative (3)
N° 8	Lung	93	Negative	Negative	NA	Negative (2)
N° 9	Liver	349	Negative	Negative	Negative	Negative (6)
N° 10	Heart	22 (deceased)	Negative	Negative	NA	Negative (1)

CITATION INFORMATION: Nishio Lucar A., Kumar A., Rao S., Kelly V., Coles K., Kamal J., Green C., Doyle A. Not Always as it Seems: Lack of Hepatitis C Virus Transmission from Nucleic Acid Testing Positive Deceased Donors *AJT, Volume 21 Supplement 3*

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Abstract# 814

Transplantation of Hepatitis C Positive Kidney and Pancreas Allografts Into Hepatitis C Naïve Recipients - A Single Center Experience as a Standard of Care

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Purpose: Transplantation of Hepatitis C positive organs into Hepatitis C naïve recipients is rapidly gaining widespread acceptance. We report our experience with transplanting HCV D+/R- kidneys at our institution as a standard of care.

Methods: Prospective kidney/SPK transplant recipients were approached at time of listing for Hepatitis C positive (Ab+/NAT - or Ab+/NAT +) kidney offers. Post-operative outcomes were assessed including Hepatitis C related outcomes and graft/patient outcomes.

Results: 50 patients received kidney transplants, 2 received SPK transplants. Out of the 52 patients, 10 organs were Ab+/NAT- while 42 were Ab+/NAT+. There was no seroconversion in the Ab+/NAT- cohort, and 100% seroconversion at 1 week in NAT+ cohort.Genotypes- 1A/1B/2/3 - 22/3/2/15 respectively. 6 patients received Ledipasvir/Sofobuvir, 16 patients Glecaprevir/Pibrentasvir, and 20 received Velpatasvir/Sofobuvir based on our institutional protocol.Therapy was initiated after a mean of 34 days post-transplant. Patient insurance was billed for DAA therapy with 100% approval. At end of treatment, 2/35 patients who have completed therapy continued to be PCR positive. Out of them, one patient had very low viral load which was undetectable on subsequent checks and achieved SVR. The other patient had negative PCR at 4 weeks of treatment but had subsequent treatment failure. He has started Velpatasvir/Voxilaprevir therapy with good initial response. 19 patients have achieved SVR thus far.Average donor KDPI was 62%, 8 (15%) donors had KDPI>85%. Average PRA for recipients was 16%. 13 (25%) patients had DGF. 7 (13%) patients developed acute rejection. 11 (21%) patients developed BK viremia, 7 developed BK nephropathy. 10 patients (19%) had a creatinine >2 at 4 weeks post-tx. There was no fibrosing cholestatic hepatitis C/ post-tx mortality.

Conclusions: Hepatitis C positive to naïve transplants can be done as a standard of care with good post-transplant outcomes. Early initiation of therapy is important. We found a higher incidence of BK viremia in these patients compared to standard. This has been reported by other groups and needs further research for better understanding.

CITATION INFORMATION: Yadav K., Padiyar A., Zhao K., Rabets J., Jittirat A., Sclair S. Transplantation of Hepatitis C Positive Kidney and Pancreas Allografts Into Hepatitis C Naïve Recipients - A Single Center Experience as a Standard of Care *AJT, Volume 21 Supplement 3*

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Abstract# LB 70

Exploring the Correlation with Donor Hepatitis C Viral Load and Viral Kinetics in Naïve Kidney Transplantation Recipients

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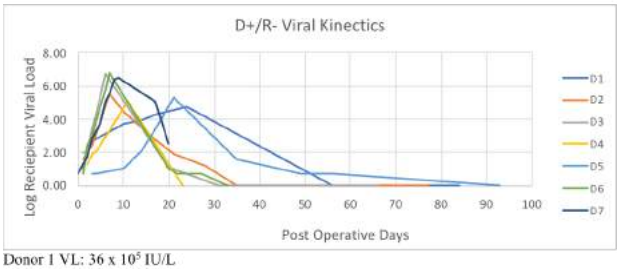
Purpose: The transplantation of Hepatitis C viremic (HCV) kidneys into uninfected recipients was made possible by effective direct acting anti-viral (DAA) therapy. This study aims to analyze the relationship between the donor HCV viral load and recipient HCV viral kinetics.

Methods: A single center retrospective study of HCV naïve patients that received HCV nucleic acid test positive kidneys (D+/R-) was performed. Seven *donors* had documented donor HCV viral loads at time of transplantation. Recipient viral loads were measured at regular intervals following transplantation. Area under the curve (AUC) was calculated to represent the extent of viral burden in the recipients. Recipient peak viral load, viral load AUC, recipient age, date of DAA initiation, and type of induction were analyzed using a linear regression model. D+/R- patients were monitored post-operatively for development of viremia and were all subsequently treated with DAAs.

Results: The average age in the D+/R- group was 43.4 years. The mean donor age was 36.5 years. KDPI was 57.1%. The mean *donor* viral load was found to be 3.05 x 10^6 UI/L. The mean peak recipient viral load was 2.23 x 10^6 IU/L. The mean AUC was 16.13 x 10^6 (IU/L x days). The linear regression model showed no correlation between the donor viral load and the recipient peak viral load or the recipient viral load AUC (p = 0.7 and 0.6). DAA initiation and induction was also non-predictive.

Conclusions: D+/R- transplantation offers patients an alternative strategy to increase access to kidney transplantation. Although, donor viral load did not correlate with the degree of recipient viremia, future studies may find this association significant with a larger cohort.



Donor 1 VL: 36 x 10^5 IU/L
Donor 2 VL: 44 x 10^5 IU/L
Donor 3 VL: 9.8 x 10^5 IU/L
Donor 4 VL: 1.8 x 10^5 IU/L
Donor 5 VL: 667 IU/L
Donor 6 VL: 2.1 x 10^5 IU/L
Donor 7 VL: 119 x 10^5 IU/L

CITATION INFORMATION: Brooks A., Rechnitzer A., Teo R., Goldstein D., Narlieva M., Rocca J., Ajaimy M., Liriano-Ward L., Azzi Y., Pynadath C., Loarte-Campos P., Akalin E., Le M., Yaffe H., Greenstein S., Torabi J., Kinkhabwala M., Graham J. Exploring the Correlation with Donor Hepatitis C Viral Load and Viral Kinetics in Naïve Kidney Transplantation Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Brooks: None. **A. Rechnitzer:** None. **R. Teo:** None. **D.Y. Goldstein:** None. **M. Narlieva:** None. **J.P. Rocca:** None. **M. Ajaimy:** None. **L. Liriano-Ward:** None. **Y. Azzi:** None. **C. Pynadath:** None. **P. Loarte-Campos:** None. **E. Akalin:** None. **M.E. Le:** None. **H. Yaffe:** None. **S. Greenstein:** None. **J. Torabi:** None. **M.M. Kinkhabwala:** None. **J.A. Graham:** None.

PTLD: All Topics

Abstract# 815

Post-Transplant Lymphoproliferative Disorder as a Trigger for Hemophagocytic Lymphohistiocytosis in Solid Organ Transplant - Case Series

M. Doraiswamy, P. Singh, T. Pesavento, *Comprehensive Transplant Center, The Ohio State University Wexner Medical Center, Columbus, OH*

Purpose: Hemophagocytic Lymphohistiocytosis (HLH) is a hyperinflammatory syndrome characterized by cytokine storm from the activated reticuloendothelial system. Due to the nonspecific presentation and overlap with other illnesses, diag-

nosis is often delayed. It has a very poor prognosis, with a 40-50% mortality rate. Reports in solid organ transplant (SOT) are meager. In this study, we aim to evaluate the incidence, triggers, and outcomes of HLH in SOT.
Methods: We did a diagnosis-based database search of all the SOT performed at our center in the past ten years.
Results: Seven SOT recipients with a diagnosis of HLH [Five Kidneys, one Liver, and one Heart] were identified. Induction agents were ATG in all Kidney recipients and IL-2 receptor antagonist for Liver and Heart transplant. Maintenance agents were Calcineurin Inhibitors and Myfortic. The median time to diagnosis post-transplant was 2 years [1-13]. All recipients were Caucasians, 72% male, and the median age of diagnosis was 50 years [28-72]. The presentation included fever, acute hypoxic respiratory failure, shock, altered mental status, hemiplegia, tremors, and hearing loss. Labs showed hyperferritinemia (8000-124,000 ng/mL), elevated Interleukin 2 receptor [1600-6500, normal 139-579 pg/mL], hypertriglyceridemia [613-765-normal less than 150mg/dL], transaminitis, coagulopathy, and pancytopenia. Bone marrow (BM) biopsy demonstrated hemophagocytosis in 72% of patients. This is consistent with previous reports where 25% could have a negative biopsy. The triggers for HLH were EBV positive PTLD (4 cases, EBV PCR 0.3-10 million IU/mL), CMV (PCR - 70 million IU/mL), Ehrlichia, and Clostridium difficile. Treatment modalities used were immunomodulatory agents (dexamethasone, anakinra, ruxolitinib), PTLD guided treatments (R-EPOCH, rituximab, etoposide, prednisone, vincristine, cyclophosphamide, and doxorubicin), and treatment of inciting illness (doxycycline for the Ehrlichiosis and ganciclovir/foscarnet for CMV]. Both patients who died were Kidney transplant and died within a month of diagnosis. The first patient was a 72-years old male with CMV titers of 70 million. He initially responded to dexamethasone, anakinra, and ruxolitinib but later developed multi-organ failure. The second patient was 59-years old with EBV positive PTLD (PCR - 10 million) and was treated with R-EPOCH and anakinra. Overall, the mortality was 28%, which is less than previously reported studies and could be due to early treatment initiation.
Conclusions: Our case-series suggest that severe infections especially EBV positive PTLD, and elderly recipients have a poor prognosis. Early empiric dexamethasone improves outcomes and should be considered if HLH is suspected without waiting for the BM biopsy. The development of a registry for SOT with HLH would enhance our understanding of this syndrome.
CITATION INFORMATION: Doraiswamy M., Singh P., Pesavento T. Post-Transplant Lymphoproliferative Disorder as a Trigger for Hemophagocytic Lymphohistiocytosis in Solid Organ Transplant - Case Series *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Doraiswamy: None. **P. Singh:** None. **T. Pesavento:** None.

Kidney

Kidney Deceased Donor Allocation

Abstract# 823

Black Patients Do Not Have Worse Short-Term Outcomes After Receiving High KDPI (>85%) Kidneys

K. Atiemo[1], S. Guisti[1], K. Guo[2], T. Amankonah[1], A. Vijay[1], A. Paramesh[1], M. Killackey[1], H. Jeon[1], L. Zhao[2], D. Ladner[2], *[1]Tulane University, New Orleans, LA, [2]Northwestern University, Chicago, IL*

Purpose: Some studies have suggested Black kidney transplant recipients have an increased incidence of graft failure and worse survival. We examined whether this finding is consistent using a cohort of recipients of high KDPI (gt85%)/lower quality grafts.
Methods: National data (UNOS) and Multivariable Cox Models were used to assess death-censored graft failure and survival at 1-year post kidney transplant.
Results: 2,845 adults who received a deceased donor kidney only (multiorgan excluded) categorized as high KDPI >85% for the first time (6/1/2015 to 6/1/2018) met inclusion criteria. 984 (35%) were White, 997 (35%) were Black, 583 (20) were Hispanic and 281 (10%) were Asian. The median KDPI for Whites was 90% (IQR 87%-94%), Blacks 90% (IQR 87%-94%), Hispanics 90% (IQR 87%-93%) and Asians 89% (IQR 87-93). The median EPTS score for Whites was 74% (IQR 56%-89%), Blacks 75% (IQR 51%-91%), Hispanics 81% (61%-91%) and Asians 77% (58%-91%). Graft failure rate for Whites was 7%, Blacks 7%, Hispanics 4% and Asians 5%. Survival for Whites was 93%, Blacks 95%, Hispanics 94% and Asians 95%. After adjusting for age, gender, insurance, education level, cause of renal failure, waiting time, number of HLA mismatches and cold ischemic time there were no racial differences in death censored graft failure. Black vs White [HR 0.89 (95% CI 0.6-1.3)]; Hispanic vs White [HR 0.63 (95% CI 0.4-1.1)] and Asian vs White [HR 0.69(95%CI 0.4-1.2)]. Similarly, after adjusting for EPTS score, BMI, gender, insurance, education level and cold ischemic time no racial differences in 1-year survival were observed. Black vs White [HR 0.80 (95% CI 0.6-1.2)]; Hispanic vs White [HR 1.1 (95% CI 0.7-1.7)] and Asian vs White [HR 0.82 (95%CI 0.5-1.5)].
Conclusions: Concern for poorer outcomes among Black recipients of high KDPI kidneys may be unwarranted at least in the short-term. Greater utility can be made of high KDPI kidneys for which survival benefit has been demonstrated yet are still discarded at a high rate.
CITATION INFORMATION: Atiemo K., Guisti S., Guo K., Amankonah T., Vijay A., Paramesh A., Killackey M., Jeon H., Zhao L., Ladner D. Black Patients Do Not Have Worse Short-Term Outcomes After Receiving High KDPI (>85%) Kidneys *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Atiemo: None. **S. Guisti:** None. **K. Guo:** None. **T. Amankonah:** None. **A. Vijay:** None. **A. Paramesh:** None. **M. Killackey:** None. **H. Jeon:** None. **L. Zhao:** None. **D. Ladner:** None.

Abstract# 824

Low Immunogenic Donors Improved Survival of Kidney Transplants in African American Recipients

D. Bekbolsynov[1], R. Green[2], B. Mierzejewska[1], O. Ekwenna[1], M. Rees[1], S. Stepkowski[1], *[1]University of Toledo, Toledo, OH, [2]Bowling Green State University, Bowling Green, OH*

Purpose: Kidney transplants fail more often in African American (AA) than in Caucasian (CAU) recipients. We calculated the hydrophobic mismatch score (HMS) from polymorphic amino acids out of donor/recipient HLAs to select low immunogenic kidney transplants for African American patients.
Methods: The HMS immunogenicity (IM) on a scale of 0-20 for 64,053 AA and CAU recipients was correlated with Kaplan-Meier survival estimates and Cox regression analyses.
Results: The median kidney graft survival was 12.0 years in AA vs. 18.6 years in CAU recipients, a 6.6-year difference ($p<0.001$). Our analysis showed that AA recipients had higher both donor/recipient HLA-A/B/DR disparities and HMS IM values than CAU recipients (both $p>0.001$). We performed a re-matching simulation of 5,000 donor/recipient pairs with a priority for either 1,000 AA recipients or 4,000 CAU recipients. When 1,000 AA were matched first with 5,000 donors, 27.2% found HMS=0 donors, 44.5% HMS≤1.0 donors, and 66.5% HMS≤3.0 donors, all with an improved graft survival (Table 1). When CAU recipients were prioritized, AA patients found significantly less donors (Table 1). Importantly, preferential re-matching of AA recipients still allowed to accommodate the vast majority of CAU recipients: 35.8% with HMS=0 donors; 55.8% with HMS=2 donors and 74.6% with HMS=7 donors. Preferential CAU re-matching only slightly increased CAU re-matching, while dramatically decreased chances for AA recipients.
Conclusions: Because higher HMS threshold is acceptable for CAU patients, the preferential AA matching significantly increased chances in finding low IM donors for AA recipients, but still providing excellent chances to find low IM donors for CAU recipients.

Recipient race	HMS Value	% re-matched AA first (±SD)	% re-matched CAU first (±SD)	Median survival (95% CI)
African Americans	0	27.2 (±1.7)	3.7 (±0.3)	16.1 (12.3-NA)
	1.0	44.5 (±1.2)	7.5 (±0.7)	16.1 (13.9-NA)
	2.0	57.2 (±1.5)	12.4 (±0.7)	14.6 (12.3-16.1)
	3.0	66.5 (±1.1)	18.0 (±0.8)	13.9 (11.9-15.0)
	7.0	87.6 (±1.0)	39.4 (±1.2)	11.9 (11.5-12.6)
Caucasians	0	35.8 (±0.5)	43.9 (±0.7)	21.6 (NA-NA)
	1.0	44.5 (±0.5)	55.6 (±0.8)	24.1 (NA-NA)
	2.0	53.8 (±0.7)	65.6 (±0.6)	22.6 (NA-NA)
	3.0	60.5 (±0.5)	72.3 (±0.6)	22.5 (18.3-NA)
	7.0	74.6 (±0.6)	85.6 (±0.5)	18.7 (18.1-NA)

CITATION INFORMATION: Bekbolsynov D., Green R., Mierzejewska B., Ekwenna O., Rees M., Stepkowski S. Low Immunogenic Donors Improved Survival of Kidney Transplants in African American Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Bekbolsynov: None. **R. Green:** None. **B. Mierzejewska:** None. **O. Ekwenna:** None. **M. Rees:** None. **S. Stepkowski:** None.

Abstract# 825

VO_{2peak} Differentiates Survival Post Kidney Transplant

H. Chakkera[1], B. Kaplan[2], P. Budhiraja[1], R. Butterfield[1], *[1]Mayo Clinic Hospital, Phoenix, AZ, [2]Baylor Scott and White Health, Temple, TX*

Purpose: The OPTN/UNOS utilizes the calculated *estimated posttransplant survival* (EPTS) score as the measure of post-kidney transplant survival to guide allocation of deceased donor kidney transplantation. This score does not include any metric of functional capacity. Peak oxygen uptake (VO_{2peak}), is an established predictor of survival among both the general and diseased populations.
Methods: We assessed the association and discriminative capacity of VO_{2peak} and that of EPTS score and all-cause mortality post-kidney transplant. Additionally, we assessed the *"mortality risk"* lower VO_{2peak} conferred on those patients with low EPTS score
Results: The study cohort included 293 patients with at least 3 year follow-up. 76.1% were deceased donor transplants. Mean follow-up period was 6.0 years. The mean transplant age was 57.6 years, 61.4% were male, 15.8% with history of coronary artery disease and 48.8% diabetic . The median VO_{2peak} was 15.0 ml/Kg/min. Through last follow-up, the cohort had 38 (13%) deaths. A 1 unit increase in the VO_{2peak} conferred approximately a 10% reduction in mortality [Unadjusted Hazard Ratio (95% Confidence Interval) = 0.90 (0.82-0.98), p = 0.018] and a 10 unit increase in the EPTS score calculated at transplant conferred approximately a 29% increase in mortality [HR (95% CI) = 1.29 (1.13, 1.47), p = 0.001]. In an adjusted

survival model (N= 293), Harrell C-Statistic (Standard Deviation) for the model with VO_{2peak} was 0.76 (0.04) indicating good discriminatory ability of VO2peak and all-cause mortality.

Lower pre-transplant VO_{2peak} and higher EPTS score conferred higher risk of post-transplant mortality. Among the cohort of "low-risk" patients (patients with EPTS score less than 50) those with lower VO_{2peak} had significantly higher risk of mortality (log rank p=0.045)., Figure 1. In fact, the mortality risk among those with *low-EPTS (*less than *50) and low* VO_{2peak} less than12ml/Kg/min was equivalent to those with high EPTS (greater than 80) score., Figure 2.

Conclusions: We concluded all EPTS is not the same. Functional capacity as defined by VO_{2peak} is an important reflection of post-transplant survival**.** VO_{2peak} is able to identify those with low EPTS who have similar survival to that of high EPTS phenotype.

Figure 1

Time-to-Event Survival Comparison of Low TX EPTS (<50): Low VO_{2peak} (<12) vs High VO_{2peak} (>15)

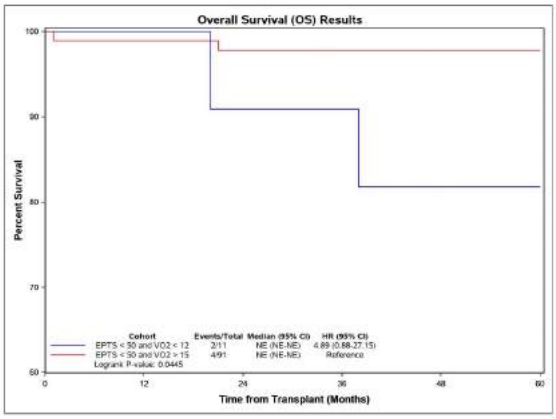
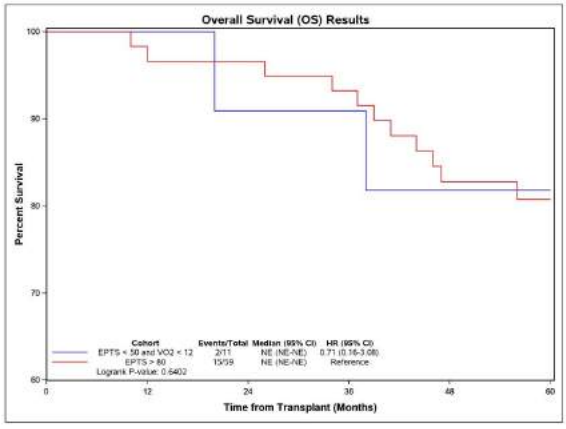


Figure 2

Time-to-Event Survival Comparison: Low TX EPTS (<50) and Low VO_{2peak} (<12) vs High TX EPTS Score (>80)



CITATION INFORMATION: Chakkera H., Kaplan B., Budhiraja P., Butterfield R. VO_{2peak} Differentiates Survival Post Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Chakkera: None. **B. Kaplan:** None. **P. Budhiraja:** None. **R. Butterfield:** None.

Abstract# 826

Outcomes of Deceased Donor Transplants with Donor Specific Antibodies Before and After the New Kidney Allocation System

R. Crew, P. Khairallah, S. S. Patel, *Columbia University, New York, NY*

Purpose: KAS forced centers to list unacceptable HLA antigens. Some centers excluded antigens at any level of anti-HLA Ab. Our center only excluded antibodies posing excess risk (ie mean fluorescence intensity [MFI] >3000). We hypothesized that the restriction in anti-HLA levels improved outcomes of +DSA DDRTx.

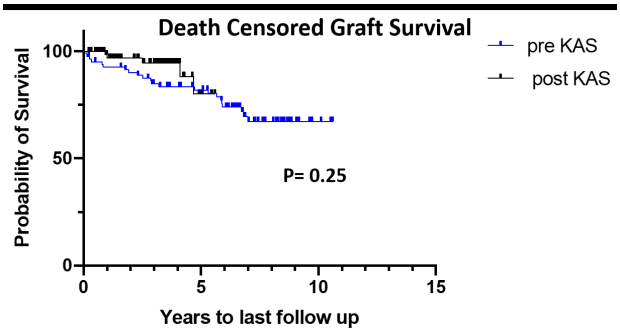
Methods: We reviewed our database to identify +DSA DDRTx recipients from 1/1/2010-12/3/2014 (last day prior to KAS) and from 12/4/2014-8/31/2020. We recorded data on induction, anti-HLA DSA measured by Luminex®, rejection rates, renal function, graft loss and death.

Results: 86 of 565 DDRT had DSA pre-KAS compared to 74 of 538 DDRT after KAS. Follow up was 6.35 (IQR 3.2-8) and 3.1 (IQR 1.2-3.9) years respectively ($p < 0.001$). Both groups had a similar % of women with similar ages but different induction strategies (Table 1). Our protocol +DSA pts changed during this time period, leading to more post-KAS patients getting IVIg/Rituximab induction to prevent AMR and more protocol biopsies (87% vs 23%, $p < 0.01$). The type of anti-HLA Abs (class 1, 2, or both) were not different between groups but the DSA MFIs were significantly lower post-KAS. Rejection was more common post-KAS (81% vs 65%), which was entirely explained by the increased use of protocol biopsies. Patients transplanted post-KAS were diagnosed with AMR significantly later. ACR occured earlier and was significantly milder with more frequent borderline rejections. Despite the high rejection rate, kidney function at 1 year was excellent with no difference between groups (median 1.57 [IQR 1.26-2] mg/dL vs 1.42 [IQR 1.27-1.81], p 0.17). Death censored graft survival was not significantly different at 1 year (94.5% vs 98.7%) or at 3 years (84.8% vs 96%).

Conclusions: Despite listing unacceptable HLA antigens postKAS, a similar percentage of our DDRTx had DSA, though at much lower MFI. The overall renal function is excellent and graft survival comparable to UNOS reported outcomes for DDRTx at 1 year (93.2%) and 3 years (85.1%).* These outcomes suggest that transplanting sensitized patients with low level MFI is worthwhile compared to continuing dialysis while awaiting an offer without DSA.

*https://optn.transplant.hrsa.gov/data/view-data-reports/national-data/ accessed 12/3/2020

	PreKAS (n=86)	PostKAS (n=74)	P value
Women	58%	56%	
Age- years (IQR 25%, 75%)	53 (40.6,63.5)	53.6 (39.8,63.5)	
Induction Therapy			**0.001**
r-ATG	52%	78%	
Alemtuzumab	33%	19%	
Basiliximab	15%	3%	
Anti-HLA Antibody Type			0.78
Class 1 Only	40 (47%)	37 (50%)	
Class 2 Only	21 (24%)	18 (24%)	
Both	25 (29%)	19 (26%)	
Antibodies per patient- mean (±SD)			
Class 1	1.023 (±0.802)	1.01(±0.816)	0.91
Class 2	0.791 (±0.896)	0.662(±0.781)	0.3359
Total	1.85 (±1.11)	1.676(±0.796)	0.265
Total number of Class 1 Antibodies	91	75	
MFI 1000-2999	46 (50.5%)	51 (68%)	
MFI 3000-9999	35 (38.5%)	24 (32%)	**0.0011**
MFI >10,000	10 (11.0%)	0 (0%)	
Total number of Class 2 Antibodies	68	49	
MFI 1000-2999	25 (36.8%)	36(73.4%)	
MFI 3000-9999	26 (38.2%)	8(16.3%)	**0.0001**
MFI >10,000	17 (25%)	5(10.2%)	
Any Rejection	56 (65%)	60 (81%)	**0.0327**
AMR or AMR + ACR	35 (41%)	24 (32%)	0.325
Days to AMR-median (IQR 25%,75%)	13.5(7,62.9)	132(14.8,299.3)	**0.02**
ACR			
Borderline	20 (23%)	33 (45%)	
1A	11 (12.8%)	7 (9%)	**0.0319**
1B	4 (4.7%)	5 (7%)	
2A	5 (5.8%)	11 (15%)	
Days to ACR- median (IQR 25%, 75%)	186 (32, 365)	28.5 (15.8,177.7)	**0.017**
Rejection % by protocol bx status			
Yes	90%	85%	
No	54%	56%	



CITATION INFORMATION: Crew R., Khairallah P., Patel S. Outcomes of Deceased Donor Transplants with Donor Specific Antibodies Before and After the New Kidney Allocation System *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Crew: None. **P. Khairallah:** None. **S.S. Patel:** None.

Abstract# 827

Titer Stability vs. Terminal Pre-transplant Titer: Titer History is Irrelevant for A_2 to B Transplantation

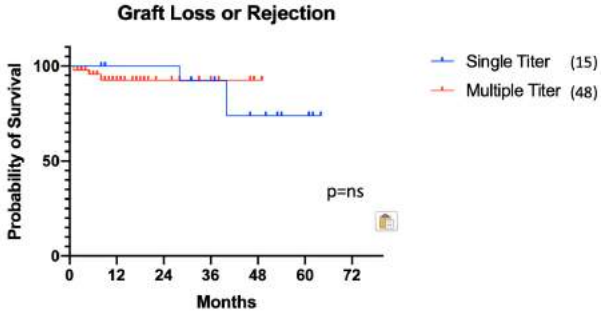
A. Gilbert[1], S. Radomski[2], J. Vucci[1], B. Thomas[1], M. Cooper[1], *[1]Medstar Georgetown Transplant Institute, Washington, DC, [2]Johns Hopkins Medical Center, Baltimore, MD*

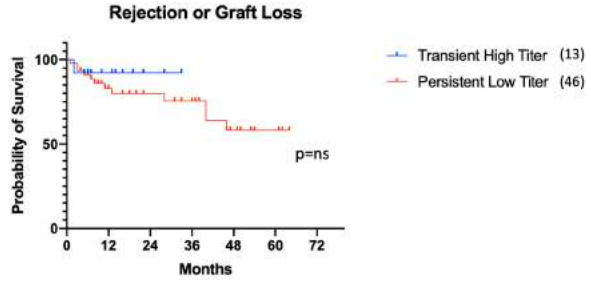
Purpose: Minor ABO incompatibile (ABOi) transplants from blood group A_2 or A_2B donors have increased since 2014, but initial guidance suggested that establishing an anti-A titer history is critical for effective transplantation. We reviewed our center's data to determine the relevance of the anti-A titer history in transplant outcomes.

Methods: This is a retrospective study. We reviewed all patients who received kidneys across minor ABOi. All patients getting minor ABOi transplants received standard treatment without any additional plasmapheresis. Recipients were categorized as those with only a single titer measurement pre-transplant vs those who had a titer history with readings over at least 3 months. For those with a titer history, we further stratified patients into those with persistently low titers (less than 1:8) and those that had at least 1 high titer but whose titers returned to low levels prior to being transplanted. The outcome of rejection or graft loss was evaluated using Kaplan-Meier plots and analyzed with the Mantel-Cox log rank test.

Results: Among our minor ABOi recipients, we found 15 had only a single anti-A titer and 48 had at least a 3 month titer history. We also identified 46 recipients who were transplanted with persistently low titers compared with 13 who had been identified with one or more high titers that returned to low levels by the time of transplant. Kaplan-Meier analysis showed no advantage in having an extended titer history (figure 1). Mean creatinine at 3 months and 1 year were not statistically different between the groups (1.55 vs 1.54 at 3m p=0.96, 1.57 vs 1.51 at 1 yr p=0.75). Similarly, in those with a history, a prior high titer that resolved before transplantation was associated with no increased incidence of graft loss or rejection (figure 2). Mean creatinine at 3m and 1yr were statistically similar (1.86 vs 1.50 at 3m p=0.10, 1.57 vs 1.43 at 1yr, p=0.53)

Conclusions: Contrary to common practice, a recipient's anti-A titer history demonstrated no significance in predicting graft outcomes as long as the titers were low at the time of transplant. Transplantation across minor ABOi does not require a titer history to be safe and effective.





CITATION INFORMATION: Gilbert A., Radomski S., Vucci J., Thomas B., Cooper M. Titer Stability vs. Terminal Pre-transplant Titer: Titer History is Irrelevant for A_2 to B Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gilbert: Honoraria; Name of Commercial Interest; Veloxis. Honoraria; Nature of Relationship; Advisory Committee Member. **S. Radomski:** None. **J. Vucci:** None. **B. Thomas:** None. **M. Cooper:** None.

Abstract# 828

HLA Haplotype Frequency and Racial Disparities in Access to Transplant Among Highly Sensitized Kidney Transplant Candidates

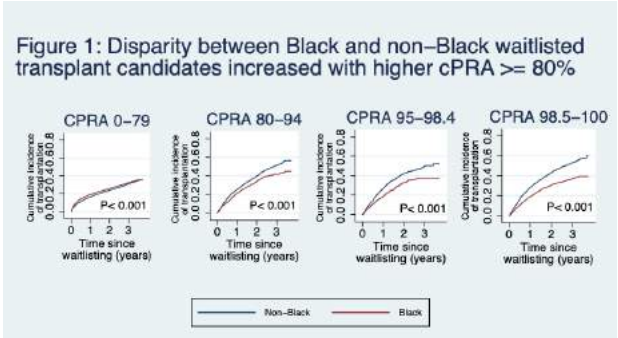
L. Gragert[1], M. Kadatz[2], D. Chang[2], H. Gebel[3], D. Stewart[4], E. Kransdorf[5], S. Brar[2], S. Vaishnav[2], J. Gill[2], J. Lan[2], *[1]Tulane University, New Orleans, LA, [2]University of British Columbia, Vancouver, BC, Canada, [3]Emory University, Atlanta, GA, [4]UNOS, Richmond, VA, [5]Cedars-Sinai, Beverly Hills, CA, Canada*

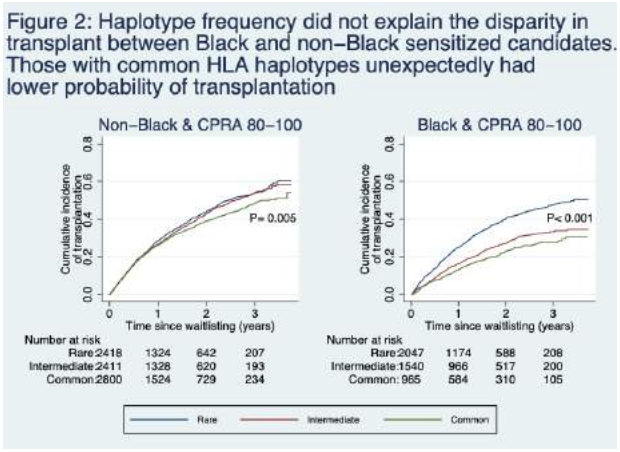
Purpose: Despite implementation of the Kidney Allocation System (KAS) which prioritizes sensitized patients, sensitized Black individuals are less likely to receive a transplant than non-Black individuals on the waitlist. Given zero-mismatch transplants are more common among sensitized patients, we hypothesized that more sensitized Black candidates have rare HLA genotypes, resulting in fewer potential matches from the donor pool and a lower likelihood of transplantation compared with non-Black candidates.

Methods: We analyzed a retrospective cohort of adult kidney transplant candidates (N=87174) from the 2019 USRDS database who were waitlisted post-KAS (Dec 4, 2014). The most likely HLA genotype for each candidate was imputed using the NMDP HapLogic algorithm from serologic HLA typing and categorized into "Common", "Intermediate" and "Rare" based on observed frequencies in the overall candidate population. Cumulative incidence of transplant from listing date was stratified by cPRA, race, and HLA genotype frequency.

Results: Black candidates had reduced probability of transplantation compared to non-Black candidates only when cPRA was >= 80%, and this disparity widened with higher cPRA (Fig 1). This effect remained significant after adjusting for competing risks of death/waitlist removal and ABO blood group. Candidates with common HLA genotype frequencies had the lowest incidence of transplantation in all candidates; however, Black candidates had a lower cumulative incidence of transplant relative to non-Black candidates, regardless of HLA genotype frequency (Fig 2).

Conclusions: Disparity in access to transplant between Black and non-Black transplant candidates is greater with increasing cPRA above 80%. This disparity is not explained by HLA genotype frequencies. Why the disparity widens with increasing cPRA remains uncertain. Contrary to our hypothesis, patients with common HLA frequency had the lowest access to transplantation. This unexpected phenomenon requires further studies.





CITATION INFORMATION: Gragert L., Kadatz M., Chang D., Gebel H., Stewart D., Kransdorf E., Brar S., Vaishnav S., Gill J., Lan J. HLA Haplotype Frequency and Racial Disparities in Access to Transplant Among Highly Sensitized Kidney Transplant Candidates *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Gragert: None. **M. Kadatz:** None. **D. Chang:** None. **H. Gebel:** None. **D. Stewart:** None. **E. Kransdorf:** None. **S. Brar:** None. **S. Vaishnav:** None. **J. Gill:** None. **J. Lan:** None.

Abstract# 829

The Incremental Cost of Transplanting Patients with 100% cPRA Under the Kidney Allocation System: A Single Center Analysis

R. Gumber, E. Kraus, K. Jackson, N. Alachkar, *Nephrology, Johns Hopkins University School of Medicine, Baltimore, MD*

Purpose: Our group has described excellent three year patient and graft survival in patients with 100% cPRA undergoing kidney transplantation under the Kidney Allocation System (KAS) (Jackson et al. AJT;20(10):2890-2898). However, there may be incremental costs of kidney transplant compared to patients with 0% cPRA associated with immunosuppression, organ allocation, hospital length of stay and readmissions. We studied the incremental cost of transplanting patients with 100% cPRA compared to patients with 0% cPRA under KAS in a single center.

Methods: Cohort of patients with 100% cPRA (n=97) and 0% cPRA (n=180) who underwent kidney transplantation from December 2014 to 2019 were retrospectively reviewed. All patients received induction therapy with anti-thymocyte globulin and high dose steroids. Recipients with presence of DSA or repeat mismatches were also given Rituximab, and those with DSA at flow cytometric cross-match level (n=6) were treated with plasmapheresis and intravenous immunoglobulin. Maintenance immunosuppression was tacrolimus, mycophenolate mofetil, and prednisone.

Results: The average cost of hospitalization for kidney transplantation (sum of hospital charges and professional fee) was $189,975 for patients with 100% cPRA and $191,700 for 0% cPRA (p-value=0.9) with similar length of stay (median=8 days). We evaluated surrogates for costs incurred after index transplant admission. 57.7% of patients with 100% cPRA versus 43.9% with 0% cPRA needed readmission within 12 months post kidney transplantation (p-value=0.028). Amongst patients readmitted, there was no difference in number of readmissions (median=2), or in readmissions within 30 days of kidney transplantation (100% cPRA=44.6%, 0% cPRA=43%). Cumulative length of stay during readmissions was similar in both groups (median=8 days). Table below summarizes these results.

	100% cPRA: Average/ Median (IQR)	0% cPRA: Average/ Median (IQR)
Hospital charges: Index admission ($)	161,664/152,783 (132,644-178,544)	154,698/135,064 (117,947-163,687)
Professional fee: Index admission ($)	28,311/24,966 (23,285 -29,271)	37,002/26,604 (21,296-35,977)
Length of stay (LOS): Index admission (days)	11/8 (6-12)	11/8 (6-13)
Readmissions (n)	2.07/2 (1-2)	2.06/2 (1-2)
LOS: readmissions (days)	13.5/8 (4-14.7)	14.3/8 (4-19)

Conclusions: Compared to 0% cPRA, patients with 100% cPRA patients did not have an incremental cost of undergoing kidney transplantation but had an increase in readmissions during the first year post transplant.

CITATION INFORMATION: Gumber R., Kraus E., Jackson K., Alachkar N. The Incremental Cost of Transplanting Patients with 100% cPRA Under the Kidney Allocation System: A Single Center Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Gumber: None. **E. Kraus:** None. **K. Jackson:** None. **N. Alachkar:** None.

Abstract# 830

Effect of HLA-DR Mismatches on Graft Outcomes of Kidney Transplant from Elderly Donors

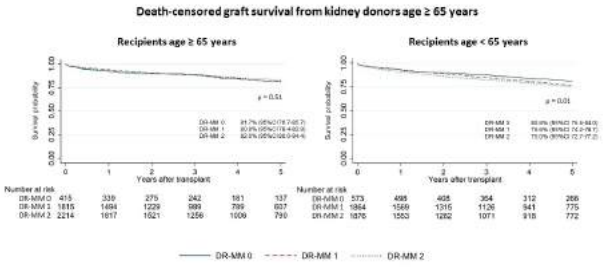
P. Homkrailas, S. Bunnapradist, *David Geffen School of Medicine at UCLA, Los Angeles, CA*

Purpose: Human leukocyte antigen (HLA)-DR has been shown to be more immunogenic than HLA-A or -B. The impact of HLA-DR mismatches remains unclear among kidney transplant from elderly donors. Here we report the effect of HLA-DR mismatches on graft rejection and graft survival among these patients.

Methods: The OPTN/UNOS data of kidneys from donors aged ≥65 years, transplanted between 2000-2018 were included. Study populations were grouped into recipients aged ≥65 years (old-old) and recipients aged <65 years (old-young).

Results: A total of 8,826 KTXs were included, which 50.7% were old-old. There were 26.5% and 24.9% living donor transplant in old-old and old-young groups, respectively. The median follow-up time was 5 years (IQR 2.2-8.8). KTXs with 0, 1 and 2 HLA-DR mismatches were 9.3%, 40.8% and 49.9% of old-old group, and 13.2%, 43.2% and 43.6% of old-young group, respectively. There were lower rejection rates in old-old group with 0, 1 and 2 HLA-DR mismatches which were 8.7%, 11.3% and 13.0% compared to old-young group which were 12.2%, 14.9% and 14.8%, respectively. Univariate analysis and multivariate analysis including recipient age, HLA-A and -B mismatches, panel reactive antibody, previous transplant, cold ischemic time, and delayed graft function showed that HLA-DR mismatch was associated with an increased risk for rejection (HR 1.13; 95%CI 1.04-1.23 and aHR 1.12; 95%CI 1.02-1.17 per each degree of mismatch). In old-old group, there were no differences in 5-year death-censored graft survivals (DCGSs) which were 81.7%, 80.8% and 82.6% when HLA-DR mismatches = 0, 1 and 2, respectively (p=0.51). In old-young group, there were statistically significant lower 5-year DCGSs when HLA-DR mismatches = 0, 1 and 2 which were 80.6%, 76.6% and 75.0%, respectively (p=0.01).

Conclusions: HLA-DR mismatches in KTX from elderly donors had no significant effect on DCGSs if transplant into older recipients but associated with statistically significant lower DCGSs if transplant into younger recipients. HLA-DR mismatches were an independent risk factor for graft rejection in both elderly and younger recipients. Comparing within each degree of HLA-DR mismatch, older recipients had better DCGS and lower rejection rates than younger recipients.



CITATION INFORMATION: Homkrailas P., Bunnapradist S. Effect of HLA-DR Mismatches on Graft Outcomes of Kidney Transplant from Elderly Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Homkrailas: None. **S. Bunnapradist:** Grant/Research Support; Name of Commercial Interest; FDA, NIDDK, NIAID, Astellas, Mallinckrodt, BMS, CareDx, Natera, Merck, Vitaeris, OneLegacy. Grant/Research Support; Nature of Relationship; grant. Honoraria; Name of Commercial Interest; Sanofi, Veloxis, Natera, CareDx. Honoraria; Nature of Relationship; speaker, advisory board.

Abstract# 831

Organ Decline Rate and Outcomes of Shared Kidneys from OneLegacy OPO Donation Service Area in Los Angeles

M. Hussain[1], P. Homkalrias[1], K. Wheeler[2], G. Danovitch[1], S. Bunnapradist[1], *[1]UCLA David Geffen School of Medicine, Los Angeles, CA, [2]OneLegacy, Los Angeles, CA*

Purpose: Background: 20% recovered kidneys are discarded in the US. Southern California has a high number of End-Stage Kidney Disease patients and the waitlist time is one of the longest in the country.

Objectives: In this study we aimed to evaluate outcomes of organs recovered from donors in OneLegacy OPO representing seven counties of the greater Los Angeles area and to identify reasons of local organ decline.

Methods: We obtained data from UNOS and the Organ Procurement Organization (OPO), OneLegacy for kidneys under their donation service area (DSA) between January 2015 and August 2020. We calculated the local organ decline rate defined as the percentage of recovered organs declined by all centers under the OPO's DSA and shared outside the DSA. We also evaluated the offer refusal rate defined as organ offers that were refused by centers within the OPO's DSA.

Results: Out of 8113 kidneys offered for transplant, 6408 (79%) were refused by centers within the OPO's DSA at least once before being accepted. 1258 out of 7894 (15.9%) kidneys that were recovered locally within the OPO's DSA were subsequently transplanted out of the DSA. Out of the 1258 kidneys that were shared, 28 grafts had the composite outcome of primary failure and primary non-function. 219 kidneys were not offered for transplant and were discarded at the time of recovery. The most common reasons for offer refusal were "donor age or quality" (36.8%) and "patient ill, unavailable, refused or temporary unsuitable" (35.3%).

Conclusions: The local organ decline rate is significant in our DSA. A significant number of kidneys that were declined in this DSA were transplanted and 2.2% had primary non-function. Opportunities for increased utilization of these organs within the service area are being explored.

CITATION INFORMATION: Hussain M., Homkalrias P., Wheeler K., Danovitch G., Bunnapradist S. Organ Decline Rate and Outcomes of Shared Kidneys from OneLegacy OPO Donation Service Area in Los Angeles *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Hussain: None. **P. Homkalrias:** None. **K. Wheeler:** Grant/Research Support; Name of Commercial Interest; OneLegacy. Grant/Research Support; Nature of Relationship; Transplant Administrator. **G. Danovitch:** Other; Name of Commercial Interest; One Legacy. Other; Nature of Relationship; Medical Director of Quality Assurance. **S. Bunnapradist:** Grant/Research Support; Name of Commercial Interest; FDA, NIDDK, NIAID, NIH, Astellas, Mallinckrodt, BMS, CareDx, Natera, Merck, Vitaeris and OneLegacy. Honoraria; Name of Commercial Interest; caredx, natera, sanofi. Honoraria; Nature of Relationship; Advisory Committee Member. Other; Name of Commercial Interest; sanofi, Veloxis, natera caredx. Other; Nature of Relationship; Speaker.

Abstract# 832

Sharing Under KAS - What is the Impact According to KDPI?

M. Jacobs, R. Stratta, C. Jay, *Wake Forest Baptist Health, Winston Salem, NC*

Purpose: The new Kidney Allocation System (KAS) implemented in 2014 was designed to facilitate sharing of kidneys due to changes in prioritization of highly sensitized patients and other groups. We sought to determine effects on sharing across pre- and post-KAS eras according to the Kidney Donor Profile Index (KDPI).

Methods: Using UNOS data, we compared local, regional, and national utilization for deceased donor kidney transplants (DDKT) alone according to KDPI strata and KAS era: Era 1 (2010-2011, pre-KDPI), Era 2 (2012-2013, pre-KAS), Era 3 (2014-2015, early post-KAS), Era 4 (2016-2017), and Era 5 (2018-2020).

Results: Since KAS, sharing of kidneys increased across all KDPI groups, and is more pronounced with increasing KDPI. Most notably, regional utilization more than doubled for KDPI >85% kidneys while local use decreased by 30% from Era 1 to 5 (Table 1). However, a 60% increase in absolute numbers of DDKTs performed from Era 1 to Era 5 compensated for increased sharing such that local DDKT volumes rebounded by Era 5. Conversely, sharing for calculated panel reactive antibody (cPRA) 99-100% patients increased post-KAS across all KDPI groups but the effect was more pronounced with lower KDPI strata (89% increase in sharing from Era 1 to 5 for KDPI 0-20%, and a 32% increase for KDPI >85%). However, sharing of kidneys for high cPRA patients accounted for only 23% of shared kidneys and 8% of DDKT alone by Era 5. Consequently, in Era 5, 70+% of kidneys in the 3 lower KDPI strata were transplanted locally whereas 50% of kidneys in the highest KDPI strata were shared.

Conclusions: KAS increased sharing across all KDPI strata with the biggest change occurring in increased regional utilization of KDPI >85% organs. Increasing DDKT volume has offset any reductions in absolute number of local transplants despite increasing sharing. Increased sharing for cPRA 99-100% patients has occurred across KDPI, particularly in the lower KDPI strata, but this represents a minority of kidneys shared.

	Era 1 2010-2011 n=19,821	Era 2 2012-2013 n=19,992	Era 3 2014-2015 n=21,464	Era 4 2016-2017 n=24,702	Era 5 2018-2020 n=32,029	p value
KDPI 0-20%	n=4,511	n=4,483	n=4,725	n=5,480	n=5,838	
Local	3594 (80%)	3519 (79%)	3584 (76%)	4144 (76%)	4447 (76%)	p<0.01
Regional	308 (7%)	317 (7%)	361 (8%)	446 (8%)	519 (9%)	
National	609 (14%)	647 (14%)	780 (17%)	890 (16%)	872 (15%)	
KDPI 21-34%	n=3,099	n=3,287	n=3,664	n=4,414	n=5,159	
Local	2425 (78%)	2601 (79%)	2620 (72%)	3162 (72%)	3698 (72%)	p<0.01
Regional	263 (8%)	267 (8%)	371 (10%)	410 (9%)	589 (11%)	
National	411 (13%)	419 (13%)	673 (18%)	842 (19%)	872 (17%)	
KDPI 35-85%	n=10,319	n=10,573	n=11,612	n=13,193	n=18,211	
Local	8123 (79%)	8223 (78%)	8488 (73%)	9111 (69%)	12416 (68%)	p<0.01
Regional	931 (9%)	1000 (9%)	1297 (11%)	1823 (14%)	2845 (16%)	
National	1265 (12%)	1350 (13%)	1827 (16%)	2559 (17%)	2950 (16%)	
KDPI 86-100%	n=1711	n=1621	n=1462	n=1615	N=2819	
Local	1245 (73%)	1139 (70%)	848 (58%)	760 (47%)	1429 (51%)	p<0.01
Regional	206 (12%)	220 (14%)	378 (26%)	605 (37%)	942 (33%)	
National	260 (15%)	262 (16%)	236 (16%)	250 (15%)	448 (16%)	

CITATION INFORMATION: Jacobs M., Stratta R., Jay C. Sharing Under KAS - What is the Impact According to KDPI? *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Jacobs: None. **R. Stratta:** None. **C. Jay:** None.

Abstract# 833

Impact of the Kidney Allocation System on Kidney Transplant Outcomes in Patients with Long Dialysis Treatment (> 10 Years)

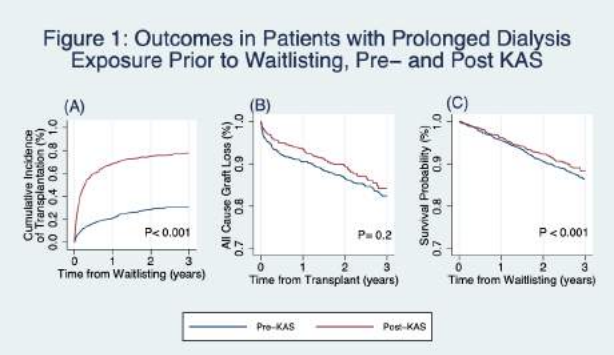
M. Kadatz, S. Vaishnav, S. Brar, D. Chang, J. Lan, J. Gill, *Medicine, Division of Nephrology, University of British Columbia, Vancouver, BC, Canada*

Purpose: Prior to the new kidney allocation system (KAS), patients treated with dialysis for > 10 years before transplantation were shown to derive a survival benefit from transplantation (Gill CJASN 2017). With the new KAS, the accrual of waiting time was back-dated to the date of first chronic dialysis for patients wait-listed after the start of chronic dialysis treatment. This led to a large increase in wait-list activations of patients with long dialysis vintage >10 years who had never been previously wait-listed. The outcomes of these patients with long dialysis vintage >10 years who were opportunistically wait-listed after the new KAS are unknown.

Methods: The study included n = 1446 adult > 18 years patients in the 2019 USRDS data base who were wait-listed for a kidney transplantation after >10 years of dialysis treatment in a 12 month period after the implementation of the new KAS in Dec. 2014, and a control group of n=1183 patients with >10 years of dialysis treatment who were wait-listed for transplantation in the 12 months prior to implementation of the new KAS. Patient characteristics pre- and post- KAS were compared, and access to transplantation was compared with cumulative incidence curves. Outcomes including overall survival, all cause graft loss (ACGL), death censored graft loss (DCGL), and death with function (DWF) pre- and post- KAS were compared with univariable and multivariable models.

Results: Patients with long dialysis vintage prior to waitlisting were similar pre- and post- KAS, being predominantly black (58%), Medicare insured (76%) and not highly sensitized. Those listed post-KAS had improved access to transplantation compared to those listed pre-KAS (78% vs 31% transplanted at 3 years after listing) (Fig 1A). Among patients who received a transplant (n = 686) pre and post KAS (n = 974) there was no difference allograft survival (Fig 1B). The overall unadjusted survival of waitlisted individuals was superior post-KAS compared to post KAS (Fig 1C).

Conclusions: The new KAS has successfully improved access to transplantation for patients with prolonged dialysis treatment , with improved survival and no deterioration in transplant outcomes. Unlisted patients with long-dialysis vintage should be prioritized for transplant evaluation.



CITATION INFORMATION: Kadatz M., Vaishnav S., Brar S., Chang D., Lan J., Gill J. Impact of the Kidney Allocation System on Kidney Transplant Outcomes in Patients with Long Dialysis Treatment (> 10 Years) *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Kadatz: None. **S. Vaishnav:** None. **S. Brar:** None. **D. Chang:** None. **J. Lan:** None. **J. Gill:** None.

Abstract# 834

Transplant Center Provisional Yes Practices for Deceased Donor Kidneys

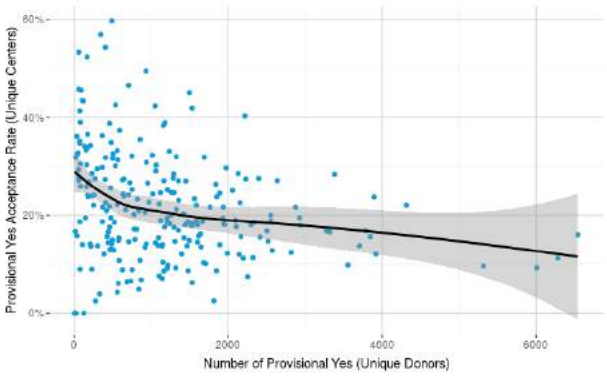
A. M. Placona[1], C. Martinez[1], H. McGehee[1], C. Van De Walker[2], J. Rosendale[1], *[1]United Network for Organ Sharing, Richmond, VA, [2]Pacific Northwest Transplant Bank, Portland, OR*

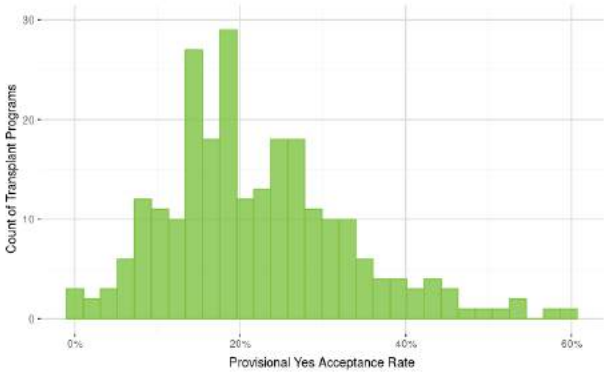
Purpose: Improving organ allocation efficiency has been a focus of the OPTN. While the use of provisional yes (PY) by transplant centers has received recent attention, little is known about these usage and variability of these practices. Our objective was to describe transplant center PY practices at the transplant center and donor level. What is the variability between centers in terms of rate of PY usage? What is the variability in terms of acceptance rates given PY between transplant centers?

Methods: We collected kidney PTR data from 2015 to 2019 retaining all match runs with at least one kidney accepted. We applied logic to remove offers associated with multi-listed candidates, bypassed offers, and offers beyond the final acceptance. Only the first donor recipient pair was retained. We calculated the number of donors offered to each center, how often each center put in a PY for at least one of their candidates for an offered donor, and how often a transplant center accepted a donor organ given a PY was put in for a given donor.

Results: The median PY frequency for transplant centers was 40.22% [IQR: 28.90% to 49.53%]. Demonstrated in figure 1, final acceptance given provisional exhibited variability; the median transplant center acceptance rate given a PY, for at least one of their candidates for a given donor, was 20.09% [IQR: 14.42% to 27.86%]. There were centers with an acceptance rate less than 10% and greater than 40%. While large centers tended to be within the IQR, larger centers are not necessarily associated with lower acceptance rates given a PY. That said figure 2 illustrates a weak relation between the number of donors a provisional yes was inputted and provisional yes rate.

Conclusions: The variability in PY to acceptance rate requires further introspection. While PY rates do not necessarily indicate a metaphorical “rubber stamp”, the variability in acceptance rates combined with some low acceptance rates could indicate room for improvement. Understanding drivers of PY variation, i.e. time of day, missing information, and offer decision making practices, could enable work groups examining this phenomena to develop better solutions to increase system efficiency.





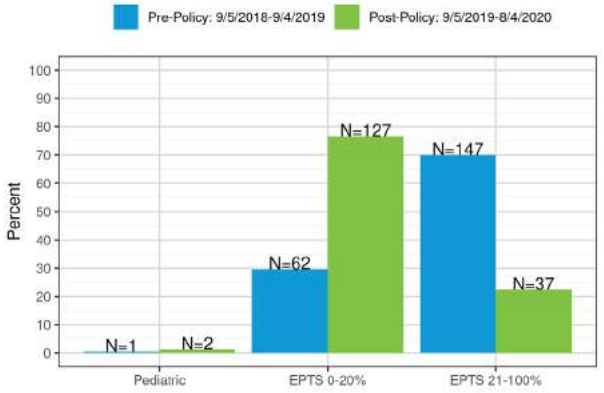
CITATION INFORMATION: Placona A., Martinez C., McGehee H., Van De Walker C., Rosendale J. Transplant Center Provisional Yes Practices for Deceased Donor Kidneys *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.M. Placona: None. **C. Martinez:** None. **H. McGehee:** None. **C. Van De Walker:** None. **J. Rosendale:** None.

Abstract# 835

Changes to Allocation of En Bloc Deceased Donor Kidneys to Low Epts Patients

A. Robinson[1], M. Pavlakis[2], V. Casingal[3], *[1]United Network for Organ Sharing, Richmond, VA, [2]Beth Israel Deaconess Medical Center, Boston, MA, [3]Carolinas Medical Center, Charlotte, NC*

Purpose: The OPTN implemented a policy on September 5, 2019 standardizing en bloc deceased donor kidney allocation in order to efficiently place and utilize kidneys from small donors. Kidneys recovered from donors weighing less than 18 kilograms are required to be offered en bloc. En bloc match runs follow the same algorithm used for KDPI 0-20% kidneys, as they have been shown to have comparable outcomes. Pediatric and low EPTS candidates were expected to have increased access to en bloc transplants as a result of this change.
Methods: We queried the OPTN database for en bloc deceased donor kidney transplants performed between September 5, 2018 and August 4, 2020. Counts and percent of transplants were compared by EPTS pre- versus post-policy implementation.
Results: There were 210 en bloc deceased donor kidney transplants in the year prior to policy implementation, and 166 in the eleven months following implementation. The proportion of en bloc transplants to EPTS 0-20% recipients more than doubled from 29.5% pre-policy to 75.5% post-policy (**Figure 1**). The proportion of pediatric recipients of en bloc transplants also increased from 0.5% to 1.2%, though this reflected a change of one transplant.
Conclusions: In addition to standardizing en bloc kidney allocation nationally, this policy change directed kidneys with good expected outcomes to patients expected to maximize the longevity of the organ. The OPTN Kidney Committee will continue to monitor its impact.
Figure 1: En Bloc Kidney Transplants by EPTS and Policy Era



CITATION INFORMATION: Robinson A., Pavlakis M., Casingal V. Changes to Allocation of En Bloc Deceased Donor Kidneys to Low Epts Patients *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Robinson: None. **M. Pavlakis:** None. **V. Casingal:** None.

Abstract# 836

Patient and Physician Perspectives on Kdpi>85 Consent and Kidney Acceptance Decision Making

K. J. Schantz[1], E. Gordon[1], U. Lee[1], M. Rocha[1], J. Friedewald[1], D. Ladner[1], Y. Becker[2], D. Kaufman[3], R. Formica[4], P. Reese[5], M. Barah[1], M. Walker[1], D. Viveros[6], O. Mehrotra[6], S. Mehrotra[1], *[1]Northwestern University, Evanston, IL, [2]University of Chicago, Chicago, IL, [3]University of Wisconsin, Madison, WI, [4]Yale University, New Haven, CT, [5]University of Pennsylvania, Philadelphia, PA, [6]University of Illinois Chicago, Chicago, IL*

Purpose: This study explores patient and physician perspectives on patients' understandings of kidney quality and patients' decision making with regards to consenting for and accepting KDPI>85 kidney offers.
Methods: In-depth,, semi-structured interviews were conducted with transplant candidates (15), transplant recipients (16), transplant surgeons (9) and transplant nephrologists (6). Patients were recruited through the American Association of Kidney Patients (AAKP) and the Northwestern Comprehensive Transplant Center. Physicians were recruited from OPTN committees and a list of transplant center medical directors. Patient interviews focused on education received at their transplant center, understandings of kidney quality and KDPI, and informed consent and kidney acceptance decision making. Physician interviews focused on how they educate patients about kidney quality and which patients they encourage to consent for KDPI>85 kidneys offers. Study team members identified emergent patters within the data, and generated themes following these patterns.
Results: Five themes emerged from the interviews. First, patients reported knowledge gaps and misperceptions about KDPI. Second, patients and physicians indicated limits to shared decision making with regards to KDPI>85 consent. Third, patients considered experiences on dialysis, health status and age in their KDPI>85 consent and acceptance decisions, while physicians reported significant variation in terms of which patients they encourage to consent for KDPI>85 offers. Fourth, patients frequently expressed concerns about infectious disease, although physicians consistently reported encouraging patients to accept PHS increased risk offers. Finally, patients underestimated the survival benefit of transplantation over dialysis, and physicians suggested that patients may misunderstand the relative risks when making consent and acceptance decisions.
Conclusions: Patient consent and acceptance decisions are influenced by the education they receive and their understandings of the tradeoff between accepting a lower quality kidney or remaining on the waiting list. Patients express willingness to accept lower quality kidneys if they offer a benefit in terms of survival and/or quality of life, but they do not always have a good understanding of options such as KDPI>85 consent. More comprehensive education is needed to ensure patients have the resources to make informed consent and acceptance decisions.
CITATION INFORMATION: Schantz K., Gordon E., Lee U., Rocha M., Friedewald J., Ladner D., Becker Y., Kaufman D., Formica R., Reese P., Barah M., Walker M., Viveros D., Mehrotra O., Mehrotra S. Patient and Physician Perspectives on Kdpi>85 Consent and Kidney Acceptance Decision Making *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.J. Schantz: None. **E. Gordon:** None. **U. Lee:** None. **M. Rocha:** None. **J. Friedewald:** None. **D. Ladner:** None. **Y. Becker:** None. **D. Kaufman:** None. **R. Formica:** None. **P. Reese:** None. **M. Barah:** None. **M. Walker:** None. **D. Viveros:** None. **O. Mehrotra:** None. **S. Mehrotra:** None.

Abstract# LB 73

Trends and Outcomes Analysis of U.S. Transplant Centers Performing High Volumes of Hard to Place Kidneys

D. Bahl[1], A. Mahajan[2], H. Aramada[3], Y. Qazi[3], *[1]St. George's University, St. George's, Grenada, [2]University College Cork School of Medicine, County Cork, Cork City, Ireland, [3]Keck Hospital of USC, Los Angeles, CA*

Purpose: Despite a growing number of patients awaiting a kidney transplant, discard rate remains significantly high. The UNOS SRTR data now provides information on all centers about **Hard-to-Place Kidneys (HTPK),** which by definition are allografts allocated and transplanted after initial 100 offers. Our study is an outcomes analysis study of centers that perform high volumes of HTPK, as well as provides a trends analysis for centers that were deemed as high volume in the previous data cycle.

Methods: Scientific Registry of Transplant Recipients (SRTR) data for all active US kidney transplant center's was analyzed to identify centers likely to accept HTPK. Of these programs, High Volume HTPK centers were defined as ones that performed more than a 30 such transplants(tx)/year and their patient and graft survivals were noted. The time period for number of Tx performed was 1/1/19 to 12/31/19 and outcomes analysis from 1/1/17 to 12/31/19. This data was compared to the previous two cycles of data, from 1/1/18 to 12/31/18 and 1/1/17 to 12/31/17.

Results: A total of 2194 HTPK were transplanted in this time period. Only 21/221 (9.5 %) of all U.S. Tx centers performed high volume HTPK centers but accounted for 1290/2194 (58.7%) of such Tx. 8/21(38.1%) had outcomes as expected , 2/21 (9.5%) had below expected outcomes and 11/21 (52.4%) had outcomes above expected. When analyzing HTPK center locations by UNOS regions, Region 9 and 5 each had 6 centers; 6/21 (28.5% each), Region 11: 3/21 (14.2%), Region 2: 2/21 (9.5%), while Regions 3,4,7, and 8 each had 1 center; 1/21 (4.7% each). 49% of HTPK centers were located in AZ, CA, and NY. Region 9 and 5 continue to transplant the highest number of HTPK's, along with region 3, transplanting more than 68.2% of all HTPK. Compared to the last data cycle, an upward trend with outcomes data was observed, with a more than 20% increase in acceptable or above expected outcomes, in addition to overall increase in volume transplanting HTPK's, with a 14% increase.

Conclusions: Our study demonstrates that only 9.5% of all U.S Tx centers are high volume utilizers of HTPK. Our study locates over 68% of such centers in 4 states: Arizona, California, Florida, and New York. 90% of the HTPK centers had acceptable outcomes or better and best practice at these centers are being captured by our ongoing study. Analyzing these centers practices is imperative to understand how to better allocate kidneys with expected outcomes or better. As new organ allocation policies are formulated, center preferences need to be captured in more granularity to identify centers likely to accept a HTPK. Our study suggests when new allocation policies are formulated, algorithms be considered specifically for organs likely to be classified as HTPK and center experience be factored. Expedited offers to such centers would increase the utilization and reduce discard.

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DISCLOSURES: D. Bahl: None. **A. Mahajan:** None. **H. Aramada:** None. **Y. Qazi:** None.

Abstract# LB 74

Is Equitable Access to Transplantation Possible in the Era of HLA Epitope Compatibility?

S. Parto[1], J. Lamsatfi[2], B. Liu[2], A. Bourdiec[2], B. Foster[2], K. Oualkacha[2], F. Claas[3], P. Keown[4], R. Sapir-Pichhadze[5], *[1]Medicine, McGill University, Montreal, QC, Canada, [2]McGill University, Montreal, QC, Canada, [3]Leiden University Medical Centre, Albinusdreef, Netherlands, [4]University of British Columbia, Vancouver, BC, Canada, [5]Medicine, McGill University Health Centre, Montreal, QC, Canada*

Purpose: We applied the calculated Panel of Incompatible Epitopes (cPIE), an algorithm informing on the likelihood of identifying blood group and eplet-compatible donors, to study how self-reported ancestry affects access to transplantation.

Methods: Candidates were identified from an incident cohort of 6169 0% PRA patients in the Scientific Registry of Transplant Recipients first activated on the kidney waiting list Jan 1, 2011 to Dec 31, 2011. Patients listed at multiple centres were excluded. For cPIE estimation, the donor pool was composed of 4608 consecutive deceased donors who presented Jan 1, 2010 to Dec 31, 2010. Imputed allele-level genotypes for HLA A, B, C, DRB1, and DQB1 were transformed to epitypes. The likelihood of finding blood group matched and eplet compatible donors by candidates' self-reported ancestry was estimated for various eplet compatibility thresholds (by HLA class, antibody-verified (AbVer), and subsets of 55 and 15 eplet mismatches (EMM) increasingly important for predicting death censored graft failure). For each threshold, donors were deemed compatible, if all their eplets were included in the candidates' epitypes (0 EMM). Distribution of cPIE when accepting residual ≤2 and ≤5 EMM were also assessed.

Results: Likelihood of identifying compatible donors (Median and Interquartile Range (IQR)) for Asian (N=300), Black (N=1194), Native American (N=52), Pacific Islander (N=31), White (N=4592) and Latino (N=1025 some overlap with prior groups) candidates was greater for subsets of higher risk eplets vs. class II AbVer, all AbVer, and complete epitypes (Figure 1). There was heterogeneity in the likelihood of identifying compatible donors at the individual level within each self-reported ancestry group, with Black candidates less likely to match. For each eplet compatibility strategy, matching was more likely for candidates accepting donors with residual ≤2 and ≤5 EMM. We found similar patterns in candidates activated in 2012 considering the 2011 donor pool.

Conclusions: Verification of allele-level HLA genotype is required for candidates of any ancestry to inform on access to eplet compatible transplants. For harder to match candidates, preferences must be established on the trade-off between immune risk and gaining access to transplantation when considering donors with residual EMM .

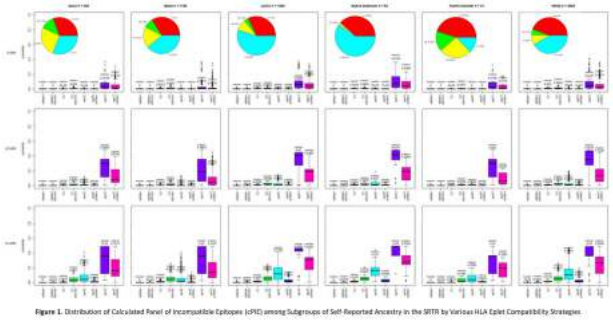


Figure 1. Distribution of Calculated Panel of Incompatible Epitopes (cPIE) among Subgroups of Self-Reported Ancestry in the SRTR by Various HLA Eplet Compatibility Strategies

CITATION INFORMATION: Parto S., Lamsatfi J., Liu B., Bourdiec A., Foster B., Oualkacha K., Claas F., Keown P., Sapir-Pichhadze R. Is Equitable Access to Transplantation Possible in the Era of HLA Epitope Compatibility? *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Parto: None. **J. Lamsatfi:** None. **B. Liu:** None. **A. Bourdiec:** None. **B. Foster:** None. **K. Oualkacha:** None. **F. Claas:** None. **P. Keown:** None. **R. Sapir-Pichhadze:** None.

Kidney

Kidney Deceased Donor Selection

Abstract# 837

Days of Delayed Graft Function and Its Impact on Graft Outcomes in Deceased Donor Kidney Transplant

P. Budhiraja[1], R. J. Butterfield[2], S. S. Misra[1], K. S. Reddy[3], L. Kodali[1], H. A. Khamash[1], S. Nair[1], G. K. Mour[1], H. A. Chakkera[1], C. C. Jadlowiec[3], H. Janna[1], R. L. Heilman[1], *[1]Department of Medicine, Mayo Clinic Arizona, Phoenix, AZ, [2]Department of Statistics, Mayo Clinic Arizona, Phoenix, AZ, [3]Department of Surgery, Mayo Clinic Arizona, Phoenix, AZ*

Purpose: There has been controversy regarding impact of delayed graft function (DGF) on risk of acute rejection and graft survival. This is likely due to DGF being reported as a dichotomous outcome and does not account for the difference in days of DGF.

Methods: We studied predictors and impact of DGF days on transplant outcomes in subjects who received deceased donor kidney transplant from 2003 to 2019 at our center. We have high rates of DGF as we accept high KDPI, long CIT and donor kidneys with AKI. We excluded cases with primary non function unrelated to DGF and preemptive transplant. Recipient and donor characteristics were compared by DGF status using *Kruskal-Wallis* test for continuous variables and χ^2 for categorical variables. Risk factors for DGF status and increased DGF days were assessed. We compared the chronic changes on the protocol biopsy performed from preimplantation to 4 month and 12 month. We used unadjusted and adjusted Cox Proportional Hazard model to assess graft survival, censoring for death events.

Results: There were 701 subjects without DGF and 1021 recipients who had DGF. Factors that were significantly associated with higher DGF days on multivariable analysis included dialysis vintage, DCD status, CIT, donor age and donor oliguria. There was association of acute rejection with presence of DGF with but not with DGF days. Risk for BKV infection and graft survival was not associated with DGF days on multivariate cox -proportional hazard model. At 12-month biopsy, each additional day of DGF conferred 4.5% increased odds of chronic interstitial fibrosis progression and 3.7% increased odds of chronic tubular atrophy progression from baseline.

Conclusions: This is first large cohort study to report the impact delayed graft function days on progression of fibrosis, rejection and graft survival. There is no higher risk of rejection, infection or graft survival. However, we did find association of DGF days with progression of fibrosis.

Predictors of DGF days on univariate and multivariate analysis

			model2			
			1		2	
order	Variable	Level	Estimate (SE)	P-value	Estimate (SE)	P-value
3	Age at Transplant	One Unit Increase	0.03 (0.02)	0.1070		
4	Recipient Gender	Female vs Male	-1.01 (0.52)	0.0504	-0.83 (0.52)	0.1109
5	Recipient Race	Black vs White	0.5 (0.74)	0.4982		
6	BMI	One Unit Increase	0.11 (0.04)	0.0125	0.08 (0.04)	0.0673
7	Diabetes Pre TX	Yes vs No	0.79 (0.49)	0.1093		
8	Previous Kidney Transplant	Yes vs No	-1.02 (0.87)	0.2395		
9	Length Dialysis (months)	One Unit Increase	0.02 (0.01)	0.0377	0.02 (0.01)	0.0069
10	Donor AKI(>/=2) or RRT	Yes vs No	0.83 (0.49)	0.0928	1.01 (0.58)	0.0831
11	KDPI	One Unit Increase	0.02 (0.01)	0.0337		
12	CIT	One Unit Increase	0.12 (0.04)	0.0014	0.09 (0.04)	0.0115
13	HTN	Yes vs No	0.86 (0.55)	0.1161	0.47 (0.6)	0.4354
14	Oliguria/Anuira	Yes vs No	1.64 (0.53)	0.0020	1.79 (0.59)	0.0022
15	Donor age	One Unit Increase	0.03 (0.02)	0.0519	0.05 (0.02)	0.0109
16	Donor Gender	Female vs Male	-0.33 (0.51)	0.5099		
17	Donor Race	Black vs White	-0.34 (0.91)	0.7074		
18	Donor BMI	One Unit Increase	-0.01 (0.03)	0.8240		
19	DCD	Yes vs No	1.27 (0.56)	0.0244	1.53 (0.61)	0.0125
20	Donor DM	Yes vs No	0.44 (0.92)	0.6343	0.06 (0.95)	0.9479

Change in Fibrosis on Biopsy by DGF Days
Logistic regression of ci/ct scores both as 2+ vs <2 and any progression with DGF Days as the predictor

		Score (2+ vs <2)			Score (2+ vs <2)	
	N	OR (95% CI)	P-value	N	OR (95% CI)	P-value
1 Month	313	0.995 (0.949, 1.042)	0.8192	312	0.988 (0.941, 1.037)	0.6187
4 Month	754	1.045 (1.017, 1.074)	0.0013	752	1.046 (1.018, 1.076)	0.0015
12 Month	642	1.05 (1.024, 1.076)	0.0001	642	1.04 (1.014, 1.068)	0.0026
		Progression from baseline (Yes vs No)			Progression from baseline (Yes vs No)	
	N	OR (95% CI)	P-value	N	OR (95% CI)	P-value
1 Month	215	0.978 (0.947, 1.011)	0.1948	215	0.971 (0.94, 1.003)	0.0787
4 Month	545	1.019 (0.996, 1.042)	0.1027	545	1.005 (0.982, 1.027)	0.6931
12 Month	453	1.045 (1.016, 1.075)	0.0025	453	1.037 (1.009, 1.066)	0.0101

At 12-month biopsy, each additional day of DGF confers 4.5% increased odds of ci fibrosis progression and 3.7% increased odds of ct fibrosis progression from baseline.

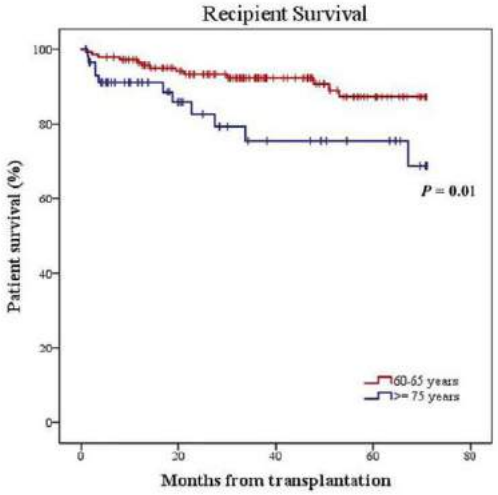
CITATION INFORMATION: Budhiraja P., Butterfield R., Misra S., Reddy K., Kodali L., Khamash H., Nair S., Mour G., Chakkera H., Jadlowiec C., Janna H., Heilman R. Days of Delayed Graft Function and Its Impact on Graft Outcomes in Deceased Donor Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Budhiraja: None. **R.J. Butterfield:** None. **S.S. Misra:** None. **K.S. Reddy:** None. **L. Kodali:** None. **H.A. Khamash:** None. **S. Nair:** None. **G.K. Mour:** None. **H.A. Chakkera:** None. **C.C. Jadlowiec:** None. **H. Janna:** None. **R.L. Heilman:** None.

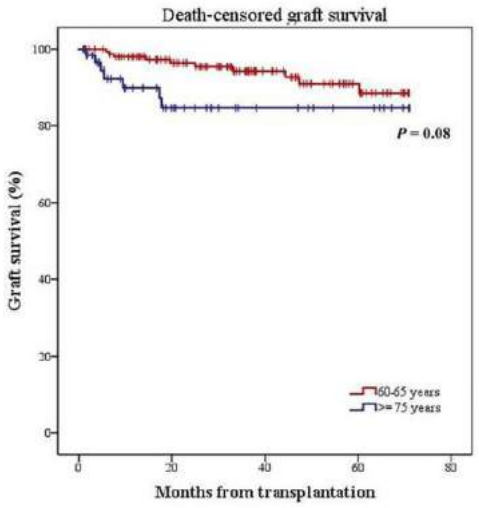
Abstract# 838

Long-Term Outcomes in Older Kidney Transplant Recipients from Older Donors

E. Cuadrado-Payán, E. Montagud-Marrahi, J. Casals-Urquiza, J. del Risco-Zevallos, D. Cucchiari, P. Ventura-Aguiar, I. Revuelta, G. Piñeiro, N. Esforzado, F. Cofan, J. Ugalde, J. Campistol, F. Oppenheimer, J. Torregrosa, F. Diekmann, *Nephrology and Kidney Transplantation, Hospital Clínic de Barcelona, Barcelona, Spain*

Purpose: The age of patients referred for kidney transplantation has increased progressively. However, the precise influence of age on hard outcomes after transplantation is controversial
Methods: Single-centre, longitudinal retrospective study in which graft and recipient survival in a cohort of ≥75 years old kidney recipients were compared with a contemporary younger cohort aged 60-65 years.
Results: We included 149 recipients between 60-65 and 60 patients of ≥75 years old. No differences in baseline characteristics were observed except for the prevalence of diabetes mellitus (62 patients versus 9 patients respectively, p < 0.0001). One- and five-year recipient survival was lower in the older group (91% and 76% for the older and 96% and 87% for the younger group, P =0.01). In the multivariate analysis, recipient age was not associated with an increased risk of death. Donor after Circulatory Death (DCD), recipient Ischemic Heart Disease and Delayed Graft Function (DGF) were associated with an increased risk of death. One- and five-year death-censored graft survival did not significantly differ between both groups (90% and 85% for the older and 98% and 88% for the younger group, respectively, *P* =0.08). In the multivariate analysis age was no associated with graft loss (HR 2.84, 95%CI [0.77-8.12], *P* =0.09), although DGF was (HR 4.46, 95%CI [1.63-12.21], *P* =0.004). DCD donor (OR 2.88, 95%CI [1.07-7.78], *P* =0.03) and Deceased Donor Kidney Transplantation (OR 2.51, 95%CI [1.26-4.99], *P* =0.009) were risk factors for DGF.
Conclusions: Recipient age should not be considered itself as an absolute contraindication for kidney transplant. With a judicious selection of the recipient and the donor, kidney transplantation can be safely performed in elderly patients.





CITATION INFORMATION: Cuadrado-Payán E., Montagud-Marrahi E., Casals-Urquiza J., del Risco-Zevallos J., Cucchiari D., Ventura-Aguiar P., Revuelta I., Piñeiro G., Esforzado N., Cofan F., Ugalde J., Campistol J., Oppenheimer F., Torregrosa J., Diekmann F. Long-Term Outcomes in Older Kidney Transplant Recipients from Older Donors *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Cuadrado-Payán: None. **E. Montagud-Marrahi:** None. **J. Casals-Urquiza:** None. **J. del Risco-Zevallos:** None. **D. Cucchiari:** None. **P. Ventura-Aguiar:** None. **I. Revuelta:** None. **G. Piñeiro:** None. **N. Esforzado:** None. **F. Cofan:** None. **J. Ugalde:** None. **J. Campistol:** None. **F. Oppenheimer:** None. **J. Torregrosa:** None. **F. Diekmann:** None.

Abstract# 839

Outcomes in Highly Sensitized Kidney Transplant Recipients Receiving DCD Organs

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Purpose: Highly sensitized (HS) patients experience longer wait times for kidney transplantation despite prioritization by the Kidney Allocation System. Kidney transplants performed from donors defined as donation after circulatory death (DCD)

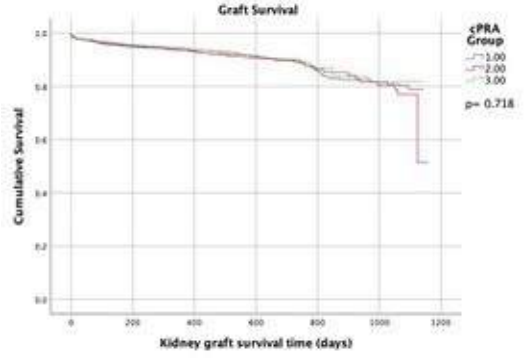
have been shown to decrease wait times for most patient populations. However, concern for increased rejection during delayed graft function (DGF) causes hesitancy in using DCD kidneys in HS patients. In this study, we evaluate the outcomes of HS kidney transplant (KT) recipients who received a DCD kidney.

Methods: KT recipients who received DCD organs from 2015-2018 were studied using the United Network for Organ Sharing database. Patients were divided into three groups for analysis; calculated panel-reactive antibody (cPRA) 0% (Group 1), 1-89% (Group 2), and 90-100% (Group 3). Data analysis was performed with the SPSS software. Survival analysis was performed using a Cox regression and Kaplan-Meier model.

Results: 7,854 KT recipients received DCD kidneys. Patients were divided into three groups: cPRA 0% (n= 4,598), cPRA 1-89% (n= 2,233), and cPRA 90-100% (n= 1,023). There was no significant difference in baseline characteristics (see Table 1). The mean KDPI in Group 3 was lower compared to other groups (51% vs. 50% vs. 44%; p<0.001). Rabbit antithymocyte globulin induction was used for most patients (58% vs. 66% vs. 75%). The incidence of DGF was similar between groups (41% vs. 42%. vs. 42%; p= 0.45). A higher number of patients in Group 3 were treated for rejection within 12 months (4.2% vs. 4.1% vs. 6.1%; p=0.003). No differences in graft failure (7.1% vs. 7.1 % vs. 6.7%; p=0.905) and patient survival (95% vs. 95% vs. 96%; p=0.449) were noted. A Cox regression model identified KDPI as a significant factor, independent of cPRA, impacting graft survival (OR 3.76; 95% CI: 2.61-5.41).

Table 1

	cPRA 0% N= 4,598	cPRA 1-89% N= 2,233	cPRA 90-100% N =1,023
Recipient age (years), mean ± SD	54.1 ± 13.1	53.1 ± 13	49.5 ± 13
Donor age (years), mean ± SD	38.5 ± 14.6	37.8 ± 14.4	35.1 ± 13.1
Recipient gender (male), n (%)	3072 (66.8)	1490 (66.7)	696 (68)
Recipient ethnicity, n (%) White; Black	1891 (41.1); 1390 (30.2)	855 (38.3); 735 (32.9)	443 (43.3); 299 (29.2)
Donor ethnicity, n (%) White; Black	3687 (80.2); 347 (7.5)	1777 (79.6); 187 (8.4)	758 (74.1); 78 (7.6)
Days on dialysis prior to transplant, mean ± SD	1907.3 ± 1110.3	1941.6 ± 1107	1798.3 ± 1455.5
EPTS, mean ± SD	53.14 ± 29.77	51.02 ± 29.39	45.89 ± 28.52



Conclusions: DCD kidney transplantation provides HS patients with comparable long term graft survival with an acceptable incidence of treated rejection within 12 months. Notably, KDPI had a larger influence on graft survival than the recipient's cPRA. This study supports an increased use of DCD kidneys in HS patients.

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DISCLOSURES: A. Diamond: None. **L. Rodrigues:** None. **A. Di Carlo:** None. **S. Karhadkar:** None.

Abstract# 840

Findings from the BARETO Study: A New, Composite Renal Vascular Plaque Score is Highly Associated with Kidney Graft Survival

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Purpose: Whether anatomic findings such as aortic and arterial renal plaque affect kidney graft outcomes is not well defined. Other than anatomical damage, it is unclear whether anatomy features should influence organ offer acceptance decisions. As part of a broader study on Biopsy, Anatomy, and Resistance Effects on Transplant Outcomes (BARETO), we aim to characterize the association between renal plaque on long-term kidney graft survival to help inform decision making.

Methods: Data were manually entered for a preliminary cohort of 4,475 ECD donor single kidney transplants from 2008-2011. Degree of aortic (hard=2, soft=1, none=0) and arterial (hard=2, soft=1, none=0) renal plaque were added to create a new, composite plaque score (0-4). Kaplan-Meier graft survival analysis out to 10 years was stratified by composite plaque score. Causal inference was performed using doubly robust regression (DRR) to adjust for 17 potential confounders.

Results: Kaplan-Meier survival analysis revealed a significant (p=0.003) association between plaque score and graft survival probability, with a plaque score of 0 associated with higher graft survival probability and a plaque score of 4 associated with lower graft survival probability (Figure 1). In the unadjusted model, a plaque score of 4 (vs. 0) was associated with significant risk of graft failure (HR: 1.29, 95% confidence interval (CI): 1.11-1.50); this effect attenuated somewhat (HR 1.15, CI: 0.98-1.36) with DRR (Fig 2). A dose-response relationship appears to be emerging based on initial data.

Conclusions: This new, composite renal plaque score is associated with long-term graft survival outcomes. Specifically, the presence of hard aortic and/or arterial plaque is associated with worse long-term graft survival. Findings from our ongoing study can help inform transplant decision making, including by their incorporation into multivariable graft survival models that summarize organ quality.

Figure 1. 10 Year Graft Survival by Plaque Score

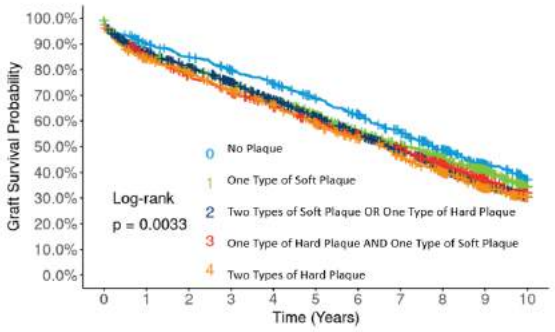
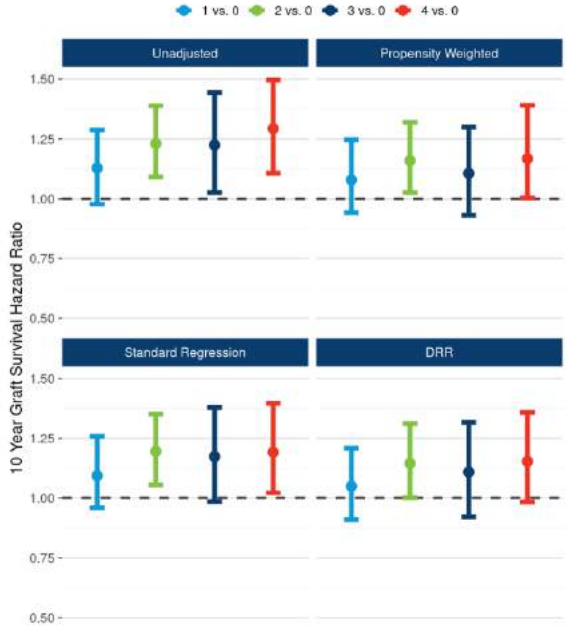


Figure 2. Graft Failure Hazard Ratios by Plaque Score



CITATION INFORMATION: Foutz J., Stewart D., Kamal L., McGehee H., Saravanane P., Yu S., Yousfi R., Gupta G. Findings from the BARETO Study: A New, Composite Renal Vascular Plaque Score is Highly Associated with Kidney Graft Survival *AJT, Volume 21 Supplement 3*

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Abstract# 841

Not Quite Right: The Irony of Longer Cold Times for Higher KDPI Kidneys

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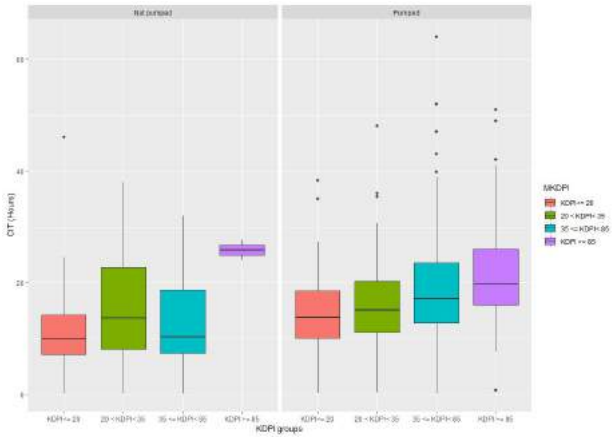
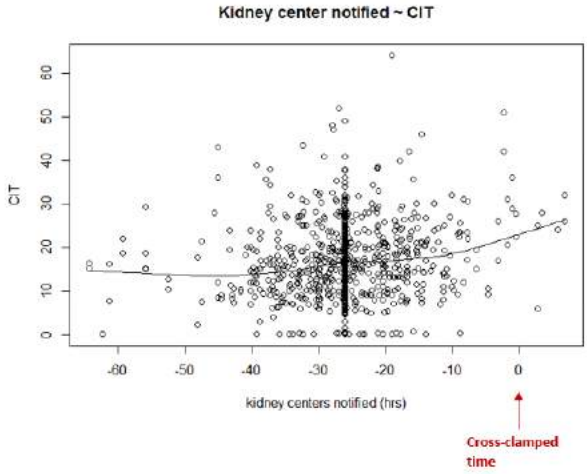
Purpose: To identify tactics for reduction of the kidney discard rate, we analyzed measurable, operational factors contributing to the key outcome of transplantation (TXP) or discard.

Methods: A retrospective review of deceased donor kidneys recovered and allocated (1/1/17 - 12/31/18) from a single, large organ procurement organization (OPO) was undertaken using internal records and UNOS data. Factors analyzed for locally transplanted (within the OPO's donor service area) organs included KDPI, cold ischemic time (CIT), hypothermic pulsatile perfusion pump use, and formal TXP center notification time (relative to cross-clamp).

Results: A total of 519 donors from whom 1028 kidneys were recovered, with 18.4% DCD, a median KDPI of 70, and an overall discard rate of 17% were included. Higher KDPI was significantly associated with the likelihood of being pumped (see figure). For kidneys transplanted locally and pumped (N=772), CIT and KDPI correlated significantly; the higher the KDPI, the longer the CIT (see figure). Regression analysis of 803 locally transplanted kidneys (pumped and non pumped) with available CIT data and 4 key time points (HLA sent, crossmatch sent, kidney center notified, serologies sent) identified only the time of center notification as a significant factor (p=0.03) inversely linked to CIT.

Conclusions: The use of hypothermic pulsatile perfusion pumping for marginal (high KDPI) kidneys was observed and is evidence-based. The observation that CIT was significantly prolonged for these marginal, pumped organs is, however, contrary to common sense or ideal practice. This important observation should be analyzed carefully to identify opportunities to improve allocation efficiency and improve the treatment of these organs. We have initially identified the relevance of early center notification as such a factor.





Percentage of pumped kidneys by KDPI group		
KDPI Groups	**N**	**% Pumped**
KDPI<=20	115	47
20<KDPI<35	119	71
35<=KDPI<85	439	85
KDPI>=85	99	98

CITATION INFORMATION: Ghali H., Won D., Yoon S., Friedman A. Not Quite Right: The Irony of Longer Cold Times for Higher KDPI Kidneys *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Ghali: None. **D. Won:** None. **S. Yoon:** None. **A. Friedman:** None.

Abstract# 842

The Extremes of KDPI: Even KDPI 95%+ Kidneys Can Be Used Successfully

A. Gilbert, J. Verbesey, B. Thomas, J. Moore, M. Cooper, *Medstar Georgetown Transplant Institute, Washington, DC*

Purpose: While the use of kidneys with KDPIs greater than 85% has become common, there is still reluctance among centers to use the very highest KDPI kidneys (95%+) for fear of poor outcomes. In our center's highly competitive region we have routinely used these kidneys and with the upcoming changes in the kidney allocation system, we expect this to increase. We reviewed our experience with these high KDPI kidneys to see if their outcomes warrant continued use.

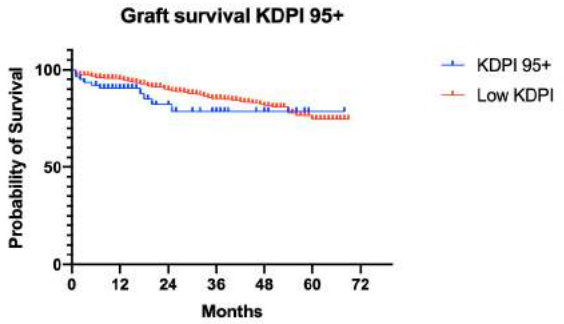
Methods: This is a single center retrospective study. We reviewed all patients receiving deceased donor kidney (DDK) transplants since KDPI was put into common use in December 2014. We looked at graft survival, death censored graft survival (DCGS), delayed graft function (DGF), extended DGF (greater than 10 days) and primary non-function (PNF) as outcomes measures. We also stratified transplants by the age of the recipient into 2 groups: those 61 years old or greater, and those 60 years old or younger. Data was analyzed using Fishers exact test with a 2-tailed p value.

Results: We had a total of 753 solitary DDKs transplanted at our center. There were 80 kidneys that had a KDPI of 95% or greater. Average follow-up was 25.2 months although the high KDPI group did have overall shorter follow-up (mean 18.7 months, p=0.001). There was no difference between the groups in graft survival (figure 1, p=0.59) or DCGS (91.2% vs 90.2% p=1.0). The high KDPI group had somewhat higher but statistically similar rates of DGF (36.7% vs 30.2% p=0.055). When looking only at extended DGF the differences reached statistical significance (21.3% vs 11.1% p=0.017).

When stratified by recipient age, there were no statistically significant differences in graft survival, DCGS, DGF, or extended DGF either when comparing high KDPI vs low KDPI kidneys in elderly patients, or when comparing high KDPI kidneys in elderly vs younger patients (table 1).

Conclusions: In an increasingly competitive environment, kidneys with KDPIs of 95%+ can provide excellent medium-term results for recipients of all ages similar to those seen with lower KDPI kidneys. These organs represent an increasingly valuable resource which will need to be used aggressively as we adapt to a new kidney allocation system that further encourages competition between centers.

Outcomes of Transplant by KDPI and Recipient Age					
	KDPI 95+, Age >60	**KDPI 95+, Age <60**	**p value**	**KDPI <95, Age >60**	**p value**
Number	39	41		185	
DGF	51.3%	31.7%	0.11	34.6%	0.07
Extended DGF	28.2%	14.6%	0.81	14.6%	0.58
Graft Survival	87.2%	85.4%	0.80	89.7%	0.58
DCGS	97.4%	85.4%	0.11	92.4%	0.48



CITATION INFORMATION: Gilbert A., Verbesey J., Thomas B., Moore J., Cooper M. The Extremes of KDPI: Even KDPI 95%+ Kidneys Can Be Used Successfully *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gilbert: Honoraria; Name of Commercial Interest; Veloxis. Honoraria; Nature of Relationship; Advisory Committee Member. **J. Verbesey:** None. **B. Thomas:** None. **J. Moore:** None. **M. Cooper:** None.

Abstract# 843

Effect of Donor Glomerulosclerosis and Interstitial Fibrosis/ Tubular Atrophy (IFTA) on Kidney Graft Survival: A Single Organ Procurement Organization (OPO) Data

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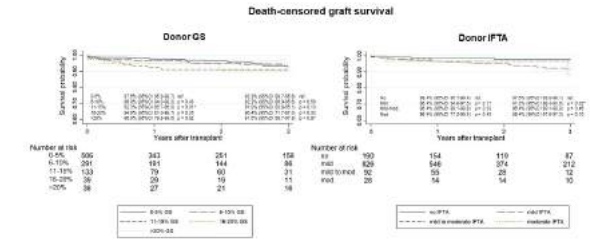
Purpose: The kidneys of deceased donors are often biopsied to evaluate transplant organ quality. A high percentage of GS is a leading cause of kidney discard yet donor GS has failed to predict graft failure and there is limited data supporting the association between IFTA and graft failure. Here we report the effect of donor GS and IFTA on graft survival at a single large OPO.

Methods: OneLegacy OPO data of deceased kidney donors with kidney biopsy results from 2015-2019 were included and merged with graft outcomes from the OPTN/UNOS data.

Results: A total of 1,148 deceased donor kidney transplants (DDKTs) were included. The median followed up time was 2 years (IQR 1-3). There were 71 (6.2%) death-censored graft failure. Donors with 0-5%, 6-10%, 11-15%, 16-20%, and >20% GS had 1-year death-censored graft survival (DCGS) of 97.6%, 96.8%, 92.3%, 94.9% and 96.9%, and 3-years DCGS of 93.3%, 92.3%, 91.0%, 90.4% and 91.5%, respectively. Donors without IFTA, mild IFTA, mild to moderate IFTA, and moderate IFTA had 1-year DCGS of 98.4%, 96.4%, 96.4%, and 96.4%, and 3-years DCGS of 97.6%, 91.3%, 96.4% and 88.4%, respectively. After adjusted for kidney donor profile index, only mild IFTA was associated with an increased risk for graft failure at 3-years (aHR 3.54; 95%CI, 1.23-10.15). Donor kidneys with any degree of GS or IFTA had a higher median serum creatinine at 1-year and 3-years followed up compared to those without GS or IFTA .

Conclusions: Overall donor kidneys with any degree of GS or IFTA have an excellent graft survival. One-year and three years DCGS in kidneys with GS were more than 90%. Kidneys with IFTA had 1-year DCGS more than 95% and 3-years DCGS more than 85%.



Risk of death-censored graft failure and serum creatinine											
Pathology		**1-year**					**3-years**				
Glomerulosclerosis	**N**	**HR**	**95% CI**	**Adjusted HR***	**95% CI**	**Median Scr. (mg/dl)**	**HR**	**95% CI**	**Adjusted HR***	**95% CI**	**Median Scr. (mg/dl)**
0-5%	511	reference	-	-	-	1.20	-	-	-	-	1.29
6-10%	293	1.43	0.59-3.46	1.27	0.49-3.30	1.40	1.20	0.62-2.31	1.17	0.58-2.38	1.43
11-15%	155	3.50	1.36-7.97	2.33	0.89-6.16	1.50	1.86	0.88-3.95	1.36	0.61-3.05	1.67
16-20%	39	2.34	0.52-10.56	1.01	0.43-9.75	1.40	1.81	0.54-6.08	1.52	0.43-5.32	2.15
>20%	36	1.27	0.16-9.82	1.16	0.15-9.13	1.44	1.13	0.27-4.81	1.00	0.23-4.29	1.40
Interstitial Fibrosis/ Tubular atrophy											
No	192	reference	-	-	-	1.16	-	-	-	-	1.17
Mild	833	2.24	0.68-7.38	1.99	0.58-6.87	1.31	3.24	1.16-8.99	3.54	1.23-10.15	1.42
Mild to moderate	93	2.17	0.44-10.77	1.13	0.19-6.82	1.40	1.73	0.38-7.81	1.04	0.19-5.59	1.38
Moderate	28	2.38	0.24-23.00	1.32	0.09-18.80	1.73	3.81	0.69-20.85	2.96	0.36-24.06	2.00

* Adjusted for kidney donor profile index

CITATION INFORMATION: Homkrailas P., Hussain M., Danovitch G., Wheeler K., Bunnapradist S. Effect of Donor Glomerulosclerosis and Interstitial Fibrosis/ Tubular Atrophy (IFTA) on Kidney Graft Survival: A Single Organ Procurement Organization (OPO) Data *AJT, Volume 21 Supplement 3*

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Abstract# 844

Comparison of Kidney Transplantation Outcomes Between Donors After Controlled Circulatory Death and Brain Death Donors in Catalonia, Spain

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Purpose: The number of kidney transplants (KT) from controlled cardiac death donors (cDCD) has exponentially increased in Spain during the last years. Results from cDCD KT have been reported to be comparable to brain-death donors (DBD) KT in countries with long tradition of retrieving organs from cDCD. No studies have compared KT outcomes between these two types of donors in Spain, being this the main purpose of our study.

Methods: Observational retrospective analysis including 1658 KT from DBD and 645 KT from cDCD, performed from January 2013 to December 2018 in Catalonia, Spain. Data were obtained from the Catalonian Registry of Renal Patients (RMRC) including donors, recipients and process of donation-transplantation. Median follow-up after KT was 26 months. A multivariate analysis was performed to identify risk factors for graft loss.

Results: Both donors and recipients mean ages were significantly higher in the cDCD group compared to DBD group. (62 ± 13 vs. 58 ± 17 for donors, p<0,001; 60 ± 12 vs. 56 ± 15 for recipients, p <0,001). Incidence of delayed graft function (DGF) was higher in cDCD KT group (37.2% vs 21.6%, p<0.001) without differences in primary non-function rates (1.7% vs 0.8%, p=0.13). Renal function at 20 months was slightly better in DBD group (eGFR 52.4 ml/min vs 47.1 ml/min, p=0.001). At 3 years post KT no differences in death-censored graft survival were observed (91.2 vs. 91.3%). However, patient survival at 3 years was worse in cDCD group (85.3 vs. 89.3%). In multivariate analysis, recipient age >75 yr, previous cardiovascular disease and DGF were independent risk factors for patient death (RR 10.4, 2.28 and 1.8 respectively). Regarding graft survival (death censored), Donor Age > 75

(RR 2.76), DGF (RR 1.85) and cPRA>50% (1.57) increased graft loss. The type of donation (cDCD vs DBD) was not an independent risk factor neither for patient survival nor graft loss.

Conclusions: In a contemporary recent cohort, graft survival from both cDCD and DBD donors is comparable. Patient survival was lower in cDCD group independently from type of donation, finding recipient age >75 years, DGF and previous CV disease as risk factors pfor patient death. Risk factors for graft loss were cPRA>50%, donor age > 75 and DGF.

CITATION INFORMATION: Juega J., Pérez-Sáez M., Comas J., Zapatero A., Crespo M., Tort J., Lauzurica R., Pascual J. Comparison of Kidney Transplantation Outcomes Between Donors After Controlled Circulatory Death and Brain Death Donors in Catalonia, Spain *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Juega: None. **M. Pérez-Sáez:** None. **J. Comas:** None. **A. Zapatero:** None. **M. Crespo:** None. **J. Tort:** None. **R. Lauzurica:** None. **J. Pascual:** None.

Abstract# 845

Donation After Cardiac Death (DCD) Agonal Phase Physiology is Associated with Post-transplant Kidney Graft Outcomes

A. Kayastha[1], K. C. Eddinger[2], E. M. Sonnenberg[2], N. Mahmud[2], D. E. Schaubel[1], P. L. Abt[2], *[1]Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, [2]Hospital of the University of Pennsylvania, Philadelphia, PA*

Purpose: Kidneys procured from DCD donors play a key role in addressing the kidney shortage in the United States, and donor hemodynamics during obligatory warm ischemia may provide insight into graft quality and outcomes. There have been no large-scale studies evaluating these relationships.

Methods: The UNOS registry was used to identify DCD kidney donors and their corresponding recipients. The dataset included donor and recipient demographic data, follow-up data, and agonal phase donor hemodynamic time-series data. The systolic blood pressure (SBP) and oxygen saturation (SpO_2) time-series were analyzed using various quantitative techniques, including computing slopes and areas under the curve (AUC). Asystolic time, defined as the time from when SBP reached 0 mmHg to cross-clamp, was also modeled. Univariable and multivariable logistic regression were used to analyze associations between calculated hemodynamic measures and delayed graft function (DGF), defined as whether the recipient required dialysis within one week after transplant. Univariable and multivariable Cox regression were used to evaluate analogous associations between hemodynamic measures and 90-day, 1-year, and 3-year graft failure.

Results: Analysis was completed on 1911 DCD kidney donors between 2012 and 2018. The time beyond SBP < 50 mmHg was found to be associated with DGF in a multivariable model (OR = 1.021, p < 0.001). The slope of the SpO_2 curve demonstrated significance in a multivariable model with respect to DGF (OR = 1.030, p < 0.001). Asystolic time was found to be significantly associated with DGF and graft failure in all models (Table 1).

Summary of Asystolic Time Results, by Outcome and Model Type

	Univariable Model	Multivariable Model
DGF	OR = 1.027, p < 0.001	OR = 1.026, p < 0.001
90-day Graft Failure	HR = 1.036, p = 0.001	HR = 1.028, p = 0.019
1-year Graft Failure	HR = 1.026, p = 0.011	HR = 1.022, p = 0.037
3-year Graft Failure	HR = 1.025, p = 0.003	HR = 1.022, p = 0.012

Conclusions: A number of hemodynamic measures are independently associated with DGF and graft failure. Greater asystolic times are associated with worse outcomes. These methods that quantify agonal phase hemodynamics are techniques that help better characterize DCD donor kidney quality and recipient graft outcomes, which may help inform organ selection and expand the donor pool.

CITATION INFORMATION: Kayastha A., Eddinger K., Sonnenberg E., Mahmud N., Schaubel D., Abt P. Donation After Cardiac Death (DCD) Agonal Phase Physiology is Associated with Post-transplant Kidney Graft Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Kayastha: None. **K.C. Eddinger:** None. **E.M. Sonnenberg:** None. **N. Mahmud:** None. **D.E. Schaubel:** None. **P.L. Abt:** None.

Abstract# 846

Impact of Elevated Initial Donor Creatinine on Outcomes After Transplanting Kidney from Deceased Donor with Severe AKI

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Purpose: Several studies have shown good outcomes with transplanting kidneys from deceased donors with AKI; however, the impact of having elevated initial donor creatinine has not been studied. Transplant centers are reluctant to use kidneys from Donors with an elevated initial serum creatinine due to concern for poor outcomes. Our hypothesis is that outcomes after transplanting kidneys from carefully selected donors with severe AKI and elevated initial creatinine are non inferior. We aim to look at the graft and patient outcomes of AKIN 3 donor kidneys with initial or admit creatinine ≥2.0 when compared to AKIN 3 donors with an admit creatinine < 2.0.

Methods: We included all deceased donor kidney transplants done at our center from 2008 to 2019. We excluded combined simultaneous extra renal organ transplant recipients. The donor AKI was classified using the AKIN staging criteria using serum creatinine criteria using data from DonorNet. We selected all recipients of AKIN3 donor kidneys and we divided the study group based on donor initial creatinine ≥2. Preimplantation biopsies were reviewed by our surgical pathologists, and kidneys with cortical necrosis >10% or mild chronic changes were discarded. Protocol biopsies were performed at 4 months and 1 year.

Results: We identified 683 (34.5%) donors with AKIN 3, out of which 156 (22.8%) were identified to have initial creatinine ≥2. Recipient age, gender, prevalence of diabetes and dialysis were similar in both groups. There were younger donors in the cohort with initial creatinine ≥2 (30.9 vs 37.4 p <0.001), which was also reflected in the KDPI (35.0 vs 52.5 p=<0.001). More female donors were present in the group with creatinine <2 (38.0 vs 16 p=<0.001). There was no statistical significance in DCD donors in the 2 groups. DGF rates were higher in the group with initial Cr ≥2 (85.3 vs 77.6%, p=0.03). CIT was similar in both the groups. There was no difference in the death censored graft survival, acute rejection and primary non-function between the 2 groups at 1 year. Estimated GFR was higher in donors with initial Cr ≥ 2 at both 4 months (62.4 vs 54.8 ml/min/1.73 m^2, p=0.0001) and 1 year (64.6 vs 58.6ml/min/1.73m^2 p=0.0086). There were less chronic changes noted on the 1 year protocol biopsy in the group with Cr ≥2.

Conclusions: With careful selection, AKIN3 donors with initial Cr≥2 have similar 1 year graft outcomes when compared to AKIN3 donors with initial creatinine <2.0. The favorable GFR and biopsy findings at 1 year are probably related to donor factors.

1 year biopsy

	Initial donor Cr>/= 2 (n=101)	Initial donor Cr < 2 (n=320)	P
ci>1	12.9	23.5	0.017
ct>1	12.9	21.9	0.038
cv>0	30.7	49.8	0.006
cg>0	1.1	6.5	0.047*
Ah	0.17 (0.05)	0.16 (0.03)	0.83

Continuous variable mean (SEM) unless otherwise stated . *Pearson

CITATION INFORMATION: Kodali L., Reddy K., Budhiraja P., Nair S., Mour G., Huskey J., Jadloweic C., Khamash H., Chakkera H., Heilman R. Impact of Elevated Initial Donor Creatinine on Outcomes After Transplanting Kidney from Deceased Donor with Severe AKI *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Kodali: None. **K. Reddy:** None. **P. Budhiraja:** None. **S. Nair:** None. **G. Mour:** None. **J. Huskey:** None. **C. Jadloweic:** None. **H. Khamash:** None. **H. Chakkera:** None. **R. Heilman:** None.

Abstract# 847

Hypoperfusion Warm Ischaemia Time in Renal Transplants from Donors After Circulatory Death

I. D. Kostakis[1], T. Kassimatis[1], C. Flach[2], N. Karydis[1], N. Kessaris[1], I. Loukopoulos[1], *[1]Department of Transplantation, Guy's Hospital, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom, [2]School of Population Health and Environmental Studies, King's College London, London, United Kingdom*

Purpose: Donor hypoperfusion before asystole in renal transplants from donors after circulatory death (DCD) has been considered responsible for worse outcomes than those from donors after brain death (DBD). We assessed how the duration of hypoperfusion phase [hypoperfusion warm ischaemia time (HWIT)] affects the outcomes of DCD renal transplants.

Methods: We included 10309 adult renal transplants (7128 DBD, 3181 DCD) (01/01/2010-31/12/2016) from the UK Transplant Registry. We divided DCD renal transplants in groups according to HWIT. We compared delayed graft function (DGF) rates, primary non-function (PNF) rates and graft survival among them using DBD renal transplants as reference group.

Results: DGF rate was 21.7% for DBD cases, whereas it was around 40% for DCD cases with HWIT shorter than 30 min (0-10 min: 42.1%, 11-20 min: 43%, 21-30 min: 38.4%) and it was 60% for DCD cases with HWIT longer than 30 min (p<0.001). All DCD groups showed higher DGF risk when compared with DBD renal transplants in logistic regression analysis also (0-10 min: OR=2.686, 95%CI: 2.352-3.068, p<0.001, 11-20 min: OR=2.531, 95%CI: 2.003-3.198, p<0.001, 21-30 min: OR=1.764, 95%CI: 1.017-3.059, p=0.043, >30 min: OR=5.814, 95%CI: 2.798-12.081, p<0.001). The highest risk for DGF in DCD renal transplants with HWIT more than 30 min was again confirmed by logistic regression analysis when it was compared with that of the other groups (compared with DBD: OR=5.814, 95%CI: 2.798-12.081, p<0.001; compared with DCD: 0-10 min: OR=2.165, 95%CI: 1.038-4.505, p=0.039; 11-20 min: OR=2.299, 95%CI: 1.075-4.902, p=0.032; 21-30 min: OR=3.3, 95%CI: 1.33-8.197, p=0.01). No statistically significant differences were detected regarding PNF rates (p=0.713) or graft survival (p=0.757), which was confirmed by multivariate analysis.

Conclusions: HWIT of more than 30 min increases the risk for DGF greatly, but without affecting the possibility of PNF or the graft survival.

CITATION INFORMATION: Kostakis I., Kassimatis T., Flach C., Karydis N., Kessaris N., Loukopoulos I. Hypoperfusion Warm Ischaemia Time in Renal Transplants from Donors After Circulatory Death *AJT, Volume 21 Supplement 3*
DISCLOSURES: I.D. Kostakis: None. **T. Kassimatis:** None. **C. Flach:** None. **N. Karydis:** None. **N. Kessaris:** None. **I. Loukopoulos:** None.

Abstract# 848

The Implications of Donor-Recipient Size Mismatch in Renal Transplantation

I. D. Kostakis, N. Karydis, T. Kassimatis, N. Kessaris, I. Loukopoulos, *Department of Transplantation, Guy's Hospital, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom*

Purpose: Transplanting kidneys small for the recipient's size results in inferior renal graft function. Body surface area (BSA) is related to kidney size. We used the BSA index (BSAi) (Donor BSA/Recipient BSA) to assess whether the renal parenchymal mass provided by the donor is sufficient for the recipient.
Methods: We included 26223 adult single kidney-only transplants (01/01/2007-31/12/2019) from the UK Transplant Registry. We divided renal transplants in groups: BSAi≤0.75, 0.75<BSA≤1, 1<BSAi≤1.25, BSAi>1.25. We compared delayed graft function (DGF) rates, primary non-function (PNF) rates and graft survival among them in the entire cohort and for each donor type separately [living, donation after brain death (DBD), donation after circulatory death (DCD)] (reference category: BSAi≤0.75).
Results: Cases with BSAi≤0.75 had the highest DGF rates in living-donor renal transplants (11.1%) (0.75<BSAi≤1: OR=0.591, 95%CI: 0.318-1.097, p=0.095, 1<BSAi≤1.25: OR=0.456, 95%CI: 0.232-0.894, p=0.022, BSAi>1.25: OR=0.318, 95%CI: 0.132-0.766, p=0.011) and DBD renal transplants (26.2%) (0.75<BSAi≤1: OR=0.723, 95%CI: 0.546-0.957, p=0.024, 1<BSAi≤1.25: OR=0.621, 95%CI: 0.465-0.83, p=0.001, BSAi>1.25: OR=0.65, 95%CI: 0.468-0.903, p=0.01). There were no significant differences in DCD renal transplants regarding DGF rates (just above 40% in all groups). No significant differences were found concerning PNF. Graft survival was similar among BSAi groups in living-donor and DBD renal transplants. DCD renal transplants with BSAi≤0.75 had shorter graft survival than the other groups (0.75<BSAi≤1: HR=0.548, 95%CI: 0.408-0.736, p<0.001, 1<BSAi≤1.25: HR=0.48, 95%CI: 0.352-0.655, p<0.001, BSAi>1.25: HR=0.45, 95%CI: 0.307-0.66, p<0.001). 5-year and 10-year graft survival rates were 73% and 58%, respectively, for DCD renal transplants with BSAi≤0.75.
Conclusions: DGF risk is higher in living-donor and DBD renal transplants with BSAi≤0.75. Graft survival is greatly reduced in DCD renal transplants with BSAi≤0.75.

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DISCLOSURES: I.D. Kostakis: None. **N. Karydis:** None. **T. Kassimatis:** None. **N. Kessaris:** None. **I. Loukopoulos:** None.

Abstract# 849

Trends in the Recovery and Discard of Kidneys from Deceased Donors with Acute Kidney Injury from 2010-2018

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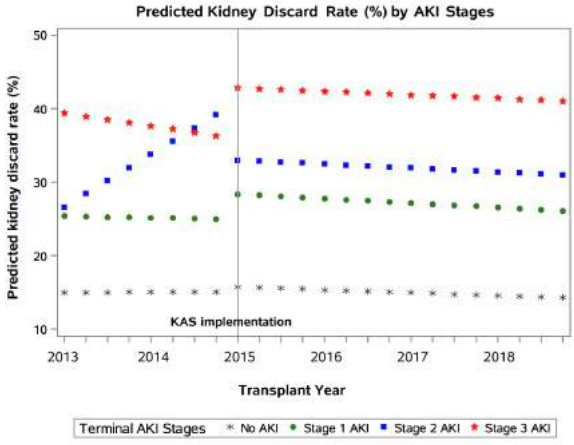
Purpose: Since the donor KDPI score used in KAS is restricted to a single terminal serum creatinine (SCr) measurement, kidneys from donors with transient acute kidney jury (AKI) may have misleadingly high KDPI scores. We characterized trends in the recovery and discard of kidneys from deceased donors with AKI in the context of KAS implementation.
Methods: We retrospectively analyzed 71,180 donors in the OPTN database >16 years of age who had at least one organ recovered for transplant between 1/1/2010-1/1/2019. AKI was defined as ≥50% or ≥0.3 mg/dL increase in terminal SCr from admission. AKI stages were defined by KDIGO guidelines. The primary outcomes were kidney recovery and discard rates. We estimated the change in discard rate following KAS implementation (in 12/2014) with interrupted time series adjusted for secular trends.
Results: Of 130,506 kidneys recovered, 25,982 (20%) were not utilized, half (12,780) of which were from donors with AKI. The proportion of donors with any AKI did not change significantly (~38%) during this time frame. The proportion of donors with stage 3 AKI increased from 6% (412/6841 donors) in 2010 to 11% (1056/9575 donors) in 2018. The kidney recovery rate did not change significantly from 2010-2018 among lower stages of AKI. The recovery rate of kidneys from donors with stage 3 AKI kidneys increased from 51% (423/824 kidneys) in 2010 to 62% (1488/2112 kidneys) in 2018. Discard of recovered stage 3 AKI kidneys decreased from 41% (175/423 kidneys) in 2010 to 32% (153/481 kidneys) in 2012 but increased after KAS implementation by 7% and remained high at 42% (619/1488 kidneys) in 2018 (**Figure**). The number of centers transplanting >5% stage 3 AKI kidneys increased from 6% (32/493) in 2010 to 15% (75/493) in 2018.
Conclusions: KAS may have contributed to the increased discard rate of stage 3 AKI kidneys. Concurrent increases in discard and transplantation of stage 3 AKI kidneys suggest increasing recovery that outpaces transplantation.



CITATION INFORMATION: Liu C., Alasfar S., Reese P., Mohan S., Doshi M., Hall I., Thiessen-Philbrook H., Jia Y., Stewart D., Parikh C. Trends in the Recovery and Discard of Kidneys from Deceased Donors with Acute Kidney Injury from 2010-2018 *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Liu: None. **S. Alasfar:** Grant/Research Support; Name of Commercial Interest; CareDX, Shire. Grant/Research Support; Nature of Relationship; Grant/Research support. **P.P. Reese:** Consulting Fee; Name of Commercial Interest; VALHealth. Grant/Research Support; Name of Commercial Interest; Merck, AbbVie, CVS Caremark. Grant/Research Support; Nature of Relationship; Grant/Research support. **S. Mohan:** Consulting Fee; Name of Commercial Interest; Angion Pharmaceuticals. Consulting Fee; Nature of Relationship; Consulting fees.. Other; Name of Commercial Interest; Kidney International Reports. Other; Nature of Relationship; Deputy Editor. **M.D. Doshi:** None. **I.E. Hall:** None. **H.R. Thiessen-Philbrook:** None. **Y. Jia:** None. **D.E. Stewart:** None. **C. Parikh:** Consulting Fee; Name of Commercial Interest; Renalytix. Consulting Fee; Nature of Relationship; Consulting fees.. Other; Name of Commercial Interest; Genfit, Abbott. Other; Nature of Relationship; Data Safety and Monitoring Board.

Abstract# 850

Two-for-One Kidney Transplant Outcomes

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Purpose: In the United States, over 91,000 people are on the waiting list for a kidney transplant. Concurrently, 3,500 kidneys deemed to be of marginal quality are discarded per year. "Two-for-One" kidney transplants use two marginal kidneys for a single recipient to provide adequate nephron mass. The purpose of this study was to evaluate outcomes with Two-for-One kidney transplants performed nationally compared with outcomes at a single center.
Methods: We conducted a retrospective cohort study of all consecutive adult kidney transplants performed from January 2012 to April 2020. National data and our local center data were analyzed separately. We compared outcomes in single kidney transplants (KT) compared with two-for-one KT in both data sets. National data was obtained from the United Network for Organ Sharing (UNOS) and our local center data was collected from the electronic medical records.
Results: Nationally there were 248,755 kidney transplants with 2,501 (1%) two-for-one KT. Our center performed 1,455 kidney transplants with 38 (2.6%) two-for-one KT during the study period. The mean national donor age was 38 vs. 57 years for single KT and two-for-one KT respectively, (p<0.001) compared with a mean age of 19 vs.38 years at our local center (p<0.001). The national recipient mean age was 50 vs.59 years for single KT and two-for-one KT respectively, (p<0.001) compared with our local center recipient mean age of 33 vs. 58 years (p<0.001). Nationally, there was a statistical difference in delayed graft function between the single KT (25%) compared with two-for-one KT (30%), p<0.001. There was no difference in delayed graft function between the two groups at our center, single KT (17%) vs. two-for-one KT (18%), p=1.00. Nationally, single KT had better graft survival than two-for-one KT (p<0.001), while there was no difference at our center, p=0.32. Patient survival at the national level was significantly improved for single KT vs. two-for-one KT (p<0.001), whereas there was no difference in patient survival in our center's data (p=0.82).

Conclusions: Two-for-one kidney transplants are a viable means of expanding the organ donor pool, however patient and graft survival differ between the national and local center data. These findings suggest disparities between both the quality of organs and recipient selections. Further studies of donor and recipient comorbidities and risk factors are warranted to facilitate greater utilization of two-for-one kidney transplants.

CITATION INFORMATION: Malanga C., Madeem H., Robichaux K., Buggs J., Kumar A., Bowers V. Two-for-One Kidney Transplant Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Malanga: None. **H. Madeem:** None. **K. Robichaux:** None. **J. Buggs:** None. **A. Kumar:** None. **V. Bowers:** None.

Abstract# 851

Transplant Center Volume in High-risk Donors are Associated with Graft and Patient Survival

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Purpose: Evaluation of high-risk kidney donors in transplant centers involves an intensive assessment of the individual risks and selection of appropriate recipients. Understandably, this requires well thought out protocols and structures to maintain good outcomes. In this study, we explore the association of center volume with patient and graft survival in high risk donor transplants.

Methods: We reviewed Organ Procurement and Transplantation Network (OPTN) data on kidney transplants among 285 transplant centers between 2000 and 2016. High-risk kidney transplant included donation after cardiac death (DCD), cold ischemic time≥24 hours and high KDPI≥85%. For each high-risk transplant, transplant centers were categorized into tertiles of low, medium and high volume according to the annual average transplant volume of such transplant. The outcomes were death censored graft loss (DCGL) and death with functioning graft (DWFG). The association of center volume with each outcome was analyzed using multivariable Cox regression including adjustment for recipient, donor, and transplant characteristics.

Results: Compared to high volume centers, the lower and medium center volume for DCD kidneys had a lower risk for DCGL at 3 months (aHR=0.771[0.639-0.932]; aHR=0.733[0.605-0.888]) longer follow up at 1, 5 and 10 years and overall have similar trends. There was only lower risk for DWFG for medium center volume DCD in 10 years aHR=0.910(0.844-0.982) and overall aHR=0.912 (0.848-0.981). For lower volume and medium volume with cold ischemic time ≥ 24 hours there was lower risk for DCGL at 1 year (aHR=0.869[0.778-0.971];aHR=0.889[0.799-0.989]), 5 years (aHR=0.892[0.831-0.957];aHR=0.918[0.858-0.982]); 10 years (aHR=0.925[0.871-0.982];aHR=0.935[0.882-0.990]) and overall (aHR=0.933[0.882];aHR=0.930[0.880-0.983]) when compare high center volume. In low and medium center volumes for prolonged cold ischemic time there was a lower risk for DWFG overall (aHR= 0.940[0.897-0.986]; aHR=0.933[0.892-0.980]) when compared with high center volume. We observed that lower and medium center volume in kidney with a KDPI≥85% were not associated with higher risk for DCGL and DWFG.

Conclusions: We found that DCD and cold ischemic time≥24 hour had a worse DCGL in high volume centers but not in kidney with high KDPI≥ 85%. Large studies with prospective follow up are needed to determine donor characteristics of DCD and cold ischemic time>24 hours that lead to greater risk for DCGL in high volume centers.

Center Volume divide by number of donor with high KDPI>85%

Center Volume		Death-censored graft failure		Death with functioning graft	
		HR	95% CI	HR	95% CI
3M	High volume	Ref	Ref	Ref	Ref
	Low volume	1.041	0.882-1.229	0.956	0.765-1.196
	Med volume	1.057	0.899-1.242	1.102	0.891-1.364
1Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.947	0.837-1.072	0.914	0.797-1.048
	Med volume	0.934	0.827-1.054	1.02	0.894-1.163
5 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.978	0.899-1.064	1.011	0.937-1.092
	Med volume	0.976	0.900-1.060	1.035	0.960-1.115
10 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.983	0.914-1.058	1.048	0.986-1.114
	Med volume	0.957	0.891-1.028	1.041	0.980-1.105
Overall	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.998	0.929-1.072	1.048	0.986-1.114
	Med volume	0.964	0.899-1.034	1.041	0.980-1.105

Center Volume divide by number of donor after cardiac death

Center Volume		Death-censored graft failure		Death with functioning graft	
		HR	95% CI	HR	95% CI
3 M	High volume	Ref	Ref	Ref	Ref
	Low volume	0.771	0.639-0.932	1.13	0.880-1.451
	Med volume	0.733	0.605-0.888	1.007	0.778-1.304
1Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.82	0.705-0.954	1.131	0.955-1.339
	Med volume	0.756	0.647-0.883	1.003	0.842-1.194
5 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.858	0.777-0.947	1.002	0.913-1.099
	Med volume	0.803	0.726-0.887	0.968	0.881-1.063
10 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.904	0.830-0.984	0.978	0.908-1.054
	Med volume	0.831	0.762-0.906	0.91	0.844-0.982
Overall	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.901	0.830-0.979	0.972	0.905-1.044
	Med volume	0.826	0.760-0.899	0.912	0.848-0.981

Center Volume divide by number of donor with renal ischemia ≥ 24 hours

Center Volume		Death-censored graft failure		Death with functioning graft	
		HR	95% CI	HR	95% CI
3M	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.902	0.783-1.039	1.079	0.893-1.304
	Med volume	0.936	0.817-1.073	0.919	0.757-1.116
1Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.869	0.778-0.971	0.977	0.866-1.102
	Med volume	0.889	0.799-0.989	0.946	0.839-1.066
5 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.892	0.831-0.957	0.945	0.884-1.010
	Med volume	0.918	0.858-0.982	0.941	0.882-1.005
10 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.925	0.871-0.982	0.951	0.904-1.001
	Med volume	0.935	0.882-0.990	0.94	0.893-0.988
Overall	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	0.933	0.882-0.988	0.94	0.897-0.986
	Med volume	0.93	0.880-0.983	0.935	0.892-0.980

CITATION INFORMATION: Merzkani M., Murad H., Mattu M., Wang M., Hu V., Chang S., Alhamad T. Transplant Center Volume in High-risk Donors are Associated with Graft and Patient Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.A. Merzkani: None. **H. Murad:** None. **M. Mattu:** None. **M. Wang:** None. **V. Hu:** None. **S. Chang:** None. **T. Alhamad:** None.

Abstract# 852

Improving Eligibility of Renal Transplants in the Elderly

L. B. Moraitis, J. Rogers, A. Farney, A. Reeves-Daniel, G. Orlando, W. Doares, S. Kaczmorski, A. Mena-Gutierrez, C. Jay, R. Stratta, *Abdominal Organ Transplant, Wake Forest Baptist Health, Winston-Salem, NC*

Purpose: In the recent past, older age was contraindication to kidney transplantation (KT). New kidney allocation schemes with use of longevity matching, initiation of frailty testing, and enhanced psychosocial assessment have improved kidney access for the elderly population, age 75 and higher.

Methods: We retrospectively reviewed outcomes in adult patients (pts) ≥75 years of age transplanted at our center with kidneys from deceased donors. All patients (pts) received antibody induction in combination with reduced dose FK, MMF, and steroids. Protocol adjustments included frailty testing, stricter psychosocial clearance, and demonstration of stable comorbidities.

Results: Over a 16-year period, we performed 92 KTs (4.7% of all adult KTs) in pts age ≥75 (mean 77 years, range 75-84). The recipient group included 40 women and 52 men (58 white, 31 black, 3 other) with a mean waiting time of 13 months and dialysis

duration of 30 months. 11 pts (12%) were transplanted prior to starting dialysis. 55 pts (60%) received kidneys from expanded criteria donors (ECDs, including 25 ≥ age 65), 8 pts received dual kidney transplants, and 6 were retransplants. Mean KDPI was 74%. The incidence of delayed graft function (need for dialysis post-KT) was 23%. With a mean follow-up of 53 months (60 pts had at least 5 years f/u), actual pt and kidney graft survival rates were 57% and 49%, respectively; death-censored kidney graft survival (DCGS) was 70%. One year pt and kidney graft survival rates were 95% and 88%, respectively. Of 47 graft losses, 11 occurred within 1 year and 28 (60%) were secondary to death with a functioning graft (DWFG). Half of the deaths and DWFGs occurred ≥ 5 years post-KT. At present, 45 of the 52 surviving pts (87%) have functioning grafts. Major causes of death were cardiovascular (10), stroke (7), sepsis (6), and respiratory failure (6). The incidences of surgical complications, acute rejection and major infection were 9%, 20%, and 25%, respectively. In 28 cases, the mate kidney from the same donor was transplanted into a <75 year old pt (mean age 60 years) at our center. DCGS rates in the donor-matched pairs were comparable in the older (56%) and younger (59%) age cohorts.

Conclusions: New kidney allocation policies should not discriminate against older recipients who are physically active and functional, have good psychosocial support, and have stable comorbidities. Acceptable medium-term outcomes can be achieved in appropriately selected elderly patients, improving both their quality and quantity of life compared to dialysis. By using predominantly ECD kidneys, which otherwise may not be appropriate for younger patients, we have enhanced opportunities for KT in the elderly while simultaneously reducing the risk for organ discard, thus permitting liberalization of both donor and recipient eligibility criteria.

CITATION INFORMATION: Moraitis L., Rogers J., Farney A., Reeves-Daniel A., Orlando G., Doares W., Kaczmorski S., Mena-Gutierrez A., Jay C., Stratta R. Improving Eligibility of Renal Transplants in the Elderly *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.B. Moraitis: None. **J. Rogers:** None. **A. Farney:** None. **A. Reeves-Daniel:** None. **G. Orlando:** None. **W. Doares:** None. **S. Kaczmorski:** None. **A. Mena-Gutierrez:** None. **C. Jay:** None. **R. Stratta:** None.

Abstract# 853

Outcomes in Older Recipients Receiving Kidneys from Donors with Acute Kidney Injury (AKI)

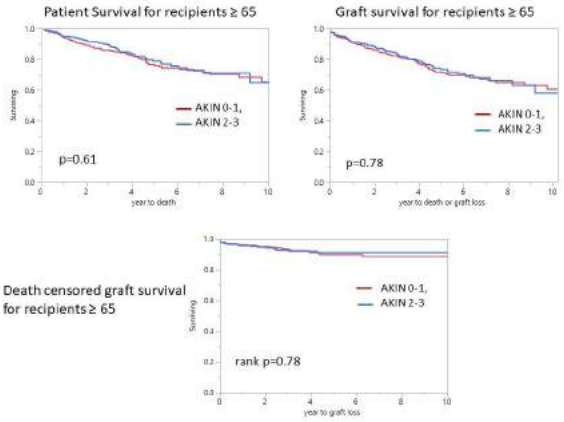
S. Nair, K. Reddy, L. Kodali, P. Budhiraja, J. Ninan, C. Jadlowiec, A. Mathur, J. Harbell, H. Khamash, M. Smith, R. Heilman, *Mayo Clinic, Phoenix, AZ*

Purpose: Older patients are perceived to tolerate delayed graft function (DGF) poorly and there is a reluctance to transplant a kidney from an AKI donor into older recipients. Our aim was to examine the outcomes of older transplant recipients (age ≥65years) receiving kidneys from donors with AKI.

Methods: We included all patients ≥65 years of age who received deceased donor kidney transplants from 2/1/08 - 12/29/19 at our center. We used acute kidney injury network (AKIN) criteria to assess the severity of AKI in the donors. Patients who received kidneys from donors with AKIN2-3 were compared to those receiving kidneys from AKIN0-1 donors. The primary outcomes were patient survival, all-cause and death-censored graft survival.

Results: Of the 594 patients who received kidney transplant at our center during the study period 265 received AKIN 2-3 kidneys and 329 received AKIN 0-1 kidneys. Baseline characteristics were similar between the 2 groups. AKIN 2-3 had a lower KDPI (58 Vs 68), younger donor age (43 Vs 51) and lower % of DCD kidneys (12 VS 23%). DGF rate was higher in the AKIN 2-3 group (65% vs 45%). The patient survival, graft survival, death censored graft survival, 1 year GFR and rejection rate were not significantly different. Biopsies at 1 year showed no significant difference for acute or chronic changes (table 2). Death with functioning graft was the most common cause for graft failure in both groups (67.4% AKIN0-1 Vs 69.8% AKIN2-3). 4 cases of primary non function (PNF) were seen in AKIN0-1 Vs 3 in AKIN2-3.

Conclusions: Despite higher rate of DGF, recipients ≥ 65 tolerate AKIN 2-3 kidneys well and have equivalent outcomes to those receiving AKIN 0-1 kidneys. As expected, death with functioning graft is the primary cause for graft loss in older recipients. Older recipients should not be excluded from receiving kidneys from severe AKI donors.



Outcomes for recipients ≥ 65

	AKIN 0-1	AKIN 2-3	P
Hospital length of stay in days(median, IQR)	3 (2-4)	3 (2.5-4)	0.62*
DGF%	45.3	65.3	<.0001
Rejection first year%	14.0	16.6	0.38
eGFR 1 year	51.2 (18.7)	54.3 (18.2)	0.07
1 year graft survival%	91.0 (n=275)	91.3 (n=235)	0.79^
1 year patient survival%	94.6 (n=279)	94.9 (n=237)	0.60^
3 year graft survival%	82.5 (n=177)	83.9 (n=164)	0.79^
3 year patient survival%	86.0 (n=178)	89.1 (n=164)	0.60^
1 year biopsy findings IFTA sum >2	28.3	20.8	0.11

*Wilcoxon p value. ^ log rank p value. Continuous variables shown as mean (SD) unless otherwise stated

CITATION INFORMATION: Nair S., Reddy K., Kodali L., Budhiraja P., Ninan J., Jadlowiec C., Mathur A., Harbell J., Khamash H., Smith M., Heilman R. Outcomes in Older Recipients Receiving Kidneys from Donors with Acute Kidney Injury (AKI) *AJT, Volume 21 Supplement 3*

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Abstract# 855

Efficacy of Hope: Analysis of Quality HIV+ Deceased Donor Organ Availability

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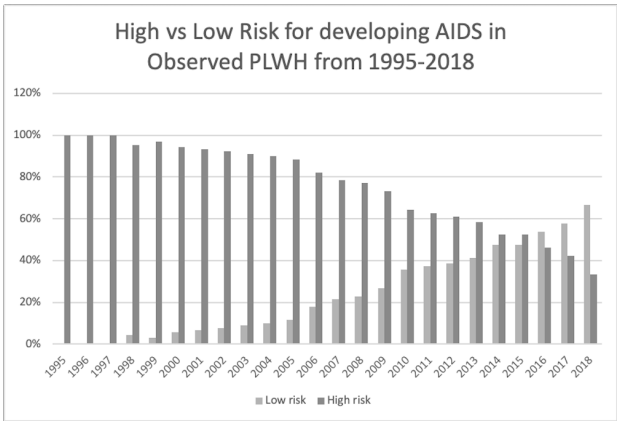
Purpose: The purpose of this study is to understand the number of organs actually available for HIV+ to HIV+ transplant utilizing data on a national scale, while taking into account organ quality.

Methods: Using data collected at Center for AIDS Research Network of Integrated Systems (CNICS) centers (1995 - 2018), 6,223 deaths (potential deceased organ donors) among PLWH were identified. 1,137 were excluded due to cancer diagnosis. The remaining 5,086 were studied to assess organ quality/suitability. Potential deceased organ donors were further characterized as high (viral load > 200 copies/mL and CD4 < 200 cells/mm^3) or low (viral load < 200 copies/mL and CD4 > 200 cells/mm^3) risk for transmission of resistant virus. Kidney quality was assessed using the Kidney Donor Profile Index (KDPI) with a KDPI > 85 indicating poor quality. Liver viability was assessed via Fibrosis-4 (FIB-4) score, which measures AST, ALT, platelet count, and age, with a FIB-4 score > 3.25 indicating severe cirrhosis rendering the donor liver not suitable for transplantation.

Results: In 1995, 100% of PLWH were considered high risk compared to just 42% in 2017 [figure]. 3,907 potential donors were high risk. Among low risk potential donors, 605 (9.72%) had a KDPI < 85, suggestive of high quality kidneys for transplant, and 967 (15.54%) had minimal (FIB-4 < 1.45) to moderate cirrhosis (FIB-4 1.45-3.25), suggestive of high quality livers for transplant. Importantly, 316 (32.7%) of potential liver donors were coinfected with hepatitis C.

Conclusions: Since the introduction of antiretrovirals in the 1990's, HIV care is increasingly more accessible, targeted, and effective, and thus, over time fewer potential donors were high risk. During the 23 years covered by this study, only 25% of deaths occurred among low risk PLWH with laboratory and clinical features suggestive of high quality, transplantable organs.



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DISCLOSURES: G.E. Owens: None. **B. Shelton:** None. **P. MacLennan:** None. **D. Sawinski:** None. **J.E. Locke:** None.

Abstract# 857

Excellent Outcomes of Kidney Transplantation from Hepatitis C Infected Donors

B. Rawashdeh, J. Dann, K. M. Marsh, A. Doddi, S. Rao, A. Agarwal, *UVA Health System, University of Virginia, Charlottesville, VA*

Purpose: Utilization of Hepatitis C viremic (HCV D+) kidney donors in HCV naïve recipients has increased in the United States. While there are shorter waiting times to receive HCV D+ organs, there is a need for HCV therapy and possible higher rates of other viral infections including cytomegalovirus (CMV) and polyomavirus virus (BK). We conducted this study to compare the outcomes of HCV D+ and HCV D- with a focus on viral infections.

Methods: A retrospective chart review was conducted to identify deceased donor kidney transplant recipients from December 1, 2018 to November 30, 2019 at a large single-center transplant center. Primary outcome was 1-year patient and kidney allograft survival. Details of kidney allograft function, rejection, HCV therapy, and viral infections were recorded. The recipients were divided into 2 groups according to donor HCV status: HCV D+ (n= 31) and HCV D- (n= 95).

Results: The groups had similar age (59 vs 56 years, p=0.3), gender (68 vs 55% male, p=0.2), race (Caucasian 55 vs 53%, African American 42 vs 38%, p=0.7), chronic dialysis (94 vs 89%, p=0.5) and dialysis vintage (4 years for both groups, p=0.5). The HCV D+ group had higher BMI (33 vs 30 kg/m2, p =0.03), more primary transplants (97% vs 80%, p =0.02) and lower mean PRA (6 vs 26, p =0.049). Comorbidities were frequent but similar between groups: HTN (90%), DM (44%), CAD (28%) and PAD (5%). Donors in the HCV D+ group were younger (36 vs 45 years, p=0.04) but the proportion of donors with terminal creatinine > 1.5mg/dl was higher (61% vs 34%, p =0.007). While the allocated KDPI was similar, the optimized KDPI was lower in the HCV D+ group (35% vs 55%, p <0.001). Delayed graft function (DGF) (54%) and cold ischemia time (CIT) (22 hours) were similar for the 2 groups. Twenty-nine HCV D+ recipients acquired HCV viremia due to donor transmission; 2 recipients in the HCV D- cohort had HCV viremia prior to transplant. All of these recipients were treated post-transplant and achieved sustained virologic response at 12 weeks. Transaminitis occurred in 9 recipients, with at least 3 times normal aminotransferase levels; no recipients had evidence of advanced hepatic dysfunction. The 1 year patient survival was excellent in HCV D+ recipients (100%) and was similar to HCV D- recipients (90%, p=0.1). No additional kidney allografts were lost at 1 year post-transplant, and both groups had similar GFR at 1 year (56 vs 60 ml/min/1.73 m^2, p=0.4). CMV and BK infections occurred at similar rates (35 vs 21%, p=0.08 and 26 vs 21%, p=0.6, respectively).

Conclusions: Our study shows that HCV D+ kidneys can be safely utilized with excellent patient and kidney allograft outcomes. The rates of viral infection were not associated with donor HCV status. HCV D+ kidneys with AKI and long CIT have high rates of DGF, but the short term outcomes are favorable. These results support a more liberal criteria for HCV D+ kidneys for transplantation.

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DISCLOSURES: B. Rawashdeh: None. **J. Dann:** None. **K.M. Marsh:** None. **A. Doddi:** None. **S. Rao:** None. **A. Agarwal:** None.

Abstract# 858

Donation After Circulatory Death Kidney Transplantation Has Equal Long-Term Graft and Patient Survival as Donation After Brain Death: A Systematic Review and Meta-Analysis

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Purpose: Donation after circulatory death (DCD) kidneys are not worldwide accepted yet due to concerns about inferior quality. To investigate whether these concerns are justified, a meta-analysis was performed to assess DCD graft survival compared to donation after brain death (DBD) graft survival. Secondary outcomes were the risk of primary non-function (PNF), delayed graft function (DGF), acute rejection (AR) within 3 months, 1-year estimated Glomerular Filtration Rate (eGFR), patient survival, and risk of urologic complications.

Methods: EMBASE, Medline, Cochrane, Web of Science and Google Scholar databases were searched for studies published until September 15th, 2020. Studies comparing DCD to DBD for any of the outcomes were included. Exclusion criteria were: studies using normothermic machine perfusion or regional perfusion and studies reporting on pediatric/dual kidney transplants. A random-effects model was used for meta-analysis. Meta-regression analysis was performed if I^2 exceeded 50%.

Results: 1808 studies were screened, 51 studies were included. The risk of 1-year all-cause and death-censored graft loss was increased in DCD recipients (risk ratio (RR) 1.13 (1.08-1.19) and RR 1.10 (1.04-1.16)). The risk of 10-year all-cause and death-censored graft loss (RR 1.03 (0.94-1.13) and RR 1.02 (0.92-1.13)) was equal to DBD recipients. DCD recipients had a higher risk of PNF (RR 1.43 (1.26-1.62)) and DGF (RR 2.02 (1.88-2.16)). The risk of AR and 1-year eGFR was similar to DBD. One-year mortality risk was increased in DCD recipients (RR 1.10 (1.01-1.21), while the 5-year and 10-year mortality risk were similar to DBD. The risk of ureter leakage/stenosis was not significantly different.

Conclusions: DCD kidney transplant recipients have similar long-term graft and patient survival as DBD recipients despite a higher risk of PNF and a higher risk of mortality and graft loss in the first year. These results should encourage implementation of DCD programs worldwide to increase the donor pool.

CITATION INFORMATION: Rijkse E., Ceuppens S., Qi H., IJzermans J., Hesselink D., Minnee R. Donation After Circulatory Death Kidney Transplantation Has Equal Long-Term Graft and Patient Survival as Donation After Brain Death: A Systematic Review and Meta-Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Rijkse: None. **S. Ceuppens:** None. **H. Qi:** None. **J.N. IJzermans:** None. **D.A. Hesselink:** None. **R.C. Minnee:** None.

Abstract# 859

Prolonged Cold Ischemic Time Demonstrating Minor Effect on Outcomes Following Renal Transplantation - A Paired Kidney Analysis

N. Sanichar[1], V. Sandra[2], K. L. King[2], S. A. Husain[2], S. Mohan[2], *[1]Columbia University Irving Medical Center, New York, NY, [2]Columbia University, New York, NY*

Purpose: An improved understanding of the effects of cold ischemia time (CIT) on deceased donor kidney (DDK) outcomes may increase organ utilization by clarifying the detrimental impact on outcomes. We performed a paired analysis of DDKs with long CIT to measure its impact on delayed graft function (DGF) and death-censored graft survival (GS).

Methods: Using national UNOS data, we identified 6,234 pairs (by donor) of transplanted DDKs from January 2000 to February 2020 with CIT above the US median (16 hours) and at least 5 hours apart. Among 1,955 pairs with discordant DGF status, we analyzed the impact of recipient factors and shorter versus longer CIT on DGF and 10-year GS using logistic regression and the log-rank test.

Results: Recipients were predominantly male with a mean age of 55.4 ± 12.4 years. The kidney pairs had a median CIT difference of 10 hours between the shorter and longer CIT kidneys. The DDK with shorter CIT in the pair experienced DGF 45.3% of the time, vs 54.7% for the DDK with longer CIT. The longer CIT kidneys had an increased odds ratio for DGF compared to the shorter CIT kidneys in the pair (OR=1.44, 95% CI: 1.25-1.67, p<0.0001), but no different 10-year GS (logrank p=0.36). Kidneys that experienced DGF, however, experienced worse 10-year GS than the non-DGF group (logrank p <0.001). Among the 1,955 kidneys with shorter CIT, recipients who were male, black, had a higher body mass index (BMI), or had a longer dialysis vintage had an increased odds of DGF (Table 1).

Conclusions: In a paired analysis of long CIT kidneys, DGF is associated with worse 10-year GS. When discordant in donor kidney pairs, DGF is likely the result of recipient factors, especially when it occurs in the kidney that experienced less CIT.

DGF	Shorter CIT Kidneys (n=1955)		
Parameters*	**aOR**	**95% CI**	**p-value**
Recipient Characteristics			
Gender			
Female	Ref.		-
Male	1.46	(1.18, 1.80)	<0.0001
Race			
White	Ref.		-
AA	1.33	(1.04, 1.71)	0.024
BMI (kg/m^2)			
<25	Ref.		-
25-30	1.32	(1.02, 1.72)	0.037
30-35	1.64	(1.23, 2.18)	0.001
35-40	2.35	(1.65, 3.37)	<0.0001
>40	2.72	(1.18, 6.27)	0.019
Missing	0.92	(0.14, 6.12)	0.933
Dialysis Vintage			
0-5	Ref.		-
5-10	1.37	(1.13, 1.90)	0.009
10-15	1.29	(0.84, 2.87)	0.360
15-20	12.27	(1.32, 30.46)	0.019
Missing	0.90	(0.06, 18.23)	0.944
*also adjusted for Age, Serum Albumin, Blood Type, Diabetes Status, Pre-emptive Listing, Panel Reactive Antibody Status, and Human Leukocyte Antigen Mismatches			

CITATION INFORMATION: Sanichar N., Sandra V., King K., Husain S., Mohan S. Prolonged Cold Ischemic Time Demonstrating Minor Effect on Outcomes Following Renal Transplantation - A Paired Kidney Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Sanichar: None. **V. Sandra:** None. **K.L. King:** None. **S.A. Husain:** None. **S. Mohan:** None.

Abstract# 860

A Kidney Waitlist Outcomes Timeline to Visualize Candidate Offers and Outcomes

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Purpose: While transplant centers closely monitor posttransplant outcomes for each transplant recipient, centers currently lack data to monitor waitlist outcomes of individual candidates. Candidates who are waiting may receive multiple deceased donor organ offers. Centers may decline offers on behalf of the candidate in order to wait for a better offer. These decisions may impact waitlist outcomes because a better offer may not arrive, and dialysis-related morbidity may worsen. We sought to develop waitlist outcomes reports to facilitate monitoring of candidates who are receiving donor offers.

Methods: Multiple report mockups were developed using patient-level data from the Scientific Registry of Transplant Recipients (SRTR). Data included a deidentified random sample of 200 kidney waitlist candidates from across the US who had received at least one offer between May 7, 2019 and May 6, 2020. For each candidate, offers were identified from match runs from January 1, 2014 to May 6, 2020. Match run data included any offer that was ultimately accepted somewhere and resulted in a transplant. Mockups excluded candidates with multiple listings.

Results: Reports were designed to visually identify several outcomes: candidates who had died after receiving offers, additional time on dialysis for candidates receiving offers, and changes to quality and frequency of donor offers over time. Figure 1A depicts multiple patients on a waitlist. Each horizontal line represents one candidate and each mark represents an offer to the candidate. Figure 1B depicts an alternative report showing a single candidate who was an example of offer Kidney Donor Profile Index (KDPI) not improving over time.

Conclusions: The waitlist reports are a potential method for centers to self-monitor candidates and may supplement posttransplant outcomes monitoring and existing decision support tools, such as statistical outcomes calculators. The reports illustrate how offer frequency and KDPI change while candidates wait and the dialysis burden faced by candidates. Future stakeholder feedback will inform improvements and alternatives to reports and identify additional relevant candidate and donor data (e.g. offer number). Additional research is warranted to understand the utility of a visual representation of the impact of offer decisions made on behalf of waitlist candidates.

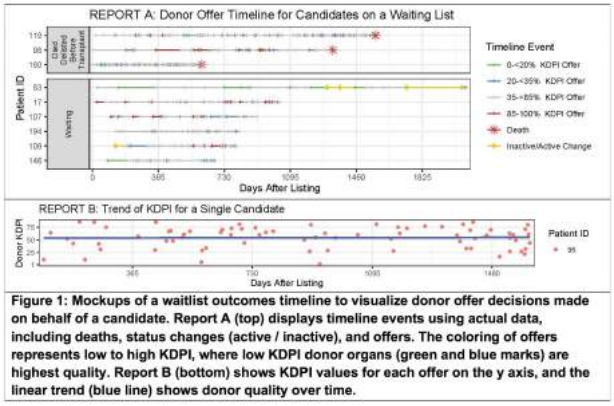

Figure 1: Mockups of a waitlist outcomes timeline to visualize donor offer decisions made on behalf of a candidate. Report A (top) displays timeline events using actual data, including deaths, status changes (active / inactive), and offers. The coloring of offers represents low to high KDPI, where low KDPI donor organs (green and blue marks) are highest quality. Report B (bottom) shows KDPI values for each offer on the y axis, and the linear trend (blue line) shows donor quality over time.

CITATION INFORMATION: Schaffhausen C., Miller J., Matas A., Israni A., Wey A., Hart A. A Kidney Waitlist Outcomes Timeline to Visualize Candidate Offers and Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Schaffhausen: None. **J. Miller:** None. **A. Matas:** None. **A. Israni:** None. **A. Wey:** None. **A. Hart:** None.

Abstract# 861

Outcomes After Usage of Organs from Deceased Organ Donors with Sepsis - A Single-center Experience

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Purpose: The deceased Organ Donation rate is around 0.8/million in our nation. There remains a severe shortage of organs worldwide, leading to a trend towards relaxing acceptance criteria for using organs. However, after these donations, outcomes need to be carefully analyzed to have guidelines for the safe use of organs from these donors. The present study analyzed the outcomes after using organs from Deceased Organ Donors (DOD) with sepsis in a kidney-pancreas transplant program at a tertiary care hospital

Methods: Data from January 2016 -October 2019 was analyzed from the local database. A total of 118 DOD were identified. 37/118(31.3%) fulfilled the criteria of ongoing sepsis any time before organ donation. Sepsis was defined as a positive blood/urine/tracheal aspirate cultures and a positive Sequential Organ Failure Assessment score (SOFA). Cultures sent on any day after ICU admission till organ procurement were included. Parametric and nonparametric multivariate analysis was done among these DODs

Results: Over 95% of donors had brain death due to road traffic accidents with a mean ICU stay of 7.3+ 6.3 days. 235 recipients received kidneys and pancreas from these donors, and 73 of these were from septic donors. Among 37 septic organ donors, 19 had multiple drug-resistant organisms (MDRO) on cultures, most commonly being Acinetobacter baumannii. A total of 6/235 Recipients had died during the hospital stay, with most (5/6) of these in patients who received kidneys from septic donors. Recipients from septic donors had Significantly higher DGF rates, required more post-op re-explorations (11. Vs. 4.9%), and had longer ICU stay, 19.8 vs. 15.6 days

Conclusions: Organ transplantation from donors with sepsis resulted in higher mortality in the early post-op period. There is a need to characterize risk factors associated with mortality in these donors. However, long-term outcomes were similar in patients who recovered

Total (n-236)	Sepsis YES (n-recipient)	Sepsis NO (n-recipient)	Multivariate significance
DCD/DBD	7/66 (73)= 31.0%	4/159 (162) = 68.9%	
Recipient age & Donor Age	41.6 & 35	40.8 & 35.5	
Cold ischemia Time(min)	347.41	357.87	
DGF	38.4%	19%	.002
In stay Rejection	8.2%	11.6%	
Discharge sCr vs follow-up sCr (mg/dl)	1.67 vs 1.29	1.50 vs 1.09	
Patient survival at 3 years	62/73= 84.9%	148/162= 91.3%	

CITATION INFORMATION: Sharma A., Choudhary D., Kenwar D., Singh S., kumar S., jain K., Bansal N., Ravi A. Outcomes After Usage of Organs from Deceased Organ Donors with Sepsis - A Single-center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Sharma: None. **D. Choudhary:** None. **D. Kenwar:** None. **S. Singh:** None. **S. kumar:** None. **K. jain:** None. **N. Bansal:** None. **A. Ravi:** None.

Abstract# 862

Poor Reliability of Karnofsky Performance Score in Kidney Transplant Candidates

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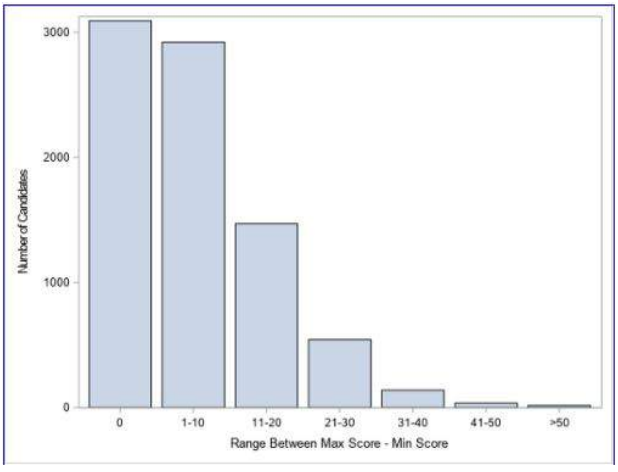
Purpose: The Karnofsky Performance Status (KPS) Scale has been used as a proxy for frailty and as a predictor of transplant outcomes, however reliability of the instrument in national transplant data registries is unknown. We investigate the inter-rater reliability of KPS reporting among transplant centers to assess its utility as a measure of physical function in kidney transplant candidates.

Methods: Patients were selected from the Scientific Registry of Transplant Recipients (SRTR) database between 2006-2020 with at least two KPS scores in a three-month period. The reliability of KPS was estimated from the intraclass correlation coefficient (ICC) in a multilevel model with patient and center level random effects. All analyses were adjusted for the time elapse between measurements, year reported, patient demographics and comorbid conditions.

Results: Among the 8,197 patients observed, 5,348 (65%) had a KPS score in the normal range (80-100 points) and only 87 (1%) had scores in the disabled range (0-40). We found substantial variability and poor reliability in KPS reporting between centers. Roughly one third of candidates had scores that varied 20-80 points in difference (See Table: Range between the maximum and minimum scores.) The Interrater reliability between centers was estimated to be 23% (95% CI: 21%, 25%) agreement, where estimates below 50% are considered poor.

Conclusions: Conclusions: Poor reliability in KPS reporting raises concerns for its utility as a measure of physical function and proxy for frailty. Kidney transplant candidates are a unique population that require a less subjective and more precise instrument for risk assessment.



CITATION INFORMATION: Stedman M., Watford D., Chertow G., Tan J. Poor Reliability of Karnofsky Performance Score in Kidney Transplant Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.R. Stedman: None. **D.J. Watford:** None. **G.M. Chertow:** None. **J.C. Tan:** None.

Abstract# 863

Use of Hepatitis B N.A.T. Positive Kidneys in Hepatitis B Immune Recipients

E. Stephenson[1], B. Nangunuri[2], T. McCune[3], *[1]Nephrology and Critical Care, Eastern Virginia Medical School, Norfolk, VA, [2]Eastern Virginia Medical School, Norfolk, VA, [3]Nephrology, Eastern Virginia Medical School, Norfolk, VA*

Purpose: There is an increasing demand for kidney donations as roughly 4000 people die on the waitlist each year while the number of kidneys being discarded has continued to increase[1,2]. Despite use of Hep C positive kidneys, thousands of kidneys are discarded annually[3]. Nucleic Acid Test (NAT) is a rapid test used to detect presence of a virus prior to serologic conversion and the false positive rate remains unknown[4]. We present nine patients with hepatitis B surface antibodies of >100 mIU/mL that received renal transplants from NAT positive donors without evidence of seroconversion.

Methods: During annual transplant evaluation, HBsAb quantitative levels were obtained. Patients with HBsAb >100mIU/mL were offered to accept Hep B antigen negative, Hep B NAT positive kidneys with informed consent. From July 2019 - July 2020, 9 patients were transplanted with Hep B NAT positive kidneys. Hep B NAT and Hep B surface antigen were checked at 4 weeks, 12 weeks and 12 months postoperatively. Hep B surface antibody and Hep B core antibodies were performed 6 months post-transplant.

Results: None of our patients experienced seroconversion or active viremia to date. Three patients will complete one year surveillance on June 2021 (Table 1). Due to small sample size, no statistical analyses were performed. Evaluation of our cohorts wait time compared to matching blood types is ongoing.

Table 1. Recipients of Hep B NAT+ kidney transplant and graft function at 1 year. NR =Non-reactive

Patient ID	Gender	Age (years)	KDPI %	HBsAb quantitative value (mIU/mL)	12 week/ 1 year Hep B NAT	Creatinine 1 year post transplant (mg/dL)
1	Male	54	70	>150	NR/NR	1.1
2	Male	41	70	>150	NR/NR	1.1
3	Female	67	59	>150	NR/NR	1.1
4	Male	68	59	>150	NR/NR	1.3
5	Male	64	40	122.8	NR/NR	1.4
6	Male	71	40	>150	NR/NR	1.2

Conclusions: We have successfully transplanted nine NAT positive kidneys into patients with immunity to Hep B without inducing active hepatitis. Our results support the use of Hep B NAT positive donors into recipients with high levels of immunity. This may assist in decreasing the number of discarded kidneys but further research is needed.

CITATION INFORMATION: Stephenson E., Nangunuri B., McCune T. Use of Hepatitis B N.A.T. Positive Kidneys in Hepatitis B Immune Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Stephenson: None. **B. Nangunuri:** None. **T. McCune:** Consulting Fee; Name of Commercial Interest; Natera, Otsuka, Sanofi Genzyme. Consulting Fee; Nature of Relationship; Consultant. Other; Name of Commercial Interest; Sanofi Genzyme, Otsuka. Other; Nature of Relationship; Speakers Bureau.

Abstract# 864

Can Procurement Biopsy Data Tell Us Anything? The Influence of Interstitial Fibrosis on Long-term Kidney Graft Survival

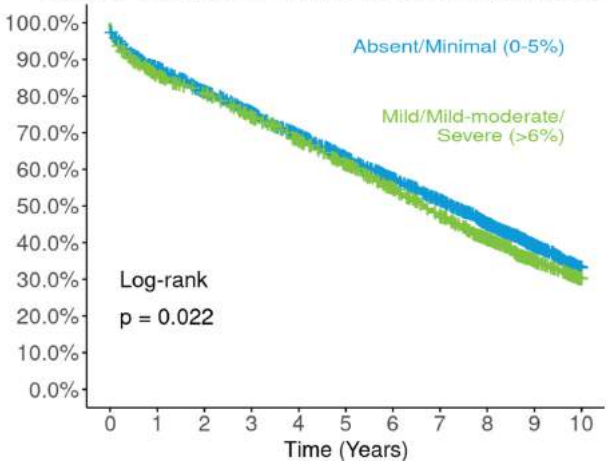
D. Stewart[1], J. Foutz[1], L. Kamal[2], H. McGehee[1], P. Saravanane[2], S. Yu[3], R. Yousfi[2], G. Gupta[2], *[1]Research, United Network for Organ Sharing, Richmond, VA, [2]Virginia Commonwealth University Health, Richmond, VA, [3]Research, Virginia Commonwealth University Health, Richmond, VA*

Purpose: Biopsy findings have been shown to have a profound impact on kidney utilization decisions. Most studies of the association between procurement biopsy findings and kidney recipient outcomes have been limited in scale and focused on short-term survival. With a goal of aiding transplant decision-making, the BARETO (Biopsy, Anatomy, and Resistance Effects on Transplant Outcomes) national registry study unlocks previously trapped biopsy and anatomy data on DonorNet attachments to assess relationships between these findings and long-term renal graft outcomes.

Methods: Data were manually entered for a preliminary cohort of 4,125 ECD donor solitary kidney transplants from 2008-2011. Interstitial fibrosis (I/F) was characterized as absent/minimal (0-5%) or mild+ (≥6%). Analyses include Kaplan-Meier all-cause graft survival and 3 types of Cox models (propensity weighted, multivariable regression, and doubly robust regression (DRR)) to adjust for 18 possible confounders.

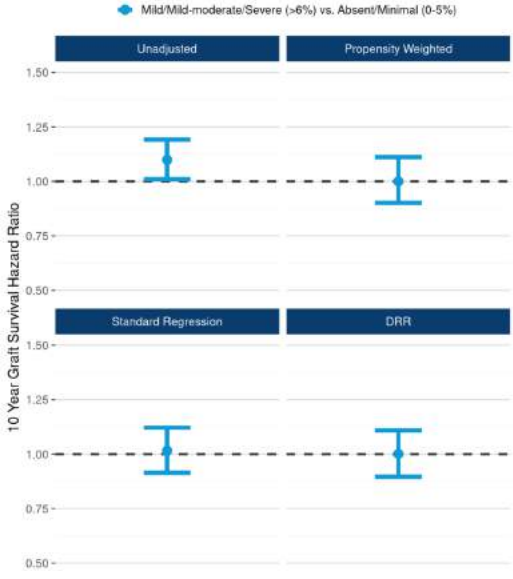
Results: Survival curves suggest a reduction in long term graft survival for kidneys having mild or worse I/F (p=0.022, Fig 1).

Fig 1. Ten-Year All-Cause Graft Survival by Interstitial Fibrosis



However, after risk adjustment (Fig 2) this effect was negated (HR 1.00, 95% CI: 0.90, 1.11 in DRR), suggesting these observed differences may be entirely attributable to correlations with other factors, namely glomerulosclerosis and ischemia time.

Fig 2. All-Cause Graft Failure Hazard Ratios by Interstitial Fibrosis



Conclusions: Robust causal inference methods suggest that the independent association between I/F and long term graft survival is very small or non-existent, challenging this parameter's relevance in kidney utilization decisions.

CITATION INFORMATION: Stewart D., Foutz J., Kamal L., McGehee H., Saravanane P., Yu S., Yousfi R., Gupta G. Can Procurement Biopsy Data Tell Us Anything? The Influence of Interstitial Fibrosis on Long-term Kidney Graft Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Stewart: None. **J. Foutz:** None. **L. Kamal:** None. **H. McGehee:** None. **P. Saravanane:** None. **S. Yu:** None. **R. Yousfi:** None. **G. Gupta:** None.

Abstract# 865

The Impact of High Kdpi on 1-year Post-transplant Graft Function and Survival in a Brazilian Cohort

H. Tedesco Silva Junior, R. Demarchi Foresto, M. Hazin, B. Cassão, A. Aquino, J. Taddeo, C. Rosso Felipe, L. Requião Moura, J. Medina, *Núcleo de Ensino e Pesquisa, Hospital do Rim, Universidade Federal de São Paulo, São Paulo, Brazil*

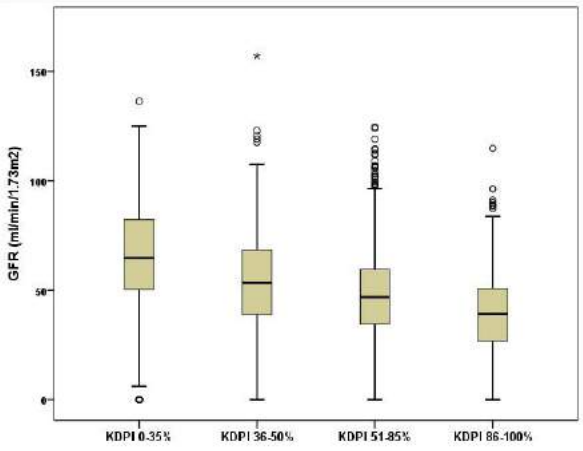
Purpose: To evaluate the impact of High Kidney Donor Profile Index (KDPI) on 1-year post-transplant renal function and graft survival.

Methods: This retrospective cohort analyzed 3,059 deceased donor kidney transplants performed between January 2013 and December 2017 in a high-volume center in Brazil. They were divided into 4 groups according to KDPI values: Group A-KDPI 0-35 (n=561), Group B-KDPI 36-50 (n=361), Group C-KDPI 51-85 (n=1,289), and Group D-KDPI >85 (n=848) and were followed during the first year post-transplantation. GFR was estimated according to the CKD-EPI formula. Sensitive analysis of GFR used last observation carried forward imputation method for death and set at 0 ml/min/1.73m^2 for graft loss.

Results: Recipients of kidneys with KDPI>85% were older and more frequently had hemodialysis as previous treatment. A higher proportion received kidneys from older, non-black, and female donors with hypertension and diabetes. Median cold ischemia time was similar and high in all groups (23h; p=0.513). The incidence of DGF were A=50.6%, B=59.3%, C=62.7% and D=62.0% (p<0.001). Median GFR were A=64.8 (50.1-82.4), B=53.3 (38.8-68.6), C=46.9 (34,5-59.6) and D=39.1 (26.8-50.5) ml/min/1.73m^2 (p<0.001), respectively (Figure 1). Biopsy-proven acute rejection (A=9.1%, B=9.8%, C=8.4%, D=9.1%, p=0.736) and graft survival (A=93.6%, B=91.1%, C=92.7%, D=90.0%, p=0.051) were similar between groups. In the ROC curve, increased values of KDPI were correlated to GFR <50ml/min/1.73m^2 with an AUC of 0.702 (IC 95% 0.684-0.721; p<0.001). In multivariate analysis, increased values of KDPI were related to GFR <50ml/min/1.73m^2 (OR 1.23; CI 95% 1.02-1.026; p<0.001).

Conclusions: In a single-center cohort of deceased donor kidney transplants with high cold ischemia time and high incidence of DGF, KDPI is correlated to GFR at 1-year post-transplantation. The median values of GFR were lower among those with high KDPI. Besides that, 1-year graft survival was similar between groups

Figure 1. Boxplot comparing median GFR between KDPI groups.



CITATION INFORMATION: Tedesco Silva Junior H., Demarchi Foresto R., Hazin M., Cassão B., Aquino A., Taddeo J., Rosso Felipe C., Requião Moura L., Medina J. The Impact of High Kdpi on 1-year Post-transplant Graft Function and Survival in a Brazilian Cohort *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Tedesco Silva Junior: None. **R. Demarchi Foresto:** None. **M. Hazin:** None. **B. Cassão:** None. **A. Aquino:** None. **J. Taddeo:** None. **C. Rosso Felipe:** None. **L. Requião Moura:** None. **J. Medina:** None.

Abstract# 866

The Edge of Glory: Determinants of Success and Failure for Prolonged Cold Ischemia in Kidney Transplantation

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Purpose: Prolonged cold ischemia time (CIT>30 hours) is associated with an increased risk of primary non-function and early graft loss in kidney transplantation, although this risk is incompletely characterized. We sought to evaluate outcomes of kidney transplants at our center with CIT>30 hours from 2010-2019.

Methods: 166 kidney transplants with CIT>30 hours were performed at our center from 2010-2019. We compared transplants with graft loss (n=20) and EGFR<40 ml/min (n=39) at 1 year (total n=59) to transplants with eGFR>40 ml/min at 1 year (n=107) with multivariable logistic regression using backward stepwise variable selection (p<0.1). Variables included recipient age, gender, race, BMI, DM, re-transplantation, EPTS, cPRA; donor age, terminal creatinine, CIT, anastomosis time, pump status, terminal pump flow and resistive index, KDPI, recovery/post perfusion biopsy Remuzzi score, and DCD status.

Results: There were no significant demographic differences between recipients of either group. The average cold ischemia time was similar between groups, 40±6 hours (p=0.59). Transplants with graft loss or eGFR<40 ml/min at one year were more likely to be DCD donors (47.5% vs. 25.2%, p=0.004; OR=3.95, 95% CI=1.64-9.50), or higher KDPI (66±19% vs. 59.6±21%, p=0.04; OR=1.31, 95% CI=1.03-1.69). Kidneys with graft loss or eGFR<40 ml/min at one year were less likely to have been placed on machine pulsatile perfusion (76% vs. 90%, p=0.05; OR=0.19, 95% CI=0.06-0.61).

Conclusions: Successful utilization of kidneys with prolonged cold ischemia time is possible with careful donor selection. Graft loss and eGFR<40 ml/min at one year is associated with kidneys transplanted from DCD donors and those with high KDPI. Machine perfusion may mitigate the risk of prolonged CIT.

Recipients of deceased donor kidneys with CIT more than 30 hours (2010-2019)			
N=166	eGFR>40 ml/min at 1 year	eGFR<40 ml/min at 1 year and/or failed allograft	P-value
N	107	59	
Recipient age	61.8 ±11.0	63.4 ±10.5	0.36
DM %	56.1	59.3	0.69
BMI	28.5 ±5.0	28.8 ±5.1	0.71
EPTS, %	57.7 ±31.8	56.2 ±32.8	0.78

Deceased donor kidneys with CIT more than 30 hours (2010-2019)			
N=166	eGFR>40 ml/min at 1 year	eGFR<40 ml/min at 1 year and/or failed allograft	P-value
KDPI, %	59.6 ±21.0	66.4 ±19.1	0.04
DCD, %	25.2	47.5	0.004
Pump, % (n=123)	90.0	76.7	0.05
Terminal Scr, (n=128)	2.00 ±1.96	1.71 ±1.77	0.41
Remuzzi biopsy score (0-12), (n=118)	3.1 ±2.3	3.3 ±2.1	0.64
eGFR at 1 year, ml/min (n=146), if graft not failed	52.5 ±15.2	31.5 ±7.6	<0.001

CITATION INFORMATION: Turner A., Hamidi M., Ariyamuthu V., Harland R., Tanriover B. The Edge of Glory: Determinants of Success and Failure for Prolonged Cold Ischemia in Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Turner: None. **M. Hamidi:** None. **V. Ariyamuthu:** None. **R. Harland:** None. **B. Tanriover:** None.

Abstract# 867

Long Term Outcomes of Kidney Transplantation from Deceased Donors with Terminal Acute Kidney Injury

J. Rogers[1], R. Stratta[2], A. Farney[2], G. Orlando[2], C. Jay[2], A. Reeves-Daniel[3], A. Mena-Gutierrez[3], N. Sakhovskaya[3], K. Gurung[2], B. Sharda[2], J. Rogers[2], *[1]Surgery, Wake Forest School of Medicine, Winston Salem, NC, [2]Surgery, Wake Forest Baptist Medical Center, Winston Salem, NC, [3]Internal Medicine, Wake Forest Baptist Medical Center, Winston Salem, NC*

Purpose: Long term outcomes of kidney transplantation from deceased donors with terminal acute kidney injury (AKI) are not well defined.

Methods: Single center retrospective review of all deceased donor kidney transplants from 1/31/07-9/1/19. AKI donor kidneys were defined by a doubling of the donor's admission serum creatinine (SCr) level and a terminal SCr > 2.0 mg/dl before organ recovery.

Results: 185 AKI donor kidneys were transplanted during the study period, including 147 kidneys from standard criteria donors (SCD), 26 from expanded criteria donors (ECD), and 12 from donation after cardiac death (DCD). Mean donor age was 36 years (range 1 - 69 years); mean admission and terminal SCr levels were 1.3 mg/dl and 3.1 mg/dl, respectively (mean terminal eGFR 32 ml/min). With a mean follow-up of 78 months, actuarial graft survival was comparable to concurrent kidney transplants from brain-dead non-AKI SCD's at our center (Table 1). Patient survival was similar between groups. Delayed graft function (DGF) occurred in 87 patients (47%) vs. 22% in recipients of non-AKI SCD kidneys ($p < 0.001$). Mean SCr at 48 months was 1.61. DGF was associated with lower graft survival in recipients of both AKI (Table 2) and non-AKI (Table 3) SCD kidneys but the impact was earlier and more pronounced in non-AKI recipients.

Conclusions: Despite having a significantly higher incidence of DGF, kidneys from deceased donors with terminal AKI have long term outcomes that are comparable to non-AKI SCD kidneys and represent a safe and effective method to expand the donor pool.

Table 1. Kidney Graft Survival				
	1-year	**3-year**	**5-year**	
AKI	95%	88%	74%	
Non-AKI	95%	85%	76%	P=NS

Table 2. AKI Kidney Graft Survival: DGF vs No DGF				
	1-year	**3-year**	**5-year**	
No DGF	97%	89%	84%	
DGF	92%	89%	67%	P=0.025

Table 3. Non-AKI Kidney Graft Survival: DGF vs. No DGF				
	1-year	**3-year**	**5-year**	
No DGF	97%	90%	81%	
DGF	86%	69%	60%	P<0.001

CITATION INFORMATION: Rogers J., Stratta R., Farney A., Orlando G., Jay C., Reeves-Daniel A., Mena-Gutierrez A., Sakhovskaya N., Gurung K., Sharda B., Rogers J. Long Term Outcomes of Kidney Transplantation from Deceased Donors with Terminal Acute Kidney Injury *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Rogers: None. **R. Stratta:** None. **A. Farney:** None. **G. Orlando:** None. **C. Jay:** None. **A. Reeves-Daniel:** None. **A. Mena-Gutierrez:** None. **N. Sakhovskaya:** None. **K. Gurung:** None. **B. Sharda:** None. **J. Rogers:** None.

Kidney

Kidney Psychosocial

Abstract# 868

Identifying Barriers to Transition Readiness in Pediatric Kidney Transplant Patients

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Purpose: Inadequate readiness for transition from pediatric to adult care is associated with loss of transplant, initiation of or return to dialysis, and other negative outcomes after transition. Graft failure rate is reported to range from 30% to 35% among renal transplant youth after transition to adult providers. Differences in the patient and family's goals and expectations and shifts in responsibilities around healthcare behaviors, perception of healthcare provider roles, and health literacy around adult health care systems may all present as risk factors in transition readiness. The purpose of this study is to identify and address barriers to transition preparedness, a crucial part of health care management in pediatric patients from pre- or early teen years in order to set them on a path to successful post-transition care.

Methods: Participants were 21 post-kidney transplant patients followed at a major pediatric hospital. Mean age at participation was 18.2 years and mean age at transplant was 11.6 years. Patients were administered the STARx Questionnaire, a validated measure of medical transition readiness and the Readiness for Transition to Adult Care Assessment Tool, a survey of transplant-related transition readiness as a part of a multidisciplinary transition program.

Results: On the STARx Questionnaire, patients reported lowest average scores (1-5 scale) on asking providers about medical care (mean= 3.2) and using internet, books, or other guides to learn more about illness (mean= 2.75). On the Readiness for Transition survey lowest averages (0-2 scale) were observed on knowledge of target medication levels (mean=1.45), make and keep track of appointments (mean= 1.4), and knowledge about health insurance (mean= 1.1). The average score for preparedness for transition was 7.2 (0-10 scale) and for confidence in transition success was 6.9 (0-10 scale).

Conclusions: Adolescents and young adults in pediatric transplant programs present with a variety of barriers to transition success. It is important to identify patients who are struggling with developmentally appropriate engagement in health care behaviors. Education about illness from providers and external forums, making appointments, and learning about health insurance policies may prepare youths for transition and practicing healthcare skills while under pediatric care may also increase confidence in success after transition. Further research on assessment of readiness and interventions to improve readiness is needed.

CITATION INFORMATION: Amatya K., Yuhas-Schiltz S., Petyak C., Moudgil A. Identifying Barriers to Transition Readiness in Pediatric Kidney Transplant Patients *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Amatya: None. **S. Yuhas-Schiltz:** None. **C. Petyak:** None. **A. Moudgil:** None.

Abstract# 869

Greater Social Vulnerability is Associated with Self-advocacy in the Living Donor Navigator Program

A. Carter, A. C. Kale, R. D. Reed, B. A. Shelton, H. Qu, M. C. McLeod, B. J. Orandi, R. M. Cannon, D. Anderson, P. MacLennan, V. Kumar, M. Hanaway, J. E. Locke, *University of Alabama at Birmingham Hospital, Birmingham, AL*

Purpose: The Living Donor Navigator (LDN) program helps transplant candidates identify live donors by pairing them with an advocate - a friend or family member trained to speak on their behalf. Some candidates are unable to identify an independent advocate and undergo LDN advocacy training alone as self-advocates. The self-advocate phenotype mirrors that of other vulnerable populations and is associated with decreased likelihood of LDKT. The purpose of this study was to examine the association between social vulnerability and LDN self-advocacy.

Methods: This single center, retrospective cohort study included 110 transplant candidates with Alabama residences who enrolled in the LDN program between 04/2017-06/2019. Social vulnerability measures at the census tract-level were obtained from the CDC's Social Vulnerability Index (SVI), which is comprised of 15 social factors based on data collected from the US census. Modified Poisson regression was used to evaluate the relative risk of self-advocacy associated with social vulnerability.

Results: Of the 110 candidates, 19% (n=21) were self-advocates. LDN participants had 17% higher risk of self-advocacy for every 10-percentage point increase in overall SVI (adjusted relative risk (aRR) 1.17, 95% Confidence Interval (CI): 1.03-1.32, p=0.01; Table 1, Figure 1). Living in areas with more unemployment (aRR: 1.18, 95%CI: 1.04-1.33, p=0.02), single parent households (aRR: 1.23, 95%CI: 1.06-1.42, p=0.006), minority status (aRR: 1.30, 95%CI: 1.04-1.55, p=0.02), or no vehicle households (aRR: 1.17, 95%CI: 1.02-1.35, p=0.02) was significantly associated with increased risk of self-advocacy (Table 1).

Conclusions: LDN participants living in more socially vulnerable areas had increased risk of self-advocacy. Community-level vulnerability may limit transplant candidates' ability to engage with the LDN program as designed. LDKT programs should address individual- and community-level vulnerability to create culturally competent solutions for mitigating disparities in LDKT.

Table 1. Modified Poisson models for relative risk of self-advocacy for every 10-percentage point increase in SVI measures

SVI	Adjusted	
	Relative Risk (95% CI)	p - value
Overall	1.17 (1.03, 1.32)	0.01
Unemployment	1.18 (1.04, 1.33)	0.02
Single Parent Household	1.23 (1.06, 1.42)	0.006
Minority Status	1.30 (1.04, 1.55)	0.02
No Vehicle	1.17 (1.02, 1.35)	0.02

Every row represents a different model adjusted for transplant candidate gender, age, race, and whether the candidate lives alone

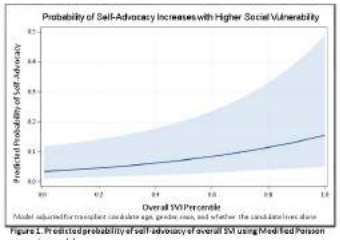

Figure 1. Predicted probability of self-advocacy of overall SVI using Modified Poisson regression model

CITATION INFORMATION: Carter A., Kale A., Reed R., Shelton B., Qu H., McLeod M., Orandi B., Cannon R., Anderson D., MacLennan P., Kumar V., Hanaway M., Locke J. Greater Social Vulnerability is Associated with Self-advocacy in the Living Donor Navigator Program *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Carter: None. **A.C. Kale:** None. **R.D. Reed:** None. **B.A. Shelton:** None. **H. Qu:** None. **M.C. McLeod:** None. **B.J. Orandi:** None. **R.M. Cannon:** None. **D. Anderson:** None. **P. MacLennan:** None. **V. Kumar:** None. **M. Hanaway:** None. **J.E. Locke:** Consulting Fee; Name of Commercial Interest; Sanofi. Consulting Fee; Nature of Relationship; Consultant.

Abstract# 870

Health-related Quality of Life (HRQoL) in Patients on Dialysis and Kidney Transplant Recipients - Experience with the PROMIS Global-10 Survey

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Purpose: The PROMIS (Patient-Reported Outcomes Measurement Information System) Global-10 survey has been used to assess HRQoL in population surveys and studies including patients with chronic medical conditions but not in patients with chronic kidney disease (CKD). Here we compare HRQoL between kidney transplant recipients (KTR) and patients on dialysis using the PROMIS Global-10 survey.

Methods: A cross-sectional convenience sample of adult KTRs and patients on dialysis completed the 10 item PROMIS Global-10 which yields a Global Physical Health (GPH) and a Global Mental Health (GMH) score. Sociodemographic and clinical characteristics were also collected. The two-sample t-test and multivariable linear regression were used to compare HRQoL between groups. Multiple imputation by chained equations was used to handle missingness.

Results: 355 patients (mean(SD) age 55(15) years, 61% male, 52% White, and 61% transplanted) were enrolled. Patients on dialysis vs KTRs were older (mean[SD] age 62[14] vs 51[14] years), less likely to be White 34% vs. 63%), and to have more than 12 years of education (43% vs. 73%.); p<0.001 for all. Compared to patients on dialysis, KTRs had significantly higher GPH (47[9] vs. 43[11], p<0.001) and GMH (49[10] vs 47[11], p= 0.048). The proportion of patients with "impaired HRQoL" (GPH or GMH <45, 5-point, i.e. half SD below general population mean, i.e. 50), was lower among KTRs (48% vs 71%, p<0.001, and 35% vs 48%, p=0.016 for GPH and GMH, respectively). After adjusting for age, sex, marital status, ethnicity, income, education, and comorbidity in linear regression, GPH (b=2.52, 95%CI: 0.1 - 4.9, p= 0.038) but not GMH (b=0.90, 95%CI: -1.8- 3.6, p= 0.504) was significantly higher in KTRs.

Conclusions: The PROMIS Global-10 GPH but not GMH was higher among KTRs compared to patients on dialysis. Further studies are needed to assess the value of this brief, widely validated tool in assessing HRQoL among patients with CKD.

CITATION INFORMATION: Chawla G., Hajjar W., Dastgheib M., Yanga N., Ahmadzadeh G., El-Dassouki N., Shahreza A., Al Kaabi N., Edwards N., Mucsi I. Health-related Quality of Life (HRQoL) in Patients on Dialysis and Kidney Transplant Recipients - Experience with the PROMIS Global-10 Survey *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Chawla: None. **W. Hajjar:** None. **M. Dastgheib:** None. **N. Yanga:** None. **G. Ahmadzadeh:** None. **N. El-Dassouki:** None. **A. Shahreza:** None. **N. Al Kaabi:** None. **N. Edwards:** None. **I. Mucsi:** None.

Abstract# 871

The Impact of Health Literacy on Kidney Transplant Listing

G. Chen[1], J. Siahaan[2], L. Leon Novelo[2], I. Rizvi[3], A. M. De Golovine[4], A. R. Edwards[4], A. Pai[4], W. A. Dar[3], *[1]Abdominal Transplant, Memorial Hermann Hospital, Houston, TX, [2]Department of Biostatistics and Data Science, School of Public Health The University of Texas Health Science Center at Houston, Houston, TX, [3]Department of Surgery, McGovern Medical School The University of Texas Health Science Center at Houston, Houston, TX, [4]Department of Internal Medicine, Renal Diseases and Hypertension, McGovern Medical School The University of Texas Health Science Center at Houston, Houston, TX*

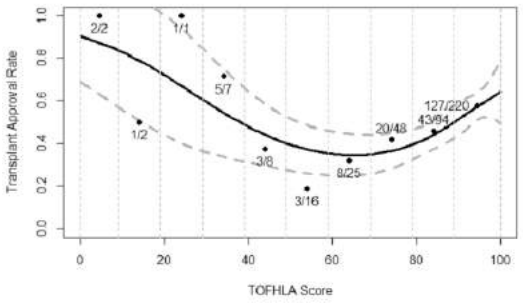
Purpose: Limited health literacy has long been associated with poor health outcomes in the general population, but there have been few studies investigating the association between health literacy and kidney transplant listing. The primary objective of this study was to determine if a patient's health literacy is associated with transplant listing.

Methods: We retrospectively reviewed 423 kidney transplant candidates who were prospectively administered the Test of Functional Health Literacy in Adults, a comprehensive numeracy and reading comprehension assessment, during their transplant evaluation. Health literacy scores, demographic, psychosocial, and medical variables were analyzed for correlation value with kidney transplant listing.

Results: Health literacy scores were found to highly correlate with transplant listing (p=0.003). Unexpectedly, a subset of patients (n=14 out of 36) who had health literacy scores < 59 was still able to obtain approval for listing. The probability of approval decreased when health literacy scores ranged from 0 to 59 and increased when health literacy scores varied between 60 to 100 (Figure 1). Multivariate analysis found transplant listing to also be associated with substance use (OR = 0.15, p < 0.001), ESRD etiology other than diabetes or hypertension (OR = 2.61, p < 0.001), pace of transplant evaluation (p < 0.001), and time on dialysis (p < 0.05). In contrast to other studies, neither race nor annual income were associated with transplant listing.

Conclusions: Health literacy is associated with kidney transplant listing, however patients with limited literacy are still able to be listed for transplant. The outcomes of this study suggest that health literacy should not be a barrier to listing, but rather an indicator for interventions that can promote access to transplantation. Further exploration on the impact of such interventions is important to reduce disparities in transplantation.

Figure 1. Estimated transplant approval rate and its 95% confidence intervals, as a function to TOFHLA score.



Note. Vertical dotted bins indicate the right limit of the frequency of score classes (0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-89, 90-100). The points indicate the observed relative frequency of each class. For example, 2 out of 2 patients with TOFHLA score lower or equal to 9 were approved for transplant.

CITATION INFORMATION: Chen G., Siahaan J., Leon Novelo L., Rizvi I., De Golovine A., Edwards A., Pai A., Dar W. The Impact of Health Literacy on Kidney Transplant Listing *AJT, Volume 21 Supplement 3*
DISCLOSURES: G. Chen: None. **J. Siahaan:** None. **L. Leon Novelo:** None. **I. Rizvi:** None. **A.M. De Golovine:** None. **A.R. Edwards:** None. **A. Pai:** None. **W.A. Dar:** None.

Abstract# 872

Experiential Expertise: What Can Patients and Donors Teach Us About Living Donation?

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Purpose: While educational materials and discussions with medical professionals are factually sound, insight from actual living donors (LDs) and recipients (Rs) may offer unique, experiential expertise that many transplant professionals do not have. Here, we examined the lessons learned, recommendations, and critical advice provided by LDs and Rs to others considering living kidney donation (LKD) as part of the Living Donation Storytelling Project.
Methods: 160 storytellers (122 donors, 38 recipients) shared their experiences by online video platform. Storytellers were primarily White (55% White; 6% Black; 7% other; and 8% Hispanic) with a mean age of 50 years old for LDs and 48 years old for Rs. Two coders watched each video and coded dimensions of advice shared in response to the following prompts: "The best advice I could give someone else who is thinking about being a Living Donor is", and "My advice to others who need a kidney is...". Descriptive statistics were run to assess frequencies of themes across stories.
Results: Thematic analyses revealed 9 LD advice dimensions and 10 R advice dimensions. LDs advised potential donors to: Do research to learn about donation (30%); Get the support needed for post-donation care (28%); Go for it, donate a kidney (25%); Ask questions and get help with the donation process (21%); The choice is yours/listen to your heart when deciding whether to donate (20%); and Seek peer support from those who have donated (20%). Rs offered advice including: Get the word out/Share your need (58%); Don't lose hope (50%); Get the support you need for post-transplant care (32%); Do your research/stay informed (24%); and Be Proactive/Advocate for yourself (16%).
Conclusions: Both donors and recipients highlighted the positive impact of LKD on their overall life and encouraged participants to proceed with LKD. Key advice identified can help prospective LDs/Rs make informed choices, address key barriers, and seek help when needed. Although this type of advice cannot replace education, it does offer a source of peer support that can enhance the experience of donors and recipients, but also encourage autonomy and self-management post-transplant.
CITATION INFORMATION: Davis L., Wood E., Ho E., Pines R., Advani S., Waterman A. Experiential Expertise: What Can Patients and Donors Teach Us About Living Donation? *AJT, Volume 21 Supplement 3*
DISCLOSURES: L.A. Davis: None. **E.H. Wood:** None. **E. Ho:** None. **R. Pines:** None. **S.M. Advani:** None. **A.D. Waterman:** None.

Abstract# 873

Ambient Air Pollution and Changes in Cognitive Function Among Kidney Transplant Recipients

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Purpose: Although cognitive function among kidney failure patients improves after kidney transplant (KT), cognitive impairment is common and associated with worse post-KT outcomes. Particulate matter ($PM_{2.5}$), a common type of air pollution, is associated with dementia among general population; less is known about this effect among KT recipients. In this study, we seek to investigate the association between $PM_{2.5}$ and post-KT cognitive function trajectory among KT recipients.
Methods: We measured global cognitive function (3MS) among 637 KT recipients from a two-center, prospective cohort. We obtained the $PM_{2.5}$ data from NASA's Socioeconomic Data and Application Center Global Annual $PM_{2.5}$ Grids and linked the data to the participants using personal address and year of KT. The association between $PM_{2.5}$ and cognitive change post-KT was investigated using mixed model with random slope (time) and intercept (person) adjusting for age, sex, race/ethnicity, education and cognitive score prior to KT. We also explored the association separately by smoking status.
Results: Among 637 KT recipients, the median age at KT was 54.4 (IQR 43.1-64.0), 60.4% were male and 50.2% were non-Hispanic white. The median $PM_{2.5}$ exposure level was 10.1 $\mu g/m^3$ (IQR 9.4-11.1 $\mu g/m^3$). After adjustment, higher level of $PM_{2.5}$ exposure was not associated with steeper cognitive decline among KT recipients (Table 1). However, among ever smokers, those who had the 2nd (9.4-10.1 $\mu g/m^3$; slope=-1.34 points/year; $p_{interaction}$=0.003), 3rd (10.2-11.2$\mu g/m^3$; slope=-0.47 points/year; $p_{interaction}$=0.048) and 4th (11.2-16.5 $\mu g/m^3$; slope=-1.01 points/year; $p_{interaction}$=0.006) quartile of $PM_{2.5}$ exposure had steeper decline in cognitive function compared to those who had lowest quartile of $PM_{2.5}$ exposure (1.2-9.3 $\mu g/m^3$; slope=1.24 points/year).
Conclusions: Exposure to higher level of $PM_{2.5}$ was associated with steeper cognitive decline among KT recipients who were ever smokers, but not the overall study population. Our results suggested that air pollution might contribute to cognitive decline among some subgroups of KT recipients. Clinicians should consider performing cognitive screening tests for all transplant recipients who have a history of smoking and live in an area with high air pollution.

Association between PM2.5 and cognitive score trajectory by smoking status among 637 KT recipients

		$PM_{2.5}$ ($\mu g/m^3$)			
		Quartile1 (1.2-9.3)	Quartile 2 (9.4-10.1)	Quartile 3 (10.2-11.1)	Quartile 4 (11.2-16.5)
Overall	Annual change in 3MS score (95%CI)	0.35 (-0.28, 0.97)	-0.11 (-0.64, 0.42)	-0.17 (-0.71, 0.37)	-0.31 (-0.78, 0.17)
	$p_{interaction}$	Ref	0.267	0.219	0.100
Ever Smoker	Annual change in 3MS score (95%CI)	1.24 (-0.06, 2.55)	-1.34 (-2.50, -0.19)	-0.47 (-1.56, 0.61)	-1.01 (-1.93, -0.09)
	$p_{interaction}$	Ref	0.003	0.048	0.006
Never Smoker	Annual change in 3MS score (95%CI)	0.05 (-0.60, 0.70)	0.04 (-0.51, 0.59)	-0.13 (-0.73, 0.47)	0.07 (-0.46, 0.61)
	$p_{interaction}$	Ref	0.986	0.696	0.957

CITATION INFORMATION: Feng Y., Jones M., Chu N., Segev D., McAdams Demarco M. Ambient Air Pollution and Changes in Cognitive Function Among Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Feng: None. **M. Jones:** None. **N. Chu:** None. **D. Segev:** None. **M. McAdams Demarco:** None.

Abstract# 874

True Living Donation Experiences: A Thematic Analysis of Storytelling from Kidney Living Donors

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Purpose: Personal experiences of living donors (LDs) or recipients (Rs) can motivate more individuals to pursue living donor kidney transplant. After building

a library of 160 video stories of patients and LDs, we conducted thematic content analysis to identify common themes and the emotional changes experienced along the LD journey.
Methods: The 160 storytellers (76% LDs; 24% Rs) of diverse race/ethnicities (55% White; 6% Black; 7% other; and 8% Hispanic) recorded stories using open-ended prompts. Two coders watched each video and coded dimensions of the content participants shared including their emotions, barriers, motivations and personal experiences. Descriptive statistics were run to explore common themes and chi-squared test were run to compare differences based on participant's emotional status.
Results: Rs mostly reported they pursued a LD transplant due to its improved outcomes over deceased donation (84%), support from family (64%), and dissatisfaction feeling sick on dialysis (40%). A majority felt gratitude for the transplant (61%). LDs reported motivations to donate to improve someone's quality of life (42%), family support for donation (47%), concern for the donor's future health (38%), and gratitude and fulfillment received from donating (47%). As Rs & LDs progressed along the transplant journey their emotions shifted (Fig 1,2). Compared to before surgery, afterwards Rs were more likely to report feelings of happiness (21% vs 29%), relief (8% vs 21%), and hope (3% during kidney failure vs. 8% after surgery). Compared to before donation, LDs were more likely to report happiness (22% vs. 55%), relief (10% vs. 20%), and pride (3% vs 10%) afterwards.
Conclusions: LD stories captured through a digital library address the emotional and practical challenges they faced as well as the positive outcomes and gratitude they feel now. This realistic and reassuring library can be used to supplement traditional education about LD within medical encounters and through social media campaigns to generate interest in LD.

Fig 1

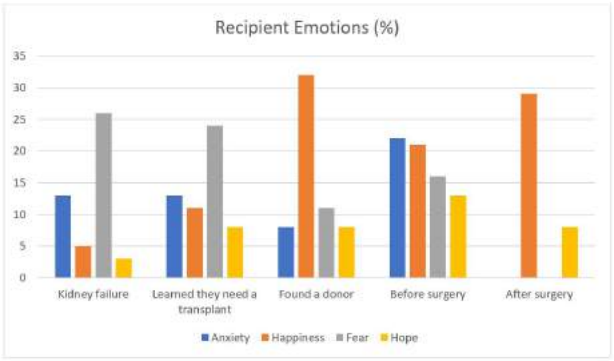
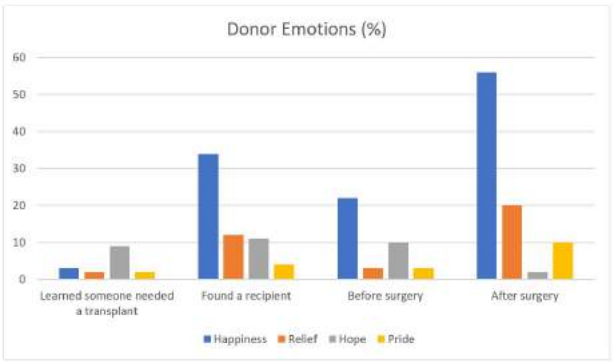


Fig 2



CITATION INFORMATION: Ho E., Wood E., Pines R., Davis L., Advani S., Waterman A. True Living Donation Experiences: A Thematic Analysis of Storytelling from Kidney Living Donors *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Ho: None. E.H. Wood: None. **R. Pines:** None. **L.A. Davis:** None. **S.M. Advani:** None. **A.D. Waterman:** None.

Abstract# 875

Association of Kidney Function with Patient Reported Outcomes After Kidney Transplantation

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Purpose: Our study aimed to determine the association of posttransplant eGFR with patient reported outcomes (PROs) and, specifically, the risk of reduced health-related quality of life (HRQoL) and increased symptoms of depression and anxiety with reduced eGFR.
Methods: PROs, assessed since 2002 in adult kidney transplant recipients at a single center, included the physical and mental summary components (PCS and MCS) of the Short Form 36 Health Survey, Centers for Epidemiologic Studies Depression Scale (CES-D), and Beck Anxiety Inventory (BAI). PROs were interpreted as being based on relevant norms (low if <35 for the PCS and MCS, and present if >9 or >7 for the CES-D and BAI). eGFR was classified as stages of chronic kidney disease (CKD): 1 or 2, 3a, 3b, and 4 or 5. The effects of eGFR on longitudinal PRO data were analyzed using multivariable mixed effects models that adjusted for age, donor type, time posttransplant, and prior transplantation. Using the most recent PRO observation per patient, multivariable logistic regression models determined the likelihood of substantively impaired PROs in relation to CKD stage.
Results: PRO data were reported by 2,116 adult kidney transplant recipients (mean age = 49.9 ± 13.1 years, male gender = 58%, re-transplantation rate = 5.5%, mean time from transplant to last (or only) observation = 74 ± 1.3 months). All covariable-adjusted longitudinal models (n >8,400 observations) demonstrated statistically significant associations between decreasing eGFR and lower PCS and MCS scores as well as greater symptom severity for depression and anxiety (all p <0.03). Substantively reduced PCS scores were 75% more likely at CKD stages 4 or 5 when compared to CKD stages 1 or 2. There was no effect of CKD stage on the likelihood of substantively reduced MCS. CKD stage 4 or 5, compared to CKD stage 1 or 2, carried a 65% greater likelihood of symptoms of depression and a 55% greater likelihood of symptoms of anxiety.

	Low Physical Quality of Life n = 2,116		Low Mental Quality of Life n = 2,116		Symptoms of Depression n = 1,809		Symptoms of Anxiety n = 1,890	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Repeat transplant (ref: no repeat transplant)	0.770 (0.478 - 1.242)	0.284	1.379 (0.824 - 2.310)	0.221	1.106 (0.733 - 1.671)	0.634	1.181 (0.800 - 1.778)	0.387
Deceased donor (ref: living donor)	1.010 (0.837 - 1.249)	0.924	0.979 (0.748 - 1.294)	0.886	0.889 (0.729 - 1.085)	0.248	1.033 (0.832 - 1.334)	0.897
Age (years)	1.024 (1.016 - 1.032)	< 0.001	0.993 (0.983 - 1.003)	0.177	1.001 (0.994 - 1.009)	0.718	1.004 (0.996 - 1.011)	0.328
Time from most recent or only transplant (months)	1.000 (0.999 - 1.002)	0.602	1.001 (0.999 - 1.004)	0.211	1.000 (0.998 - 1.001)	0.595	0.999 (0.997 - 1.001)	0.204
eGFR Stratum(ml/min)		< 0.001		0.519		0.001		0.008
45 – 59 (ref: ≥60)	0.787 (0.595 - 1.040)	0.092	1.100 (0.768 - 1.577)	0.603	0.955 (0.746 - 1.225)	0.716	1.012 (0.788 - 1.301)	0.924
30 – 44 (ref: ≥60)	1.276 (0.969 - 1.680)	0.082	1.236 (0.854 - 1.790)	0.261	1.014 (0.780 - 1.318)	0.917	1.130 (0.872 - 1.463)	0.356
≤ 29 (ref: ≥60)	1.745 (1.313 - 2.319)	< 0.001	1.304 (0.887 - 1.916)	0.177	1.651 (1.248 - 2.184)	< 0.001	1.547 (1.176 - 2.035)	0.002
Constant	0.080	< 0.001	0.154	< 0.001	0.679	0.082	0.404	0.002

Conclusions: Using a robust dataset of PROs, we found that kidney transplant recipients with CKD stages 4 and 5 are at increased risk for lower physical quality of life, and greater likelihood of having symptoms of depression and anxiety. Vigilant monitoring and earlier interventions by clinicians may be warranted in this vulnerable population.
CITATION INFORMATION: Kochar G., Rega S., Feurer I., Dreher A., Schaefer H., Shaffer D., Forbes R., Pinson C., Concepcion B. Association of Kidney Function with Patient Reported Outcomes After Kidney Transplantation *AJT, Volume 21 Supplement 3*
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Abstract# 876

Attitudes of Obese Kidney Transplant Candidates Towards Bariatric Surgery

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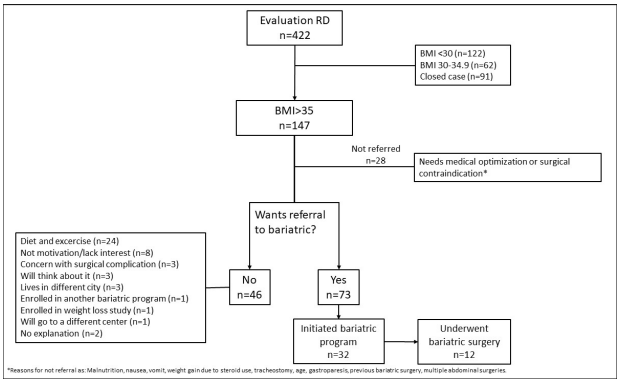
Purpose: Obesity is an epidemic in the US and increasingly prevalent in kidney transplant candidates. Surgical weight-loss interventions are effective and reduce transplant-related complications. They also have a significant positive impact on the lifestyle and wellbeing of these patients. Special attention should be given to analyze what barriers or deterrents impede these patients from having bariatric surgery and design initiatives to overcome them.
Methods: A retrospective review was conducted in patients registered for kidney transplant evaluation from July 2017- June 2018. A chart review of the electronic medical record was conducted to collect demographics of the patients with criteria

(BMI > 35) for laparoscopic sleeve gastrectomy (LSG) and their responses to the offer of a bariatric referral with posterior follow up to identify patients that ultimately receive the procedure.

Results: A total of 422 patients were registered for kidney transplant and had nutrition evaluation completed, 119 (28.2%) met the eligibility requirements for bariatrics. Of those that were eligible, 73 (61.34%) accepted bariatric referral of which 32 (43.8%) initiated bariatric workup. Ultimately, 12 (10.1%) completed bariatric workup and underwent bariatric surgery, 1 patient had surgery in an affiliated hospital, details characterized in table and graphic.

Conclusions: Our obese candidates for kidney transplant have low bariatric surgery rates despite offering evaluations for LSG to all of them. Diet and exercise remain as their primary choice, which unfortunately has low success. Initiatives to increase acceptance of bariatric referral such as education and motivation should be considered for further investigation as a tool for success.



Characteristic	Meet referral criteria N=119 (%)	LSG N=12 (%)
Race		
Asian	2 (1.7)	-
African American	60 (50.4)	7 (58.3)
White	34 (28.6)	5 (41.7)
Other	5 (4.2)	-
n/a	7 (5.9)	-
Hispanic	11 (9.24)	-
Sex		
Female	59 (49.6)	6 (50)
Male	60 (40.4)	6(50)
Age mean± SD	51.5 ± 10.5	41.33 ± 10.12
BMI mean ± SD	42.8 ± 5.2	47.14 ± 6.42

CITATION INFORMATION: LaVerne C., Thompson V., Aguiluz G., DiCocco P., Almario Alvarez J., Spaggiari M., Tang I., Tzvetanov I., Benedetti E. Attitudes of Obese Kidney Transplant Candidates Towards Bariatric Surgery *AJT, Volume 21 Supplement 3*

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Abstract# 877

Current Opioid Utilization Practices of Kidney Transplant Centers in the United States: A National Survey of Institutional Practices

A. Lichvar[1], H. Kim[1], A. Ingemi[2], J. Jarrett[1], *[1]University of Illinois at Chicago, Chicago, IL, [2]Sentara Healthcare, Norfolk, VA*

Purpose: The opioid epidemic in the United States (US) and the known risks of opioid utilization highlight the need for better understanding of pain management around kidney transplantation. Although studies have been published describing efforts to minimize opioid therapy, clinical practices across the US remain unknown. The purpose of this survey study was to describe the utilization of opioids in the perioperative timeframe and upon discharge after kidney transplantation in the US.

Methods: This study was a cross-sectional survey of transplant pharmacists to evaluate the national landscape of opioid management with regards to pre-transplant candidacy, perioperative pain management, and post-transplant pain management. A 25-question survey was distributed to members of transplant pharmacy listservs within the US in March 2020.

Results: A total of 63/208 (30.3%) adult kidney transplant centers responded to the survey. Table 1 details survey demographics. The majority of institutions (84%) utilized opioids for first-line post-operative pain management in opioid-naïve patients. More than half of the centers (55%) did not differentiate post-operative pain regimen between opioid-naïve and opioid-tolerant patients. A total of 72.6% of institutions prescribed opioids upon discharge from transplant, and 10.8% of the institutions prescribed subsequent opioid analgesics in the outpatient setting. Figure 1 and Table 2 summarizes opioid utilization. Many patients were actively listed while on opioids (84.1%) or medications for opioid use disorder medications (MOUD) (58.2%) (Table 3). Many responders (82.7%) reported their institutions did not have a written protocol or policy for post-transplant pain management.

Conclusions: This survey highlights the existence of significant practice heterogeneity regarding opioid and MOUD utilization across kidney transplant programs in the US. Our survey highlights the opportunity transplant pharmacists have within the context of their multidisciplinary team to develop multimodal pain management strategies to minimize opioid use in kidney transplant candidates and recipients to continue to optimize patient care.

Table 1. Demographics Information

Demographic characteristic	n (%)
Type of hospital (n=47), n (%)	
Academic medical centers	40 (85.1%)
Non-academic medical centers	7 (14.9%)
Mean years of kidney transplant program, (SD) (n = 40)	35.5 (15.6)
Median number of transplants in year 2018-2019, (IQR) (n = 45)	150 (94.75-250)
UNOS Transplant Region (n = 44), n (%)	
Region 1	3 (6.8)
Region 2	4 (9.1)
Region 3	9 (20.5)
Region 4	6 (13.6)
Region 5	1 (2.3)
Region 6	0 (0)
Region 7	8 (18.2)
Region 8	1 (2.3)
Region 9	0 (0)
Region 10	7 (15.9)
Region 11	5 (11.4)

Table 2. Management of post-operative pain after kidney transplantation

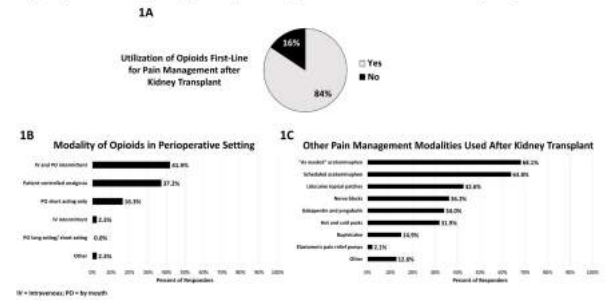
Utilization of opioids as first-line therapy for opioid-naive patients after renal transplant (n=51), n (%)	
Yes	43 (84%)
No	8 (16%)
Duration of IV opioids in peri-operative setting (n=35), n (%)	
24 hours	19 (54.3%)
48 hours	6 (17.1%)
72 hours	2 (5.7%)
Available until discharge	5 (14.3%)
Other	3 (8.6%)
Number of institutions that to not differentiate post-operative pain regimen between opioid-naive and opioid tolerant patients (n=51), n (%)	28 (55%)
Presence of written policy or protocol on opioids/MOUD usage in the pre-, peri, or post-operative phases of kidney transplant (n=52), n (%)	9 (17.3%)

Table 3. Pre-transplant opioid medications screening, patient pain education, and pharmacist provider beliefs regarding opioid medication risks

Active listing of kidney transplant candidates currently on opioid medications (n = 63), n (%)	
Yes	53 (84.1%)
No	4 (6.4%)
Depends	6 (9.5%)
Requirements of patients on current opioid therapy to remain on the kidney transplant waitlist (n = 46), n (%)	
Case-by-case basis	35 (76.1%)
Co-management with a pain specialty service	23 (50.0%)
Drug screening	5 (10.9%)
Opioid dosing below a certain threshold	2 (4.3%)
Other	3 (6.5%)
Active listing of kidney transplant candidates currently on MOUD (n = 55), n (%)	
Yes	32 (58.2%)
No	12 (21.8%)
Depends	11 (20.0%)
Requirements of patients on current MOUD therapy to remain on the kidney transplant waitlist (n = 30), n (%)	
Case-by-case basis	22 (73.3%)
Co-management with a pain specialty service	17 (56.7%)
Drug screening	6 (20.0%)
MOUD dosing below a certain threshold	1 (3.3%)
Other	2 (6.7%)
Belief of risks to utilizing opioids (n=41), n (%)	
Yes	37 (90.7%)
No	4 (9.3%)
Risks to utilizing opioids (n=41), n (%)	
Dependency/Addiction	31 (75.6%)
Constipation	20 (48.8%)
Sedation/Drowsiness	12 (29.3%)
Graft loss	2 (4.9%)

IQR = interquartile range;
MOUD = medications for opioid use disorder;
SD = standard deviation
UNOS = United Network for Organ Sharing

Figure 1. Center practices regarding pain management after kidney transplant regarding (1A) utilization of opioids for first-line pain management after kidney transplant in opioid naïve patients, (1B) modality of opioids in the perioperative setting, and (1C) other pain management modalities used after kidney transplant.



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Abstract# 878

Covid-19-related Knowledge, Health Behaviors and Attitudes Towards Telemedicine and Emergency Visits in a Population of Kidney Transplant (KTx) Recipients

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Purpose: We explored knowledge about COVID-19 and attitudes towards emergency care and telemedicine visits in a population of inner-city KTx pts.

Methods: A telephone survey was administered to a random sample of 33 KTx pts during July 2020, including questions regarding knowledge about COVID-19, health behaviors and attitudes regarding emergency and telemedicine visits. A COVID-19 knowledge score and COVID-19 concern score were calculated, with higher numbers indicating better knowledge and higher concern.

Results: Mean age was 58.3±11.1 yrs, with 19 (58%) men and 14 (42%) women with 23 (74%) Black, 4 (13%) Hispanic, 2 (7%) White, and 2 (7%) Other. 25 (78%) pts had not completed college. Five (15%) pts answered all questions correctly on COVID-19 knowledge, 28 (85%) answered at least 1 question incorrectly. 23 (74%) pts were afraid of COVID-19. 15 (46%) pts feared going to public places. 32 (97%) believed social distancing is important. Half were afraid of getting infected from a friend (18, 55%) or a family member (17, 52%). 27 (93%) reported feeling unsafe traveling on a plane. 6 (21%) pts reported reluctance to go to the ED if they had a medical emergency, including if they had a persistent low-grade fever (8, 28%), trouble breathing (2, 7%), or extreme belly pain (5, 17%). Pts who were afraid of going to the ED had higher scores for fear of COVID-19, fear of getting infection from a family member, fear of going to public places, and fear of traveling on an airplane ($p<0.05$). No associations were found between concerns about ED and COVID-19 knowledge. Pts who preferred telemedicine over in-person appointments were less likely to go the ED in an emergency (40% vs 89%, $p<0.05$) and scored higher overall on the COVID-19 knowledge (0.90±0.12 vs 0.76±0.13, $p<0.05$). No association was found for telemedicine preference and attitudes towards COVID-19. 100% (31) of pts reported: hand-washing with soap and water; using masks in crowds;

and isolating if flu-like symptoms were felt. Fewer avoided touching eyes, nose or mouth (94%); sanitized regularly surfaces at home (90%); avoided traveling for fun (87%), leaving their home (61%), or interacting in-person with someone who has COVID-19 (87%). No associations were found between behaviors and COVID-19 knowledge, telemedicine preference, or ED concerns.

Conclusions: In our population of KTx: 1. The majority of pts are knowledgeable but concerned about COVID-19 and follow public health guidelines. 2. Few pts answered all knowledge questions correctly. 3. Over a quarter would refuse to go to the ED if they had a persistent fever and many were concerned about the ED in general. 4. Pts who preferred telemedicine appointments were more knowledgeable about COVID-19 and less likely to go to the ED which may reflect their overall concern with COVID-19 exposure. 5. Education of our patients regarding actual risks of in-person or ED visits should be done to assure that they get care when needed.

CITATION INFORMATION: Lin A., Saw-Aung M., Yang W., Udod G., Imas A., Markell M. Covid-19-related Knowledge, Health Behaviors and Attitudes Towards Telemedicine and Emergency Visits in a Population of Kidney Transplant (KTx) Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Lin: None. **M. Saw-Aung:** None. **W. Yang:** None. **G. Udod:** None. **A. Imas:** None. **M. Markell:** Consulting Fee; Name of Commercial Interest; CareDx. Grant/Research Support; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx.

Abstract# 879

Identifying the Needs of Kidney Transplant Recipients That Can be Addressed by a Web-based Self-management Program

D. Massierer[1], R. Sapir-Pichhadze[2], V. Bouchard[3], K. Dasgupta[2], N. Fernandez[4], D. da Costa[2], S. Ahmed[1], M. Fortin[5], R. Langevin[6], N. Mayo[1], T. Janaudis-Ferreira[1], *[1]Faculty of Medicine- School of Physical and Occupational Therapy, McGill University, Montreal, QC, Canada, [2]Centre for Outcomes Research and Evaluation (CORE), Research Institute of the McGill University Health Centre (RI-MUHC), Montreal, QC, Canada, [3]CIUSSS du Saguenay-Lac-Saint-Jean, Chicoutimi, QC, Canada, [4]Department of Family Medicine/Emergency Medicine, Université de Montreal, Montreal, QC, Canada, [5]Department of Medicine, Université de Montreal, Montreal, QC, Canada, [6]Canadian Donation and Transplantation Research Program (CDTRP), Edmonton, AB, Canada*

Purpose: Kidney transplantation improves the quality of life (QoL) of patients with end-stage renal disease, however, post-transplant recovery of physical health and other aspects of QoL remains well below age- and sex-matched norms. While members of the health care team are focused on optimizing the biological responses to transplant, patients may have few or no tools at their disposal to engage in behaviours that optimize QoL. We aimed to identify the needs of kidney transplant (KTx) recipients that are appropriate to address through self-management.

Methods: We used four strategies to identify areas of concern post-kidney transplantation: 1) assessment of affected areas post-transplant in 51 KTx recipients using the patient-generated index to identify areas of QoL that are affected post-transplant; 2) review of the outcome domains suggested by the Standardized Outcomes in Nephrology-Transplantation (SONG-Tx) international initiative; 3) review of the domains included in QoL questionnaires for KTx recipients and patients with chronic kidney disease and 4) focus groups and key informant interviews with patients, clinicians, and researchers. We linked the identified themes to the International Classification of Functioning's code list and created a saturation table to visualize the most common areas of concern.

Results: The most prevalent identified topics (identified in >3 strategies) were physical activity; fatigue; pain; sleep; mental health; nutrition; sexual function; side effects of medication; religion and spirituality; personal relationships/social life; and heart and kidney health.

Conclusions: KTx recipients have many areas of concern post-transplant that can be addressed through self-management. The next steps will include the development of a comprehensive, evidence- and experience-based self-management web-based program tailored to this patient population to improve their QoL.

CITATION INFORMATION: Massierer D., Sapir-Pichhadze R., Bouchard V., Dasgupta K., Fernandez N., da Costa D., Ahmed S., Fortin M., Langevin R., Mayo N., Janaudis-Ferreira T. Identifying the Needs of Kidney Transplant Recipients That Can be Addressed by a Web-based Self-management Program *AJT, Volume 21 Supplement 3*

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Abstract# 880

Intersecting Disparities in Health Literacy Among Renal Patients Experiencing Transplant Barriers

C. W. Nonterah, K. Workman, S. Shah, *Psychology, University of Richmond, Richmond, VA*

Purpose: Recent data from the United States Renal Data System (USRDS, 2020) indicate that 131, 636 patients were diagnosed with end-stage renal disease (ESRD) in 2018, a 2.3% increase from the previous year (USRDS, 2020). Although kidney transplantation has been reported as the most effective form of renal replacement therapy, factors such as race, gender and socioeconomic status continue to affect patients' access to this treatment, resulting in disparities (McSorley et al., 2017; Nonterah & Gardiner, 2019; Patzer & Paston, 2013; Schold et al., 2011). Health literacy has been revealed as a contributing factor to reduced access to kidney transplantation, perpetuating disparities (Levy & Janke, 2016; Grubs et al., 2009). Yet, few studies have examined different disparities in health literacy and the ways in which they intersect to magnify a patient's barrier to transplantation. The current study sought fill a gap in the literature by examining disparities in race, gender and income associated with health literacy as well as potential intersections between these disparities.

Methods: Participants consisted of ESRD adult patients (N=181) with a mean age of 43.50 (SD =9.50) who reported experiencing transplant barriers. These participants were recruited from a transplant center in the Southeastern region of the US. Participants took a survey which consisted of demographic questions and all nine scales of the Health Literacy Questionnaire.

Results: Multiple regression analyses were conducted to examine the associations between race, gender and income with health literacy. Results revealed a significant relationship between gender and feeling understood and supported by providers, having enough information to manage health, actively managing health, and appraisal of health information. Income was also significantly associated with these dimensions of health literacy. When gender, income, and the multiple effects of gender and income were placed in the model, the results revealed a significant regression equation between gender and feeling understood by providers, β =-.44 , t (175) = -2.306 , p = .022 well as the combined effect of gender and having a household income between $40,000-$79,999, β =.34, t (175) = 2.036 , p = .043.

Conclusions: Overall, the findings from the current study suggest that gender differences contributed the most to the differences in health literacy with women reporting low health literacy relative to the men in our sample. Men in the middle-income range reported higher levels of health literacy. These results provide some evidence for additional research in this area, especially research that examines the multiple effects of different factors associated with disparities in health literacy.

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DISCLOSURES: C.W. Nonterah: None. **K. Workman:** None. **S. Shah:** None.

Abstract# 881

Understanding Early Transplant Preparation: CKD 3-5 Patients' Transplant Knowledge and Actions at Kaiser Permanente Southern California

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Purpose: While consensus exists on the need to educate patients earlier about transplant, delays in education persist, leaving patients insufficient time to make optimal renal replacement (RRT) decisions. This study assessed levels of transplant-related knowledge and actions by kidney patients varying by CKD stage and primary language spoken.

Methods: 971 patients at Kaiser Permanente Southern California were assessed about their knowledge of CKD symptoms (6-items, e.g., increased fatigue is a CKD symptom) and transplant (20-items, e.g., patients can live longer with a transplant than on dialysis). They also reported whether they had already taken 25 possible RRT actions divided into three groups: (1) learning actions, (2) making informed decisions about RRT, and (3) pursuing transplant. Patients varied by CKD Stage [3 (41.2%); 4 (34.4%); 5 (24.4%)], race/ethnicity, and primary language [Spanish-speaking Hispanic (28%), White (22%), English-speaking Hispanic (22%), Black (18%), and Asian (10%)].

Results: Overall, patients correctly answered 58% of CKD symptoms items, and 20% of transplant knowledge items. Most patients had taken few steps to learn more (median: 0 of 5 steps), make informed decisions about RRT options (median: 2 of 6 steps), and pursue transplant (median: 0 of 6 steps). Earlier CKD stage and Spanish-speaking patients had poorer CKD symptom and transplant knowledge and took fewer action steps overall (Table).

Conclusions: Patients in earlier CKD stages and Spanish-speakers are less knowledgeable and less likely to take transplant-related actions, however, all patients need

greater support with RRT decision-making and pursuit of transplant. Educational interventions that engage patients earlier in their CKD progression may increase informed decision-making and pursuit of LDKT.

Table. Variation in Transplant Knowledge and Actions

	CKD Stage			Primary Language Spoken	
	3	4	5	English	Spanish
Knowledge (% Correct)					
CKD Symptoms**	50.0%	58.3%	75.0%	66.7%	50.0%
Transplant Knowledge**	16.0%	20.0%	24.0%	20.0%	14.0%
Actions (Median Completed)					
Learn about RRT**	0	1	2	1	0
Make Informed Decisions about RRT**	1	3	4	3	2
Pursue Transplant*	0	0	1	0	0

Note: **p < 0.001, *p < 0.05

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Abstract# 882

Patients' Perceptions of Kidney Transplant Failure and Transitioning to Dialysis

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Purpose: Approximately 5,000 US kidney transplant recipients return to dialysis each year due to allograft failure. Understanding how kidney allograft failure and transitioning to chronic dialysis affects patients emotionally, and their perceptions of the care that they received during the transition can identify avenues for improved care for patients.

Methods: Semi-structured interviews were conducted at a single center with 29 adult patients who had developed allograft failure and returned to dialysis within the last 5 years. Thematic analysis was used to code the transcripts and identify emerging themes.

Results: Five themes emerged about patients' transition from allograft failure to chronic dialysis: 1) Patient context: the acuity of allograft decline, symptoms that accompanied decline, frequency of interactions with the heath care system, and personal understanding of reasons for graft failure varied among patients. 2) Impact on quality of life: allograft failure had a negative impact on quality of life such as interference with daily life activities, and loss of independence. (3) Emotional response: patients reported feelings of shock, sadness, hopelessness, frustration, disappointment and anxiety, (4) Coping: they felt well-supported emotionally by their family, friends and providers. They expressed desire that the diagnosis of allograft failure be delivered with compassion along with a thorough discussion of the cause of allograft loss. They expressed appreciation when this occurred. (5) Health system context: mental health resources were considered helpful. Poor care coordination after allograft failure leading to confusion in immunosuppression medication tapering and infectious complications as well as limitations in insurance coverage were perceived as harmful.

Conclusions: Kidney allograft failure is a devastating experience to patients and their families. Ensuring compassionate communication between patients and providers, readily available mental health resources and care coordination, and social work support to navigate health insurance challenges during the transition from allograft failure to chronic dialysis may improve the patient experience.

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Abstract# 883

Impact of Pre- and Post-transplant Outcomes on Patient-reported Outcomes in a Prospective Multicenter Trial in Kidney Transplantation

J. M. Rohan[1], J. P. Leone[2], E. Woodle[3], D. Kaufman[4], A. R. Shields[3], A. Wiseman[5], A. J. Matas[6], P. West-Thielke[7], E. King[3], R. R. Alloway[3], *[1]Children's Hospital Richmond VCU, Richmond, VA, [2]Tampa General, Tampa, FL, [3]U Cincinnati, Cincinnati, OH, [4]U Wisconsin, Madison, WI, [5]Centura Transplant, Denver, CO, [6]U Minnesota, Minneapolis, MN, [7]UIC, Chicago, IL*

Purpose: BEST Trial (**B**elatacept-based **E**arly **S**teroid-withdrawal **T**rial) compared belatacept (BELA)-based early steroid withdrawal (ESW) regimens with a tacrolimus (TAC)-based ESW regimen across 2years. CNI free/ESW bela groups revealed improved patient-reported outcomes (PROs) in kidney transplant (KTx) patients (pts). GI distress in TAC group increased across 2-years. Neurologic, GI, and mobility symptoms were reported less frequently in BELA groups. Previous trials did not examine predictive models investigating longitudinal differences in PROs between BELA- and TAC-groups. We attempt to determine if clinically relevant pre- and post-transplant outcomes [e.g., chronic dialysis vs. pre-emptive, acute rejection, diabetes (preexisting, new onset diabetes after transplant (NODAT), death, death censored graft loss (DCGL), and eGFR<45] predicted worse PROs over two years

Methods: This longitudinal, multisite study was conducted across 8 sites. All pts received mycophenolate and 5 days of steroids. Pts were randomized to 3 groups: alem+BELA, r-ATG+BELA, r-ATG+TAC. Pts completed 2 PRO measures at baseline, 1-, and 2-years (MEMPHIS, MTSOSD-59R). Intent to treat analyses (n=316) using a multivariate analysis (MVA) framework examined pre- and post-transplant outcomes, randomization assignment, time since KTx, gender, and race

Results: MVA (Table 1) indicated pts receiving pre-emptive transplant reported worse PROs across 2-years. Preexisting diabetes and NODAT predicted worse PROs over time. Death, DCGL, rejection, and eGFR<45 was not predictive of PROs with exception of mobility; those with eGFR<45 reported worse mobility. Controlling for gender, race, and time post KTx, medication regimen only significantly influenced the relationship between PROs in pts who developed NODAT and received TAC; these pts reported significantly worse miscellaneous symptoms than BELA-treated pts.

Conclusions: Predictive models indicated pre-emptive transplant, preexisting diabetes, NODAT, and eGFR<45 significantly predicted worse PROs. Rejection did not predict PROs. TAC pts with NODAT reported worse miscellaneous symptoms. These findings support utilization of PROs in drug trials to highlight the value of regimens with lower NODAT and improved eGFR.***Table 1. Multivariate Analyses for Predictive Models of PROs***

Patient-Reported Outcomes (***p<0.0001, **p<0.01. *p<0.05)	Total Score	Misc Side Effects	GI Distress	Emotional Burden	Life/ Role	Mobility	Symptom Occurrence
Model 1: Pretransplant Dialysis	*F* value	*F* value	*F* value	*F* value	*F* value	*F* value	*F* value
Chronic Dialysis vs. Pre-Emptive Transplant	**15.54*** **	**17.76*** **	**4.30***	**6.05****	**10.68****	**14.65****	**6.71****
TAC vs. BELA-regimens	0.30	1.99	0.01	0.17	0.93	**4.63***	0.52
Model 2: Acute Rejection							
Acute Rejection (no vs. yes)	0.03	0.39	0.13	0.08	0.00	0.29	0.62
TAC vs. BELA-regimens	0.09	2.27	0.00	0.12	0.43	2.89	0.37
Model 3a: Preexisting Diabetes							
Preexisting Diabetes (no vs. yes)	**20.05*** **	**35.47*** **	3.71	1.97	**10.17****	**32.74*** **	**12.45****
TAC vs. BELA-regimens	0.02	3.64	0.01	0.06	0.32	2.97	0.11
Model 3b: NODAT							
Post-Transplant Diabetes (no vs. yes)	**4.59***	**3.89***	1.77	**4.75***	3.38	1.00	**4.85***
TAC vs. BELA-regimens	0.08	**4.42***	0.15	0.04	0.12	1.48	0.00
Model 4: Death							
Patient death (no vs. yes)	0.00	1.15	0.88	0.02	0.40	1.50	0.00
TAC vs. BELA-regimens	0.07	2.98	0.01	0.08	0.50	3.69	0.21
Model 5: Death Censored Graft Loss							
DCGL (no vs. yes)	0.89	0.83	0.01	0.29	1.02	1.21	0.01
TAC vs. BELA-regimens	0.12	2.52	0.00	0.12	0.56	3.76	0.22
Model 6: eGFR < 45ml/min							
eGFR < 45 at 24 months (no vs. yes)	3.17	2.96	0.31	1.01	3.17	**4.04***	1.21
TAC vs. BELA-regimens	0.12	3.78	0.00	0.16	0.01	2.10	0.02

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Abstract# 884

Validation of PROMIS Anxiety Computer Adaptive Test in Solid Organ Transplant Recipients

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Purpose: To assess the validity and reliability of the PROMIS Anxiety item bank administered using Computer Adaptive Test (PROMIS-A CAT) in patients who received solid organ transplant.

Methods: A cross-sectional convenience sample of adult kidney (KTR), kidney-pancreas (KPTR), and liver (LTR) transplant recipients completed PROMIS-A CAT, General Anxiety Disorder-7 (GAD7), Patient Health Questionnaire (PHQ-9), Kidney/Liver Disease Quality of Life-36 (KDQoL/LDQoL), Edmonton Symptom Assessment System Revised (ESASr) and EuroQoL EQ-5D (EQ5D) questionnaires on an electronic data capture platform. Sociodemographic and clinical variables were collected from medical records. A sub-group of participants was asked to retake PROMIS-A CAT within 14 days; test-retest reliability was assessed using intraclass correlation coefficient (ICC). Construct validity was confirmed using correlation between PROMIS-A CAT scores and scores on questionnaires measuring similar constructs, and also using "known group" comparisons. Discrimination of PROMIS-A CAT was assessed using receiver operating characteristic (ROC) analysis and an established cut-off on GAD7 (≥10) for moderate/severe anxiety.

Results: A cross-sectional, convenience sample of 431 participants were recruited (mean [SD] age: 53 [14] years, 65% male, 68% Caucasian). 251 (58%) were KTRs, 18 (4%) were KPTRs and 162 (38%) were LTRs. 13% reported moderate/severe anxiety (GAD7 score ≥10). Mean (SD) PROMIS-A CAT score was 52.4 (8.5); participants answered an average of 5 questions. PROMIS-A CAT showed good test-retest reliability (ICC: 0.802). PROMIS-A CAT showed moderate correlation with GAD7 (rho=0.63, p<0.001), PHQ9 (rho=0.60, p<0.001), and KDQoL/LDQoL SF-12 Mental Health Composite Score (rho=-0.56, p<0.001). In "known group" comparisons, mean (SD) PROMIS-A CAT scores were significantly higher for females compared to males (54 [7], 51 [9]; p<0.001) and for albumin (g/L) ≤35 compared to ≥40 (56 [8], 52 [8]; p=0.024). PROMIS-A CAT scores were also significantly higher for patients who reported ≥30 score on ESASr compared to <30 (59 [8], 51 [8]; p<0.001), and for patients who reported moderate/severe compared to no/slight anxiety/depression on EQ5D (56 [9], 51 [8]; p<0.001). PROMIS-A-CAT had excellent discrimination with an area under of the ROC curve of 0.87 (95% CI: 0.82, 0.93).

Conclusions: These results provide support the validity and reliability of PROMIS-A CAT among patients who received a solid organ transplant and support its use in research and clinical care.

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Abstract# 885

Transplant Decision Making Concerns for Asian Patients with End-Stage Kidney Disease

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Purpose: Compared to White Canadians, Asian Canadians with end stage kidney disease (ESKD) are less likely to receive living donor kidney transplant (LDKT). We explored factors associated with kidney transplant (KT) decision-making, specifically the weight patients give to perceived pros and cons for KT decisions.

Methods: Using the Transplant Decisional Balance survey, patients rated the importance of perceived pros and cons to KT decision-making from 1-5 ("not important"-"extremely important"). We surveyed a cross-sectional convenience sample of adults with ESKD in Toronto. Ethnicity (White, Asian [South and East], other) was self-identified. Individual ratings of pro/con items were summed to yield LDKT and deceased donor KT (DDKT) pro/con scores. Individual scale items were also examined: dichotomized (not/slightly/moderately vs very/extremely important) and their independent association with ethnicity was analyzed in multivariable logistic regression.

Results: Among 590 participants (mean[SD] age 57[13] years, 62% male), 24% were Asian, and 42% were White. Asians were less likely to have incomes >$30K/year (52% vs 71%, p<0.001) and were more likely to be immigrants (75% vs 27%, p<0.001) compared to Whites. The summed LDKT scores and DDKT pro scores were similar between the groups. However, Asian participants rated perceived DDKT con scores (median [IQR]: 12[7,16] vs 9[5,13]; p=0.025) higher than Whites. In univariable analysis, compared to White participants, Asian participants were more likely to indicate that perceived "pain from surgery" (OR, 2.20 [95% CI: 1.30, 3.37]), "taking many medications post-transplant" (OR, 2.18 [95% CI: 1.40, 3.38]), and "if transplant failed it would be a lot of work/pain for nothing" (OR, 3.02 [95% CI: 1.75, 5.21) were very/extremely important to their transplant decision. These associations remained significant after adjusting for sociodemographic variables, comorbidity, and transplant knowledge at onset, (OR, 2.16 [95% CI: 1.23, 3.78]), (OR, 2.22 [95% CI: 1.37, 3.60]), (OR, 3.30 [95% CI: 1.83, 5.95], respectively).

Conclusions: Anticipated pain, concerns about the quantity of post-transplant medications and potential unsuccessful transplant weighs into KT decision making among Asian Canadians with ESKD more than for White Canadians. Further qualitative research is needed to better understand the reasons for these ethnicity-specific differences in decision making.

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Abstract# 886

Information-Seeking Behavior During Covid-19: Opportunities for Communication and Care Transition Improvements

S. H. Advani[1], S. M. Advani[2], Y. A. Iraheta[3], A. Murillo[4], H. A. Gritsch[3], A. D. Waterman[3], *[1]Terasaki Institute, Bethesda, MD, [2]National Human Genome Research Institute, Bethesda, MD, [3]UCLA, Los Angeles, CA, [4]Terasaki Institute, Los Angeles, CA*

Purpose: To learn more about how at-risk dialysis and transplant patients sought health information during COVID-19 and what was most helpful, we conducted a mixed-methods study of people contacting a telephone COVID-19 Kidney & Transplant Listening Center.

Methods: Participants answered a survey in English or Spanish, including open-ended and closed-item questions assessing the types of COVID-19 related care transition experiences they had, their telehealth comfort using the Unified Theory of Acceptance and Use of Technology (UTAUT), what types of questions they had, and information-seeking behavior. Thematic analysis was conducted and descriptive statistics were run for quantitative items.

Results: 111 participants completed the survey. They were primarily English-speakers (84.85%) and of Hispanic/Latino (26.13%), White (24.35%) Black (23.42%) and Asian (23.42%) race/ethnicities, with an average age of 50 years, and with either a bachelor's degree or higher (51.96%).

Participants consumed health information at least two times weekly via internet (56.57%), television (40.57%), or print sources (31.13%). They were more likely to learn about health issues from news media (78.38%) than healthcare institutions (57.66%). Nearly 70% talked about health issues with family/friends twice a week. Most patients had experienced a change in care during the pandemic (66.3%), and 44.14% said they had postponed a medical visit. Questions that were raised related to their vaccine priority, higher risk of death as a transplant patient during COVID-19, and how to stay safe at dialysis.

A third (28.57%) agreed they could not find specific health information they needed. Participants with high school (HS) degrees or less were less likely to agree that the amount of information they had to make health choices was helpful (P=0.002).

Generally, participants believed they had the necessary resources (95.23%) and knowledge (93.27%) to access telehealth, however, those with HS degrees (p=0.002) or Medicare (P<0.001) were less confident. Finally, they reported that a website with FAQs answered by experts (68.47%) or a live chat for questions (67.57%) would be helpful.

Conclusions: During the pandemic, patients engaged in high levels of health information seeking weekly, often from media sources versus healthcare institutions that have more accurate kidney-related recommendations.

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Kidney

Kidney: Acute Cellular Rejection

Abstract# 887

How Should Acute T-Cell Mediated Rejection of Kidney Transplants be Treated?

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Purpose: Many guidelines suggest treating acute T-cell mediated rejection (TCMR) of kidney allografts that is Banff grade I with steroids alone and Banff grade II with steroids plus anti-thymocyte globulin (ATG).

Methods: We reviewed the kidney function and histological outcomes after treatment of 163 first episodes of biopsy-proven TCMR between 1/1/2015 and 07/31/2020. Patients with any component of antibody mediated rejection were excluded. Histological responses were defined: complete response (CR) as no residual rejection, partial response (PR) as improved Banff grade but persistent rejection, and no response (NR) as no change in Banff grade. Kidney function responses were defined: CR as eGFR returned to within 5ml/min/m2 of baseline eGFR, PR as improvement of eGFR by more than 5ml/min/m2 from nadir eGFR, and NR as eGFR staying above a value 5ml/min/m2 lower than peak eGFR.

Results: Of 163 kidney recipients with TCMR, 146 were treated with steroid pulse alone. 83% of patients with borderline rejection, 82.5% with grade 1A, 67% with grade 1B, and 50% with grade IIA had a histological CR or PR to treatment with steroids alone. Seventeen patients were treated with steroids plus ATG. The CR or PR response rate was 100% with grade 1A, 75% with grade 1B, 100% with grade IIA, and 57% with grade IIB. In patients with CR histologically, 58% had CR in their eGFR, but 18% had NR in eGFR. Of patients with PR histologically, 33% had CR, 42% had PR and 25% had NR based on eGFR. Of the 34 patients without CR histologically on the first biopsy who underwent additional treatment with steroids, 26 achieved CR. Histological and kidney function response to treatment was associated with better graft outcomes compared to patients with PR or NR to treatment (p=0.03 & 0.01 respectively). Multivariate analyses showed that higher grade of rejection was associated with worse long-term graft outcomes (HR=1.5, p=0.004, 95%CI 1.13 to 1.99). Histological response and kidney function response to treatment was associated with improved graft outcomes (HR=0.64, p=0.04, 95%CI 0.3961 to 1.0541; HR=0.5, p=0.003, 95%CI 0.315 to 0.84 respectively).

Conclusions: We demonstrate that responses based on kidney function alone do not correlate well with histological responses. Some patients with CR in eGFR have only PR histologically, and benefit from additional treatment. Others with NR in eGFR have CR histologically, and do not require additional treatment. These findings support the utility of protocol follow-up biopsies after treatment for TCMR to guide further treatment.

Correlation between histological and kidney function response to the treatment

Histological response to the treatment	Response to the treatment based on eGFR		
	Complete response (n=79)	Partial response (n=42)	No response (n=42)
Complete response (N=129)	75/129 = 58%	31/129 = 24%	23/129 = 18%
Partial response (N=12)	4/12 = 33%	5/12 = 42%	3/12 = 25%
No response (N=22)	0/22	6/22 = 27%	16/22 = 73%

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Abstract# 888

Kidney Transplant Survival After Borderline Rejection in the Setting of Denovo Dsa Formation

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Purpose: The significance of borderline cellular rejection has been questioned in the past. Data on borderline rejection with deNovo DSA (dnDSA) formation is limited. We sought to evaluate the outcome of borderline rejection detected after the appearance of dnDSA.

Methods: Retrospective review of adult primary kidney alone transplant recipients of either living or deceased donor at our center since 2000 who received depletional induction with thymoglobulin 6mg/kg and early steroid withdrawal that survived >1 month with allograft, found to have dnDSA and had kidney transplant biopsy within 2 months of dnDSA discovery. We grouped recipients by rejection grade into 3 groups: no rejection (n=60), borderline rejection (n=24) and definitive rejection group defined as rejection other than borderline (BPAR) (n=46). Kaplan-Meier curves were generated for death censored graft Survival (DCGS) by rejection grade with follow up censored at 5-years post dnDSA discovery.We used Cox proportional hazard model to examine the association between rejection grade and death censored graft survival. Model was adjusted for HLA-MM, Race, BMI, donor type and age.

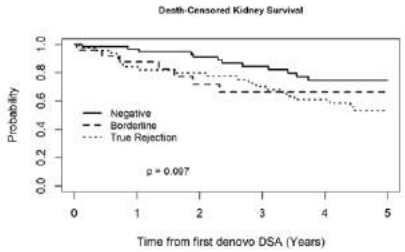
Results: Baseline characteristics are listed in Table 1. Greater than 70% of patients had a subtherapeutic CNI level in the month preceding biopsy. In the Kaplan-Meier analysis, death censored graft survival was not statistically different by rejection grade among recipients with dnDSA formation (Figure 1). In the multivariable Cox proportional hazards model for DCGS, compared to the no rejection group, borderline rejection was not found to be a significant predictor of graft loss [HR 2.9, 95% C.I. (0.48, 17.2) p=0.25], while BPAR was associated with a 5.7-fold increased risk of graft loss among dnDSA forming recipients [HR 5.7, 95% C.I. (1.756, 18.415), p=0.004].

Conclusions: In this small sample of transplant recipients with dnDSA formation who underwent diagnostic biopsy, borderline rejection was not a significant predictor of graft loss as compared to recipient without rejection.

Table 1. Baseline Recipient Characteristics - N (%) or Median [IQR]

	Negative N=60	Borderline N=24	BPAR N=46	p
Age at Transplant	48.76 [30.39, 60.61]	39.09 [28.70, 50.17]	47.08 [33.34, 57.77]	0.192
Male	32 (53.3)	14 (58.3)	35 (76.1)	0.051
Race (White)	40 (66.7)	19 (79.2)	31 (67.4)	0.650
Primary Disease DM	12 (20.0)	0	12 (26.1)	0.026
Dialysis Before Transplant	44 (73.3)	18 (75.0)	28 (60.9)	0.307
Years on dialysis	1.55 [0.99, 3.10]	1.21 [0.67, 3.09]	2.61 [1.35, 5.07]	0.076
cPRA	44.00 [2.50, 70.00]	33.00 [19.00, 77.75]	15.00 [0.25, 50.50]	0.205
Living Donor Transplant	36 (60.0)	14 (58.3)	26 (56.5)	0.937
Cold Ischemia Time (Min)	483 [44.75, 832.75]	485.5 [364.5, 847]	636 [199, 750]	0.527
HLA Mismatch	4.00 [3.00, 5.00]	4.00 [3.75, 5.25]	5.00 [3.00, 5.00]	0.484
Donor Age	48.43 [33.52, 54.26]	47.64 [26.25, 51.37]	42.02 [29.50, 53.46]	0.428
deNovo DSA (Months After Transplant)	6.06 [0.66, 29.48]	8.05 [1.09, 24.10]	10.43 [5.14, 31.28]	0.415
Tacrolimus or Cyclosporine at Goal	14 (28.6)	6 (30.0)	12 (30.0)	0.987

Figure 1. Death Censored Graft Survival by Rejection Grade



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Abstract# 889

Impact of Induction Immunosuppression Selection on Clinical Outcomes in Kidney Transplant Recipients During the COVID-19 Pandemic in New York City

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Purpose: As an early epicenter in the coronavirus pandemic, our center modified induction immunosuppression strategies for transplantation. We sought to determine if changes in induction immunosuppression secondary to the COVID-19 pandemic impacted the incidence of acute rejection.

Methods: Adult kidney transplant recipients at NYU Langone Health between 09/2019 and 08/2020 were retrospectively identified. Patients who received a multi-organ transplant or whose induction regimen was changed due to clinical course were excluded. Patients transplanted before and after 3/17/2020 were grouped as pre-pandemic (PRE) and post-pandemic (POST), respectively, based on temporary interruption of transplantation. Induction immunosuppression discordance was identified by blind adjudication from a standard protocol. Reduced induction agent use (basiliximab given when pre-pandemic protocol indicated rabbit anti-thymocyte globulin (rATG)) was compared between groups using a Chi-square test. Biopsy-proven acute rejection (BPAR) and the incidence of rejection was compared using a Poisson regression model.

Results: 203 kidney transplant recipients were retrospectively identified. 38 patients were excluded, leaving 165 patients for analysis. Median patient age was 57 years, 67% were male, and diabetes mellitus (35%) was the most common cause of renal disease. Discordance from protocol induction agent was 16% in the PRE group and 28% in the POST group (p=0.06). More patients received reduced induction with basiliximab in lieu of rATG in the POST group than the PRE group (26% vs. 7%, p=0.001). BPAR occurred in 5 PRE (5%) and 6 POST (11%) patients (p=0.19). The incidence of rejection was 0.13 and 0.75 rejection episodes/1,000-patient days for the PRE and POST groups, respectively; this was significantly different between the 2 time periods (unadjusted IRR 5.69, 95% CI 1.74-18.6, p=0.004).

Conclusions: More patients received reduced induction immunosuppression driven by the COVID-19 pandemic concerns. These COVID-related changes in immunosuppression may have contributed to a trend in increased acute rejection in a preliminary analysis.

Table 1. Patient and Donor Characteristics

	PRE (n=108)	POST (n=57)	p value
Age, years	58 (44-65)	55 (41-67)	0.15
Male sex, n (%)	72 (67)	38 (68)	0.82
Body mass index, mg/m²	26.0 (23.1-30.8)	25.4 (23.3-29.7)	0.57
Native kidney disease, n (%)			0.76
Diabetes mellitus	38 (35)	20 (35)	
Hypertension	22 (20)	12 (21)	
IgA Nephropathy	8 (7)	2 (4)	
Polycystic kidney disease	5 (5)	5 (9)	
Systemic lupus erythematosus	6 (6)	1 (2)	
Focal segmental glomerulosclerosis	8 (7)	5 (9)	
Other	21 (19)	12 (21)	
PRA ≥ 20%	16 (15)	6 (11)	0.44
Donor characteristics, n (%)			
Age	40 (28-49)	40 (30-55)	0.83
Terminal serum creatinine	1.4 (0.8-4.1)	1.5 (0.8-6.1)	0.57
KDPI	58 (39-74)	59 (44-80)	0.38
Donor type, n (%)			0.55
Brain death donor	53 (49)	33 (58)	
Living donor	29 (27)	12 (21)	
Circulatory death donor	26 (24)	12 (21)	
Cold ischemic time (hours)	29.0 (23.7-34.1)	28.3 (24.8-33.1)	0.92

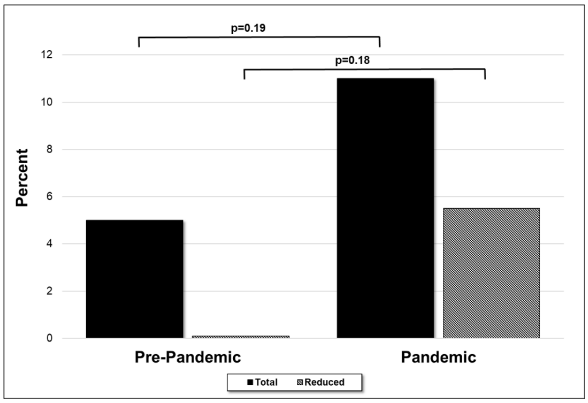
All data reported as median (IQR), unless otherwise specified. KDPI=kidney donor profile index. PRA = panel reactive antibody

Table 2. Graft and Patient Outcomes

	PRE (n=108)	POST (n=57)	p value
Biopsy-proven Rejection, n (%)	5 (5)	6 (11)	0.19
Reduced induction immunosuppression	0 (0)	3 (50)	0.18
Days to follow-up, median (IQR)	356 (289-425)	142 (119-163)	
Incidence Rate, rejection episodes/1000-patient days	0.13	0.75	
Unadjusted IRR (95% CI)	5.69 (1.74-18.6)		0.004
Survival, n (%)	5 (5)	1 (2)	0.67

**Follow up through 11/23/2020*

Figure 1. Acute Rejection in the Total Cohort and Those with Reduced Induction Immunosuppression



CITATION INFORMATION: Khalil K., Jonchhe S., Stern J., Lewis T., Alnazari N., Lonze B., Stewart Lewis Z., Ali N. Impact of Induction Immunosuppression Selection on Clinical Outcomes in Kidney Transplant Recipients During the COVID-19 Pandemic in New York City *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Khalil: None. **S. Jonchhe:** None. **J. Stern:** None. **T.C. Lewis:** None. **N. Alnazari:** None. **B. Lonze:** None. **Z. Stewart Lewis:** None. **N. Ali:** None.

Abstract# 890

Impact of Treatment of Subclinical Rejection at 2 Weeks After Kidney Transplantation, Compared by 1 Year Histologic Outcomes

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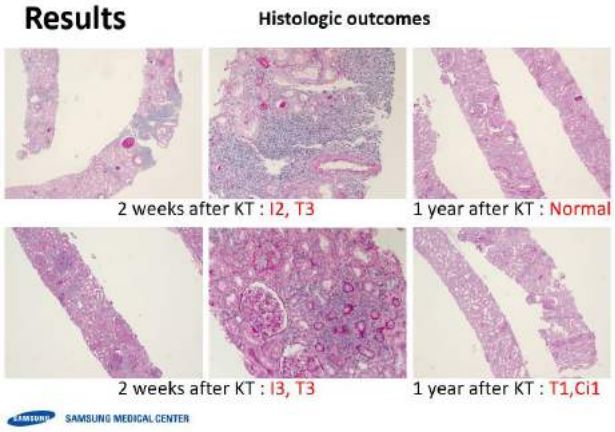
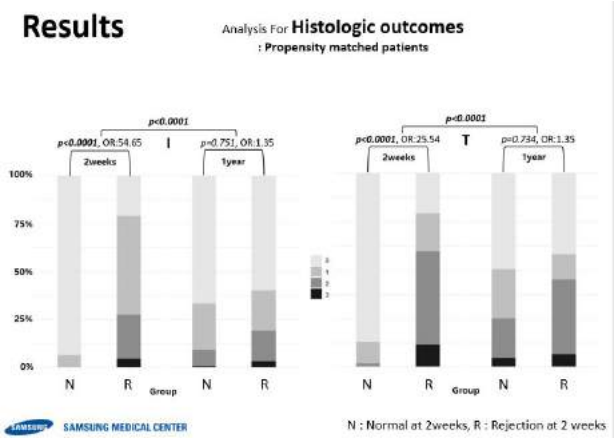
Purpose: Subclinical rejection (SCR) is associated with chronic allograft nephropathy, which is the most common cause of allograft failure in kidney transplantation (KT). Therefore, early detection and treatment of subclinical rejection through protocol biopsy can reduces the incidence of chronic allograft nephropathy and the improvement of graft survival. This study aims to evaluate the effective early detection role of routine protocol biopsy by comparing the pathologic outcome.
Methods: We retrospectively analyzed 914 kidney transplantation recipients in our center between August 2012 and December 2018. Of these, pediatric cases, re-transplantations and multi-organ transplantation, cyclosporine and azathioprine users, patients who were not underwent protocol biopsy, and diagnosed rejection but not treated patients were excluded. Finally, a total of 624 adult patients who were underwent protocol biopsy at post KT 2 weeks and 1 year were analyzed.
Results: After propensity score matching, patients were divided into two groups, 2-week protocol biopsy proven normal group (n=256) and rejection group (n=96). Before propensity matching, normal group was significant higher recipient age and ABO incompatible KT, rejection group was higher HLA II mismatch and proportion of deceased donor KT, the difference was corrected through matching. Rejection group showed no significant difference from normal group in the tendency of graft function (eGFR), and Kaplan-Meire curve also shown that in graft survival. In the pathologic outcomes between two groups and two periods, the pathological differences between two groups showed a decrease between two periods.
Conclusions: Subclinical rejection treatment through protocol biopsy can contribute to maintenance of graft function and improvement of pathologic change.





CITATION INFORMATION: Lee O., Lee K., Park J., Lee J., Kwon G., Kim K. Impact of Treatment of Subclinical Rejection at 2 Weeks After Kidney Transplantation, Compared by 1 Year Histologic Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: O. Lee: None. **K. Lee:** None. **J. Park:** None. **J. Lee:** None. **G. Kwon:** None. **K. Kim:** None.

Abstract# 891

Continuous 24-Hour Antithymocyte Globulin (ATG) for Renal Allograft Rejection: Results of a Randomized Controlled Trial

S. J. Patel, A. Rogers, S. Kuten, R. Knight, E. Graviss, D. Nguyen, T. Ellimuttil, I. Agboli, L. Gaber, A. Gaber, *Houston Methodist Hospital, Houston, TX*

Purpose: For acute renal allograft rejection (AR), ATG is generally administered in the inpatient setting because of the need for intravenous access, patient monitoring, and daily administration. Herein, we report the initial outcomes of a trial evaluating the feasibility of a 24-hour ATG infusion to reduce inpatient length of stay (LOS).
Methods: Patients requiring ATG (Thymoglobulin®) for treatment of biopsy-proven AR were randomized 1:1 to receive either a 24-hour continuous infusion of ATG 6 mg/kg (24-hour arm) or 4 daily infusions of 1.5 mg/kg, each over 6 hours (Daily arm). Pre-medications were methylprednisolone, diphenhydramine and acetaminophen administered every 6 hours starting prior to the infusion in the 24-hour group and prior to each daily infusion in the Daily group. Patients with concomitant antibody mediated rejection (AMR) were excluded. The primary endpoint of the study was LOS defined as the number of overnight stays post-ATG initiation. Secondary endpoints included side effects occurring during the infusions, rejection resolution

(defined as absence of AR on repeat biopsy 2-3 weeks post-treatment), 30-day readmissions, infections, renal function, and hematologic laboratory values through 6 months post-treatment.

Results: To date, 30/30 patients have been randomized, all have reached the primary endpoint analysis and 24/30 have completed 6 months of follow-up. One 24-hour patient was diagnosed with AMR after enrollment and required an extended LOS for treatment but was included in the current analysis. Baseline characteristics were similar between groups (Table 1). 24-hour ATG was discontinued after 75% of the infusion in one patient due to nausea and anxiety, and temporarily held in another patient due to chills and fatigue. All other patients tolerated the infusion well. Mean infusion time for the 24-hour group was 25±5.2 hours. Mean LOS following ATG initiation was 2.3±1.4 days for the 24-hour group vs. 3.7±1.0 days for the Daily group (p=0.004, Table 2). No differences were seen in vital signs or adverse effects between 24-hour and Daily infusion groups, nor were there significant differences in hematologic parameters, renal function and other post-treatment outcomes through 6 months (Table 2). Graft loss occurred a week after ATG initiation in one 24-hour patient who presented with acute and chronic rejection 7.7 years post-transplant.

Conclusions: Continuous infusion ATG over 24 hours for AR is feasible and significantly reduces inpatient LOS. Complete follow-up on the remaining patients is ongoing.

Table 1. Demographics and clinical characteristics (N=30)

	24-hour Infusion (n=15)	Daily Infusion (n=15)	p-value
Age at injection, years, mean (±SD)	48.9 (±13.4)	49.5 (±15.0)	0.41
Race, n(%)			1.00
White	5 (33.3)	6 (40.0)	
African American	6 (40.0)	6 (40.0)	
Other	4 (26.7)	3 (20.0)	
Male gender, n(%)	9 (60.0)	5 (33.3)	0.14
Deceased donor recipient, n(%)	13 (86.7)	10 (66.7)	0.20
Time since transplant, days, median (IQR)	825 (170, 1857)	468 (89, 1164)	0.52
Baseline (pre-rejection) creatinine, mg/dL, mean (±SD)	1.6 (±0.5)	1.4 (±0.4)	0.12
Rejection (at biopsy) creatinine, mg/dL, mean (±SD)	2.7 (±1.4)	2.2 (±1.4)	0.34
Rejection grade			0.24
Borderline	1 (6.7)	0 (0.0)	
1a	2 (13.3)	3 (20.0)	
1b	8 (53.3)*	3 (20.0)	
2a	3 (20.0)	7 (46.7)	
2b	0 (0.0)	1 (6.7)	
3	1 (6.7)	1 (6.7)	
Total ATG dose, mg/kg, mean (±SD)	5.7 (±0.7)	5.4 (±0.7)	0.22
Total methylprednisone, mg, mean (±SD)	1266 (±222)	1045 (±165)	0.07

Comparison between groups was conducted using the Chi-square or Fisher's exact tests for categorical variables and the t or Wilcoxon rank-sum test for continuous variables as appropriate.
ATG, antithymocyte globulin; IQR, interquartile range; LOS, length of stay; SD, standard deviation
*One patient diagnosed with antibody mediated rejection after enrollment

Table 2. Length of stay and outcomes at 6 months (N=30)

	24-hour Infusion (n =15)	Daily Infusion (n =15)	p-value
LOS-post ATG initiation, days, mean (±SD)	2.3 (±1.4)	3.7 (±1.0)	0.004
LOS-post ATG initiation, days, median (IQR)	2.0 (1.0, 3.0)	3.0 (3.0, 4.0)	0.004
30-day readmission, n(%)	7 of 14 (50.0)	3 (20.0)	0.12
Serum sickness, n(%)	0 (0.0)	1 (6.7)	1.00
Rejection resolution, n(%)	5 of 13 (38.5)	7 of 12 (58.3)	0.43
Infection, n(%)	3 of 12 (33.3)	6 of 12 (50.0)	0.68

Comparison between groups was conducted using the Chi-square or Fisher's exact tests for categorical variables and t-test or Wilcoxon rank-sum test for continuous variables as appropriate.
ATG, antithymocyte globulin; IQR, interquartile range; LOS, length of stay; SD, standard deviation

CITATION INFORMATION: Patel S., Rogers A., Kuten S., Knight R., Graviss E., Nguyen D., Ellimuttil T., Agboli I., Gaber L., Gaber A. Continuous 24-Hour Antithymocyte Globulin (ATG) for Renal Allograft Rejection: Results of a Randomized Controlled Trial *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.J. Patel: ; Veloxis Pharmaceuticals, Inc. **A. Rogers:** Honoraria; Name of Commercial Interest; Sanofi-Genzyme. Honoraria; Nature of Relationship; Advisory Board. **S. Kuten:** None. **R. Knight:** Honoraria; Name of Commercial Interest; Sanofi-Genzyme. Honoraria; Nature of Relationship; Speaker's Bureau. **E. Graviss:** None. **D. Nguyen:** None. **T. Ellimuttil:** None. **I. Agboli:** None. **L. Gaber:** None. **A. Gaber:** None.

Abstract# 892

Dosing Weight of Rabbit Antithymocyte Globulin and Outcomes Among Kidney Transplant Patients Treated for Rejection

C. Patton, K. Cunningham, C. D'Agostino, A. Novak, M. Kapugi, K. Lang, C. Kane, *Pharmacy, Northwestern Memorial Hospital, Chicago, IL*

Purpose: Rabbit antithymocyte globulin (rATG) is FDA approved for kidney transplant induction therapy and treatment of T-cell mediated rejection (TCMR). While prior studies comparing dosing weight strategies for induction therapy have illustrated similar outcomes between IBW and TBW, there is no data comparing dosing strategies for treatment of rejection. This study was designed to identify the impact of dosing weight on outcomes in kidney transplant recipients treated for TCMR.

Methods: This was a single-center, retrospective review of kidney transplant recipients who received at least one dose of rATG for the treatment of TCMR between 2014 and 2019 at Northwestern Memorial Hospital. Patients were excluded if they were multi-organ transplant recipients < 18 years of age. Patients were divided into groups based on cumulative rATG exposure of > 7.5 mg/kg or ≤ 7.5 mg/kg according to IBW. The primary outcome was the change in serum creatinine (SCr) from the first dose of rATG to one month after the final dose. Six-month secondary outcomes included graft survival, hospital readmissions, and infection rate. In addition, we evaluated the incidence of leukopenia (WBC < 3.5 K/UL), neutropenia (ANC < 1.5 K/UL), and thrombocytopenia (PLT < 150 K/UL) after the final rATG dose.

Results: 44 patients who received rATG for treatment of TCMR were included, with 16 patients receiving > 7.5 mg/kg and 28 patients receiving ≤ 7.5 mg/kg. BMI was significantly greater in the group receiving > 7.5 mg/kg group (31.3 vs 25.2 kg/m^2, p=0.008), with other baseline characteristics similar between groups. There was no difference between groups in the percent change in SCr one month after rATG therapy (-14.3% vs -16.9% p=0.8). Graft failure at six months was numerically higher in the >7.5 mg/kg group; however, this was not a statistically significant finding (31.3% vs 17.9%, p=0.46). There were two fungal infections identified, Cryptococcal meningitis in the > 7.5 mg/kg group and pulmonary blastomycosis in the ≤ 7.5 mg/kg group. One patient died from septic shock in the >7.5 mg/kg group. Overall, the infection rate was similar between treatment groups (43.8% vs 25.0%, p=0.31). No difference was identified for other secondary outcomes (Table 1).

Conclusions: There was no significant difference in percent change in SCr between dosing groups in kidney transplant patients treated for rejection. There was a trend towards a decreased risk of infectious complications, hospital readmissions, and graft failure in the ≤ 7.5 mg/kg dosing group. Larger, prospective studies are needed to confirm these findings.

Table 1: Baseline Characteristics and Outcomes

	≤ 7.5 mg/kg rATG, IBW (n=28)	> 7.5 mg/kg rATG, IBW (n=16)	P-value
Baseline Characteristics			
Age (years ± SD)	37 ± 17	40 ± 15	0.61
Male gender	16 (57.1%)	10 (62.5%)	0.76
BMI (kg/m^2 ± SD)	25.5 ± 6.6	31.3 ± 6.5	**0.008**
TBW (kg ± SD)	73.8 ± 26.5	96.9 ± 26.7	**0.008**
TCMR ≥ Banff 2A	10 (35.7%)	9 (56.3%)	0.22
Outcomes			
Percent change in SCr	-16.9%	-14.3%	0.8
Graft failure	5 (17.9%)	5 (31.3%)	0.46
Hospital readmissions	10 (35.7%)	9 (56.3%)	0.22
Infection	7 (25.0%)	7 (43.8%)	0.31
Leukopenia*	4 (14.3%)	3 (23.1%)	0.67
Neutropenia*	0 (0%)	1 (6.3%)	0.37
Thrombocytopenia*	5 (23.8%)	4 (36.4%)	0.68

SD – standard deviation; IBW – ideal body weight; TBW – total body weight; rATG – rabbit antithymocyte globulin; BMI – body mass index; TCMR – T-cell mediated rejection; SCr – serum creatinine
*Patients were excluded from this outcome if they had leukopenia, neutropenia, or thrombocytopenia prior to rATG administration.

CITATION INFORMATION: Patton C., Cunningham K., D'Agostino C., Novak A., Kapugi M., Lang K., Kane C. Dosing Weight of Rabbit Antithymocyte Globulin and Outcomes Among Kidney Transplant Patients Treated for Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Patton: None. **K. Cunningham:** None. **C. D'Agostino:** None. **A. Novak:** None. **M. Kapugi:** None. **K. Lang:** None. **C. Kane:** None.

Abstract# 893

Role of Serial Donor Derived Cell-Free DNA Monitoring in Kidney Transplant Recipients

A. X. Wang, C. R. Lenihan, *Nephrology, Stanford University School of Medicine, Palo Alto, CA*

Purpose: Donor derived cell-free DNA (dd cf-DNA; Allosure, CareDx) is increasingly employed for non-invasive kidney transplant monitoring. The goal of this study was 1) to examine the association between dd cf-DNA and for-cause biopsy findings and 2) describe changes in dd cf-DNA and creatinine following rejection treatment.

Methods: We included patients who 1) received a kidney transplant between May 2017 and July 2020 at our center, 2) underwent for-cause kidney transplant biopsy, 3) had ≥ 1 dd cf-DNA prior to biopsy and 4) had ≥ 2 dd cf-DNA levels measured during the entire study period. Patient demographic and clinical data were abstracted from medical records.

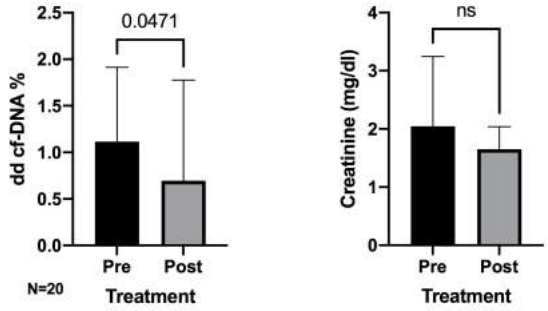
Results: 41 patients were stratified into 4 groups based on their most recent pre-biopsy dd cf-DNA: >1.0% (Group 1), 0.50-0.99% (Group 2), 0.21-0.49% (Group 3), and <0.21% (Group 4). Baseline characteristics are shown in table 1. The prevalence of rejection was greatest in the highest dd cf-DNA stratum (Group 1) and decreased across the 4 dd cf-DNA strata (table 2). Severe rejection (per Banff Criteria) was seen more frequently in Group 1. Only 1 patient (out of 11) in the lowest dd cf-DNA stratum (Group 4) had rejection and that was a 'borderline' T cell mediated rejection diagnosed on a background of prominent tubular injury and delayed graft function. Nearly all patients had a decrease in dd cf-DNA after treatment of rejection. Post-rejection decrease in creatinine (measured at the same time as dd cf-DNA) was less pronounced (figure 1).

Conclusions: Our study suggests that kidney transplant recipients with low dd cf-DNA (<0.21%) who undergo for-cause biopsy are unlikely to have rejection. Monitoring of dd cf-DNA may prove useful in assessing response to rejection treatment.

Table 1				
	Group 1: dd cf-DNA >1.0% (N = 12)	**Group 2: dd cf-DNA 0.50-0.99% (N=7)**	**Group 3: dd cf-DNA 0.21-0.49% (N=11)**	**Group 4: dd cf-DNA<0.21% (N=11)**
Median dd cf-DNA (IQR)	1.85 (1.25 - 2.93)	0.90 (0.83 - 0.97)	0.38 (0.26 - 0.43)	0.15 (0.13 - 0.18)
Median Cr (IQR)	1.45 (1.14 - 2.37)	1.56 (1.02 - 1.83)	1.76 (1.45 - 2.54)	1.43 (1.11 - 1.99)
Median cPRA % (IQR)	89 (30 - 100)	75 (6 - 97)	69 (27 - 99)	45 (0 - 89)
Median HLA Mismatch #/14 (IQR)	8 (6 - 11)	6 (6 - 11)	8 (5 - 11)	8 (7 - 9)
Living donor (%)	5 (35.7)	3 (42.9)	1 (9.1)	2 (18.2)
Median KDPI % (IQR)	28 (22 - 32)	39 (21 - 69)	49 (20 - 71)	41 (10 - 69)
Median days between dd cf-DNA and biopsy (IQR)	18 (1 - 43)	16 (10 - 53)	5 (4 - 22)	32 (8 - 92)

Table 2					
	Group 1: dd cf-DNA >1.0% (N=12)	**Group 2: dd cf-DNA 0.50-0.99% (N=7)**	**Group 3: dd cf-DNA 0.21-0.49% (N=11)**	**Group 4: dd cf-DNA <0.21% (N=11)**	***P*-Value**
All rejections (%)	9 (75.0)	5 (71.4)	5 (45.5)	1 (9.1)	*0.008*
Rejections excluding borderline (%)	6 (50.0)	2 (28.6)	2 (18.2)	0	*0.04*
All TCMR	8	5	5	1	
Borderline TCMR	2	3	3	1	
ABMR (*including mixed rejections)	3*	2*	0	0	
% Change in dd cf-DNA after treatment	-63.3	-67.4	-50.0	0	
% Change in Cr after treatment	+6.7	-4.5	-9.6	0	

Figure 1



CITATION INFORMATION: Wang A., Lenihan C. Role of Serial Donor Derived Cell-Free DNA Monitoring in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: **A.X. Wang:** Grant/Research Support; Name of Commercial Interest; CareDx. **C.R. Lenihan:** Grant/Research Support; Name of Commercial Interest; CareDx.

Kidney

Kidney: Cardiovascular and Metabolic Complications

Abstract# 894

Risk of Statin-Related Side Effects in Kidney Transplant Recipients

S. Bae[1], J. Ahn[1], K. Lentine[2], M. A. Schnitzler[2], G. Hess[3], H. Xiao[2], D. Segev[1], M. McAdams DeMarco[1], *[1]Johns Hopkins University, Baltimore, MD, [2]Saint Louis University, Saint Louis, MO, [3]Drexel University, Philadelphia, PA*

Purpose: Statins are widely used in kidney transplant (KT) recipients for prevention of cardiovascular events. Statins' safety profile may differ in KT recipients due to their chronic comorbidities and concomitant immunosuppression. We conducted a national registry study to measure the association of statin use with the statin-related side effects in KT recipients.

Methods: We studied 101,460 adult (≥18) kidney-only recipients with Medicare Parts A, B, and D coverage in 2006-2016 using USRDS data. Use of statins was ascertained from Medicare Part D prescription drug claims and treated as a time-varying exposure. Statin-related side effects, including hemorrhagic stroke, type 2 diabetes, cataract, liver injury, and rhabdomyolysis, were ascertained from ICD-9/-10 diagnosis and procedure codes, and CPT codes in Medicare Parts A and B claims. After excluding recipients with diagnoses of the specific side effect during 30 days prior to KT, we conducted Cox regression for each side effect.

Results: The proportions of statin users were 29.6% at KT and 44.7% at 5 years post-KT. Type 2 diabetes was the most common side effect (5-year incidence=22.8%), followed by cataract (11.6%), liver injury (1.8%), hemorrhagic stroke (1.3%), and rhabdomyolysis (0.9%). Compared to non-users, statin users were at higher risk of type 2 diabetes ($aHR=_{1.78}1.87_{1.96}$), cataract ($aHR=_{1.57}1.65_{1.74}$), and rhabdomyolysis ($aHR=_{1.21}1.42_{1.68}$). The risk of hemorrhagic stroke ($aHR=_{0.70}0.81_{0.94}$) and liver injury ($aHR=_{0.90}1.02_{1.16}$) was not higher in statin users after adjustments.

Conclusions: Statins might increase the risk of type 2 diabetes, cataract, and rhabdomyolysis in KT recipients, potentially to a greater degree than they do in the general population. On the other hand, unlike the general population, KT recipients may not experience increased risk of hemorrhagic stroke or liver injury following statin use.

Table. Association of statin use with statin-related side effects in kidney transplant recipients

	Model 1 (Unadjusted)	Model 2 (M1 + recipient)	Model 3 (M2 + IS)	Model 4 (M3 + donor)
Hemorrhagic stroke	1.20 (1.05 - 1.38)	0.85 (0.74 - 0.98)	0.84 (0.73 - 0.97)	0.81 (0.70 - 0.94)
Type 2 diabetes	2.39 (2.29 - 2.50)	1.94 (1.85 - 2.03)	1.92 (1.83 - 2.01)	1.87 (1.78 - 1.96)
Cataract	2.41 (2.30 - 2.54)	1.68 (1.59 - 1.76)	1.67 (1.59 - 1.76)	1.65 (1.57 - 1.74)
Liver injury	1.16 (1.03 - 1.31)	1.05 (0.92 - 1.20)	1.05 (0.92 - 1.20)	1.02 (0.90 - 1.16)
Rhabdomyolysis	1.87 (1.60 - 2.19)	1.48 (1.25 - 1.74)	1.46 (1.24 - 1.72)	1.42 (1.21 - 1.68)

CITATION INFORMATION: Bae S., Ahn J., Lentine K., Schnitzler M., Hess G., Xiao H., Segev D., McAdams DeMarco M. Risk of Statin-Related Side Effects in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Bae: None. **J. Ahn:** None. **K. Lentine:** None. **M.A. Schnitzler:** None. **G. Hess:** None. **H. Xiao:** None. **D. Segev:** None. **M. McAdams DeMarco:** None.

Abstract# 895

Association of Delayed Graft Function with Mortality Post-kidney Transplantation

N. Eguchi[1], H. Ichii[2], F. J. Ferrey[1], U. G. Reddy[1], D. C. Dafoe[2], H. Seo[3], K. Kalantar-Zadeh[1], E. Tantisattamo[1], *[1]Division of Nephrology, Hypertension and Kidney Transplantation, Department of Medicine, University of California Irvine, Orange, CA, [2]Division of Kidney and Pancreas Transplantation, Department of Surgery, University of California Irvine, Orange, CA, [3]School of Pharmacy and Pharmaceutical Sciences, University of California Irvine, Irvine, CA*

Purpose: Given the ongoing shortage of donated organs, marginal kidneys with a higher possibility of delayed graft function(DGF) have been increasingly utilized. While DGF in kidney transplant recipients(KTR) is associated with acute kidney allograft rejection, its association with mortality is unclear.
Methods: A single-center retrospective cohort study of consecutive KTR was conducted over 2 years. DGF was defined as a dialysis requirement within 7 days post-transplant. With the study population divided into DGF and non-DGF groups, an association between DGF and all-cause mortality were examined by multiple Cox proportional hazard regression analysis. Competing risk analysis was performed to determine the association of DGF with acute rejection by using mortality as a competing risk variable.
Results: Of all 219 KTR, mean age±SD was 50±13 years and 123 patients (56%) were male. The majority were White(45%) followed by Asian(20%) and Black (2%). Up to 87 patients(40%) had diabetes and 26% had coronary artery disease. During a median follow-up of 22.2 months(0.63, 34.93), incidence rates of all-cause mortality and acute rejection were 0.002 and 0.006 person-months, respectively. Among 10 patients who died during the follow-up period, 6 patients (60%) were in the DGF group (p 0.012); whereas, only 7 out of 26 patients (27%) with acute rejection had DGF (p 0.871). Compared to the non-DGF group, the DGF group had 4.4 times greater mortality risk (HR 4.39, p 0.022, 95% CI 1.24, 15.55; Figure 1). After adjusted by age, gender, body mass index, former smoking, presence of pre-transplant diabetes, coronary artery disease, stroke, type of deceased kidney donors, the DGF group still had a significantly higher risk of death (HR 4.39, p 0.034, 95% CI 1.12, 17.22). However, DGF was not associated with acute rejection from unadjusted and adjusted competing risk analyses ($HR_{unadjusted}$ 1.05, p 0.910, 95% CI 0.44, 2.55 and sub-$HR_{adjusted}$ 1.35, p 0.515, 95% CI 0.55, 3.30).
Conclusions: While DGF was an independent risk of mortality post-transplant, it was not associated with acute rejection. Non-immunological factors may play a role in poorer survival in KTR who developed DGF. Mechanism and risk factors of mortality in patients with DGF require further studies.

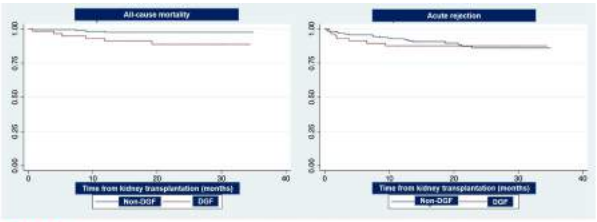


Figure 1: Kaplan-Meier curves show the statistical significance of unadjusted cumulative all-cause mortality and non-significantly unadjusted cumulative acute rejection in kidney transplant recipients with delayed graft function (DGF) compared to those without DGF.

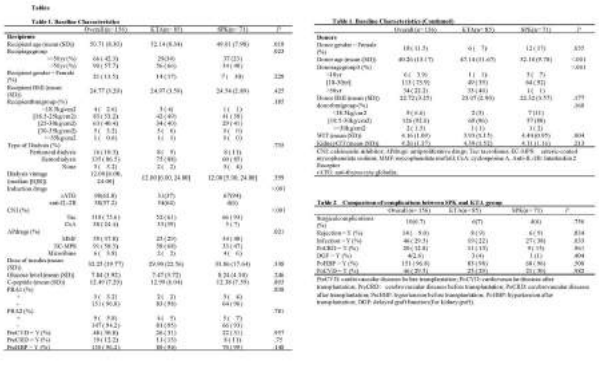
CITATION INFORMATION: Eguchi N., Ichii H., Ferrey F., Reddy U., Dafoe D., Seo H., Kalantar-Zadeh K., Tantisattamo E. Association of Delayed Graft Function with Mortality Post-kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Eguchi: None. **H. Ichii:** None. **F.J. Ferrey:** None. **U.G. Reddy:** None. **D.C. Dafoe:** None. **H. Seo:** None. **K. Kalantar-Zadeh:** None. **E. Tantisattamo:** None.

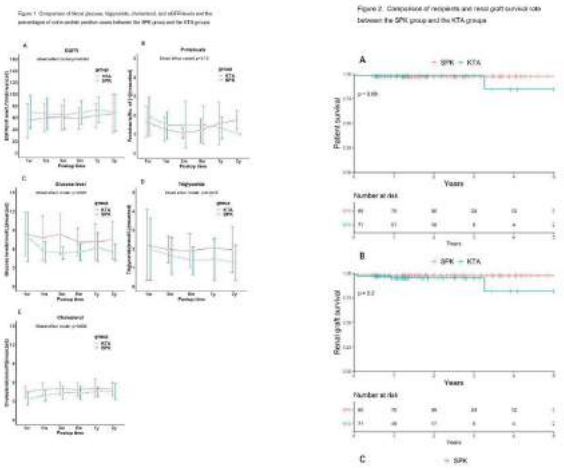
Abstract# 896

Superior Metabolic Function of Type 2 Diabetes Mellitus Patients After Simultaneous Kidney/pancreas Transplantation Compared with Kidney Transplantation Alone

X. Y. Fu, C. Yu, H. Wang, J. Zhao, Z. Wang, C. Mo, X. Shi, G. Feng, W. Song, Z. Shen, *Tianjin First Centeral Hospital, Tianjin, China*

Purpose: To compare the renal function, metabolic profiles and survival outcomes of simultaneous pancreas kidney transplantation (SPK) and kidney transplantation alone (KTA) to end-stage renal disease (ESRD) patients with type II diabetes mellitus (T2DM).
Methods: patients with ESRD combined with T2DM who underwent SPK (n=85) or KTA (n=71) in our center were retrospectively analyzed. General demography data, perioperative parameters, postoperative blood glucose and lipid profiles, complications and survival outcomes in these two cohorts were analyzed. Repeated data were compared with mixed effect model.
Results: SPK recipients were generally younger than KTA recipients (49.01±7.98 vs. 52.14±8.34 years, p = 0.018), as well as for the age of donors (32.1±9.78 vs. 47.14±11.67 years, p <0.001)(Table1). SPK leads to superior renal function and metabolic outcomes, with higher eGFR level (p=0.393), lower fasting serum glucose level (p<0.001), lower triglyceride level (p =0.0439), and lower cholesterol level (p=0.002) (Figure 1). The rate of infection was higher in KTA group (38% vs. 22.4% , p = 0.003) (Table2). The survival outcomes were comparable between the two groups(Figrue2).
Conclusions: SPK provides better renal function and metabolic outcomes, but has higher rate of infection than KTA for ESRD-T2DM patients. The 5-year survival outcomes of recipients and grafts were comparable between the two groups.





CITATION INFORMATION: Fu X., Yu C., Wang H., Zhao J., Wang Z., Mo C., Shi X., Feng G., Song W., Shen Z. Superior Metabolic Function of Type 2 Diabetes Mellitus Patients After Simultaneous Kidney/pancreas Transplantation Compared with Kidney Transplantation Alone *AJT, Volume 21 Supplement 3*

DISCLOSURES: X.Y. Fu: None. **C. Yu:** None. **H. Wang:** None. **J. Zhao:** None. **Z. Wang:** None. **C. Mo:** None. **X. Shi:** None. **G. Feng:** None. **W. Song:** None. **Z. Shen:** None.

Abstract# 897

Early Parathyroidectomy for Management of Post-transplant Hyperparathyroidism: A Case Series

A. Gokhale, J. Chancay, S. Johnson, R. P. Owen, F. Tedla, A. Bhansali, V. Sehgal, R. Shapiro, G. De Boccardo, *Recanati Miller Transplant Institute, Mount Sinai Hospital, New York, NY*

Purpose: Secondary hyperparathyroidism (HPT) gradually resolves after successful kidney transplantation (KT), and parathyroidectomy (PTX) is reserved for patients whose HPT persists longer than a year after KT. Few reports have examined the role of PTX within the first year of transplant. In this case series, we describe our experience with early PTX as treatment for post-transplant HPT that failed medical therapy.

Methods: Between August 2015 and December 2019, we identified 12 patients who underwent PTX within a year of KT. PTX was considered if HPT persisted despite treatment with the maximal tolerated dose of cinacalcet. Demographic and clinical characteristics were summarized using descriptive statistics. Estimated glomerular filtration rate (eGFR) was calculated using the Modification of Diet in Renal Disease (MDRD) formula. Intra-individual changes of relevant serum chemistry values and eGFR before and after PTX were compared with the Sign test. Statistical analysis was performed with SPSS v. 24.0; $p<0.05$ was considered significant.

Results: The median (interquartile range [IQR]) age was 54 (44-63) years; 42% were women and 83% had undergone deceased donor KT. The median daily dose of cinacalcet was 120 (60-120) mg. Pre-PTX renal biopsy showed intratubular calcium phosphate crystals in 2 patients. The median interval between KT and PTX was 169 (134 - 272) days, and the median length of stay for the PTX was 3 (3-4) days. There were no cases of permanent injury of the recurrent laryngeal nerve or chronic hypocalcemia. Before PTX, median eGFR (ml/min/1.73m2), and serum intact parathyroid hormone (iPTH, pg/mL), calcium (Ca, mg/dL), phosphorus (Phos, mg/dL), and alkaline phosphatase (ALP, U/L) were 64 (44-83), 548 (363-1032), 10.8 (9.8-11.9), 2.4 (2.2-3), and 170 (126-297), respectively. The corresponding values at 3 months post-PTX were 50 (39-68), 46 (18-154), 9.4 (9-10.5), 3 (2.6-3.2), and 75 (61-120), respectively. One year post-PTX, eGFR, and serum Ca, Phos and ALP were 49 (40-70), 9.1 (8.5-9.6), 3.2 (2.9-3.5), and 77 (50-87), respectively. Comparing intra-individual pre-PTX to post-PTX values, ALP was lower at 3 and 12 months ($p<0.01$), iPTH was lower at 3 months ($p=0.02$) and Ca at 12 months ($p<0.01$); changes in eGFR or Phos were not statistically significant at 3 or 12 months.

Conclusions: Our data suggest that early PTX is a safe and effective treatment for HPT after KT, with minimal complications. Early PTX was not associated with graft dysfunction in our study. Long term outcomes of early PTX need to be studied.

CITATION INFORMATION: Gokhale A., Chancay J., Johnson S., Owen R., Tedla F., Bhansali A., Sehgal V., Shapiro R., De Boccardo G. Early Parathyroidectomy for Management of Post-transplant Hyperparathyroidism: A Case Series *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gokhale: None. **J. Chancay:** None. **S. Johnson:** None. **R.P. Owen:** None. **F. Tedla:** None. **A. Bhansali:** None. **V. Sehgal:** None. **R. Shapiro:** None. **G. De Boccardo:** None.

Abstract# 898

Renal Transplant Recipients with Low Skeletal Muscle Attenuation Have a Greater Risk of Developing New-onset Diabetes After Transplantation

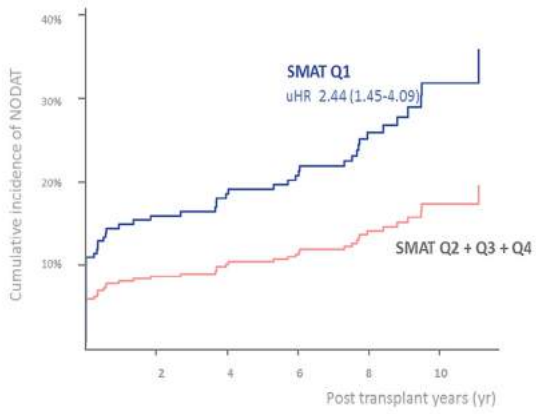
A. Han, H. Kim, C. Chung, H. Ko, K. Choi, S. Min, S. Min, J. Ha, *Department of Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of*

Purpose: Decreased muscle radiation attenuation on computed tomography (CT) is indicative of fat infiltration within the muscle. Such ectopic fat accumulation has recently been recognized as a risk factor for metabolic alterations and cardiovascular disease. Here we examined the possible association between skeletal muscle attenuation and future development of new-onset diabetes after transplantation (NODAT) in renal allograft recipients.

Methods: We performed a morphometric assessment of preoperative abdominal CT scans of non-diabetic adult patients who underwent renal transplants between January 2009 and December 2014 in our transplant center. Mean skeletal muscle attenuation (SMAT), skeletal muscle index (SMI; height normalized skeletal muscle area) were assessed for non-contrast CT scans at the level of L3 vertebra. Patients with polycystic kidney disease were excluded. We examined the association between CT morphometric indices and NODAT development.

Results: Our study population included 314 adult renal allograft recipients who did not have diabetes mellitus at the time of transplant. A total of 59 (18.8%) patients developed NODAT during the mean follow-up period of 8.9 years. According to univariate cox analysis, SMAT but not SMI showed significant association with future NODAT development (HR of the lowest quartile of SMAT 2.44, 95% CI 1.45-4.09, $p=<0.001$; HR for SMI 1.02, 95%CI 0.99-105, $p=1.55$; Figure 1). Other patient and transplant factors that showed significant association with NODAT development in univariate analysis were age (HR 1.03), BMI (HR 1.16), previous diagnosis of hypertension (HR 2.67). In the multivariate model including the factors mentioned above and other known risk factors of NODAT such as HCV and tacrolimus use, SMAT remained a significant factor (HR of the lowest quartile of SMAT 1.96, 95% CI 1.04-3.69, $p=0.039$) along with age (HR 1.03, 95% CI 1.00-1.06, $p=0.023$).

Conclusions: Our study shows that decreased muscle attenuation in preoperative CT scans is associated with the development of NODAT in renal allograft recipients independent of known risk factors.



CITATION INFORMATION: Han A., Kim H., Chung C., Ko H., Choi K., Min S., Min S., Ha J. Renal Transplant Recipients with Low Skeletal Muscle Attenuation Have a Greater Risk of Developing New-onset Diabetes After Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Han: None. **H. Kim:** None. **C. Chung:** None. **H. Ko:** None. **K. Choi:** None. **S. Min:** None. **S. Min:** None. **J. Ha:** None.

Abstract# 899

An Unexpected Case of Transthyretin Amyloid Cardiomyopathy (ATTR-CM) Overlooked Pretransplant, but Then Diagnosed Early After Kidney Transplant with a Negative Patient Outcome: A Case Report

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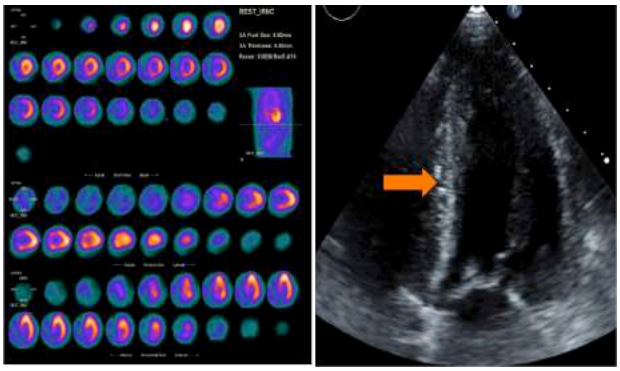
Purpose: ATTR-CM is underrecognized and commonly overlooked and undiagnosed. When found it is often a late diagnosis in patients with severe left ventricular hypertrophy (LVH) and diastolic heart disease. These findings are common and non-specific in patients with end-stage renal disease (ESRD) making for a challenging diagnosis.

Methods: We present a case of a 63-year-old female with a history significant for ESRD on hemodialysis, idiopathic chronic hypotension, and dysautonomia. She

had a seemingly unremarkable pre-transplant workup including for the hypotension and then underwent a deceased donor kidney transplant admitted 4 weeks later with acute onset dyspnea.

Results: On that admission, the patient required renal replacement therapy for volume overload and acute kidney injury. A kidney transplant biopsy was consistent with acute tubular necrosis but was without acute rejection. Her Kidney function improved with a baseline creatinine of 1.8-2.2. A repeat echocardiogram found severe LVH with grade 2 diastolic dysfunction, unchanged from pre-transplant but now reported to have a speckled pattern suggestive of infiltrative cardiomyopathy. Congo red staining of the kidney biopsy was negative in the renal tissue but surprisingly positive in sampled extra-renal vascular tissue suggestive of systemic amyloidosis. Her clinical picture including the history of dysautonomia, EKG findings of low QRS voltage and AV block, and increased LV wall thickness were fitting of amyloidosis. The patient underwent a TcPYP (Technetium-pyrophosphate) scan that was highly suggestive of ATTR-CM. Serum and urine protein electrophoresis and immunofixation and serum-free light chain ratios were not consistent with an immunoglobulin light chain (AL) amyloidosis. Genetic testing for mutant ATTR (ATTRm) was also negative. The patient was therefore thought to likely have wild-type ATTR (ATTRwt) and was started on Tafamidis (transthyretin selective stabilizer) therapy. The patient was planned for an endomyocardial biopsy for a definitive diagnosis. Unfortunately, before this could be completed she succumbed to sudden death likely related to cardiac arrhythmia about 7 months post-transplant.

Conclusions: This case demonstrates the need for high suspicion of cardiac amyloidosis in appropriate cases. The early and accurate diagnosis of ATTR cardiac amyloidosis is paramount given advances in noninvasive diagnostic modalities and treatment options.



CITATION INFORMATION: Hoffman W., Waybill M., Yang H., Ladie D., Singh M. An Unexpected Case of Transthyretin Amyloid Cardiomyopathy (ATTR-CM) Overlooked Pretransplant, but Then Diagnosed Early After Kidney Transplant with a Negative Patient Outcome: A Case Report *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Hoffman: None. **M. Waybill:** None. **H. Yang:** None. **D. Ladie:** None. **M. Singh:** None.

Abstract# 900

Changes in Body Mass Index Before and After Kidney Transplant

M. Laub[1], S. Finder[2], P. Harikrishnan[1], M. Simon[3], I. Gani[1], M. Saeed[1], R. Kapoor[1], *[1]Augusta University Medical Center, Augusta, GA, [2]Vanderbilt University Medical Center, Nashville, TN, [3]Brandon Wilde, Augusta, GA*

Purpose: Describe changes in body mass index (BMI) before and after kidney transplant and determine the association between BMI and graft loss or mortality.

Methods: Single center, retrospective study of adult patients undergoing kidney transplant from June 2012-June 2016. Patients were excluded if they received a repeat or multi-organ transplant, experienced death or graft loss prior to three months post-transplant, were lost to follow up, became pregnant, or underwent a weight-loss surgery. BMI at time of listing, time of transplant and post-transplant at 3 months, 1 year, 2 years, and 3 years were documented. The changes in BMI over time were analyzed using paired sample t-test. The association of BMI with graft loss and mortality were analyzed using logistic regression.

Results: A total of 202 patients met inclusion criteria; 171 patients were alive with a functioning renal graft at 3 years post-transplant. The average age at time of transplant was 54 years-old (SD 13), and the majority of subjects were African American males who received a deceased donor transplant. The average BMI at transplant listing was 29.7 kg/m^2 (SD 5.9), which significantly decreased to 29 kg/m^2 (SD 5.3) by the time of transplant (p=0.02). BMI increased post-transplant to 29.1 kg/m^2 (SD 5.3) at 3 months (p=0.69); 30.8 kg/m^2 (SD 5.6) at 1 year (p<0.01); 31.1 kg/m^2 (SD 5.6) at 2 years (p<0.01); and 31.1 kg/m^2 (SD 5.8) at 3 years (p<0.01) as compared to the time of transplant. The increase in BMI from the second year to third year after transplant was not significant. None of the baseline patient characteristics were significantly associated with extent of BMI change. The average BMI at the time of transplant for subjects who experienced graft loss (n=14) was higher than those who did not [32 kg/m^2 (SD 5.3) vs 29 kg/m^2 (SD 4.2), (p=0.02)]. The average BMI at the time of transplant for subjects who died during follow up (n=18) was similar to subjects who survived [29.6 kg/m^2 (SD 4.6) vs 29.2 kg/m^2 (SD 5.3), (p=0.76)].

Conclusions: Patients lost weight while on the wait list for kidney transplant and then gained weight post-transplant. Weight gain became significant at 1 year post-transplant and continued to increase until 2 years post-transplant, after which it plateaued. Higher BMI at transplant was associated with increased graft loss. There was no association between BMI at transplant and 3 year post-transplant mortality.

CITATION INFORMATION: Laub M., Finder S., Harikrishnan P., Simon M., Gani I., Saeed M., Kapoor R. Changes in Body Mass Index Before and After Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Laub: None. **S. Finder:** None. **P. Harikrishnan:** None. **M. Simon:** None. **I. Gani:** None. **M. Saeed:** None. **R. Kapoor:** None.

Abstract# 901

Predictors of Postoperative Atrial Fibrillation in an Urban, Obese Adult Renal Transplant Population

A. Lichvar, Z. Ress, M. Tabriz, H. Jenkins, T. Walsh, I. Tzvetanov, E. Benedetti, M. Campara, *University of Illinois at Chicago, Chicago, IL*

Purpose: Postoperative atrial fibrillation (POAF) is a common surgical complication. Renal transplant (RT) recipients possess risk factors that may lead to a higher incidence of POAF. Past evaluations did not include obese RT recipients. The purpose of this analysis is to identify factors associated with the development of POAF after RT in a diverse population.

Methods: Adult RT recipients between 1/1/2013 - 12/31/2017 at the University of Illinois Hospital were analyzed. POAF was identified by electrocardiogram. Furosemide dosing and net fluid balance were collected within the first 3 postoperative days (POD). Delayed graft function was defined as requiring dialysis within the first 7 days post-RT. The primary outcome was to describe the incidence of POAF. Demographics, pre-transplant cardiac history, and clinical course were compared between those with and without POAF. Univariate and multivariate logistic regression models were built to identify risk factors for POAF. Area under the receiver operating characteristic curve (ROC AUC) was reported in the final model.

Results: A total of 430 RT recipients were included in the analysis. The incidence of POAF was 9.3%. Demographics and cardiac history are detailed in Table 1. Those with POAF received more furosemide (p<0.001) without difference in net fluid balance (p=0.164), experienced more DGF (p<0.001), and had longer transplant admission LOS (<0.001). Clinical course outcomes are demonstrated in Table 2. Increasing age (OR 1.53, p=0.03), increasing body mass index (BMI) (OR 2.69, p<0.001), history of prior pre-RT atrial arrhythmias (OR 7.09, p=0.002), increasing IV calcium supplementation requirements (OR 1.12, p=0.005), and increasing cumulative furosemide dosing (OR 1.37, p=0.012) were associated with increased risk of POAF (Table 3). ROC AUC was 86.4% (Figure 1).

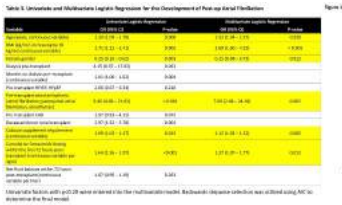
Conclusions: Judicious fluid management is required in RT recipients who are older in age, obese, and have a pre-RT history of atrial arrhythmias. Appropriate replacement of calcium and utilization of furosemide in tandem with fluid management should also be pursued. Protocols guiding fluid management in a high POAF risk population should be developed and evaluated.

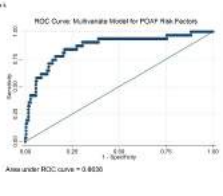
Table 1. Demographic Information and Pre-Transplant Cardiac History

Variable	No POAF (n=390)	POAF (n = 40)	P-value
Age at transplant, years (SD)	48.4 (14.7)	54.9 (12.5)	0.007
Male gender, n (%)	230 (58.9)	34 (85.0)	0.001
Black race, n (%)	165 (42.3)	26 (65.0)	0.058
Dialysis pre-transplant, n (%)	320 (82.1)	38 (95.0)	0.037
Time on dialysis, months (IQR)	36 (12 – 84)	76 (32 – 106)	0.001
Body mass index > 35 kg/m2, n (%)	129 (33.1)	16 (40.0)	0.378
Pre-transplant DM, n (%)	162 (41.7)	17 (42.5)	0.917
Deceased donor RT, n (%)	131 (33.6)	24 (60.0)	0.001
En bloc or two-for-one RT, n (%)	7 (1.3)	1 (4.2)	1.00
DCD RT, n (%)	15 (11.4)	3 (12.5)	1.00
EDPI, average % (SD)	47 (27 – 67)	40 (28 – 52)	0.171
Pre-Transplant Cardiac History, n (%)			
Heart failure (HFrEF and HFpEF)	20 (5.1)	4 (10.0)	0.201
Atrial fibrillation	13 (3.3)	8 (20.0)	**< 0.001**
Paroxysmal atrial fibrillation	4 (1.0)	3 (7.5)	**0.020**
Atrial flutter	3 (0.3)	2 (5.0)	**0.024**
Non-atrial arrhythmias	1 (0.3)	0 (0)	1.00
CAD	63 (16.2)	11 (27.5)	0.070
CABG	15 (3.9)	4 (10.0)	0.071
NSTEMI	8 (2.1)	0 (0)	0.361
STEMI	1 (0.3)	0 (0)	1.00
Pre-transplant anticoagulation, n (%)	22 (5.9)	8 (20.0)	0.001
Pre-Transplant antiarrhythmic, n (%)	241 (61.7)	32 (80.0)	0.033
Pre-Transplant antiarrhythmic, n (%) (multiple selections available)			
Beta blocker	237 (60.8)	31 (77.5)	0.038
Diltiazem/ Verapamil	3 (0.8)	1 (2.5)	0.324
Flecainide	1 (0.3)	0 (0)	1.00
Propafenone	0 (0)	1 (2.5)	0.093
Amiodarone	3 (0.8)	0 (0)	1.00
Other	7 (1.8)	1 (2.5)	0.545

Table 2. Clinical Outcomes

Variable	No POAF (n=390)	POAF (n = 40)	P-value
Placement on furosemide infusion, n (%)	265 (67.9)	38 (95.0)	**< 0.001**
Duration of furosemide infusion, days (IQR)	2 (1 – 3)	4 (3 – 7)	**< 0.001**
Cumulative furosemide dose within the first 72 hours post-op, mg (IQR)	480 (180 – 1965)	2716 (950.7 – 3982.2)	**< 0.001**
Serum creatinine, mg/dL (IQR)			
POD3	1.79 (1.17 – 3.55)	5.09 (2.38 – 7.24)	**<0.001**
POD7	1.53 (1.11 – 2.23)	3.07 (1.59 – 4.96)	**< 0.001**
Net fluid balance, mL (IQR)	5537 (2732 – 7952)	7011 (3844 – 8693)	0.164
Delayed graft function (dialysis before POD7)	33 (8.5)	9 (22.5)	**<0.001**
Magnesium replacement, n (%)	352 (90.3)	34 (85.0)	0.278
Median magnesium replacement, gram (IQR)	7 (4 – 10)	8.5 (4.3 – 12)	0.184
Potassium replacement, n (%)	235 (60.3)	28 (70.0)	0.307
Median potassium replacement, mEq (IQR)	80 (40 – 120)	80 (50 – 120)	0.466
Calcium replacement, n (%)	251 (64.4)	31 (77.5)	0.119
Median calcium replacement, gram (IQR)	2.3 (2 – 4.5)	4 (1.5 7)	0.143
Anticoagulation initiated for postoperative atrial fibrillation, n (%)	0 (0.0)	15 (37.5)	**< 0.001**
Transplant admission LOS, days (IQR)	5 (4 – 7)	8 (6 – 16)	**< 0.001**
Discharged on diuretic, n (%)	96 (24.9)	17 (43.6)	**0.012**





CITATION INFORMATION: Lichvar A., Ress Z., Tabriz M., Jenkins H., Walsh T., Tzvetanov I., Benedetti E., Campara M. Predictors of Postoperative Atrial Fibrillation in an Urban, Obese Adult Renal Transplant Population *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Lichvar: None. **Z. Ress:** None. **M. Tabriz:** None. **H. Jenkins:** None. **T. Walsh:** None. **I. Tzvetanov:** None. **E. Benedetti:** None. **M. Campara:** None.

Abstract# 902

The Seattle Heart Failure Model is a Predictor of Mortality After Kidney Transplant in Patients with End Stage Renal Disease and Heart Impairment

A. Perez-Gutierrez[1], P. J. Bachul[2], D. N. Danz[3], B. Juengel[2], M. Josephson[2], J. Fung[2], P. Witkowski[2], B. Chung[4], Y. Becker[2], *[1]Surgery, University of Chicago, Chicago, IL, IL, [2]Surgery, University of Chicago, Chicago, IL, [3]Economics, University of Pittsburgh, Pittsburgh, IL, [4]Cardiology, University of Chicago, Chicago, IL*

Purpose: Cardiovascular disease is the main cause of mortality after kidney transplantation. Many patients with ESRD have heart failure that is attributed to fluid overload. The Seattle heart failure model (Seattle Model) is a risk model based on clinical status, therapy and laboratory parameters. It includes the following variables: age, gender, NYHA class, ejection fraction (EF), ischemic disease, systolic BP, use of angiotensin-converting enzyme inhibitor, angiotensin receptor blocker, statin, betablocker, diuretics, allopurinol, sodium, hemoglobin, lymphocytes, uric acid, and cholesterol. It predicts survival in patients with heart failure. Our objective was to apply this model to patients with ESRD at the time of their evaluation for kidney transplant and to determine whether the model predicts mortality after transplant.

Methods: This is a retrospective study of all adult, deceased donor kidney transplants from 2014 to 2017. We used univariate and multivariate logistic regression models ($p < 0.05$).

Results: A total of 154 kidney transplant patients were reviewed. The table shows the patient characteristics and outcomes. The overall mortality was 9.7%. The one-year survival from the Seattle Model predicted all-cause mortality after transplant in patients with an EF ≤50% or the presence of ventricular hypertrophy (p=0.045, OR 0.70), this after controlling for age and gender. All input factors of the model where evaluated individually in univariate analysis and none of the factors alone was a significant predictor of mortality.

Conclusions: The Seattle Model is a useful tool to predict mortality in patients with heart failure and it does not take into account kidney function. We show for the first time that this model can be used in patients with ESRD and cardiac impairment and can help to better select patients for transplant. It can also identify those patients that need cardiac rehabilitation or treatment optimization to reduce risk of death after transplant.

Patients characteristics and outcomes	
Age	52 (20 - 79)
Male	63.6%
African American	72.7%
BMI (median)	27.5 (18.2 - 46.1)
HTN	35.7%
DM2	26%

Patients characteristics and outcomes (cont)	
Years on dialysis	6.7 (0.7 - 17.5)
Smoking	44.2%
Ischemic disease	15.6%
Delayed graft function	45.6%
Rejection	14.9%
Death	9.7%

CITATION INFORMATION: Perez-Gutierrez A., Bachul P., Danz D., Juengel B., Josephson M., Fung J., Witkowski P., Chung B., Becker Y. The Seattle Heart Failure Model is a Predictor of Mortality After Kidney Transplant in Patients with End Stage Renal Disease and Heart Impairment *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Perez-Gutierrez: None. **P.J. Bachul:** None. **D.N. Danz:** None. **B. Juengel:** None. **M. Josephson:** None. **J. Fung:** None. **P. Witkowski:** None. **B. Chung:** None. **Y. Becker:** None.

Abstract# 903

Effect of Insulin versus Oral Agents on Early Glycemic Control Following Kidney Transplant

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Purpose: Insulin therapy is commonly prescribed to treat hyperglycemia early post-kidney transplant (KTx) due to its widespread availability and ease of titration. Alternatively, there is limited evidence analyzing the comparative effectiveness of oral therapies on glycemic outcomes following KTx.

Methods: This was a single-center, retrospective cohort study of adult KTx recipients with new or worsening hyperglycemia requiring treatment between 01/2014-05/2020. Patients were excluded if they had received a prior or combined organ transplant, had a history of type 1 diabetes or HIV, were converted to belatacept, or were on intensive insulin prior to transplant. Patients discharged on oral medications were matched in a 1:1 ratio to patients receiving intensive insulin based on pre-transplant diabetes regimen, baseline hemoglobin A1c (HbA1c), duration of diabetes, and steroid maintenance. The primary endpoint was the number of hyperglycemia-related readmissions within 6 months of KTx. Key secondary endpoints included HbA1c at 6 months post-transplant, serum glucose levels and documented hypoglycemia within 1 month of KTx, and treated urinary or bloodstream infections.

Results: 30 patients prescribed intensive insulin were matched to 30 patients receiving oral therapies based on clinical parameters. Four patients in each group were discharged on chronic steroid therapy, while others received dual tacrolimus and mycophenolate. Baseline characteristics were similar between groups, with the exception of more Caucasians in the insulin group (53.5% vs 26.7%; p=0.04). There were no differences between groups in the incidence of the primary endpoint (3.3% vs 6.7%; p=0.55) or all-cause readmissions within 30 days (26.7% vs 26.7%; p=1.00); however, 9 patients in the oral group required the use of emergency sliding scale insulin and 7 (23.3%) subsequently were converted to standing insulin. HbA1c at 6 months was similar between groups (7.0 vs 7.3; p=0.49), and no differences were observed in serum glucose levels during follow-up (179.9 vs 179.8; p=0.99). There were also no significant differences in the incidence of laboratory reported hypoglycemia or weight change at 6 months. More insulin patients were treated for urinary or bloodstream infections, however this did not reach statistical significance (23.3% vs 13.3%; p=0.32).

Conclusions: This study suggests that the early use of oral antiglycemics post-KTx in selected patients results in similar outcomes relative to insulin therapy. Rigorous follow-up of blood glucose levels is still required, as up to 25% of patients may require conversion to intensive insulin within the first month. Practitioners should consider concomitant comorbidities, lifestyle preferences, and patient goals of care when selecting patients for oral therapies.

CITATION INFORMATION: Petrosan A., Santeusanio A., Khaim R., Delaney V. Effect of Insulin versus Oral Agents on Early Glycemic Control Following Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Petrosan: None. **A. Santeusanio:** None. **R. Khaim:** None. **V. Delaney:** None.

Abstract# 904

Kidney Transplantation in Patients with Severe Pulmonary Hypertension: Not an Absolute Contraindication?

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Purpose: Severe pulmonary arterial hypertension (PAH) as defined by a pulmonary artery systolic pressure (PASP) >50mmHg is associated with high peri-operative mortality and thus is usually considered a contraindication to kidney transplantation. In this preliminary study, we describe the pre-kidney transplant management and post-transplant outcomes in patients with severe PAH using a multidisciplinary care team approach.

Methods: Between November 2013 and August 2020 we identified all patients with severe PAH on initial pre-transplant workup who underwent ultrafiltration (UF) and/or medical therapy for PAH prior to kidney transplant. After transplant we evaluated their peri-operative course, renal function, graft and patient survival.

Results: Fourteen patients (mean age=56±12years, AA race: 8/14; 57%) were diagnosed with severe PAH on pre transplant screening echocardiogram. These findings were confirmed by right heart catheterization (RHC) (mean PASP 63.4±15mmHg). These patients were also noted to have an elevated pulmonary capillary wedge pressure (mean PCWP 23.4±6.4mmHg) and right atrial pressure (mean RA 12.1±3.6mmHg). Based upon a diagnosis of mixed PAH with a post-capillary component, patients were subjected to aggressive mechanical ultrafiltration (UF; mean 4.6±1.6 sessions) with an average weight loss of 5.5±2.1kg at the end of the UF sessions. Twelve (out of 14; 86%) patients underwent repeat RHC and were noted to have a marked decline in PASP from an average of 65±16 to 33±12 mmHg, in PCWP from 23.5±7 to 7.4±3.4 mmHg and in RA pressure from 12.1±3.6 to 3.17±2.0 mmHg. Four (29%) patients were on vasodilator (phosphodiesterase type 5; PDE5 inhibitor therapy) prior to UF and remained on those after UF and through transplant. Majority of these patients received a deceased donor kidney transplant (12/14; 86%). Two (14%) of the patients had a planned one-day ICU stay after surgery, six (42%) had a 30-day readmission and nine (64%) of the patients had delayed graft function. The mean eGFR at 3, 6, 9 and 12 months was 70.69±27, 70.23±27, 74.92±30 and 73.09±32 ml/min/1.73m^2. At a mean follow-up of 28±21 months post-transplant both graft and patient survival are 100%.

Conclusions: In this small single center study, we report that severe PAH should not be considered an absolute contra-indication to kidney transplantation. A better elucidation of the etiology of PAH with a RHC should be considered. Post-capillary PAH can be a significant and common contributor to elevations in PASP and mean PAP especially in the dialysis population. Using a multidisciplinary approach, PAH could be improved with optimal volume removal and PDE5 inhibitor therapy leading to a complication free peri-operative period and a successful post-transplant outcome.

CITATION INFORMATION: Prajapati B., Gumber D., Moinuddin I., Bhati C., Gupta G., Grinnan D., Kumar D. Kidney Transplantation in Patients with Severe Pulmonary Hypertension: Not an Absolute Contraindication? *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Prajapati: None. **D. Gumber:** None. **I. Moinuddin:** None. **C. Bhati:** None. **G. Gupta:** None. **D. Grinnan:** None. **D. Kumar:** None.

Abstract# 905

Screening, Management and Acceptance of Patients with Aortoiliac Vascular Disease for Kidney Transplantation: An International Survey Among Transplant Surgeons

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Purpose: Aortoiliac vascular disease (AVD) is frequently observed during the work-up for kidney transplantation, but recommendations on its screening and management are lacking. We aimed to assess differences in screening, management and acceptance of these patients for transplantation by performing an international survey among transplant surgeons. Secondly, we aimed to identify center- and surgeon-related factors associated with either declining or accepting kidney transplant candidates with AVD.

Methods: A survey was sent to transplant surgeons worldwide. The survey contained general questions and 2 patient-based cases with Trans-Atlantic Inter-Society Consensus (TASC) D and B AVD supported with videos of their CT-scans.

Results: 191 (20.3%) potential participants responded; 171 were currently involved in kidney transplantation; 145 (84.8%) completed the survey. Screening for AVD was mostly (37.2%) restricted to high-risk patients. Pre-transplantation vascular interventions were infrequently performed (71.7% mentioned <10 per year). If needed, 67.5% would perform an open vascular intervention before transplantation and 32.5% simultaneously. The likelihood to decline a patient for transplantation was higher in the TASC D case compared to TASC B (26.9% and 9.7%). Respondents from centers with expertise in pretransplant vascular interventions were more likely to accept both patients with TASC D and B for transplantation.

Conclusions: Heterogeneity exists concerning management of transplant candidates with AVD. A multidisciplinary meeting where technical feasibility and comorbidity are discussed could aid in providing equal access to transplantation. Referral to centers with experience in pretransplant vascular procedures may increase the chance of acceptance of patients with AVD for transplantation.

CITATION INFORMATION: Rijkse E., Kimenai H., Dor F., IJzermans J., Minnee R. Screening, Management and Acceptance of Patients with Aortoiliac Vascular Disease for Kidney Transplantation: An International Survey Among Transplant Surgeons *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Rijkse: None. **H.J. Kimenai:** None. **F.J. Dor:** None. **J.N. IJzermans:** None. **R.C. Minnee:** None.

Abstract# 906

Renal Transplant is Safe in Septuagenarians

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Purpose: With increasing life expectancy, there has been increase in transplant rates amongst elderly recipients who often have more comorbidities than younger recipient. The aim of the study was to evaluate the outcomes of septuagenarian kidney transplant (KT) recipients.

Methods: Single-center, retrospective cohort study was conducted to evaluate outcomes of recipients more than 70 years old who underwent KT with respect to 1-3-5 year graft and patient survival and peri-operative outcomes like length of stay and delay graft function. For assessment of the results which can be meaningful, we compared it to recipients between age 65 and 69 who underwent KT. We divided the groups in cohort 1 65-69 years old, and cohort 2 70-79 years old. EHR charts were reviewed for hospital stay, need for ICU management, delay graft function and primary non function. We adjusted for patient comorbidities common in this patient population, which include, hypertension, diabetes mellitus, coronary artery disease, cerebral vascular disease, peripheral vascular disease, and chronic obstructive pulmonary disease. T-test was used for comparisons of parametric continuous variables and Mann-Whitney U test was utilized for nonparametric continuous variables.

Results: From April 2014 to July 2019 55 kidney transplants were performed in cohort 1and 28 in cohort 2. Cohort 1 54% were male, 42% White, 47% Black, 11% other; 27% received living donor (LD), 23% donation after cardiac death (DCD) and 49% brain death donor (BDD). In cohort 2 40% were male, 53% were white, 43% were black and 4% other. 32% received LD, 10% DCD, 58% BDD. One-, three- and five-year graft and patient survival were 94%, 91% and 91%in cohort 1 and 100% in cohort 2 (p=NS). Mean length of stay (LOS) was 8 days for both cohorts with a median of 6 days. Readmission in first 30 days was 18.2% and 33.3% respectively, delay graft function (DGF) was 18.2% and 22.2% respectively.

Conclusions: We did not find significant differences between the 65-69 year old and the 70-79 year old after adjusting for comorbidities. We found that more women and white patients were in the cohort 2. Kidney transplant is a safe and adequate procedure in septuagenarian recipients.

CITATION INFORMATION: Serrano Rodriguez P., Vonderau J., Szempruch K., Desai C. Renal Transplant is Safe in Septuagenarians *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Serrano Rodriguez: None. **J. Vonderau:** None. **K. Szempruch:** None. **C.S. Desai:** None.

Abstract# 907

Early Hypertransaminasemia in Kidney Transplant Recipient: Influence of Donor Type and Clinical Significance

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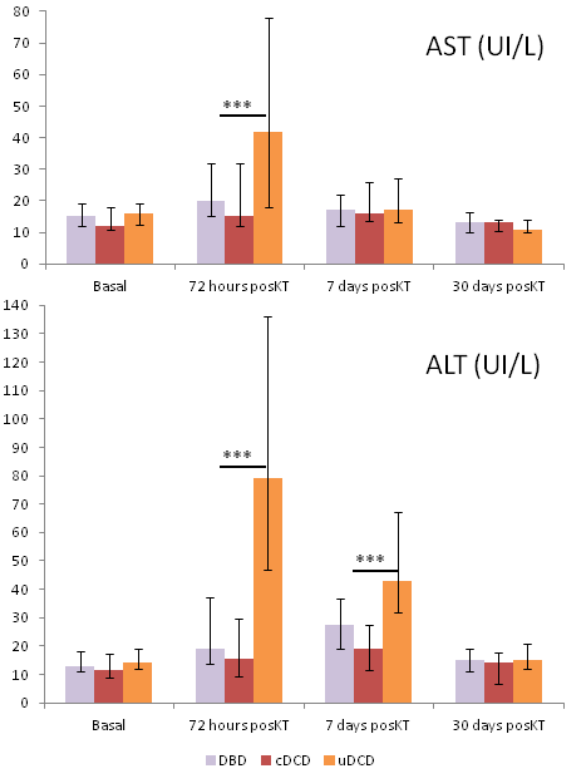
Purpose: The increase in transaminases after kidney transplant (KT) is frequent. Although the cause is unknown, it has been associated with factors such as immunosuppression, infections and cross-talk between liver and kidney in ischemia-reperfusion situations. However, the influence of the type of donor has not been evaluated. We analyze the incidence, relevance and meaning of post-KT hypertransaminasemia.

Methods: Retrospective study (2004-2018) to analyze the increase in serum AST/ALT during the first 3 months after KT in 119 consecutive KT recipients of deceased donors either brain death (DBD), controlled after cardiac death (cDCD) or uncontrolled after cardiac death (uDCD). All donors received induction with thymoglobulin and maintenance with tacrolimus and mycophenolate.

Results: Comparing the donor groups, in the uDCD group (n=39) donors and recipients were younger, there were more first transplants and prolonged delayed graft function, although creatinine was similar at 3 months. There were no differences in liver disease history, cold ischemia time, or post-KT hypotension. There were no differences in thymoglobulin induction dose, and uDCD recipients presented lower levels of tacrolimus at one week post-KT. At 72 hours post-KT, 69.2/82.1% of uDCD recipients presented elevation of AST/ALT over the normal values (vs 22/29.3% DBD and 21.1/21.1% cDCD, p<0.001) and 30.8/56.4% presented an elevation of AST/ALT twice over the normal values (vs 6.8/12.1% DBD and 5/5% cDCD, p=0.024/<0.001). This elevation was resolved early, one moth after KT AST/ALT values in all groups were below normal limits (Figure). In the multivariate analysis, donor type was associated with hypertransaminasemia at 72 hours post-KT and, in the uDCD group, hypertransaminasemia was not associated with a prolonged delayed graft function (creatinine decrease> 15 days post-KT).

Conclusions: Post-transplant hypertransaminasemia is frequent and is associated with the type of kidney donor. This finding is temporary and is not related to a prolonged delayed graft function.



CITATION INFORMATION: Solà-Porta E., Redondo-Pachón M., Núñez-Delgado S., Arias-Cabrales C., Mir M., Buxeda A., Burballa C., Crespo M., Pascual J., Pérez-Sáez M. Early Hypertransaminasemia in Kidney Transplant Recipient: Influence of Donor Type and Clinical Significance *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Solà-Porta: None. **M. Redondo-Pachón:** None. **S. Núñez-Delgado:** None. **C. Arias-Cabrales:** None. **M. Mir:** None. **A. Buxeda:** None. **C. Burballa:** None. **M. Crespo:** None. **J. Pascual:** None. **M. Pérez-Sáez:** None.

Abstract# 908

Sodium Zirconium Cyclosilicate Use in Kidney Transplant Recipients

K. J. Swanson, F. Aziz, S. Parajuli, M. Mohamed, D. A. Mandelbrot, A. Djamali, N. Garg, *University of Wisconsin-Madison, Madison, WI*

Purpose: Hyperkalemia is a common problem experienced by kidney transplant recipients (KTR)s. New strategies to treat hyperkalemia are now available. KTRs often require medications that raise serum potassium (K). Sodium zirconium cyclosilicate (ZS-9) lowers serum K levels via exchanging sodium and hydrogen for potassium in the gastrointestinal tract. Its safety and efficacy in KTRs is unknown.
Methods: This was a single-center retrospective analysis of KTRs with hyperkalemia (serum K >5.1mEq) treated with sodium zirconium cyclosilicate from 12/2019 - 10/2020. Treatment was determined by electronic medical record review of the medication administration record and/or documented use. Primary outcomes were need for renal replacement therapy and change in serum K at ~ 48 hours (mmol/L). Secondary outcomes included use of potassium raising medications, mean change in tacrolimus level (ng/dL), significant hypokalemia (serum K <3.0mmol/L), major gastrointestinal adverse outcomes (bleed, perforation, ischemic colitis, post-operative ileus) and hypersensitivity reactions.
Results: 27 KTRs with hyperkalemia were treated with ZS-9 from 12/2019 - 10/2020. Mean age at transplant was 52 years. Median time to use since transplant was 0.75 years. Most patients were white (17, 63%) men (23, 85%). Diabetes mellitus (11, 41%) and glomerulonephritis (10, 37%) were the leading causes of end stage kidney disease. 5 (19%) patients were living donor recipients. Basiliximab (18, 67%) was the primary induction agent used. Most patients (22, 81%) were on standard triple maintenance immunosuppression. Mean baseline serum creatinine was 3.71 ± 2.84 mg/dL. 16 (59%) of the patients were inpatient. 6 (23%) had delayed graft function. 5 (19%) had slow graft function. Mean total ZS-9 used was 30 gm; mean doses utilized was 3. 9 patients were treated with ZS-9 within 30 days of transplant. The remaining 18 received ZS-9 thereafter. Primary outcomes wise, 6 patients (22%) required hemodialysis. 3 (50%) underwent hemodialysis for hyperkalemia. The mean decrease in K at ~48 hours was 0.8 ± 0.5 mmol/L. In steady state patients (n = 5), tacrolimus levels remained stable with the mean change of 1.3 ± 0.7 ng/mL. Patients were also able to remain on potassium raising medications e.g. prophylactic (n=4) and treatment (n =1 for *Pneumocystis* pneumonia, 1 for *Nocardiosis*) dosed trimethoprim-sulfamethoxazole, angiotensin-converting enzyme inhibitors/angiotensin receptor blockers/mineralocorticoid receptor antagonists (n=4), treatment dosed heparin (n=2), and azoles (n=2). Safety wise, no major adverse outcomes were observed. Edema is a concern but could not be assessed precisely due to multiple, dynamic factors driving fluid status in this population.
Conclusions: Sodium zirconium cyclosilicate appears to be an effective, safe medication in KTRs. More studies are needed to characterize its use in the kidney transplant population.
CITATION INFORMATION: Swanson K., Aziz F., Parajuli S., Mohamed M., Mandelbrot D., Djamali A., Garg N. Sodium Zirconium Cyclosilicate Use in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.J. Swanson: None. **F. Aziz:** None. **S. Parajuli:** None. **M. Mohamed:** None. **D.A. Mandelbrot:** None. **A. Djamali:** None. **N. Garg:** None.

Abstract# 909

Dietary Intake of Calories and Protein in the Acute Phase Following Kidney Transplant: Opportunities for Improvement

L. Teigen[1], G. Onyeaghala[1], Y. Doronin[2], B. Guo[1], B. Wu[1], J. Abrahante[1], D. Schladt[1], W. Guan[1], C. Staley[1], M. Al-Kofahi[1], S. Riad[1], A. Matas[1], R. Remmel[1], W. Oetting[1], C. Dorr[1], P. Jacobson[1], A. Israni[1], *[1]University of Minnesota, Minneapolis, MN, [2]Hennepin Healthcare Research Institute, Minneapolis, MN*

Purpose: Nutritional therapy post kidney transplant includes both an acute (1-1.5 months post-transplant) and a chronic phase. To date, most of the available literature has focused on the metabolic derangements (e.g. obesity, diabetes) associated with the chronic phase. Adequate nutrition during the acute phase, however, is essential to support an increased metabolic demand following surgery and to begin correction of altered body composition (e.g. sarcopenia) associated with end stage renal disease, which is important for long-term metabolic health. Currently, recommendations support calorie intakes of up to 35 kcal/kg/d and protein intakes of up to 1.5 g/kg/d, but little is known about dietary intake during the acute post transplantation phase.
Methods: In the Microbiome and Immunosuppression in Kidney Transplantation (MISSION) study, we collected baseline 48 hours food recalls up to 20 days after kidney transplantation for 7 participants, using the Nutrition Data System for Research (NDSR). Descriptive tables and figures were generated using SAS version 9.4.
Results: Demographic characteristics, calorie, and protein intake of the study cohort are presented in **Table 1**. Calorie and protein intake collected during the 3 weeks post-transplant correlated positively (r=0.84). Calorie intake ranged from 20 kcal/kg/d to 34 kcal/kg/d and protein intake ranged from 0.7 g/kg/d to 1.5 g/kg/d. Only 1/7 (14%) kidney transplant recipients achieved a calorie intake of ~35 kcal/kg/d. Similarly, only 1/7 (14%) patients achieved a protein intake of 1.5 g/kg/d. Notably, 4/7 (57%) patients had protein intakes less than 1.0 g/kg/d.
Conclusions: These preliminary findings suggest an opportunity to optimize nutritional intake in the acute period following kidney transplantation. Given the negative impact of end stage renal disease on body composition, it is important to ensure adequate nutritional intake begins in the acute post-transplantation phase to help support both recovery from surgery and prevention of long-term metabolic complications.

Table 1: Demographics and Dietary Intake

Variable	
Body Mass Index (BMI; kg/m^2); Median (Min, Max)	27.3 (23.3, 27.8)
Sex (Female:Male)	3:4
Donor Type (Living:Deceased)	4:3
Calorie Intake (kcal/kg/d); Median (Min, Max)	22.4 (19.8, 34.3)
Protein Intake (g/kg/d); Median (Min, Max)	0.8 (0.7, 1.5)

CITATION INFORMATION: Teigen L., Onyeaghala G., Doronin Y., Guo B., Wu B., Abrahante J., Schladt D., Guan W., Staley C., Al-Kofahi M., Riad S., Matas A., Remmel R., Oetting W., Dorr C., Jacobson P., Israni A. Dietary Intake of Calories and Protein in the Acute Phase Following Kidney Transplant: Opportunities for Improvement *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Teigen: None. **G. Onyeaghala:** None. **Y. Doronin:** None. **B. Guo:** None. **B. Wu:** None. **J. Abrahante:** None. **D. Schladt:** None. **W. Guan:** None. **C. Staley:** None. **M. Al-Kofahi:** None. **S. Riad:** None. **A. Matas:** None. **R. Remmel:** None. **W. Oetting:** None. **C. Dorr:** None. **P. Jacobson:** None. **A. Israni:** None.

Abstract# 910

Clinical Effect of Post-transplant Av-fistula Ligation on Hemodynamic Status and Kidney Allograft Function

S. Valavoor, J. Powelson, A. Sharfuddin, O. Adebiyi, *Nephrology, Indiana University, Indianapolis, IN*

Purpose: Ligation of AVF post kidney transplant often done mostly for esthetic reasons, however, they are occasionally indicated in the presence severe steal syndrome, severe heart failure or pulmonary hypertension. Several observational studies have shown conflicting outcome with respect to the clinical implication of post kidney transplant AV-Fistula ligation on hemodynamics and allograft function. A few observational studies have shown worse outcome with increased risk for accelerated kidney allograft decline with no remarkable effect on blood pressure profile post AVF ligation. We conducted an observational study in our academic center to see the effects of AVF ligation on Hypertension and kidney function parameters at one-year post procedure.

Methods: This was an observational case series with retrospective chart review of patients who underwent AVF ligation between January 1 2015 and September 30 2019 with a minimal of one year follow up. Patient with baseline history of kidney allograft rejection, donor specific antibodies (DSA) or with rising serum creatinine leading to the AVF ligation were excluded from the study. Blood pressure profile including the number of anti-hypertensive medications in use, serum creatinine and Urine protein creatine ratio were compared at 12 months before and after procedure.

Results: Sixty-four patients were included in the study. There was no clinically significant difference in Mean Serum Creatinine and Mean Urine Protein-Creatinine ratio at 12 months before and 12 months after AVF ligation. However, there was a modest increase in the mean MAP from 93 mmhg at 12 months before AVF ligation to 99 mmhg at 12 months after procedure (Delta positive change of 6 mmhg).

Conclusions: Post-kidney transplant AV fistula Ligation appears to have no significant effect on kidney allograft function one-year post procedure though it may be associated with higher blood pressure.

CITATION INFORMATION: Valavoor S., Powelson J., Sharfuddin A., Adebiyi O. Clinical Effect of Post-transplant Av-fistula Ligation on Hemodynamic Status and Kidney Allograft Function *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Valavoor: None. **J. Powelson:** None. **A. Sharfuddin:** None. **O. Adebiyi:** None.

Abstract# 911

Risk Factors for Low Bone Density and Vertebral Fracture in Kidney Transplant Recipients: A Cross-sectional Cohort Study

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Purpose: Kidney transplantation (KT) recipients are at increased risk of low bone density (LMD) and fractures. In this retrospective study, we investigated bone mineral density (BMD), vertebral fractures, calculated risk for major osteoporotic fractures (MOF) and hip fractures in the KT recipients.

Methods: Patients completed at least one year after KT were included in the analysis. Demographic, clinical, and laboratory data were recorded. Measurements of BMD were performed by dual-energy X-ray absorptiometry. Vertebral fractures were assessed using semi-quantitative criteria with conventional radiography. The ten-year risk for MOF and hip fracture were calculated using the FRAX@ tool with BMD.

Results: One hundred fifty-three KT recipients were included in the study. The population included 77 women. The mean age at evaluation was 46,5±11,9years. Seventy-eight (50.9%) patients had normal femoral neck BMD while osteoporosis and osteopenia at the femoral neck were present in 12 (7.8%) and 63 (41.1%) of the patients, respectively. Age at evaluation was the risk factor for LMD (OR 1.057; 95% CI 1.024-1.091; p=0.001). In female KT recipients, LMD was principally affected by menopausal status whereas in males, mammalian target of rapamycin (mTOR) inhibitor use and lower BMI levels were the risk factors. The prevalent vertebral fracture was found in 43.4% of patients. In multivariate analysis, only steroid use (OR 0.121; 95% CI 0.015-0.988; p=0.049) was found to be associated with prevalent fracture. Among all KT recipients, 1.9% had a high MOF probability (≥20% risk of fracture), and 23.5% had high hip fracture probability (≥3% risk of hip fracture).

Conclusions: Exploring the prevalence of LBD and vertebral fracture and the risk factors would help clinicians to modify long-term follow-up strategies. Furthermore, the high hip fracture risk probability in our cohort suggested that there is a need for longitudinal studies to confirm the validity of the FRAX tool in the transplant population.

CITATION INFORMATION: Velioglu A., Kaya B., Aykent B., Ozkan B., Karapinar M., Arikan H., Asicioglu E., Bugdayci O., Gogas Yavuz D., Tuglular S. Risk Factors for Low Bone Density and Vertebral Fracture in Kidney Transplant Recipients: A Cross-sectional Cohort Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Velioglu: None. **B. Kaya:** None. **B. Aykent:** None. **B. Ozkan:** None. **M.S. Karapinar:** None. **H. Arikan:** None. **E. Asicioglu:** None. **O. Bugdayci:** None. **D. Gogas Yavuz:** None. **S. Tuglular:** None.

Abstract# 912

The Association of Pre-Kidney Transplant C-Peptide Level with Post Transplant Outcomes

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Purpose: Insulin is produced by pancreatic beta-cells by cleavage of a prohormone precursor into equal parts insulin and C-peptide. C-peptide has been shown to have renoprotective properties including decreasing microalbuminuria, reduced hyperfiltration injury, and regression of diabetic histologic changes on kidney biopsy when administered to type 1 diabetics. In animal models, C-peptide also protects against ischemia-reperfusion injury. How pre-transplant C-peptide levels relate to outcomes after kidney transplantation has not been previously explored.

Methods: We identified a cohort of non-diabetic adult patients who underwent kidney transplant in Halifax, Nova Scotia between January 1, 2016-December 31, 2018 who had fasting C-peptide levels measured immediately prior to transplant. The association of pre-transplant C-peptide level dichotomized around the median and i. delayed graft function (DGF), ii. proteinuria and iii. median estimated glomerular filtration rate (eGFR) at one year was determined and statistical differences were identified using Fischer's exact or Wilcoxon rank-sum methods where appropriate. C-peptide level was also examined as a continuous variable and categorized into quartiles. We used multivariable linear regression to determine the association of pre-transplant C-peptide level with eGFR at one year post-transplant.

Results: Mean and median pre-transplant C-peptide levels were 3458 and 3118 pmol/L, respectively. As such, in an initial analysis, pre-transplant C-peptide level was dichotomized at 3000 pmol/L. The incidence of DGF was higher 8/31 (25.8%) amongst those with low C-peptide levels, compared with 6/33 (18.2%) for those with levels ≥ 3000. The eGFR was lower at 1 year in those with a C-peptide < 3000 compared with ≥ 3000 (49.8 ± 4.1 versus 60.0 ± 4.2, p-value 0.0877). When C-peptide was instead categorized based on quartile, eGFR again increased steadily from the lowest to highest quartile, Table 1, likewise, the percentage with proteinuria at 1 year also increased. When C-peptide was treated as a continuous variable, the association between C-peptide and eGFR at one year post transplant was significant (coefficient = 0.0043, 95% CI 0.00038-0.0081, p-value 0.032).

Conclusions: A higher pre-transplant C-peptide level is associated with a lower risk of DGF, and a higher eGFR and lower proportion with proteinuria at one year after kidney transplant.

Pre-Transplant C-Peptide Level (pmol/L)	eGFR at 1 year (mL/min/1.73m²) (Q1, Q3)	DGF* (%)	Proteinuria > Trace at 1 year (%)
≤1940	46.4 (27.4, 71.4)	12 (25.5)	7 (43.8)
1940-3118	48.8 (32.0, 62.2)		5 (29.4)
3118-4616	55.0 (48.8, 86.5)		4 (26.7)
>4616	57.3 (39.7, 67.7)	2 (12.5)	4 (25.0)

*DGF dichotomized due to a low number of events.

CITATION INFORMATION: Vinson A., Tennankore K. The Association of Pre-Kidney Transplant C-Peptide Level with Post Transplant Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.J. Vinson: Consulting Fee; Name of Commercial Interest; Paladin Labs Inc. **K. Tennankore:** Consulting Fee; Name of Commercial Interest; Otsuka, Janssen, AstraZeneca. Grant/Research Support; Name of Commercial Interest; Otsuka, Astellas.

Kidney

Kidney Immunosuppression: Desensitization

Abstract# 913

Deceased Donor Transplantation Across Positive Flow Crossmatch - A Single Center Experience

M. Campara, A. Lichvar, J. Benken, S. Patel, C. Muran, D. Pierce, I. Tang, P. Di Cocco, J. Almario Alvarez, M. Spaggiari, E. Benedetti, I. Tzvetanov, *University of Illinois at Chicago, Chicago, IL*

Purpose: Transplantation across a positive flow crossmatch (+FXM) has been established as a lifesaving measure in the living donor setting. Time required for desensitization limits utility in deceased donor transplants (DDTx). We report outcomes of +FXM DDTx recipients using conventional and modified desensitization applied in the postoperative setting.

Methods: Adult +FXM DDTx recipients from 7/2018 to 6/2020 were analyzed. Crossmatch was done by local HLA lab or organ procurement organization. No patients received waitlist desensitization. Standard of care was Plasmapheresis(PP)/Thymoglobulin 2.5mg/kg (IBW) on POD0,1,3,5,7,9 and IVIG 150mg/kg (IBW) on POD2,4,6,8. A subset of patients received PP/bortezomib 1.3mg/m² on POD1,4,8,11 and Thymoglobulin 1.5mg/kg (IBW) on POD0-4. Discharge IS consisted of TAC, MPA, and prednisone.

Results: Twenty six patients received +FXM DDTx. All had negative standard XM. Majority (92.3%) received isolated kidney, were female (57.7%) and black (46.1%). **Table 1** details demographic and IS. T cell +FXM was present in 73.1% cases, and B cell +FXM in 80.8% cases. Patient outcomes are provided in Table2. Three patients

(11.5%) experienced delayed graft function. Four patients (16%) received rejection treatment (1/BPAR requiring IVIG/PP/Thymoglobulin; and 3/with steroids). At 6 months, mean eGFR was 57+/- 34.9 ml/min. Patients with longer follow up showed stable eGFR out to 24 months (Figure 1). Majority (69.2%) remained on TAC/MPA/Pred at last follow up. Seven patients (27%) required IS manipulation (4 for infection [57.2%] and 2 for leucopenia [28.6%]). Two patients died, both due to infection related complications; neither experienced rejection. Serial DSA screening was performed in 92.3% cases, with 54% showing negative Class I and 75% showing negative Class II DSA at last follow up, Table 3. Majority of patients had a decline in both Class I (72.7%) and Class II (54.5%) DSA strength index at last follow up.
Conclusions: Decreased donor transplantation across +FXM may be an option for a select group of patients but requires close monitoring and swift IS modification to ensure optimal outcomes.

Table 1: Baseline Demographics

Variable	N = 26
Age at transplant, y (SD)	52.5 (10.2)
Female, n (%)	15 (57.7)
Black race, n (%)	10 (38.5)
Transplant type, n (%)	
• Kidney	24 (92.3)
• Simultaneous kidney pancreas	2 (7.7)
Donor KDPI, % (SD)	43.1 (18.4)
HLA mismatch, median (IQR)	5 (4 – 5)
Mean PRA, median (IQR)	
• Peak Class I	93 (33.8-99.8)
• Peak Class II	86 (0-100)
• Current Class I	89 (2.2-99.4)
• Current Class II	71 (0-100)
Positive crossmatch, n (%)	
• T-cell flow XM positive	19 (73.1)
• B-cell flow XM positive	21 (80.8)
Induction IS, n (%)	
• Standard of care (Thymoglobulin/PP/IVIG)	18 (69.2)
• Bortezomib (Thymoglobulin/PP/Bortezomib)	8 (30.8)
Maintenance IS on discharge, n (%)	
• TAC/MPA/Prednisone	24 (92.3)
• Belatacept/TAC taper/MPA/Prednisone	1 (3.8)
• Died before maintenance IS established	1 (3.8)

KDPI – kidney donor profile index; XM – crossmatch; IS – immunosuppression; PP – plasmapheresis; IVIG – intravenous immune globulin; TAC – tacrolimus; MPA – mycophenolic acid

Table 2: Patient Outcomes

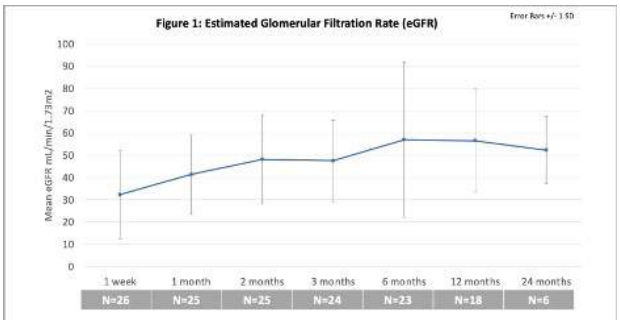
Variable	N = 26
Delayed graft function, n (%)	3 (11.5)
Acute rejection (both BPAR and empiric), n (%)	4/25 (16.0)
Empiric rejection treatment, n (%)	2/25 (7.7)
BPAR, n (%)	2/25 (7.7)
Maintenance IS at last follow up, n (%)	
• TAC/MPA/Prednisone	18 (69.2)
• TAC/Pred	3 (11.5)
• Eculizumab/TAC/Everolimus/Prednisone	1 (3.8)
• Belatacept/Prednisone	1 (3.8)
• Belatacept/TAC/Prednisone	1 (3.8)
• Belatacept/MPA/Prednisone	1 (3.8)
• Died before established	1 (3.8)
Indication for IS change, n (%)	
• Seizure on CNI	1/7 (14.3)
• BK viremia	3/7 (42.9)
• CMV viremia	1/7 (14.3)
• Leucopenia	2/7 (28.6)
Death-censored graft failure, n (%)	1 (3.8)
Patient death, n (%)	2 (7.7)
Time to patient death/Cause	Patient #1: 13 days, infection/sepsis Patient #2: 519 days, infection/sepsis

BPAR – biopsy proven acute rejection; TAC – tacrolimus; MPA – mycophenolic acid; IS – immunosuppression; CNI – calcineurin inhibitor; CMV - cytomegalovirus

Table 3: Donor Specific Antibody (DSA) Monitoring and Characteristics

Variable	N = 26
DSA checked at the time of transplant, n (%)	11 (42.3)
DSA checked post-transplant, n (%)	24 (92.3)
• Class I DSA strength index* negative at last follow up	13 (54.2)
• Class II DSA strength index* negative at last follow up	18 (75)
Class I DSA strength index* change over time n (%)	
• Unchanged	2/11 (18.2)
• Decreased	8/11 (72.7)
• Increased	0/11 (0)
• Lost to follow up	1/11 (9.1)
Class II DSA strength index* change over time, n (%)	
• Unchanged	4/11 (36.4)
• Decreased	6/11 (54.5)
• Increased	0/11 (0)
• Lost to follow up	1/11 (9.1)

*DSA strength index defined using mean fluorescence intensity as negative <700, weak 700-200, moderate 2000-5000 and strong >5000.



CITATION INFORMATION: Campara M., Lichvar A., Benken J., Patel S., Muran C., Pierce D., Tang I., Di Cocco P., Almario Alvarez J., Spaggiari M., Benedetti E., Tzvetanov I. Deceased Donor Transplantation Across Positive Flow Crossmatch - A Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Campara: None. **A. Lichvar:** None. **J. Benken:** None. **S. Patel:** None. **C. Muran:** None. **D. Pierce:** None. **I. Tang:** None. **P. Di Cocco:** None. **J. Almario Alvarez:** None. **M. Spaggiari:** None. **E. Benedetti:** None. **I. Tzvetanov:** None.

Abstract# 914

Iguratimod Reduce Panel Reactive Antibody in High Mismatched Renal Transplant Recipients: A Retrospective Propensity Score-Matched Study

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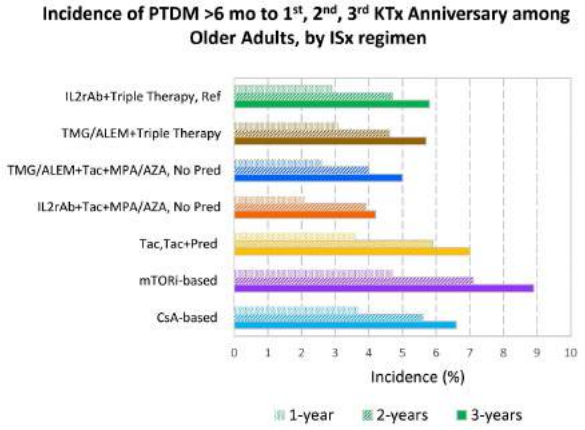
Purpose: To evaluate the clinical efficacy and safety of iguratimod (IGU) for reducing panel reactive antibody (PRA) in high mismatched renal transplant recipients.
Methods: Eligible recipients found positive PRA with or without IGU administered were enrolled. Propensity score matching (PSM) analysis was conducted to eliminate the difference between the IGU group and the No IGU group. After adjustment, MFI changes of PRA before and after drug treatment between the two groups were assessed. Adverse reactions or side effects were also reviewed.
Results: 54 recipients were included eventually after 1:1 matching analysis. 340 and 144 PRA sites were detected in the IGU group and the No IGU group, respectively. The proportion of PRA sites with decreased MFI was obviously higher in the IGU group than in the No IGU group. After IGU taken for 9 months, significantly MFI decrease was seen in anti-HLA class I, anti-HLA class II, anti-HLA class I and class II, anti-HLA A, anti-HLA B, anti-HLA Cw, anti-HLA DQ and anti-HLA DR antibody sites (P <0.05), except of anti-HLA DP antibody sites (P >0.05). Decrease of PRA in the IGU group was greater than in the No IGU group in anti-HLA class I, anti-HLA class II, anti-HLA class I and class II, anti-HLA A, anti-HLA DR antibody sites (P <0.05), except in anti-HLA Cw, anti-HLA DP and anti-HLA DQ antibody sites (P >0.05). Adverse reactions or side effects was identical between the two groups (P >0.05).
Conclusions: IGU can effectively reduce PRA in high mismatched renal transplant recipients and can be applied safely without serious adverse effects.
CITATION INFORMATION: Feng D., Wang Z., Han Z., Tao J., Ju X., Tan R., Gu M. Iguratimod Reduce Panel Reactive Antibody in High Mismatched Renal Transplant Recipients: A Retrospective Propensity Score-Matched Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Feng: None. **Z. Wang:** None. **Z. Han:** None. **J. Tao:** None. **X. Ju:** None. **R. Tan:** None. **M. Gu:** None.

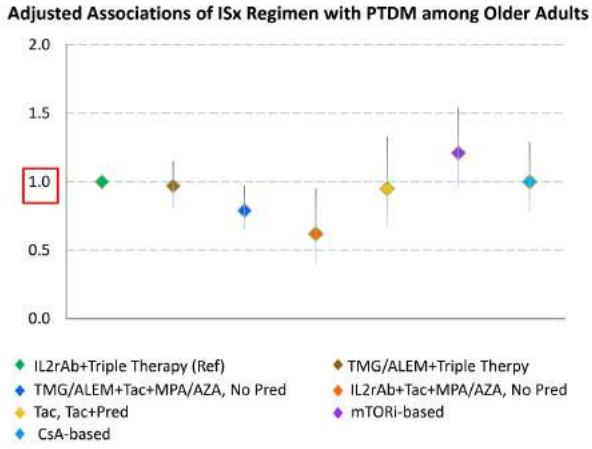
Abstract# 916

Immunosuppression Regimen and Risk of Posttransplant Diabetes Among Older Kidney Transplant Recipients

K. Lentine[1], J. Ahn[2], M. McAdams Demarco[2], H. Xiao[1], S. Bunnapradist[3], D. Segev[2], D. Axelrod[1], S. Bae[2], V. Dharnidharka[4], Y. Caliskan[1], S. Chang[4], G. Hess[5], J. Snyder[6], M. Schnitzler[1], *[1]Saint Louis Univ, Saint Louis, MO, [2]Johns Hopkins, Baltimore, MD, [3]Univ of California, Los Angeles, Los Angeles, CA, [4]Washington Univ, Saint Louis, MO, [5]Drexel Univ, Philadelphia, PA, [6]SRTR, Minneapolis, MN*

Purpose: Posttransplant diabetes mellitus (PTDM) is a common complication after kidney transplantation (KTx), which may be exacerbated by immunosuppressive therapy (ISx). Older adults tend to have lower acute rejection risk due to immunosenescence but increased risk of non-immune complications, including PTDM. We examined associations of ISx and PTDM among adults 55 years and older using national US transplant registry data.
Methods: We examined a linkage of Scientific Registry of Transplant Recipients (SRTR) and Medicare claims (2005-2016). Induction agent use was defined by registry reporting. Early maintenance ISx regimen was defined using Medicare pharmacy claims for ISx agents submitted within the first 6 months after transplant, and patients were classified into 7 regimens (**Figure**). Diabetes diagnosis was ascertained from Medicare claims. We modeled associations ($_{95\%LCL}$aHR$_{95\%UCL}$) of ISx regimen with PTDM >6 months to 3 years posttransplant, compared with a reference regimen of IL2-receptor antibody (IL2rAb) induction + triple maintenance (Tac + MPA mycophenolic acid: MMF or mycophenolate sodium)/azathioprine (AZA) + prednisone (Pred)) using Cox regression. Models were adjusted for potentially confounding differences in distributions of demographic and clinical factors using inverse probability of treatment weighting (IPTW).
Results: Among 31,740 recipients aged ≥55 without pretransplant diabetes, 61% were men, 54% were white, 24.5% Black, and 15.2% Hispanic. Overall, 5.9% developed PTDM by 3 years. The unadjusted incidence of PTDM was lower among those who received TMG/ALEM+Tac+MPA/AZA,No Pred (5.0%) and IL2rAb+Tac+MPA/AZA,No Pred (4.1%) compared with the reference regimen (5.7%) but trended higher in those who received mTORi-based (8.9%) or CsA-based regimens (6.6%). After adjusting for potential confounding using IPTW, TMG/ALEM+Tac+MPA/AZA,No Pred was associated with 21% lower risk of PTMD (aHR, $_{0.65}0.79_{0.97}$) and IL2rAb+Tac+MPA/AZA,No Pred was associated with 38% lower risk (aHR, $_{0.40}0.62_{0.95}$).





Conclusions: Steroid-free ISx is associated with lower risk of PTDM among older adult KTx recipients. Risk of non-immune complications should be considered along with rejection risk in tailoring immunosuppression choice in older adults.

CITATION INFORMATION: Lentine K., Ahn J., McAdams Demarco M., Xiao H., Bunnapradist S., Segev D., Axelrod D., Bae S., Dharnidharka V., Caliskan Y., Chang S., Hess G., Snyder J., Schnitzler M. Immunosuppression Regimen and Risk of Posttransplant Diabetes Among Older Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Lentine: Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **J. Ahn:** None. **M. McAdams Demarco:** None. **H. Xiao:** None. **S. Bunnapradist:** Consulting Fee; Name of Commercial Interest; CareDx, Natera, Sanofi. Consulting Fee; Nature of Relationship; Advisory Board. Grant/Research Support; Name of Commercial Interest; FDA, NIDDK, NIAID, NIH, Astellas, Mallinckrodt, BMS, CareDx, Natera, Merck, Vitaeris, One Legacy. Grant/Research Support; Nature of Relationship; Research Support. Honoraria; Name of Commercial Interest; Sanofi, Veloxis, Natera, CareDx. Honoraria; Nature of Relationship; Speaker. **D. Segev:** Honoraria; Name of Commercial Interest; Sanofi, Novartis, Veloxis. Honoraria; Nature of Relationship; Speaker. **D. Axelrod:** Consulting Fee; Name of Commercial Interest; CareDx, Sanofi. Consulting Fee; Nature of Relationship; Consulting, Specialist Direct. **S. Bae:** None. **V. Dharnidharka:** Consulting Fee; Name of Commercial Interest; Atara Bio. Consulting Fee; Nature of Relationship; Consulting. **Y. Caliskan:** None. **S. Chang:** None. **G. Hess:** None. **J. Snyder:** None. **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting.

Abstract# 917

Desensitization with Plasmapheresis and IV Immunoglobulin is Safe and Effective in Pra Positive Kidney Transplant Recipient Candidates in Covid-19 Pandemic Period

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Purpose: High panel reactive antibody (PRA) levels may limit living-donor kidney transplantation (LDKT) according to increased risk of antibody mediated rejection. Desensitization may provide better graft survival rates in high-risk KT recipient candidates. We aimed to share our desensitization experience in LDKT recipients in COVID-19 pandemic period (March 1 to September 2, 2020).

Methods: At Baskent University Transplantation Center, we performed desensitization protocol of plasmapheresis (5 sessions) and intravenous immunoglobulin(IVIG of 2g/kg) in three KT recipients who had high PRA levels.

Results: Three sensitized KT recipients candidates had a mean age of 25.3 years and mean fluorescence intensity (MFI) level of 13862. All the patients were receiving their second transplant and had PRA class II positivity with percentages of 77%, 56% and 66% respectively. After desensitization, all the recipients became cross-match negative and LDKT was performed successfully for all. No acute rejection episodes were detected either in the early period or in the three months period after LDKT. Patients had a mean creatinin level of 0,83 mg/dL in the 7th day and 0,88mg/dL in the 3rd month after LDKT without significant proteinuria. No complication according to COVID-19 and no sign of infection was obtained.

Conclusions: In conclusion, desensitization with 5 sessions of plasmapheresis and 2g/kg of IV immunoglobulin provide safe and effective desensitization in PRA positive LDKT recipients even in the COVID-19 pandemic period.

CITATION INFORMATION: Sayin B., Akdur A., Karakaya E., Musabak U., Colak T., Haberal M. Desensitization with Plasmapheresis and IV Immunoglobulin is Safe and Effective in Pra Positive Kidney Transplant Recipient Candidates in Covid-19 Pandemic Period *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Sayin: None. **A. Akdur:** None. **E. Karakaya:** None. **U. Musabak:** None. **T. Colak:** None. **M. Haberal:** None.

Abstract# 918

Safety and Tolerability of Tacrolimus Extended-Release (astagraf Xl) in Hla Sensitized Kidney Transplant Recipients: A Single Center Experience

A. A. Vo, N. Ammerman, E. Huang, A. Peng, R. Najjar, S. Sethi, K. Lim, M. Gillespie, S. C. Jordan, *Cedars Sinai Medical Ctr, Los Angeles, CA*

Purpose: Pill burden is a limitation in kidney transplant. Tacrolimus extended-release (Astagraf XL) is a once daily formulation approved for kidney transplantation. Increased compliance could reduce or possibly modify allosensitization in HS patients and improve outcomes. Here we report on a pilot, open label, single-arm, non-controlled design study to determine safety and tolerability of Astagraf XL in HS renal transplant patients.

Methods: All HS patients received desensitization with IVIG 2g/kg (>70kg max 140g) and rituximab 375mg/m^2 ± PLEX, induction with alemtuzumab and maintained with Astagraf XL, MMF, and pred taper post-tx. Monitoring parameters included BPAR, graft failure or death and AEs/SAEs @12M.

Results: Twenty HS patients were enrolled from 9/2017-11/2019. Table 1 showed overall outcomes. Overall, 80% of patients had previous transplant, 75% had DSA at transplant, and 55% had positive FCMX with 2 patients developed dnDSA @12M post-tx. Rejections occurred in 6 patients (30%) {active/cABMR (2); chronic active CMR/ABMR (2); early TG (1) & CMR (1)} . Four patients had BK viremia. eGFR @12M was: 71±24 ml/min/1.73m^2. Mean tacrolimus dose @Day 365 was: 5.4±1.9mg with mean level of 8.2±3.0 (goal 5-8ng/ml). Patient and graft survival @12M were 100%. AEs included: mouth ulcer (1), perinephric fluid collection (1), BKAN grade 2 with stable Scr (1). SAEs included: bacteremia (1); DKA (1); incisional abscess & AKI (1).

Conclusions: Astagraf XL in HS patients was safe and effective in this high risk, HS population with similar rejection rates (30%) and dnDSA generation (22%) compared to our previous experience with tacrolimus twice daily.

Characterisitics	Overall (N=20)
Age (Range)	30-70
Male Gender (%)	8 (40%)
Type of Tx	
LD	3 (15%)
DD	17 (85%)
# of Transplants, Mean (SD)	2.2±0.81
FCMX @ Tx, No.(%)	
Positive (T/Bpronase >70MCS & 130MCS)	11 (55%)
Negative (T/Bpronase <70MCS &<130MCS)	8 (40%)
Not available	1 (5%)
DSA @ Tx /Historical, No.(%)	15 (75%)
DSA RIS* @ Tx	5.1±4.52
DSA RIS* @ 12M	2.05±3.69
dnDSA @12M	2 (10%)
Tac Levels (ng/ml) , Mean(SD)	
Day 7 (Goal 7-9ng/ml w/in 1st 3M)	7.1±2.3
Day 14	8.5±3.9
Day 30	8.9±2.8
Day 60	7.1±1.4
Day 90	8.9±2.5
Day 365 (Goal 5-8ng/ml beyond 6M)	8.2±3.0
Tac Dose (mg), Mean(SD)	
Dose Day 7	6.5±2.2
Dose Day 14	6.4±2.2
Dose Day 30	5.4±2.0
Dose Day 60	6.5±2.0
Dose Day 90	6.3±2.4
Dose Day 365	5.4±1.9
eGFR @ 12M (ml/min/1.73m²)	71±24
Infections	
BK Viremia	4 (20%)
Rejections	6 (30%)
*DSA Relative Intensity Score (RIS): 0 point (no DSA); 2 points: <5000 MFI; 5 points: 5000-10,000 MFI; 10 points: >10,000 MFI	

CITATION INFORMATION: Vo A., Ammerman N., Huang E., Peng A., Najjar R., Sethi S., Lim K., Gillespie M., Jordan S. Safety and Tolerability of Tacrolimus Extended-Release (astagraf Xl) in Hla Sensitized Kidney Transplant Recipients: A Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: **A.A. Vo: Co**nsulting Fee; Name of Commercial Interest; CareDx. **N. Ammerman:** None. **E. Huang:** Grant/Research Support; Name of Commercial Interest; CareDx, CSL Behring, Veloxus. **A. Peng:** None. **R. Najjar:** None. **S. Sethi:** None. **K. Lim:** None. **M. Gillespie:** None. **S.C. Jordan:** Consulting Fee; Name of Commercial Interest; CareDx. Grant/Research Support; Name of Commercial Interest; Astellas, CSL Behring, CareDx.

Kidney

Kidney Immunosuppression: Induction Therapy

Abstract# 919

A Question with Multiple Answers: Do Renal Transplant Recipients Require Steroid Maintenance Following Thymoglobulin Induction?

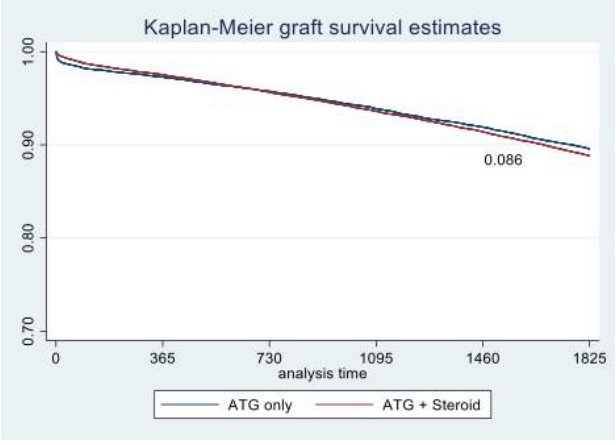
A. Aala, H. Patel, F. Cardarelli, *Beth Israel Deaconess Medical Center, Boston, MA*

Purpose: Anti-thymocyte globulin (ATG) has been used with good results in renal transplantation as induction therapy, followed by triple immunosuppression with calcineurin inhibitors, antimetabolites, and steroids. In 2004, steroids avoidance regimens started to be used by transplant centers, and since the year 2007, about 30% of kidney transplant patients in the USA have been discharged without steroid maintenance therapy. In this study, we evaluated outcomes of kidney transplant recipients who received ATG and were maintained on steroids and compared them to patients who did not receive steroid maintenance therapy after transplant using UNOS/OPTN database.

Methods: We conducted a retrospective cohort analysis of the UNOS database. We identified all kidney transplant patients who received ATG as induction therapy between January 2007 & December 2018. We divided the cohort based on whether they received steroids as part of maintenance immunosuppression or not, and compared transplant and patient outcomes. Baseline donor and recipient characteristics were compared between groups using Student t-test or Kruskal Wallis test for continuous variables and Chi-2 test for categorical variables. Kaplan Meier curve was used to measure graft survival time.

Results: A total of 89,044 patients were identified who received their first renal transplant between the year 2007 and 2018. Of them, 29,825 [33.5%] recipients received ATG and did not receive steroid maintenance therapy on discharge. Patients without steroid maintenance had significantly higher acute rejection rate compared to patients who received steroid maintenance therapy, (7.3% vs 6.4% p < .001). Similarly, graft failure rate at 1st year was significantly higher among the recipients who received steroid free maintenance immunosuppressive therapy (2.5% vs 2.2%, p=0.009). There was no significant difference in graft survival time, patient survival time and graft failure rate at 3rd (p=0.64) and 5th (p=0.086) year post transplant between the groups.

Conclusions: Compared to patients who receive ATG induction with steroid maintenance therapy, recipients who receive ATG without steroids have higher acute rejection rate and allograft failure rate at 1 year after transplant. However, there is no significant difference in graft and patient survival rate at 3rd and 5th year post transplant.



CITATION INFORMATION: Aala A., Patel H., Cardarelli F. A Question with Multiple Answers: Do Renal Transplant Recipients Require Steroid Maintenance Following Thymoglobulin Induction? *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Aala: None. **H. Patel:** None. **F. Cardarelli:** None.

Abstract# 920

A Comparative Analysis of Kidney Allograft Outcomes in Steroid Use versus Steroid Discontinuation After Basiliximab Induction: Unos Data Base Study

F. Cardarelli, H. Patel, A. Aala, *Nephrology, BIDMC, Boston, MA*

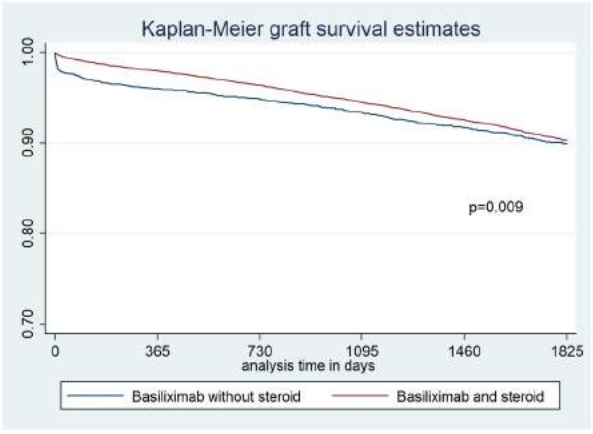
Purpose: Basiliximab is a monoclonal antibody produced by recombinant DNA technology used by many transplant centers in the U.S. as induction immunosuppression. When Basiliximab is used, most of the patients are kept on maintenance steroids vs early steroid withdrawal in some centers. With this study, we seek to evaluate rejection, graft and patient survival rates among recipients who received Basiliximab and were maintained on steroids compared to early steroid withdrawal.

Methods: We conducted a retrospective cohort analysis of the UNOS database. We identified all kidney transplant patients who received Basiliximab as induction therapy between January 2007 & December 2018. We divided the cohort based on whether they received steroids as part of maintenance immunosuppression or not, and compared risk factors of graft loss among them. Baseline donor and recipient characteristics were compared between groups using Student t-test or Kruskal Wallis test for continuous variables and Chi-2 test for categorical variables. Kaplan Meier curve and cox-regression analysis was used to measure graft and patient survival time.

Results: A total of 33,914 patients who received Basiliximab induction were identified. Of them, 29,152 [85.9%] recipient received steroids as maintenance immunosuppression and 4,762 [14.0%] underwent early steroid withdrawal. Recipients kept on maintenance steroids had significantly higher acute rejection rate at one year post transplant compared to those who did not receive steroids [9.1% vs 8.0%, p=0.01]. However, kidney allograft failure rate at 5 years was significantly lower among patients who were on steroid maintenance compared to steroid-free [6.3% vs 7.3%, p=0.009]. Of the recipients who suffered graft failure, death censored graft survival time was significantly higher among the recipients who received steroids (p=0.009). Allograft survival advantage remained statistically significant after adjustment for age>70 years, delayed graft function, KDPI>85% and female donor. Finally, patient's death rate at 5 year post transplant was significantly lower among the recipients who received steroids compared to the other group (9.1% vs 11.6%, p<0.001).

Conclusions: In spite of higher rejection rates within the first year of transplant, kidney allograft survival rate was significantly higher among recipients who received Basiliximab induction and were maintained on steroids compared to recipients who underwent early steroid withdrawal. Patient survival was also significantly higher among patients maintained on steroids compared to early steroid withdrawal.

	Multivariate HR (95% CI)	p-value
Age>=70	1.45 [1.25 – 1.70]	<0.001
Delayed graft function	1.78 [1.61 – 1.96]	<0.001
KDPI>85%	1.23 [1.06 – 1.43]	0.005
Donor gender(Female)	1.09 [1.001 – 1.19]	0.048



CITATION INFORMATION: Cardarelli F., Patel H., Aala A. A Comparative Analysis of Kidney Allograft Outcomes in Steroid Use versus Steroid Discontinuation After Basiliximab Induction: Unos Data Base Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Cardarelli: ; Allovir. **H. Patel:** None. **A. Aala:** None.

Abstract# 921

Cost Savings Initiative with Idea Body Weight Dosing of Rabbit Anti-thymocyte Globulin (rATG) Induction in an Older Kidney Transplant Population: A Single Center Analysis

C. LaFratte[1], S. Witek[1], D. Sawinski[2], J. Trofe-Clark[2], C. Sammons[2], B. Hardek[1], R. Samudralwar[1], A. Forte[1], S. Lyle[1], J. Rashid[1], G. Malat[2], *[1]Pharmacy, Hospital of Univ of Pennsylvania, Philadelphia, PA, [2]Penn Transplant Institute, Hospital of Univ of Pennsylvania, Philadelphia, PA*

Purpose: Optimal dosing schemes for rATG induction are not well defined for older kidney transplant recipients (KTRs), who are at greater risk for adverse events from

over-immunosuppression. The goals of this study are to assess potential cost-savings with ideal body weight (IBW) vs actual body weight (ABW) rATG induction dosing schemes while maintaining efficacy in older KTRs.

Methods: This retrospective single-center cohort study included 1st and 2nd KTRs age ≥ 60 years transplanted 4/2016-12/2019. Multi-organ KTRs and KTRs with HIV, HCV, or < 30 days follow-up were excluded. Standard immunosuppression included rATG, tacrolimus, mycophenolate, and prednisone taper. KTRs were grouped by total rATG given for induction: the ABW group received > 110% of an IBW-based dose, and the IBW group received ≤ 110% of an IBW-based dose. Costs were calculated by the average wholesale price (AWP) of rATG. The ABW group served as a control for safety and efficacy outcomes within 1-yr post-op. Patients were censored upon graft failure, death, or any safety outcome.

Results: An interim analysis was performed on 52 KTRs (IBW group n=15; ABW group n=37). KTRs in both groups were similar at baseline (Table 1). IBW-based dosing of rATG resulted in a median cost savings of $4,240/patient (IQR $3,150-$6,300) and a total savings potential of $171,166 within the ABW group. Safety and efficacy data were similar between groups (Table 2).

Table 1. Older KTR Demographics at Transplant

Baseline Characteristic	IBW (n=15)	ABW (n=37)	p-value
Age, median (IQR)	64 (61-66)	65 (62-68)	0.58
Sex, n (%)			
Male	10 (66.7)	19 (51.4)	0.35
Race/Ethnicity, n (%)			
Black	4 (26.7)	15 (40.5)	0.53
Non-Black	11 (73.3)	22 (59.5)	
Dialysis Pre-Transplant, n (%)	13 (86.7)	25 (67.6)	1
Kidney Donor Profile Index, median (IQR)	70 (43-79)	49 (40-70)	0.25
Deceased Donor, n (%)	11 (73.3)	26 (70.3)	1
Prior Kidney Transplant, n (%)	0 (0)	2 (5.4)	1
White Blood Cells ($x10^3$ cells/mm^3), median (IQR)	7.4 (4.8-10.1)	6.2 (4.4-8.4)	0.42
Platelets ($x10^3$ cells/mm^3), median (IQR)	161 (150.5-179.5)	160 (131-181)	0.81
Calculated Panel Reactive Antibodies, median (IQR)	0 (0-0)	0 (0-0)	0.82

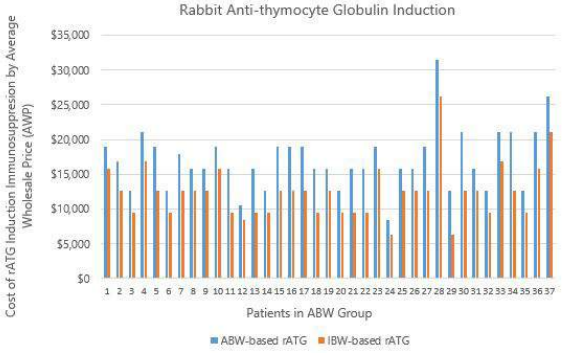
Table 2. Safety and Efficacy Outcomes in Older KTRs

Outcome (within one year of transplant)	IBW (n=15) n (%)	ABW (n=37) n (%)	p-value
Leukopenia White blood cells < $3x10^3$ cells/mm^3	6 (40)	14 (37.8)	1
Thrombocytopenia Platelets < $75x10^3$ cells/mm^3	6 (40)	18 (48.6)	0.76
Opportunistic Infections	3 (20)	7 (18.9)	1
BK Virus	1 (6.7)	3 (8.1)	1
Cytomegalovirus	1 (6.7)	3 (8.1)	1
Epstein-Barr Virus	1 (6.7)	1 (2.7)	0.50
Hospital Re-presentation	11 (73.3)	25 (67.6)	0.75
Biopsy-proven Acute Rejection	1 (6.7)	0 (0)	0.29

There were no graft failures and 1 KTR death, which was in the ABW group.

Conclusions: An interim analysis showed an opportunity for cost savings with IBW-based rATG induction dosing. There were no differences in safety or efficacy between groups. Data collection/analysis are ongoing.

Figure 1. Costs of Ideal Body Weight vs. Actual Body Weight Dosing of Rabbit Anti-thymocyte Globulin Induction



CITATION INFORMATION: LaFratte C., Witek S., Sawinski D., Trofe-Clark J., Sammons C., Hardek B., Samudralwar R., Forte A., Lyle S., Rashid J., Malat G. Cost Savings Initiative with Idea Body Weight Dosing of Rabbit Anti-thymocyte Globulin (rATG) Induction in an Older Kidney Transplant Population: A Single Center Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. LaFratte: None. **S. Witek:** None. **D. Sawinski:** Honoraria; Name of Commercial Interest; Veloxis Pharmaceuticals, CareDx, Natera. Honoraria; Nature of Relationship; Advisory Committee Member, Advisory Committee Member, Advisory Committee Member. **J. Trofe-Clark:** Consulting Fee; Name of Commercial Interest; MedActionPlan. Consulting Fee; Nature of Relationship; Consultant Agreement. Grant/Research Support; Name of Commercial Interest; Veloxis Pharmaceuticals. Grant/Research Support; Nature of Relationship; Grant funding received by institution. Honoraria; Name of Commercial Interest; Veloxis Pharmaceuticals, CareDx. Honoraria; Nature of Relationship; Speaker/Speaker's Bureau, Advisory Committee Member. **C. Sammons:** Consulting Fee; Name of Commercial Interest; Mallinckrodt Pharmaceuticals. Consulting Fee; Nature of Relationship; Speaker Bureau. **B. Hardek:** None. **R. Samudralwar:** None. **A. Forte:** None. **S. Lyle:** None. **J. Rashid:** None. **G. Malat:** None.

Abstract# 922

The Impact of Fixed-Dose Alemtuzumab in Renal Transplant Recipients According to Weight

S. Mandala[1], N. Khodieva[2], A. Bigness[1], S. Mohamed[2], H. Mohammed[1], K. Robichaux[2], A. Brueckner[3], R. Baliga[4], J. Buggs[5], A. Kumar[1], L. Bowman[3], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Pharmacy, Tampa General Hospital, Tampa, FL, [4]Nephrology, Florida Kidney Physicians, Tampa, FL, [5]Transplant Surgery, Tampa General Hospital, Tampa, FL*

Purpose: Alemtuzumab, a potent anti-CD52 monoclonal antibody is used for induction immunosuppression post-renal transplantation as a fixed 30mg dose regardless of the patient's weight. The aim of this study was to evaluate the safety and efficacy of 30mg alemtuzumab induction immunosuppression in kidney transplant recipients (KTR) based on patient weight. We hypothesized that lower weight patients would have a higher incidence of leukopenia and infection compared to higher body weight patients.

Methods: We conducted a retrospective cohort study of adult (≥18 years) KTR between January 2015 and December 2017 at a single center. Patients were divided into study groups based on their weight (≤60 kg, 61-74 kg, ≥75 kg). All patients received a 30mg fixed dose of alemtuzumab for induction immunosuppression.

Results: A total of 445 patients were included in our analysis: ≤60kg group (n=59), 61-74kg group (n=113), ≥75kg group (n=273). There was no difference in the incidence of acute rejection, graft loss, or death at 12 months between groups (figure 1). There was a trend towards higher rates of readmission due to leukopenia at 12 months in the ≤60kg group, but no difference in readmission secondary to infection (figure 2). While there was no difference in BK viremia or nephropathy, there was a trend toward a higher incidence of CMV viremia in the ≤60kg group (32.2% vs. 19.5% and 19% in the other two cohorts; p=0.07).

Conclusions: While there was a trend toward a higher incidence of hospital readmission due to leukopenia and numerically higher incidence of CMV viremia in KTR ≤60kg that received alemtuzumab 30mg for induction immunosuppression, these findings should be further evaluated in a larger cohort of low body weight adult KTRs. In addition, the safety of fixed-dose alemtuzumab 30mg should be evaluated in other weight ranges to better determine the safety and efficacy of a fixed-dose in all patients regardless of weight.

Figure 1: Rejection, death, graft loss

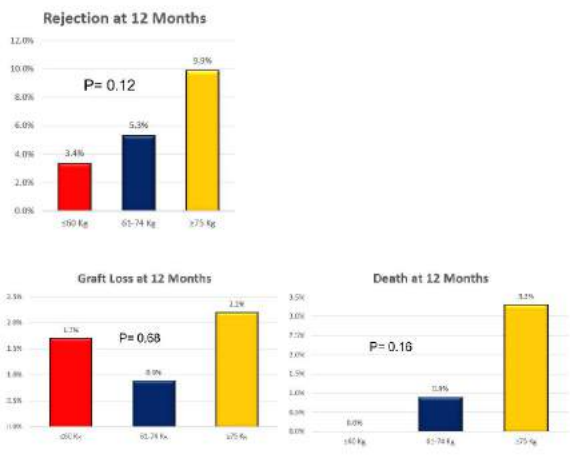
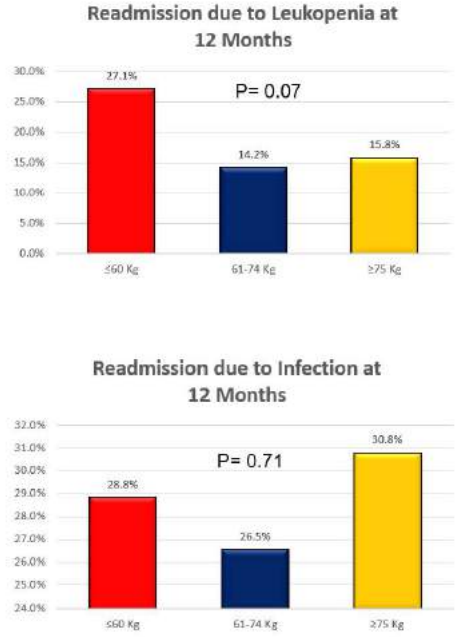


Figure 2: Readmissions due to leukopenia and infection



CITATION INFORMATION: Mandala S., Khodieva N., Bigness A., Mohamed S., Mohammed H., Robichaux K., Brueckner A., Baliga R., Buggs J., Kumar A., Bowman L. The Impact of Fixed-Dose Alemtuzumab in Renal Transplant Recipients According to Weight *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Mandala: None. **N. Khodieva:** None. **A. Bigness:** None. **S. Mohamed:** None. **H. Mohammed:** None. **K. Robichaux:** None. **A. Brueckner:** None. **R. Baliga:** None. **J. Buggs:** None. **A. Kumar:** None. **L. Bowman:** None.

Abstract# 923

Rabbit Anti-thymocyte Globulin Induction Dosing Strategies in a High-risk Kidney Transplant Population

C. Nguyen, R. Yau, C. Tunwar, *Pharmacy, CHI Baylor St. Luke's Medical Center, Houston, TX*

Purpose: The objective of this retrospective observational study is to compare the safety and efficacy of two dosing strategies, rabbit anti-thymocyte globulin (rATG) at a total cumulative dose of 4.5 mg/kg versus rATG at a total cumulative dose of 6 mg/kg, in high-risk renal transplant patients (re-transplant, panel reactive antibodies > 20%, presence of donor specific antibodies, African Americans < 60 years old, or other ethnicities < 50 years old).

Methods: A retrospective chart review was conducted in patients who received a renal transplant at CHI Baylor St. Luke's Medical Center (BSLMC) from January 2019 to September 2020. The following three-month outcomes were analyzed between the two rATG dosing groups: patient survival, graft survival, and incidence of rejection. Secondary outcomes included incidence of thrombocytopenia, leukopenia, infusion related reaction, delayed graft function, and infection.

Results: A total of 117 patients were included in this study. With regard to patient and graft survival at three months, 100% of the 4.5 mg/kg group (n=46) and 98.6% of the 6 mg/kg group (n=71) survived (*P*=1). Graft rejection at three months occurred in 6.5% of patients in the 4.5 mg/kg group and 5.6% in the 6 mg/kg group (*P* =1). Incidence of secondary outcomes in the 4.5 mg/kg and 6 mg/kg group, respectively, were the following: thrombocytopenia (41.3%, 50.7%, *P*=0.348), leukopenia (41.3%, 45.0%, *P*=0.707), infusion related reaction (0%, 2.8%, *P*=0.519), delayed graft function (21.7%, 22.5%, *P*=1), and infection (60.9%, 56.3%, *P*=0.703).

Conclusions: rATG at a total cumulative dose of 4.5 mg/kg is just as effective as 6 mg/kg. There was no significant difference in patient survival, graft survival, or incidence of rejection within three months from transplant. There was also no difference in any of the secondary and safety outcomes analyzed. The lower total dose may result in cost savings.

CITATION INFORMATION: Nguyen C., Yau R., Tunwar C. Rabbit Anti-thymocyte Globulin Induction Dosing Strategies in a High-risk Kidney Transplant Population *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Nguyen: None. **R. Yau:** None. **C. Tunwar:** None.

Abstract# 924

Preemptive Second Kidney Transplant Outcomes by Induction Type in the United States

S. Riad[1], G. Larrieux[2], S. Jackson[3], R. Kandaswamy[2], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Surgery, University of Minnesota, Minneapolis, MN, [3]Complex Care Analytics, M-Health Fairview, Minneapolis, MN*

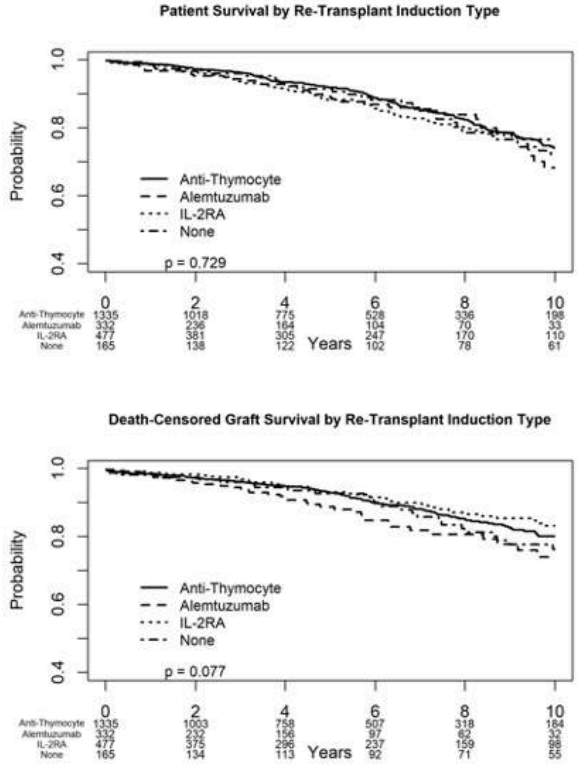
Purpose: Failed kidney allograft is the fourth leading indication for kidney transplantation. A significant portion of second kidney transplant recipients undergo preemptive transplantation while on maintenance immunosuppression. We examined the association between the type of induction used and long-term graft and recipient survival.

Methods: Using the SRTR, we identified all preemptive second kidney transplant recipients. We excluded those with missing or unusual induction regimens, recipients with maintenance other than tacrolimus and Mycophenolate +/- steroids and those with crossmatch positive results. We grouped recipients by induction type into four groups: Anti-thymocyte globulin group (n=1335), Alemtuzumab group (n=332), IL-2 Receptor Antagonist group (n=477) and No-induction group (n=165). We generated Kaplan-Meier curves of recipient survival **(RS)** and death-censored graft survival **(DCGS)** with follow up censored at ten-year post-transplant. We used Cox proportional hazards models to examine the effect of induction along with other factors on the outcomes of interest. To account for center specific effect, we included center as a random effect. We adjusted for recipient age, gender, race, diabetes, PVD, ESRD etiology, donor type and gender, HLA-MM, steroid maintenance, time between transplants, payor type and transplant year. The **(RS)** model was stratified by donor gender and HLA-Mismatch, whereas the **(DCGS)** model was stratified by donor type due to proportional hazards violations.

Results: Glomerulonephritis was the leading cause of ESRD among the groups accounting for over 40% of the recipients. Rates of DGF, rejection, hospitalization, and PTLD at one year were not statistically different. Mean creatinine was slightly higher in the no-induction group. In the Kaplan-Meier analyses, neither **(RS)** (log-rank p=0.729) nor **(DCGS)** (log-rank p=0.077) (Figure 1) differed by induction type. In the fully adjusted models, induction type was not a predictor of recipient or graft survival. Live-donor kidney was a favorable predictor of **(RS)** [aHR 0.66, 95% C.I. (0.50, 0.86), p=0.002]. Publicly insured recipients had worse recipient and allograft survival outcomes.

Conclusions: In this large cohort of crossmatch negative second pre-emptive kidney transplant recipients who were discharged on tacrolimus and mycophenolate maintenance, induction type was not associated with improved rejection rates, recipient or graft survival. Live-donor kidneys improved recipient survival.

Figure 1. !0-year Patient and Graft Survival by Re-Transplant Induction Type



CITATION INFORMATION: Riad S., Larrieux G., Jackson S., Kandaswamy R. Preemptive Second Kidney Transplant Outcomes by Induction Type in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Riad: None. **G. Larrieux:** None. **S. Jackson:** None. **R. Kandaswamy:** None.

Abstract# 925

Outcomes of Second Kidney Transplant After Return to Dialysis by Induction Type in the United States

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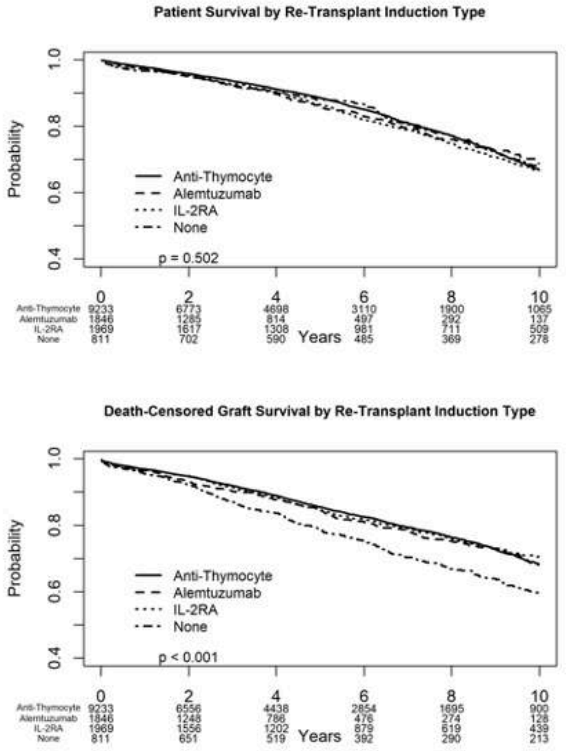
Purpose: A failed kidney allograft is the 4th leading indication for kidney transplantation. We examined the association of induction use in 2nd kidney transplant recipients after returning to dialysis and the long-term recipient survival **(RS)** and death censored graft survival **(DCGS)**.

Methods: Using the SRTR database, we identified all 2nd kidney recipients who returned to dialysis before re-transplantation. We excluded those with missing or unusual induction regimens, recipients with maintenance other than Tac and MMF +/- steroids and those with crossmatch positive results. We grouped recipients by induction type into 4 groups: Anti-thymocyte globulin (n=9233), Alemtuzumab (n=1846), IL-2RA (n=1969) and No-induction (n=811). We generated Kaplan-Meier curves of **(RS)** and **(DCGS)** with follow up censored at 10-year post-transplant. We used Cox proportional hazard **(PH)** models to examine the association of induction with these outcomes. We included center as a random effect. We adjusted for recipient age, gender, race, DM, PVD, ESRD etiology, donor type and gender, HLA-MM, steroid maintenance, time between transplants, payor type and transplant year. The **(RS)** model was stratified by transplant year; the **(DCGS)** model was stratified by time between transplants, time on dialysis, recipient age and donor age due to (**PH)** violations.

Results: Rejection and PTLD rates at 1-year were not statistically different. DGF and re-hospitalization rates were lower, but mean creatinine was higher in the no induction group compared to the other groups. In the univariate analyses, **(RS)** did not differ by induction type (log-rank p=0.50). However, **(DCGS)** was the lowest in the no-induction group (log-rank p <0.001) (Figure 1). After adjustment, induction type was not a predictor of **(RS)** or **(DCGS)**. Steroid maintenance was associated with better **(DCGS)** [aHR 0.86, 95% C.I. (0.76, 0.98), p=0.02]. Live-donor kidney was a favorable predictor of **(RS)** [aHR 0.75, 95% C.I. (0.67, 0.85), p<0.001] and **(DCGS)** [aHR 0.75, 95% C.I. (0.67, 0.85), p<0.001]. Publicly insured recipients had worse **(RS)** and **(DCGS)**.

Conclusions: In this large cohort of crossmatch negative second kidney transplant recipients, who were on dialysis prior to re-transplantation and discharged on Tac and MMF maintenance, recipients of no-induction had worse graft survival in the univariate analysis. In the fully adjusted models, induction type was not a predictor of **(RS)** or **(DCGS)**. Live-donor kidneys improved recipient and graft survival.

Figure 1. Ten-Year Recipient and Death Censored Graft Survival by Induction Type



CITATION INFORMATION: Riad S., Shaker T., Jackson S., Kandaswamy R. Outcomes of Second Kidney Transplant After Return to Dialysis by Induction Type in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Riad: None. **T. Shaker:** None. **S. Jackson:** None. **R. Kandaswamy:** None.

Abstract# 926

Outcomes in Standard vs. Extended Use of Thymoglobulin as Induction Therapy in Kidney Transplant Recipients

N. M. Sifontis[1], A. Coleman[1], D. Tang[1], K. Lau[2], S. Karhadkar[2], A. DiCarlo[2], A. Diamond[2], *[1]Temple University School of Pharmacy, Philadelphia, PA, [2]Temple University Health System, Philadelphia, PA*

Purpose: Thymoglobulin induction along with modern maintenance immunosuppression has been found to have a significant reduction in acute rejection in kidney transplantation. The recommended duration to complete thymoglobulin is within 4-7 days after kidney transplant (KT). Due to its toxicity profile and cost, some centers have moved towards an expanded duration of thymoglobulin in the outpatient setting, but the efficacy of this strategy is unknown. The purpose of this research was to evaluate outcomes in KT recipients who received standard vs. extended duration of thymoglobulin.

Methods: All KT recipients who received thymoglobulin induction between January 1st, 2017 to December 31st 2019 were included. Patients were divided into two groups (standard therapy (ST): completion of thymoglobulin induction within 7 days of KT) and (extended therapy (ET): completion of thymoglobulin induction after 7 days after KT). The primary outcomes were the incidence of delayed graft function (DGF), biopsy confirmed acute rejection at 6 months and graft and patient survival at 12 months.

Results:

Table 1. Baseline characteristics			
	ST group (n=47)	ET group (n=57)	p-value
Recipient age at transplant (years), mean ±SD	53.98 ± 11.34	50.81 ± 13.68	0.21
Male gender, n(%)	30 (64)	37 (65)	0.91
KDPI, median [IQR]	37.5 [17-49]	30.5 [24.3-49.5]	0.61
%cPRA, median [IQR]	0 [0-10]	10 [0-53]	0.14
Total thymoglobulin dose (mg/kg), mean ±SD	4.44±0.91	5±0.87	0.001
Duration of thymoglobulin (days), mean ±SD	6±1	9±2	<0.001
Delayed graft function, n(%)	12 (25)	23 (40)	0.11

The majority of patients were middle-aged, male, and African American (43% in the ST group vs. 60% in the ET group; p< 0.01). The majority received maintenance immunosuppression with tacrolimus, mycophenolate with or without prednisone. The incidence of acute rejection was 15% vs 12% in the ST group vs. ET group, respectively; p=0.15. There was no graft loss at 12 months. There were two non-kidney related deaths (1 death in each group) at 12 months.

Conclusions: This data suggests that extended use of thymoglobulin for induction therapy is common at our institution. This strategy did not appear to negatively impact short term kidney transplant outcomes such as acute rejection. KT recipients who experienced DGF were more likely to receive ET most likely to delay the start of calcineurin inhibitors. Larger studies are warranted to fully evaluate the impact of this strategy in kidney transplantation.

CITATION INFORMATION: Sifontis N., Coleman A., Tang D., Lau K., Karhadkar S., DiCarlo A., Diamond A. Outcomes in Standard vs. Extended Use of Thymoglobulin as Induction Therapy in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N.M. Sifontis: None. **A. Coleman:** None. **D. Tang:** None. **K. Lau:** None. **S. Karhadkar:** None. **A. DiCarlo:** Grant/Research Support; Name of Commercial Interest; Veloxis. Grant/Research Support; Nature of Relationship; Grant Support. **A. Diamond:** Grant/Research Support; Name of Commercial Interest; Veloxis. Grant/Research Support; Nature of Relationship; Grant Support.

Abstract# 927

Sirolimus (srl) versus Everolimus (evr) versus Mycophenolate (mpa) in Kidney Transplant Recipients Receiving Anti-thymocyte Globulin Induction (r-atg), Tacrolimus (tac), and Prednisone

H. Tedesco Silva Junior, C. Felipe, L. Viana, M. Cristelli, N. Tenorio, V. Lima, V. Azevedo, K. Ficher, J. Rezende, R. Foresto, M. Nakamura, Y. Dreige, J. Taddeo, C. Zito, J. Medina, *Hospital do Rim, Universidade Federal de São Paulo, São Paulo, Brazil*

Purpose: The aim of this study is to compare the efficacy and safety of SRL versus EVR versus MPA in kidney transplant recipients.

Methods: This is a single center, prospective and randomized trial in kidney transplant recipients receiving a single 3 mg/kg dose of r-ATG induction therapy, tacrolimus and faster prednisone taper (Clinicaltrials.govNCT03468478). Randomized patients receive SRL (3mg QD adjusted to maintain concentrations between 4 to 8 ng/mL), EVR (3mg BID adjusted to maintain concentrations between 4 to 8ng/mL), or MPA (720 mg BID). All patients received preemptive treatment for CMV infection. The primary endpoint was the incidence of CMV infection at 12 months.

Results: This analysis includes data from 267 kidney transplants recipients receiving SRL(n=87), EVR(n=91), or MPA(n=89). Key efficacy and safety outcomes are shown in Table. The incidence of CMV infection was lower in SRL and EVR groups compared to MPA group but there were no differences in the proportion of patients with CMV specific cellular immunity based on the Quantiferon (QTF) test or with BKV viremia. There was no difference in the incidence of biopsy proven acute rejection (BPAR), incidence of de novo DSA, graft loss or death. At 12 months, there was no difference in renal function or in Banff scores of protocol biopsies.

Conclusions: These data confirms and expands previous observations regarding the comparable efficacy of mTOR inhibitors and lower incidence of CMV infection.

Conclusions: .

Parameters	SRL, N=87	EVR, N=91	MPA, N=89
CMV infection/disease, n(%)	7(8)	6(6,6)	39(43,8)
Positive QTF CMV month 1, n(%)	4(44,4)	7(46,7)	8(42,1)
Positive QTF CMV month 2, n(%)	13(68,4)	7(58,3)	3(30)
Positive QTF CMV month 3, n(%)	6(42,8)	11(55)	4(33,3)
Positive QTF CMV month 4, n(%)	8(57,2)	10(52,6)	11(52,4)
Positive QTF CMV month 5, n(%)	10(66,7)	12(54,5)	10(47,6)
Positive QTF CMV month 6, n(%)	7(41,2)	9(56,2)	9(45)
Positive BKV viremia at month 3, n(%)	3(4,2)	2(2,5)	2(2,6)
Positive BKV viremia at month 6, n(%)	4(6,1)	3(3,9)	5(6,5)
Positive BKV viremia at month 9, n(%)	3(4,8)	5(7,3)	5(7,2)
Positive BKV viremia at month 12, n(%)	2(4,3)	5(9,2)	6(11,5)
BPAR, n(%)	11(12,6)	8(8,8)	8(8,9)
BPAR at 12 months protocol biopsies, n(%)	1(3)	2(6,7)	4(11,1)
DSA, n(%)	2(2,8)	0	1(1,3)
Mean GFR, ml/min/1.73 m², month 12	79.3	76.7	75.6
Graft loss, n	2	2	0
Death, n	0	1	3
Treatment discontinuation, n	20	21	6

CITATION INFORMATION: Tedesco Silva Junior H., Felipe C., Viana L., Cristelli M., Tenorio N., Lima V., Azevedo V., Ficher K., Rezende J., Foresto R., Nakamura M., Dreige Y., Taddeo J., Zito C., Medina J. Sirolimus (srl) versus Everolimus (evr) versus Mycophenolate (mpa) in Kidney Transplant Recipients Receiving Anti-thymocyte Globulin Induction (r-atg), Tacrolimus (tac), and Prednisone *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Tedesco Silva Junior: None. **C. Felipe:** None. **L. Viana:** None. **M. Cristelli:** None. **N. Tenorio:** None. **V. Lima:** None. **V. Azevedo:** None. **K. Ficher:** None. **J. Rezende:** None. **R. Foresto:** None. **M. Nakamura:** None. **Y. Dreige:** None. **J. Taddeo:** None. **C. Zito:** None. **J. Medina:** None.

Abstract# LB 78

Alemtuzumab vs Antithymocyte Globulin Induction in Hepatitis C Viremic Donors to Hepatis C Negative Kidney Transplant Recipients

K. Walter, L. Mincemoyer, J. Giang, J. Suero, N. Shah, K. Szempruch, *University of North Carolina Medical Center, Chapel Hill, NC*

Purpose: The optimal induction agent for kidney transplantation of hepatitis C virus nucleic acid test positive donors to negative recipients (HCV NAT D+/R-) is unknown. Achievement of HCV cure with directed acting antivirals (DAA) post-transplant has been reported in HCV NAT D+/R- kidney transplant recipients who received antithymocyte globulin (ATG) induction, yet theoretical concerns for over immunosuppression with alemtuzumab (ALEM) exist. We sought to compare ALEM vs ATG induction on HCV clearance and transplant outcomes in a cohort of HCV NAT D+/R- kidney transplant recipients.

Methods: A single center, retrospective analysis comparing ALEM vs ATG induction in HCV NAT D+/R- adult kidney transplant recipients from July 2018 to December 2020 was conducted. Multi-organ transplant recipients were excluded. Maintenance therapy included tacrolimus, mycophenolate, and a 3-day steroid taper. DAA were determined by HCV genotype and payer preference. The primary outcome was achievement of sustained virologic response 12 weeks (SVR12) after therapy completion.

Results: 20 recipients were included (7 ALEM, 13 ATG); 15 reached SVR12 at the time of data analysis. There were no differences in baseline characteristics between groups (Table 1). The majority of recipients were treated with glecaprevir/pibrentasvir for 12 weeks, initiated at a mean of 44 days posttransplant (range 22-88 days). There was no difference in achievement of SVR12 between groups (100% ALEM vs 100% ATG). Biopsy proven acute rejection within 6 months occurred in one recipient in each group. The recipient in the ALEM group who developed antibody mediated rejection was highly sensitized prior to transplant. One recipient in the ATG group experienced an adverse event from DAA therapy leading to its discontinuation.

Conclusions: In HCV NAT D+/R- kidney transplant recipients initiated on a DAA posttransplant, the use of ALEM induction did not impact HCV clearance or transplantation outcomes compared to ATG induction in this limited series.

Table 1.				
	Overall (N=20)	ALEM (N=7)	ATG (N=13)	P-Value
Mean age, years (SD)	59 (9)	56 (11.4)	61 (7)	0.28
Male, n (%)	11 (55)	4 (57.1)	7 (53.9)	0.89
Mean Time from Transplant to Detection of HCV RNA, days (SD)	3 (4.7)	4 (6.7)	3 (3.3)	0.58
Mean Time from Transplant to HCV RNA >500, days (SD)	11 (6.8)	10 (6.7)	10 (7.1)	0.83
Mean Time from Transplant to Genotype, days (SD)	21 (10.3)	22 (9.6)	21 (10.9)	0.89
Mean Time from Transplant to Initiation of DAA, days (SD)	44 (17.6)	38 (10.2)	47(20.3)	0.35
Genotype, n (%)				
1	2 (10)	1 (14.3)	1 (7.7)	0.45
1A	12 (60)	3 (42.9)	9 (69.2)	
2	1 (5)	1 (14.3)	0 (0)	
3	5 (25)	2 (28.6)	3 (23.1)	
DAA Regimen, n (%)				
Glecaprevir/Pibrentasvir	12 (60)	4 (57.1)	8 (61.5)	0.37
Sofosbuvir /Velpatasvir	7 (35)	2 (28.6)	5 (38.5)	
Ledipasvir/Sofosbuvir	1 (5)	1 (14.3)	0 (0)	
Duration of Treatment, n (%)				
8 weeks	2 (10)	0 (0)	2 (15.4)	0.27
12 weeks	18 (90)	7 (100)	11 (84.6)	
Biopsy Proven Acute Rejection within 6 Months of Transplant, n (%)	2 (10)	1 (14.3)	1 (7.7)	0.65
Acute Cellular Rejection	1 (5)	0 (0)	1 (7.7)	
Antibody Mediated Rejection	1 (5)	1 (14.3)	0 (0)	
Mean Time from Transplant to First Episode of BPAR, days (SD)	67 (37)	41	93	--

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Kidney

Kidney Immunosuppression: Novel Regimens and Drug Minimization

Abstract# 928

Effect of Early Steroid Withdrawal on Posttransplant Diabetes Mellitus Among Kidney Transplant Recipients Differs by Recipient Age

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Purpose: Posttransplant diabetes mellitus (PTDM) is a major complication after kidney transplantation (KT) often attributable to immunosuppression. The risk of PTDM may increase with more potent steroid maintenance and older recipient age.

Methods: Using USRDS data, we studied 12,488 adults (age≥18) first-time KT recipients (2010-2015) without diabetes at the time of KT. We compared the risk of PTDM among recipients underwent early steroid withdrawal (ESW) versus those continued steroid maintenance (CSM) using Cox regression with inverse probability weighting to adjust for confounding. We also tested whether the risk of PTDM resulting from CSM differed by recipient age (18-29, 30-54 and 55+ years).

Results: Of 12,488, 28.3% recipients received ESW. The incidence rate for PTDM was 13 per 100 person-years (11 per 100 person-years in ESW; 14 per 100 person-years in CSM). Overall, ESW was associated with lower risk of PTDM compared with CSM (aHR=$_{0.72}0.79_{0.86}$) but the risk differed by recipient age. ESW was associated with lower risk of PTDM among old (aged 55+) recipients (aHR=$_{0.62}0.71_{0.81}$), but not among young (aged 18-29) recipients (aHR=$_{0.81}1.18_{1.72}$, interaction p=0.01).

Table. Effect of early steroid withdrawal (versus continued steroid maintenance) on posttransplant diabetes mellitus among kidney transplant recipients by recipient age (18-29, 30-54, and 55+)

	N	aHR	P for interaction
Overall	12,488	$_{0.72}0.79_{0.86}$	-
Recipient age			
18-29	1,123	$_{0.81}1.18_{1.72}$	-
30-54	6,567	$_{0.73}0.83_{0.95}$	0.09
55+	4,798	$_{0.62}0.71_{0.81}$	0.01

Conclusions: Early immunosuppression strategy should be tailored among old recipients to balance the risks and benefits.

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DISCLOSURES: J. Ahn: None. **S. Bae:** None. **M. Schnitzler:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consultant. **G. Hess:** None. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consultant. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **D. Segev:** Honoraria; Name of Commercial Interest; Sanofi, Novartis, and CSL Behring. Honoraria; Nature of Relationship; Speaker. **M. McAdams-DeMarco:** None.

Abstract# 929

Evaluation of Rituximab-abbs in Renal Transplant: A Case Series

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Purpose: Biosimilars are FDA-approved alternatives to cost-prohibitive biologics, with no clinically meaningful differences in safety, purity, and potency. Rituximab-abbs, a biosimilar to rituximab, has labeled indications for several oncologic and autoimmune conditions. There is currently no published literature on the use of rituximab-abbs in the renal transplant population. In this report, we describe the safety and efficacy in renal transplants who received rituximab-abbs at our center.

Methods: This is a retrospective chart review of renal transplants who received rituximab-abbs between June to December 2020. Indications, safety, and clinical outcomes were reviewed. Per institutional standard of care, renal transplants with donor-specific antibodies (DSA) greater than 2000 MFI at time of transplant receive rituximab-abbs 375 mg/m^2 intravenously once as part of induction therapy. For antibody medicated rejection (AMR), one dose is given at the end of the treatment course with plasmapheresis, bortezomib, corticosteroids, and enhanced maintenance immunosuppression.

Results: Five patients received rituximab-abbs between the time period: 1 for baseline DSA, 4 for AMR. Patient characteristics and clinical outcomes are summarized in Table 1. All patients received appropriate pre-medications. No infusion-mediated reactions were reported. At a median follow-up of 72 days, no incidence of leukopenia (WBC < 3x10^9/L), documented infections, and other serious adverse effects were reported. All patients achieved peak DSA MFI reduction and/or resolution at time of last follow-up. In contrast to rituximab, utilization of rituximab-abbs in these 5 patients resulted in a $13,275.78 cost-saving.

Conclusions: Rituximab-abbs is a safe, well-tolerated, and cost-effective alternative to rituximab for the treatment of DSA in renal transplant patients. Further studies are necessary to determine efficacy of rituximab-abbs in DSA reduction in renal transplants.

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
Age (years)	37	55	41	62	43
Race/Ethnicity	White	African American	African American	White	Asian
Sex	Male	Female	Male	Female	Male
Indication	Baseline DSA	AMR	AMR	AMR	AMR
Time from transplant to administration (days)	0	22	657	1416	1313
Duration of follow-up (days)	72	98	93	52	15
Infusion mediated reaction	None	None	None	None	None
Documented infections	None	None	None	None	None
Leukopenia/neutropenia	No	No	No	No	No
Serum creatinine (mg/dL) - Baseline - Day of Administration - Last follow-up	 14 17 1.8	 1.4 1.5 1.4	 3.7 4.7 5.5	 1.4 1.6 1.7	0.8 1.3 1.3
Peak DSA (MFI) - Baseline - Last follow-up	DR 4 2,400 950	DR 4 17,148 779	DQ 8 29,017 15,836	DQ 6 28,965 15,131	DR 12 2,030 64

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Abstract# 930

Evaluation of Conversion to Extended-Release Tacrolimus in Abdominal Organ and Thoracic Transplant Recipients

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Purpose: An established approach for conversion from immediate-release tacrolimus (IR TAC) to extended-release tacrolimus (LCPT) in kidney transplantation exists, but is lacking in other organ populations. Due to recent shortages of IR TAC, an increase in use of LCPT is seen in all organ populations. To broaden our understanding of the

optimal approach in converting from IR TAC to LCPT, the purpose of this study is to identify differences in conversion ratios amongst all organ populations compared to current conversion recommendations.

Methods: One hundred twenty-four transplant recipients were included (43 kidney, 8 kidney/pancreas, 6 liver, 17 heart, and 50 lung). The primary outcome was the conversion ratio from IR TAC to LCPT required to achieve therapeutic TAC trough levels. Secondary outcomes included pre-conversion IR TAC dosage, LCPT dosage at time of therapeutic TAC trough level, and serum creatinine (SCr) at time of therapeutic TAC trough level.

Results: Mean age at transplantation was 59.9 ± 11.8 years. A lower mean age and a higher percentage of African American and Hispanic patients were noted in the abdominal organ transplant (AOT) population compared to the thoracic transplant population. Ethnicity was self-reported. At conversion, 72% of patients were at a therapeutic TAC trough level. The mean conversion ratio at time of conversion from IR TAC to LCPT was 1:0.91 for all organ populations. At the time of achieving therapeutic TAC trough levels, the mean conversion ratio required to reach therapeutic TAC trough level was 1:0.91 with lower median conversion ratios required in thoracic transplant recipients (1:0.81 for heart and 1:0.79 for lung) compared to AOT recipients (1:1 for kidney, 1:1 for kidney/pancreas, and 1:0.95 for liver). A longer than desirable time to reach therapeutic level was noted which may be due to varying frequency in checking TAC trough levels. No notable changes in mean SCr at conversion to time to achieve therapeutic level were observed (1.46 mg/dL vs. 1.57 mg/dL).

Table 1

	All Patients (N= 124)	Kidney (N= 43)	Lung (N= 50)	Heart (N= 17)	Kidney/ Pancreas (N= 8)	Liver (N= 6)
Age (years), mean ± SD	59.9 ± 11.8	57.1 ± 11.5	65.3 ± 8.8	61.4 ± 10.7	45.3 ± 13.2	54.8 ± 12.4
Ethnicity, n (%) White; Black; Hispanic	62 (50); 46 (37); 14 (11)	11 (26); 22 (51); 8 (18)	39 (78); 9 (18); 2 (0.04)	9 (53); 7 (41); 1 (0.06)	0 (0); 5 (63); 3 (38)	3 (50); 3 (50); 0 (0)
Mean pre-conversion IR TAC daily dose (mg/day), mean ± SD	6.73 ± 4.27	6.72 ± 3.82	6.64 ± 4.39	5.32 ± 2.88	8.12 ± 6.83	9.75 ± 4.86
Median initial conversion ratio (IR TAC : LCPT), mg : mg	1 : 0.9	1 : 1	1 : 0.8	1 : 0.8	1 : 1	1 : 1
Median conversion ratio at time of achieving therapeutic TAC trough level (IR TAC : LCPT), mg : mg	1 : 0.89	1 : 1	1 : 0.79	1 : 0.81	1 : 1	1 : 0.95
Mean LCPT dose, (mg/day), mean ± SD At conversion; Post-conversion at therapeutic TAC trough level	6.09 ± 4.23; 5.95 ± 4.06	6.61 ± 4.45; 6.49 ± 4.04	5.5 ± 3.51; 5.29 ± 3.54	4.5 ± 2.51; 4.34 ± 2.38	8.25 ± 7.17; 8.5 ± 7.11	9 ± 5.37; 8.83 ± 7.5
Time to achieve therapeutic level (days), mean	49.9	68.7	24.3	55.8	54.3	108.1

Conclusions: Our findings suggest that different dosing conversion requirements may be warranted depending on the type of organ transplant received. A higher percentage of African American and Hispanic patients in the AOT population may have led to higher dosing requirements of LCPT in this cohort. Organ type, age, and ethnicity should be taken into consideration when determining conversion ratios from IR TAC to LCPT. Further prospective research is needed to confirm these findings.

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Abstract# 931

Belatacept Conversion in Elderly Renal Transplant Recipients

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Purpose: Describe the impact of conversion from a calcineurin inhibitor (CNI) based immunosuppressive regimen to belatacept in elderly renal transplant recipients.

Methods: Adult renal transplant patients aged ≥ 60 years who were converted to belatacept from a CNI between 3/2013-6/2020 were included. Belatacept conversion was defined as CNI withdrawal or minimization (cyclosporine trough < 75 ng/mL or tacrolimus < 5 ng/mL) following belatacept initiation. Primary objective was to describe our experience with the safety of conversion defined as 6 month incidence of infection and malignancy. Secondary endpoints included efficacy defined as change in estimated GFR (eGFR), incidence of rejection, death-censored graft loss and death at last follow-up.

Results: Fifty-one patients met inclusion criteria, 86% with CNI withdrawal and 14% with minimization. Median time to conversion was 6.3 (IQR 2.3-20) months post-transplant with median follow-up of 12 (IQR 7-27) months. Mean age at time of conversion was 67 (SD 0.8) years. Conversion was pursued due to desire to improve renal function in 51%, neurotoxicity in 22% and metabolic/cardiovascular concerns in 16% of patients. Discontinuation of belatacept occurred in 27% of patients during follow-up. Primary reason for discontinuation was rejection (29%) followed by infection (21%). There were no instances of transplant lymphoproliferative disorder. However, 7.8% of patients experienced other malignancies. Thirty-nine percent of patients experienced at least one infection within 6 months of conversion with mean time from conversion to first infection of 1.8 (SD 0.4) months. Bacterial infections occurred in 27%, viral in 24%, and fungal in 2% of patients. eGFR significantly improved following belatacept conversion (31 ml/min/1.73m^2 pre vs 42 ml/min/1.73m^2 post; p = 0.002). Rejection occurred in 20% of patients at a median of 2 (IQR 1.9-2.7) months post conversion. There was a cumulative incidence of 5.7 death-censored graft losses per 100 person-years and 10.3 deaths per 100 person-years.

Conclusions: In our observational study, conversion from a CNI based regimen to belatacept in elderly renal transplant recipients resulted in improved eGFR. However, infection occurred in over a third of the population, which is at higher risk of infection due to age-related immune senescence, and rejection in a fifth of patients. The discontinuation rate was over 25%. Further studies evaluating safety, particularly infectious risk, in elderly patients converted to belatacept are warranted.

Table 1. Recipient Characteristics

Patients, n	51
Age at transplant, mean (SD) years	64.9 (0.9)
Male gender, n (%)	32 (62.8)
Race, n (%)	
Caucasian	43 (84.3)
African American	3 (5.9)
Asian	3 (5.9)
Hispanic/Latino	1 (2.0)
Pacific Islander	1 (2.0)
Primary Cause of ESRD, n (%)	
Diabetes	19 (37.3)
Glomerulonephritis	12 (23.5)
Hypertensive Nephrosclerosis	5 (9.8)
Drug Toxicity	4 (7.8)
Polycystic kidney disease	3 (5.9)
Other	8 (15.7)
First transplantation, n (%)	48 (94.1)
Induction, n (%)	
Basiliximab	24 (47.1)
Thymoglobulin	18 (35.3)
Alemtuzumab	9 (17.6)
DGF, n (%)	26 (51.0)

Table 2. Conversion Characteristics

Reason for Conversion, n (%)	
Nephrotoxicity	26 (50.9)
Neurotoxicity	8 (15.7)
Cardiovascular Complications	6 (11.8)
Neuropathy	3 (5.9)
Metabolic Complications	2 (3.9)
Other	6 (11.8)
Maintenance Therapy at Conversion, n (%)	
Prednisone	42 (82.4)
Tacrolimus	48 (94.1)
Cyclosporine	3 (5.9)
Mycophenolate	49 (96.1)
Azathioprine	2 (3.9)
Tacrolimus Trough at Conversion, mean (SD) ng/mL	6.5 (0.4)

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Abstract# 932

Avoiding Tacrolimus Under- and Overexposure with a Dosing Algorithm for Renal Transplant Recipients: A Single Arm Prospective Intervention Trial

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Purpose: Bodyweight-based tacrolimus dosing followed by therapeutic drug monitoring is standard clinical care after renal transplantation. However, after transplantation, a meagre 38% of patients is on target at first steady state and it can take up to three weeks to reach the target tacrolimus pre-dose concentration (C_0). Tacrolimus

under- and overexposure is associated with an increased risk of rejection and drug-related toxicity, respectively. To minimize sub- and supra-therapeutic tacrolimus exposure in the immediate post-transplant phase, a previously-developed dosing algorithm to predict an individual's tacrolimus starting dose was tested prospectively.
Methods: In this single-arm, prospective, therapeutic intervention trial, 60 *de novo* kidney transplant recipients received a tacrolimus starting dose based on a dosing algorithm instead of a standard, bodyweight-based dose. The algorithm included cytochrome P450 (*CYP*) *3A4* and *3A5* genotype, body surface area and age as covariates. The target tacrolimus C_0, measured for the first time at day 3, was 7.5-12.5 ng/mL.
Results: Between 23 February 2019 and 07 July 2020, 60 patients were included. One patient was excluded because of a protocol violation. On day three post-transplantation, 34 out of 59 patients (58%; 90%-CI 47% to 68%) had a tacrolimus C_0 within the therapeutic range. Markedly sub-therapeutic (<5.0 ng/mL) and supra-therapeutic (>20 ng/mL) tacrolimus concentrations were observed in 7% and 3% of the patients, respectively. Biopsy-proven acute rejection occurred in three patients (5%).
Conclusions: Algorithm-based tacrolimus dosing leads to the achievement of the tacrolimus target C_0 in as many as 58% of the patients on day three after kidney transplantation.
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Abstract# 933

Calcineurin Inhibitor Dose and Selection, Not Antiproliferatives or Steroids, Influence Development of DSA One Year Post-kidney Transplant

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Purpose: Allograft rejection is a serious complication in kidney transplantation (KT). Despite advances in immunosuppression, acute rejection remains a concern in the first year of transplant. The incidence of donor-specific antibody (DSA) formation in approaches, such as steroid minimization, is undefined.
Methods: This retrospective, single center study, included patients who received KT between January 2017 and November 2019. Renal function, DSA formation, monthly median calcineurin inhibitor (CNI) levels, duration of goal dosing antiproliferatives, and monthly median steroid doses were recorded. DSAs were measured using single-antigen bead immunoassay with cutoff of 3000 MFI. The primary outcome was incidence of DSA formation within one year post KT. Secondary outcomes included incidence of DSA formation in patients on steroid minimization protocol, time at goal dose antiproliferatives, and trends in CNI concentrations.
Results: Patients (n=167) were followed for one year post KT. All patients received anti-thymocyte globulin (ATG) induction therapy (median dose of 4.2 mg/kg). Twenty-three (8%) patients developed DSA and median time to formation was 28 days (IQR 71 - 12). DSAs were predominantly against HLA Class II (78%). DSA formation did not differ based on ATG dose. At 3 months post KT, 33 patients (19%) were off steroids and did not develop DSA. There was no difference in incidence of DSA based on time at goal dose antiproliferatives. Twenty-seven patients transitioned from tacrolimus (FK) to cyclosporine (CsA) and 37% developed DSA compared to 9% in patients that remained on FK (P<0.001). Patients with DSA were less likely to be at goal dosing of CNI within the first month post KT (27% versus 55%; P = 0.02).
Conclusions: In summary, preventing DSA formation appears to be primarily influenced by CNI selection and levels. Steroid minimization or goal antiproliferative dosing had no effect on DSA. Critically, our data emphasize the importance of maintaining adequate CNI levels and caution when transitioning from FK to CsA.
CITATION INFORMATION: Henderson M., Morris G., Awdishu L., Fabbri K., Shah M., Khan A., Kerr J. Calcineurin Inhibitor Dose and Selection, Not Antiproliferatives or Steroids, Influence Development of DSA One Year Post-kidney Transplant *AJT, Volume 21 Supplement 3*
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Abstract# 935

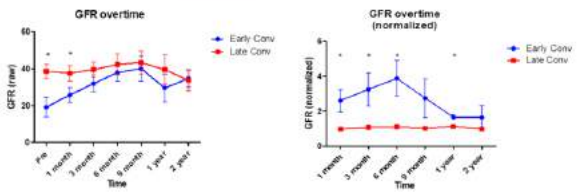
Early Conversion to Belatacept-based Therapy Improves Graft Function in Renal Transplant Patients

N. Huang[1], C. J. Yang[2], I. Movileanu[1], R. H. Dvorai[3], K. M. Ecal[1], R. F. Saidi[1], A. N. Ayla Senay[1], B. Gallay[4], M. J. Hanlon[1], S. Narsipur[4], M. R. Laftavi[1], R. Shahbazov[1], *[1]Surgery, SUNY Upstate Medical University, Syracuse, NY, [2]Pharmacy, SUNY Upstate Medical University, Syracuse, NY, [3]Pathology, SUNY Upstate Medical University, Syracuse, NY, [4]Medicine, SUNY Upstate Medical University, Syracuse, NY*

Purpose: Our goal in this study was to assess the impact of early vs late conversion to Belatacept based (Bela) IS in kidney transplant (KT) recipients
Methods: We collected data on renal transplant recipients from 2016-2020 that were converted to a Belatacept-based IS regimen. Patients were stratified into an early-converted group if starting Bela therapy within 26 weeks of transplantation and late-conversion group if treatment was initiated after 26 weeks. Primary outcomes assessed graft function with estimate glomerular filtration rate (GFR). Secondary outcomes included serum creatinine (sCr) and glucose levels
Results: At our institute total 40 patients converted to Belatacept based IS (Image 1). Early conversion to Bela-therapy significantly enhanced graft function as measured by GFR. Early conversions had a significant increase in GFR from 19±5.3 mL/min to 40.0±6.8 mL/min by the ninth month (p=0.015) and 34.6±4.6 mL/min by the two-year mark (p=0.023). The late conversions had a higher baseline GFR of 38.6±3.8 that was saw little to no deviation over the two years ranging between 33 and 43 mL/min. (Image 1). Before conversion to Bela, average serum creatinine (sCr) was 3.12 (±0.38) and 2.06 (±0.17, p=0.0017) in the early and late groups, respectively. After conversion, the early group experienced a 33% decrease in sCr by the 2-year mark (p=0.0017) compared to their baseline values. Conversely, the late-converted group did not have significant deviations from respective baseline values prior to conversions. At 1, 6, and 24 months post-conversion, the early converted group saw significant improvements in sCr compared to the late converted group with sCr levels decreasing by 13% (p=0.04), 23% (p=0.015), and 38% (p=0.011), respectively.
There was no statistical significance between early and late conversion groups on metabolic glucose levels. There was no significant difference in the number of acute rejections between the two groups (early - 6 events or 29%, late - 5 events or 26%)
Conclusions: Our study has shown that early Belatacept conversion improves kidney graft function more effectively than later conversion. Therefore, early conversion to Belatacept based IS therapy may be considered more often in selected patients after kidney transplantation

	Early Conversion	Late Conversion	Total
Number of patients	21	19	40
Male	13	12	25
Female	8	7	15
Average Age (years)	59.4±2.0	56.0±3.3	
Average Time Before Conversion (Weeks)	12.0±1.4	160.7±25.4	

Figure 1. Early conversion to Belatacept-based therapies improve graft function



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Abstract# 936

Tolerability of De Novo and Conversion Belatacept Regimens in Kidney Transplantation

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Purpose: Belatacept, a selective T lymphocyte co-stimulation blocker, has been shown to be a safe and effective maintenance therapy for immunosuppression. We investigated the long-term tolerability of belatacept in both de novo and conversion regimens in kidney transplant recipients.

Methods: This is a retrospective, single-center analysis of all kidney transplant recipients who received belatacept prior to June 30, 2020. We examined the length of time that patients received belatacept, reasons for discontinuation, estimated glomerular filtration rate (eGFR), and incidence of acute rejection.

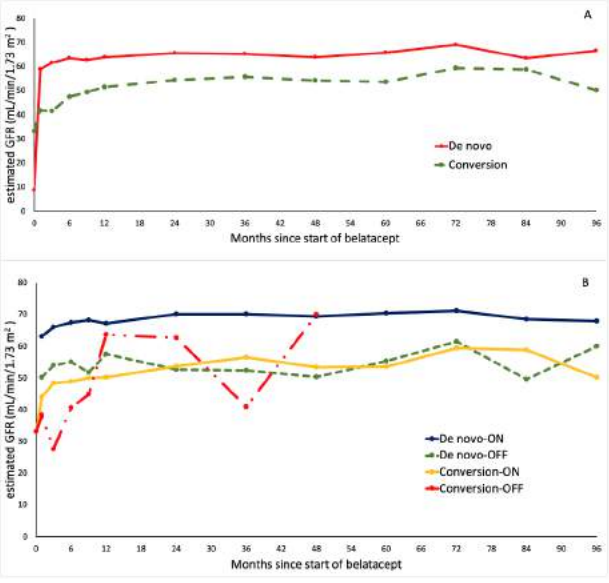
Results: One-hundred and thirty-six patients were included in the analysis, 91 de novo (67%) and 45 conversion (33%). The median time from transplant to conversion was 4 months (IQR 1.9-6.1, range 0.4-122.9). Eighty-seven patients remained on belatacept, while 42 patients discontinued belatacept for the medical reasons shown in Table 1. There was no statistically significant difference in the rate of discontinuation between de novo and conversion groups (34.1% vs 40%, p = 0.57). In patients who stopped belatacept, the median time from the start of therapy to discontinuation was 3.9 months (IQR 2.2-5.6, range 0.2-151.7) in the de novo group vs 2.5 months (IQR 0.8-4.2, range 0.9-52.5) in the conversion group (p = 0.41). The mean eGFR at 1-year after starting belatacept was significantly higher in the de novo group (63.8 ± 34.4 mL/min/1.73 m2 vs 51.6 ± 16.8 mL/min/1.73 m2, p = 0.02). Figure 1 shows mean eGFR for up to 8 years. The rate of acute rejection at 1-year was similar between de novo and conversion groups (18.7% vs 22.2%, p = 0.65).

Conclusions: Belatacept was discontinued in a substantial number of patients for various medical reasons. Of these reasons, acute rejection was the most common. The length of time that patients received belatacept was similar between de novo and conversion patients, as were the rates of rejection. Patients started on belatacept de novo maintained a higher eGFR than those who were converted.

Table 1. Medical reasons for discontinuing belatacept

	De novo (n = 26)	Conversion (n = 16)
Acute rejection	17 (65.4%)	7 (43.8%)
Infection	2 (7.7%)	6 (37.5%)
Tolerability to regimen	5 (19.2%)	3 (18.7%)
Others	2 (7.7%)	-

Figure 1. Renal function during belatacept regimen. (A) Between de novo and conversion groups. (B) Between subgroups (staying ON belatacept vs switching OFF)



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Abstract# 937

Belatacept Utilization During the Covid-19 Pandemic in the United States

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Purpose: With the onset of the COVID-19 pandemic, many people in the United States were urged to stay at home. Kidney transplantation continued during this time, albeit at a reduced pace. We examined if there was increased utilization of belatacept during the pandemic in fresh transplant recipients, as this would potentially decrease need for blood draws for monitoring medication troughs.

Methods: The UNOS STARfile was queried to examine all patients who received a kidney transplant between 3/1/2020 - 5/31/2020 (COVID era, COVID). All kidney transplants performed during 3/1/2019 - 5/31/2019 were defined as the pre-COVID era (Pre). In each era, patients were divided based upon belatacept (Bela) immunosuppression vs. non-belatacept (N) immunosuppression. The four groups examined included COVID/belatacept (COVID-Bela), pre-COVID/belatacept (Pre-Bela), COVID/non-belatacept (COVID-N), and pre-COVID/non-belatacept (Pre-N).

Results: There were 9563 transplants performed over both periods, of which 4171 (43.6%) were performed during COVID (118 or 2.8% COVID-Bela, 4053 or 97.2% COVID-N) and 5392 were performed pre-COVID (56.4%) (153 or 2.8% with Pre-Bela, 5239 or 97.2% Pre-N). Donor KDPI was significantly higher in both belatacept groups (57% COVID-Bela, 58% Pre-Bela vs. 44% COVID-N, 47% Pre-N, p<0.0001), along with a longer cold storage time (19.6 h COVID-Bela, 17.3 h Pre-Bela vs. 15.1 h COVID-N, 13.7 Pre-N, p<0.0001) and higher donor creatinine (1.66 mg/dL COVID-Bela, 1.63 mg/dL Pre-Bela vs. 1.33 mg/dL COVID-N, 1.32 mg/dL Pre-N, p<0.002). Recipients in the belatacept groups were also significantly older (55.8 y COVID-Bela, 55.2 y Pre-Bela vs. 51.9 y COVID-N, 52.9 y Pre-N, p<0.0001), had a higher EPTS (0.53 COVID-Bela, 0.50 Pre-Bela vs. 0.46 COVID-N, 0.47 Pre-N, p=0.03), higher creatinine at discharge (5.68 mg/dL COVID-Bela, 4.37 mg/dL Pre-Bela vs. 4.20 mg/dL COVID-N, 3.74 mg/dL Pre-N, p<0.0001), and greater delayed graft function (DGF) (42.4% COVID-Bela, 30.7% Pre-Bela vs. 23.1% COVID-N, 23.2% Pre-N, p<0.0001). Regions 3, 4, and 5 had the greatest utilization of belatacept during the COVID era at 29.7%, 25.4%, and 8.5%, respectively.

Conclusions: Despite stay at home recommendations, utilization of belatacept did not increase during the COVID era. Belatacept immunosuppression continued to be used in higher KDPI kidneys in older recipients as had been done in the pre-COVID era. Transplantation during COVID brought longer cold storage times and greater DGF, but belatacept potentially has allowed utilization of kidneys that might have otherwise been discarded during the COVID era.

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Abstract# 938

Association of Belatacept Conversion on Patient and Allograft Survival in Kidney Transplant Recipients with Congestive Heart Failure

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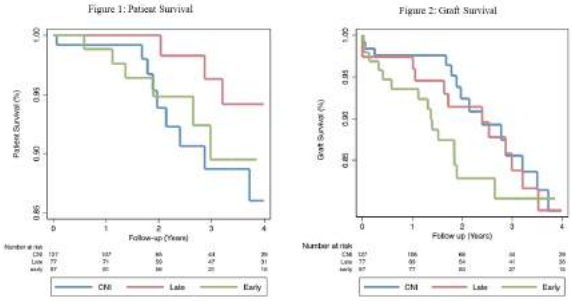
Purpose: Calcineurin inhibitors (CNI) exert deleterious effect on cardiovascular risk in kidney transplant recipients (KTRs). Belatacept conversion may reduce CV risk in KTRs. We hypothesized that early conversion to Belatacept will have better patient and graft survival and lower rate of readmission within 30-days in KTRs with congestive heart failure (CHF) compared to long-term CNI use.

Methods: We merged Belatacept dataset in Wisconsin Allograft Recipient Database with Clarity Healthlink dataset which contain admitted recipients with CHF between 2014-2019 using ICD-10 Code I50 for CHF and E87.70 for volume overload. Subjects switching to Belatacept were divided into Early Conversion (EC: switched to Belatacept within one year from transplant) and Late Conversion (LC: switched after one year). The Greedy matching was used for the EC and LC participants based on transplant date in a 1:2 allocation ratio to CNI control subjects (CNI-c).

Results: Of the 301 patients in the study, EC accounted for 31.5% (n=97), LC 25.1% (n=77), and CNI-c 43.3% (n=133). The median patient survival (years, IQR): CNI-c (2, 2.3), EC (2.2, 1.8) and LC (3.4, 2.4) (p<0.001). There was no significant difference in the prevalence of history of MI, CHF and CAD at time of transplant. Mean time to switching was 3.36 months and 3.5 years for EC and LC, respectively. Compared to Belatacept groups, CNI-c had significantly higher rate of Basiliximab induction (p=0.001), were more likely to have received deceased donor transplant (p=0.05) and had significantly younger donor age (43.2 years, p=0.04). Adjusted hazard ratios (aHR) showed no statistical difference for patient and graft survival between the three groups. However, conversion to Belatacept was associated with better numerical patient and graft survival (aHR 0.36, 95% CI [.03-3.8], p=0.4)

and (aHR 0.74, 95% CI [0.1-7.2], P=0.8), respectively. There was no significant difference in readmission within 30-days rate (18%, 11% and 15%, p=0.32) among CNI-c, EC and LC, respectively.

Conclusions: Patient and graft survival and rate of readmission within 30-days post CHF hospital discharge were not significantly different among the three groups. However, the patient and graft survival rates do suggest clinically protective effects of converting patients to Belatacept after transplant date.



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DISCLOSURES: H. Mogallapalli: None.

Abstract# 939

Modeling of Alternative Weight-Based Dosing Strategies of LCP-Tacrolimus in De Novo Kidney Transplant Patients

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Purpose: LCP-tacrolimus (LCPT; Envarsus XR®) is a modified-release once-daily formulation approved for prophylaxis of organ rejection in de novo kidney transplant patients in combination with other immunosuppressants. A phase 3 study of LCPT initiated at a dose of 0.17 mg/kg/day resulted in trough concentrations >12ng/mL in 36.5% of recipients after the first dose. The objective of this study was to simulate alternative weight-based dosing strategies of LCPT in this population, using the recommended starting dose per product labelling: (i) 0.14 mg/kg actual body weight (ABW), (ii) 0.14 mg/kg ideal body weight (IBW), (iii) 0.14 mg/kg ABW with a dose cap of 12 mg.

Methods: The initial dose of LCPT was given within 48 hours of transplantation. First dose trough concentrations for each alternative dosing scenario were simulated by proportional scaling of actual dose received and observed trough concentration, as follows

$$\text{Predicted first trough} = \frac{\text{Observed first trough (Alternative dosing regimen)}}{\text{Actual dose received}}$$

For each dosing scenario, the proportion of subjects with a predicted first tacrolimus trough concentration <3, 3 - 6, 6 - 9, 9 - 12, 12 - 15, and >15 ng/mL was determined.

Results: A total of 266 de-novo kidney transplant patients were included. The median (interquartile range; IQR) age, actual body weight, ideal body weight, and actual dose received were 46 years (35 - 55 years), 73.0 kg (62.5 - 87.0 kg), 63.5 kg (55.4 - 71.4 kg), and 13 mg (10 - 15 mg). The proportion of subjects with a predicted trough concentration within each bin are shown in the Table.

Proportion of subjects (n=266) with a predicted trough conc based on dose modeling strategies.

First trough concentration (ng/mL)	0.17 mg/kg ABW (observed)	0.14 mg/kg ABW	0.14 mg/kg IBW	0.14 mg/kg ABW with dose cap of 12 mg
<3	5.3%	9.3%	12.0%	9.3%
3 to 6	20.5%	22.0%	29.7%	23.2%
6 to 9	19.4%	27.4%	22.4%	27.4%
9 to 12	18.3%	12.4%	15.1%	12.4%
12 to 15	9.1%	11.6%	8.1%	10.4%
>15	27.4%	17.4%	12.7%	17.0%

Conclusions: Alternative LCPT dosing strategies may result in a greater proportion of therapeutic first-dose trough concentrations in de-novo kidney transplant patients. In particular, dosing LCPT based upon IBW is predicted to reduce the likelihood of supratherapeutic first-dose trough concentrations.

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DISCLOSURES: J.D. Momper: Consulting Fee; Name of Commercial Interest; Veloxis Pharmaceuticals. Grant/Research Support; Name of Commercial Interest; Veloxis Pharmaceuticals. **S.J. Patel:** Salary; Name of Commercial Interest; Veloxis Pharmaceuticals. Salary; Nature of Relationship; Employee. **M.A. Moten:** Salary; Name of Commercial Interest; Veloxis Pharmaceuticals. Salary; Nature of Relationship; Employee. **D.R. Stevens:** Salary; Name of Commercial Interest; Veloxis Pharmaceuticals. Salary; Nature of Relationship; Employee. **U. Meier-Kriesche:** Salary; Name of Commercial Interest; Veloxis Pharmaceuticals. Salary; Nature of Relationship; Employee.

Abstract# 940

Evaluation of Empiric Extended-Release Tacrolimus Dosing in Adult Kidney Transplant Recipients

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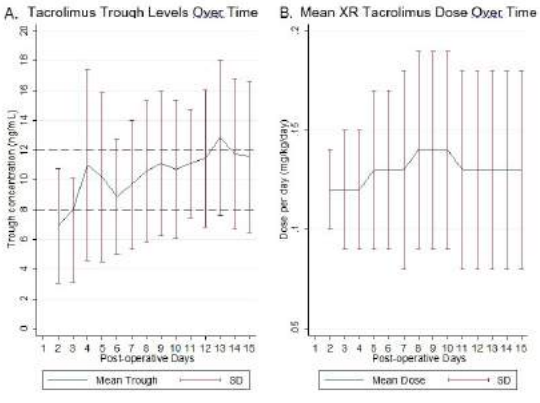
Purpose: Envarsus XR® (extended-release [XR] tacrolimus) is the standard of care tacrolimus formulation at our center for *de novo* maintenance immunosuppression in adult kidney transplant recipients (KTR). At our center, KTR empirically begin XR tacrolimus at a dose of 0.12 mg/kg/day. The purpose of this study is to evaluate weight-based dosing requirements at various times post-transplant.

Methods: This was an IRB-approved, single center retrospective analysis of adult patients who received a KT between 07/2019-07/2020. Patients were excluded if they received formulations other than XR tacrolimus or received medications known to interact with tacrolimus within the first two weeks following KT. The primary endpoint was the weight-based XR tacrolimus dose at first therapeutic tacrolimus trough level, defined as at least 2 consecutive trough levels between 8-12 ng/mL. Secondary endpoints included weight-based XR tacrolimus dose at postoperative days (POD) 7 and 14, and time to therapeutic tacrolimus trough level. Additional sub-group stratifications for sex, race, and weight were evaluated.

Results: A total of 141 KTR were identified. Median patient age was 57 (46-64) years. Patients were predominantly male (60%) and white (45%). Median BMI was 26.9 (22.3-30.5) kg/m^2. A total of 67 patients achieved a therapeutic tacrolimus trough level within the first 14 days following KT. Median weight-based XR tacrolimus dose at first therapeutic tacrolimus trough level was 0.12 (0.11-0.14) mg/kg/day and the median time to therapeutic trough level was 5 (4-9) days (Figure 1A and B). Median weight-based therapeutic XR tacrolimus doses on PODs 7 and 14 were 0.13 (0.1-0.17) and 0.13 (0.09-0.17) mg/kg/day, respectively. Median therapeutic weight-based XR tacrolimus dose for male patients was 0.13 (0.11-0.17) versus 0.12 (0.1-0.13) mg/kg/day for female patients (p=0.033). In patients with a BMI of <24, 24-29, and >29 kg/ m^2, the median therapeutic weight-based XR tacrolimus dose was 0.14 (0.12-0.17), 0.11 (0.1-0.14), and 0.12 (0.1-0.14) mg/kg/day, respectively (p=0.022). The therapeutic dose was 0.12 (0.1-0.15) for patients who were Caucasian, African American, Asian, and other ethnicities and 0.13 (0.12-0.18) for Hispanic patients (p=0.796).

Conclusions: XR tacrolimus starting doses of 0.12 mg/kg/day allowed for attainment of goal tacrolimus trough blood levels in most patients following KT. Accounting for patient gender and BMI when dosing XR tacrolimus may permit earlier achievement of therapeutic trough blood levels, however additional study is required to further evaluate this.

Figure 1:



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Abstract# 941

Obesity Impacts Acute Rejection but Not Allograft Function Improvement in the Setting of Belatacept Conversion

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Purpose: There is limited data regarding belatacept conversion in obese patients as an alternative to calcineurin inhibitor (CNI) immunosuppression. Pharmacokinetic (PK) data suggests increasing clearance and volume of central/peripheral compartments with increasing body weight. The purpose of this study is to compare rejection, allograft function, and infectious outcomes of obese versus non-obese renal transplant (RT) recipients converted to belatacept.

Methods: Adult RT recipients between 3/1/2018 - 5/30/2020 at the University of Illinois Hospital & Health Sciences System converted to belatacept were assessed. Patients who received multiorgan transplants or were lost to follow up were excluded. Belatacept was initiated at 10mg/kg on days 1, 5, 14, 28, and then every 4 weeks until week 16 where patients received 5mg/kg every 4 weeks. CNIs were tapered to discontinuation over 8 weeks. All patients were started on prednisone 10mg at conversion. Obese (body mass index [BMI] > 35 kg/m^2) and non-obese patients were compared. High immunologic risk was defined as PRA > 10%, presence of DSA at RT, and positive XM. Acute rejection (defined as biopsy proven acute rejection (BPAR) or empiric rejection treatment) was compared. Allograft function (measured by eGFR), BK viremia, CMV viremia, death-censored allograft survival, and patient death were also analyzed.

Results: A total of 38 RT recipients were included (25 [65.7%] non-obese patients and 13 [34.2%] obese patients (Table 1). Belatacept conversion occurred at a median of 48 days (IQR 24 - 127 days) post-transplant for predominantly nephrotoxicity/nephroprotection (78.9%). Acute rejection was significantly higher in obese patients after belatacept conversion (non-obese 12% vs obese 46.2%, p=0.019). Table 2 details rejection and allograft function. Figure 1 illustrates time to acute rejection survival curve analyses. Despite this there was no difference in eGFR. Incidence of post-transplant viremias were similar (Table 2).

Conclusions: Acute rejection was observed more frequently in the obese RT cohort without impact to allograft function. More studies examining the PK and clinical outcomes of belatacept in obese patients is warranted.

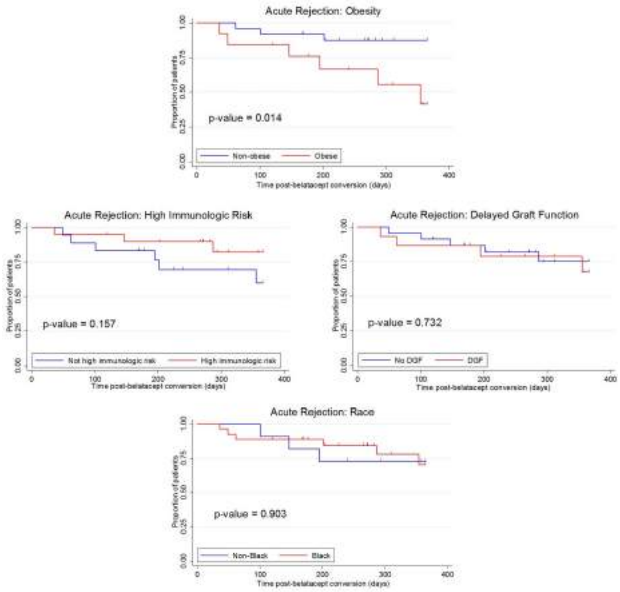
TABLE 1. Demographics, Immunosuppression, and Belatacept Conversion in formation

Variable	Overall (n=38)	Non-Obese (n=25)	Obese (n=13)	p-value
Baseline Recipient and Donor Demographics				
Age, mean years (SD)	52.8 (11.6)	53.4 (7.9)	52.6 (13.2)	0.832
Male, n (%)	25 (65.8)	8 (61.5)	17 (68.0)	0.690
African American, n (%)	27 (71.1)	19 (76.0)	8 (61.5)	0.351
Weight, mean kg (SD)	89.7 (29.2)	74.5 (22.5)	117.7 (16.7)	< 0.001
Body mass index, mean kg/m^2 (SD)	31.4 (9.6)	25.4 (4.7)	42.5 (5.4)	< 0.001
Pre-transplant DSA, n (%)	6 (15.8)	5 (20.0)	7 (7.7)	0.324
Peak PRA I, II > 10%, n (%)	20 (52.0)	14 (56.0)	6 (46.2)	0.564
Peak PRA I, II > 30%, n (%)	6 (24.0)	5 (27.8)	1 (14.3)	0.478
T/B cell flow cross match positive, n (%)	5 (13.2)	5 (20.0)	0 (0)	0.144
Deceased donor kidney transplant, n (%)	28 (73.7)	18 (72.0)	10 (76.7)	0.744
Donor DCD, n (%)	12 (42.9)	9 (50)	3 (30.0)	0.306
Median KDPI, % (SD)	62.3 (20.9)	65.3 (21.8)	56.9 (18.9)	0.318
Allograft function, n (%) Good immediate graft function Slow graft function Delayed graft function	 15 (39.5) 8 (21.1) 15 (39.5)	 12 (48.0) 4 (16.0) 9 (36.0)	 3 (23.1) 4 (31.8) 6 (46.2)	0.093
Duration of follow-up, days (IQR)	388 (266 – 611)	516 (396 – 700)	266 (203 – 311)	0.003
Death-censored allograft survival, n (%)	38 (100)	25 (100)	13 (100)	1.00
Patient death, n (%)	4 (10.5)	2 (8.0)	2 (15.4)	0.482
Immunosuppression Therapy				
Induction immunosuppression, n (%) Rabbit anti-thymocyte globulin	 33 (86.8)	 22 (88.0)	 11 (86.6)	 0.483
Pre-conversion maintenance immunosuppression, n (%) Tacrolimus Mycophenolic acid Chronic steroid	 37 (97.4) 34 (89.5) 13 (34.2)	 24 (96.0) 24 (96.0) 10 (40.0)	 13 (100) 10 (76.9) 3 (23.1)	 0.465 0.069 0.297
Belatacept Immunosuppression Conversion Characteristics				
Reason for conversion, nephrotoxicity/nephroprotection, n(%)	30 (78.9)	21 (84.0)	9 (69.2)	0.289
Conversion as a component of rejection treatment, n (%)	6 (15.8)	4 (16.0)	2 (15.4)	1.00
Time to belatacept conversion, median, (IQR), days	48 (24 – 127)	47 (26 – 127)	49 (16 – 92)	0.487

TABLE 2. Rejection, Allograft Function, and Infection Outcomes

Variable	Overall (n=38)	Non-Obese (n=25)	Obese (n=13)	p-value
Rejection and Allograft Function				
Acute rejection prior to belatacept conversion, n (%)	7 (18.4)	6 (24.0)	1 (7.7)	0.593
Acute rejection after belatacept conversion, n (%)	9 (23.7)	3 (12.0)	6 (46.2)	0.019
Acute rejection subtypes, n (%) Biopsy-proven acute rejection Empiric rejection	 6 (66.7) 3 (33.3)	 2 (8.0) 1 (4.0)	 4 (30.8) 2 (15.6)	 0.154 0.217
Median time to acute rejection after belatacept conversion, days (range)	147 (36 – 202)	101 (62 – 202)	171 (36 – 355)	0.796
Estimated eGFR, ml/min/m2 (IQR) At time of conversion 1 month post-conversion 3 month post-conversion 6 month post-conversion 12 month post-conversion	 28.9 (14.6 – 45.4) 42.1 (20.3 – 62.9) 47.1 (24.9 – 63) 47.2 (29.3 – 57.6) 43.6 (19.2 – 53.6)	 32.6 (14.6 – 49.2) 41.4 (20.3 – 64.5) 45.7 (22.1 – 64.5) 48 (30.5 – 57.2) 37.8 (16.1 – 57)	 22.1 (14.1 – 29.9) 42.1 (21.8 – 51.2) 52.6 (28 – 61.5) 47.1 (27.1 – 60) 47.8 (26.1 – 53.6)	 0.161 0.797 0.290 0.808 0.540
Percent improvement at 1 month post-conversion, % (IQR)	19.7% (-0.1% - 45.0%)	15.8% (-2.1% - 35.9%)	28.9% (10.2% - 45.0%)	0.274
Infection Outcomes				
CMV viremia after belatacept conversion, n (%)	6 (15.8)	5 (20.0)	1 (7.7)	0.324
BK viremia after belatacept conversion, n (%)	5 (13.2)	2 (8.0)	3 (23.1)	0.192

Figure 1. Time to Acute Rejection After Belatacept Conversion



CITATION INFORMATION: Pierce D., Benken J., West-Thielke P., Tzvetanov I., Benedetti E., Lichvar A. Obesity Impacts Acute Rejection but Not Allograft Function Improvement in the Setting of Belatacept Conversion *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Pierce: None. **J. Benken:** None. **P. West-Thielke:** None. **I. Tzvetanov:** None. **E. Benedetti:** None. **A. Lichvar:** None.

Abstract# 942

Kidney Transplant Outcomes Stratified by Race with a Calcineurin and Steroid Free Regimen

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Purpose: This study aimed to describe the outcomes, stratified by race, associated with belatacept and sirolimus immunosuppression after alemtuzumab induction.

Methods: This was a retrospective, single-center study analyzing the outcomes of kidney transplant recipients who received belatacept-sirolimus after alemtuzumab induction. To be included, patients must have received a kidney-only transplant between 1/1/2016 and 8/31/2019, be >/= 18 years old, and be EBV seropositive. The primary outcome was renal function (GFR by MDRD or CKD-EPI) at 1 year. Secondary outcomes were renal function at 3, 6, and 9 months, incidence of biopsy proven rejection (BPAR), patient/graft survival, incidence of infection and malignancy, and medication tolerability.

Results: Fifteen African American (AA) and 26 non-AA patients were included. The cohorts were well-matched, except for more deceased donor recipients and longer cold ischemic times in the AA cohort (see figure 1). At 1 year, median GFR was 60 mL/min in the AA cohort and 55.5 mL/min in the non-AA cohort (p=0.82) (see figures 2 and 3). Patient/graft survival was 100% overall. BPAR occurred in 3 patients (20%) in the AA group, 1 due to non-adherence and 1 to a decrease in immunosuppression due to BK viremia. No BPAR was seen in the non-AA group. Mouth ulcers and leukopenia were the most common ADRs (40% vs 46.2% and 20% vs 53.8%, respectively). Infection rates were similar between groups with CMV (6 patients in each) and BK viremia (3 vs 1 patient, respectively).

Conclusions: No significant differences between the AA and non-AA cohort were found in GFR at 1 year. Rejection occurred in 20% of patients, which is similar to prior studies with belatacept. The medication regimen was well tolerated with excellent patient/graft survival. In conclusion, race did not impact renal outcomes in patients who received this belatacept-based regimen.

Figure 1. Baseline Demographics

	AA (n=15)	Non-AA (n=26)	P-value
Age years, mean (SD)	48.7 (16.2)	48.6 (11.6)	0.98
Male, n (%)	8 (53.3)	19 (73.7)	0.31
Donor type, n (%)			0.006
Living	9 (60)	25 (96.2)	
Deceased	6 (40)	1 (3.8)	
Cold ischemic time, minutes, mean (SD)	580.2 (651.82)	179.0 (362.52)	0.015
HLA mismatches, mean (SD)	4.6 (1.64)	3.58 (1.53)	0.052
KDPI, median (IQR)±	47.5 (40.5-53)	84	NS
Etiology of ESRD, n (%)			0.48
Hypertension	2 (13.3)	1 (3.8)	
Diabetes mellitus	3 (20)	6 (23.1)	
Polycystic kidney disease	2 (13.3)	2 (7.7)	
IgA nephropathy	0 (0)	6 (23.1)	
Other*	8 (53.3)	11 (42.3)	

±Denotes 6 patients in AA group and 1 patient in the other group
*Other: chronic glomerulonephropathy, post-infectious glomerulonephropathy, focal segmental glomerulosclerosis, congenital nephropathy, etc.

Figure 2. Median GFR and Serum Creatinine (SCr) Stratified by Race Over 1 Year Follow-up

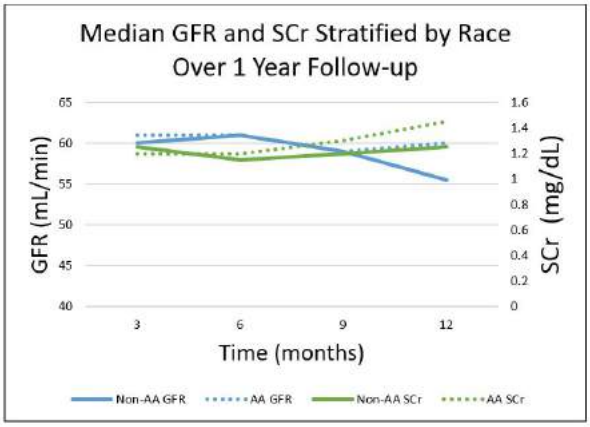

Figure 3. Outcomes

	AA (n=15)	Non-AA (n=26)	P-value
GFR at 1 year, MDRD/CKD-EPI, median (IQR)	60 (52-61)	55.5 (43.5-61)	0.82
SCr at 1 year, median (IQR)	1.45 (1.05-1.68)	1.25 (1.1-1.7)	0.77
DGF, n (%)	1 (6.7)	0 (0)	NS
BPAR within 1 year, n (%)*	3 (20)	0 (0)	0.04
De novo DSA, n (%)*	3 (20)	0 (0)	0.04
Patient survival at 1 year, n (%)	15 (100)	26 (100)	NS
Graft survival at 1 year, n (%)	15 (100)	26 (100)	NS

* One patient missed 2 doses of belatacept and one patient developed BK viremia and immunosuppression was lowered

CITATION INFORMATION: Scalzo R., Harris M., Morris J., Byrns J. Kidney Transplant Outcomes Stratified by Race with a Calcineurin and Steroid Free Regimen *AJT, Volume 21 Supplement 3*
DISCLOSURES: R.E. Scalzo: None. **M.T. Harris:** None. **J.D. Morris:** None. **J.S. Byrns:** None.

Abstract# 943

Kidney Transplant Outcomes Stratified by Age with a Calcineurin and Steroid Free Regimen

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Purpose: To evaluate the impact of an alemtuzumab, belatacept, and sirolimus based regimen on renal function stratified by age in kidney transplant (KT) patients.
Methods: This was a single center, retrospective analysis of KT patients receiving alemtuzumab for induction with denovo belatacept/sirolimus between 2016-2019. Cohorts included patients who were <55 years old (yo) versus >/=55 yo, received a KT alone, were >/=18 years, and EBV seropositive. The primary endpoint was GFR (MDRD or CKD-EPI) at 12 months (m). Secondary endpoints were GFR at 3, 6, 9m, incidence of biopsy proven acute rejection (BPAR), patient/graft survival at 12m, incidence of malignancy and infection, and medication tolerability. Descriptive statistics were performed.
Results: Forty one patients (n=27 in <55 yo and n=14 in >/=55 yo) were included. Baseline demographics were similar between groups (figure 1) except for age. GFR at 12m was similar (51.5 ml/min vs 57.5 ml/min, respectively, p=0.32) (figure 2 and 3). Serum creatinine at 12m was higher in the <55 yo group (1.5 vs 1.1, respectively, p=0.02). BPAR and patient/graft survival were not different between groups. CMV viremia occurred in 6 patients in each group (22.2% vs 42.9%, respectively) and BK viremia occurred in 8 patients in the <55 yo group versus 3 in the >/=55 yo group. The most common infection was urinary tract infections (18.5% vs 14.3%, respectively). Malignancy occurred in 1 patient. The medication regimen was well tolerated with mouth ulcers (40.7% vs 42.9%, respectively) and leukopenia (66.7% vs 71.4%, respectively) as the most common ADR.
Conclusions: Renal function by MDRD was preserved in both groups regardless of age in those receiving a maintenance regimen of belatacept/sirolimus after alemtuzumab induction. The regimen was well tolerated with excellent patient/graft survival.

Figure 1. Demographics

	< 55 years old (N=27)	>/= 55 years old (N=14)	p-value
Age yrs, mean (SD)	41.3 (9.9)	62.7 (4.68)	0.0001
Male, n (%)	18 (66.7)	9 (64.3)	1.00
Race, n (%)			0.79
Caucasian	16 (59.3)	9 (64.3)	
African American	10 (37.0)	5 (35.7)	
Other	1 (3.7)	0 (0)	
Donor Type, n (%)			0.39
Living	21 (77.8)	13 (92.9)	
Deceased	6 (22.2)	1 (7.2)	
CIT min, mean (SD)	358.2 (540.2)	263.2 (487.9)	0.58
HLA mismatches, mean (SD)	4 (1.59)	4.07 (1.82)	0.89
KDPI, median (IQR)±	47.5 (40.5-53)	84	NS
Etiology of ESRD, n (%)			0.47
Hypertension	2 (7.4)	1 (7.2)	
Diabetes Mellitus	3 (7.4)	6 (42.9)	
Polycystic kidney	2 (7.4)	2 (14.3)	
IgA nephropathy	3 (11.1)	3 (21.4)	
Other*	17 (62.7)	2 (14.3)	

± Denotes 6 patients in <55 year old group and 1 patient in the >/= 55 year old group
* Other: chronic glomerulonephropathy, post-infectious glomerulonephropathy, focal segmental glomerulosclerosis, congenital nephropathy, etc.

Figure 2. Median GFR and SCr over 12 m by Age Group

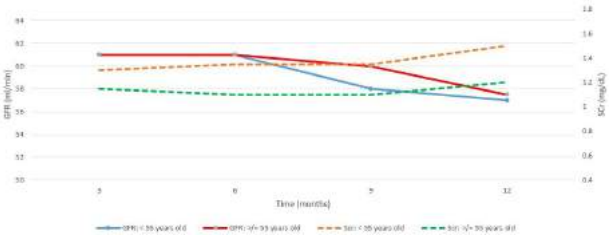

Figure 3. Outcomes

	< 55 years old (N=27)	>/= 55 years old (N=14)	p-value
GFR at 12m, MDRD/CKD-EPI, median (IQR)	51.5 (41-61)	57.5 (52.3-64.8)	0.32
Serum creatinine at 12m, median (IQR)	1.5 (1.2-1.7)	1.1 (1-1.3)	0.02
DGF, n (%)	1 (3.7)	0	NS
BPAR within 12m, n (%)*	3 (11.1)	0	0.54
Denovo DSA, n (%)*	3 (11.1)	0	0.54
Patient Survival at 12m, n (%)	27 (100)	14 (100)	NS
Graft survival at 12m, n (%)	27 (100)	14 (100)	NS

*One patient missed 2 doses of belatacept and one patient developed BK viremia and immunosuppression was lowered

CITATION INFORMATION: Scalzo R., Harris M., Morris J., Byrns J. Kidney Transplant Outcomes Stratified by Age with a Calcineurin and Steroid Free Regimen *AJT, Volume 21 Supplement 3*
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Abstract# 944

Sharp Anti-HLA Antibody Development Due to Concomitant Graft Nephrectomy and Immunosuppression Withdrawal After Early Graft Loss

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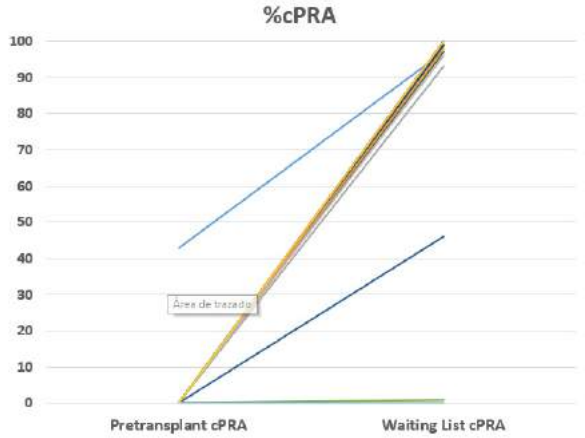
Purpose: The number of patients awaiting for retransplantation has been progressively increasing. The presence of anti-HLA antibodies can significantly lengthen the waiting time, limiting the access for a new transplant and increase the risk of graft rejection and failure. Risk factors for HLA sensitization are withdrawal of immunosuppression (IS) and graft nephrectomy (GN). GN is usually a non-elective procedure performed after early graft loss, mostly related to surgical complications or severe rejection. Currently there is no consensus on the discontinuation of immunosuppressive therapy after early graft nephrectomy.

Methods: Between 2014 and 2020 17 kidney grafts were removed at our center after early loss due to vascular thrombosis or bleeding. In 15 isolated kidney transplants (IKT), tacrolimus and mycophenolate were immediately withdrawn after GN and steroids were tapered in two weeks. In 2 simultaneous pancreas-kidney transplants (SPK) IS was maintained to preserve pancreas graft function. Anti-HLA antibodies were tested six months after graft loss using *Single Antigen* test. Calculated panel-reactive antibody (cPRA) was estimated using Virtual PRA Eurotransplant Calculator.

Results: Pretransplant cPRA was 0% in all recipients but one (43%). Median cPRA 6-mo after GN was 98% (IQR 93%-99%), whereas both SPK transplants remained at 0%. Median difference between pretransplant and 6-mo post GN cPRA was 98% (IQR 54%-99%). Only 3 patients (20%) had a cPRA below 50% at the end of the study period (isolated kidney graft). Age, gender or induction therapy did not relate to development of anti-HLA antibodies (p = 0.712) whereas the presence of 2 DR-mismatches showed a higher trend to increased cPRA (98%±2% *vs* 57%±44%, p=0.072). Neither age nor gender related to a higher increase of cPRA.

Conclusions: Early GN with rapid IS elimination is associated with almost universal severe HLA sensitization. This effect might be a direct consequence of IS elimination as it is not observed when IS is maintained. This fact should be considered when a new kidney transplant might be an option in the short/mid-term. Risk/benefit balance of IS maintenance on dialysis should be evaluated and it might be beneficial in selected cases.



CITATION INFORMATION: Valero R., Aguilera A., Rodrigo E., San Segundo D., Lopez-Hoyos M., Ruiz J. Sharp Anti-HLA Antibody Development Due to Concomitant Graft Nephrectomy and Immunosuppression Withdrawal After Early Graft Loss *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Valero: None. **A. Aguilera:** None. **E. Rodrigo:** None. **D. San Segundo:** None. **M. Lopez-Hoyos:** None. **J. Ruiz:** None.

Abstract# 945

Tolerability of Mycophenolate Mofetil in Elderly Kidney Transplant Recipients: A Retrospective Cohort Study

S. Witek[1], G. Malat[2], D. Sawinski[2], C. Sammons[2], C. LaFratte[1], A. Forte[1], R. Samudralwar[1], S. Lyle[1], J. Rashid[1], J. Trofe-Clark[2], *[1]Dept of Pharmacy, Hospital of the Univ of Pennsylvania, Philadelphia, PA, [2]Penn Transplant Institute, Hospital of the Univ of Pennsylvania, Philadelphia, PA*

Purpose: Optimal immunosuppression in elderly kidney transplant recipients (KTRs) is not well-defined, with MMF being poorly tolerated at standard doses. This study aims to compare MMF dose reduction incidence and reason(s) in elderly vs. non-elderly KTRs in the first yr after transplant with a protocol dose of 1g/day.

Methods: In this IRB-approved, single-center retrospective cohort study, KTRs receiving rabbit antithymocyte globulin (rATG) induction, MMF 1g/day, tacrolimus, and prednisone, with ≥ 6 mos f/u were stratified by age [≥ 60 (elderly) or < 60 yrs (non-elderly)]. Only 1st or 2nd KTRs alone were considered. Primary outcome was MMF dose reduction incidence in the first yr, reviewed at defined intervals. Secondary outcomes include the indication for dose reduction, 1-yr patient/graft survival, and graft function.

Results: An interim analysis included 133 KTRs (elderly n=51, non-elderly n=82). Groups were similar in demographics except for more living donors and lower kidney donor profile index (KDPI) in the non-elderly group (Table 1). MMF dose reductions occurred in 32 elderly and 50 non-elderly KTRs during the first yr (61% vs 63%, p=0.86) for reasons mentioned in Table 2. Most dose reductions occurred within 2 mos (elderly 31% vs. non-elderly 32%) with nearly all occurring between mos 2-6 (84% and 82%). At 1 yr, 47% elderly and 49% non-elderly were on MMF 1g/day (p=0.86), 6% and 13% were on 500mg/day (p=0.25), and 45% and 35% were on 0mg/day (p=0.28). There were no differences in 1-yr patient/graft survival or graft function.

Table 1: Baseline Characteristics

Characteristic	Elderly (N=51)	Non-elderly (N=82)	p-value
Age, median (IQR)	64 (61-67)	47 (38-52)	< 0.005
Prior kidney transplant, n (%)	2 (3.9)	7 (8.5)	0.48
Female, n (%)	22 (43.1)	35 (42.7)	1
Caucasian, n (%)	31 (60.8)	49 (59.8)	1
Dialysis pre-transplant, n (%)	37 (72.5)	62 (75.6)	0.69
Deceased donor, n (%)	36 (70.6)	42 (51.2)	0.03
KDPI, median (IQR)	52 (40-74)	37 (20-59)	0.01
DGF, n (%)	20 (39.2)	21 (25.6)	0.12

Table 2: Reasons for MMF Dose Reduction

Rationale	Elderly (n=32) n (%)	Non-elderly (n=50) n (%)	p-value
Gastrointestinal	9 (28)	9 (18)	0.29
Leukopenia (WBC < 3k/mcL)	11 (34)	30 (60)	0.08
BK virus	5 (16)	4 (8)	0.30
CMV	4 (13)	1 (2)	0.07
Non-opportunistic infection	0	3 (6)	0.28
Other	3 (9)	3 (6)	0.68

Conclusions: In this interim analysis, there was no difference in MMF dose reduction incidence between elderly vs non-elderly KTRs using 1g/day with rATG induction. Most dose reductions occurred in the first 6 mos post-transplant. The elderly KTR group more commonly required MMF dose reductions secondary to GI side effects and viral infections, including BK and CMV, although not statistically significant. Continued data collection/analysis is necessary to further elucidate this trend.

CITATION INFORMATION: Witek S., Malat G., Sawinski D., Sammons C., LaFratte C., Forte A., Samudralwar R., Lyle S., Rashid J., Trofe-Clark J. Tolerability of Mycophenolate Mofetil in Elderly Kidney Transplant Recipients: A Retrospective Cohort Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Witek: None. **G. Malat:** None. **D. Sawinski:** Honoraria; Name of Commercial Interest; Veloxis Pharmaceuticals, CareDx, Natera. Honoraria; Nature of Relationship; Advisory Committee Member, Advisory Committee Member, Advisory Committee Member. **C. Sammons:** Consulting Fee; Name of Commercial Interest; Mallinckrodt Pharmaceuticals. Consulting Fee; Nature of Relationship; Speaker Bureau. **C. LaFratte:** None. **A. Forte:** None. **R. Samudralwar:** None. **S. Lyle:** None. **J. Rashid:** None. **J. Trofe-Clark:** Consulting Fee; Name of Commercial Interest; MedActionPlan. Consulting Fee; Nature of Relationship; Consultant Agreement. Grant/Research Support; Name of Commercial Interest; Veloxis Pharmaceuticals. Grant/Research Support; Nature of Relationship; Grant funding received by institution. Honoraria; Name of Commercial Interest; Veloxis Pharmaceuticals, CareDx. Honoraria; Nature of Relationship; Speaker/Speaker's Bureau, Advisory Committee Member.

Abstract# 946

Tacrolimus Variability Score Outperforms Coefficient of Variation in Predicting Clinical Outcomes of Living Kidney Transplantation

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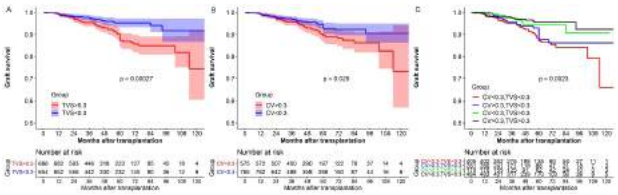
Purpose: Intra-patient variability (IPV) was previously defined as coefficient of variation (CV) or standard deviation of Tacrolimus (Tac) exposure while none of them was easily being interpreted and translated into clinical practice after kidney transplantation (KT).

Methods: We developed a novel Tac variability score (TVS) to evaluate IPV by calculating the frequency of clinically significant changes of Tac trough levels after KT. Multivariate Cox proportional analyses were conducted to compare the impact of TVS and CV on transplant outcomes.

Results: A total of 1343 patients were divided into high TVS (>0.30) and low TVS (<0.30) groups, and low CV (<0.30) and high CV (>0.30) groups. Univariate analyses showed that high TVS (HR: 2.323, 95%CI: 1.455-3.709) and high CV (HR: 1.606, 95%CI: 1.044-2.471) were associated with inferior graft survival. However, only TVS was an independent predictor for graft failure in multivariate analyses (HR: 1.972, 95%CI: 1.2-3.24), and the correlation maintained in high CV (P=0.020) and low CV (P=0.037) subgroups, while CV failed to predict graft loss in neither low

(P=0.387) nor high TVS (P=0.600) subgroups. In addition, TVS had a higher correlation with graft survival in patients with Tac exposure within the therapeutic range and the correlation was less influenced by mean Tac trough levels.

Conclusions: TVS is a novel measure of Tac IPV with higher correlation with graft survival and more convenience in clinical use than CV after kidney transplantation.



CITATION INFORMATION: Yin S., Song T., Zhong Q., Lin T. Tacrolimus Variability Score Outperforms Coefficient of Variation in Predicting Clinical Outcomes of Living Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Yin: None. **T. Song:** None. **Q. Zhong:** None. **T. Lin:** None.

Kidney

Kidney Living Donor: Long Term Outcomes

Abstract# 947

Frailty Component Trajectories Among Kidney Transplant Recipients

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Purpose: Frailty is associated with decreased access to kidney transplantation (KT) and poor post-KT outcomes. Little is known about how an acute stressor, like KT, can impact the five physical frailty phenotype (PFP) criteria.

Methods: We conducted a two-center prospective cohort study (2009-2019) of adult patients undergoing KT. PFP criteria were measured at KT admission, 1 month, 3 months, 6 months, 1 year, and annually thereafter post-KT. We used adjusted mixed effects models with fixed and random effects for person and time to describe repeated measures of continuous criteria components (weight, gait speed, grip strength, activity). We used an adjusted generalized estimating equation to quantify longitudinal, binomial response patterns of exhaustion.

Results: Among 1,410 KT recipients (mean age=53) followed for a mean of 1.9 years (IQR=0.1-3.2), 46.3% had low activity, 46.6% weakness, 28.9% exhaustion, 16.2% slowness, and 14.2% unintentional weight loss at KT admission. Among continuous components, weight worsened (0.4lb/month, 95%CI:0.3,0.5), while grip strength (0.16kg/month, 95%CI: 0.13,0.19) and activity (23.9Kcal/month, 95%CI:17.5,30.2) improved post-KT; gait speed remained stable (-0.005s/month, 95%CI:-0.01,0.003). Additionally, recipients were less likely to transition to being exhausted (OR=0.99, 95%CI:0.98,1.00). Weight trajectories differed by age, such that older recipients (≥65years) experienced weight gain (0.5lb/month,95%CI:0.4,0.6), while younger recipients (<65years) remained stable (0.1lb/month,95%CI:-0.1,0.3; p-interaction=0.003).

Conclusions: After undergoing a common surgical stressor, KT recipients demonstrated weight gain as well as improvements in strength and activity. Despite benefits of restoration of kidney function, clinicians should consider monitoring KT recipients for persistent weight gain and slowness post-KT, particularly among older adults.

Table. Adjusted estimates of frailty components trajectories post-KT overall and by age among kidney transplant (KT) recipients (n=1,410). Mixed effects models for continuous components (weight, grip strength, gait speed, activity) and generalized estimating equations for dichotomous components (exhaustion) were used to estimate level and change of each frailty component in separate models. All models were adjusted for age, sex, race, cause of ESKD, years on dialysis, diabetes status, and donor type. Intergroup differences and monthly changes that are statistically significant at p<0.05 are bolded.

Subgroup	Level (95% CI)			Monthly change (95% CI)			
	At KT	30 months post-KT	60 months post-KT	0-30 months post-KT	p-value	30-60 months post-KT	p-value
Weight (pounds)	194.3 (187.6, 201.0)	206.1 (199.0, 213.2)	206.0 (197.7, 214.2)	**0.39 (0.30, 0.48)**	**<0.001**	-0.003 (-0.17, 0.16)	0.97
Age							
≥ 65 years	1944.4 (187.0, 201.9)	197.2 (187.9, 206.5)	200.5 (184.8, 216.1)	0.09 (-0.12, 0.31)	0.40	0.11 (-0.38, 0.59)	0.66
18-64 years	197.5 (190.2, 204.7)	211.1 (203.4, 218.8)	210.3 (201.5, 219.2)	**0.45 (0.36, 0.55)**	**<0.001**	-0.03 (-0.20, 0.15)	0.78
Difference	-3.0 (-10.0, 4.0)	-13.9 (-23.2, -4.6)	-9.9 (-26.2, 6.4)	**-0.36 (-0.60, -0.12)**	**0.003**	0.13 (-0.38, 0.65)	0.61
Grip strength (kilograms)	31.7 (30.2, 33.2)	36.5 (34.9, 38.2)	34.4 (32.4, 365.5)	**0.16 (0.13, 0.19)**	**<0.001**	**-0.07 (-0.12, -0.01)**	**0.01**
Age							
≥ 65 years	27.5 (25.8, 29.3)	30.4 (27.9, 32.9)	24.9 (20.3, 29.4)	**0.10 (0.02, 0.17)**	**0.01**	**-0.18 (-0.35, -0.02)**	**0.03**
18-64 years	32.8 (31.1, 34.4)	38.0 (36.2, 39.8)	36.2 (34.0, 38.4)	**0.17 (0.14, 0.20)**	**<0.001**	**-0.06 (-0.12, -0.005)**	**0.03**
Difference	-5.2 (-6.9, -3.6)	-7.6 (-10.1, -5.0)	-11.3 (-16.1, -6.5)	-0.08 (-0.16, 0.001)	0.05	-0.12 (-0.30, 0.05)	0.16
Gait speed (seconds)	4.9 (4.6, 5.2)	4.8 (4.4, 5.1)	4.7 (4.2, 5.2)	-0.005 (-0.01, 0.003)	0.20	-0.003 (-0.02, 0.01)	0.69
Age							
≥ 65 years	5.6 (5.3, 5.9)	6.0 (5.3, 6.6)	50.2 (4.0, 6.3)	0.01 (-0.01, 0.03)	0.22	-0.03 (-0.07, 0.02)	0.23
18-64 years	4.7 (4.4, 5.1)	4.5 (4.1, 4.9)	4.5 (4.0, 5.0)	-0.01 (-0.02, 0.0002)	0.06	0.0005 (-0.01, 0.01)	0.95
Difference	0.9 (0.6, 1.2)	1.5 (8.3, 2.1)	0.7 (-0.5, 1.9)	0.02 (-0.001, 0.04)	0.06	-0.03 (-0.07, 0.02)	0.24
Activity (Kcal/week)	867.2 (661.7, 1072.7)	1583.19 (1321.8, 1844.6)	975.1 (808.2, 1341.9)	**23.9 (17.5, 30.2)**	**<0.001**	**-20.3 (-32.3, -8.2)**	**0.001**
Age							
≥ 65 years	715.6 (481.2, 949.9)	1688.5 (1229.4, 2147.5)	868.1 (-44.1, 1780.2)	**32.4 (16.7, 48.1)**	**<0.001**	-27.3 (-61.3, 6.6)	0.11
18-64 years	924.1 (699.9, 1148.3)	1588.7 (1302.5, 1874.9)	1021.0 (627.6, 1414.5)	**22.2 (15.2, 29.1)**	**<0.001**	**-18.9 (-31.8, -6.0)**	**0.004**
Difference	-208.5 (-430.2, 13.2)	99.8 (-388.7, 588.2)	-153.0 (-1118.4, 812.5)	10.3 (-6.9, 27.5)	0.24	-8.4 (-44.7, 27.9)	0.65
Exhaustion (odds)	0.34 (0.27, 0.44)	0.23 (0.17, 0.32)	0.28 (0.18, 0.44)	**0.99 (0.98, 1.00)**	**0.002**	1.01 (0.99, 1.02)	0.38
Age							
≥ 65 years	0.24 (0.17, 0.33)	0.42 (0.24, 0.73)	0.46 (0.16, 1.37)	1.02 (1.00, 1.04)	0.11	1.00 (0.96, 1.05)	0.87
18-64 years	0.32 (0.25, 0.42)	0.30 (0.21, 0.42)	0.36 (0.22, 0.59)	1.00 (0.99, 1.01)	0.61	1.01 (0.99, 1.03)	0.49
Odds Ratio	0.74 (0.54, 1.02)	1.40 (0.76, 2.58)	1.28 (0.40, 4.07)	1.02 (1.00, 1.05)	0.09	1.00 (0.95, 1.05)	0.91

CITATION INFORMATION: Chu N., Chen X., Segev D., McAdams-DeMarco M. Frailty Component Trajectories Among Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Chu: None. **X. Chen:** None. **D. Segev:** None. **M. McAdams-DeMarco:** None.

Abstract# 948

Different Levels of GFR of Retained Kidney on the Long-term Safety of the Donors in Living-related Renal Transplantation

M. Dou, P. Tian, B. Zheng, G. Deng, Y. Shi, C. Ding, *The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China*

Purpose: To summarize the long-term safety of different levels of GFR of retained kidney among living-related donors.Health status,postoperative recovery,and postoperative complications were compared and analyzed.

Methods: A total of 512 living donors in our kidney transplantation center from 1999 to 2018 were enrolled into this study.The donors were divided into three groups according to donor retained kidney GFR level(GFR<45ml/min;45ml/min≤GFR<50ml/min;GFR≥50ml/min).The predonation retained kidney GFR was measured by 99mTC-DTPA.The recovery of kidney function and complications of the donor after surgery were evaluated.

Results: 163 donors were excluded because of incomplete data.A total of 349 cases were included in this study,All donors were healthy with no kidney failure.The longest postoperative follow-up time was 20 years,The median follow-up time was 8.3 years.No significant difference was observed in the incidence of postoperative hypertension and urine protein among the three groups of donors.The postoperative Scr of GFR≥50ml/min group at 1 week,1month,3 months,3 years,5 years,10 years was higher compared with the GFR<45ml/min group,and the difference of Scr and eGFR at 1 week,3 months was significantly different(P<0.05).The GFR(measured by 99mTC-DTPA)of three groups of donors more than 10 years were not significantly different.

Conclusions: Living-related donors have good long-term safety after donation.For donors with preoperative total GFR≥80ml/min,the level of retained renal GFR affects the donor's early renal function ,while donors with high retained kidney GFR have higher eGFR level and lower Scr level ,but the donor's retained renal GFR level does not affect the donor Long-term renal function and complication rate after donation.

CITATION INFORMATION: Dou M., Tian P., Zheng B., Deng G., Shi Y., Ding C. Different Levels of GFR of Retained Kidney on the Long-term Safety of the Donors in Living-related Renal Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Dou: None. **P. Tian:** None. **B. Zheng:** None. **G. Deng:** None. **Y. Shi:** None. **C. Ding:** None.

Abstract# 949

Factors Affecting Sensitization Following Kidney Allograft Failure

N. Garg, L. Hidalgo, S. Parajuli, F. Aziz, M. Mohamed, A. Djamali, D. Mandelbrot, *UW Madison, Madison, WI*

Purpose: Kidney transplant (KT) recipients with failed allografts constitute nearly 12% of the current waitlist in the US. Sensitization as a result of graft failure (GF) leads to longer wait-times and lower repeat KT rates. In addition, repeat KT in the setting of preexisting DSA may contribute to worse outcomes. This study explored factors affecting sensitization following GF.

Methods: Inclusion criteria included 1) index KT between 7/2009 and 6/2019, 2) GF between 1/2016 and 6/2020, and 3) repeat transplant evaluation including cPRA analysis after GF. The most recent available cPRA value was used for analysis. Among those with pre-index KT cPRA of ≤ 50, analyses were done to identify risk factors for 1) increase in cPRA (delta cPRA) of ≥ 50-points, and 2) sensitization to cPRA of ≥ 98.

Results: 55 KTs, 14% of which were simultaneous pancreas kidney transplants, met our inclusion criteria. Median (range) pre-index KT cPRA was 0 (0-100), post-GF cPRA was 85 (0-100), and time from GF to most recent cPRA was 14.5 months (1.5-50.8). Most patients were on triple immunosuppression prior to GF. Steroids were continued in 85%, calcineurin inhibitor (CNI) in 58%, and antimetabolite in 31%. Among 45 KTs with pre-transplant cPRA ≤ 50, univariate analysis showed that those with delta cPRA ≥ 50 were less likely to be SPK recipients (4% vs 32%, p=0.02), and less likely to have been continued on steroid (65% vs 100%, p=0.004), CNI (30% vs 86%, p<0.001), or antimetabolite after GF (17% vs 50%, p=0.03). There was no difference in age, sex, race, blood type, ESKD etiology, HLA mismatches, induction or maintenance immunosuppression, time from transplant to GF or nephrectomy rates between the two groups. Ongoing CNI use after GF was protective against delta cPRA ≥ 50 (Odds ratio (OR) 0.12, p=0.02), and benefit associated with ongoing steroid approached statistical significance (OR 0.13, p=0.07). Using delta cPRA as a continuous variable, linear regression modeling yielded similar results for ongoing CNI use (p=0.003) and ongoing steroid use (p=0.03). In another analysis evaluating sensitization to cPRA ≥ 98, ongoing CNI use was the only protective variable (OR 0.07, p=0.009).

Conclusions: Continuing CNI and steroids are associated with significantly lower risk of sensitization after kidney allograft failure. CNIs appear to be particularly important in preventing sensitization to cPRA ≥ 98.

CITATION INFORMATION: Garg N., Hidalgo L., Parajuli S., Aziz F., Mohamed M., Djamali A., Mandelbrot D. Factors Affecting Sensitization Following Kidney Allograft Failure *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Garg: ; CareDx. **L. Hidalgo:** None. **S. Parajuli:** None. **F. Aziz:** None. **M. Mohamed:** None. **A. Djamali:** None. **D. Mandelbrot:** None.

Abstract# 950

Pill Burden in Belatacept versus Tacrolimus-Based Immunosuppression

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Purpose: Medication non-adherence is a major barrier amongst renal transplant recipients, and improvement can be seen after reduction in pill burden. Belatacept versus tacrolimus-based immunosuppression has shown renal preservation and improved cardiovascular and metabolic outcomes. We aimed to compare the daily pill burden in patients on belatacept versus tacrolimus-based regimens.

Methods: We performed a single center retrospective analysis of kidney transplant recipients who were transplanted January 2017 through January 2019. Patients with failed allograft, death, or <1 year of follow-up were excluded from the study. Using t-tests and ANOVA, we compared 4 groups based on immunosuppression regimen: belatacept, tacrolimus, tacrolimus to belatacept conversion, and belatacept to tacrolimus conversion.

Results: 432 patients were included in this study: belatacept (n=74), tacrolimus (n=330), conversion to belatacept (n=21), and conversion to tacrolimus (n=7). All groups were similar in demographics. (TABLE1). The number of oral medications and daily pill burden at discharge was similar across all groups. A significant reduction in number of medications [Median 8 (IQR 6-11) pills, **p 0.001**] and pill burden [Median 11(IQR 9-15) pills, **p<<0.001**] was observed amongst recipients on belatacept. A reduction in number of medications [Median 7(IQR 5-9) pills, **p 0.001**] and daily pill burden [Median 11 (IQR 7-15) pills, **p<0.001**] was also observed in patients converted from tacrolimus to belatacept. Reduction in pill burden in belatacept groups was seen even if stratified by age group (Table 2).

TABLE 1.Characteristics by immunosuppression protocol

Total N=432	Belatacept (n=74)	Tacrolimus (n=330)	Conversion to belatacept (n=21)	Conversion to tacrolimus (n=7)	p-value
Median Age (IQR)	53(43-60)	51(42-59)	46(38-66)	50(40-58)	0.67
Male (%)	41	196	2	15	0.37
Black (%)	38	176	3	11	0.45
Time to Follow up(IQR)	22(18-38)	28(24-34)	29(23-35)	35(23-37)	0.25
Post-transplant					
Median Number or medications	12(10-13)	12(10-13)	11(9-13)	13(11-14)	0.16
Daily Pill Burden	19(16-23)	21(17-25)	18(15-22)	18(17-23)	0.03
At last visit					
Median Number or medications	8(6-11)	10(8-12)	7(5-9)	11(10-13)	**0.001**
Daily Pill Burden	11(9-15)	17(13-20)	11(7-15)	22(17-28)	**<0.001**

TABLE 2. Pill burden at follow up by age (IQR)

	Belatacept	Tacrolimus	Conversion to belatacept	Conversion to tacrolimus	p-value
<40 yrs	10 (6-11)	15 (11-18)	15 (10-17)	22 (18-25)	**0.003**
40-60 yrs	12 (10-15)	17 (13-21)	9 (7-14)	16 (12-19)	**<0.001**
>60 yrs	13 (11-18)	17 (14-22)	13 (12-14)	27 (24-29)	**0.005**

Conclusions: Belatacept should be the immunosuppression of choice amongst all eligible kidney transplant recipients to reduce pill burden and potentially improve medication adherence.

CITATION INFORMATION: Gattis S., Lakhani L., Basu A. Pill Burden in Belatacept versus Tacrolimus-Based Immunosuppression *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Gattis: None. **L. Lakhani:** None. **A. Basu:** None.

Abstract# 951

Creatinine Reduction Ratio at 2 Postoperative Day as a Predicting Factor of Long-Term Outcomes After Living Donor Kidney Transplantation

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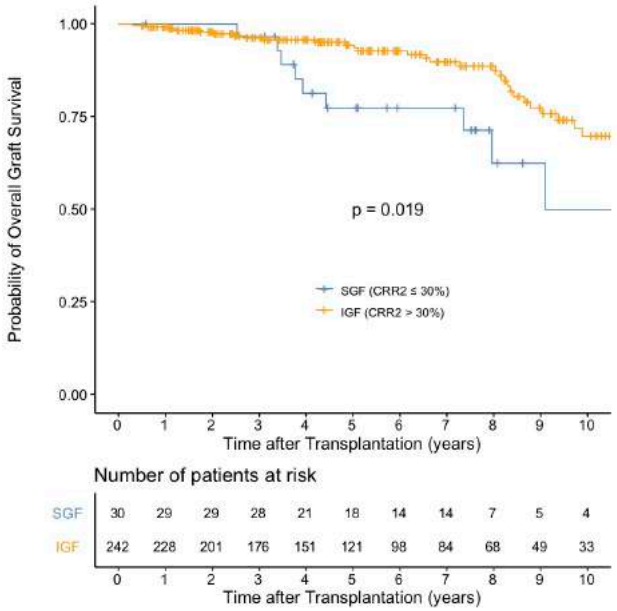
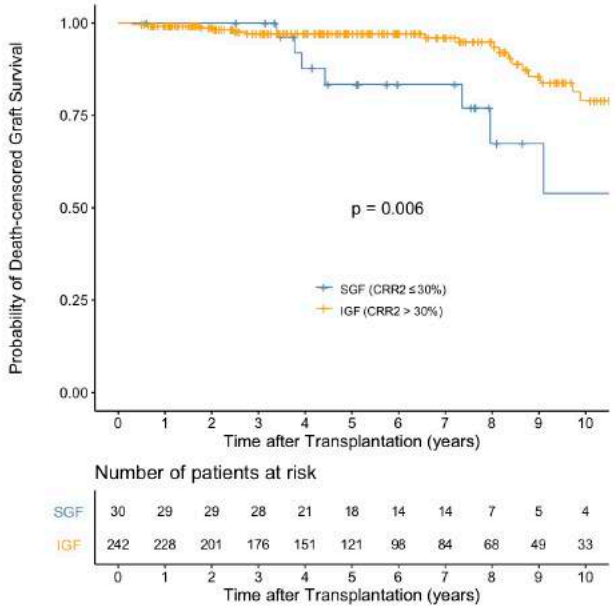
Purpose: Creatinine reduction ratio from 1 to 2 postoperative days (CRR2) under 30% has been defined as a slow graft function (SGF) and used to predict long-term graft outcomes in some studies involving deceased donor kidney transplantation. However, the usefulness of the parameter involving living donor kidney transplantation (LDKT) remains uncertain. We retrospectively evaluated the relationship between CRR2 and graft survivals after LDKT and the risk factor for SGF.

Methods: Clinical data on patients who underwent LDKT at Jichi Medical University Hospital in 2006-2019 were extracted from the medical records. After excluding patients who needed reoperation, dialysis, or anti-rejection therapy within 1 week after transplantation, patients were divided into 2 groups: immediate graft function (IGF) defined as patients with CRR2 > 30%, and SGF defined as patients with CRR2 ≤ 30%. CRR2 was calculated by the formula: (Cre1 - Cre2)×100/Cre1 (Cre1 and Cre2 refered serum creatinine level 1 and 2 postoperative days after transplantation).

Results: Of the 272 patients, 242 were IGF group and 30 were SGF group. Regarding the relationship between CRR2 and graft survivals, the log-rank test and multivariate Cox proportional hazards regression analyses showed a significantly higher incidence of overall and death-censored graft loss in SGF group (Hazard ratio = 2.5 and 2.8, p = 0.025 and 0.035, respectively), after adjusting for background characteristics including age, sex, duration of dialysis, ABO compatibility, donor-specific antibody positivity, and medically complex donor. Regarding the risk factor for SGF, in the logistic regression analysis using the aforementioned covariates and intraoperative factors including total ischemia time, warm ischemia time, renal artery reconstruction, and right donor kidney, using 225 complete cases without missing value, only renal artery reconstruction was associated with SGF (Odds ratio = 2.8, p = 0.043).

Conclusions: CRR2 as a definition of SGF could be used to predict long-term graft outcomes. Renal artery reconstruction could be the risk factor for SGF.





CITATION INFORMATION: Kinoshita Y., Shinzato T., Shimizu T., Iwami D. Creatinine Reduction Ratio at 2 Postoperative Day as a Predicting Factor of Long-Term Outcomes After Living Donor Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Kinoshita: None. **T. Shinzato:** None. **T. Shimizu:** None. **D. Iwami:** None.

Abstract# 952

The Impact of Diabetes on Young Transplant Recipients: An American Perspective

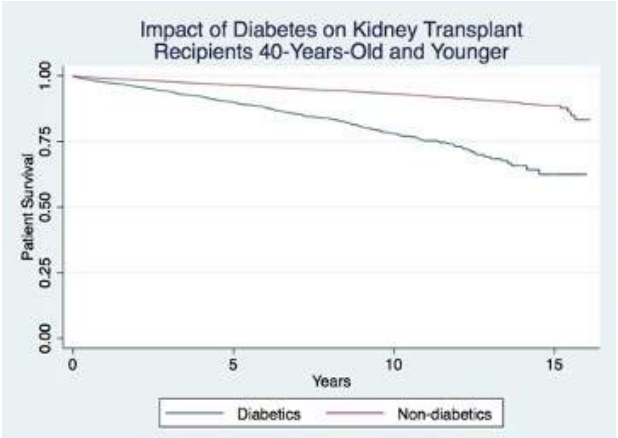
J. M. Loera, S. C. Barrett, T. S. Zhang, A. A. Awan, B. V. Murthy, R. T. Cotton, C. A. O'Mahany, N. T. Galvan, J. A. Goss, A. A. Rana, *Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, TX*

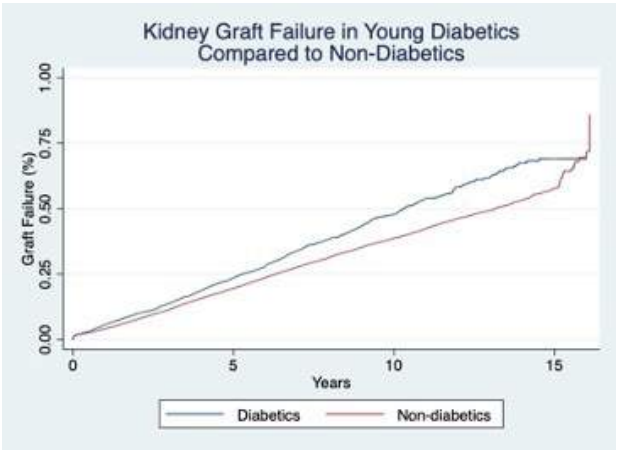
Purpose: Our study aims to demonstrate the impact of diabetes, types I and II, on American young adults (18-40 years old) requiring kidney transplantation.

Methods: Using the United Network for Organ Sharing database, we conducted a population cohort study which included all first-time, kidney-only transplant recipients during 2002-2019. Patients were grouped according to indication for transplant. Primary outcomes were cumulative all-cause mortality and graft failure. Graft and patient survivals at 1, 5, and 10 years were calculated via the Kaplan-Meier method. Multivariate Cox regression was used to assess for potential confounders.

Results: Of 42,473 transplant recipients, 3,418 (8.1%) had end-stage kidney disease associated with diabetes. At each time-point, cumulative mortality and graft failure were higher in diabetics compared to patients with non-diabetic causes of renal failure. Adjusted hazard ratios for all-cause mortality and graft failure in diabetics were 2.96 (95% CI 2.65-3.31; p<0.01) and 1.26 (95% CI 1.17-1.35, p<0.01), respectively.

Conclusions: This study demonstrates the vulnerability of young adult diabetic patients in the largest cohort of kidney transplant patients to date. Identifying the underlying causes of poor outcomes in this population should be a priority for future study.





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DISCLOSURES: J.M. Loera: None. **S.C. Barrett:** None. **T.S. Zhang:** None. **A.A. Awan:** None. **B.V. Murthy:** None. **R.T. Cotton:** None. **C.A. O'Mahany:** None. **N.T. Galvan:** None. **J.A. Goss:** None. **A.A. Rana:** None.

Abstract# 953

Patient Survival After Living Donor Kidney Donation

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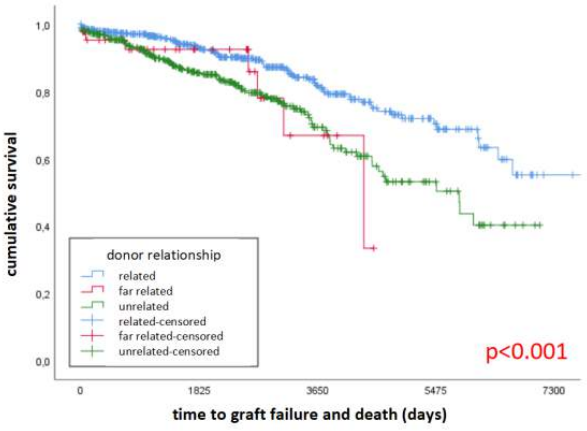
Purpose: Living donor kidney transplantation [LDKT] is associated with best patient survival and life quality among kidney replacement therapies in case of chronic kidney disease. As risk factors for recipient [rcpt] survival are variable in previous studies, we investigated in our center.

Methods: All LDKT rcpts transplanted from 01.01.1997 to 18.03.2020 were analyzed retrospectively. Based on the relationship to their donor rcpts were grouped into "related [R]" (first-degree relatives or grandparents), "far related [FR]" (other biological relationships) and "unrelated [UR]" (not related). Endpoint of this study was patient and graft loss [pg] survival analyzed by Kaplan-Meier method and log-rank test. Independent risk factors were estimated with Cox-regression.

Results: Among 946 LDKT rcpts we identified n=504 R, n=44 FR and n=398 UR rcpts. Overall 9.1% (86) grafts failed and 10.8% (102) died. Rates of graft failure and deaths were 8.7% and 6.7% in R rcpts; 9.1% and 11.4% in FR rcpts; 9.5% and 15.8% in UR rcpts. Kaplan-Meier-analysis (figure 1) showed overall pg survival of 89.8%, 76.3% and 48.3% with median follow-up time of 5.9 years. There was a significant difference in pg survival (p<0.001) between subgroups. In the multivariate analysis (figure 2) we observed delayed graft function (HR:2.59; p<0.001) and rcpt age in years (HR:1.04; p<0.001) as independent risk factors for pg survival.

Conclusions: LDKT rcpt without biological relationship to their donors have inferior pg survival. The donor relationship as well as delayed graft function and rcpt age should be taken into account in patient evaluation. Rcpt with these characteristics should be informed about their individual risks and carefully monitored long term.



	Hazard Ratio (95% CI) graft failure and death	p
Rcpt characteristics		
Age (years)	1.02 1.04 1.06	<0.001
Cold ischemia time (hours)	0.81 0.98 1.20	0.868
Delayed graft function	1.57 2.59 4.28	<0.001
HLA-mismatches		
0	reference [ref]	
1	0.53 1.71 5.57	0.373
2	0.48 1.34 3.71	0.572
3	0.76 2.01 5.28	0.158
4	0.46 1.32 3.79	0.608
5	0.59 1.68 4.81	0.331
6	0.37 1.21 3.93	0.751
Primary kidney disease		
Diabetic nephropathy	ref	
Glomerulopathy	0.34 0.83 2.07	0.696
Hypertensive Nephropathy	0.53 1.35 3.44	0.524
IgA-Nephropathy	0.25 0.70 1.94	0.488
Vasculitis	0.48 1.70 6.10	0.414
Others	0.35 0.81 1.87	0.617
Donor characteristics		
Age (years)	0.98 1.00 1.02	0.904
Men	0.55 0.79 1.14	0.200
BMI (kg/cm²)	0.96 1.00 1.05	0.958
Relationship		
R	ref	
FR	0.21 0.61 1.80	0.368
U	0.70 1.14 1.84	0.601

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DISCLOSURES: M.G. Naik: None. **K. Sakurayama:** None. **K. Budde:** None. **F. Halleck:** None.

Abstract# 954

Awareness of Teratogenic Potential of Mycophenolic Acid Products and Pregnancy Outcomes in Kidney Transplant Recipients

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Purpose: In 2006, Transplant Pregnancy Registry International (TPRI) reported teratogenic effects of mycophenolic acid products (MPA) in pregnancies in transplant recipients. This resulted in black box warning for MPA products by the FDA for the pregnancy risk category in 10/2007, and awareness in the transplant community of pregnancy risks associated with MPA products. We aim to analyze the impact of MPA teratogenicity awareness on pregnancy outcome and patient and graft survival in kidney recipients.

Methods: The TPRI dataset was queried for pregnancies in kidney transplant recipients from 1995 to 2019. The data were collected via questionnaires, telephone interviews, and medical records review. Pregnancies were grouped into pre-awareness (1995-10/2007) and post-awareness (after 10/2007) of MPA teratogenicity.

Results: The pre-awareness group included 361 recipients, 691 pregnancies, and 718 outcomes was compared with the post-awareness group (344 recipients, 655 pregnancies, and 684 outcomes). Demographics are listed in Table 1. Among recipients taking MPA prior to pregnancy (457), there was significantly less MPA exposure during pregnancy in the post-awareness era (16% vs 44% in the pre-awareness era, p <0.001). Post-awareness era has higher planned pregnancies (75% vs 59%, p<0.001). Rejection during and after pregnancy were infrequent and similar in both groups. In both eras 74% of pregnancies resulted in live births, with high rates of prematurity (48%) and low birthweight (43%). The patient and kidney allograft survival were not independently related to the era of MPA teratogenicity awareness (Figure 1) and neither was graft loss within 2 years of delivery.

Conclusions: The increased awareness amongst the transplant community of MPA teratogenicity has resulted in higher proportion of planned pregnancies and fewer MPA exposures during pregnancy. MPA avoidance during pregnancy did not have negative impact on patient and kidney allograft survival.

Table 1: Recipient demographics, pregnancy comorbidities and outcomes based on MPA teratogenicity awareness era.

	Pre-awareness era (1995 to 10/2007)	Post-awareness era (After 10/2007)	p-value
Recipient / Pregnancy / Outcomes (including multiple births)	361 / 691 / 718	344 / 655 / 684	
Pre-pregnancy characteristics			
Age at 1st transplant, yr, mean ± SD	23.9 ± 6.2	24.2 ± 6.8	0.56
Age at conception, yr, mean ± SD	30.9 ± 5.0	32.2 ± 4.8	**<0.001***
Transplant to conception interval, yr, mean ±SD	5.8 ± 4.0	6.5 ± 4.6	0.3*
Living donor, n (%)	420 (61.9)	457 (71.9)	**<0.001**
Planned pregnancy, n (%)	384 (59.4)	472 (75.8)	**<0.001**
Caucasian, n (%)	513 (77.3)	392 (67.0)	**<0.001**
HTN prior to pregnancy	334 (50.4)	260 (43.3)	0.013
Comorbidities during pregnancy			
HTN during pregnancy, n (%)	374 (55.1)	324 (50.2)	0.07
Rejection during pregnancy, n (%)	21 (3.1)	15 (2.3)	0.4
Rejection post-partum, n (%)	26 (3.9)	16 (2.6)	0.2
MPA exposure during pregnancy			
Recipients on MPA prior to pregnancy	77 (44.3)	88 (16.4)	**<0.001**
Total pregnancies exposed to MPA	80 (11.6)	91 (14.4)	0.12
Kidney allograft characteristics			
Creatinine, mg/dl, mean ±SD			
before pregnancy	1.28 ± 0.44	1.16 ± 0.35	**0.009***
during pregnancy	1.35 ± 0.65	1.30 ± 0.66	0.16
post-partum	1.41 ± 0.56	1.41 ± 0.74	0.06
Graft loss within 2 yrs of pregnancy, n (%)	52 (7.4)	29 (4.4)	0.8^
Pregnancy Outcomes			
Live birth, n (%)	544 (75.8)	493 (72.2)	0.07
Gestational age, weeks, mean ± SD	35.8 ± 3.7	35.5 ± 3.2	0.2
Birth weight, g, mean ± SD	2546 ± 799	2526 ± 749	0.6
Birth defects, n (%)	50 (9.2)	27 (5.6)	**0.02**
Cesarean Section, n (%)	267 (50.0)	286 (58.6)	**0.01**

Two-sided p-value of <0.05 was considered statistically significant; Qualitative and quantitative variables were compared by chi-square and T-test respectively, unless otherwise specified; * Mann-Whitney-U test; ^ Multivariate logistic regression

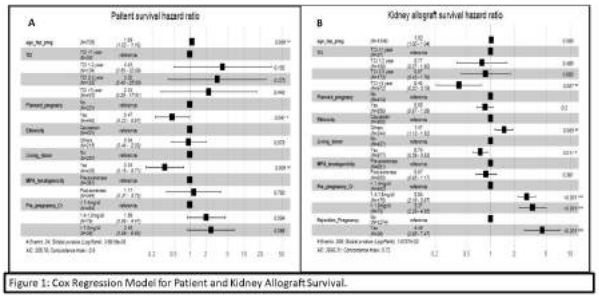


Figure 1: Cox Regression Model for Patient and Kidney Allograft Survival.

CITATION INFORMATION: Rao S., Coscia L., Yusuf A., Constantinescu S., Moritz M. Awareness of Teratogenic Potential of Mycophenolic Acid Products and Pregnancy Outcomes in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Rao: None. **L. Coscia:** None. **A. Yusuf:** None. **S. Constantinescu:** None. **M.J. Moritz:** None.

Abstract# 955

Very Long-Term Patient and Kidney Allograft Outcomes in Kidney Transplant Recipients More Than 20 Years After Transplantation:

T. Schachtner, A. Reimann, T. Müller, *University Hospital Zurich, Zürich, Switzerland*

Purpose: Despite rapid medical advancements in the field of transplantation over the last decades, long-term kidney allograft survival only slowly improves. Especially little is known about those kidney transplant recipients (KTRs) with very long-term survival of more than 20 years.

Methods: We followed 271 KTRs with kidney allograft survival of more than 20 years on a quarterly/yearly basis in our kidney transplant outpatient clinic. KTRs were analyzed for patient and kidney allograft outcomes.

Results: Our 271 KTRs with a median age of 59 years (range 38-89) at 20 years post-transplant showed a median kidney allograft function of 51 ml/min/1.73m² (range 11-103) and median proteinuria of 236 mg/day (range 0-7260). Patient survival was 84%, 63%, and 52%, and death-censored kidney allograft survival was 85%, 76%, and 61% at 25, 30, and 35 years post-transplant, respectively. We identified 104 KTRs (38.4%) with superior kidney allograft function defined as eGFR >45 ml/min/1.73m², proteinuria <300mg/day, and eGFR slope <2ml/min/1.73m². The only independent factor associated with superior kidney allograft function at 20 years post-transplant was donor age with 25 vs. 37 years (p<0.001). Patient survival was 92%, 65%, and 52% among KTRs with superior kidney allograft function compared with 85%, 62%, and 57% among KTRs with inferior kidney allograft function at 25, 30, and 35 years, respectively (p=0.420). Death-censored kidney allograft survival was 98%, 95%, and 83% among KTRs with superior kidney allograft function compared to 78%, 59%, and 39% among KTRs with inferior kidney allograft function at 25, 30, and 35 years, respectively (p<0.001). The only independent factor associated with kidney allograft loss was the development of de novo DSA (p=0. 019).

Conclusions: While younger donor age is highly associated with superior kidney alloraft function in the very long-term, the development of de novo DSA strongly impacts kidney allograft survival. Surprisingly, ultimate patient survival did not differ between KTRs with superior and KTRs with inferior kidney allograft function at 20 years after transplantation.

CITATION INFORMATION: Schachtner T., Reimann A., Müller T. Very Long-Term Patient and Kidney Allograft Outcomes in Kidney Transplant Recipients More Than 20 Years After Transplantation: *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Schachtner: None. **A. Reimann:** None. **T. Müller:** None.

Abstract# 956

Impact of Rituximab Induction Therapy on Donor-specific Anti-HLA Antibodies in Abo-compatible Kidney Transplant Recipients

T. Yagisawa[1], T. Kanzawa[1], K. Unagami[2], M. Furusawa[1], M. Inui[1], H. Ishida[2], K. Tanabe[1], *[1]Department of Urology, Tokyo Women's Medical University, Tokyo, Japan, [2]Department of Organ Transplant Medicine, Tokyo Women's Medical University, Tokyo, Japan*

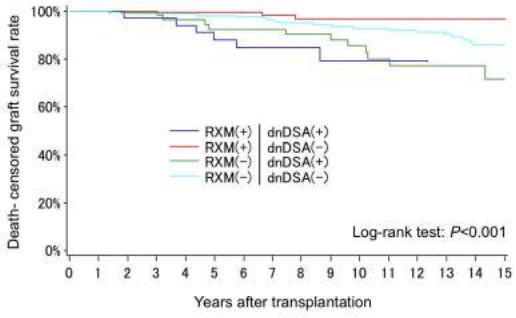
Purpose: Development of de novo donor-specific anti-HLA antibodies (dnDSA) after kidney transplantation remains strongly associated with antibody-mediated rejection (AMR), which leads to poor graft outcome. Anti-CD20 antibody, rituximab (RXM) plays a role in inhibiting the B cell allo-response immunity in AMR process. This study evaluated the efficacy of RXM as an induction therapy in kidney transplant patients with or without dnDSA development. We also performed a comparative study on the graft survival rates in transplant recipients with/without rituximab RXM treatment as well as with/without de novo antibody development.

Methods: We retrospectively analyzed the data of 432 patients who underwent ABO-compatible living kidney transplantation at our institution between 2001 and 2015. Conditions of almost all patients were managed with tacrolimus and mycophenolate mofetil. Preoperative RXM induction was observed in 177 (40.9%) of the 432 patients (RXM+). Low-dose RXM 200mg was administered within 7 days before transplantation. Eighty-five (19.6%) patients (dnDSA+) were positive for dnDSA. Based on RXM induction and dnDSA production, the patients were divided into four groups as follows: RXM(+)/dnDSA(+) (n=33); RXM(+)/dnDSA(-) (n=144); RXM(-)/dnDSA(+) (n=52); and RXM(-)/dnDSA(-) (n=203). The median follow-up period was 10 years (range 7.0-14.3 years).

Results: The graft survival curve comparing each group is shown in Figure 1. Patients with dnDSA showed poor graft survival than those without dnDSA, regardless of presence/absence of RXM induction. In patients without dnDSA, RXM induction contributed to favorable graft survival. There were significant differences among the four groups (P< 0.001). The most common cause of graft loss in each group was chronic antibody-mediated rejection. The incidence rate of biopsy-proven rejection was significantly higher in the dnDSA(+) groups than that in the dnDSA(-) groups (RXM(+)/dnDSA(+) 60.6%; RXM(+)/dnDSA(-) 11.1%; RXM(-)/dnDSA(+) 55.8%; RXM(-)/dnDSA(-) 25.6%, *P*<0.001).

Conclusions: Regardless of RXM induction, the graft survival in dnDSA(-) patients was better than that in dnDSA(+) patients. RXM induction in dnDSA(+) patients was insufficient to achieve the improved graft outcome.

Figure 1:



CITATION INFORMATION: Yagisawa T., Kanzawa T., Unagami K., Furusawa M., Inui M., Ishida H., Tanabe K. Impact of Rituximab Induction Therapy on Donor-specific Anti-HLA Antibodies in Abo-compatible Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Yagisawa: None. **T. Kanzawa:** None. **K. Unagami:** None. **M. Furusawa:** None. **M. Inui:** None. **H. Ishida:** None. **K. Tanabe:** None.

Kidney

Kidney Living Donor: Other

Abstract# 957

Graft Volume Changed in the First Year After Living Donor Kidney Transplantation

M. Abou Zeinab, M. Eltemamy, Y. Lin, K. Sasaki, V. Krishnamurthi, Z. Zaky, A. Wee, J. Kaouk, *Cleveland Clinic, Cleveland, OH*

Purpose: Pre-donation total kidney volume was shown to correlate with graft outcomes and long-term graft survival. However, only a few studies have studied the changes of the graft volume in the recipient, with conflicting results. We investigated variations in graft volume changes after kidney transplantation and their clinical outcomes.

Methods: Between 2012 -2019 we retrospectively reviewed 40 kidney recipients who had an abdominal Computed tomography (CT) within the first year after kidney transplantation. Recipient kidney volume (RKV) was calculated and correlated with donor kidney volume (DKV) to calculate a graft volume change percentage (GVC) (GVC= DKV/RKV x 100). Patients were divided into Group 1 (GVC less than 150%) and Group 2 (GVC more than 150%). Estimated glomerular filtration rate (eGFR) was calculated at 1-, 3- and 6-months then yearly up to 8 years post-transplantation using the CKD-EPI formula. Other clinical outcomes including rejection, BK viremia and graft survival were correlated with the GVC.

Results: The median donor age was 45 years (IQR: 37-53), median BMI was 27.3 (IQR: 23.7-29.5) and males were 42.5%. The median DKV was 171.5 cc (IQR: 150-190). Most of the allografts experienced progressive enlargement in the first year after transplant with a median RKV of 225 cc (IQR: 194-291) and a GVC of 135% (IQR: 120-165). Patients in Group 1 had a higher Median e-GFR compared to Group 2 on short and long term follow up (figure 2). Young donor kidney were more likely to be associated with a lower GVC (p=0.038).

Conclusions: Graft kidneys are expected to enlarge in the first year after transplantation. A possible explanation is compensatory hypertrophy. However other possible reasons are hyperfiltration, inflammation, and edema. Our data suggest that more than 50% enlargement of the graft in the first year is associated with a lower GFR on short and long term follow up which might reflect a pathological process rather than compensatory hypertrophy. Young donor kidneys were more likely to have less than 50% enlargement in the first year post-transplant.

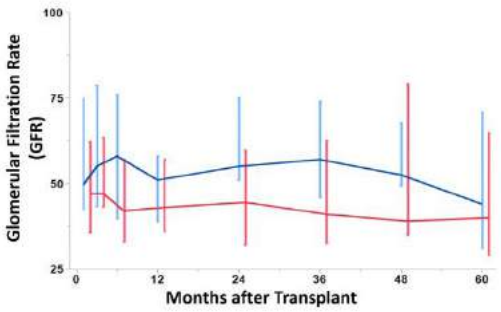


Figure 2. Median glomerular filtration rate. Group 1 (blue) have better GFR overtime compared to Group 2 (red).

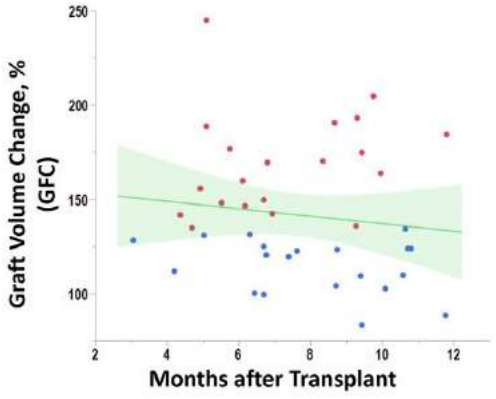


Figure 1: Graft volume changes. Group 1 are (Blue) are separated from Group 2 (Red)

CITATION INFORMATION: Abou Zeinab M., Eltemamy M., Lin Y., Sasaki K., Krishnamurthi V., Zaky Z., Wee A., Kaouk J. Graft Volume Changed in the First Year After Living Donor Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Abou Zeinab: None. **M. Eltemamy:** None. **Y. Lin:** None. **K. Sasaki:** None. **V. Krishnamurthi:** None. **Z. Zaky:** None. **A. Wee:** None. **J. Kaouk:** None.

Abstract# 958

Modifiable Barriers in Decision Making Around Living Donor Kidney Transplantation - A Rapid Scoping Review to Guide (DEAL-KD) Study

A. Ahmed[1], A. Winterbottom[1], S. Ahmed[2], J. Stoves[3], S. Daga[1], *[1]Leeds Teaching Hospitals Trust, Leeds, United Kingdom, [2]Division of Psychological and social Medicine, University of Leeds, Leeds, United Kingdom, [3]Bradford Teaching Hospitals NHS Foundation Trust, Bradford, United Kingdom*

Purpose: Living donor kidney transplantation (LDKT) is the optimal modality of renal replacement therapy for patients with advanced renal disease; associated with superior recipient and graft survival. LDKT offers better perceived quality of life and self-reported health status versus dialysis. The decision making can be complex; healthcare professionals convey information to patients but rely on the recipient to encourage potential donors to engage. LDKT occurs less frequently in Black and Minority Ethnic (BAME) groups compared to Caucasians. This rapid scoping literature review aims to identify modifiable barriers in the decision making to pursue LDKT with a focus on BAME populations

Methods: 208 articles were identified from Pubmed and Medline using keywords; barriers, decision making, living donor, kidney transplantation. Studies focusing on donors, paediatric recipients and abstracts for conference purposes only, were excluded.

Results: 25 studies were included; USA (15), Netherlands (3), Canada (3), New Zealand (3), UK (1). 18 studies, based in the USA (13), Netherlands (3), New Zealand (2) included BAME groups; African Americans (8), far East Asian (1) ,Hispanics (3) , and mixed other (6). South Asians were represented in one study, as 6% of the study sample. Key barriers identified were; 1) Lack of knowledge and insight into LDKT 2) Higher risk perception 3) Fear of financial burden on donors 4) Guilt for requiring a kidney and causing potential harm 5) Religious and cultural reservations.

Conclusions: This literature review provides a global perspective on modifiable barriers to decision making in pursuing LDKT. This review will inform The Decision Around Living Kidney Donation (DEAL-KD) study (ref: KRY 19-127) to create a patient decision aid to address these perceptions and facilitate engagement with particular focus on South Asian groups the second largest ethnic group in the UK. Further exploration of stakeholder views will enable the development of a culturally sensitive, evidence-based resource

CITATION INFORMATION: Ahmed A., Winterbottom A., Ahmed S., Stoves J., Daga S. Modifiable Barriers in Decision Making Around Living Donor Kidney Transplantation - A Rapid Scoping Review to Guide (DEAL-KD) Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Ahmed: None. **A. Winterbottom:** None. **S. Ahmed:** None. **J. Stoves:** None. **S. Daga:** None.

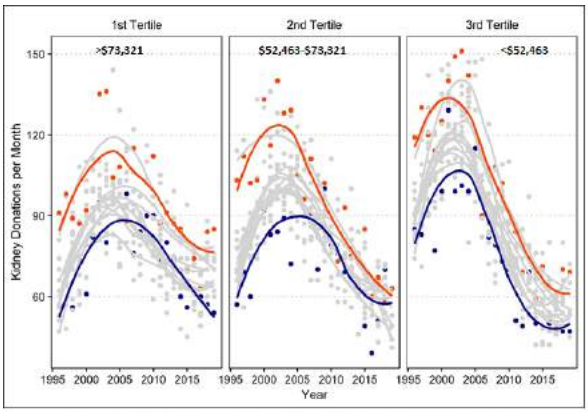


Figure 1: Biologically related kidney donations per month for live kidney donors. Blue points represent February donations, orange points represent July donations, and gray represents the other months

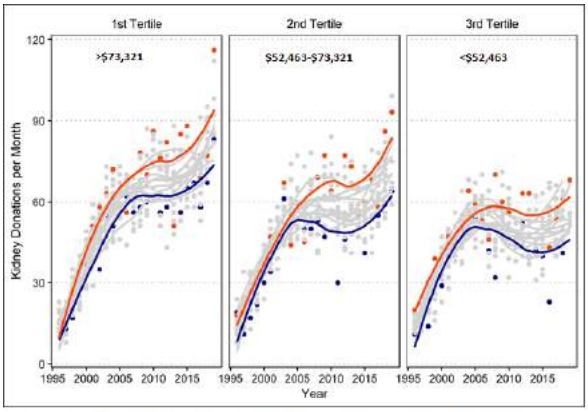


Figure 2: Unrelated kidney donations per month for live kidney donors. Blue points represent February donations, orange points represent July donations, and gray represents the other months

Abstract# 959

Seasonal and Income-related Factors in Live Kidney Donation in the United States from 1995 to 2019

F. Al Ammary[1], A. Arking[2], G. Kaddu[2], J. Garonzik Wang[2], A. B. Massie[2], D. Segev[2], A. Muzaale[2], *[1]Medicine, Johns Hopkins University, Baltimore, MD, [2]Surgery, Johns Hopkins University, Baltimore, MD*

Purpose: For nearly two decades, the annual number of US live kidney donors has been characterized by striking and worrying patterns of general decline that differ by donor-recipient relationship. But thus far no factor has been identified to explain, and reverse, these patterns. We assessed seasonal and income-related factors to refine our understanding of trends in live kidney donation.

Methods: We studied SRTR data on 141,965 live kidney donors in the US from 1995-2019. We examined within-year seasonal variation and between-year trends using Poisson regression, stratified by donor-recipient biological relationship and estimated household income tertiles.

Results: Within any given year, kidney donation was highest in the summer months for related and unrelated donors across all income groups. From year to year, the number of related donors across all income groups increased from 1995-2004 and then decreased from 2005-2019 in any given season [Figure 1]. The number of unrelated donors across all income groups increased from 1995-2004 in any given season, but thereafter the trends varied by income tertile from 2005-2019: increased for the high income tertile across all seasons, increased for middle income tertile only in summer months but decreased in winter months; and decreased for low income tertile in any given season [Figure 2].

Conclusions: Overcoming financial barriers associated with non-summer donations can potentially translate into timely, life-saving live kidney donation.

CITATION INFORMATION: Al Ammary F., Arking A., Kaddu G., Garonzik Wang J., Massie A., Segev D., Muzaale A. Seasonal and Income-related Factors in Live Kidney Donation in the United States from 1995 to 2019 *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Al Ammary: None. **A. Arking:** None. **G. Kaddu:** None. **J. Garonzik Wang:** None. **A.B. Massie:** None. **D. Segev:** None. **A. Muzaale:** None.

Abstract# 960

Decreased Pca and Regional Anesthesia Requirements Following Robotic Donor Nephrectomy

J. C. Alonso-Escalante, L. Machado, K. R. Tabar, R. P. Tindall, N. Thai, T. Uemura, *Surgery, Allegheny General Hospital, Pittsburgh, PA*

Purpose: Robotic donor nephrectomy is increasingly popular, however, studies have not yet shown a clear benefit. The main aim of this study is to evaluate whether robotic donor nephrectomy has any impact on postoperative pain control, patient-controlled analgesia (PCA), epidural or peripheral block use. Additionally, the rate of donor chyle leak and recipient slow graft function (24hr creatinine reduction ratio <40%) were compared.

Methods: Patients who have undergone a donor nephrectomy between June 2017 and March 2020 were studied and split in two groups: robotic donor nephrectomy (n=34) and laparoscopic donor nephrectomy (n=50). Patients were asked to rate their pain intensity in a scale of 1-10, and the maximum pain score obtained in the first 24 hours was compared using a Mann Whitney test. The number of patients who required a PCA, epidural or peripheral block in the first 24 hours was compared using Fisher's exact test. The rate of chyle leak and slow graft function (SGF) was analyzed using Fisher's exact test. Slow graft function was defined as less than 40% creatinine reduction ratio within 24 hours.

Results: No statistically significant difference was obtained with regards to post-operative pain control. Fewer patients in the robotic nephrectomy group required a PCA, epidural or peripheral block (Table 1). None of the robotic donors developed a chyle leak, as opposed to two laparoscopic donors. Slow graft function was only encountered in the laparoscopic donor group. None of these findings were significant (Table 2).

Conclusions: This single-center retrospective study shows that robotic donor nephrectomy results in a decreased use of PCA and regional anesthesia blocks, which will help expedite donation as operative times continue to improve. Furthermore, the absence of chyle leaks and SGF in the robotic donor group is a strong incentive to continue implementing this new technology.

Table 1: Pain Score, PCA and Regional Anesthesia Requirements			
	Robotic	Laparoscopic	p value
Maximum Pain Score (1-10)	7	6	0.09
PCA	38%	92%	<0.01
Epidural or Peripheral Block	0%	80%	<0.01

Table 2: Clinically Significant Chyle Leak and Slow Graft Function			
	Robotic	Laparoscopic	p value
Chyle Leak	0	2	0.51
SGF	0	1	0.99

CITATION INFORMATION: Alonso-Escalante J., Machado L., Tabar K., Tindall R., Thai N., Uemura T. Decreased Pca and Regional Anesthesia Requirements Following Robotic Donor Nephrectomy *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.C. Alonso-Escalante: None. **L. Machado:** None. **K.R. Tabar:** None. **R.P. Tindall:** None. **N. Thai:** None. **T. Uemura:** None.

Abstract# 961

Kidney Transplantation in Patients with Hereditary Kidney Diseases

Y. Caliskan[1], N. Garayeva[2], A. B. Dirim[2], S. Safak[2], S. Mirioglu[2], H. Yazici[2], A. Yildiz[3], O. A. Oto[2], E. Demir[2], Y. Ozluk[4], A. Turkmen[2], K. Lentine[1], *[1]Saint Louis University, Saint Louis, MO, [2]Division of Nephrology, Istanbul University, Istanbul, Turkey, [3]Division of Nephrology, Uludag University, Bursa, Turkey, [4]Department of Pathology, Istanbul University, Istanbul, Turkey*

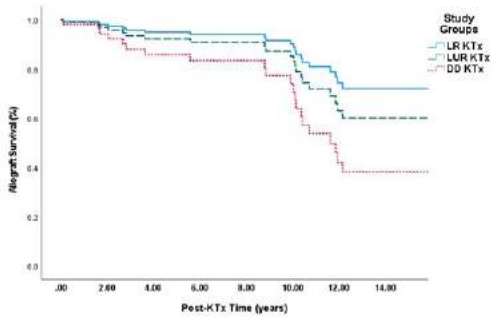
Purpose: Genetic testing is poised to play a larger role in the evaluation and management of both kidney transplant (KTx) recipients and donors. We characterized genetic variants and examined KTx outcomes among recipients with hereditary kidney diseases.

Methods: A total of 96 prevalent KTx recipients with a blood relative diagnosed with a kidney disease by kidney biopsy, imaging or genetic testing were evaluated. Genetic sequencing, either whole exome sequencing (WES) (n=38) or a targeted gene panel (n=58), was performed. Graft loss risk was compared by donor type using multivariate Cox regression. Living donors were also followed for renal outcomes.

Results: The genetically sequenced cohort comprised 58% men with mean age at KTx of 33±11; 70% were living related (LR), 8% living unrelated (LUR), and 22% deceased donor (DD) KTx recipients. We identified a diagnostic variant in 86% KTx recipients with hereditary kidney diseases including familial Mediterranean fever [43 of 43 recipients (100%)], FSGS (19/22, 86%), CAKUT (1/8, 12.5%), atypical hemolytic uremic syndrome (6/6, 100%), Alport syndrome (5/5, 100%), Fabry disease (4/4, 100%), C3 Glomerulopathy (4/4, 100%) and nephronophthisis (1/1, 100%). When grouped according to donor type, LUR KTx recipients were significantly older (48±7 yrs) than the LR (32±11 yrs) and DD (33±10 yrs) KTx recipients (p<0.001). Number of HLA mismatch was also higher in LUR KTx (4.1±0.8) than LR (2.8±1.1) and DD (3.0±0.9) KTx recipients (p<0.003). All groups were similar regarding gender, primary disease, post-KTx follow-up time. During a median follow up time of 9 years (IQR, 5-12), the rate of graft loss was significantly higher in DD KTx recipients [9/21 (43%)] compared to LUR [2/8 (25%)] and LR [11/67 (16%)] KTx groups (p=0.04). In Cox regression including adjustment for age and number HLA mismatches, DD KTx was significantly associated with 2.9-times increased risk of allograft loss (adjusted hazard ratio, $_{1.20}2.93_{7.12}$) (p=0.018). Of 67 LR donors, only one (1.5%) developed nephrotic range proteinuria and biopsy confirmed FSGS during 9 years of follow-up. None of the LR donors required renal replacement treatment.

Conclusions: Living donor KTx is the best option for ESKD patients with hereditary kidney diseases. Although the risk is low, the possible occurrence of the same disease in the related living donor can happen.

Figure 1. Cox proportional hazards regression curves of groups adjusted for potential confounding factors including age and number HLA mismatch (p=0.018).



CITATION INFORMATION: Caliskan Y., Garayeva N., Dirim A., Safak S., Mirioglu S., Yazici H., Yildiz A., Oto O., Demir E., Ozluk Y., Turkmen A., Lentine K. Kidney Transplantation in Patients with Hereditary Kidney Diseases *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Caliskan: None. **N. Garayeva:** None. **A.B. Dirim:** None. **S. Safak:** None. **S. Mirioglu:** None. **H. Yazici:** None. **A. Yildiz:** None. **O.A. Oto:** None. **E. Demir:** None. **Y. Ozluk:** None. **A. Turkmen:** None. **K. Lentine:** None.

Abstract# 962

Effects of Transverse Abdominis Plane Blocks on Opioid Requirements Post Kidney Donation

R. Caputo, O. Witkowsky, A. Rajab, *The Ohio State University Wexner Medical Center, Columbus, OH*

Purpose: There is lacking data regarding the use of transverse abdominis plane (TAP) blocks to reduce post-operative opioid requirements in kidney donors (KD). TAP blocks may serve as an effective adjunct in multimodal pain management to reduce the need for opioid analgesia. The purpose of this study was to review the opioid requirements of KD who did and did not receive a TAP block.

Methods: This was a single-center, retrospective study of all patients who underwent nephrectomy for living kidney donation between September 2018 and September 2020. The primary outcome was the total milligrams of oral morphine equivalents (OMEs) used during the postoperative period to discharge. Secondary outcomes included total OMEs of non-patient controlled analgesia (PCA) IV opioids used and total OMEs of oral opioids, length of stay (LOS), 30-day readmission rates, and pain scores.

Results: A total of 158 KD were included. There were 50 KD in the non-TAP group and 108 KD in the TAP group. Overall, the groups had similar characteristics (Table 1). The median total OME use was 235 (126-328) milligrams in the non-TAP group versus 207 (116-258) milligrams in the TAP group (p=0.064). Excluding PCA use, IV OME use was significantly lower in the TAP group [19 (8-38) vs 39(20-50) milligrams, p<0.001]. Oral OME use was similar between the non-TAP and TAP groups [75 (45-105) vs 75 (44-105), p=0.66]. Combined IV plus oral OME use was not significantly different between the non-TAP and TAP groups [118 (75-171) vs 104 (56-133), p=0.06]. Average LOS was 3.2±0.6 days for both groups. There were 3 (6%) readmissions within 30 days of discharge in the non-TAP group, two of which were for ileus and small bowel obstruction, versus 1 (<1%) readmission in the TAP group. None of the readmissions were related to pain control. The average pain score between the non-TAP and TAP groups were also similar (4.8±1.3 vs 4.8±1.2).

Conclusions: Use of TAP blocks resulted in an overall decrease in post-operative opioid requirements among KD. TAP block use significantly reduced the amount of IV OMEs used.

Table 1

	Non-TAP group (n=50)	TAP group (n=108)	P-value
Age (years), mean ± SD	45±12	43±12	
Male, %	24	37	
BMI (kg/m²), mean ± SD	28.4±4.5	27.0±4.0	
Total OME use in mg	235 (126-328)	207 (116-258)	p=0.064
Non-PCA IV OME in mg	39 (20-50)	19 (8-38)	p<0.001
Oral OME in mg	75 (45-105)	75 (44-105)	p=0.66
Non-PCA IV + Oral OME in mg	118 (75-171)	104 (56-133)	p=0.06
Average LOS (days) ± SD	3.2±0.6	3.2±0.6	
Readmissions within 30 days	3	1	
Pain score average	4.8±1.3	4.8±1.2	

CITATION INFORMATION: Caputo R., Witkowsky O., Rajab A. Effects of Transverse Abdominis Plane Blocks on Opioid Requirements Post Kidney Donation *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Caputo: None. **O. Witkowsky:** None. **A. Rajab:** None.

Abstract# 963

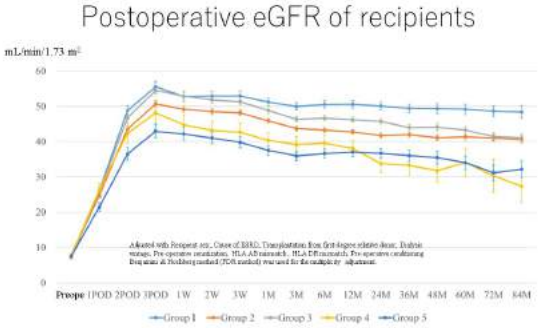
The Impact of Donor Age and Donor-Recipient Age Difference on Living Donor Kidney Transplantation

T. Hiramitsu[1], T. Tomosugi[2], K. Futamura[2], M. Okada[2], N. Goto[2], T. Ichimori[2], S. Narumi[2], Y. Watarai[2], *[1]Nagoya Daini Red Cross Hospital, Myokencho Showaku, Japan, [2]Nagoya Daini Red Cross Hospital, Nagoya, Japan*

Purpose: The impact of donor age and donor-recipient age difference on living donor kidney transplantation have not been investigated simultaneously.

Methods: A total 805 adult living donor kidney transplantation between January 2008 and December 2018 including donor age > 30 years old and donor-recipient age difference -10 - +10 years or +20 - +40 years was investigated. Recipients were stratified into 5 groups according to the donor age and donor-recipient age difference: Group 1 (120 recipients), donor age 30 - 49 years old and donor-recipient age difference-10 - +10 years; Group 2 (338 recipients), donor age 50 - 69 years old and donor-recipient age difference-10 - +10 years; Group 3 (240 recipients), donor age 50 - 69 years old and donor-recipient age difference +20 - +40 years; Group 4 (28 recipients), donor age 70 - 89 years old and donor-recipient age difference -10 - +10 years; Group 5 (79 recipients), donor age 70 - 89 years old and donor-recipient age difference +20 - +40 years. Recipient postoperative eGFR was compared with linear mixed model analysis. Benjamini & Hochberg method was used for multiple comparisons. Risk of graft loss was analyzed with Cox regression hazard model.

Results: In the recipient and donor characteristics, significant differences were identified in donor sex, recipient sex, cause of end stage renal disease, recipient body mass index, relationship between donor and recipient, dialysis vintage, preoperative sensitization, HLA AB mismatch, HLA DR mismatch, preoperative conditioning including retuximab and plasmapharesis, and calcineurin inhibitor at transplant. Postoperative eGFR of recipients were adjusted for these factors. The postoperative eGFR showed difference among groups.



eGFR of Group 4 and 5 were the lowest and eGFR of Group 1 was the highest among groups. Univariate analysis of Cox regression hazard model showed Group 4, recipient sex, preoperative sensitization including transplantation, pregnancy, and transfusion were the significant risk for the graft loss (P = 0.001, P = 0.016, P = 0.020, respectively). Multivariate analysis showed Group 4 and recipient sex were the significant risk for graft loss (P < 0.001, hazard ratio 19.07, 95% confidence interval 4.877 - 74.558, P = 0.045, hazard ratio 2.74 95% confidence interval 1.022 - 7.346).

Conclusions: Postoperative eGFR of recipients correlated with donor age. Donor age 70 - 89 years old and donor-recipient age difference -10 - +10 years was the significant risk for the graft loss.

CITATION INFORMATION: Hiramitsu T., Tomosugi T., Futamura K., Okada M., Goto N., Ichimori T., Narumi S., Watarai Y. The Impact of Donor Age and Donor-Recipient Age Difference on Living Donor Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Hiramitsu: None. **T. Tomosugi:** None. **K. Futamura:** None. **M. Okada:** None. **N. Goto:** None. **T. Ichimori:** None. **S. Narumi:** None. **Y. Watarai:** None.

Abstract# 964

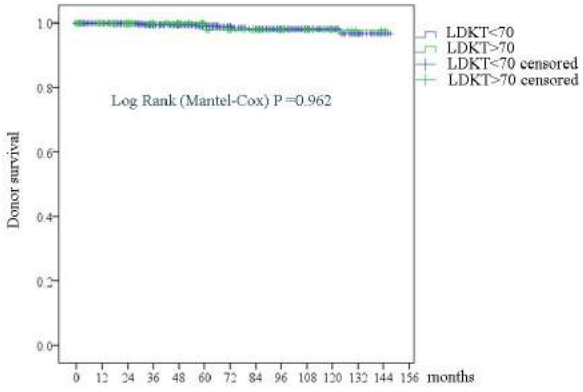
The Impact of Living Donors Aged 70 and Older on Living Donor Kidney Transplantation

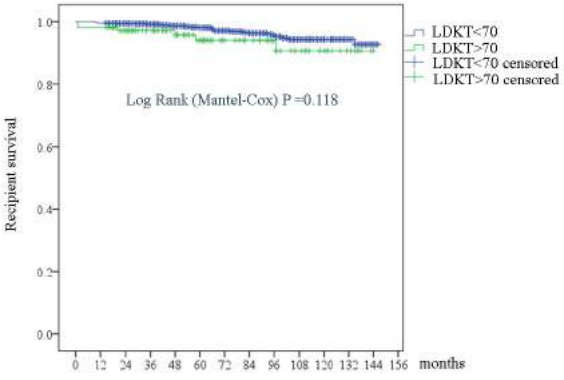
T. Hiramitsu, T. Tomosugi, K. Futamura, M. Okada, N. Goto, T. Ichimori, S. Narumi, Y. Watarai, *Nagoya Daini Red Cross Hospital, Nagoya Aichi, Japan*

Purpose: Due to the discrepancy between the number of patients on the waiting list and oragn supply, living donor kidney transplantation is more required. The number of living donors aged 70 and older is gradually increasing. We investigated the safety of living donor kidney transplantation from living donors aged 70 and older.

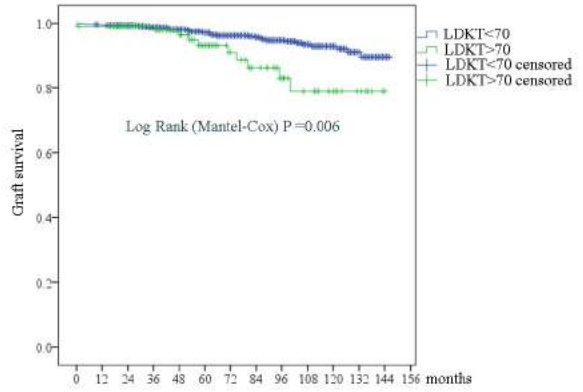
Methods: Between January 2008 and December 2018, a total 978 adult living donor kidney transplantations (LDKTs) was performed. A total of 879 LDKTs was included in this study. LDKT was stratified into 2 groups; 769 LDKTs from donors aged less than 70 (LDKT<70) and 110 LDKTs from donors aged 70 and older (LDKT>70). Operative results of donors and recipients, postoperative eGFR of donors and recipients, mortality rate of donors and recipients, graft survival rates, and incidence of end stage renal disease in donors were compared between LDKT<70 and LDKT>70.

Results: Operative results of donors including warm ischemic time, operation time, blood loss, and incidence of perioperative and postoperative adverse events showed no significant difference. Operative results of recipients including cold ischemic time and incidence of perioperative and postoperative adverse events showed no significant difference. eGFR of donors and recipients in LDKT>70 were significantly lower than those of LDKT<70. The mortality rate of donors and recipients showed no significant difference.





The graft survival rates of LDKT>70 showed significantly lower than that of LDKT<70 (P = 0.006).



End stage renal disease of donors was not identified in both LDKT<70 and LDKT>70.

Conclusions: LDKT from donors aged 70 and older was demonstrated to be a safe operation although graft loss rate in donors aged 70 and older was significantly higher than that in donors aged less than 70.

CITATION INFORMATION: Hiramitsu T., Tomosugi T., Futamura K., Okada M., Goto N., Ichimori T., Narumi S., Watarai Y. The Impact of Living Donors Aged 70 and Older on Living Donor Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Hiramitsu: None. **T. Tomosugi:** None. **K. Futamura:** None. **M. Okada:** None. **N. Goto:** None. **T. Ichimori:** None. **S. Narumi:** None. **Y. Watarai:** None.

Abstract# 965

Identifying Health-System Level Barriers and Facilitators to Living Donor Kidney Transplantation: A Comparative Case Study

A. Horton[1], M. Fortin[2], P. Nugus[3], D. Landsberg[4], M. Paquet[2], M. Cantarovich[1], S. Sandal[1], *[1]Nephrology, McGill University Health Centre, Montreal, QC, Canada, [2]Nephrology, Centre Hospitalier de l'Université de Montréal, Montreal, QC, Canada, [3]Family Medicine, McGill University, Montreal, QC, Canada, [4]Nephrology, University of British Columbia, Vancouver, BC, Canada*

Purpose: Despite the well-known advantages of living donor kidney transplantation (LDKT), rates at many centers have stagnated or declined. In Canada, there are large interprovincial variations in LDKT rates, the reasons for which are not well understood. The objective of this study is to identify health system-level barriers and facilitators to LDKT by investigating and comparing health systems.

Methods: This research takes the form of a comparative case study, which entails analyzing similarities, differences, and patterns across multiple cases. Each province presents a case. Thus, we are comparing the health systems in three provinces, where 50-60%; 30-40%; <15% of kidney transplants done annually are from living donors. Data collection involves document analysis; semi-structured interviews; participant observation. Our qualitative methodology reflects the need to understand health systems as an integrated whole - across macro, meso and micro levels - by investigating the relationships between its agents (Figure 1). Data are being analyzed using framework analysis.

Results: We commenced research in the province with the highest rates of LDKT. Thus far we have conducted 15 interviews with personnel from various organizations involved in co-ordinating LDKT, whilst initiating document analysis of organizational guidelines, policies and resources. Preliminary themes from this province reveal: 1) Efforts to increase LDKT are not only focused on micro levels; 2) Strong links exist between multiple levels of practice - macro, meso and micro - that are involved in facilitating LDKT; 3) Professional networks and working groups span the core to periphery of renal practices in the province; 4) These groups have developed educational initiatives and standardized resources related to LDKT; 5) These efforts facilitate buy-in to LDKT as a treatment option across the province.

Conclusions: Preliminary results suggest that in order to increase rates of LDKT in lower-performing provinces, interventions must target the dynamic relationships between different elements of a system. This contradicts current efforts that primarily target barriers on the micro-level (i.e. the patient). Thus, efforts to increase LDKT, must target multiple levels of practice in order improve access and capacity for LDKT.

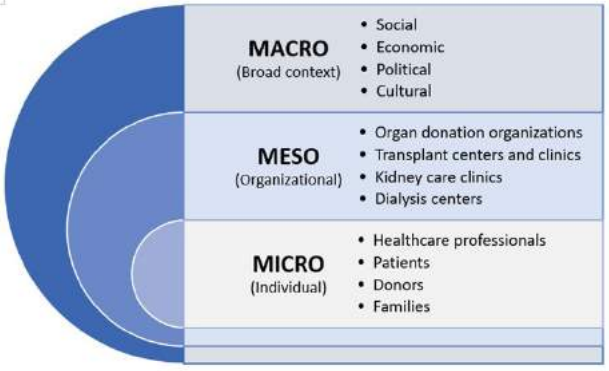


Figure 1. Levels of a LDKT system

CITATION INFORMATION: Horton A., Fortin M., Nugus P., Landsberg D., Paquet M., Cantarovich M., Sandal S. Identifying Health-System Level Barriers and Facilitators to Living Donor Kidney Transplantation: A Comparative Case Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Horton: None. **M. Fortin:** None. **P. Nugus:** None. **D. Landsberg:** None. **M. Paquet:** None. **M. Cantarovich:** None. **S. Sandal:** Grant/Research Support; If "Other" Please Explain; An education grant from Amgen Canada.

Abstract# 966

The Evaluation of Living-Related Kidney Transplantation Donors in Autosomal-Dominant Polycystic Kidney Disease

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Purpose: Autosomal-dominant polycystic kidney disease (ADPKD) is a progressive hereditary disease caused primarily by gene mutations, leading to multiple kidney cyst occurrence, kidney function deterioration, and end-stage renal disease (ESRD). The gene mutations have been identified as PKD1 and PKD2, however, genetic testing is not commonly available; therefore, diagnosis of ADPKD, including work-up for kidney transplantation (KTx) recipients, is usually done through history taking and imaging tests such as computed tomography and/or ultrasound examination. In KTx, blood-relative donors who have the PKD1 and PKD2 gene mutation have an increased risk of developing ADPKD with worsening renal function after nephrectomy. However, these donors' pre-KTx work-up also involves imaging, renal function tests, etc., and does not include genetic testing. We retrospectively investigated the post-operative outcomes of living KTx donors whose recipients' etiology of ESRD were ADPKD.

Methods: We evaluated a total of 90 patients who received KTx from living donors at the Department of Urology of Tokyo Women's Medical University between 2000 and 2020. For the donor type, blood relative groups in 37 cases and non-blood relative (which represents, spouses, fathers, mothers, brothers, sisters, and sons-in-law) in 53 cases were enrolled in this study.

Results: There were no significant differences in renal function between the two groups (graft failure: two cases (5.4%) in the blood relative group, and three cases (5.6%) in non-blood relative group). New occurrence and/or enlargement of renal cysts in allograft for recipients from blood relative donors have been observed in four cases without renal function deterioration. For blood donors, there was no occurrence of renal cysts or deterioration of renal function (eGFR: 45.1±7.6ml/min/1.73 m^2).

Conclusions: For blood-relative KTx donors whose recipients have ADPKD, there is stable renal function with no occurrence of renal cysts. Therefore, the outcome of this study indicates that KTx can be performed with minimal risk of developing ADPKD after KTx in living-relative donors.

Table Patient characteristics

	Total (n=90)	Living-related kidney transplantation (n=37)	Living-unrelated kidney transplantation (n=53)
Recipients			
Age, years (mean ± SD)	51.1 ± 11.3	44.0 ± 10.8	56.0 ± 8.7
Sex, n (%)			
Male	59 (65.5%)	26 (7.2%)	33 (62.2%)
ABO incompatibilities			
Compatible, n(%)	44 (48.8%)	22 (59.4%)	20 (37.7%)
Flow cytometry crossmatch, (%)			
Positive	3 (3.3%)	0%	3 (3.3%)
Duration of dialysis, months (mean ± SD)	31.7 ± 44.2	25.1 ± 48.3	34.3 ± 39.0
Donors			
Age, years (mean ± SD)	59.9 ± 10.4	64.6 ± 10.5	56.6 ± 9.1
Sex, n (%)			
Male	38 (42.2%)	26 (70.2%)	24 (45.2%)
Preoperative DSA, (%)			
Positive	13 (14.4%)	6 (16.2%)	7 (13.2%)

CITATION INFORMATION: Kikuchi T., Unagami K., Kobari Y., Yagisawa T., Kanzawa T., Omoto K., Uemura A., Ishida H., Tanabe K. The Evaluation of Living-Related Kidney Transplantation Donors in Autosomal-Dominant Polycystic Kidney Disease *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Kikuchi: None. **K. Unagami:** None. **Y. Kobari:** None. **T. Yagisawa:** None. **T. Kanzawa:** None. **K. Omoto:** None. **A. Uemura:** None. **H. Ishida:** None. **K. Tanabe:** None.

Abstract# 967

Developing a Robot-assisted Donor Nephrectomy Program in a High Volume Laparoscopic Living Donor Nephrectomy Program

S. S. Lee, N. Vachharajani, M. Pfeiffer, S. Matson, M. Scherer, M. Doyle, J. Wellen, Y. Lin, T. Rice, J. Yu, A. Khan, *Abdominal Transplant Surgery, Washington University at St. Louis, St Louis, MO*

Purpose: Three dimensional visualization, improved dexterity and fine instrument control make robotic surgery an attractive option for further improving the safety profile of laparoscopic living donor nephrectomy (LDN). This is a single center review of the initial experience of a high volume kidney transplant program in transitioning from laparoscopic to robotic donor nephrectomy (RDN).

Methods: Retrospective review of prospectively maintained living donor nephrectomy database at Washington University in St Louis. RDN was implemented in 2020 after 3 months of program building. Donor and recipient data for the first 30 RDNs was reviewed and compared with the last 30 LDNs to assess learning curve and safety profile.

Results: The mean age of patients undergoing RDN was 47 years, the majority were female (72%) and the average BMI was 27. Ninety-three percent had left sided nephrectomy and one-third had more than one artery or vein. The total operative time (TOT) was 194 minutes with console time of 128 minutes. There were no conversions to laparoscopic or open surgery. Estimated blood loss was 62 ccs, and median length of stay (LOS) was 2 days. Significant complication (Clavien-Dindo III-IV) was seen in one patient (pneumothorax). There were no complications in recipients related to donor surgery technique. There was no difference between

the RDN and LDN studied variables except for TOT and the warm ischemia time (WIT), defined as cross clamp to on ice time, which were significantly longer for RDN groups (194 mins vs. 136 mins and 5 mins vs. 2 mins, respectively). All kidneys were transplanted successfully with no difference in delayed function and graft survival rates between the two groups.

Conclusions: RDN is a viable alternate to LDN and can be safely implemented after careful planning and team building with comparable donor and recipient outcomes. Improved visualization and ergonomic ease offer potential advantages over LDN.

Donor Variables			
	RADN	LDN	p-value
WIT (min)	5 (+/- 2)	2 (+/- 1)	<0.0001
Docking time (min)	151 (+/- 31)	136 (+/- 21)	0.0380
Console (min)	128 (+/- 29	136 (+/- 21	0.2557
Total operative time (min)	194 (+/- 36)	136 (+/- 21)	<0.0001
EBL (mL)	62 (+/- 28)	79 (+/- 149)	0.5415
Length of Stay (days)	2 (1, 4)	2 (1, 3)	0.3230
POD 3 Serum Creatinine	1.36 (+/- 0.24)	1.39 (+/- 0.28)	0.6776

CITATION INFORMATION: Lee S., Vachharajani N., Pfeiffer M., Matson S., Scherer M., Doyle M., Wellen J., Lin Y., Rice T., Yu J., Khan A. Developing a Robot-assisted Donor Nephrectomy Program in a High Volume Laparoscopic Living Donor Nephrectomy Program *AJT, Volume 21 Supplement 3*

DISCLOSURES: S.S. Lee: None. **N. Vachharajani:** None. **M. Pfeiffer:** None. **S. Matson:** None. **M. Scherer:** None. **M. Doyle:** None. **J. Wellen:** None. **Y. Lin:** None. **T. Rice:** None. **J. Yu:** None. **A. Khan:** None.

Abstract# 968

Alterations in Mineral Metabolism of Living Kidney Donors: Prospective Observational Study

H. Lee[1], E. Ko[1], H. Cho[2], C. Yang[1], B. Chung[1], *[1]Division of Nephrology, Department of Internal Medicine, Seoul St. Mary's Hospital, Seoul, Korea, Republic of, [2]Department of Urology, Seoul St. Mary's Hospital, Seoul, Korea, Republic of*

Purpose: The aim of this study is to investigate whether reduction in glomerular filtration rate (GFR) after kidney donation causes mineral metabolism alterations, and also investigate what factors associated with mineral metabolism adaptation.

Methods: 144 living kidney donors (LKDs) in Seoul St. Mary's hospital between May 2016 and September 2018 were enrolled, prospectively. Laboratory evaluation, 24-hour urine collection and Technetium-99m diethylene-triamine-pentaacetate scan were performed in two subsequent time points; pre-donation and 6-month after donation. LKDs were divided into 2 groups according to the difference of fractional excretion of phosphate (FEPi).

Results: 6-month after uni-nephrectomy, estimated GFR (eGFR) declined (100.76 to 66.89 ml/min/1.73m^2) significantly ($p<0.001$). After donation, serum phosphorus decreased ($p<0.001$), whereas FEPi (13.34 to 20.23 %, $p<0.001$) and serum iPTH (38.70 to 52.20 pg/ml, $p<0.001$) were increased. In subgroup analysis, semi-log FGF-23 tended to increase after donation (85.20 to 106.71 pg/ml, $p=0.092$). Percentage change in eGFR was significantly higher in high delta FEPi group ($p=0.043$). In multivariable logistic regression, the odds ratio of percentage change in eGFR was 1.076 ($p=0.005$).

Conclusions: After uni-nephrectomy, LKDs develop secondary hyperparathyroidism related to a decreased serum phosphorus, increased FEPi. Moreover, the greater the reduction of GFR occurs, the greater adaptation of mineral metabolism follows.

CITATION INFORMATION: Lee H., Ko E., Cho H., Yang C., Chung B. Alterations in Mineral Metabolism of Living Kidney Donors: Prospective Observational Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Lee: None. **E. Ko:** None. **H. Cho:** None. **C. Yang:** None. **B. Chung:** None.

Abstract# 969

Kidney Transplant Associated Allergy Transfer After Living Donation

K. López-Vega, S. Davis, *Division of Renal Diseases and Hypertension, Anschutz Medical Campus, University of Colorado, Aurora, CO*

Purpose: Donor to recipient IgE-mediated food allergy transfer has been described in non-kidney solid organ transplant. Here, we report a novel case of an adult post-transplant kidney allergy transfer resulting in anaphylaxis.

Methods: A 56-year-old man with ESRD secondary to PKD underwent a living donor transplant with thymoglobulin induction and maintenance tacrolimus, mycophenolate, and prednisone. Four weeks after transplant, he developed a de novo anaphylactic reaction, presenting with swollen throat and lips and hives after ingesting a collagen bar containing cashews. These symptoms progressed to hypotension, generalized rash, shortness of breath, and loss of consciousness requiring emergency treatment with epinephrine. The patient had no prior history of food allergy. Evaluation of the donor's medical record revealed a history of allergies to pine nuts, hazelnuts, macadamia, and cashews. Further testing revealed positive skin testing for cashews and pistachio. In contrast, skin testing was negative for walnut, pecan, and brazil nut. Serum specific IgE testing was negative to walnut, pecan, hazelnut, pine nut, and macadamia nut. The oral challenge was negative for macadamia nut, pecan, and walnut. The patient was instructed to avoid ingestion of cashews and pistachio and received education on the use of Epi-pen in case of incidental exposures.

Results: This is the first case of allergy transfer on an adult patient after receiving a kidney transplant. The other case described after a kidney transplant was on a 7-year-old patient. Although increased risk for atopic diseases occurs after transplantation, donor to recipient acquired food allergies have been described mostly on liver, lung, and combined pancreas-kidney transplants. Some of the possible mechanisms for posttransplant acquired allergy are binding of passively transferred IgE to recipient mastocytes and transfer of IgG-memory B cells, IgE-producing B cells, clone specific T cells, and tissue-resident mastocytes. Although it has been speculated that the kidneys contain a small amount of memory B cells explaining the low risk for posttransplant acquired allergies, this case suggests allergy transfer after kidney transplant is possible.

Conclusions: Fatal anaphylactic reactions in non-kidney solid organ transplants have led to the development of protocols to identify patients at risk for severe donor-derived food allergies. Review of food allergies among living kidney donors prior to transplant may be a simple and effective tool to prevent this rare but life-threatening complication in kidney transplant recipients, as well.

CITATION INFORMATION: López-Vega K., Davis S. Kidney Transplant Associated Allergy Transfer After Living Donation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. López-Vega: None. **S. Davis:** None.

Abstract# 970

Which Living Kidney Donors Arrive to the Donation Process Informed About Surgery?

L. Malinzak, A. Segal, R. Prashar, M. Jesse, *Henry Ford Hospital, Detroit, MI*

Purpose: To evaluate perceived knowledge about surgery in potential living kidney donors embarking on the donation process.

Methods: Potential living kidney donors were surveyed about their level of familiarity with donor surgery. Candidates used the BREEZE TRANSPLANT™ program which allows submission of basic information to help determine potential candidacy for donation. 75 applications were reviewed. 55 applications were considered complete and were evaluated. The survey included questions about knowledge of robotic surgery, laparoscopic surgery, or kidney paired donation (KPD). Response options about KPD included: None, general idea or has learned about KPD. Response options regarding surgery were: Not familiar, somewhat familiar or very familiar. Those who answered somewhat familiar or very familiar were grouped together as being knowledgeable about surgery. Free hand answers were also accepted.

Results: Of the 55 patients surveyed, 16 (29%) reported they were knowledgeable about surgical options: 10 (18%) reported being knowledgeable about both robotic and laparoscopic surgery, 4 (7%) reported they were only knowledgeable about laparoscopic surgery, and 2 (4%) reported they were only knowledgeable about robotic surgery.

There were no significant differences between a patient's perceived knowledge of robotic surgery and their age, educational level, referral sources (tx candidate or friend/family of candidate compared to all others), knowledge of KPD or median income. Those who reported some level of knowledge of laparoscopic surgery (vs no knowledge) were also more likely to report some knowledge of robotic surgery($p<0.001$). Those who reported they were highly motivated (vs unsure or interested but wanted more information) were significantly more likely to report some knowledge of robotic surgery ($p<0.024$).

There were no significant differences between a patient's knowledge of laparoscopic surgery and motivation, education level, referral source, and KPD knowledge.

Of the 12 patients (22%) who attempted to free text their knowledge of robotic and laparoscopic surgery, 6 patients (10%) indicated they had some knowledge of both laparoscopic and robotic surgery, 5 patients (9%) stated they had no knowledge and 1 patient (2%) felt knowledgeable about only laparoscopic surgery

Conclusions: Highly motivated donors reported being more knowledgeable about robotic surgery prior to starting the living kidney donation process. It may be the case that highly motivated donors are self-selecting to centers that offer robotic surgery. Or being highly motivated, the donors have already begun seeking education.

Table 1. ROBOTIC SURGERY

	No knowledge or familiarity with robotic surgery	Knowledge or familiarity with robotic surgery	*p*-value
Donor Candidate Characteristics/Responses	**N (%)**		
Education			0.746
High school grad or less	11 (26.2%	4 (30.8%)	
Some college of more	31 (73.8%)	9 (69.2%)	
Race			0.506
White	26 (61.9%)	10 (76.9%)	
All others	16 (38.1%)	3 (23.1%)	
Referral			0.710
By Tx candidate or friend/family of candidate	31 (73.8%)	11 (84.6%)	
All others	11 (26.2%)	2 (15.4%)	
Kidney Paired Donation			0.333
No knowledge/familiarity	17 (40.5%)	3 (23.1%)	
Some knowledge/familiarity	25 (59.5%)	10 (76.9%)	
Motivation			0.024
Highly motivated to donate	28 (66.7%)	13 (100.0%)	
Unsure, has some questions and/or reservations	14 (33.3%)	0 (0.0%)	
Laparoscopic			<0.001
No knowledge/familiarity	38 (90.5%)	2 (15.4%)	
Some knowledge/familiarity	4 (9.5%)	11 (84.6%)	
	Mean (SD)		
Age	40.07 (11.17)	42.31 (16.47)	0.653
Median Income	$55,042.52 ($21,188.19)	$56,480.85 ($17,622.37)	0.825

Note, fisher's exact test for frequency comparisons, paired t-tests were used to compare means.

Table 2. LAPAROSCOPIC SURGERY

	No knowledge or familiarity with LAP surgery	Knowledge or familiarity with LAP surgery	*p*-value
Donor Candidate Characteristics/Responses	**N (%)**		
Education			0.521
High school grad or less	12 (30.0%)	3 (20.0%)	
Some college of more	28 (70.0%)	12 (80.0%)	
Race			0.213
White	24 (60.0%)	12 (80.0%)	
All others	16 (40.0%)	3 (20.0%)	
Referral			0.734
By Tx candidate or friend/family of candidate	31 (77.5%)	11 (73.3%)	
All others	9 (22.5%)	4 (26.7%)	
Kidney Paired Donation			0.531
No knowledge/familiarity	16 (40.0%)	4 (26.7%)	
Some knowledge/familiarity	24 (60.0%)	11 (73.3%)	
Motivation			0.304
Highly motivated to donate	28 (70.0%)	13 (86.7%)	
Unsure, has some questions and/or reservations	12 (30.0%)	2 (13.3%)	
	Mean (SD)		
Age	40.60 (12.31)	40.60 (13.39)	1.000
Median Income	$54,785.75 ($21,757.99)	$56,973.80 ($16,120.97)	0.725

Note, fisher's exact test for frequency comparisons, paired t-tests were used to compare means.

CITATION INFORMATION: Malinzak L., Segal A., Prashar R., Jesse M. Which Living Kidney Donors Arrive to the Donation Process Informed About Surgery? *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Malinzak: None. **A. Segal:** None. **R. Prashar:** None. **M. Jesse:** None.

Abstract# 971

Multimodal Analgesia Reduces Length of Stay in Living Kidney Donors

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Purpose: This study evaluated the outcomes between living kidney donors who received a multimodal analgesic regimen compared to a historical cohort that did not.

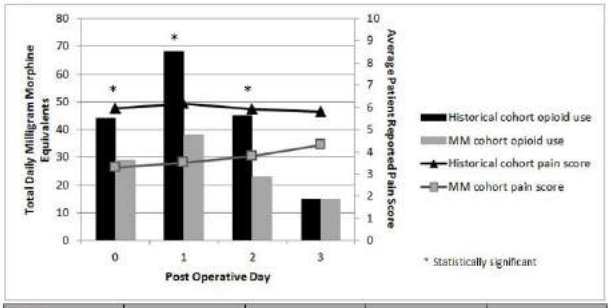
Methods: Hartford Hospital implemented a multimodal analgesic regimen for living kidney donors in March 2019. This regimen consists of pharmacist-led pre-procedure pain management education, a transverse abdominis plane (TAP) block with bupivacaine and dexamethasone, scheduled acetaminophen and gabapentin, and as-needed opioids. This was a single-center retrospective chart review of patients who underwent laparoscopic living donor nephrectomy from 8/16/2016-7/1/2020. Patients who received the multimodal regimen comprised the multimodal (MM) group, and those who did not comprised the historical group.

Results: The baseline characteristics are described in Table 1. 68 patients comprised the historical group and 44 comprised the MM group. The MM group had a significantly shorter length of stay (LOS) (days, mean±SD: 1.8±0.7 vs 2.6±0.8; p<0.001). More patients were discharged on postoperative day (POD) 1 in the MM group (38.6% vs 1.5%; p<0.001). The total morphine milligram equivalents (MME) donors received while inpatient was significantly less in the MM group vs the historical group on POD 0-2 (Figure 1). The outpatient MME prescribed through POD 60 was also significantly less in the MM group (median [IQR]; 180 [150-188] vs 225 [150-300]; p<0.001). The mean patient-reported pain score (PRPS) was significantly lower in the MM group vs the historical group on POD 0, 1, and 2 (Figure 1). The maximum PRPS was significantly lower on POD 0 in the MM group (mean±SD: 7±2 vs 8±1; p=0.02). There was no significant difference in renal function prior to donation through POD 180. There were no significant differences in readmission (4.5% vs 4.4%; p=0.97), surgical site infection (2.3% vs 4.4%; p=0.55), or postoperative ileus (0% vs 7.4%; p=0.07), between the MM and historic groups, respectively.

Conclusions: In conclusion, this multimodal analgesic regimen resulted in a significantly shorter LOS, significantly lower PRPS, and significantly lower opioid requirements following living kidney donation.

Table 1: Baseline characteristics	Multimodal (n = 44)	Historical (n = 68)	P value
Age, years (mean ± SD)	44.0 ± 12.4	49.1 ± 11.2	0.03
Race n (%):			0.66
White	37 (84.1)	57 (85.1)	
African American	1 (2.3)	2 (3.0)	
Asian	1 (2.3)	0 (0.0)	
Other	5 (11.4)	9 (13.2)	
Ethnicity n (%):			0.66
Non-Hispanic	40 (90.9)	60 (88.2)	
Hispanic	4 (9.1)	8 (11.8)	
Body mass index (mean ± SD)	26.9 ± 4.7	26.8 ± 3.6	0.91

Figure 1



MME use median (IQR)	POD 0	POD 1	POD 2	POD 3
Historical	44 (30-61)	68 (45-92)	45 (23-60)	15 (9-32)
MM	29 (15-36)	38 (23-68)	23 (8-45)	15 (0-30)
p value	**<0.001**	**<0.001**	**0.003**	0.23
PRPS mean ± SD	**POD 0**	**POD 1**	**POD 2**	**POD 3**
Historical	6 ± 2	6 ± 2	6 ± 2	6 ± 2
MM	3 ± 2	4 ± 1	4 ± 2	4 ± 2
p value	**<0.001**	**<0.001**	**<0.001**	0.11

CITATION INFORMATION: Marti K., O'Sullivan D., Ye X., Rochon C., Kutzler H. Multimodal Analgesia Reduces Length of Stay in Living Kidney Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Marti: None. **D. O'Sullivan:** None. **X. Ye:** None. **C. Rochon:** None. **H. Kutzler:** None.

Abstract# 972

Preempting Misconceptions: An Educational Initiative for Preemptive Kidney Transplant Candidates

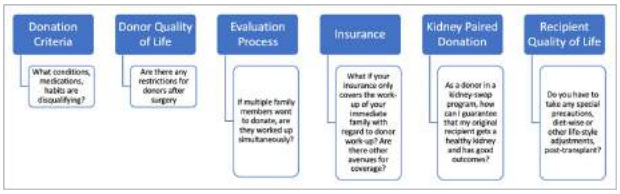
T. Menser[1], M. Hobeika[2], H. Ibrahim[2], A. Khan[1], B. Cruz[2], J. Sharp[2], A. Gaber[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX*

Purpose: reemptive living donor kidney transplantation (pLDKT) offers many advantages for patients with advanced chronic kidney disease. However, pLDKT represents less than 1 out of 6 U.S. kidney transplants, with documented racial, ethnic, and gender disparities in utilization.

Methods: *Transplant: A Family Journey* is a two-hour educational session for preemptive kidney transplant candidates, family, and friends held prior to initial transplant evaluation. A knowledge pretest was administered based on a validated end-stage renal disease treatment knowledge assessment converted to true-false format. The course information is presented by a clinician on treatment options, and then a prior living donor/recipient share their stories of pLDKT. Participants are encouraged to ask questions throughout. Study team members observed these courses and took verbatim notes of participants' mid-session questions and later conducted qualitative thematic analysis on the question content.

Results: Seven educational sessions were performed between December 2019 and March 2020 involving 56 patients and 92 family/friends at a neutral, non-hospital affiliated site. Pretest questions most often answered incorrectly included the topics of recovery time required for living donors, length of function for transplanted kidneys, average amount of time spent on the waitlist for a deceased donor kidney, Medicare coverage time post-transplant, and lifestyle changes required after living donation. Non-white patients more often answered questions on these topics incorrectly: "Surgery will not affect the donor's ability to have children" and "Living donors need to take medication after they donate." Additionally, 54% of male patients had misconceptions about insurance coverage compared to 30% of females. There were a total of 126 participant-generated questions asked mid-session, classified into six main categories (Figure 1) that can be used to guide future educational interventions.

Conclusions: Pre-evaluation education directed towards pLDKT candidates and their family/friends elucidates patterns of misunderstanding which may be used to reduce disparities in access to pLDKT.



CITATION INFORMATION: Menser T., Hobeika M., Ibrahim H., Khan A., Cruz B., Sharp J., Gaber A. Preempting Misconceptions: An Educational Initiative for Preemptive Kidney Transplant Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Menser: None. **M. Hobeika:** Consulting Fee; Name of Commercial Interest; Veloxis Pharmaceuticals. Consulting Fee; Nature of Relationship; Speaker's Bureau. **H. Ibrahim:** None. **A. Khan:** None. **B. Cruz:** None. **J. Sharp:** Salary; Name of Commercial Interest; Explore Transplant. Salary; Nature of Relationship; Contract Employee. **A. Gaber:** None.

Abstract# 973

Clinical Outcomes of Living Kidney Transplantation from Elderly Spousal Donors

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Purpose: In Japan, the spousal kidney transplantation accounts for approximately 40% out of whole living kidney transplantation. In addition, about half of whole living donors are over 60 years old. Transplantations from elderly donors have been shown to display impaired long-term graft outcomes. We aimed to examine whether spousal kidney transplantation of elderly donors is clinically acceptable.
Methods: We included 98 recipients with living donor kidney transplantation between 2006 and 2020 in this study. We compared to examine 27 cases of living kidney transplantation from elderly spousal donors aged 60 years or older (group A) and 34 cases of living kidney transplantation from elderly related donors aged 60 years or older (group B). Twelve donors (44.4%) in Group A were male, that is, their husbands, and 31 donors (91.2%) in group B were parents of recipients.
Results: The median donors' age of group B was significantly older than that group A (64 years old vs 72 years old, $p<0.05$), On the other hands, the median recipients' age was significantly older in group A than that in group B (66 years old vs 45 years old, $p<0.001$). Blood type incompatibility was significantly higher in group A than in group B (44.4% vs 20.6%; $p<0.05$). Seven recipients (25.9%) in group A and 6 recipients (17.6%) in group B had preformed donor specific antibodies (DSAs), but there was no significant difference. Four recipients (14.8%) in group A had de novo DSAs after transplantation, which was significantly higher than that in group B (0%; $p<0.05$). Human leukocyte antigen incompatibility is significantly higher degree in group A ($p<0.001$). Rituximab was used significantly more frequently in Group A than in Group B because of, for example, blood type incompatibility, presence of DSAs, and pregnancy history (96.3% vs 52.9%; $p<0.001$). The volume of donated kidney was measured by CT, but there was no significant difference between the two groups. Graft function tended to be superior in group A, but there was no significant difference in the long term, and there was no significant difference in rejection rate or graft survival rate.
Conclusions: Using suitable immunosuppressive regimen, the outcomes of elderly spousal transplantation are also satisfactory.
CITATION INFORMATION: Miyauchi Y., Noda T., Miura N., Kikugawa T., Saika T. Clinical Outcomes of Living Kidney Transplantation from Elderly Spousal Donors *AJT, Volume 21 Supplement 3*
DISCLOSURES: Y. Miyauchi: None. **T. Noda:** None. **N. Miura:** None. **T. Kikugawa:** None. **T. Saika:** None.

Abstract# 974

A Dynamic Markov Model to Assess the Cost-Effectiveness of the Kidney Team at Home Intervention in the Netherlands

S. Redeker[1], S. Ismail[1], H. van Eeren[1], E. K. Massey[2], W. Weimar[2], M. Oppe[3], J. van Busschbach[1], *[1]Psychiatry, Erasmus MC, Rotterdam, Netherlands, [2]Internal Medicine, Erasmus MC, Rotterdam, Netherlands, [3]Axentiva Solutions S.L., Tacoronte, Spain*

Purpose: The Kidney Team at Home program is an educational intervention aimed at patients with chronic kidney disease to assist them in their choice for kidney replacement therapy. Previous studies have shown that the intervention results in an increase in knowledge and communication on kidney replacement therapy, and eventually in an increase in the number of living donor kidney transplantations. The present study assesses the cost-effectiveness of the intervention compared to standard care.
Methods: A dynamic probabilistic Markov model was used to estimate the monetary and health benefits of the intervention in the Netherlands over 10 years. Data on costs and health-related quality of life were derived from the literature. Transition probabilities, prevalence and incidence rates were calculated using a large national database. An optimistic and a pessimistic implementation scenario were compared to a base case scenario with only standard care.
Results: In both the optimistic and pessimistic scenario, the intervention is cost-effective and dominant compared to standard-care: savings were €108,681,985 and €51,770,060 and the benefits were 1382 and 695 QALYs respectively.
Conclusions: The Kidney Team at Home intervention has been shown to be cost-effective compared to the standard care. This is caused by the superior health effects and the reduction of costs associated with transplantation, and the relatively small incremental costs of the intervention. Successful nationwide implementation of the intervention could lead to an increase in the demand for transplantation and to a reduced need for dialysis facilities in the Netherlands.
CITATION INFORMATION: Redeker S., Ismail S., van Eeren H., Massey E., Weimar W., Oppe M., van Busschbach J. A Dynamic Markov Model to Assess the Cost-Effectiveness of the Kidney Team at Home Intervention in the Netherlands *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Redeker: None. **S. Ismail:** None. **H. van Eeren:** None. **E.K. Massey:** None. **W. Weimar:** None. **M. Oppe:** None. **J. van Busschbach:** None.

Abstract# 975

Implementation of the Kidney Team at Home Intervention: Evaluating Generalizability, Implementation Process, and Effects

S. Redeker[1], S. Ismail[1], R. Timman[1], J. van Busschbach[1], C. Boonstra[2], H. F. Brulez[3], D. A. Hollander[4], L. Hilbrands[5], F. J. Bemelman[6], S. P. Berger[7], J. van der Wetering[8], R. A. van den Dorpel[9], M. A. Jansen-Dekker[10], W. Weimar[8], E. K. Massey[8], *[1]Psychiatry, Erasmus MC, Rotterdam, Netherlands, [2]De Viersprong, Rotterdam, Netherlands, [3]Internal Medicine, OLVG, Amsterdam, Netherlands, [4]Internal Medicine, JBZ, Den Bosch, Netherlands, [5]Internal Medicine, Radboud UMC, Nijmegen, Netherlands, [6]Internal Medicine, Amsterdam UMC, Amsterdam, Netherlands, [7]Internal Medicine, UMCG, Groningen, Netherlands, [8]Internal Medicine, Erasmus MC, Rotterdam, Netherlands, [9]Internal Medicine, Maasstad Ziekenhuis, Rotterdam, Netherlands, [10]Internal Medicine, ZGT, Almelo, Netherlands*

Purpose: Research has shown that a home-based educational intervention for patients with chronic kidney disease results in better knowledge and communication on all treatment options, and more living donor kidney transplantations (LDKT) compared to care-as-usual. The aims of this study were (1) to demonstrate generalizability, (2) evaluate the implementation process in terms of feasibility, fidelity and intervention costs, and (3) to assess the relationship of the intervention effects on LDKT-activity.
Methods: Between 2016-2018, eight hospitals in the Netherlands participated in an implementation project. Patients eligible for all kidney replacement therapies (KRT) were invited to participate with their social network. Effect outcomes were KRT-knowledge and KRT-communication, and treatment choice. Feasibility, fidelity and intervention costs were assessed as part of the process evaluation. Cox-regression was used to assess the relationship of intervention effects on LDKT-activity.
Results: 812 patients were approached, and 332 patients completed the intervention. There was a significant increase in KRT-knowledge and KRT-communication among patients and invitees. After the intervention, 129 out of 332 patients (39%) had LDKT-activity. Overall participation rate was 40.9%. Protocol adherence was high (4.61 out of 5) and intervention costs were between €2500 and €3000 per intervention. Protocol adherence, knowledge and a lower age were positively correlated with LDKT-activity.
Conclusions: Results of the present study are comparable to the previous RCTs. These results show that the intervention can be implemented in multiple regions, while maintaining impact and quality. Results from the implementation process also support a nationwide implementation of the intervention. We recommend including home-based education in standard-care for patients with chronic kidney disease.
CITATION INFORMATION: Redeker S., Ismail S., Timman R., van Busschbach J., Boonstra C., Brulez H., Hollander D., Hilbrands L., Bemelman F., Berger S., van der Wetering J., van den Dorpel R., Jansen-Dekker M., Weimar W., Massey E. Implementation of the Kidney Team at Home Intervention: Evaluating Generalizability, Implementation Process, and Effects *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Redeker: None. **S. Ismail:** None. **R. Timman:** None. **J. van Busschbach:** None. **C. Boonstra:** None. **H.F. Brulez:** None. **D.A. Hollander:** None. **L. Hilbrands:** None. **F.J. Bemelman:** None. **S.P. Berger:** None. **J. van der Wetering:** None. **R.A. van den Dorpel:** None. **M.A. Jansen-Dekker:** None. **W. Weimar:** None. **E.K. Massey:** None.

Abstract# 976

Living Donor Total Robotic Renal Transplantation: Early Single Center Experience

M. E. Tobon Lascano, S. Koganti, M. E. Akoad, M. Anastopoulos, C. J. Simon, B. A. Bouthot, E. D. Walshe, Y. L. Cheah, *Transplant, Lahey Clinic, Burlington, MA*

Purpose: To establish the feasibility and evaluate the results and outcomes of a newly established totally robotic kidney transplant program.
Methods: Retrospective review of a single center experience at living donor totally robotic kidney transplants performed between January to October 2020. We evaluated the recipient demographics, Donor/graft characteristics, Intraoperative details

including Cold Ischemia time (CIT), Warm Ischemia Time (WIT), Complications, Length of stay (LOS), Pain scores per visual analogue scale (VAS) on day 0,1,3, average Urine output (UOP) on first postoperative day and creatinine at days 7-10.
Results: A total of 5 totally robotic kidney transplants were performed during the established time frame. Recipient and donor characteristics are reported on table 1. The mean CIT was 51.2 minutes and the WIT was 43.6 minutes. Mean UOP on the first 12 hours was 7640 ml. The average VAS at day 0, 1 and 2 was 1.4, 3.2 and 3.6 respectively. Creatinine measurements between days 7-10 had a mean of 1.38mg/dl. The only recorded complication was acute cellular rejection type Banff 1A in one patient that resolved with standard medical management. The Average LOS was 5 days with no re-admissions or recorded wound complications.
Conclusions: Our early experience with living donor totally robotic kidney transplant shows that after adequate candidate selection the use of this technique is safe with reproducible outcomes and no procedure related complications. Additionally we showed rapid recovery and excellent graft function. Further investigation with a bigger cohort of patients and comparison to other techniques as well as learning curve for training physicians is needed."$$table_"
CITATION INFORMATION: Tobon Lascano M., Koganti S., Akoad M., Anastopoulos M., Simon C., Bouthot B., Walshe E., Cheah Y. Living Donor Total Robotic Renal Transplantation: Early Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.E. Tobon Lascano: None. **S. Koganti:** None. **M.E. Akoad:** None. **M. Anastopoulos:** None. **C.J. Simon:** None. **B.A. Bouthot:** None. **E.D. Walshe:** None. **Y.L. Cheah:** None.

Kidney

Kidney Technical

Abstract# 977

Detrusor Reinforced Lich-Gregoir Ureteroneocystostomy for Kidney Transplants Recipients: Comparative Analysis of the First 100 Cases

R. H. Astolfi, J. Medina-Pestana, H. Tedesco Silva Junior, W. Aguiar, *Urology, Universidade Federal de São Paulo, São Paulo, Brazil*

Purpose: In this study, we describe and compare the postoperative outcomes of our modified Lich-Gregoir ureteroneocystostomy (mLG), without DJ stent and with early bladder catheter removal, with the traditional technique.
Methods: Data from 100 consecutive patients who underwent mLG with early (48 hours) bladder catheter removal between October 2018 and November 2019 were compared to a control group (LG) comprised by the last 165 consecutive patients who underwent traditional Lich-Gregoir technique with routine (4-5 days) bladder catheter removal until July 2017. The same surgeon performed all surgeries and follow up was 6 months after transplantation. Surgical complications were stratified in early, occurring during the first month, and late.Differently from the traditional LG technique, in which the bladder mucosa is completely separated from the muscular layer, in our mLG the detrusor muscle is dissected in order to preserve a thin layer of detrusor fibers over the mucosa. Subsequently, the vesicoureteric anastomosis is performed by 2 separate continuous sutures of polidioxanone 6.0 between the spatulated ureter and the mucosa coated with detrusor fibers. Finally, the upper muscle layer is then loosely approximated over the distal portion of the ureter using interrupted 3.0 polyglactin sutures in order to create a tunnel that will serve as an anti-reflux mechanism.
Results: Patients in the mLG group were younger (37.4±13.7yo vs. 42±14.0yo, p=0.012) and had higher residual diuresis volume (911±753.8mL vs. 629±638.6mL, p=0.016). The incidence of diabetes was low and similar in both groups. There were no differences in chronic kidney disease etiology and time on dialysis was relatively short. Over 77% received a kidney from a living donor, and there were no differences in cold and warm ischemia time. There was a statistical difference in the distribution of the maintenance immunosuppressive regimen, with a lower proportion of patient receiving an mTOR inhibitor in the mLG group.After the transplant, it was observed that patients from the mLG group successfully underwent early indwelling Foley catheter removal (2.2±0.9d vs. 4.8±4.8d, p<0.001) and had a significantly lower hospital length of stay (6.5±5d vs. 7.1±6.2d, p=0.023), while also having lower rates of early surgical complication (3% vs. 17%, p=0.029). When analyzing specifically the occurrence of urinary leakages, we observed that in the mLG group there was only 1 case that resulted from necrosis of the entire ureter secondary to thrombosis of the graft's lower polar renal artery, while in the LG group there were 5 cases directly related to the vesicoureteric anastomosis.
Conclusions: The results of this study suggest that our modified Lich-Gregoir ureteroneocystostomy technique for kidney transplantation is a safe alternative to the traditional method, even with an early bladder catheter removal and without the use of DJ stents.
CITATION INFORMATION: Astolfi R., Medina-Pestana J., Tedesco Silva Junior H., Aguiar W. Detrusor Reinforced Lich-Gregoir Ureteroneocystostomy for Kidney Transplants Recipients: Comparative Analysis of the First 100 Cases *AJT, Volume 21 Supplement 3*
DISCLOSURES: R.H. Astolfi: None. **J. Medina-Pestana:** None. **H. Tedesco Silva Junior:** None. **W. Aguiar:** None.

Abstract# 978

Single Center Experience in Ex Vivo Hilar Renal Artery Aneurysm Repair and Autotransplantation

A. Chang[1], K. Cederquist[1], P. Abt[1], G. Wang[2], B. Jackson[2], A. Naji[1], *[1]Transplant Surgery, University of Pennsylvania, Philadelphia, PA, [2]Vascular Surgery, University of Pennsylvania, Philadelphia, PA*

Purpose: In this study, we review our centers experience with complex renal artery aneurysms using our preferred technique of open nephrectomy, ex vivo repair, and autotransplantation in the pelvis.
Methods: The records of 11 consecutive cases of hilar RAA treated at our center between 2012 and 2020 were reviewed retrospectively. In each case, an open nephrectomy and partial ureterectomy was performed through an 8 cm flank incision. The affected organ was flushed with ice cold Belzer UW solution. Ex vivo resection of RAAs and reconstructions were performed on the back table in an ice bath. Autotransplantation was performed immediately after repair in the pelvis via a Gibson incision. Demographic data, intraoperative details, short term and long term outcomes are reported.
Results: During the study period, 11 ex vivo renal artery aneurysm repairs and autotransplantation procedures were performed in 10 patients. The median age of the patients was 56 years (interquartile range 47 - 66 years). Nine patients had at least 1 major cardiovascular comorbidity. The right kidney was involved in 5 cases, the left kidney in 6 cases. One patient had bilateral RAAs that were addressed in a staged manner. The total ischemia time was 303 ± 79 minutes. The mean aneurysm size measured by largest diameter in cross sectional imaging was 27.0 ± 8.5 mm. The mean pre-operative serum creatinine was 0.77 ± 0.14 mg/dL. Seven RAAs were repaired by aneurysmorrhaphy, 3 were implanted using a common patch, and in one case a combination of techniques was used. The mean serum creatinine at discharge on post-operative day 3 was 1.12 ± 0.98 mg/dL. Post-operative length of stay was 3 ± 0 days. Only one graft loss was reported due to microembolic disease in the kidney requiring graft nephrectomy. No patients progressed to chronic kidney disease or required dialysis during the study period. There were no deaths during follow up.
Conclusions: Ex vivo repair and autotransplantation is a treatment modality for complex hilar RAAs which has low complications and excellent outcomes.

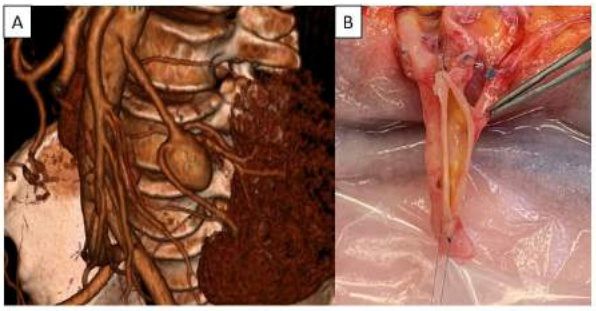

Figure 1: 3D reconstruction of hilar renal artery aneurysm (A) and ex vivo aneurysmorraphy repair (B) after nephrectomy and cold preservation.

CITATION INFORMATION: Chang A., Cederquist K., Abt P., Wang G., Jackson B., Naji A. Single Center Experience in Ex Vivo Hilar Renal Artery Aneurysm Repair and Autotransplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Chang: None. **K. Cederquist:** None. **P. Abt:** None. **G. Wang:** None. **B. Jackson:** None. **A. Naji:** None.

Abstract# 979

Initial Experience with Single-port Robotic-assisted Kidney Transplantation

M. Eltemamy, A. Aminsharifi, Y. Lin, Z. Schwen, M. Abou Zeinab, V. Krishnamurthi, D. Goldfarb, A. Wee, J. Kaouk, *Cleveland Clinic, Cleveland, OH*

Purpose: Early experiences with multi-port robotic kidney transplantation have demonstrated a potential reduction in complications and improved convalescence while maintaining equivalent functional outcomes relative to the open approach. We present the technique and evaluate perioperative and short-term postoperative outcomes of single-port robotic-assisted kidney transplantation (RAKT) as a novel promising procedure to further reduce the morbidity of kidney transplantation.
Methods: We prospectively evaluate the perioperative and postoperative outcomes after single-port RAKT in patients who underwent primary kidney transplant (n=6) between November 2019-2020. Kidney allografts from living (n=4) and deceased (n=2) donors were transplanted into six patients. Single-port robotic surgery was done by placement of a GelPOINT system through a 5cm midline infraumbilical abdominal incision after developing the extraperitoneal space. The da Vinci SP® robotic system was used to prepare the vascular bed. After extracorporeal preparation of the allograft, the robot was undocked and the kidney was introduced into the extraperitoneal space followed by re-docking. The SP robot was used to complete vascular and ureteral anastomoses.

Results: Single-port RAKT was successfully completed without the need for conversion to any alternative approach in six patients with ESRD. Median age was 57 years (IQR: 55-60) with a median BMI of 28 (IQR: 23-37). Median operative time was 372 min (IQR: 367-439). Median arterial anastomosis time was 23 min (IQR:19-25) and Median vein anastomosis time was 28 min (IQR:28-29). Median hospital stay was 2 days (IQR: 2-3). Median Visual analogue score pain on discharge was 2 (IQR: 2-3). All patients had excellent graft function with serum creatinine levels at last follow- up ranging between 1.2-1.5 mg/dL.
Conclusions: Single-port RAKT is feasible with comparable short-term graft functional outcomes. Compared to the multiport robot, it offers the benefit of being a true single-site minimally invasive surgery as well as recapitulating the open extraperitoneal approach which might further reduce the morbidity of kidney transplantation. While these early results are promising, larger series with longer follow-up are required.
CITATION INFORMATION: Eltemamy M., Aminsharifi A., Lin Y., Schwen Z., Abou Zeinab M., Krishnamurthi V., Goldfarb D., Wee A., Kaouk J. Initial Experience with Single-port Robotic-assisted Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Eltemamy: None. **A. Aminsharifi:** None. **Y. Lin:** None. **Z. Schwen:** None. **M. Abou Zeinab:** None. **V. Krishnamurthi:** None. **D. Goldfarb:** None. **A. Wee:** None. **J. Kaouk:** None.

Abstract# 980

Anterior Rectus Sheath versus Gibson Incision for Kidney Transplantation - University of Chicago Experience

G. S. Generette, P. J. Bachul, P. E. Borek, K. Jayant, A. Perez-Gutierrez, B. Juengel, Y. T. Becker, R. Barth, J. Fung, P. Witkowski, *Surgery, University of Chicago, Chicago, IL*

Purpose: The advantages of Anterior Rectus Sheath (ARS) incision over traditional Gibson (GB) incision have been described for kidney transplantation. Therefore, we decided to compare those two incisions in regards to surgical site complication rates (SSC) in our center.
Methods: We analyzed retrospectively data from 45 subsequent adults submitted to unilateral kidney transplantation utilizing ARS incision and compared to outcomes in 99 subsequent adults treated with the same operation applying a standard GB incision. All procedures were performed by the same attending surgeon within last 3 years.
Results: There were significantly more patients 60 years old and older in ARS group- 55% comparing to 28% in GB group (p=0.006). Otherwise kidney donor and recipient characteristics did not differ between the groups. 60% of patients were male, median BMI was 27 (16-40), and 35% were diabetic. The donors were mostly deceased (90%), brain dead (54%) and median KDPI was 60%, (3-100). Delayed graft function rate was around 50% and length of hospital stay around (4-5 days) did not differed between the groups. The rate of surgical site complication (SSC) (wound infection or dehiscence) did not differ statistically: 14% in ARS vs 5% in GB group. All SSCs after ARS incision (6/6) were found in patient over 60 years old. Accordingly, SSC rate was significantly higher after ARS incision- 25% (6/24) in this age subgroup versus none after GB incision (p=0.002). In contrast, 80% of SSCs in GB group were found in obese (BMI>30) patients. Accordingly, the rate of SSC was significantly higher in GB versus ARS group in obese cohort: 12% vs 0 (p=0.015).
Conclusions: We found significantly less SSCs in obese patient subpopulation after utilizing ARS versus Gibson incision for kidney transplantation. However, Gibson incision was superior in patients over 60 years old resulting in significantly less SSCs.
CITATION INFORMATION: Generette G., Bachul P., Borek P., Jayant K., Perez-Gutierrez A., Juengel B., Becker Y., Barth R., Fung J., Witkowski P. Anterior Rectus Sheath versus Gibson Incision for Kidney Transplantation - University of Chicago Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: G.S. Generette: None. **P.J. Bachul:** None. **P.E. Borek:** None. **K. Jayant:** None. **A. Perez-Gutierrez:** None. **B. Juengel:** None. **Y.T. Becker:** None. **R. Barth:** None. **J. Fung:** None. **P. Witkowski:** None.

Abstract# 981

The Experience of 1000 Hand Assisted Laparoscopic Donor Nephrectomy for Living Donor Kidney Transplantation

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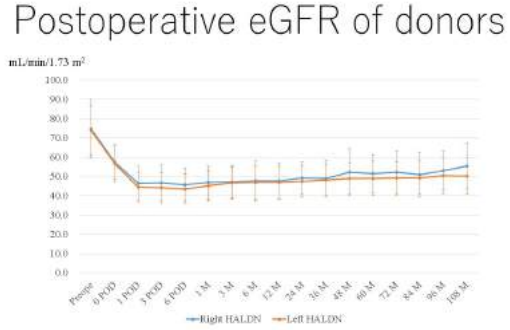
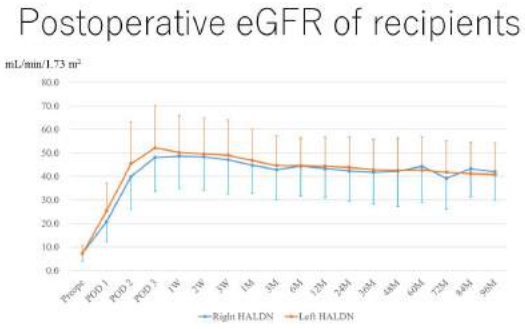
Purpose: Due to the profound organ shortage, living donor kidney transplantation becomes more necessary. Hand assisted laparoscopic donor nephrectomy (HALDN) is widely performed to lessen the burden of living donors. However, efficient and safe donor nephrectomy is essential. We investigated the efficacy and safety of right and left HALDN.
Methods: Between January 2008 and August 2019, 1018 living kidney donors underwent HALDN. Left and right HALDN were indicated for 957 and 61 living kidney donors based on the results of the kidney function in the 99mTc-DTPA scintigraphy. Operative results of donors and recipients were compared between right and left HALDN group.
Results: Significat difference was not identified in donor characteristics between left and right HALDN group. Operative duration and blood loss were similar in left and right HALDN group (212.7±98.4 vs 211.0±42.6min, P=0.892, 95%CI -26.595-23.165; 33.5±60.3 vs 60.0±189.1ml, P=0.284, 95%CI -22.537-75.463). Warm ischemia time was significantly longer in right HALDN group (133.6±69.4 vs 177.42.3 sec, P<0.001, 95%CI 26.479-61.766). Two and one open conversion were identified in left and right HALDN group (P=0.169, OR 1.44 95%CI 0.634-9.142). The incidences of other postoperative complications including adhesive intestinal obstruction (2 vs 0, P=0.060), incisional hernia (5 vs 2, P=0.646 , OR 1.416, 95%CI 0.526-3.814), bleeding (2 vs 0, P>0.999), and wound infection (88 vs 4, P=0.646, OR 1.416, 95%CI 0.526-3.814) were similar in both groups. Post-operative estimated glomerular filtration rates of living kidney donors were similar in both groups.



Post-operative estimated glomerular filtration rates of recipients were similar in both groups.



Only 1 delayed graft function due to the arterial injury during the left HALDN was identified.
Conclusions: The efficacy and safety of left and right HALDN were demonstrated through our experience of 1000 cases.
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Abstract# 982

Urine Donor-derived Cell-free is Valuable for Predicting BK Polyomavirus-associated Nephropathy in Kidney Transplant Recipients

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Purpose: Our previous study has proved that urine donor-derived cell-free DNA (dd-cfDNA) can assist in the diagnosis of BK polyomavirus-associated nephropathy (BKPyVAN), but its specificity is not clear. This prospective study was designed to evaluate the relationship between urine dd-cfDNA and various types of pathological damages in the transplanted kidney.
Methods: Urine dd-cfDNA quantification and proportion were respectively assayed from 96 patients receiving kidney transplant biopsies in our center. Dd-cfDNA was detected through Target Region Capture Sequencing and reads were calculated by Maximum Likehood Estimation.

Results: There was no significant difference in urine dd-cfDNA proportion among all groups (Figure 1A). Urine dd-cfDNA quantification was significantly higher in BKVN than Mixed-rejection (P=0.020), Borderline rejection (P=0.020), IgAN (P<0.001), IF/TA (P=0.003), and FSGS (P=0.042) (Figure 1B).
Receiver operating characteristic (ROC) analysis showed that the optimal cut-off value of urine dd-cfDNA quantification for predicting BKPyVAN was 6.08, with an area under the ROC curve (AUC) of 0.804 (95% confidence interval [CI]: 0.771-0.878) (Figure 2A). Youden index, sensitivity and specificity were 0.459, 0.778 and 0.681 respectively. ROC analysis exhibited that the optimal cut-off value of urine dd-cfDNA proportion for predicting BKPyVAN was 5.93%, with an AUC of 0.670 (95% CI: 0.566-0.762) (Figure 2B). Youden index, sensitivity and specificity were 0.340, 0.630 and 0.710 respectively.
Conclusions: Urine dd-cfDNA quantification was significantly increased in transplanted kidney with BKPyVAN. Urine dd-cfDNA has diagnostic value in predicting BKPyVAN.

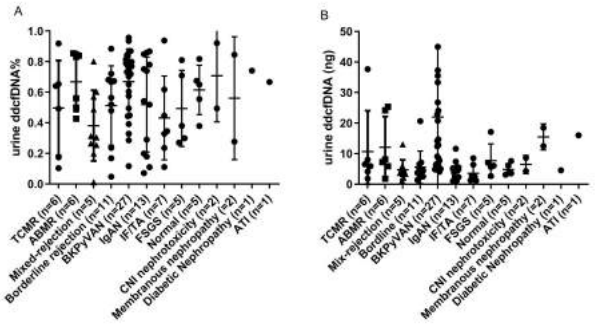

Figure 1. Urine dd-cfDNA quantification (A) and proportion (B) among all groups. Donor-derived cell-free DNA (dd-cfDNA); Antibody mediated-rejection (ABMR); BK polyomavirus-associated nephropathy (BKPyVAN); Interstitial fibrosis and tubular atrophy (IF/TA); IgA nephropathy (IgAN); Focal segmental glomerulosclerosis (FSGS); Calcineurin inhibitors (CNI); Acute tubular injury (ATI)

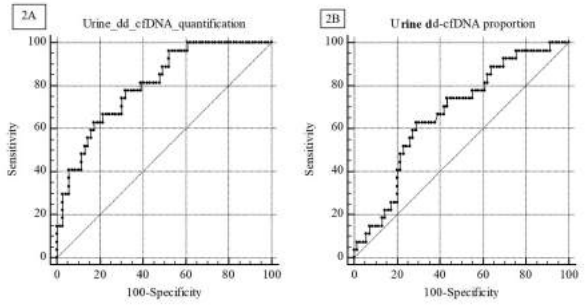

Figure 2. Receiver operating characteristic (ROC) curves of urine dd-cfDNA quantification (A) and proportion (B) for predicting BKPyVAN. Donor-derived cell-free DNA (dd-cfDNA); BK polyomavirus-associated nephropathy (BKPyVAN)

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Abstract# 983

Single Incision Simultaneous Liver Kidney Transplantation: Outcomes and Feasibility

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Purpose: Simultaneous liver and kidney transplantation (SLK) is indicated in patients with concomitant end stage liver disease and severe chronic kidney disease or end stage renal disease. The number of SLK performed in USA has consistently been increasing in last few years. Traditionally SLK is performed using a subcostal incision for the liver allograft and a lower abdominal incision for kidney transplantation (Dual Incision, DI). At our institution, we perform a single subcostal incision (SI) for SLK. Aim of our study was to report our outcomes using single and dual incisions for SLK.
Methods: Retrospective analysis of all SLK done at our center from 01/2015 to 11/2020 was performed. Demographic characteristics, complications, intraoperative findings and complication after SI and DI were statistically compared. Further subgroup analysis was performed based on early and late experience with SI SLK.
Results: A total 34 SLK were performed (18 DI and 16 SI) during study period. MELD score, age, and indications for transplant were comparable in both groups. Recipient demographics, outcomes and comparison between two groups are shown in table 1 and 2. Patient in SI group had higher BMI without any statistical significance. Cold ischemic time of kidney transplantation was significantly shorter in SI group (p=0.002). The complications were slightly higher in SI group in early era without any statistical significance. Hospital stay, warm ischemia time were comparable in both groups. Post-operative morphine requirements and overall operative time in SI group was lower.
Conclusions: Single incision SLK is technically feasible and has comparable outcome to dual incision SLK. Single incision SLK was associated with shorter cold ischemia time for kidney transplant as well as lower overall operative time without any impact on outcome. Further study is required to delineate additional benefit of single incision SLK with particular focus on patient acceptance and recovery from the surgical wound.

Table 1 Comparison of single and dual incision SLK

	Dual Incision (n=18)	Single Incision (n= 16)	*p*-value
Age (mean ±SD)	57.1 ± 2.3	55.7 ± 2.5	0.697
Male	50%	56.3%	0.716
MELD score (mean ±SD)	28.2 ± 1.2	28.7 ± 1.3	0.759
BMI (mean ±SD)	27.3 ± 1.6	31.6 ± 1.7	0.080
KDPI (mean ±SD)	48.5 ± 6.3	43.0 ± 6.5	0.551
Operative Time (minutes)	511 ± 26	446 ± 28	0.098
WIT, kidney (min, mean ±SD)	29.3 ± 1.8	32.1 ± 1.9	0.283
CIT, Kidney (min, mean ±SD)	590 ± 28	450 ± 29	***0.002***
Hospital Stay (days, mean ±SD)	17.2 ± 5.5	25.6 ± 5.9	0.306
Morphine (mg Eq) at postoperative day 14	27.7 ± 5.4	16.4 ± 5.7	0.160
Complications			
Bile leak	0	3 (18.8%)	0.054
Bleeding	1 (5.6%)	2 (12.5%)	0.476
Clavien – Dindo grade ≥III complication	4 (22.2%)	7 (43.8%)	0.181
Mortality (1-month)	0	1	

Table 2 : Comparison of first 8 cases of SI group to later 8 cases.

	Dual Incision (n=18)	Single Incision First 8 cases	Single Incision The other 8 cases
WIT, kidney (min, mean ±SD)	29.3 ± 1.8	34.0 ± 2.6	30.3 ± 2.6
Bile leak	0	3 (37.5%)	0
Clavien – Dindo grade ≥III complication	4 (22.2%)	5 (62.5%)	2 (25.0%)

MELD, Model For End-Stage Liver Disease; BMI, body mass index; KDPI, Kidney Donor Profile Index; WIT, warm ischemic time; CIT, cold ischemic time

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DISCLOSURES: D. Imai: None. **Y. Sambommatsu:** None. **A. Khan:** None. **S. Lee:** None. **A. Sharma:** None. **V. Kumaran:** None. **D. Bruno:** None. **A. Cotterell:** None. **C. Bhati:** None. **M.F. Levy:** None.

Abstract# 984

Is There a Role for Pre-Operative Angiographic Kidney Embolization Prior to Allograft Nephrectomy?

M. Jacobs[1], R. Stratta[1], D. Harriman[2], A. Farney[1], J. Rogers[1], G. Orlando[1], A. Reeves-Daniel[1], C. Jay[1], *[1]Wake Forest Baptist Health, Winston Salem, NC, [2]University of British Columbia, Vancouver, BC, Canada*

Purpose: To determine if morbidity associated with allograft nephrectomy (AN) of a failed or diseased kidney transplant (KT) is improved by pre-operative angiographic kidney embolization (PAKE).
Methods: We retrospectively reviewed adult KT recipients who underwent AN at our center from 2002-2020. Three patients whose grafts had auto-thrombosed at time of angiography were included in the PAKE group according to intention to treat. Ten patients, who underwent AN within 7 days of KT, and 2 patients, who underwent AN during repeat KT, were excluded.
Results: A total of 80 remaining patients underwent AN, including 54 (67.5%) who underwent PAKE prior to AN and 26 (32.5%) who underwent AN alone. Time interval between KT and AN was higher in PAKE patients (PAKE: 57±64 months vs AN alone: 24±44 months, p=0.02). Indications for AN included allograft intolerance (n=42), chronic graft infection (n=12), primary nonfunction (n=8), malignancy (n=8), late vascular events (n=7), and other (n=3). There was a trend toward more females in the PAKE group (PAKE: 58.5% female vs AN alone: 38.5%, p=0.1), but no other demographic differences were noted. PAKE was associated with significantly reduced blood loss (PAKE: mean 266±292 ml vs AN alone: 495±689 ml; p=0.04) and reduced transfusion requirements (PAKE: mean 0.5±0.8 packed red blood cell units vs AN alone: 1.6±2.6 units; p=0.004) despite comparable pre-operative hemoglobin levels. Mean operating time (PAKE: 141±43 minutes vs AN alone: 202±111 minutes; p=0.001) and mean length of initial hospital stay (PAKE: 4.3±1.9 days vs

AN alone: 9.3±9.4 days; p<0.001) both favored PAKE. PAKE was associated with a lower complication rate [11% (6/54); including vascular injury (2), re-exploration (1), small bowel obstruction (1), incisional hernia (1), and perioperative death (1)], compared to AN alone [38.5% (10/26, p=0.007); including vascular injury (2), wound complication (5), and re-exploration (3)].

Conclusions: PAKE was associated with less intra-operative blood loss, fewer transfusions, reduced operating time, shorter length of stay, and fewer complications compared to AN alone. More widespread use of PAKE should be considered to potentially reduce morbidity associated with AN. Further study is required to determine if allograft embolization alone as definitive therapy can prevent the need for AN in patients with complications of graft failure.

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Abstract# 985

Robotic Assisted Donor Nephrectomy: A Single Center Experience

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Purpose: Robotic donor nephrectomy (RLDN) is an emerging procedure of choice for living kidney donors at many programs. This approach has benefit of minimal invasive surgery as well improved ergonomic movements for the surgeon, 6-degrees of freedom, precision and 3-D vision. The purpose of this study was to evaluate the technical feasibility and safety of non-hand assisted robotic donor nephrectomy in living donors and assess our outcomes.

Methods: Retrospective review was conducted in patients who underwent RLDN from 02/2016 to 12/2019 at our center. All relevant demographic and perioperative data was collected. Postoperative course including renal function before surgery and 2 weeks post-surgery, with all complications and additional long-term follow up were evaluated.

Results: A total of 141 donor robotic nephrectomies were performed at our center during study period. Majority of them were females (65%) with median age of 43 years(range 18-71 years). Thirty-nine donors underwent right donation and 102 had left kidney donation based on their vascular anatomy and size. Median operative time was 191 minutes(123-334 minutes). Multiple arteries and veins noted in 26 and 19 patients respectively. Average estimated blood loss was 37 cc. No donor required any blood transfusion. Predonation average creatinine was 0.83mg/dl and at 2 weeks 1.29mg/dl. Median hospital stay was 2 days (2-5 days). Nausea was most common complication(21%). Three patients had chest pain and two patients hypertension in early postoperative period. One patient had gluteal muscle rhabdomyolysis managed conservatively. Three donors had arterial stump bleeding after stapling. None required conversion to open procedure. Two patients required readmission, one for severe constipation with abdominal pain and another had a pneumonia. No donor had Clavien-Dindo 3 or higher complication.

Conclusions: RDLN is safe procedure with excellent outcome. The application of robotic technique to donor nephrectomy allows for greater control and maneuverability allowing it to be a safe and attractive option for both patients and surgeons.

Demographic Data	
Number of donors	141
Age (median)	43(18-71)
BMI(mean ± SD)	27.1 ± 4.3
Race (Black/white/others)	39/96/6
Maritalstatus (single/married/divorced)	36/90/15
Sex(M/F)	92/49

Intraoperative complications		
Stump bleeding	3	Managed with clipping or new staple fire
Gall bladder injury	1	Suture repaired
Early ureter transaction	1	Kidney implanted without any problems
Spleen capsule tear	1	Stopped with temporary pressure and argon beam

CITATION INFORMATION: Khan A., Sharma A., Lee S., Cotterell A., Kumar D., Kamal L., Moinuddin I., Bruno D., Kumaran V., Levy M., Bhati C. Robotic Assisted Donor Nephrectomy: A Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Khan: None. **A. Sharma:** None. **S. Lee:** None. **A. Cotterell:** None. **D. Kumar:** None. **L. Kamal:** None. **I. Moinuddin:** None. **D. Bruno:** None. **V. Kumaran:** None. **M. Levy:** None. **C. Bhati:** None.

Abstract# 986

Robotic versus Open Mini-incision Living Donor Nephrectomy: Single Center Experience

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Purpose: A minimally invasive approach is the gold standard for living donor nephrectomy (LDN). While robotic surgery is commonly used for native nephrectomies and urological procedures, robotic LDN is being performed at very few centers worldwide. The robotic platform allows three-dimensional imaging of the surgical site and precise replication of human hand movements scaled down. Robotic surgery is associated with less tissue manipulation and earlier recovery with minimal incision. The aim of this study is to compare the short-term clinical outcomes between robotic-assisted donor nephrectomy (RDN) and open mini-incision donor nephrectomy (ODN) at a single center.

Methods: From 2016 to 2019, 141 consecutive cases involving RDN were analyzed at our single center. Patient outcomes were compared with those from a historical cohort of 191 patients who underwent ODN (7-9 cm incision) from 2010 to 2015. Medical records, including demographics, operation factors, perioperative outcomes, and complications were reviewed retrospectively.

Results: The RDN and ODN groups had a mean age of 42.8 and 41.4 years old, respectively ($p = 0.31$) as well as a mean BMI of 27.1 and 27.2, respectively ($p = 0.76$). Left-sided donor nephrectomy was performed in 102 patients (72.3%) via robotic approach and 88 patients (44.7%) via open approach ($p < 0.001$). Operative time was similar between both groups (194.0 for RDN vs. 197.8 min for ODN, respectively; $p = 0.40$). The RDN group presented with less blood loss than the ODN group (37.5 vs. 79.3 ml; $p = 0.023$). There was no open conversion case in the RDN group. Postoperative creatinine and glomerular filtration rate were not significantly different between two groups (1.28 and 61.68 for RDN vs. 1.28 mg/dL and 64.26 ml/min for ODN; $p = 0.996$ and 0.098, respectively). Length of hospital stay was significantly shorter in the RDN group than the ODN group (2.34 vs. 3.08 days; $p < 0.005$). The overall rate of complications was low and there was no statistically significant difference in complication rates between the groups. Complications included stump bleeding (3 for RDN vs 1 case for ODN, $p = 0.313$), urinary retention (1 for RDN vs 3 cases for ODN, $p = 0.643$), and lymphatic leak (1 for RDN vs. 0 case for ODN, $p=0.417$).

Conclusions: RDN is a safe and minimally invasive technique with excellent clinical outcomes for living donors. The robotic approach has benefits over the traditional open approach, including shorter length of hospital stay and reduced intraoperative blood loss.

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DISCLOSURES: S. Lee: None. **S.Z. Wang:** None. **A. Khan:** None. **A. Sharma:** None. **D. Kumar:** None. **L. Kamal:** None. **A. Cotterell:** None. **V. Kumaran:** None. **D. Bruno:** None. **M. Levy:** None. **C. Bhati:** None.

Abstract# 987

Evaluation of the Impact of Delayed Graft Function (dgf) on Kidney Allograft Outcomes

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Purpose: DGF is an important post-transplant complication that has early and long-term consequences on graft survival with increased relative risk of graft loss. DGF frequency varies widely worldwide ranging from 2-50% with the variability likely stemming from differences in rates reported by different national registries and type of donor. We sought to further evaluate effect of DGF on graft survival and glomerular filtration rate (GFR) at 1 and 3 years

Methods: We conducted a single-center retrospective chart review of deceased donor kidney transplants recipients from March 2013 to June 2017. Baseline patient demographics, transplant characteristics were collected. The recipients were grouped into two based on IGF vs DGF. Data was analyzed on SAS version 9.3.

Results: Of 184 recipients included in the study, 104 had IGF and 78 had DGF. The mean age was 53.5, 65.9% male, 40% Caucasian and 41.2 African American which was similar between the groups. The comorbidity burden in the cohort was high with 63.7% DM, 99% HTN and was similar amongst the groups. The mean donor age was 38.6, 25 were donation after cardiac death (DCD), mean KDPI was 53.8. At 3 year follow up, there was 9 patient death and 19 all-cause kidney allograft loss. On

univariate logistic regression, DGF status did not impact 3 year patient or allograft survival. On linear regression, DGF had an negative impact on GFR at 1 year and 3 year post-transplant. with GFR being lower by 8ml/min/1/73m^2 (p=0.01) (Figure 1).
Conclusions: We found that in recipients of deceased-donor kidney transplants, non-Caucasian race was associated with and increased risk of DGF. DGF was not associated with significantly different 3 year patient or graft survival, but did associate with worse kidney allograft function, with lower 1- and 3- year GFR measurements.

Table 1: Linear Regression Model for GFR at 1- and 3-years post-transplant

	GFR at 1 year		GFR at 3 years	
	Beta	p-value	Beta	p-value
DGF (ref IGF)	-8.7	0.01	-8.2	0.01
Age (yrs.)	-0.2	0.1	-0.2	0.08
Male (ref female)	0.5	0.8	0.1	0.9
Caucasian (ref Other)	1.9	0.5	0.9	0.7
DM (ref No DM)	-0.2	0.4	0.5	0.8
Dialysis Vintage (yrs.)	0.04	0.7	-0.04	0.8
KDPI	-0.2	0.001	-0.2	<0.001
DCD (vs DBD)	-16.0	0.05	-2.4	0.5

CITATION INFORMATION: Leeds J., Rawashdeh B., Sestito M., Sharma B., Kamal J., Kumar A., AgarwalAA4VB A., Doyle A., Rao S. Evaluation of the Impact of Delayed Graft Function (dgf) on Kidney Allograft Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Leeds: None. **B. Rawashdeh:** None. **M. Sestito:** None. **B. Sharma:** None. **J. Kamal:** None. **A. Kumar:** None. **A. AgarwalAA4VB:** None. **A. Doyle:** None. **S. Rao:** None.

Abstract# 988

Early Recovery After Surgery Protocol in Kidney Transplantation is Associated with Decreased Hospital Stay and Improved Clinical Outcomes

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Purpose: Early recovery after surgery protocols (ERAS) has been adopted in many surgical procedures. In 2018 we introduced transplant ERAS to our institution. It included modified preoperative counselling, strict fluid replacement, earlier discharge, outpatient dosing of induction immunosuppression and intensified postoperative follow-up.
Methods: We retrospectively reviewed 817 patients who had kidney transplantation only in our department from 2015 to 2020 with at least 6 months follow-up. Patients were divided into 2 groups; Group 1 from 2015 to 2017 (n=369) and Group 2 from 2018 to 2020 (n=448)
Results: Patients in Group 2 were older (56 vs 53 years, p<0.01) and had fewer living donation (32.3% vs 44.6%, P<0.01). They had a lower rate of delayed graft function (DGF) (8% vs 16.8%, P<0.01), decreased length of stay (3 vs 5 days, P<0.01) with a higher creatinine level at discharge (3 vs 2 mg/dl, P<0.01) but similar creatinine levels (p=0.1) and better graft survival (99.3% vs 96.5%, P<0.01) at 6 months follow up.
Conclusions: Our ERAS protocol was associated with a lower rate of DGF, decreased length of hospital stay, and better graft survival at 6 months. The higher creatinine at discharge can be explained by the lower percentage of living donation as well as the earlier discharge.
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DISCLOSURES: Y. Lin: None. **M. Eltemamy:** None. **K. Sasaki:** None. **V. Krishnamurthi:** None. **D. Goldfarb:** None. **A. Wee:** Consulting Fee; Name of Commercial Interest; Care Dx. Consulting Fee; Nature of Relationship; Advisory board.

Abstract# 990

Anterior Rectus Sheath versus Standard Gibson Approach to Kidney Transplantation: A Randomized Double-blinded Controlled Trial

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Purpose: Purpose: The anterior rectus sheath (ARS) approach to kidney transplantation (KT) involves a small skin incision to incise the ARS and medially retract rectus musculature, exposing the extraperitoneal space without cutting muscle. Retrospective literature demonstrated decreased wound-related complications compared to the standard Gibson approach (GA). Herein we present preliminary results from a randomized double-blind controlled trial comparing approaches for patients with at least 6 months follow-up.
Methods: Methods: Patients above age 18 without prior ipsilateral KT were enrolled. Surgeons randomized patients intraoperatively. Participants were not given additional incision-specific details apart from the fact that they were receiving one of two muscle splitting approaches. Data collection and analysis were blinded. Student's t-test and Chi-square were used to compare continuous and categorical data, respectively. The primary endpoint was wound complications and associated admissions; secondary endpoints were post-operative pain and analgesic requirements.
Results: Results: 59 ARS and 56 GA patients were reviewed (Table 1). Demographic data, total operative and anastomotic time, benched kidney volumes, pain scores and length of stay did not differ between groups. The ARS group had smaller incisions (p<0.01) and potentially less inpatient narcotic use (p=0.053). 3 patients in the ARS and none in the GA group had a wound related complication (p=0.34). One ARS patient was re-admitted for fascial dehiscence, and two had superficial skin dehiscence requiring bedside skin re-approximation.
Conclusions: Conclusions: At interim analysis of patients with 6 month follow up, wound related complications did not differ between the ARS and GA groups. Patients undergoing ARS may require less inpatient narcotic use despite having similar subjective reporting of pain.

Table 1 – Demographic, Peri-operative, Post-operative, and Wound Related Data

	ARS (n=59)	Gibson (n=56)	p-value
Mean Age (years, std. dev.)	55.4 (14.2)	51.0 (13.7)	0.09
Mean BMI (kg/m^2)	28.2 (5.0)	29.0 (5.3)	0.40
Dialysis Status			0.06
Intermittent Hemodialysis	37 (63%)	23 (41%)	
Peritoneal Dialysis	12 (20%)	19 (34%)	
Pre-Emptive	10 (17%)	14 (25%)	
Patients with Pre-Op Narcotic Requirements	7 (12%)	3 (5%)	0.22
Prior Abdominal Surgery History	34 (58%)	31 (55%)	0.81
Mean Operative Time (minutes)	189.1 (58.7)	207.6 (69.1)	0.13
Mean Vascular Anastomosis Time (minutes)	37.4 (8.9)	34.3 (11.6)	0.13
Mean Benched Kidney Volume (cm^3)	237.4 (57.2)	220.5 (53.2)	0.15
Subcutaneous Drain Placement	54 (92%)	53 (95%)	0.43
Mean Incision Length (cm)	**9.8 (1.7)**	**13.4 (2.6)**	**<0.01**
Mean Post-Op Day 1 Pain (VAS*, st. dev)	2.9 (2.2)	3.5 (1.9)	0.14
Median Hospital Length of Stay (Days, range)	2 (2-4)	2 (2-12)	-
Delayed Graft Function Rate	2 (3.4%)	6 (10.7%)	0.19
Wound Related Post-Operative Complications	3 (5.0%)	0	0.24
Wound Related Readmissions	2 (3.4%)	0	0.50
Mean Inpatient Oral Morphine Equivalents (mg)	**56.2 (50.0)**	**100.4 (165.5)**	**0.053**

*Visual Analog Scale

CITATION INFORMATION: Murthy P., Lyon M., Fascelli M., Spinner M., Miller E., Lin Y., Goldfarb D., Krishnamurthi V., Wee A., Eltemamy M. Anterior Rectus Sheath versus Standard Gibson Approach to Kidney Transplantation: A Randomized Double-blinded Controlled Trial *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Murthy: None. **M. Lyon:** None. **M. Fascelli:** None. **M. Spinner:** None. **E. Miller:** None. **Y. Lin:** None. **D. Goldfarb:** None. **V. Krishnamurthi:** None. **A. Wee:** None. **M. Eltemamy:** None.

Abstract# 991

Application of Incisional Wound Vac to Decrease Wound Complications and Surgical Site Infections: A Single Center Pilot Project

E. K. Venniro, M. Dokus, J. Taylor, R. Kashyap, *University of Rochester Medical Center, Rochester, NY*

Purpose: Wound complications and surgical site infections (SSIs) are common but morbid complications of transplant in immunosuppressed patients. Kidney transplant patients who are obese, highly immunosuppressed and diabetic are at further risk. These patients often end up with open incisions that require return to the OR, antibiotics, and weeks of routine dressing changes. New technologies, such as incisional wound vacuum assisted closure (VAC) devices, have been proven to reduce SSIs and wound complications other surgical fields. This aim of this pilot project was to study the impact of this technology in the kidney transplant population.
Methods: Based on a historical cohort of kidney transplant patients at a large academic medical center, risk factors for wound complications were analyzed to inform inclusion criteria for incisional wound VAC (IWV) application. Patients with 1) BMI over 35 or 2) BMI over 30 and history of diabetes or thymoglobulin induction had an IWV applied with a JP drain during the transplant operation. The incisional vac was left in place for 7 days post-discharge. Patients were monitored for surgical site infection or fluid collection requiring intervention.
Results: Between August 2019 and October 2020, 37.9% of our transplant patients met criteria for IWV placement. Eleven patients were able to be included in this pilot project. Four (36%) met criteria based on BMI≥35 all of whom were diabetic, one (9%) for BMI 30-35 & diabetes, and six (55%) were included for a BMI 30-35 & thymoglobulin induction. One patient's IWV had to be removed early due to skin blistering. Three patients (27%) in the higher risk IWV group had a wound complication, in line with the overall benchmark. Over that time period, the programmatic SSI rate decreased from 14.1% to 10.1% (figure 1) and a reduction in wound complications from 32.9% to 22.5% (figure 2).
Conclusions: A clinically significant decrease in the number of wound complications and SSIs was demonstrated over the study period. Though limited by small sample size and non-randomized design, incisional wound vacs appear safe to use in kidney transplant recipients. Further study is warranted to elicit the full impact of this technology in a population at high risk for wound complications.

Figure 1

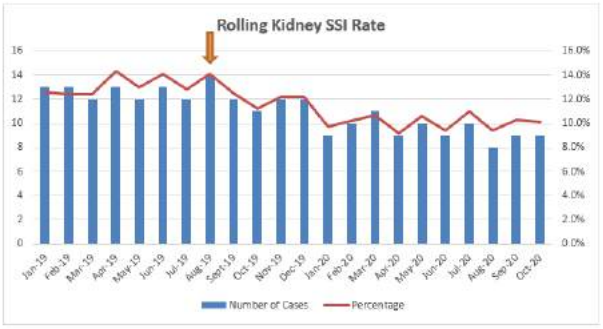
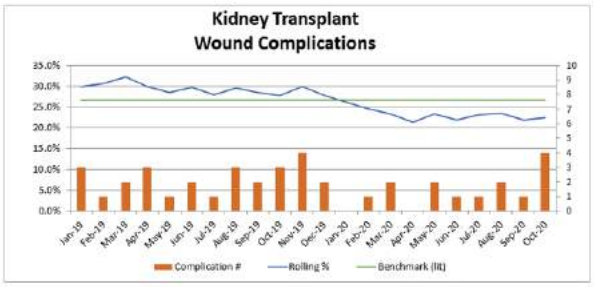


Figure 2



CITATION INFORMATION: Venniro E., Dokus M., Taylor J., Kashyap R. Application of Incisional Wound Vac to Decrease Wound Complications and Surgical Site Infections: A Single Center Pilot Project *AJT, Volume 21 Supplement 3*
DISCLOSURES: E.K. Venniro: None. **M. Dokus:** None. **J. Taylor:** None. **R. Kashyap:** None.

Abstract# 992

Early Experience with Machine Retrograde Perfusion of Deceased Donor Kidneys: Short-term Outcomes of a Prospective Study

J. Zeng, Q. Zhong, S. Yin, Z. Jia, Z. Huang, Y. Fan, X. Wang, T. Lin, T. Song, *Urology Institute and Organ Transplantation Center, West China Hospital, Chengdu, China*

Purpose: To maximize the utilization of potential kidneys, improving perfusion and preservation technique is necessary. This article mainly investigated the safety and efficacy of retrograde machine perfusion of kidneys from deceased donor.
Methods: Twenty-four kidneys were included and all grafts were preserved in the LifePort Kidney Transporter. Twelve donor kidneys received retrograde perfusion (RP) were selected as the RP group, and their counterparts received standard antegrade perfusion (AP group). Perfusion pressure, flow, resistance, immediate graft function status, urine output, and renal function in first month were compared
Results: All recipients were followed up for one month. There was no primary non-function in both groups. No difference in the incidence of delayed graft function was found in both groups (3 in RP vs 2 in AP, $p = 0.62$). Both groups had comparable urine output, serum creatinine, estimated glomerular filtration rate, cystatin c, and blood urea nitrogen at any time point within 30 days. No wound infection and urinary fistula were observed in the two groups. Renal resistance in RP group remained stable during the perfusion. There was no difference in ultrasonic arterial resistance at one week between both groups. Patients in RP group with resistance < 0.4 had numerically better renal function than those with resistance ≥ 0.4.
Conclusions: Kidneys receiving retrograde machine perfusion had comparable outcomes to those receiving antegrade perfusion, indicating this novel technique may be an effective and safe alternative for kidney preservation.
CITATION INFORMATION: Zeng J., Zhong Q., Yin S., Jia Z., Huang Z., Fan Y., Wang X., Lin T., Song T. Early Experience with Machine Retrograde Perfusion of Deceased Donor Kidneys: Short-term Outcomes of a Prospective Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Zeng: None. Q. Zhong: None. **S. Yin:** None. **Z. Jia:** None. **Z. Huang:** None. **Y. Fan:** None. **X. Wang:** None. **T. Lin:** None. **T. Song:** None.

Abstract# 993

Initial Experiment of Self-expanding Metal Ureteral Stent in Recurrent Ureteral Stenosis After Kidney Transplantation

Q. Zhong, T. Song, J. Zeng, Y. Fan, X. Wei, T. Lin, *Urology Institute and Organ Transplantation Center, West China Hospital, Chengdu, China*

Purpose: Expanding metal ureteral stent has been proven to be effective in the treatment of ureteral stenosis (US). However, its application in US after kidney transplantation (KT) is rarely reported. Here we described our experience of self-expanding metal ureteral stent in the management of recalcitrant US after KT.
Methods: We conducted a retrospective review of all patients with diagnosis of US after KT received treatment of Allium® ureteral stent at the West China Hospital, from January 1st, 2019 to May 31st, 2020.This study was approved by Ethics Approval Committee of West China Hospital.
Results: 15 patients with US diagnosis received self-expanding metal ureteral stent placement procedures and followed up for 8 months (rang,2-20). The ureteral stricture segments were located in the distal and the ureterovesical anastomosis site for all 15 cases, and the length was 2.2±1.0 cm. The procedure time for the stent placement was 71.4±29.3 minutes. After the procedure, two patients had fever, and no one developed urinary sepsis. Immediate ultrasonography did not reveal any further hydronephrosis and all patients had stable renal function. One month after the procedure, three patients had stent migration, with one returned to normal after reinserting, and the other two migrated again one month later and have to remove the stent. All other patients had stent in-situ at the last follow up. The overall success rate was 86.7%.
Conclusions: This study indicated that self-expanding metal ureteral stent is an effective treatment for US following KT
CITATION INFORMATION: Zhong Q., Song T., Zeng J., Fan Y., Wei X., Lin T. Initial Experiment of Self-expanding Metal Ureteral Stent in Recurrent Ureteral Stenosis After Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: Q. Zhong: None. **T. Song:** None. **J. Zeng:** None. **Y. Fan:** None. **X. Wei:** None. **T. Lin:** None.

Kidney

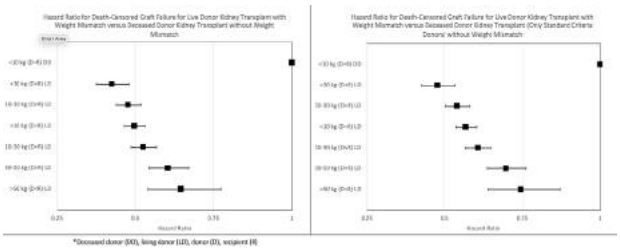
Kidney Living Donor: Selection

Abstract# 1000

The Differential Impact of Size Mismatch in Live versus Deceased Donor Kidney Transplant

A. J. Vinson[1], T. Skinner[2], B. Kiberd[3], D. Clark[1], K. Tennankore[1], *[1]Division of Nephrology, Department of Medicine, Nova Scotia Health Authority, Halifax, NS, Canada, [2]Department of Urology, Nova Scotia Health Authority, Halifax, NS, Canada, [3]Dalhousie University, Halifax, NS, Canada*

Purpose: The risk of significant weight mismatch between donors and recipients (D-R) undergoing living donor kidney transplant (LDKT) is not well established. Further, how this risk compares with deferring LDKT for a weight matched deceased donor kidney transplant (DDKT) is unknown. Therefore, the purpose of this study was to determine the risk of D-R weight mismatch in LDKT and how this relates to deferring LDKT to facilitate a weight matched DDKT.
Methods: We used multivariable Cox proportional hazards models and the Scientific Registry of Transplant Recipients to determine the association of weight mismatched D-R (>50 kg, 30-50 kg or 10-30 kg ((D<R); (D>R); and <10 kg (D=R)) with death-censored graft failure in LDKT recipients in the USA from 2006-2017. We explored outcomes in weight mismatched LDKT D-R relative to weight matched (< 10 kg difference) DDKT D-R (separately for i. all deceased donors and ii. only standard criteria deceased donors (SCD)). Finally, we explored the impact of combined D-R weight-sex mismatch in LDKT versus weight and sex-matched DDKT.
Results: In LDKT, the risk of graft loss was increased in the setting of extreme D<R weight pairing (HR 1.282, 95% CI 1.053-1.560 for >50kg difference relative to D=R), but minimal if recipients were up to 30k larger than their donor (HR 1.059, 95% CI 0.977-1.149). However even in the highest risk LDKT D-R weight pairing, graft loss was still less than in weight-matched DDKT (HR 0.646, 95% CI 0.541-0.772 for >50 kg D<R LDKT compared with all D=R deceased donors; HR 0.745, 95% CI 0.617-0.899 for >50 kg D<R LDKT compared with only SCD D=R deceased donors), Figure 1a & b. D-R sex and combined weight-sex mismatch in LDKT was only important for male recipients (HR 1.472, 95% CI 1.265-1.712 for a male recipient >30 kg larger than their female donor, relative to weight-matched male donor-male recipient). This remained superior to weight-sex matched DDKT however.
Conclusions: D-R weight mismatch is important in LDKT, however graft survival remains superior to proceeding with weight matched DDKT. The same is true for weight-sex mismatch in LDKT versus weight-sex matched DDKT. Optimizing D-R matching in LDKT could be facilitated through a national kidney paired donation registry.



CITATION INFORMATION: Vinson A., Skinner T., Kiberd B., Clark D., Tennankore K. The Differential Impact of Size Mismatch in Live versus Deceased Donor Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.J. Vinson: Consulting Fee; Name of Commercial Interest; Paladin Labs Inc. **T. Skinner:** None. **B. Kiberd:** None. **D. Clark:** Honoraria; Name of Commercial Interest; Baxter. **K. Tennankore:** Consulting Fee; Name of Commercial Interest; Otsuka, Janssen, AstraZeneca. Grant/Research Support; Name of Commercial Interest; Otsuka, Astellas.

Abstract# 1001

Pediatric Kidney Transplant Strategy: The Sequence Effect

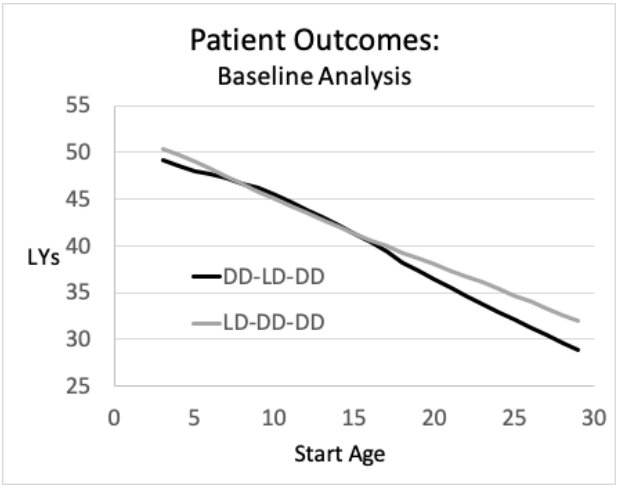
A. J. Vinson[1], B. Kiberd[2], P. Acott[3], K. Tennankore[1], *[1]Nova Scotia Health Authority Division of Nephrology, Departm, Halifax, NS, Canada, [2]Dalhousie University, Halifax, NS, Canada, [3]IWK Health Center, Halifax, NS, Canada*

Purpose: Improvements in patient survival with pediatric end stage kidney disease (ESKD) predicts needing more than one kidney transplant over a child's lifetime. Timing of utilization of willing live donor transplant (LD) relative to a deceased donor transplant (DD) remains controversial. Considerations under the current Allocation System notes pediatric DD transplant rates and organ quality are higher than in adults, graft failure rates are higher in adolescent recipients, and smaller children may have transplant hypoperfusion leading to worse graft outcomes. Families perceive benefit to the LD-backup option in case the first DD transplant fails. The best strategy is unclear.
Methods: Evaluation of 3 transplants over a lifetime, using a Markov model applied to USRDS data, evaluated patient and graft survival. Accounting for reduced transplant candidate eligibility over time and inputting current transplant rates, projected remaining life years (LYs) after transplant were calculated for 3 options: 1) LD-first (LD-DD-DD) with DDs if needed; 2) LD-backup (DD-LD-DD); or 3) No-LD (DD-DD-DD) in recipients age 3 to 30 years.
Results: Opting for a LD-first provided more LYs than the LD-backup option for most recipients (Table 1). The LD-backup sequence was slightly better in recipients age 7 to 15 years, Figure 1. However, the LD-backup advantage disappeared if LD availability changed, candidacy for DD altered (e.g. sensitization), or if pediatric DD transplant rates were lower. The No-LD group produced the fewest LYs for each age category. The Table also shows how many DD organs were used for the 3 options.
Conclusions: LD-first is best for most pediatric recipients, although LD-backup is slightly better for a subset age 7 to 15 years. Preferential, LD-backup equates to more DD organs utilized by pediatrics and not available for others on the waitlist. Pediatric LD utilization (first or backup) leads to more LYs compared to DD only organ options. The lesson is to 'utilize LD when you can'.

Table 1. Predicted Remaining Life Years (and total DD kidney requirement) for Selected Options

Age (years)	LD-first (DD Kidneys)	LD-backup (DD Kidneys)	No-LD (DD Kidneys)	Net Differences (DD Kidneys) [LD-first vs LD-backup] [LD-first vs No-LD]
3-5	50.22 (0.85)	48.99 (1.23)	46.73 (1.94)	1.23 (0.38) 3.49 (1.09)
5-10	48.94 (0.85)	47.91 (1.23)	45.64 (1.93)	1.03 (0.38) 3.30 (1.08)
10-15	44.90 (0.80)	45.38 (1.22)	43.00 (1.89)	-0.48 (0.42) 1.90 (1.09)
15-20	41.22 (0.68)	41.29 (1.13)	38.95 (1.69)	-0.07 (0.45) 2.27 (1.01)
20-25	37.98 (0.53)	36.41 (0.97)	34.54 (1.58)	1.57 (0.44) 3.44 (1.05)
25-30	34.68 (0.40)	32.04 (0.90)	30.87 (1.22)	2.63 (0.50) 3.81 (0.82)
30	31.20 (0.30)	28.12 (0.85)	27.03 (1.11)	3.08 (0.56) 4.17 (0.81)

Live donor (LD), deceased donor (DD)



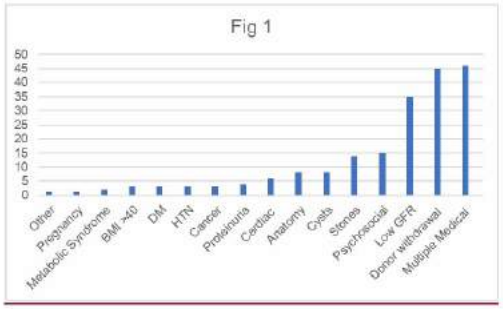
CITATION INFORMATION: Vinson A., Kiberd B., Acott P., Tennankore K. Pediatric Kidney Transplant Strategy: The Sequence Effect *AJT, Volume 21 Supplement 3*
DISCLOSURES: A.J. Vinson: Consulting Fee; Name of Commercial Interest; Paladin Labs Inc. **B. Kiberd:** None. **P. Acott:** None. **K. Tennankore:** Consulting Fee; Name of Commercial Interest; Otsuka, Janssen, AstraZeneca. Grant/Research Support; Name of Commercial Interest; Otsuka, Astellas.

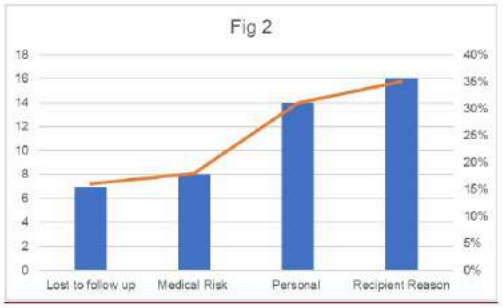
Abstract# 994

Barriers to Living Kidney Donation: A Closer Look at Declined Donors

M. Anand, S. Barhorst, S. Bumb, B. Abu Jawdeh, T. Kaur, A. Govil, *University of Cincinnati, Cincinnati, OH*

Purpose: Medically complex donors are increasingly being assessed for donation. Due to concern for donor safety, there is a wide variation amongst transplant providers in the acceptance criteria for these candidates. In this study, we review the reasons for declining living kidney donor candidates, identify trends and determine quality improvement initiatives to streamline the live kidney donor evaluation process.
Methods: Data was collected retrospectively on all live donor (LD) candidates evaluated in donor clinic at our center from January 2019 to October 2020. Multiple medical reasons for donor denial were defined as the presence of 2 or more risk factors for progression to chronic kidney disease (CKD). Donor withdrawal was defined as a potential donor who was evaluated in clinic, but did not proceed with donation for various reasons.
Results: 291 individuals were evaluated for potential living kidney donation, of which 63 % were female and 45% older than 50 years. Out of these LD candidates, 94 (32.3%) were approved for donation while 197 candidates (67.7%) were declined. The reasons for declining donor candidates are shown in Figure 1. About 46% potential candidates did not proceed for donation due to either the presence of multiple medical conditions (23.3%) or donor withdrawal from the evaluation process (22.8%). The most common risk factors for CKD were obesity, pre-diabetes and hypertension. Interestingly, 45/197 (22.8%) potential donors who withdrew from the donation process (Fig 2), 35% did not proceed with donation either due to recipient ineligibility or the recipient received a deceased donor transplant. 31% withdrew due to undefined personal reasons, 18% pulled out due to concern for CKD post donation despite being considered as an acceptable medical risk and 16% lost contact after the initial clinic visit with no further follow-up.
Conclusions: Medical risk factors are widely recognized as a common reason for donor denial due to the lack of long-term safety data. However, we were surprised to find that donor withdrawal constituted a significant roadblock to donation. Further analysis revealed several modifiable factors that influenced donor decisions. In addition, we noticed variation among providers for acceptance criteria despite center-based guidelines for donor evaluation. To overcome these barriers , we propose a dedicated multi-disciplinary living donor team to identify risk factors that can be mitigated by donor education, counseling and primary care intervention. We believe that such a dedicated team will also avoid inter-provider variability and further streamline the process of live donor evaluation.





CITATION INFORMATION: Anand M., Barhorst S., Bumb S., Abu Jawdeh B., Kaur T., Govil A. Barriers to Living Kidney Donation: A Closer Look at Declined Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Anand: None. **S. Barhorst:** None. **S. Bumb:** None. **B. Abu Jawdeh:** Consulting Fee; Name of Commercial Interest; Alexion. Consulting Fee; Nature of Relationship; speakers bureau. Other; Name of Commercial Interest; AstraZeneca. Other; Nature of Relationship; Speakers Bureau. **T. Kaur:** None. **A. Govil:** Honoraria; Name of Commercial Interest; Natera, Mallinckrodt. Honoraria; Nature of Relationship; Speakers Bureau, Speakers Bureau.

Abstract# 995

Development and Validation of a Nomogram for Remnant Kidney Function After Living-donor Donation

M. Dou, P. Tian, B. Zheng, G. Deng, Y. Shi, C. Ding, *The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China*

Purpose: This study was to develop and validate a nomogram to predict remnant kidney function after living-donor kidney donation.

Methods: We conducted a retrospective cohort study on living kidney donors in our centre from 1999 to 2018.All donors were medically fit to donate and met Chinese donor selection criteria for donation. A favorable outcome was defined as post-donation eGFR at 1 year > 60% of the pre-donation eGFR.For nomogram construction and validation,all the donors were randomly divided into two cohorts in a 7:3 ratio,including training cohorts and validation cohorts .Then we identified independent prognostic factors using univariate analysis and multivariate logistic regression models.A nomogram for predicting 1-year eGFR was constructed based on these identified prognostic factors.The performance of the nomogram was validated both internally in training cohort and externally in validating cohort.The concordance index (C-index) and the receiver operating characteristic curve (ROC) were used to evaluate the discriminative ability of the nomogram. We used calibration curves to compare the actual outcomes with the predicted probabilities.

Results: Age and pre-donation eGFR were identified in univariate analysis. Next,these significant ($p<0.05$) factors identified in the univariate analysis were in the multivariate analysis,and multivariate analyses were performed via multivariate logistic regression. Age and pre-donation eGFR were significantly identified in multivariate analysis.Finally, a nomogram was constructed by incorporating these two independent predictors.The C-indexes for eGFR predicion in the nomogram were 0.84 and 0.81 for the training set and validation set.The calibration plot showed good agreement between the actual observations and the predicted outcomes both in training set and validation set.

Conclusions: This model might be a simple, but useful guide to predict remnant kidney function after donation,which could be an important clinical tool to improve the selection of living donors.

CITATION INFORMATION: Dou M., Tian P., Zheng B., Deng G., Shi Y., Ding C. Development and Validation of a Nomogram for Remnant Kidney Function After Living-donor Donation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Dou: None. **P. Tian:** None. **B. Zheng:** None. **G. Deng:** None. **Y. Shi:** None. **C. Ding:** None.

Abstract# 996

Body Surface Adjusted vs Raw GFR in Predicting Long Term Outcomes of Kidney Donors. Who is Disadvantaged?

H. N. Ibrahim[1], S. A. Hebert[1], H. E. Adrogue[1], D. Murad[1], D. T. Nguyen[2], E. A. Graviss[2], *[1]Medicine, Houston Methodist Hospital, Houston, TX, [2]Pathology and Genomic Medicine, Houston Methodist Hospital, Houston, TX*

Purpose: KDIGO and others recommend that GFR level acceptance (typically >80 ml/min) should be adjusted for body surface area (BSA) as GFR correlates highly with body size. This probably results in a wider acceptance of those with BSA <1.73 m^2 and lesser access for those >1.73 m^2 since adjusted GFR will be higher in the former and lower in the latter. Herein, we describe whether indexing GFR by BSA correlates with long term donor outcomes more accurately than raw GFR.

Methods: We compared the development of hypertension, proteinuria, reduced eGFR, ESKD and mortality in 5504 donors whose adjusted and raw GFR were >80 ml/min with 256 donors with only adjusted eGFR >80 ml/min, 1086 donors with only raw eGFR >80 ml/min and 1730 with both adjusted and raw <80 ml/min.

Results: In total 35% of donors had an adjusted eGFR <80 ml/min. Those with adjusted GFR > raw GFR were more likely to be women, had a lower BMI, lower SBP and DBP. Mean follow-up was 16 ± 11 years. The multivariable analysis revealed that donors with both eGFR <80 ml/min are more likely to die and reach eGFR <30 and <45 at last follow-up. Those whom only adjusted eGFR >80 ml/min did not incur increased risks of the outcomes studied. In contrast, donors with only raw GFR >80 ml/min and those with both GFR methods <80 ml/min were more likely to develop an eGFR <45 ml/min during follow-up.

Conclusions: More women are accepted when adjusted eGFR >80 ml/min is used. Donors with both adjusted and raw <80 ml/min and donors with only raw >80 ml/min were more likely to reach an eGFR <45 ml/min but had similar risk of mortality, hypertension and proteinuria. We see no major advantage for indexing GFR by BSA and it clearly results in over selection of those with smaller body frame.

Multiple logistic regression analysis: reference group is donors with both adjusted and raw GFR >80 ml/min

Outcome (events/ donors)	Adjusted eGFR ≥80 only		Raw eGFR ≥80 only		Both eGFRs <80	
	aOR (95% CI)	p-value	aOR (95% CI)	p-value	aOR (95% CI)	p-value
Mortality (418/ 8578)	1.71 (0.80, 3.62)	0.17	1.46 (0.96, 2.24)	0.08	1.64 (1.13, 2.38)	0.01
Hypertension (3182/ 8577)	1.20 (0.84, 1.71)	0.33	1.05 (0.86, 1.24)	0.60	1.07 (0.91, 1.25)	0.40
Proteinuria (1075/ 7684)	0.80 (0.48, 1.34)	0.40	1.08 (0.87, 1.33)	0.51	1.19 (0.98, 1.46)	0.08
eGFR <45 (1610/ 8371)	1.69 (0.87, 3.31)	0.12	3.73 (2.99, 4.65)	<0.001	8.65 (7.01, 10.67)	<0.001

Covariates included: age, gender, BMI, SBP, fasting plasma glucose, smoking, donation year. Post-donation diabetes and hypertension were adjusted for as time-dependent covariates.

CITATION INFORMATION: Ibrahim H., Hebert S., Adrogue H., Murad D., Nguyen D., Graviss E. Body Surface Adjusted vs Raw GFR in Predicting Long Term Outcomes of Kidney Donors. Who is Disadvantaged? *AJT, Volume 21 Supplement 3*

DISCLOSURES: H.N. Ibrahim: None. **S.A. Hebert:** None. **H.E. Adrogue:** None. **D. Murad:** None. **D.T. Nguyen:** None. **E.A. Graviss:** None.

Abstract# 997

Criteria and Practice Patterns for Accepting Living Donors with Prior Covid-19: A National Survey

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Purpose: A critical question facing transplant programs is if, when and how to safely accept living kidney donors (LKD) who have a history and recovered from COVID-19 Infection. The purpose of the study is to understand current practices related to accepting living donors for donation who have recovered from COVID-19.

Methods: We surveyed US transplant programs from September 3, 2020 through November 3, 2020 by e-mail and postings to professional society list-serves. Center level as well individual opinion based responses were analyzed.

Results: A total of 174 US respondents from 115 unique centers responded, representing 59% of US Living Donor Programs and 72.4% of 2019 and 71.9% of 2020 LKD volume (as of October 31, 2020). Respondent Roles included Nephrologist (53.4%); Surgeon (19.5%); Infectious Disease (11.5%); Coordinator (9.8%).

Overall during the survey period, 48.6% of responding centers had received inquiries from such LKDs, while 44.3% were currently evaluating such donors. A total of 98 donors were reported to be in the evaluation phase, while 27.8% centers had approved a total of 42 such donors to proceed with donation.

Conclusions: Selection practices and criteria for LKD who have recovered from COVID-19 are variable. Ongoing research and consensus building are needed to guide optimal practices to ensure the safety of accepting such donors.

Responses for Questions Related to Donor Evaluation Who Have Recovered from COVID-19	
Accepting LKD who have recovered from COVID-19?	Yes (53.4%), Case-by Case (38%); Decline/Unsure (6.3%)
Accept LKD with past COVID-19 for Non-Directed Donation	Yes (62%); Unsure (28%); No (7.5%)
Accept LKD with past COVID-19 for KPD.	Yes (68.4%); Unsure (22.4%); No (7.5%)
Accept LKD with past COVID-19 for High Immunological Risk Recipient	Yes (63.8%); Unsure (26.4%); No (8.0%)
Minimum Time From Onset of Infection To Evaluation	>3mo (39.1%); >2mo (13.2%); >1mo (34.5%)
Minimum Time from Onset of infection to Donation Surgery	>3mo (48.9%); >2mo (11.5%); >1mo (27%)
Consider Additional testing ?	Chest CT (65%); PFT (51%)
Any other COVID-19-Specific testing During Evaluation ?	IGM (29.3%); IGG (52.3%); Antigen (16.1%)

Responses for Questions Related to Recipients who Receive COVID-19 recovered LD Kidneys	
Modify Immunosuppression protocol ?	NO (64%); Case-by-Case (14%); Unsure (15.5%)
Screen Recipient for COVID-19 Post-Transplant ?	No (51.7%); Yes 42.5%)
If screening, time frame to Screen ?	<1mo (71%); >1mo (20.5%); >2mo (1.4%); >3mo (1.4%)
If Screening, Type of Test ?	NP-PCR (35.6%); IGM (12%); IGG (12.6%); Antigen (10%)

CITATION INFORMATION: Jawed A., Jan M., Barros N., Adebiyi O., Diez A., Fridell J., Goggins W., Yaqub M., Mujtaba M., Taber T., Kumar V., Lentine K., Sharfuddin A. Criteria and Practice Patterns for Accepting Living Donors with Prior Covid-19: A National Survey *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Jawed: None. **M.Y. Jan:** None. **N. Barros:** None. **O. Adebiyi:** None. **A. Diez:** None. **J. Fridell:** None. **W. Goggins:** None. **M. Yaqub:** None. **M.A. Mujtaba:** None. **T. Taber:** None. **V. Kumar:** None. **K. Lentine:** None. **A. Sharfuddin:** None.

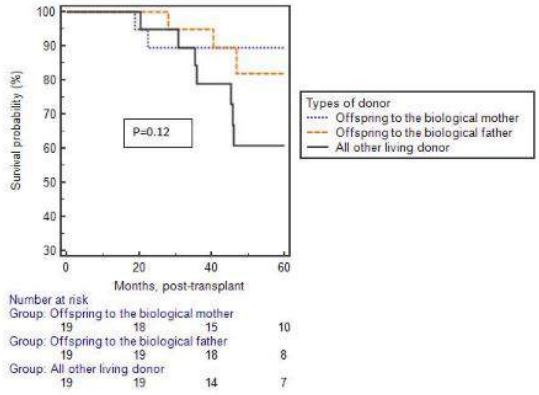
Abstract# 998

Kidney Transplantation from Offspring to Mothers is Not Associated with Adverse Outcomes

S. Parajuli, N. Garg, A. Djamali, D. Mandelbrot, *University of Wisconsin, Madison, WI*

Purpose: Due to concerns of donor-specific alloimmunization during pregnancy, some have suggested avoiding living donor kidney transplants (LDKT) from offspring to biological mothers. Published analyses of UNOS data have yielded conflicting results, but there is limited data from single centers, which can provide more granular baseline information to perform adjusted analyses. In this study, we analyzed outcomes of offspring transplants to mothers.
Methods: All LDKT between 2013 and 2017 from our transplant program were analyzed. Offspring to mother transplants were defined as cases and two groups of controls were selected in a 1:1:1 ratio. Control 1 was offspring to biological fathers, matched for recipients age and DR mismatch and control 2 was all other remaining living donors, matched for recipients age, DR mismatch and HLA mismatch (out of 6).
Results: There were a total of 511 LDKT during the study period, of which 19 were cases, 19 (out of 43 fathers receiving offspring kidneys) matched LDKT were selected as control 1, and of the remaining 449, 19 matched LDKT were selected as control 2. Most of the recipients' baseline characteristics were similar between the groups. Not surprisingly, donors were significantly younger in cases (37.6 yrs) and control 1 (36.2 yrs) compared to control 2 (51.5 years) $p < 0.001$. There was no difference in the percentage of LDKT with pre-transplant DSA, mean HLA mismatch out of 6 or 12, or DR or DQ mismatch between the groups. Mean post-transplant follow-up was no different between groups. A total of 7 LDKT developed denovo DSA and 9 had acute rejection, with no significant difference between the groups. 1-year graft and patient survival was 100% in all three groups. There were a total of 6 graft failures at last follow up, 1 among the cases, 1 in the control 1, and 4 in the control 2 ($p=0.2$). The total number of patients with graft failure or eGFR <45 were similar between the groups: case (4), control 1 (3), Control 2 (8) ($p=0.15$). This was further confirmed by the K-M survival analysis curve (Figure 1). Similar results were obtained using as the composite endpoint graft failure or rejection or eGFR <45.
Conclusions: Although our data was limited by a small sample size, we present detailed information about offspring kidney transplants and do not find evidence of adverse outcomes in offspring to mother kidney transplantation. Because of potential emotional motivations for offspring to donate directly to their mothers, we do not believe that such transplants should be discouraged, especially in the absence of detectable DSA.

Figure 1: Outcomes at last follow up, graft failure or eGFR < 45



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DISCLOSURES: S. Parajuli: None. **N. Garg:** None. **A. Djamali:** None. **D. Mandelbrot:** None.

Abstract# 999

Early Experience with Broad Renal Genetic Testing in an Academic Transplant Center

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Purpose: Genetic testing is an emerging tool in kidney transplantation (KT), particularly to assess risk of recurrent disease in patients with KT and for selection of a living-related kidney donor. Studies highlight the benefit of using a broad, unbiased panel over using a selected targeted panel based on the clinical presentation of the disease.
Methods: A total of 19 patients, aged 23-69 years, who underwent genetic testing using a commercially available 382-gene renal panel in August and September, 2020 were included in this study. Of the 19 patients, 13 were awaiting transplant and 6 recently received transplants. Samples were analyzed using next-generation sequencing and variants were confirmed by orthogonal methods (eg, Sanger sequencing). Genetic testing results were interpreted by certified genetic counselors (cGCs) and was correlated with other clinical parameters.
Results: Monogenic variants associated with kidney disease were identified in 16% (3/19) patients (Table 1). All conditions identified using the 382 gene renal panel test confer increased risk of extrarenal manifestations for which the patients

were not being monitored previously. Additionally, 42% (8/19) of the patients were identified as heterozygous carriers of autosomal recessive conditions with potential reproductive risk implications.

Conclusions: Genetic testing resulted in the diagnosis of conditions that had previously not been identified based on clinical presentation alone. These findings demonstrate the benefit of using the broad renal genetic test in the transplant setting. Furthermore, genetic testing results can support patient management and enable identification of at-risk family members, such as living-related kidney donor. Integrating renal genetic tests in KT and future studies will expand our understanding of monogenic contributors to end-stage renal disease (ESRD) and guide pre- and post-KT management.

Genetic testing results and associated clinical condition for 3 identified monogenic etiologies

Age	Gender	Clinical History	Gene(s) identified	Inheritance	Condition
35	M	ESRD, liver ascites, hepatorenal insufficiency	*AVPR2*	X-linked	Nephrogenic diabetes insipidus
36	M	ESRD, seizures, renal angio-myolipoma	*PKD1, TSC2*	Autosomal dominant	Polycystic kidney disease with tuberous sclerosis complex
23	M	KTR returning dialysis after graft loss	*INF2*	Autosomal dominant	Focal segmental glomerulo-sclerosis (FSGS) type 5, intermediate Charcot-Marie-Tooth disease E with FSGS

CITATION INFORMATION: Tantisattamo E., Brossart K., Ioannou N., McCormick S., Billings P., Tabriziani H. Early Experience with Broad Renal Genetic Testing in an Academic Transplant Center *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Tantisattamo: ; Natera. **K. Brossart:** Ownership Interest; Name of Commercial Interest; Natera. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera. Salary; Nature of Relationship; Employee. **N. Ioannou:** Ownership Interest; Name of Commercial Interest; Natera. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera. Salary; Nature of Relationship; Employee. **S. McCormick:** Ownership Interest; Name of Commercial Interest; Natera. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera. Salary; Nature of Relationship; Employee. **P.R. Billings:** Ownership Interest; Name of Commercial Interest; Natera. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera. Salary; Nature of Relationship; Employee. **H. Tabriziani:** Ownership Interest; Name of Commercial Interest; Natera. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera. Salary; Nature of Relationship; Employee.

Kidney

Kidney: Pediatrics

Abstract# 1002

The Use of Donor Derived Cell Free DNA in Children to Monitor Therapy of Kidney Rejection

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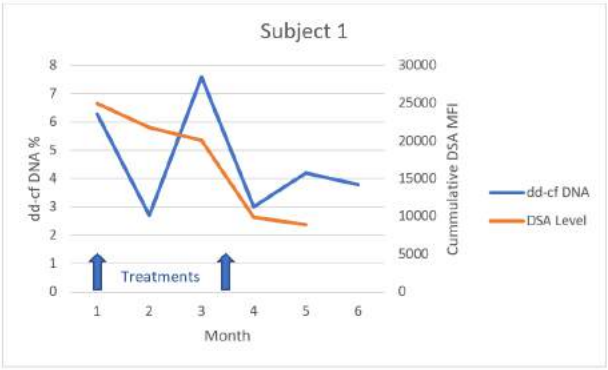
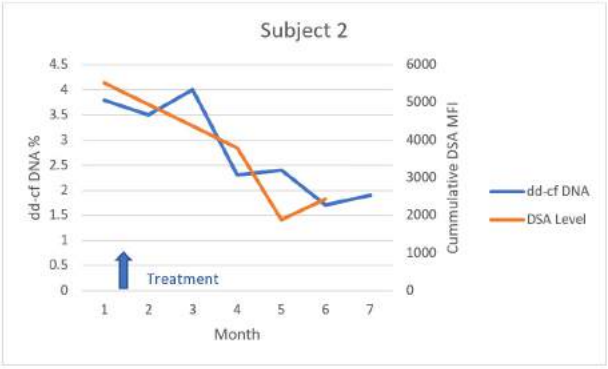
Purpose: Elevated donor-derived cell-free DNA (dd-cfDNA) in the presence of HLA donor-specific antibodies (DSA) are shown to correlate with acute antibody-mediated rejection (AMR) in adult and pediatric kidney transplant recipients. A dd-cfDNA result of > 1.0% is considered positive for acute rejection but data about changes in dd-cfDNA after AMR treatment in children remain scarce. The objective of our study is to assess the changes in dd-cfDNA over time after therapy of AMR in children with kidney transplant. We report the preliminary results of two patients who participated in the study.

Methods: This is a longitudinal non-interventional study in children < 21 y with biopsy-proven AMR and positive DSA. Our center's standard therapy for AMR consists of steroids, rituximab, and 3-5 monthly intravenous gamma globulin (IVIG) infusions, then quarterly as necessary. Persistent AMR is treated with additional plasma exchanges and bortezomib. DSA and dd-cfDNA tests were obtained before each IVIG infusion. We calculated the cumulative MFI by adding together the MFI of each single DSA. Statistical analysis used descriptive statistics.

Results: Two subjects accumulated enough data points to report. Subject 1 is a 14-year-old male who developed AMR 21 months post living unrelated kidney transplant. He was treated initially with steroids, rituximab, and IVIG. A repeat kidney biopsy showed evidence of persistent AMR and was treated with plasma exchange, bortezomib, rituximab, and IVIG (0.7-2 g/kg/dose X 7). He had two biopsies completed. Subject 2 is an 8-year-old male who developed AMR 37 months after a living-related transplant (documented by biopsy) and was treated with steroids, rituximab, and IVIG (1-2 g/kg/doses X 4). Creatinine remained stable in both subjects. Repeated measurements of dd-cfDNA and cumulative DSA-MFI were monitored over several months as in the following graphs





Conclusions: The dd-cfDNA test is a valuable tool to use after therapy of AMR when combined with HLA-DSA to monitor response to therapy and may preclude the need for a repeat kidney biopsy. Further studies in a larger population are in progress.

CITATION INFORMATION: Al-Uzri A., Wright M., Clark K., Jenkins R. The Use of Donor Derived Cell Free DNA in Children to Monitor Therapy of Kidney Rejection *AJT, Volume 21 Supplement 3*

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Abstract# 1003

Graft Loss in Adolescent and Young Adult Generation After Pediatric Kidney Transplantation: A Single Center Experience in Japan

Y. Aoki, Y. Hamasaki, M. Muramatsu, J. Hashimoto, M. Kubota, S. Shishido, K. Sakai, *Nephrology, Toho University Faculty of Medicine, Tokyo, Japan*

Purpose: Kidney transplant recipients of all ages may have difficulty adhering to a strict treatment plan, adolescents and young adults are at particularly high risk for poor adherence. In previous reports, young people also have the highest risk for graft failure of any age group. In recent years, attention has been focused on how to enhance medical care for the adolescent and young adult (AYA) generation, and measures for medical care and care for the AYA generation in patients with pediatric cancer, congenital diseases, and chronic pediatric diseases are important issues. Kidney transplantation (KT) is a beneficial treatment not only for the body but also for life stages for pediatric patients with renal failure, and it is thought that the way the AYA generation spends will greatly affect their lives thereafter. The aim of this study was to investigate patient background, employment and re-transplantation in the AYA generation of graft loss after pediatric KT.

Methods: We performed a retrospective cohort study on pediatric kidney transplant recipients, aged 15 years or younger, who received their first transplant between 1975 and 2009. Recipients were graft loss in AYA generation (15-40 years old) and followed from KT until the last known date alive as of May 2017.

Results: Among the 323 children who underwent first KT during the study period, 80 children (24.8%) were graft loss in AYA generation after KT. Forty-eight patients who continued to visit the hospital were included in this study. The median duration of follow-up was 25.0 years (IQR 20.3-31.0). The median age at first KT was 11.2 years (IQR 6.4-12.9) and median age at the time of graft loss was 21.7 years (IQR 19.1-26.0). The most common cause of graft loss was chronic allograft nephropathy (93.7%). The overall graft half-life was 11.8 years. Nonadherence to immunosuppressive medication was 16.7%, and the age of onset was 15 to 20 years old in 75%. However, there was no significant difference in graft survival by nonadherence (p=0.74). Overall, 29 patients (60.4%) were employed, 7 patients (14.6%) were married, and 3 patients had a baby. Of the 48 patients, 25 (52%) underwent second KT at median age of 25.8 years (IQR 22.3-28.5). Twenty-three patients (92%) had living kidney transplants, six patients (24%) had ABO-incompatible KT, and 13 patients (52%) had preemptive KT. The employment rate did not decrease, and five patients were married after re-transplantation.

Conclusions: Many patients who had graft loss in the AYA generation are forced to choose renal replacement therapy at a stage in their development of social independence. In our study, patients who were re-transplanted in the AYA generation were able to progress to social independence. Addressing the medical health care of the AYA generation of patients with end-stage renal failure is an important challenge for building a fuller life stage and a more productive society.

CITATION INFORMATION: Aoki Y., Hamasaki Y., Muramatsu M., Hashimoto J., Kubota M., Shishido S., Sakai K. Graft Loss in Adolescent and Young Adult Generation After Pediatric Kidney Transplantation: A Single Center Experience in Japan *AJT, Volume 21 Supplement 3*

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Abstract# 1004

Growing Up During the Pandemic: A New Look for Transitioning to Adult Transplant Care

M. M. Chandran, E. Blanchette, A. Sikora, M. Bisek, E. S. Christofferson, M. Bock, *Children's Hospital Colorado, Aurora, CO*

Purpose: Adolescent and young adult (AYA) recipients of solid organ transplants (SOT) are confronted with a unique set of life stressors that may negatively impact allograft outcomes. Regardless of age at time of transplant, AYA transplant recipients have a higher risk of graft loss compared to other age groups. A transition from pediatric to adult healthcare teams often occurs during this life period, potentially intensifying this challenging time. Recently the COVID-19 pandemic has compounded anxiety and stressors surrounding major life events, adding uncertainty and lack of normalcy for this population.

Methods: In 2016, our center implemented a comprehensive, multidisciplinary Transition-to-Adult-Care (T2AC) curriculum for AYA SOT recipients to facilitate successful transfer of care. This curriculum consists of longitudinal education, readiness assessment, outreach programming, and a day-long seminar focusing on education from pediatric and adult transplant providers, pharmacists, coordinators, social workers, and psychologists. "Graduates" of our curriculum demonstrate improved transplant outcomes in the first year following transition with decreased rejection episodes, de novo DSA formation, graft loss, loss to follow-up, ED visits and inpatient admissions, and fewer "bounce-backs" to the pediatric center [Abstract C221; Am J Transplant. 2019; 19 (suppl 3)]. Recognizing the need to continue preparing our AYA population for transition, despite limitations created by social distancing, we adapted the T2AC Transitions Seminar to a virtual platform. Patients and caregivers received virtual didactic education with visual aids, interacted with providers and peers, and received support from transplant psychology during focused break-out sessions.

Results: Despite changes in structure and platform, virtual programming was successfully implemented. This event boasted the highest attendance to date with 25 AYA recipients and additional family members participating; we hypothesize this was attributed to joining from a location of their choosing, precluding the need for travel. Additionally, active participation was notably increased, potentially related to multiple modes of online interaction (e.g. private/group chat message) and minimized anxiety by removing in-person interaction. A post-course survey indicated positive reception with an average response of 7.7 /10 (10 = Very Likely) to "How likely are you to attend a similar event again in the future?". The average response to "After attending this event, how prepared do you feel for transitioning to adult care?" of 6.7/10, comparable to 7.2 for prior in-person events, suggests change in venue did not reduce impact.

Conclusions: Given the overall positive experience, we plan to maintain and grow the virtual nature of our T_2AC Seminar through the pandemic and beyond, hoping to broaden our audience and strengthen our educational mission.

CITATION INFORMATION: Chandran M., Blanchette E., Sikora A., Bisek M., Christofferson E., Bock M. Growing Up During the Pandemic: A New Look for Transitioning to Adult Transplant Care *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.M. Chandran: None. **E. Blanchette:** None. **A. Sikora:** None. **M. Bisek:** None. **E.S. Christofferson:** None. **M. Bock:** None.

Abstract# 1005

Impact of Once-Daily Extended-Release Tacrolimus Intrapatient Variability in Stable Adolescent and Young Adult Renal Transplant Recipients - 3 Year Results

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Purpose: Successful renal transplantation requires complex medication regimens that rely heavily on strict adherence to be effective. Variability in immunosuppression exposure, specifically tacrolimus, is associated with poor allograft outcomes. Wide intrapatient variability of tacrolimus trough concentrations (Vtac) is likely, in part, attributable to poor medication adherence. Once-daily tacrolimus formulations create opportunity to simplify therapeutic regimens, and this study aims to evaluate their impact on Vtac, and ultimately transplant outcomes.

Methods: This retrospective cohort study investigated stable adolescent and young adult (AYA) renal transplant recipients converted from immediate-related tacrolimus (IR-Tac) to extended-release tacrolimus (ER-Tac). Subjects served as their own controls. Vtac was assessed prior to and at five time points post-conversion to ER-Tac over 36-month follow-up. Secondary outcome measures included graft function, infection rates, and effect on modifiable treatment-related factors.

Results: Twenty-eight AYA subjects were converted from IR-Tac to ER-Tac. Vtac significantly improved following conversion and was sustained for 36 months ($Vtac_0$ 2.32 vs. $Vtac_5$ 0.83, $p < 0.05$). Renal function remained stable and biopsy proven acute rejection (BPAR) rates were modest (14%). Mean pill burden was reduced by 15% and 42.9% of subjects achieved a once-daily medication regimen.

Conclusions: Conversion from IR-Tac to ER-Tac in this AYA population significantly improved Vtac with sustained effect over 3 years. This effect is likely attributable in part to simplification of the medication regimen and presumably improved medication adherence. Furthermore, such conversion does not appear to compromise graft function.

N	28
Male	16 (57%)
Caucasian	15 (53.6%)
Azathioprine (Aza)/Mycophenolate	8 (29%)/20 (71%)
Median Age (yrs) at conversion (IQR)	15.8 (11.9 -23)
Mean time (yrs) post-RT at conversion (SD)	2.8 (2.9)

	Mean Vtac (SD)	Mean CV% (SD)
IR Tac (at conversion)	2.32 (1.39)	36.9 (21.6)
ER Tac (1 mo)	1.14 (0.81)	20.89 (14.3)
ER Tac (6 mo)	1.24 (1.08)	21.49 (16.4)
ER Tac (12 mo)	1.03 (0.67)	18.8 (10.9)
ER Tac (24 mo)	1.11 (0.64)	18.2 (10.1)
ER Tac (36 mo)	0.83 (1.22)	13.9 (21.4)

CITATION INFORMATION: Chandran M., Blanchette E., Goebel J., Bock M. Impact of Once-Daily Extended-Release Tacrolimus Intrapatient Variability in Stable Adolescent and Young Adult Renal Transplant Recipients - 3 Year Results *AJT, Volume 21 Supplement 3*

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Abstract# 1006

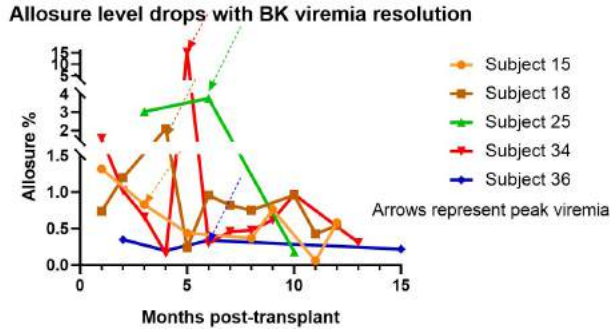
Longitudinal Studies of Blood Donor-derived Cell Free DNA (dd-cfDNA) Show Predictable Rise at Time of BK Viremia or Viruria in Pediatric Kidney Transplant Recipients (PKTx)

R. Dandamudi[1], H. Gu[1], C. Goss[1], S. Federman[2], R. Woodward[2], S. Dholakia[2], L. Walther[1], V. Dharnidharka[1], *[1]Washington University in St Louis, St. Louis, MO, [2]CareDx, Brisbane, CA*

Purpose: Blood levels of dd-cfDNA elevate in various forms of kidney transplant injury, most notably used for detecting potential acute rejection. A few adult studies, largely cross-sectional, have described elevations at time of other injuries such as ischemic or infections (bacterial or polyoma BK virus). We hypothesized that dd-cfDNA had a discriminating role between BK Viruria and Viremia and can act as a surrogate marker to quantify the severity of viral injury for both diagnosis and management.

Methods: We have performed longitudinal biobanking of plasma and urine in our PKTx population since 2013, combined with monthly testing for urine BK virus DNA by PCR (switch to blood once urine is positive) from months 1-12 post-transplant. In this study we assayed longitudinal biobanked and prospective plasma samples for dd-cfDNA levels (Allosure; CareDx) and associated to standard of care longtitudinal BK viremia or viruria results, positive defined as any detectable DNA. Statistical analyses were performed via SAS using least squares means mixed modeling.

Results: In 257 urine and 257 plasma samples from 56 children (Males 57.1%, white 76.7%, deceased donor 67.8%), subjects with BK viruria within the first 12 months (sample n = 71/257 or 28%) showed a simultaneous higher plasma dd-cfDNA load (mean 0.77% versus 0.49%). Subjects with BK viremia within the first 12 months (sample n = 23/257 or 9%) showed a simultaneous higher plasma dd-cfDNA load (mean 1.24% versus 0.50%). By longitudinal analysis that accounted for within-subject variability, a rise of 0.80% (95% confidence intervals [CI] 0.3 to 1.28%) in dd-cfDNA levels were seen at time of BK viremia (p = 0.0014). A smaller non-significant rise of 0.32% (95% CI -0.01 to 0.66%) in dd-cfDNA levels were seen at time of BK viruria (p = 0.06). In 5 patients with BK viremia resolution, later dd-cfDNA levels dropped compared to levels at peak BK viremia (Figure).
Conclusions: In our PKTx cohort, where BK infection is more common than acute rejection in the first year, the longitudinal testing suggests that any BK viremia, but not BK viruria, causes sufficient renal allograft parenchymal injury to elevate the dd-cfDNA level above a given patient's baseline. Further, we can now quantitate the level of dd-cfDNA elevation needed to predict onset of viremia, allowing for targeted biopsies to determine BK nephropathy.



CITATION INFORMATION: Dandamudi R., Gu H., Goss C., Federman S., Woodward R., Dholakia S., Walther L., Dharnidharka V. Longitudinal Studies of Blood Donor-derived Cell Free DNA (dd-cfDNA) Show Predictable Rise at Time of BK Viremia or Viruria in Pediatric Kidney Transplant Recipients (PKTx) *AJT, Volume 21 Supplement 3*
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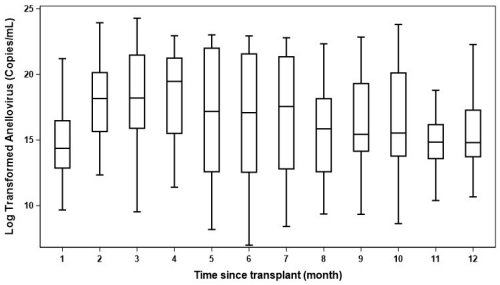
Abstract# 1007

Longitudinal Studies of Blood Anellovirus DNA Prior to Acute Rejection or Major Infection Events in Pediatric Kidney Transplant Recipients (PKTx)

R. Dandamudi, H. Gu, C. Goss, H. Gula, K. Wylie, V. Dharnidharka, *Washington University in St Louis, St. Louis, MO*
Purpose: Blood levels of the ubiquitous but non-pathogenic anellovirus (AnV) taxa have been postulated to represent a biomarker of the overall state of immunosuppression after transplantation. Prior studies, largely cross-sectional in adults, suggest that levels of the AnV rise with major infection events (MIE) and drop with acute rejection (AR).
Methods: We have performed longitudinal biobanking of serum in our PKTx population since 2013, combined with monthly testing for opportunistic viruses DNA by PCR from months 1-12 post-transplant and recording of clinical events. In this study we assayed longitudinal biobanked and prospective serum samples for AnV DNA levels (copies/mL) and associated to standard of care monitoring and clinical results. To adjust for repeated measurements within subjects, we used a linear mixed model approach to test for differences in AnV DNA levels between complication groups (None, MIE at time of sample, AR at time of sample). A log transformation was used to better meet model assumptions, and results are reported on the log scale.
Results: In 271 plasma samples from 46 children (Males 52%, white 83%, deceased donor 69%), as shown in **Figure**, most serum samples are positive for AnV through all time points. Further, box plots of longitudinal results in **Figure** show a slight increase in median AnV DNA levels at 2-4 months, the peak time period for opportunistic viral replication. Mixed model results showed that the log AnV DNA (copies/mL) was elevated by 0.5 log for the MIE group (adjusted mean of 17.3 [95% CI, 16.1 to 18.4]) compared to the no complications group (adjusted mean of 16.8 [95% CI, 15.9 to 17.7]) (P=0.41). In contrast, results for the AR group showed a lowering of log AnV DNA (copies/mL) (14.3 [95% CI, 15.9 to 17.7]) by 2.5 log compared to the no complications group (P=0.12). Although neither result was statistically significant (likely due to small sample size), both results are consistent with the concept from cross-sectional studies of AnV load as an immunosuppression state biomarker.
Conclusions: In our PKTx cohort, our results suggest that longitudinal AnV levels that account for within patient variability also seem to associate to AR and MIE events. Further prospective longitudinal testing in a larger multicenter cohort is recommended.



CITATION INFORMATION: Dandamudi R., Gu H., Goss C., Gula H., Wylie K., Dharnidharka V. Longitudinal Studies of Blood Anellovirus DNA Prior to Acute Rejection or Major Infection Events in Pediatric Kidney Transplant Recipients (PKTx) *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Dandamudi: None. **H. Gu:** None. **C. Goss:** None. **H. Gula:** None. **K. Wylie:** None. **V. Dharnidharka:** Consulting Fee; Name of Commercial Interest; Atara Bio. Grant/Research Support; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx.

Abstract# 1008

The Impact of the Kidney Transplant Journey on Patient's and Parent's Identities and Self-Management

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Purpose: Describe the experiences of pediatric patients and their families after kidney transplant. Our qualitative study aimed to understand (1) how these individuals describe and develop a "normal life" after transplant and (2) how this view affects their ability to self-manage.
Methods: Pediatric kidney transplant recipients and their families were recruited from a pediatric transplant center in the United States. All participants were asked to submit photographs related to when they feel: (1) worried, (2) confident, (3) similar to their peers without kidney disease, and (4) different from their peers without kidney disease. During interviews, participants were asked to share their experiences using the photos as prompts. Interviews were recorded, transcribed and analyzed using an inductive grounded theory approach to identify common themes.
Results: 10 pediatric kidney transplant recipients, ages 7-21 years, and 9 parents completed the study. All participants described the profound, life changing impact of the kidney transplant, resulting in periods of highs and lows. These changes led to the development of a new facet of their identities, both as individuals (a "kidney kid") and as a family unit (family/parent of a "kidney kid"). Our analysis identified five tensions that describe and form this new Kidney Identity: (1) exchanging information, (2) managing transitions, (3) building confidence, (4) telling their transplant stories, and (5) normalizing the transplant journey. As patients progressed through their transplant journey, tensions shifted depending on both their actual and perceived clinical status. Positive health outcomes increased feelings of self-confidence and personal security resulting in increased (1) interest and ability to express themselves, (2) willingness to share their story with others, and (3) capacity to build strong peer connections. Positive changes within their Kidney Identity led to improved self-efficacy, autonomy, and self-management, further improving their clinical status. However, as setbacks occurred, individuals regressed in one or more of the five Kidney Identity tensions, with negative consequences.
Conclusions: After kidney transplant, patients and families develop a new Kidney Identity that positively influences their ability to engage in self-management. In future work, we plan to longitudinally assess and identify an individual's movement within each of the five Kidney Identity tensions after transplant. We believe this will support self reflection on one's progress after transplant and help clinicians identify barriers which prevent successful patient and family engagement in their own care. Surfacing these five tensions and making them visible to all stakeholders has the potential to help patients, families, and clinicians ensure successful health outcomes.
CITATION INFORMATION: Dunbar J., Bascom E., Pratt W., Snyder J., Smith J., Pollack A. The Impact of the Kidney Transplant Journey on Patient's and Parent's Identities and Self-Management *AJT, Volume 21 Supplement 3*
DISCLOSURES: J.C. Dunbar: None. **E.E. Bascom:** None. **W. Pratt:** None. **J. Snyder:** None. **J.M. Smith:** None. **A.H. Pollack:** None.

Abstract# 1009

Outcomes of Granulocyte-Colony Stimulating Factor Use in Pediatric Renal Transplant Recipients: A Pediatric Nephrology Research Consortium Study

R. M. Engen[1], P. L. Weng[2], W. Shih[3], H. Patel[4], K. Richardson[5], S. Dowdrick[6], I. Ashoor[7], J. Misurac[8], A. Z. Traum[9], M. Semanik[10], N. G. Jain[11], R. Sreedharan[12], *[1]Northwestern University, Chicago, IL, [2]University of California Los Angeles, Los Angeles, CA, [3]University of Michigan, Ann Arbor, MI, [4]Nationwide Children's Hospital, Columbus, OH, [5]Oregon Health & Science University, Portland, OR, [6]Penn State Health, Hershey, PA, [7]Louisiana State University, New Orleans, LA, [8]University of Iowa, Iowa City, IA, [9]Harvard University, Boston, MA, [10]University of Wisconsin-Madison, Madison, WI, [11]Columbia University, New York, NY, [12]Medical College of Wisconsin, Milwaukee, WI*

Purpose: Neutropenia is common after pediatric kidney transplant and is associated with an increased risk of bacterial infection, allograft loss, and death. Granulocyte colony-stimulating factor (G-CSF) increases neutrophil production, but its use in pediatric solid organ transplant recipients remains largely undescribed.

Methods: Multicenter retrospective cohort study of pediatric renal transplant recipients with neutropenia, defined as absolute neutrophil count (ANC) <1500/mm^3 within 6 months after transplant. Multivariable linear regression compared outcomes between those who did and did not receive G-CSF.

Results: Of 341 neutropenic pediatric renal transplant recipients from 13 centers, 94 (27.6%) received at least one course of G-CSF. Median G-CSF dose was 5 mcg/kg for 3 (IQR 2-7) doses. G-CSF was given to 83 patients during their first episode of neutropenia while 11 were treated for recurrent neutropenia. Median time from neutropenia onset to G-CSF initiation was 7 days (IQR 2-16 days). Treatment with G-CSF was associated with transplant center, induction immunosuppression, steroid-free maintenance immunosuppression, ANC nadir, hospitalization, and decreases in mycophenolate mofetil and valganciclovir doses but was not associated with patient age or CMV or EBV viremia. While G-CSF was associated with a shorter duration of a neutropenia episode (p=0.026), there was a higher rate of recurrent neutropenia following G-CSF discontinuation (p=0.004). Total duration of neutropenia did not differ when the first and second episodes were combined (p=0.817). G-CSF was not associated with decreased bacterial infections, duration of hospitalization, incidence of rejection within 3 months of neutropenia, or increased eGFR at 1 year post-transplant.

Conclusions: G-CSF does not shorten the overall duration of neutropenia in pediatric kidney transplant recipients and is not associated with decreased rejection or improved eGFR. Additional studies are needed to determine which subset of transplant recipients would benefit from G-CSF treatment.

CITATION INFORMATION: Engen R., Weng P., Shih W., Patel H., Richardson K., Dowdrick S., Ashoor I., Misurac J., Traum A., Semanik M., Jain N., Sreedharan R. Outcomes of Granulocyte-Colony Stimulating Factor Use in Pediatric Renal Transplant Recipients: A Pediatric Nephrology Research Consortium Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: R.M. Engen: None. **P.L. Weng:** Ownership Interest; Name of Commercial Interest; Pfizer, Johnson & Johnson. Ownership Interest; Nature of Relationship; Stockholder. Other; Name of Commercial Interest; Reata Pharmaceuticals. Other; Nature of Relationship; Advisory Committee Member. **W. Shih:** None. **H. Patel:** None. **K. Richardson:** None. **S. Dowdrick:** None. **I. Ashoor:** None. **J. Misurac:** None. **A.Z. Traum:** None. **M. Semanik:** None. **N.G. Jain:** None. **R. Sreedharan:** None.

Abstract# 1010

Understanding Delays to Pediatric Kidney Transplant Wait-List Activation: Providers and Families Weigh in

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Purpose: Since timely access to kidney transplant mediates mortality of children with kidney disease, we examined which factors most commonly affect providers' decision-making to delay wait-listing, compared provider and family perspectives about the importance of these factors, and determined recommendations to overcome factors affecting delays.

Methods: Using a mixed method design, 20 providers and 20 family members responded to 25 open-ended questions. 33 participants completed a survey of closed-ended questions on the importance of dimensions that delay waitlist activation. Interviews were analyzed using thematic analysis. Providers were 65% nephrologists, 10% coordinators, 15% surgeons or 10% social workers from 17 pediatric transplant centers. Families included patients who were post-transplant 50%, patients with history of dialysis 95%, single parent household 50%; patient ages ranged 2-21 years.

Results: Themes named by providers affecting waitlist delays included avoiding retransplantation, the presence of an unstable family environment, primary disease (e.g., FSGS), pervasive nonadherence and poor psychological readiness for transplant care. Families similarly described challenges related to family instability or patient health problems, which were often adherence or psychiatric-related. Although families generally agreed with providers' choices to delay waitlisting, they expressed stress and burdens from remaining on dialysis. These burdens, especially financial, raise ethical concerns that current practices may contribute to disparities in access to transplant. Families recommended earlier psychological treatment, positive relationships with coordinators, more social support, and financial help from governmental programs to reduce delays.

Conclusions: Both providers and families agree that stabilizing the family situation and adherence to treatment are important reasons to delay wait-listing. However, patients and family members need more support from transplant centers to overcome these challenges.

Table 1 Factors important to listing for kidney transplant

Percentage ranked factor important	Family	Provider
Knowledge of transplant complications	n/a	94%
Dialysis Adherence	60%	94%
Psychiatric adherence	73%	89%
Back up caregiver available	47%	67%
Phosphorus, Hemoglobin in goal	87%	47%
Literacy	93%	39%
Symptoms prevent school attendance	60%	28%

CITATION INFORMATION: Farkas-Skiles C., Feinsinger A., Pines R., Waterman A. Understanding Delays to Pediatric Kidney Transplant Wait-List Activation: Providers and Families Weigh in *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.M. Farkas-Skiles: None. **A. Feinsinger:** None. **R. Pines:** None. **A.D. Waterman:** None.

Abstract# 1011

Maternal Perinatal Condition and Neonatal Growth and Development After Renal Transplantation

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Purpose: Although pregnancy and delivery after kidney transplantation have been reported in many studies , it is still little known about growth and development of neonates born to kidney-transplanted women.

Methods: We retrospectively included patients who became pregnant and gave birth after transplantation from October 2011 to November 2020, and matched post-transplant pregnant women with contemporaneous non-transplant pregnant women at 1:3 ratio by childbearing age, pregnant times, BMI and the mode of delivery in the same period.

Results: In this study, a total of 24 recipients received kidney transplantation at the average age of 25.5±3.3Y/O. from September 2005 to December 2017 and became pregnant and gave birth at the average age of 29.9±2.5Y/O. from October 2011 to November 2020. All mothers were natural fertilization with single fetus in both two groups. In spite of higher incidence of preeclampsia(TX vs non-TX: 20.8% vs 4.2%, relative risk/RR: 4.95) in kidney-transplanted group, the incidence of gestational diabetes mellitus, intrahepatic cholestasis of pregnancy (12.5% vs 11.1%, RR=1.13; 8.3% vs 6.9%, RR=1.20, respectively) were similar. Although, compared with non-transplanted group, the rates of low birth weight and premature birth (29.2% vs 0 and 75% vs 0, both p values<0.05, respectively) were much higher in kidney-transplanted group, there is no significant difference in weight and height at 1st, 3rd, 6th, 9th, 12th, 18th month after birth (weight(kg): 4.07 vs 3.99, 6.62 vs 5.97, 8.18 vs 7.51, 8.83 vs 8.25, 10.04 vs 9.00, 11 vs 10.12, respectively; length(cm): 52.94 vs 52.7, 60.26 vs 59.7, 66.38 vs 66, 70.6 vs 70.1, 75.48 vs 73.8, 78.85 vs 79.6, respectively, all p values<0.05) compared with 2009 Reference Standard for Growth and Development of Children under 7 years old in China publicated by Chinese MINISTRY OF HEALTH, even better numerically, which both lower numerically than that of WHO Standard though.

Conclusions: Although the rates of low birth weight and premature birth were far more than non-transplanted pregnancies, which was the same as the previous studies, the weight and length development of the neonates seems unaffected, which still needs more large- sample, long-term and random studies to confirm.

CITATION INFORMATION: Feng X., Song T., Zhong Q., Zeng J., Wang X., Fan Y., Huang Z., Lin T. Maternal Perinatal Condition and Neonatal Growth and Development After Renal Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: X. Feng: None. **T. Song:** None. **Q. Zhong:** None. **J. Zeng:** None. **X. Wang:** None. **Y. Fan:** None. **Z. Huang:** None. **T. Lin:** None.

Abstract# 1012

Bortezomib for Antibody-Mediated Rejection of Renal Transplant in Youth

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Purpose: The purpose of the study was to examine preliminary efficacy and tolerability of bortezomib, a protease inhibitor, in treatment-refractory antibody mediated rejection (AMR) in pediatric kidney transplant patients.

Methods: Patients who received bortezomib (4 doses at 1.3 mg/m^2 per cycle) for AMR (per Banff 2017 criteria) at a large children's hospital over a 1.5 year period were included. Charts were abstracted for demographic and clinical data. Primary outcomes were change in donor specific antibodies (DSA) and estimated glomerular filtration rate (eGFR; based on bedside Schwartz formula) before, and 1 and 3 months after bortezomib. Descriptive statistics were performed.

Results: Six patients were included (baseline characteristics and outcomes summarized in Table 1). Two cycles of bortezomib were given as a 2nd line agent after increased baseline immunosuppression and other treatments (e.g., IVIG, rituximab, plasmapheresis, and/or thymoglobulin) failed to resolve DSA or improve renal function. Two patients had DSA resolution (30%) and 2 different patients showed improvement in eGFR (30%). Data collection is still ongoing for the remaining patients. No serious adverse effects were noted.

Conclusions: In this small, single-center study of bortezomib for refractory AMR in pediatric kidney transplant patients, we observed variable improvement in DSA and renal function. Bortezomib was well-tolerated, however efficacy evaluation was limited due to small sample size, lack of randomization, and short follow-up period. This study adds to the nascent but growing literature examining bortezomib for AMR in kidney transplanted youth.

Table 1. Baseline characteristics and outcomes pre- and post-bortezomib.

Baseline		Patient 1	2	3	4	5	6
Sex/Race/Age at transplant (yrs)		F/W/10.7	M/W/16.0	F/W/7.3	M/W/6.4	M/W/13.3	F/W/5.6
Etiology		FSGS	FSGS	HUS	ARPKD	Cortical necrosis	Dysplasia
Donor Source		D	L	D	L	D	D
Time to biopsy-proven rejection (yrs)		3.4	1.6	6.3	6.9	6.1	0.97
Histology	Rejection type	AMR	Mixed	Mixed	Mixed	AMR	Mixed (AT1R)
	C4d	+	+	+	Equivocal	Minimal	-
	IFTA	Mild	Severe	Mild	Mild	Mild	Mild
Outcomes							
DSA, peak MFI †	Pre-bortez	7,555	18,951	20,888	15,282	<1500	26*
	1 month post	↓ 31%	↑ 6%	↓ 8%	↓ 94%	<1500	↓ 82%
	3 months post	P	↑ 4%	↓ 27%	P	P	↓ 73%
	Resolution	No	No	No	Yes	N/A	Yes*
eGFR (mL/min/1.73m²)	Pre-bortez**	60.1	18.1	37.2	68.4	30.4	10.7
	1 month post	50.7	26.9	53.3	65.2	P	6.7
	3 months post	55.0	27.9	45.7	P	P	8.9

Abbreviations: yrs=years, F=female, M=male, W=white, non-Hispanic, FSGS=focal segmental glomerulosclerosis, HUS=hemolytic uremic syndrome, ARPKD=autosomal recessive polycystic kidney disease, L=living, D=deceased, AMR=antibody-mediated rejection, AT1R=angiotensin II type 1 receptor antibody (non-HLA), IFTA=interstitial fibrosis & tubular atrophy, mixed=AMR plus acute cellular rejection, eGFR=estimated glomerular filtration rate, P=pending, DSA=donor specific antibodies, MFI=mean fluorescence intensity by Luminex, N/A=not applicable
*AT1R expressed in units/mL instead of MFI. AT1R negative <10, borderline 10-17, positive >17.
**during rejection episode
†Percent change in DSA refers to peak MFI pre-bortezomib

CITATION INFORMATION: Galea L., Hewlett J., Savant J., Lopez S., Amaral S., Viteri B. Bortezomib for Antibody-Mediated Rejection of Renal Transplant in Youth *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Galea: None. **J. Hewlett:** None. **J. Savant:** None. **S. Lopez:** None. **S. Amaral:** None. **B. Viteri:** Grant/Research Support; Name of Commercial Interest; Bracco Imaging sponsored study. Grant/Research Support; Nature of Relationship; Principal investigator.

Abstract# 1013

Predictors of Prolonged Length of Stay in Pediatric Kidney Transplantation: Changes Over the Last Three Decades

K. Goli, N. T. Galvan, R. T. Cotton, J. A. Goss, C. A. O'Mahony, A. Rana, *Department of Abdominal Transplantation, Baylor College of Medicine, Houston, TX*

Purpose: Hospital length of stay (LOS) following kidney transplantation, particularly prolonged LOS, has not shown much improvement since the early 2000s. This study explores changes in risk factors for prolonged pediatric LOS over the last 3 decades.

Methods: The UNOS database was queried for pediatric (age<18) kidney transplants between 1990 and 2020. Multivisceral transplants, retransplants, and living donor transplants were excluded and the final sample was 8229 patients. Risk factors for prolonged LOS were analyzed by decade using univariate logistic regression and those which were significant (α=0.05) were entered into a multivariate logistic regression analysis.

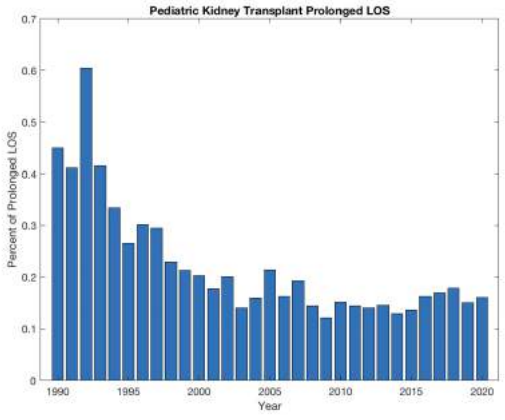
Results: Over the last 3 decades (Figure 1), recipient age has become an increasingly significant protective factor against prolonged length of stay. While dialysis during the waitlist period has become an increasingly significant risk factor for prolonged LOS, dialysis at time of transplant has become nonsignificant in the recent decade. Additionally in the recent decade, low recipient functional status (20%), African American or Asian ethnicity, and spending more than 1 year on the waiting list have become significant recipient risk factors for prolonged LOS. In contrast, having private insurance, autoimmune disease diagnosis, shortened cold ischemic time, high BMI, and being a dropout from school have become protective against prolonged length of stay (Table 1).

Conclusions: These findings suggest some improvements in pediatric kidney transplantation over the 3 decades, as shorter cold ischemic times are associated with shorter length of stay. Being on dialysis at time of transplant is no longer a significant risk factor for patients, which may suggest transplantation of healthier patients overall. Additionally, adolescents are possibly being discharged earlier with increasing confidence. However, waitlist time of more than 1 yr and dialysis during the waitlist period has become an increased risk factor, which may suggest longer waitlist times in recent years with more patients on dialysis becoming ill. This may explain the lack of improvement in prolonged LOS from 2000-2020.

Table 1: Changes in prolonged LOS risk factors and protective factors over the last 3 decades

Variable (Reference)	1990 – 1999 H.R. [95% C.I.]	2000 – 2009 H.R. [95% C.I.]	2010-2020 H.R. [95% C.I.]	Overall (1990 – 2020) H.R. [95% C.I.]
UNOS Region 1	**2.57 [1.32 – 5.00]**	----------	----------	**1.58 [1.17 – 2.15]**
UNOS Region 2	**2.20 [1.53 – 3.16]**	----------	----------	**1.31 [1.08 – 1.60]**
UNOS Region 4	**1.70 [1.17 – 2.48]**	**1.51 [1.10 – 2.06]**	**1.38 [1.09 – 1.75]**	**1.67 [1.40 – 1.99]**
UNOS Region 10	0.76 [0.50 – 1.18]	**0.57 [0.35 – 0.92]**	----------	0.79 [0.62 – 1.01]
UNOS Region 11 (UNOS Region 5)	----------	----------	**0.64 [0.44 – 0.93]**	----------
ABO Incompatible	----------	----------	----------	**5.21 [1.20 – 22.59]**
ABO Compatible (ABO Match)	----------	----------	**1.76 [1.15 – 2.68]**	**1.35 [1.01 – 1.81]**
Recipient Age				
5 yrs < Age ≤ 12 yrs	1.10 [0.72 – 1.69]	----------	----------	**0.57 [0.46 – 0.71]**
12 yrs < Age ≤ 17 yrs (2 yrs < Age ≤ 5 yrs)	**0.61 [0.41 -0.92]**	**0.53 [0.42 – 0.67]**	**0.42 [0.33 – 0.52]**	**0.34 [0.28 – 0.41]**
Recipient BMI				
25 ≤ BMI < 30	0.72 [0.41 – 1.27]	0.97 [0.61 – 1.56]	**0.56 [0.33 – 0.94]**	0.90 [0.67 – 1.21]
30 ≤ BMI < 35 (18.5 ≤ BMI < 25)	----------	----------	**0.39 [0.16 – 0.94]**	0.84 [0.52 – 1.34]
Cold Ischemic Time (CIT)				
4 hrs < CIT ≤ 8 hrs (8 hrs ≤ CIT < 12 hrs)	----------	----------	**0.51 [0.28 – 0.95]**	1.05 [0.88 – 1.26]
Donor Creatinine ≥ 2 (Donor Creatinine <1.5)	**1.94 [1.33 – 2.82]**	----------	----------	**2.21 [1.76 – 2.79]**
Recipient Creatinine ≥ 2 (Recipient Creatinine < 1.5)	1.10 [0.77 – 1.56]	----------	----------	**1.59 [1.28 – 1.99]**
Diagnosis				
Hypertension	----------	----------	0.18 [0.02 – 1.35]	**0.44 [0.23 – 0.82]**
Inherited	----------	----------	----------	**0.79 [0.67 – 0.93]**
Autoimmune Disease (Other)	----------	----------	**0.29 [0.13 – 0.67]**	**0.52 [0.36 – 0.76]**
Recipient on Dialysis during Waitlist Period (Not on Dialysis)	----------	**1.47 [1.02 – 2.10]**	**1.70 [1.20 – 2.42]**	**1.29 [1.07 – 1.55]**
Recipient on Dialysis at Time of Transplant (Not on Dialysis)	----------	**1.76 [1.16 – 2.68]**	1.17 [0.81 – 1.68]	**1.31 [1.07 – 1.55]**
African American Recipient	----------	**1.59 [1.26 – 2.01]**	**1.41 [1.15 – 1.73]**	**1.37 [1.19 – 1.58]**
Hispanic Recipient	----------	----------	----------	0.87 [0.75 – 1.02]
Asian Recipient (White Recipient)	----------	----------	**1.72 [1.15 – 2.57]**	----------
Recipient Functional Status				
Functional Status 20%	----------	----------	**6.60 [1.98 – 22.00]**	2.48 [0.99 – 6.17]
Functional Status 80%	----------	0.70 [0.47 – 1.03]	----------	**0.65 [0.53 – 0.80]**
Functional Status 90%	----------	----------	----------	**0.73 [0.60 – 0.90]**
Functional Status 100% (Functional Status 40%)	----------	----------	----------	**0.72 [0.61 – 0.86]**
Waitlist Time ≥ 1 yr (Waitlist Time < 3 mo.)	----------	----------	**1.41 [1.16 – 1.70]**	**1.32 [1.17 – 1.51]**
Private Insurance (Public Ins./Other Payment)	0.80 [0.55 – 1.16]	**0.75 [0.59 – 0.96]**	**0.72 [0.57 – 0.90]**	**0.72 [0.62 – 0.84]**
Recipient is a Dropout from School (Recipient is in School)	1.05 [0.75 – 1.48]	----------	**0.73 [0.60 – 0.89]**	0.96 [0.82 – 1.12]

Figure 1: Trend in percentage of patients experiencing prolonged LOS from 1990 – 2020



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Abstract# 1014

Improving Allograft Survival by Informing Donor Selection in Kidney Transplant Recipients Under 5 Years Old

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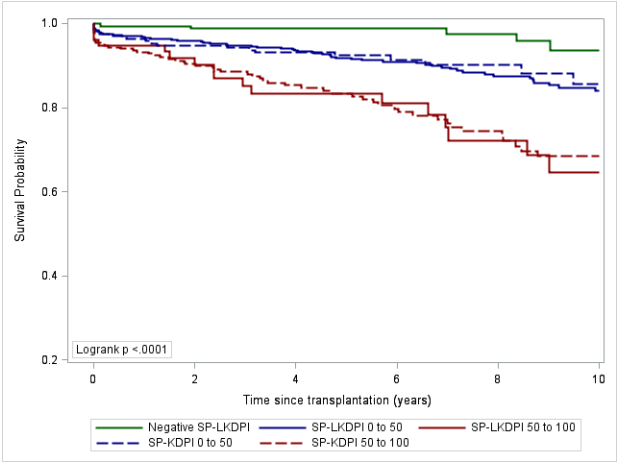
Purpose: The kidney allocation system aims at allocating high-quality kidneys in pediatric recipients but the KDPI score used to assess the quality of the donors may not accurately predict graft survival of pediatric recipients. We aimed at assessing KDPI accuracy to predict graft failure in pediatric recipients and at developing predictive models of graft loss for deceased and living donor transplants to inform donor selection.

Methods: We included all first-time, kidney only transplant recipients under 18 years old from the SRTR database receiving a transplant from an adult donor between January 2005 and August 2018. The primary outcome was graft failure, defined as dialysis, re-transplantation, or death with a functioning graft. Kaplan-Meier and Cox methods were used to assess KDPI accuracy in the overall cohort. To improve donor selection in children < 5 years old at kidney transplantation, we developed a Small Pediatric-KDPI (SP-KDPI) and Small Pediatric-Living KDPI (SP-LDKPI) on the same scale to compare each other by using Cox models adjusted for recipients characteristics.

Results: KDPI C-statistic was 0.52 (95% CI = 0.50 - 0.54) in all pediatric recipients of adult deceased donors kidneys and higher KDPI was not associated with higher rate of graft failure in recipients < 5 years old. Six deceased donor factors were included in the SP-KDPI computation (ethnicity, age, body surface area, gender, cold ischemia time, HLA-B mismatches number). Four living donor factors were included in the SP-LKDPI computation: race, age, HLA-B mismatch number and donor/recipient body surface area ratio. Model accuracies were validated internally by cross-validations and C-statistics were 0.64 (95% CI = 0.57 - 0.70) and 0.65 (95% CI = 0.58 - 0.73) for SP-KDPI and SP-LKDPI, respectively. Figure 1 presents allograft survival stratified by donor type and SP-(L)KDPI stratum. SP-LKDPI identified 16.8% of living donors with predicted graft survival superior to any deceased donor.

Conclusions: The current KDPI allocates good kidneys (< 35%) to pediatric recipients but provides little information to guide donor selection especially in recipients younger than 5 years old. We developed an adaptation of the KDPI that demonstrated a higher accuracy to predict graft loss in young recipients. We also developed an extension of this score to accurately compare adult living and deceased donors offered to young recipients.



CITATION INFORMATION: Manca Barayre F., Greenbaum L., Garro R., Winterberg P., Patzer R., Hogan J. Improving Allograft Survival by Informing Donor Selection in Kidney Transplant Recipients Under 5 Years Old *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Manca Barayre: None. **L. Greenbaum:** None. **R. Garro:** None. **P. Winterberg:** None. **R. Patzer:** None. **J. Hogan:** None.

Abstract# 1015

Treatment of Bk Virus With Intravenous Immunoglobulin in Pediatric Kidney Transplant

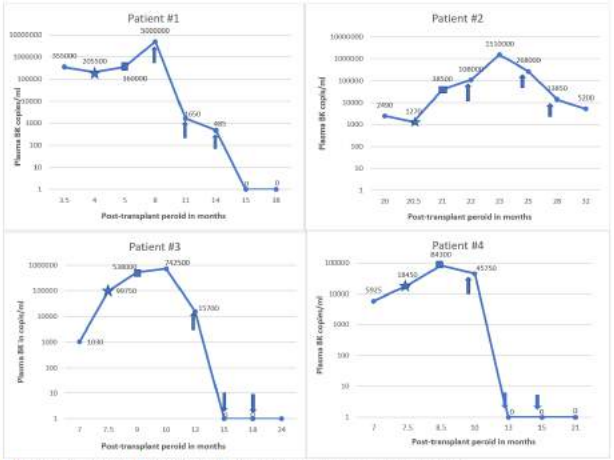
D. Mohammad, D. Kim, R. Baracco, G. Kapur, A. Jain, *Pediatric Nephrology and Transplant Services, Children's Hospital of Michigan, Detroit, MI*

Purpose: To study the prevalence of BK viremia (BKV) and BK Virus Nephropathy (BKVN) utilizing plasma BK quantitative Polymerase Chain Reaction (qPCR) and report outcomes of treatment with reduction of immunosuppression and intravenous immunoglobulin (IVIG).

Methods: A retrospective cross-sectional study of pediatric kidney transplants from January 2013 to January 2020. Excluded were age> 21 years at transplant and primary nonfunctioning allograft. Surveillance was conducted using plasma BK qPCR at 1,3,6,9,12,18,24 months and then annually. BKV was defined as ≥ 250 copies/ml, and BKV resolution as <250 copies/ml on consecutive blood draws at least two weeks apart. Persistent BKV was defined as ≥ 250 copies/ml at last follow up. Presumed BKVN was defined as persistent BKV ≥10,000 copies/ml despite immunosuppression reduction and elevated creatinine; confirmed BKVN if SV-40 stain was positive on biopsy. Chi-square, One-Way ANOVA, and Box-plot analysis was performed using SPSS 21.0.

Results: Inclusion criteria was met by 56 children. Demographics: mean age at transplant was 11.8±5.6 years; 68% male; 55% African-American; 75% deceased-donor; 91% primary transplant. Mean follow up was 42.5±22.5 months. All patients received thymoglobulin induction and tacrolimus-prednisone-mycophenolate mofetil (MMF) maintenance regimen. Twenty (35.7%) of 56 had BKV, two (3.5%) presumed BKVN and two (3.5%) confirmed BKVN. A comparison of BKV vs. Non BKV group revealed that mean age at transplant, gender, race, primary diagnosis, type of donor, re-transplantation status, HLA matching, cold ischemia time, thymoglobulin dosing, duration of stent, acute rejection and mean duration of follow up were not statistically significant. Mean post-transplant time (months) to initial detection (5.5±4.5), peak (8.5±5), and resolution (15±7) of BKV was noted. Reduction in immunosuppression was the first line of therapy in 100% patients. At initial detection of BKV, tacrolimus trough level was reduced to target range in 8(40%) and below target range in 1(5%). For those within tacrolimus target range, 5 (25%) had < 50% reduction and 7(35%) had ≥50% reduction in MMF dose. Four patients with presumed/confirmed BKVN also received 6 doses of IVIG each. 14/20 (70%) had BKV resolution. Mean eGFR (ml/min/1.73m^2) at the last follow up in BKV vs. Non-BKV group was 68.7±22 vs. 63.1±22.3; p=0.7, with 100% graft survival in both groups.

Conclusions: Screening for BKV using qPCR, stepwise reduction in immunosuppression and use of IVIG resulted in resolution of BKV and preservation of renal allograft function.



Immunosuppression reduction and IVIG treatment in Presumed/Confirmed BK Virus Nephropathy (n=4)

CITATION INFORMATION: Mohammad D., Kim D., Baracco R., Kapur G., Jain A. Treatment of Bk Virus With Intravenous Immunoglobulin in Pediatric Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Mohammad: None. **D. Kim:** None. **R. Baracco:** None. **G. Kapur:** None. **A. Jain:** None.

Abstract# 1017

Single Center Experience on SARS-CoV-2 Testing of Symptomatic and Asymptomatic Pediatric Kidney Transplant Recipients

H. Pizzo[1], P. R. Soni[2], S. Nadipuram[2], J. Garrison[1], D. Puliyanda[1], *[1]Pediatric Nephrology, Cedars-Sinai Medical Center, Los Angeles, CA, [2]Pediatric Infectious Disease, Cedars-Sinai Medical Center, Los Angeles, CA*

Purpose: As of late November 2020, there have been 61.5 million cases of SARS-CoV-2 (COVID-19) worldwide resulting in 1.44 million deaths. Despite the outstanding number of cases there is limited data on the incidence of SARS-CoV-2 infection, both symptomatic and asymptomatic, among pediatric (ped) kidney transplant (KTx) patients (pts) and their outcomes.

Methods: Between March and November 2020, 33 SARS-CoV-2 RNA RT-PCR tests were performed among 23 ped KTx pts who were maintained on mycophenolate mofetil, tacrolimus, +/- steroids. Pts were tested for SARS-CoV-2 if they had any COVID-19 symptoms, had positive COVID-19 contact, or needed SARS-CoV-2 testing for admission to the hospital or for pre-procedural clearance. No pts were tested more than once during each encounter.

Results: Of the 33 SARS-CoV-2 tests performed, 7 (21.2%) were due to pts having one or several COVID-19-like symptoms, while 26 (78.8%) were for pts who had positive COVID-19 contact or needed SARS-CoV-2 testing for admission to the hospital or for pre-procedural clearance. Of the 33 tests performed, there were 3 (9.1%) confirmed cases of COVID-19. Two of the 3 SARS-CoV-2 positive cases had symptoms consistent with infection, compared to one asymptomatic case ($p = 0.11$). The two positive cases with symptoms were on steroid-free immunosuppression, had estimated GFR (eGFR) of 101 and 60 ml/min/1.73m2, and were 0.9 and 3.1 years post-Tx, respectively. The one asymptomatic case was on steroid-based immunosuppression, had eGFR 85, and was 0.9 years post-Tx. No pts who tested positive for SARS-CoV-2 required hospitalizations. Five of the 7 pts (71.4%) with symptoms consistent with COVID-19 were eventually diagnosed with a different infection (bacterial and/or viral) and all required admission for management.

Conclusions: There is a low rate of asymptomatic SARS-CoV-2 (COVID-19) infection among our ped KTx cohort. When infected with SARS-CoV-2, ped KTx pts tend to present with minimal symptoms. In this small cohort, there appears to be no correlation between the time since Tx, eGFR, and the maintenance immunosuppression in relation to whether or not pts were more likely to have symptoms or have more severe disease if infected with SARS-CoV-2. Ped KTx pts with symptoms concerning for COVID-19 with clinical indications for admission were more likely to have alternative diagnoses. Larger studies are needed to understand the prevalence and impact of SARS-CoV-2 infection in the ped KTx population.

Table 1. Characteristics of Ped KTx Pts with SARS-CoV-2 Testing

	Total Tests (n=33)	Symptomatic (n=7)	Asymptomatic (n=26)	*p*
Total number of pts	23	7	16	
Age at testing (yrs)	15.9 (5.1-21.3)	11.8 (7-20.9)	15.9 (5.1-21.3)	0.44
Kidney diagnosis				0.84
CAKUT	15	3	12	
GN	2	1	1	
Cystic kidney disease	2	1	1	
Other	4	2	2	
Steroid-free immunosuppression	9 (39.1)	3 (42.9)	6 (37.5)	> 0.99
Age of allograft at testing (yrs)	3.5 (0.4-17)	1 (0.4-9.5)	3.7 (0.8-17)	0.23
eGFR	65 (23-101)	74 (23-101)	65 (39-101)	0.48
Positive SARS-CoV-2 (%)	3 (9.1)	2 (28.6)	1 (3.8)	0.11
Age of allograft at testing (yrs)	0.9 (0.8-3.1)	2 (0.9-3.1)	0.8	n/a
eGFR	85 (60-101)	80.5 (60-101)	85	n/a
Steroid-free immunosuppression	1	0	1	0.33

Values are expressed as n (%) or median (range)

Yrs, years; CAKUT, congenital anomalies of kidney and urinary tract; GN, glomerulonephritis

CITATION INFORMATION: Pizzo H., Soni P., Nadipuram S., Garrison J., Puliyanda D. Single Center Experience on SARS-CoV-2 Testing of Symptomatic and Asymptomatic Pediatric Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Pizzo: None. **P.R. Soni:** None. **S. Nadipuram:** None. **J. Garrison:** None. **D. Puliyanda:** None.

Abstract# 1018

To Whom do Pediatric Donor Organs Go?

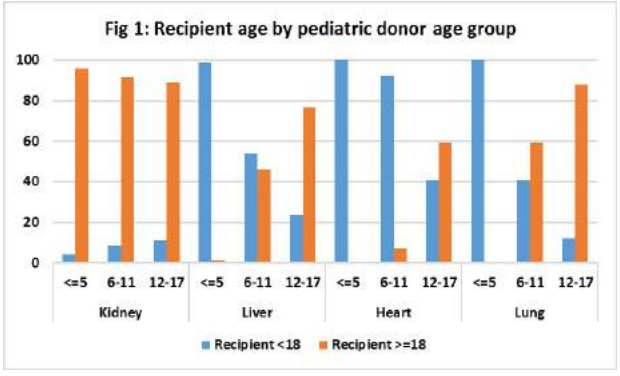
J. Smith[1], M. Skeans[2], R. Engen[3], S. Bartosh[4], *[1]Seattle Children's Hospital, Seattle, WA, [2]SRTR, Minneapolis, MN, [3]Lurie Children's Hospital, Chicago, IL, [4]Univ of Wisconsin, Madison, WI*

Purpose: Pediatric priority in organ allocation is mandated by the Final Rule, but prioritization varies by organ, sometimes informed by size-matching needs. Heart (Policy 6.6.E) and lung (Policy 10.4.D) policy dictate that organs from donors <18 years be allocated to pediatric candidates before adults. Liver (Policy 9.8.F, 9.8.G) policy prioritizes pediatric candidates for pediatric donor organs. Kidney policy has no such priority. Moreover, the kidney profile donor index (KDPI, a measure of donor quality) is limited by the exclusion of pediatric recipients in the model. A high proportion of pediatric donor organs with KDPI >35% results in allocation of pediatric donor kidneys to adults. We wanted to determine how often pediatric donor organs go to pediatric recipients.

Methods: We used SRTR data to classify donor and recipient age groups per organ. The cohort includes kidney, liver, heart, and lung transplant recipients, 2015-2019, whose deceased donor was <18 years. Donors were grouped as aged 0-5, 6-11, and 12-17 years, and recipients as pediatric (<18 years) or adult (≥18 years). We computed the proportion of organs that went to pediatric vs. adult recipients by pediatric donor age group.

Results: The proportion of pediatric recipients varied considerably by organ. Among young (<5 years) pediatric donors of livers, hearts, and lungs, nearly all recipients were <18 years old, but among 1795 kidney donors <5 years, only 4.1% of organs went to pediatric recipients (Figure 1). Among donors 6-11 years, 54.0% of livers, 92.5% of hearts, and 40.7% of lungs—but only 8.4% of kidneys—went to pediatric recipients. Organs from donors 12-17 years went primarily to adult recipients for all organs.

Conclusions: Current policy prioritizes pediatric recipients for pediatric donors of liver, heart, and lung. Absence of such prioritization of pediatric donor kidneys results in the allocation of most pediatric donor kidneys to adults. Development of a policy for pediatric donor kidneys, similar to pediatric donor liver, heart, and lung, will increase access for pediatric kidney candidates, particularly those that may benefit from size matching.



CITATION INFORMATION: Smith J., Skeans M., Engen R., Bartosh S. To Whom do Pediatric Donor Organs Go? *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Smith: None. **M. Skeans:** None. **R. Engen:** None. **S. Bartosh:** None.

Abstract# 1019

Pediatric Kidney Transplant Recipients Frequently Experience Utis Regardless of Esrd Etiology

E. Spiwak, C. Nailescu, A. Schwaderer, *Indiana University Department of Pediatrics Division of Nephrology, Indianapolis, IN*

Purpose: Urinary tract infections (UTIs) remain the most common type of infectious complication experienced by renal allograft recipients. UTIs in transplant patients most commonly occur in the first year post-transplant, but recurrent episodes can occur due to various reasons. In the general pediatric population, *Escherichia coli* (*E.coli)* causes 80-90% of UTIs. The purpose was to review and understand the demographics of pediatric transplant patients who required hospitalization over a four-year time period at one center. UTIs in transplant patients are associated with acute rejection risk, chronic allograft nephropathy, and in some cases, urosepsis.

Methods: A chart review of 145 pediatric kidney transplant recipients was performed to retrospectively identify a total of 65 individual patients with a total of 191 hospital visits. Patients aged 3 to 21 years of age who are followed at the Indiana University Department of Pediatrics for kidney transplantation were included. Data was recorded for symptoms at presentation, urine lab results, and etiology of the underlying kidney disease that lead to end stage renal disease (ESRD).

Results: Out of 65 total patients included, 39 had a congenital anomaly of the kidneys and the urinary tracts (CAKUT). Obstructive uropathy was the ESRD etiology for 48% of children with CAKUT. Non-obstructive CAKUT included renal hypo/dysplasia and reflux nephropathy. The patients with CAKUT were younger and more likely to be male. Hospitalized pediatric transplant kidney recipients were diagnosed with UTIs at a rate of 30% for the 191 admissions reviewed. There were no statistical differences in the percentage that experienced UTIs or the number of UTIs per year between pediatric transplant recipients with and without CAKUT. *E.coli* was only responsible for 23% of the UTIs.

Conclusions: Among hospital visits for pediatric kidney transplant recipients, diagnosis of UTI occurred in almost one-third of admissions. The risk for UTI hospitalization appears to be similar regardless of ESRD etiology. The microbe profile for UTIs experienced by the transplant patients differed from those noted in UTIs in the general pediatric population, *E.coli* was less likely to the be the causative organism.

Patient Differences Between Those with Non-structural vs CAKUT Underlying ESRD Etiology			
	Normal Urinary Tract (n=26)	**CAKUT (n=39)**	**Difference Testing, p-value**
Patient Age at First Admission Mean (SD)	14.8 (3.78)	12.1 (4.81)	Mann-Whitney, 0.0389
Graft Age at First Admission Mean (SD)	3.4 (3.79)	3.4 (3.20)	Mann-Whitney, 0.6628
Sex (% Male)	42.3	85	Fisher, **0.004**
UTI During Any Admission % (contingency values)	35% (9/26)	38% (15/39)	Fisher, 0.7984
UTIs/year Mean rate (SD)	0.66 (2.05)	0.31 (0.70)	Mann-Whitney, 0.9664

CITATION INFORMATION: Spiwak E., Nailescu C., Schwaderer A. Pediatric Kidney Transplant Recipients Frequently Experience Utis Regardless of Esrd Etiology *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Spiwak: None. **C. Nailescu:** None. **A. Schwaderer:** None.

Abstract# 1020

Kidney Allograft Outcomes in Pediatric Patients Transitioned to Adult Care - A Single Center Study

S. Subramanyam, G. Agarwal, M. Seifert, V. Kumar, G. Towns, K. Wille, S. Ong, *University of Alabama at Birmingham, Birmingham, AL*

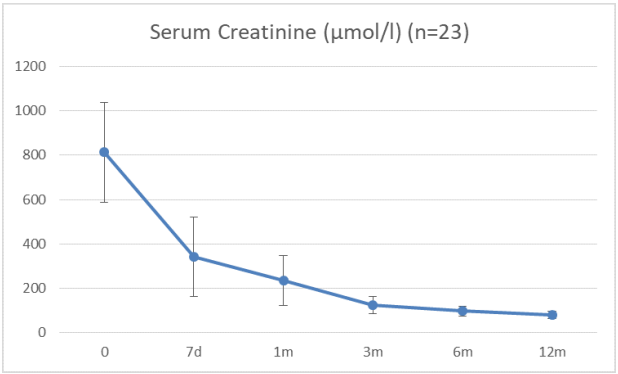
Purpose: The transition of healthcare for young adults with kidney transplants from pediatric to adult care settings is an area of need, hitherto under-recognized in adult care centers. The outcomes of pediatric patients transitioned to adult care have not been studied rigorously and may help identify areas for intervention.
Methods: We performed a retrospective study to evaluate the outcomes of 29 kidney transplant patients who were transitioned from Children's of Alabama to University of Alabama at Birmingham between 1/1/2017 and 9/30/2020. Data are presented as medians and interquartile ranges where appropriate. Fisher's exact test was used to compare the difference pre and post transition. Statistical analyses were performed using JMP (Cary, NC).
Results: Out of the 29 patients, 61.1% were male, 45% were African American and 40% were White. Median age at transplant and at transition were 16.2 years (IQR 13.9-17, range 9-18.4). and 19.9 years (IQR 19.6-20.7, range 18.5-21.9) respectively and median age at last follow up was 21 years (IQR 20-22). Median time from transplant to transition was 4.3 years (IQR 2.5-5.0). Median creatinine and proteinuria at transition was 1.3 mg/dl (IQR 1.1-1.9) and 0.2 g/g (0.12-0.82) respectively. At the time of transition, ten patients (34%) had a history of rejection, 6 (21%) had a history of a positive donor-specific antibody (DSA). Nearly all patients received maintenance immunosuppression consisting of tacrolimus (93%), mycophenolate mofetil (86%) and prednisone (93%). Within 2 years following transition, 6 (20%) developed *de novo* DSA , 4 (14%) developed acute rejection and 4 (14%) developed graft failure (3 had acute and 1 had chronic rejection). All 4 graft losses occurred within 1 year of transition and of the 4, 3 had a pre-transition history of acute rejection and/or DSA. However DSA and rejection before transition and de-novo DSA post-transition were not predictive of graft failure within 2 years of transfer (p= 0.24 and 0.17 respectively). Pre-transition suspected non-compliance was strongly associated with rejection and DSA prior to transition (p <0.001 and p= 0.0011) but not with graft failure or de-novo DSAs post-transition (p=0.076 and p= 0.118).
Conclusions: A significant number of patients transitioning to adult care already have a history of organ rejection and DSA. At time of transition patients had minimal proteinuria and good graft function. In a 2 year period following transfer of care, graft loss rate was low. Prior rejection, DSA and non-compliance did not impact graft loss in the early post-transition period. Additional data is needed to verify this finding and to identify areas of intervention that may improve outcomes following pediatric to adult transition of care at our center.
CITATION INFORMATION: Subramanyam S., Agarwal G., Seifert M., Kumar V., Towns G., Wille K., Ong S. Kidney Allograft Outcomes in Pediatric Patients Transitioned to Adult Care - A Single Center Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Subramanyam: None. **G. Agarwal:** None. **M. Seifert:** None. **V. Kumar:** None. **G. Towns:** None. **K. Wille:** None. **S. Ong:** None.

Abstract# 1021

En Bloc Kidney Transplantation from Pediatrics Weighing Less Than 5 Kg: Single Center Analysis of 31 Cases

Z. Wang[1], X. Zeng[2], Q. Xia[2], J. Peng[2], H. Xiao[2], J. Liu[2], H. Li[2], *[1]Urology, Huazhong University of Science and Technology, Union Hospital, Wuhan, China, [2]Urology, Union Hospital, Wuhan, China*

Purpose: Very low bodyweight pediatrics are rarely chosen as donors because of potential higher risk for complications such as early allograft thrombosis, and possible latter hyperfiltration injury. We evaluated our transplants from the small donors focusing on the complications.
Methods: We retrospectively studied 31 cases of en-bloc kidney transplantation from pediatrics weighing less than 5kg between 2014-2019. All allografts were preserved by static cold storage. Induction immunosuppression consisted of thymoglobulin+methylprednisolone, and maintenance of tacrolimus+mycophenelate mofetil+prednisone. 19/31 were administered with low molecular weight heparin, while 12/31 had no postoperative anticoagulation. All recipients were followed up for at least 1 year.
Results: 8 recipients (25.8%) including 2 graft venous thrombosis, 4 graft arterial thrombosis, 1 primary non-function, and 1 acute rejection had early graft loss in two weeks after transplant. Graft thrombosis morbidity in the anticoagulation treated group is even higher than the non-anticoagulation group (26.3% vs 8.3%, p>0.05). The remaining 23 recipients had satisfactory renal perfusion and renal function recovery. Their proteinuria (PU) morbidity is 30.4%, 21.7%, 21.7% at 3, 6, 12 months after transplant respectively. And the recipient/donor body weight ratio of PU and non-PU recipients were not significantly different (p>0.05) at these time points. Overall delayed graft function (DGF) morbidity is 39.1% (9/23), in addition the DGF recipients had significantly higher (20.8±9.9 vs 13.3±2.9, p<0.05) recipient/donor body weight ratio than the ones without DGF.
Conclusions: Kidneys from neonatal donors can achieve promising outcomes with proper surgical procedures and perioperative managements. However, there was a learning curve for utilizing these small grafts. Postoperative anticoagulation did not contribute to prevention of graft thrombosis. Higher recipient/donor body weight ratio seemed to be related to higher possibility of DGF but not proteinuria. Future expanded studies are warranted to determine the reliability of our protocol of using such small donors and long-term recipient outcomes.



Donor and Recipient Characteristics	
Donor Wt (kg; median, range)	3.3, 1.3-5.0
Donor Age (d; median, range)	25, 4-120
Recipient Wt (kg; mean ± SD)	46.9±5.6
Recipient Age (yrs; mean ± SD)	27.6±7.0
Recipient/Donor Wt Ratio (mean ± SD)	15.7±3.0

CITATION INFORMATION: Wang Z., Zeng X., Xia Q., Peng J., Xiao H., Liu J., Li H. En Bloc Kidney Transplantation from Pediatrics Weighing Less Than 5 Kg: Single Center Analysis of 31 Cases *AJT, Volume 21 Supplement 3*
DISCLOSURES: Z. Wang: None. **X. Zeng:** None. **Q. Xia:** None. **J. Peng:** None. **H. Xiao:** None. **J. Liu:** None. **H. Li:** None.

Abstract# 1022

Nutrition, Body Habitus, and Food Insecurity, in Pediatric Kidney Transplant Recipients

A. Wilkerson[1], J. Figueroa[1], C. Kang[1], R. Garro[2], M. Kamel[1], R. P. George[2], *[1]Emory University, Atlanta, GA, [2]Emory University and Children's Healthcare of Atlanta, Atlanta, GA*

Purpose: Appropriate nutrition and physical activity are critical for optimal post-transplant recovery and long term outcomes, especially in pediatric populations. Both malnutrition and obesity are detrimental for transplant recipients and are influenced

by several factors including socioeconomic status and access to healthy food. The purpose of our study was to assess the nutritional status of pediatric kidney transplant recipients, in the context of household income and food access, since there is scant data in the literature about this.

Methods: Data was collected from 79 patients (25 females; 38 White, 26 Black), who were ≥1 year post-transplant with stable, functioning allograft. Nutrition and physical activity were assessed using the validated Family Nutrition and Physical Activity Screening (FNPA) tool. Patients' Body Mass Index (BMI), and Percentage Body Fat (PBF) were measured using Bioelectrical Impedance Analysis (BIA). Family economic status and zip codes were self-reported. Food access was assessed using United States Department of Agriculture (USDA) Food Access Research Atlas. Limited access was defined as the lack of a supermarket within 0.5 mile (urban) and 10 miles (rural), per USDA Economic Research Service food atlas 2020. Wilcoxon rank-sum tests and Chi-square tests were used for comparisons of continuous and categorical data, respectively.

Results: Patients were 8-20 years old (median age: 15), with BMI showing 5%, underweight, 55% normal, 12% overweight and 27% obese. Reported household income (71 patients) showed 49% (n=35) below an annual income of <$50,000, designated as low income. BMI (p=0.004) and PBF (p=0.02) were higher in patients with low income, compared with high income. Patients in low income group had higher obesity (45% vs. 14%, p=0.028). Overall, 52% (n=41) lived in low food access areas which included 54% with a reported low household income. Of patients who lived in low food access areas 51% (n=19) had elevated BMI.

Conclusions: Higher BMI, has traditionally been associated with comorbidities and sub-optimal post-transplant outcomes. Patients of lower economic status have less access, especially to healthy or fresh foods and are more at risk for higher BMI. The nuances of household income and food access should be taken into consideration when providing nutritional recommendations and education should be tailored for resources available to our pediatric kidney transplant patients and their families. It is critical to partner with community organizations and work for systemic change to mitigate these challenges.

CITATION INFORMATION: Wilkerson A., Figueroa J., Kang C., Garro R., Kamel M., George R. Nutrition, Body Habitus, and Food Insecurity, in Pediatric Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Wilkerson: None. **J. Figueroa:** None. **C. Kang:** None. **R. Garro:** None. **M. Kamel:** None. **R.P. George:** None.

Abstract# 1023

Use of Donor-Derived Cell-Free DNA in Children with Kidney Transplantation: A Pilot Study

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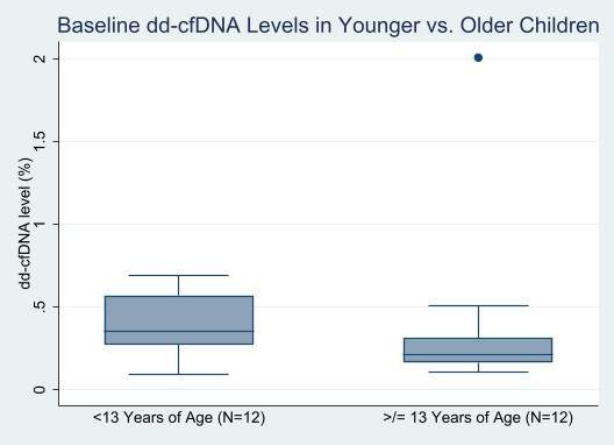
Purpose: Use of a blood test to detect donor-derived cell-free DNA (dd-cfDNA) levels has been shown to predict rejection in adults with kidney transplants. If dd-cfDNA levels perform similarly in children, use of this biomarker for monitoring pediatric recipients could lead to earlier detection of rejection and potentially reduce the need for biopsy. We aim to determine whether dd-cfDNA is a useful marker of rejection in children by designing a cohort study with serial assessments of dd-cfDNA levels after kidney transplantation. The primary objective of this phase of the study was to assess feasibility of participant recruitment and ascertainment of dd-cfDNA levels as well as parent/patient perspectives on its potential application in routine care.

Methods: This is a single-center prospective study of children treated with kidney transplant. At enrollment, participants (if >8 years) or their parents (if </=8 years) were asked to rate how concerned they were about having blood drawn or undergoing kidney biopsy (with 1 being least concerned and 10 being most concerned.) Donor-derived-cfDNA levels were obtained using AlloSure. We defined baseline dd-cfDNA level as the first level obtained in participants >/=2 months post-transplant with stable creatinine. Baseline dd-cfDNA levels were compared between children <13 vs. >/=13 years using Wilcoxon Rank-Sum test.

Results: Of 29 patients approached for participation, 27 (93%) consented to enroll. Median (Q1, Q3) age at entry was 13 (5, 16) years, 56% were male, 37% were non-Hispanic white race, and the primary cause of ESKD was congenital anomalies of the kidney and urinary tract (48%). Participants or their parents (for younger children) were least concerned about blood draws, with a median (Q1,Q3) rating of 1 (1,1). Median (Q1, Q3) rating for level of concern of undergoing kidney biopsy was 3 (1,5). Of 25 participants with stable creatinine, baseline dd-cfDNA levels were ascertained in 24 (96%) at a median (Q1,Q3) of 23.6 (5.0, 69.0) months post-transplant; one sample was hemolyzed. Median (Q1,Q3) baseline dd-cfDNA level was 0.29% (0.19,0.48) in the overall cohort. Levels were not significantly different for younger versus older children (median 0.36% vs. 0.21%, p=0.11, Figure).

Conclusions: Recruitment of participants and ascertainment of dd-cfDNA levels is feasible in this prospective cohort study. Baseline dd-cfDNA are similar in younger children compared to adolescents to date. This ongoing study will follow dd-cfDNA levels and aims to determine whether dd-cfDNA levels will discriminate risk of rejection.



CITATION INFORMATION: Winnicki E., Brennan J., McEnhill M., Brakeman P., Ku E. Use of Donor-Derived Cell-Free DNA in Children with Kidney Transplantation: A Pilot Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Winnicki: Grant/Research Support; Name of Commercial Interest; CareDx. **J. Brennan:** None. **M. McEnhill:** None. **P. Brakeman:** Consulting Fee; Name of Commercial Interest; Horizon Therapeutics USA. **E. Ku:** Grant/Research Support; Name of Commercial Interest; CareDx.

Abstract# LB 80

Food Insecurity and Impact on Transplant Outcomes in Pediatric Kidney Transplant Recipients

A. Moin, P. Verghese, R. Engen, D. Matossian, *Pediatric Nephrology, Lurie Children's Hospital, chicago, IL*

Purpose: Food insecurity (FI), defined as inconsistent access to food or worry over shortage of food that prevents an active and healthy life, has not been studied in pediatric kidney transplant (pedsKTx) recipients. The COVID-19 pandemic increased prevalence of FI in children from 17.4% to 19.9% incentivizing this single-center retrospective cohort study in the largest pediatric hospital in Illinois, to assess for FI prevalence in pedsKTx and association with transplant outcomes.

Methods: A 2-question survey was administered to all pediatric kidney recipients that attended the kidney transplant clinic in person or via telemedicine for the month of November 2020. All families were asked if they were ever worried that food would run out or if food ever ran out over the past year. Sociodemographic and clinical data from December 2019 to November 2020 were collected using electronic health records.

Results: FI was identified in 12/45(26.7%) pedsKTx patients. Hispanic ethnicity (RR 3.75 (95th%ile CI 1.16-12.04), p= 0.019) was associated with FI. FI patients were more often on Medicaid vs private insurance (75% vs. 54%) and received deceased vs living donations (75 % vs. 69%), although not statistically significant possibly due to small numbers. Age, gender, race, time from transplant, good medication adherence, type of underlying renal disease and presence of hypertension were not significantly associated with FI status. Rejection episodes (25% vs. 9%) and hospital admissions (58.3% vs. 36.4%) were not significantly associated with FI although infectious hospitalizations trended towards significance (25% vs. 3%, p=0.05).

Conclusions: Food insecurity is prevalent in pediatric renal transplant patients. Hispanic patients are more likely to be food insecure. The pandemic effect on magnifying prevalent racial and ethnic disparities in pediatric kidney transplant requires a larger sample size.

Table 1: Demographics for Pediatric Renal Transplant Patients

Variables	Food Secure (N=33) N (%)	Food Insecure (N=12) N (%)	p-value*
Food Security Status	33 (73.33)	12 (26.7)	
Gender (F)	12 (36)	6 (50)	0.499
Age (mean Y)	14.1 ±5	13.7 ±5.3	0.835
Race			
White	11 (39.4)	10 (83.3)	
Black	1 (3.0)	1 (8.3)	0.888
Asian	9 (27.3)	1 (8.3)	0.350
Ethnicity			*0.019*
Hispanic	11 (33.3)	9 (75)	
Not Hispanic	22 (66.7)	3 (25)	
Insurance			0.268
Private	14 (42.4)	3 (25)	
Medicaid	18 (54.6)	9 (75)	
Other	1 (3)	0 (0)	
Time from Transplant (<1y)	15 (45.4)	5 (42.7)	1.000
Donor Status			1.000
Living	10 (30.3)	3 (25)	
Deceased	23 (69.7)	9 (75)	
Good medication adherence	26 (78.8)	11 (91.7)	0.419
Kidney disease			0.700
Glomerular	14 (42.4)	7 (58.3)	
Non-glomerular	19 (57.6)	5 (41.7)	
Hypertension	22 (66.7)	7 (58.3)	0.722

*p<0.05 considered significant

Table 2: Outcomes for Pediatric Renal Transplant Patients

Outcomes over 1 year	Food Secure (N=33) N (%)	Food Insecure (N=12) N (%)	RR	95th %ile CI	p-value*
Presence of Rejection	3 (9.1)	3 (25)	2.17	0.81-5.80	0.318
Any admissions	12 (36.4)	7 (58.3)	1.92	0.72-5.12	0.306
Any infectious admissions	1 (3)	3 (25)	3.42	1.52-7.66	0.052

*p<0.05 considered significant

CITATION INFORMATION: Moin A., Verghese P., Engen R., Matossian D. Food Insecurity and Impact on Transplant Outcomes in Pediatric Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Moin: None. **P. Verghese:** None. **R. Engen:** None. **D. Matossian:** None.

Kidney

Kidney Acute Antibody Mediated Rejection

Abstract# 1025

Outcomes of Kidney Transplant Recipients with Antibody-mediated Allograft Rejection: A Retrospective Study

A. Al Jurdi[1], L. Goldfarb[1], M. Lafargue[2], J. Azzi[3], L. V. Riella[1], *[1]Center for Transplantation Sciences, Massachusetts General Hospital, Charlestown, MA, [2]Université de Paris, Paris, France, [3]Transplantation Research Center, Brigham and Women's Hospital, Boston, MA*

Purpose: The optimal regimen for treating acute and chronic antibody-mediated rejection (AMR) in kidney transplant recipients has yet to be established. The purpose of the study was to evaluate the outcomes of kidney transplant recipients with acute and chronic AMR managed with different treatment regimens.

Methods: We conducted a single-center retrospective cohort study of all kidney transplant recipients with biopsy-proven acute or chronic AMR between January 2017 and September 2020. The primary outcome was allograft loss at last follow up. Secondary outcomes included differences in allograft survival between treatment regimens, and changes in estimated glomerular filtration rate (eGFR) and urine protein-creatinine ratio (UPCR) at last follow up.

Results: Fifty-three kidney transplant recipients with AMR were included in the study. Mean age was 51 years, 50% were female and the most common cause of end-stage kidney disease was glomerular disease. 57% received living donor kidney transplants, median number of HLA ABDR mismatches was 4, and 38% had pre-transplant donor-specific antibodies. For induction immunosuppression, 61% received anti-thymocyte globulin, while 35% received basiliximab and 4% alemtuzumab. 35% had acute AMR and 65% had chronic-active AMR. At the time of biopsy, mean (±SD) eGFR was 32±16ml/min/1.73m^2 and UPCR was 3.0±5.6g/g. For treatment, 72% received pulse steroids, 64% received intravenous immunoglobulin, 51% received plasma exchange, 43% received bortezomib and 4% received rituximab. Some patients received more than one of the treatments listed. At a median follow up of 23 months, patient survival was 94% and death-censored allograft survival was 74%; mean (±SD) eGFR was 28±19ml/min/1.73m^2 and UPCR was 0.96±1.4g/g. The risk of allograft loss was higher in patients with UPCR greater than 3g/g at time of biopsy compared to those with UPCR less than 3g/g (relative risk [RR]=4.3, 95% 95% confidence interval [CI]: 1.6-11.6). There was no difference in the risk of allograft loss in patients who received plasmapheresis compared to those who did not (RR=0.97, 95% CI: 0.4-2.4). There was also no significant difference in the risk of allograft loss in patients who received bortezomib compared to those who did not (RR=0.8, 95% CI: 0.3-2.0). The risk of allograft loss was similar in patients with chronic AMR compared to those with acute AMR (RR=1.3, 95% CI: 0.5-3.6).

Conclusions: Proteinuria above 3g/day is associated with increased risk of allograft failure in patients with AMR. Use of plasmapheresis or bortezomib was not associated with lower risk of allograft failure in kidney transplant recipients with AMR. Novel treatment regimens are needed to improve the outcomes of kidney transplant recipients with acute and chronic AMR.

CITATION INFORMATION: Al Jurdi A., Goldfarb L., Lafargue M., Azzi J., Riella L. Outcomes of Kidney Transplant Recipients with Antibody-mediated Allograft Rejection: A Retrospective Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Al Jurdi: None. **L. Goldfarb:** None. **M. Lafargue:** None. **J. Azzi:** None. **L.V. Riella:** None.

Abstract# 1026

Clinical Validation and Performance of Donor-Derived Cell-Free DNA in Allograft Rejection

S. Anand[1], A. Pai[2], J. S. Bromberg[3], G. Gupta[4], I. Moinuddin[4], T. Alhamad[5], V. Bowers[6], S. Ghosh[7], W. Tian[7], L. Bu[8], E. Stites[9], *[1]Intermountain Medical Center, Murray, UT, [2]University of Texas McGovern Medical School, Houston, TX, [3]University of Maryland School of Medicine, Baltimore, MD, [4]Virginia Commonwealth University, Richmond, VA, [5]Washington University in St. Louis, St. Louis, MO, [6]Tampa General Hospital, Tampa, FL, [7]CareDx, Brisbane, CA, [8]University of Minnesota, Minneapolis, MN, [9]University of Colorado, Aurora, CO*

Purpose: Extensive literature regarding the utility of donor-derived cell-free DNA (dd-cfDNA) shares various thresholds for active rejection (AR) based on differing data sets for both cellular (TCMR) and antibody-mediated allograft rejection (ABMR) after kidney transplant (KT). Our aim was to independently validate the performance of dd-cfDNA in the context of AR, both in "for cause" but also in the context of surveillance biopsies, the latter typically highlighting detection of subclinical rejection.

Methods: Patients from the Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219) were analyzed with total of 219 biopsies (Bx) and paired plasma dd-cfDNA (AlloSure®; CareDx) from 196 patients (110 "for cause", 109 "surveillance" Bx). Samples were considered if Bx was performed ≤ 20 days after dd-cfDNA measurement. AR was detected in 107 Bx from 95 patients (65 "for cause", 42 "surveillance") and compared to 112 Bx from 108 patients (45 "for cause", 67 "surveillance") who did not have AR.

Results: 74 episodes of ABMR were detected in 66 Patients (39 "for cause", 35 "surveillance") and 33 TCMR in 30 patients (26 "for cause", 7 "surveillance"). The AUC for AR events = 0.77, AUC for ABMR = 0.80 and TCMR = 0.70 [**FIGURE 1**]. Median level dd-cfDNA with ABMR = 2.1% in "for cause "and 0.91% for "surveillance" Bx [**FIGURE 2**]. Median level dd-cfDNA with TCMR = 0.85% in "for cause" and 0.52% for "surveillance" Bx. Absence of rejection was associated with median dd-cfDNA = 0.39% in "for cause" and 0.23% for "surveillance" Bx procedures.

FIGURE 1.

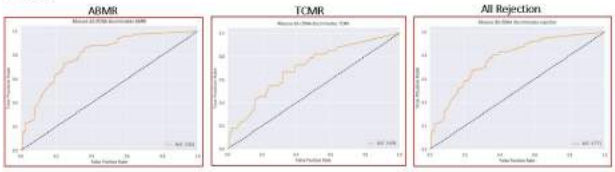
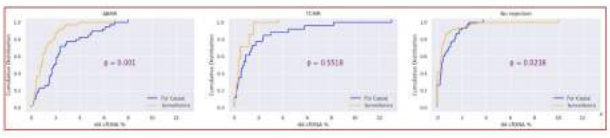


FIGURE 2.



Conclusions: These results independently validate the robust performance characteristics of dd-cfDNA (AlloSure®) as consistent with the published literature ─ for detection of both clinically suspected and *subclinical* allograft rejection. dd-cfDNA has utility in the detection of both TCMR and ABMR with different patterns of elevation. As these are overlapping and difficult to discriminate, further analysis of Δdd-cfDNA from prior baseline may further optimize use of Bx and enhance histological interpretation.

CITATION INFORMATION: Anand S., Pai A., Bromberg J., Gupta G., Moinuddin I., Alhamad T., Bowers V., Ghosh S., Tian W., Bu L., Stites E. Clinical Validation and Performance of Donor-Derived Cell-Free DNA in Allograft Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Anand: Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Alexion (speaker). **A. Pai:** None. **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. **G. Gupta:** Grant/Research Support; Name of Commercial Interest; Gilead. Honoraria; Name of Commercial Interest; CareDx, Alexion, Mallinckrodt, Thermo Fisher. Other; Name of Commercial Interest; Alexion (advisory board), Bristol Myers Squibb (advisory board), CareDx (advisory board), Veloxis (advisory board). **I. Moinuddin:** Other; Name of Commercial Interest; CareDx (advisory board). **T. Alhamad:** Consulting Fee; Name of Commercial Interest; Veloxis (consultant/advisory board, speaker's bureau), Mallinckrodt (consultant/advisory board), CareDx (consultant/advisory board, speaker's bureau), Sanofi (speaker's bureau). Grant/Research Support; Name of Commercial Interest; Mallinckrodt, Angion, Natera, CareDx. **V. Bowers:** None. **S. Ghosh:** Salary; Name of Commercial Interest; CareDx (employee). **W. Tian:** Salary; Name of Commercial Interest; CareDx (employee). **L. Bu:** Consulting Fee; Name of Commercial Interest; CareDx. **E. Stites:** Honoraria; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; CareDx (advisory board).

Abstract# 1027

A2 to B Deceased Donor Renal Transplantation Outcome Analysis: Single Center Experience

S. Bindroo, M. Doshi, *Nephrology, University of Michigan, Ann Arbor, MI*

Purpose: Initial experience under kidney allocation system (KAS) implemented in December 2014 showed equivalent outcomes for A2 to B kidney transplantation compared with ABO compatible kidney transplants. Despite the advantages, A2 to B kidney transplantation has been underused and significant knowledge gaps are noted in areas of rejections, infection rate, anti-A titer thresholds post-transplant. The purpose of our study is: 1) To assess AMR rates in A2 to B DDKT and determine association with anti-A IgG titers. 2) To assess graft function, rejection and infection rates (bacterial, viral and fungal).

Methods: We conducted a retrospective chart review of 55 A2 to B DDKT performed at the University of Michigan from January 2015 to September 2020. All patients received Thymoglobulin for induction and were maintained on triple immunosuppression. All patients underwent monitoring of anti-A2 titers and surveillance biopsy at 3-, 6- and 12- months after transplant. Other outcomes included graft function, rejection and infection rates in our cohort at last follow-up.

Results: Our cohort consisted of 55 recipients with mean age of 54(±13) years, 67% males and 29% African Americans. The median follow-up time was 2.5 [0.5-5] years. Ten (15%) developed acute rejection at 3 [1-6] months after transplant. One patient developed hyper-acute rejection due to ABO incompatibility, five developed T cell mediated rejection, and four had antibody mediated rejection. Anti-A titers remained undetectable or less < 1:4 in 54 (98 %) in post-transplant period with no increase in titers at 3-6 month follow up. The patient with hyper-acute rejection in one out of four patients with AMR anti-A titers increased to 1:128, in rest three anti-A titers remained same (1:2) and rejection was due to donor specific antibodies against HLA. Overall, 20% (11/55) mortality was noted, unrelated to graft dysfunction at median follow-up of 1.8 [0.08-4] years. Post-transplant infections (bacterial, viral and fungal) accounted for 41% cases (23/55). Bacterial infections were reported in 16 % (9/55), viral in 25% (14/55) and fungal in 3.6 % (2/55) respectively. BK viremia noted in 20% (11/55) with BK nephropathy in six. The mean (SD) glomerular filtration rate (GFR) mL/min, creatinine mg/dL and urine protein creatinine ratio (UPCR) at three months, one year and at last follow up post-transplant was 49 (14.69), 1.4(0.47), 0.32 (0.55); 54 (14.49), 1.3 (0.43), 0.17(0.20) and 52.8 (14.69), 1.4(0.59), 0.22 (0.27) respectively.

Conclusions: Our study showed no overall increase in AMR due to ABOi in A2 to B DDKT. The rise in anti-A titer was noted in one AMR and rejections were associated with increase in donor specific anti-HLA antibodies. Our study is the first study to assess AMR along with anti-A titers in A2 to B DDKT. More such studies are needed to assess anti-A trajectory with AMR. We also noted high infection and BK viremia rates, attributed to use of Thymoglobulin induction therapy. While A2B transplants have good graft outcomes, infectious complications are more frequent.

CITATION INFORMATION: Bindroo S., Doshi M. A2 to B Deceased Donor Renal Transplantation Outcome Analysis: Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Bindroo: None. **M. Doshi:** None.

Abstract# 1028

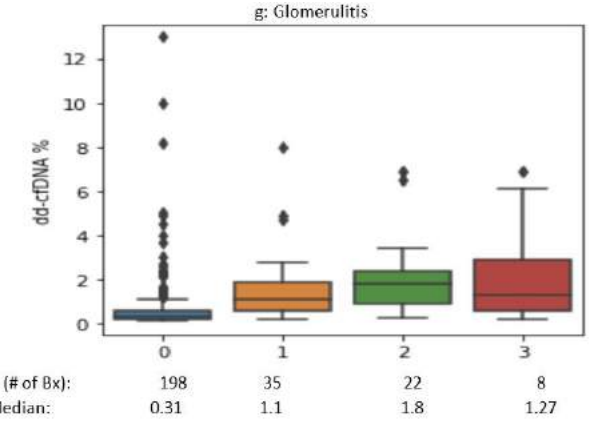
Plasma Donor-Derived Cell-Free DNA Levels Risk-Stratify Kidney Allograft Injury with Isolated Transplant Glomerulitis

L. Bu[1], S. Anand[2], A. Pai[3], J. S. Bromberg[4], G. Gupta[5], I. Moinuddin[5], T. Alhamad[6], V. Bowers[7], S. Ghosh[8], W. Tian[8], E. Stites[9], *[1]University of Minnesota, Minneapolis, MN, [2]Intermountain Medical Center, Murray, UT, [3]University of Texas McGovern Medical School, Houston, TX, [4]University of Maryland School of Medicine, Baltimore, MD, [5]Virginia Commonwealth University, Richmond, VA, [6]Washington University in St. Louis, St. Louis, MO, [7]Tampa General Hospital, Tampa, FL, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*

Purpose: The Banff lesion Glomerulitis (g) characterizes the degree of microvascular glomerular inflammation. Some studies have demonstrated glomerulitis in the absence of C4d in association with donor-specific HLA antibodies (DSA). The clinical significance of *"isolated glomerulitis"* has not been adequately studied in light of heterogenous clinical outcomes and "equivocal" Banff lesion scores. We hypothesized that quantification of molecular inflammation with donor-derived cell-free DNA (dd-cfDNA) may permit risk-stratification of (g).

Methods: 263 KT biopsies with paired dd-cfDNA levels (AlloSure®; CareDx, Inc.) were examined from the Assessing AlloSure dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL Study, clinicaltrials.gov: NCT04566055219). Paired biopsies performed ≤ 20 days after the dd-cfDNA level consisted of both "protocol" and "for cause". Pathology reports were centrally interpreted and scored. Correlations with histology lesion and dd-cfDNA levels were performed; high dd-cfDNA was defined as >0.5% based on previous injury analysis for ADMIRAL cohort. Isolated glomerulitis was assessed using Banff 2018 with g(0):no glomerulitis, g(1): segmental or global glomerulitis < 25% glomeruli, g(2):25-75% and g(3): >75% glomeruli affected.

Results: 198 biopsies with no glomerulitis, (g(0), had median dd-cfDNA = 0.31%, while 35 had g(1) median 1.1%, g(2) 1.8% or g(3) 1.27%. Significant differences were observed between normal and active g lesions, but not across spectrum of active g lesions. There were statistically significant differences between g(0) and g(1) [p=1.63e-05] and g(2) [p=4.12e-08]. Despite the sample-size (n=8), the putative trend discordance for the severe g(3) was significant with respect to g(0) [p=0.0183].



Conclusions: Isolated glomerulitis has some correlation with dd-cfDNA which may enhance interpretation compared to Banff criteria alone. Active histological changes may not precisely correlate with graft injury and so considering higher plasma dd-cfDNA levels regardless of the degree of glomerulitis may be beneficial to interpretation.

CITATION INFORMATION: Bu L., Anand S., Pai A., Bromberg J., Gupta G., Moinuddin I., Alhamad T., Bowers V., Ghosh S., Tian W., Stites E. Plasma Donor-Derived Cell-Free DNA Levels Risk-Stratify Kidney Allograft Injury with Isolated Transplant Glomerulitis *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Bu: ; CareDx. **S. Anand:** Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Alexion (speaker). **A. Pai:** None. **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. **G. Gupta:** Grant/Research Support; Name of Commercial Interest; Gilead. Honoraria; Name of Commercial Interest; CareDx, Alexion, Mallinckrodt, Thermo Fisher. Other; Name of Commercial Interest; Alexion (advisory board), Bristol Myers Squibb (advisory board), CareDx (advisory board), Veloxis (advisory board). **I. Moinuddin:** Other; Name of Commercial Interest; CareDx (advisory board). **T. Alhamad:** Consulting Fee; Name of Commercial Interest; Veloxis (consultant/advisory board, speaker's bureau), Mallinckrodt (consultant/advisory board), CareDx (consultant/advisory board, speaker's bureau), Sanofi (speaker's bureau). Grant/Research Support; Name of Commercial Interest; Mallinckrodt, Angion, Natera, CareDx. **V. Bowers:** None. **S. Ghosh:** Salary; Name of Commercial Interest; CareDx (employee). **W. Tian:** Salary; Name of Commercial Interest; CareDx (employee). **E. Stites:** Honoraria; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; CareDx (advisory board).

Abstract# 1029

The Role of Donor-derived Cell-free DNA Testing in Detecting Subclinical Kidney Allograft Rejection

M. Dasari[1], J. Hendele[2], L. Sibulesky[2], N. Leca[3], *[1]Department of Surgery, University of Washington, Seattle, WA, [2]Department of Surgery, Division of Transplant, University of Washington, Seattle, WA, [3]Department of Nephrology, UW Medicine Kidney and Pancreas Transplantation Program, University of Washington, Seattle, WA*

Purpose: Donor-derived cell-free DNA (dd-cfDNA) testing is an emerging method of non-invasive testing for graft rejection in the field of solid-organ transplantation. We describe how dd-cfDNA testing aided in the diagnosis of subclinical rejection in a group of kidney transplant recipients at our institution.

Methods: We conducted a retrospective analysis of 227 patients who underwent renal transplantation at our institution between 2017-2020 and had dd-cfDNA testing within 4 months post-transplant. We analyzed serum creatinine trends post-transplant for all patients, donor serum antigen (DSA) and tissue biopsy results.

Results: 7.9% (18/227) of patients had dd-cfDNA test results that indicated probability of active rejection. 10 of the 18 underwent tissue biopsy. 1 of the patients had an acutely abnormal change in creatinine prompting biopsy; 1 patient had hematuria and proteinuria; the other 8 patients were subclinical with normal or stable creatinine values and biopsy was performed based on abnormal dd-cfDNA test alone. 8 biopsies were consistent with rejection: 4 with antibody-mediated rejection, 2 with cellular rejection, 2 with concern for both types of rejection. Only 1 of the 8 patients had previously detected donor serum antibodies (DSA).

Conclusions: dd-cfDNA testing can help detect rejection in the absence of other markers of abnormal allograft function (detected DSA, abnormal changes in creatinine, clinical symptoms). In our cohort, 8 of 10 patients with abnormal dd-cfDNA results had biopsies that confirmed rejection. Our experience suggests that dd-cfDNA can allow clinicians to detect both cellular and antibody-mediated variants of rejection in otherwise clinically stable patients, suggesting a role for dd-cfDNA in screening for patients who should undergo biopsy.

CITATION INFORMATION: Dasari M., Hendele J., Sibulesky L., Leca N. The Role of Donor-derived Cell-free DNA Testing in Detecting Subclinical Kidney Allograft Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Dasari: None. **J. Hendele:** None. **L. Sibulesky:** None. **N. Leca:** None.

Abstract# 1030

Donor Derived Cell-free DNA Kinetics Early After Kidney Transplant in Patients with Delayed Graft Function Who Received Kidneys from Donation After Cardiac Death Donors

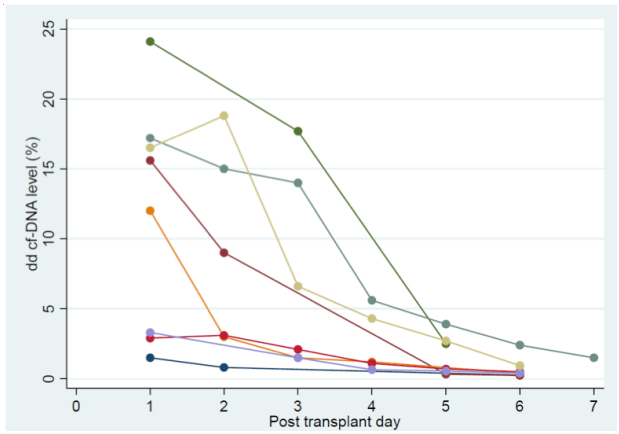
R. Gumber, M. Abuzeineh, C. Mejia, D. Brennan, F. Naqvi, *Division of Nephrology, Johns Hopkins University School of Medicine, Baltimore, MD*

Purpose: Delayed graft function (DGF) may reduce long-term kidney allograft survival due to ischemia-reperfusion injury and rejection. Donor Derived Cell-Free DNA (dd-cfDNA) is proposed to be a non-invasive marker for detection of allograft rejection and injury. Dd-cfDNA are higher in deceased than living donor recipients in the first week after Kidney Transplant (KTxp) and decrease to less than 1.0% in the absence of DGF. This exploratory study describes the kinetics of dd-cfDNA in the immediate post-transplant period in patients with DGF, which has not been studied previously, and determines its' correlation with allograft function.

Methods: Eight deceased-donor KTxp recipients at high risk for DGF (score of 30% or more on Irish Nomogram: *Irish W* et al. AJT,10:2279-2286) were enrolled after signing an informed consent. Blood samples were collected daily for 7 days post-KTxp for dd-cfDNA (AlloSure, CareDx).

Results: Table 1 shows baseline recipient and donor characteristics. All patients had DGF with subsequent recovery of allograft function. Median duration of DGF was 9.5 days (IQR 6.5-21.8). Median nadir serum creatinine (sCr) was 1.4 mg/dL (IQR 0.98-1.8) at last follow up of 1-7 (median 2.5) months post KTxp. The dd-cfDNA kinetics for each patient is shown in Figure 1. Median dd-cfDNA level at day 1 was 14% (IQR 3-17%) and at day 7 was 0.45% (IQR 0.3-1.36%). Duration of DGF showed weak correlation with daily average decline in dd-cfDNA (R^2=0.37), but no correlation with dd-cfDNA level at day 7 (R^2=0.0005). There was no correlation of nadir sCr with daily average decline in dd-cfDNA (R^2=0.03) or dd-cfDNA level at day 7 (R^2=0.001).

Table 1		
	Recipient characteristics	**Donor characteristics**
N	8	7
Median age	59.5 years (IQR 44-62.8)	51 years (IQR 28-58.5)
Race	4 Black, 2 Asian, 2 White	1 Black, 7 White
Sex	3 Female, 5 Male	3 Female, 5 Male
Median time on dialysis	48.5 months (IQR 29.8-71.5)	
DCD		n=7
Median KDPI		67.5% (IQR 40.5-89)



Conclusions: In patients with DGF who received kidneys from DCD donors, dd-cfDNA levels are elevated immediately after KTxp, but decline within the first week to <1.5%. Our data suggests that in these patients, elevated dd-cfDNA of >1.5% (3x the median) and not decreasing 7 days after KTxp warrants further investigation for the cause of persistent elevation which may include rejection, obstruction, recurrent disease etc.

CITATION INFORMATION: Gumber R., Abuzeineh M., Mejia C., Brennan D., Naqvi F. Donor Derived Cell-free DNA Kinetics Early After Kidney Transplant in Patients with Delayed Graft Function Who Received Kidneys from Donation After Cardiac Death Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Gumber: None. **M. Abuzeineh:** None. **C. Mejia:** None. **D. Brennan:** Consulting Fee; Name of Commercial Interest; Allovir, Amplyx, CareDx, Medeor, Natera, Sanofi, Veloxis. Grant/Research Support; Name of Commercial Interest; CareDx, Allovir, Amplyx, Natera. Honoraria; Name of Commercial Interest; CareDx, Veloxis. Other; Name of Commercial Interest; Editorial board Transplantation, Editorial board UpTo Date. **F. Naqvi:** Grant/Research Support; Name of Commercial Interest; CareDx grant, investigator initiated trial.

Abstract# 1031

Utility of Donor-Derived Cell Free DNA for Detecting ABMR in Patients With AT1R Antibodies

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Purpose: The presence of angiotensin II type 1 receptor (AT1R) antibodies is associated with non-HLA active antibody mediated rejection (ABMR). The frequent co-existence of negative donor-specific antibodies (DSAs) and histological features of ABMR with positive AT1R antibodies underlies the need for non-invasive markers of rejection. We investigated the utility of donor derived cell free DNA (dd-cfDNA) in patients with positive AT1R antibodies and ABMR.

Methods: We performed a multicenter retrospective analysis of patients with positive AT1R antibodies who had concomitant dd-cfDNA measurements (AlloSure, CareDx) for surveillance or worsening of allograft function concerning for rejection. These patients also underwent allograft biopsies demonstrating evidence of ABMR with negative DSAs. A positive AT1R test was defined as >10 IU/mL and dd-cfDNA >1%. Statistical analysis included Spearman correlation and Mann-Whitney tests

Results: We identified 16 kidney transplant recipients with histologic evidence of ABMR with negative DSA and positive AT1R antibodies- 6 (38%) were female, 7 (44%) were Caucasian (44%) and 7 (44%) were African American, with a mean

age 43 years at transplant. Thirteen patients (81%) underwent deceased donor kidney transplantation. Primary FSGS was the etiology of kidney disease in the majority of patients.

All patients had elevation of dd-cfDNA >1% prior to allograft biopsy with median levels 2.6% (0.66-7.9%). There was an inverse association between levels of AT1R and dd-cfDNA (r=-0.2, p=0.2),with stronger correlation for dd-cfDNA done for concern for rejection (r=- 0.5, p= 0.12) compared to those done for all purposes. Levels of dd-cfDNA were lower in patients with FSGS as primary disease (p=0.04), in comparison other etiologies of kidney disease.

Dd-cfDNA levels correlated well with Banff grades of rejection (g r=0.3 p=0.12; ptc r=0.4 p=0.05; g+ptc r=0.4 p=0.04, i+t r=0.06, p=0.4), with AT1R levels demonstrating no correlation (Fig 1)

Conclusions: This study suggests that AT1R titers do not reflect severity of ABMR, while dd-cfDNA correlates well with severity grades of the Banff criteria. This study demonstrates that dd-cfDNA could be used for monitoring and detecting rejection in patients with AT1R antibodies.It is imperative to conduct larger studies to validate these findings.

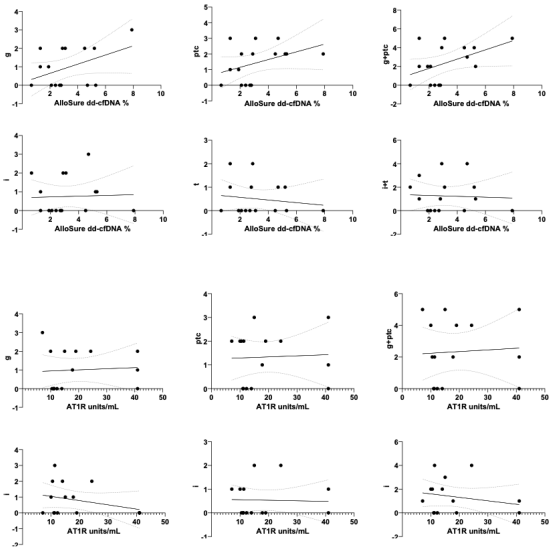

Figure 1. Spearman correlation curves for dd-cfDNA and AT1R levels for various Banff grades of rejection.

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Abstract# 1032

Graft Outcomes of Antibody Mediated Rejection without Donor Specific Anti - HLA Antibodies After Kidney Transplantation

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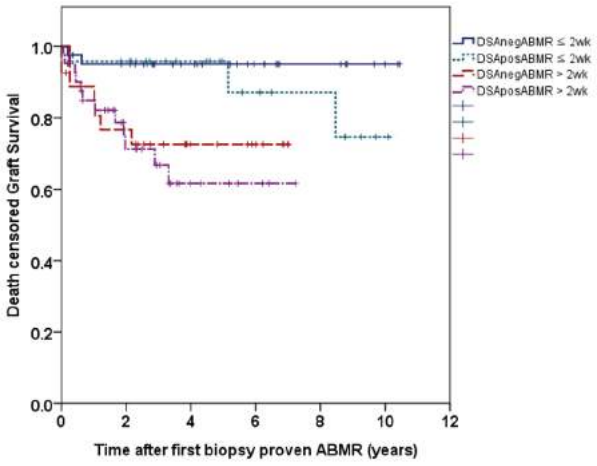
Purpose: The aim of this study was to investigate graft outcomes based on the presence of donor-specific anti-HLA antibodies (DSA) and the time of diagnosis in recipients with biopsy proven antibody-mediated rejection (ABMR) after kidney transplantation.

Methods: Data were collected retrospectively for 136 recipients with histological ABMR after kidney transplantation between January 2010 and December 2018 in Seoul National University Hospital. We compared the graft outcome between the group of ABMR without anti-HLA DSA (DSA_{neg}ABMR) and the ABMR with anti-HLA DSA (DSA_{pos}ABMR). In addition, subgroup analysis was performed for the diagnosis time (within 2 weeks or after 2 weeks) of ABMR after kidney transplantation.

Results: Of a total of 136 recipients with biopsy-proven ABMR, 67 (49.3%) were DSA_{pos}ABMR, and 69 (50.7%) were DSA_{neg}ABMR. The mean time to ABMR histologic diagnosis after kidney transplantation was 0.99 ± 1.93 years and 2.17 ± 2.35 years In the DSA_{neg}ABMR group and the DSA_{pos}ABMR group, respectively (p = 0.002). The mean fluorescence intensity (MFI) of DSA_{pos}ABMR was 8276 ± 8130. Although there was no statistically significant difference (p = 0.077), the DSA_{neg}ABMR group tended to have a superior graft survival rate compared to the DSA_{pos}ABMR group. The estimated glomerular filtration rate (eGFR) level was significantly higher in DSA_{neg}ABMR at the time of ABMR diagnosis (DSA_{neg}ABMR, 48.62 ± 30.60 mL/min/1.73m^2; DSA_{pos}ABMR, 38.78 ± 22.99 mL/min/1.73m^2; p = 0.036) and 1 year after diagnosis (DSA_{neg}ABMR, 53.85 ± 23.22 mL/min/1.73m^2; DSA_{pos}ABMR, 42.83 ± 21.29 mL/min/1.73m^2; p = 0.007). In the subgroup analysis of DSA_{neg}ABMR, ABMR diagnosed within 2 weeks after kidney transplantation had a graft survival rate superior to ABMR diagnosed after 2 weeks or more (p = 0.011). The subgroup analysis of DSA_{pos}ABMR also showed a similar pattern (p = 0.016).

Conclusions: Our data demonstrate that DSA_{neg}ABMR diagnosed within 2 weeks after kidney transplantation had a superior graft survival rate.



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Abstract# 1033

Combined Impact of Pre-sensitization and Delayed Graft Function on Allograft Rejection in Deceased Donor Kidney Transplantation: A Nationwide Cohort Study

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Purpose: The aim of this study is to investigate whether or not delayed graft function (DGF) and pre-transplant sensitization has a synergistic adverse effect on allograft outcome after deceased donor kidney transplantation (DDKT) using the Korean Organ Transplantation Registry (KOTRY) database, the nationwide prospective cohort.

Methods: The study included 1,370 cases between May 2014 and June 2019. The cases were divided into 4 subgroups according to pre-sensitization and the development of DGF post-transplant (non-pre-sensitized-DGF(-) (n=1100), non-pre-sensitized-DGF(+)(n=133), pre-sensitized-DGF(-) (n=116), and pre-sensitized-DGF(+) (n=21)). We compared the incidence of biopsy-proven allograft rejection (BPAR), change in allograft function, allograft or patient survival, and post-transplant complications across 4 subgroups.

Results: The incidence of overall BPAR and acute antibody-mediated rejection (ABMR) was significantly higher in the pre-sensitized-DGF(+) subgroup than in other 3 subgroups. In addition, multivariable analysis demonstrated that pre-sensitization combined with DGF is an independent risk factor for both overall BPAR and acute ABMR (hazard ratio 9.100, p < 0.001). Moreover, DGF and pre-sensitization showed significant interaction with each other (p for interaction < 0.001). Pre-sensitization combined with DGF did not show significant impact on allograft function, and allograft or patient survival.

Conclusions: In conclusion, pre-sensitization and DGF had a synergistic adverse impact on allograft rejection after DDKT.

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Abstract# 1034

The Clinical Significance of Preformed Anti-HLA-DQ Donor-specific Antibodies on Allograft Outcomes in Kidney Transplantation

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Purpose: De-novo anti-HLA-DQ donor-specific antibody (DSA) has been identified as a risk factor for late graft dysfunction and graft loss in kidney transplantation (KT). The impact of preformed anti-HLA-DQ DSA has been discussed, but it has not been established yet. This study aimed to investigate the clinical significance of preformed anti-HLA-DQ DSA on graft outcomes.

Methods: We evaluated 982 recipients who underwent kideny transplantation at Seoul St. Mary's Hospital from January 2010 to December 2018. According to results of DSA using luminex single antigen bead assay, recipients were classified as no DSA group, only DQ group and non-DQ group. Primary outcome was the incidence of biopsy-proven acute antibody-mediated rejection (AMR).

Results: Recipients were classified as no DSA (903 recipients, 91.9 %), only DQ (23 recipients, 2.3 %) and non-DQ (56 recipients, 5.7 %). The only DQ and non-DQ groups had significantly higher the incidence of acute AMR compared to no DSA group ($p < 0.05$, for both). There were no significant differences in the death-censored graft loss rate and mortaliy between groups. In multivariate logistic regression analysis, the presence of preformed anti-HLA DQ DSA or anti-non-HLA DQ, and 4 or more of HLA mismatch number were risk factors associated with acute AMR (anti-HLA DQ DSA: HR 3.23; CI 95 %, $p = 0.040$, anti-non-HLA DQ: HR 6.63; CI 95 %, $p < 0.001$, HLA mismatch number ≥ 4: HR 1.72; CI 95 %, $p = 0.029$, respectively). In Kaplan-Meier analysis for cumulative incidence of acute AMR, the incidences of acute AMR of only DQ and non-DQ groups were significantly higher than no DSA group ($p = 0.010$ and $p < 0.001$, respectively).

Conclusions: Preformed anti-HLA DQ DSA could affect the development of acute rejection, especially acute ABMR, as much as anti-HLA A, B and DR DSA. The identification of preformed anti-HLA DQ DSA can help improve allograft outcomes.

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DISCLOSURES: S. Lee: None. **C. Yang:** None. **B. Chung:** None.

Abstract# 1035

The Clinical Significance of Preformed C1q-binding Donor-specific HLA Antibodies in Kidney Transplantation

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Purpose: Complement activation is one dominant mechanism which cause allograft injury in kidney transplantation (KT). Anti-HLA donor-specific antibodies (DSA) that bind to HLA molecules on graft endothelium are cross-linked by the C1 complex, which initiates the classical complement pathway. De novo complement component 1q-binding donor-specific anti-HLA antibodies (C1q-binding DSAs) are already reported as risk factor associated with acute allograft rejection in KT. This study investigated the clinical significance of preformed C1q-binding DSA for predicting graft outcomes in KT.

Methods: From December 2016 to December 2018, 373 recipients underwent KT at Seoul St. Mary's Hospital. If the results of panel reactive antibodies (PRA) were positive in the pre-transplant examination, DSAs and C1q-binding DSAs were performed using Luminex Single Antigen Bead Assay (SAB) at the same time. Mean fluorescence intensity above 1000 was defined as positive result. Patients with preformed anti-HLA DSA were classified as C1q-positive group and C1q-negative group. Acute rejection was defined as biopsy-proven rejection based upon the Banff classification. Primary outcome was acute antibody-mediated rejection (AMR).

Results: Seventy five of 373 recipients (20.1 %) had preformed anti-HLA DSA, and of them, sixteen recipients (4.3 %) had preformed C1q-binding DSA. C1q-positive group had more positive PRA Class II and DSA class II ($p = 0.036$ and 0.050, respectively). And, DSA Class II MFI in C1q-positive group was significantly higher than in C1q-negative group (13796 (10746.5, 22883.5) vs. 3055.5 (1247.3, 7697.8); $p < 0.001$). In allograft outcomes according to the presence of C1q-binding DSA, the incidence of acute rejection in C1q-positive group is significantly higher than in C1q-negative group, especially acute AMR ($p = 0.037$ and 0.040, respectively). There was no significant difference in death-censored graft loss rate. In univariate logistic regression analysis, the presence of DSA Class II, 5000 or more of DSA MFI, the presence of C1q-binding DSA and C1q-binding DSA Class II were risk factors associated with acute ABR. However, in multivariate analysis, 5000 or more of DSA MFI was the only risk factor associated with acute AMR. In Kaplan-Meier analysis for the cumulative incidence of acute AMR, the incidence of acute AMR in C1q-binding DSA positive group was significantly higher than in C1q-binding DSA negative group ($p = 0.012$).

Conclusions: Preformed C1q-binding DSA may be a risk factor associated with acute AMR. Surveillance, such as protocol allograft biopsy, can help to detect acute AMR early in recipients with preformed C1q-binding DSA.

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Abstract# 1036

Comparing Bortezomib Protocol versus IVIG/Rituximab in the Treatment of Antibody Mediated Rejection (AMR) in Kidney Transplantation

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Purpose: To compare outcomes of historical treatment of AMR [PLEX + IVIG + Rituximab] with addition of bortezomib, along with characterizing safety parameters aimed at evaluating the risk versus benefit of additional immunosuppression.

Methods: A single-center retrospective chart review was performed on patients receiving treatment for AMR with either Standard of Care (SOC) [Plasmaphereis (PLEX) x 3-7 sessions + Intravenous Immunoglobulin (IVIG) 2g/kg + Rituximab (RTX) 375 mg/m^2 x 1] or SOC + Bortezomib 1.3 mg/m^2 x 4 doses with IVIG (0.1 g/kg) after PLEX (SOC+B) from 11/2012 to 11/2017. Adult renal transplant recipients (RTR) were included upon first biopsy proven acute AMR. Combined organ transplants, recurrent AMR, AMR > 3 years post-transplant, and those transplanted outside our institution were excluded. Primary outcomes included eGFR over 3, 6, 12, and 24 months, graft and patient survival at 6, 12, and 24 months post treatment. Secondary outcomes included incidence of bacteremia and/or pneumonia within 6 months of treatment, BK or CMV viremia within 6 months, and dose-limiting side effects including thrombocytopenia and leukopenia.

Results: Total of 84 patients were included, SOC (n=23) and SOC+B (n=61). AMR occurred a median of 1.19 years post-transplant. Majority of patients in both groups received maintenance with Tacrolimus/Mycophenolate (MPA) ± steroids. SOC+B group had a trend towards higher median eGFR at time of biopsy (21 vs 36 mL/min per 1.73 m^2; p=0.051), with eGFR at 6 months significantly higher (28 vs 42 mL/min per 1.73 m^2, p=.02). Graft survival at 24 months was higher in SOC+B (35% versus 54%; p=0.02) as well as patient survival at 12 months (87% vs 98%; p=0.03). No difference was observed in incidence of bacteremia, BK or CMV between groups.

	SOC n= 23	SOC+B n= 61	p-value
Tacrolimus/MPA ± steroids	21 (91%)	61 (100%)	
eGFR (mL/min per 1.73 m^2), mo			
3	30	49	0.06
6	28	42	0.02
12	22	48	0.07
24	31	35	0.70
Graft Survival, mo			
6	19 (90%)	51 (84%)	0.91
12	14 (66%)	44 (72%)	0.32
24	8 (35%)	38 (54%)	0.02
Patient Survival, mo			
6	21 (91%)	60 (98%)	0.12
12	20 (87%)	60 (98%)	0.03
24	20 (87%)	57 (97%)	0.09
CMV within 6 mo	2 (9.5%)	4 (7%)	0.70
BK within 6 mo	4 (19%)	3 (5%)	0.10
Bacteremia within 6 mo	1 (5%)	6 (9.8%)	
Pneumonia within 6 mo	0 (0%)	1 (2%)	
Thrombocytopenia	1 (5%)	9 (15%)	0.27
Leukopenia	6 (29%)	13 (21%)	0.46

Conclusions: We observed higher eGFR at 6 months, patient survival at 12 months and graft survival at 24 months with the addition of bortezomib to our SOC in AMR. No significant difference was seen in infectious or safety profile between groups. Further detailed multivariable analysis is needed to confirm these findings.

CITATION INFORMATION: Lowery V., Centeno A., Harrison T., Cabrera P., Mattiazzi A. Comparing Bortezomib Protocol versus IVIG/Rituximab in the Treatment of Antibody Mediated Rejection (AMR) in Kidney Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 1037

Membrane versus CentrifugeBased Therapeutic Plasma Exchange to Treat Antibody-Mediated Rejection in Kidney Transplantation

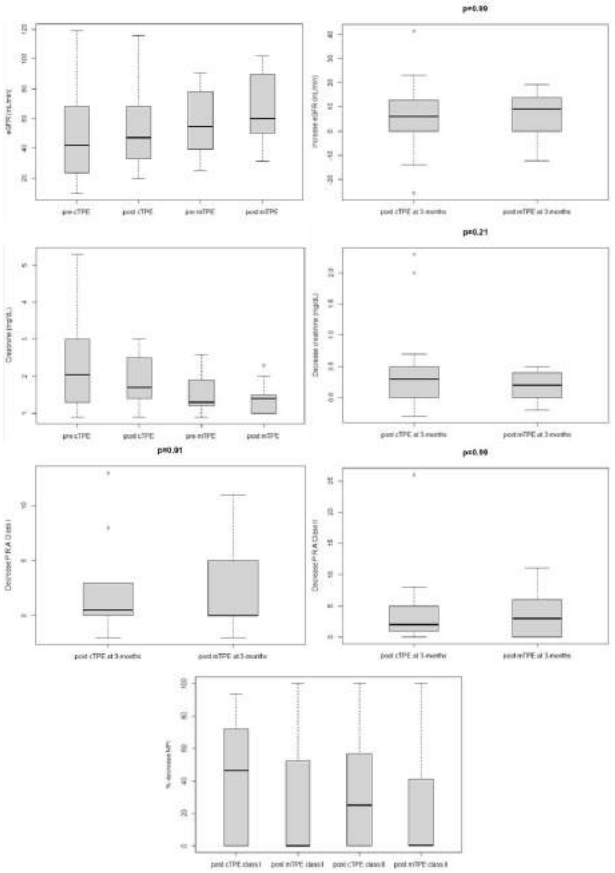
P. Maggiani[1], J. C. Ramirez Valdestino[1], J. H. Cano Cervantes[1], O. D. Díaz Avedaño[1], G. García Castillo[1], M. C. Oseguera Vizcaíno[2], M. A. Covarrubias[2], M. Matías Carmona[1], D. F. Ovando Morga[1], G. Ramirez Ramirez[1], V. D. Lebrija Córdoba[1], S. Hernandez Estrada[1], *[1]Transplantation, Centro Medico Nacional 20 de Noviembre, Mexico City, Mexico, [2]Transplantation, Hospital Civil Fray Antonio Alcalde, Guadalajara, Mexico*

Purpose: Therapeutic plasma exchange (TPE) is either performed using a highly permeable filter with standard multifunctional renal replacement equipment (mTPE) or a centrifugation device (cTPE). Although both techniques are well established in clinical practice, performance of these two modes of TPE was never compared in antibody-mediated rejection (AMR).

Methods: A cohort retrospective study with 27 patients with AMR were analyzed between 2016 to 2020. 14 patients were treated with cTPE and 13 with mTPE. Each patient received 5 sessions of TPE, plus IV immunoglobulin and rituximab. The primary endpoints were a comparison between cTPE and mTPE efficacy in different response markers of AMR. Statistics: Data are presented as median and SD. Comparisons between both techniques and between pre-and post-TPE laboratory marker levels were performed using a paired t test. Differences were considered to be statistically significant if p values were <0.05.

Results: Mean age was 33±9 years, 22 (81%) were living donor recipients. Sensitizing events occurred in 19 (70%). The mean AMR time appearance was 25 months (3 min- 108 max). C4d positivity in 11 (40%) patients. Both treatments were comparable at the end of 3-months post treatment in terms of decrease in creatinine levels (post cTPE 0.4 ±0.7 and post mTPE 0.2 ±0.2 mg/dL, p=0.21), increment in eGFR (post cTPE 6.4 ±16 and post mTPE 6.1 ±10 ml/min, p=0.99), panel-reactive antibody class I reduction percent (post cTPE 2 ±4 and post mTPE 2 ±4 %, p=0.91), and panel-reactive antibody class II (post cTPE 4 ±6 and post mTPE 4 ±4 %, p=0.99), DSA MFI class I reduction percent (post cTPE 41.1% and post mTPE 29.1%, p=0.55), and DSA MFI class II (post cTPE 34.8% and post mTPE 27.3%, p=0.51). (Figure 1).

Conclusions: The improvement between cTPE and mTPE in markers of AMR response were not different between groups.



CITATION INFORMATION: Maggiani P., Ramirez Valdestino J., Cano Cervantes J., Díaz Avedaño O., García Castillo G., Oseguera Vizcaíno M., Covarrubias M., Matías Carmona M., Ovando Morga D., Ramirez Ramirez G., Lebrija Córdoba V., Hernandez Estrada S. Membrane versus CentrifugeBased Therapeutic Plasma Exchange to Treat Antibody-Mediated Rejection in Kidney Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 1038

Donor Derived Cell Free Dna: Teasing Out the Optimal Threshold for Antibody Mediated Rejection

M. Mattu[1], H. Murad[1], M. Merzkani[1], A. Malone[1], R. Delos Santos[1], M. Wang[2], B. Wang[2], S. Chang[2], T. Alhamad[1], *[1]Department of Medicine, Washington University in St Louis, St Louis, MO, [2]Washington University in St Louis, St Louis, MO*

Purpose: Donor-derived cell-free DNA (dd-cfDNA) assay is a putative noninvasive marker for renal allograft rejection and other etiologies of injury such as BK nephropathy. The assay reports donor-derived cell-free DNA as a percentage of total cell-free DNA in the recipient's blood. With it's high negative predictive value (NPV), it serves as a useful rule-out test particularly for antibody mediated rejection (AMR). While most clinicians use 1% as the diagnostic threshold for predicting AMR, our study has tried to elucidate if a lower threshold would be more clinically useful.

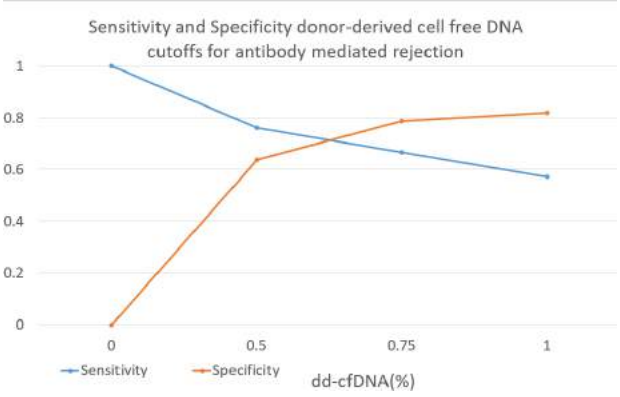
Methods: We prospectively collected the dd-cfDNA levels in 63 patients that had a "for cause" renal transplant biopsy planned. These dd-cfDNA values were obtained within 4 weeks of a biopsy. We tested the association of AMR with dd-cfDNA thresholds of 0.5%, 0.75% and 1% and compared them to biopsies with no rejection.

Results: A total of 63 cases were included, of which 21 had AMR, 9 had acute cellular rejection and 33 had no rejection. When comparing the patients with AMR with no rejection, we found that the NPV was 0.75, 0.78 and 0.80, respectively for 1%, 0.75% and 0.5% dd-cfDNA thresholds. The positive predictive value was 0.66, 0.67 and 0.57 respectively. Concurrently the sensitivity was 0.57, 0.66 and 0.76 respectively, while the specificity was 0.8, 0.78 and 0.63 respectively (fig 1).

Conclusions: Our results suggest that a lower dd-cfDNA threshold of 0.75% had a similar PPV and higher NPV than a threshold of 1%. This dd-cfDNA cut off could be a more reliable noninvasive rule-out test for AMR, which will be particularly useful in high-risk renal biopsy candidates. Larger prospective studies are needed to further validate lower dd-cfDNA cutoffs for rejection.

Figure 1

Statistic	Threshold		
	1%	0.75%	0.50%
Sensitivity	57.14%	66.67%	76.19%
Specificity	81.82%	78.79%	63.64%
Positive Predictive Value	66.67%	66.67%	57.14%
Negative Predictive Value	75.00%	78.79%	80.77%



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Abstract# 1039

De Novo Membranous Nephropathy Associated with Antibody-mediated Rejection in Renal Transplant Recipients

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Purpose: Membranous nephropathy (MN) is a rare autoimmune disease, with the potential to develop a persistent nephrotic syndrome and end-stage chronic renal disease in some patients, with a recurrence rate after transplant ranging from 30 to 40%. We report a case series of four kidney transplant recipients with biopsy-proven antibody-mediated rejection associated to histological findings compatible with membranous nephropathy. We reviewed the published literature on *de novo* MN associated with AMR and its treatment.

Methods: Single-center retrospective cohort of kidney transplant recipients with donor-specific anti-HLA antibodies and biopsy-proven antibody-mediated rejection, with histological findings compatible with membranous nephropathy. We performed a literature review through a PubMed search using the terms "membranous nephropathy", "antibody-mediated rejection", "DSA", "anti-HLA antibodies". We selected case reports, systematic reviews, clinical trials, multicenter studies, and meta-analysis with cases of membranous nephropathy associated to antibody-mediated rejection.

Results: The time post-transplant to this occurrence varied from 10 to 92 months. Two cases developed class II de novo anti-DQ DSA, and the others presented class I DSA. The patients with longer kidney transplantation presented more intense microvascular inflammation and histological findings of chronic injury, possibly due to subclinical immunological injury. In all these cases, we observed typical histological characteristics of membranous nephropathy, with subepithelial deposits with spikes. One patient did not receive AMR treatment due to infectious events. In other cases, it was administered intravenous immunoglobulin 2g/kg. Only one patient that developed class I DSA received plasmapheresis treatment. We observed one death due to infectious events and one graft failure in our sample. The other two patients remain with functioning grafts and using antiproteinuric drugs. DSA remains detectable in these cases, with routine solid-phase DSA test control every six months.

Conclusions: Different from primary MN, where anti-PLA2R and IgG4 are usually detected, *de novo* MN might represent a form of immune response triggered by exposure of hidden antigens, probably different from those antigens observed in idiopathic MN, and IgG1 staining seems to be dominant. In the reported case, we observed *de novo* anti-DQ antibodies and C4d deposits in the graft. Probably, these antigens elicited immune response, which can lead to damage of podocytes and release of cytoplasmic- or membrane-associated podocytes proteins, with production of antibodies and immunocomplex and its deposition in the subepithelial area.

CITATION INFORMATION: Sousa M., Fernandes L., de Freitas L., Zollner R., Mazzali M. De Novo Membranous Nephropathy Associated with Antibody-mediated Rejection in Renal Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.V. Sousa: None. **L.G. Fernandes:** None. **L.L. de Freitas:** None. **R.L. Zollner:** None. **M. Mazzali:** None.

Abstract# 1040

Treatment and Outcomes of Kidney Transplant Recipients with C4d Negative Antibody Mediated Rejection

M. Walsh, L. Lineberger, M. Brokhof, N. Kenyon, N. Alvey, *Rush University Medical Center, Chicago, IL*

Purpose: The purpose of this study is to describe and evaluate treatment practices and patient outcomes for kidney transplant recipients with presence of C4d negative antibody mediated rejection (AMR) on kidney biopsy.

Methods: This was a single center, retrospective cohort study of kidney transplant recipients. Patients were included in the study if they had a kidney biopsy performed between January 1, 2016 and November 30, 2019 that showed presence of C4d negative AMR. Patients who received treatment for C4d negative AMR had data collected at months 6 and 12 after the completion of treatment. Patients who did not receive treatment for C4d negative AMR had data collected at months 6 and 12 after their biopsy.

Results: Ninety patients were screened for inclusion in this study. Sixty patients who were identified to have C4d negative AMR on kidney biopsy during the specified time period were included. Overall, 46 patients received treatment for C4d negative AMR while 14 did not receive treatment. There were no significant differences in baseline characteristics observed between groups. Treatment for C4d negative AMR consisted of weekly infusions of intravenous immunoglobulin (IVIG) for 31 patients (67.4%), plasma exchange followed by IVIG for 14 patients (30.4%) and plasma exchange followed by IVIG with 1 dose of rituximab for 1 patient (2.2%). When comparing those who received treatment and those who did not, there was not a significant difference in graft survival at month 6 (95.7% vs. 85.7%, p=0.23) or 12 (89.1% vs. 71.4%, p=0.19). In patients with a functioning graft, median change in serum creatinine was not statistically different at month 12 when comparing those who received treatment to those who did not (0.47 mg/dL vs. 0.31 mg/dL, p=0.76).

Conclusions: This study describes treatment practices and patient outcomes of a cohort of kidney transplant recipients at our center who had C4d negative AMR on kidney biopsy. Majority of the patients in this study were treated with either weekly IVIG infusions or plasma exchange in combination with IVIG. Data from this cohort did not reveal a significant difference in change in serum creatinine or graft survival at 12 months for patients who received treatment for C4d negative AMR compared to those who did not.

CITATION INFORMATION: Walsh M., Lineberger L., Brokhof M., Kenyon N., Alvey N. Treatment and Outcomes of Kidney Transplant Recipients with C4d Negative Antibody Mediated Rejection *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Walsh: None. **L. Lineberger:** None. **M. Brokhof:** None. **N. Kenyon:** None. **N. Alvey:** None.

Abstract# 1041

Use of Donor-Derived Cell-Free DNA for Assessment of Allograft Rejection After Change in Maintenance Immunosuppression Regimens in the First Year Post Kidney Transplant

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Purpose: The purpose of this study was to investigate whether the use of donor-derived cell-free DNA (dd-cfDNA) is an effective screening tool for allograft rejection in kidney transplant recipients who underwent a change in their immunosuppression regimens within the first year post-transplant.

Methods: This was a single center, retrospective cohort study of kidney transplant recipients. Patients were included in the study if they received a kidney transplant between May 1, 2018 and July 31, 2020, had at least 2 dd-cfDNA results and had a change in their maintenance immunosuppression within 12 months post-transplant. Patients were identified as having a change in their maintenance immunosuppression regimen if it was different from our center's standard therapy including tacrolimus, mycophenolate and prednisone within the first 12 months post-transplant.

Results: Sixty-three patients were screened for inclusion in this study. Thirteen patients were identified to have a change in their maintenance immunosuppression within the 12 months following kidney transplantation, 4 of which did not have baseline dd-cfDNA measurements prior to the change in immunosuppression and therefore were excluded. Of the remaining 9 patients, 4 did not have an increase in dd-cfDNA values or a biopsy performed after changes in immunosuppression. Two patients had biopsies performed following changes in immunosuppression without an increase in baseline dd-cfDNA. Both biopsies were negative for acute cellular and antibody mediated rejection. The remaining 3 patients were noted to have an increase in dd-cfDNA measurements after a change in maintenance immunosuppression and proceeding biopsy proven acute rejection.

Conclusions: This study highlights a novel attempt to utilize dd-cfDNA to predict rejection in kidney transplant patients who undergo a change in maintenance immunosuppression regimens within the first 12 months following transplant. In order to fully assess the clinical application of dd-cfDNA in this setting, a larger cohort of patients should be evaluated.

CITATION INFORMATION: Walsh M., Peev V., Lineberger L., Brokhof M., Kenyon N., Alvey N. Use of Donor-Derived Cell-Free DNA for Assessment of Allograft Rejection After Change in Maintenance Immunosuppression Regimens in the First Year Post Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Walsh: None. **V. Peev:** None. **L. Lineberger:** None. **M. Brokhof:** None. **N. Kenyon:** None. **N. Alvey:** None.

Abstract# LB 76

Detection of Rejection in Kidney Transplant Patients Using an Algorithm That Combines Donor Fraction and Absolute Donor-derived Cell-free DNA

S. Bunnapradist[1], E. Ahmed[2], M. Maninder[2], Z. P. Demko[2], P. R. Billings[2], H. Tabriziani[2], P. Gauthier[3], *[1]David Geffen Sch of Med @ UCLA, Los Angeles, CA, [2]Natera, Inc., San Carlos, CA, [3]Natera, Inc., Los Angeles, CA*

Purpose: Donor-derived cell-free DNA (dd-cfDNA) in the plasma of renal allograft patients is a clinically validated biomarker for allograft injury and rejection. Several dd-cfDNA assays have shown that >1% dd-cfDNA is associated with a high risk for active rejection (AR). Additional studies have shown the advantage of measuring absolute dd-cfDNA concentration to avoid the variability that dd-cfDNA fraction encounters due to the host-derived cfDNA component. Here we present initial results from a new algorithm that combines both dd-cfDNA donor fraction and absolute dd-cfDNA concentration in the plasma and the results were compared with our previous algorithm.

Methods: For this proof-of-concept study, we collected 241 plasma samples from 226 transplant patients. Our cohorts included both related and unrelated donors. Maintaining the 1% dd-cfDNA fraction cut-off, a set of plasma samples (n=200) were used for training the algorithm to set the optimal threshold for absolute dd-cfDNA cut-off (6.9 AU). Samples that exceeded either the 1% dd-cfDNA fraction or the new absolute dd-cfDNA threshold were considered high risk for rejection. The performance of the updated algorithm was further evaluated on the test cohort (n=41), and the results were compared to the previous algorithm that used the 1% dd-cfDNA fraction threshold alone. Biopsy samples were defined as: a) AR, with TCMR and/or ABMR rejection, and b) clinically stable; five patients had TCMR (2xIA, 2xIB, 1xIIB), one had ABMR and two had mixed rejection.

Results: The updated algorithm demonstrated improved performance, with an observed sensitivity of 8/8 (100%), as compared to the previous algorithm with a 1% dd-cfDNA threshold, 6/8 (75%), without compromising the specificity (91%; 30/33).
Conclusions: Host-derived cfDNA can be influenced by a number of physiological and pathological factors, which can therefore affect the reported dd-cfDNA fraction and potentially decrease test accuracy. Thus, an algorithm that incorporates absolute dd-cfDNA concentration to dd-cfDNA fraction is clinically meaningful as it increases sensitivity in detecting rejection in renal allograft patients without affecting the specificity. Future work to further optimize and validate this two-dimensional dd-cfDNA assay is currently ongoing.
CITATION INFORMATION: Bunnapradist S., Ahmed E., Maninder M., Demko Z., Billings P., Tabriziani H., Gauthier P. Detection of Rejection in Kidney Transplant Patients Using an Algorithm That Combines Donor Fraction and Absolute Donor-derived Cell-free DNA *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Bunnapradist: Consulting Fee; Name of Commercial Interest; Natera, Inc., CareDx, Merck, Sanofi, Veloxis, Astellas, Mallinckrodt, BMS, Vitaeris, OneLegacy Foundation. Consulting Fee; Nature of Relationship; Speaker and Consultant. Grant/Research Support; Name of Commercial Interest; FDA, NIH, NIDDK, NIAID. Grant/Research Support; Nature of Relationship; Research support and grant. **E. Ahmed:** Ownership Interest; Name of Commercial Interest; Natera, Inc.. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera, Inc.. Salary; Nature of Relationship; Employee. **M. Maninder:** Ownership Interest; Name of Commercial Interest; Natera, Inc.. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera, Inc.. Salary; Nature of Relationship; Employee. **Z.P. Demko:** Ownership Interest; Name of Commercial Interest; Natera, Inc.. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera, Inc.. Salary; Nature of Relationship; Employee. **P.R. Billings:** Ownership Interest; Name of Commercial Interest; Natera, Inc.. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera, Inc.. Salary; Nature of Relationship; Employee. **H. Tabriziani:** Ownership Interest; Name of Commercial Interest; Natera, Inc.. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera, Inc.. Salary; Nature of Relationship; Employee. **P. Gauthier:** Ownership Interest; Name of Commercial Interest; Natera, Inc.. Ownership Interest; Nature of Relationship; Stockholder. Salary; Name of Commercial Interest; Natera, Inc.. Salary; Nature of Relationship; Employee.

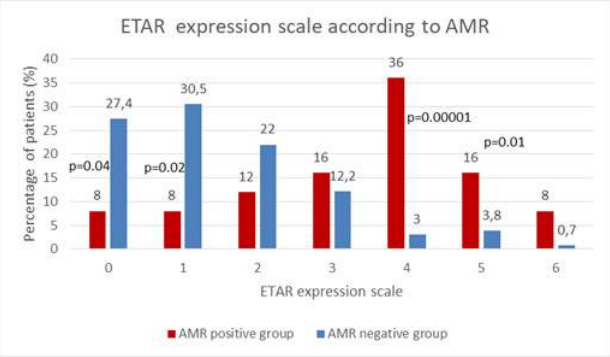
Kidney

Kidney Chronic Antibody Mediated Rejection

Abstract# 1042

The Summarized Assessment of Endothelin a Receptors Expression in Renal Transplant Compartments is Associated with Antibody Mediated Rejection

M. Banasik[1], K. Nowanska[1], P. Donizy[2], K. Koscielska-Kasprzak[3], S. Zmonarski[1], M. Kuriata-Kordek[1], A. Tukiendorf[4], A. Hałoń[2], D. Janczak[5], M. Krajewska[1], *[1]Department of Nephrology and Transplantation Medicine, Wroclaw Medical University, Wroclaw, Poland, [2]Department of Pathomorphology and Oncological Cytology, Wroclaw Medical University, Wroclaw, Poland, [3]Research laboratory, Wroclaw Medical University, Wroclaw Medical University, Wroclaw, Poland, [4]Department of Public Health, Wroclaw Medical University, Wroclaw, Poland, [5]Department of General, Vascular and Transplant Surgery, Wroclaw Medical University, Wroclaw, Poland*
Purpose: The presence of non-HLA anti-endothelin A receptor antibodies may be important in transplant injury but the expression of the endothelin A receptor (ETA receptor) in renal compartments has not been described yet. We assessed the presence and relevance of the ETA receptor in renal transplant biopsy for cause. The aim of our study was to evaluate the expression of ETA receptor in patients who had a transplant biopsy due to the deterioration of function.
Methods: Expression of ETA receptors was analyzed in renal transplant biopsies using immunohistochemical method. Microscopic assessment of ETA receptors expression (rabbit polyclonal antibody, dilution: 1:100, catalog number: G094 (P25101); Assay Biotechnology Company, USA) was performed on 4 µm-thick paraffin sections, which were fitted on silanized slides (DAKO, Denmark). ETA receptors expression was analyzed in four compartments of renal transplant biopsies: glomeruli, vessels, tubular epithelium and interstitium. The assessment was presented using three-step scale (0: lack of expression, 1: mild to moderate immunoreactivity, 2: high expression). The results of each compartment for single biopsy were summarized and assessed in context of antibody mediated rejection.
Results: Results: We analyzed 154 patients who had a renal allograft biopsy after renal transplantation. We noticed that patients with antibody mediated rejection had significantly higher summarized expression of ETA receptors 3,28 ± 1,56 in comparison to patients who had biopsy for other reason 1,47 ± 1,35. ($p<0.000001$).
Conclusions: The expression of endothelin A receptors in renal transplant compartments may be associated with antibody mediated rejection. The positive ETA receptor staining might be an important feature in the diagnosis of damage in progress of antibody mediated rejection. The identification of an injury with ETA receptor during rejection may help to the development of new treatment strategies to improve transplant survival.



CITATION INFORMATION: Banasik M., Nowanska K., Donizy P., Koscielska-Kasprzak K., Zmonarski S., Kuriata-Kordek M., Tukiendorf A., Hałoń A., Janczak D., Krajewska M. The Summarized Assessment of Endothelin a Receptors Expression in Renal Transplant Compartments is Associated with Antibody Mediated Rejection *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Banasik: None. **K. Nowanska:** None. **P. Donizy:** None. **K. Koscielska-Kasprzak:** None. **S. Zmonarski:** None. **M. Kuriata-Kordek:** None. **A. Tukiendorf:** None. **A. Hałoń:** None. **D. Janczak:** None. **M. Krajewska:** None.

Abstract# 1043

Higher Calcineurin Inhibitor Levels Associate with Graft Outcomes in Kidney Recipients with De Novo Donor-specific Antibodies of Either Hla Class I or II

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Purpose: The development of de novo anti-HLA donor specific antibodies (dnDSA) is associated with poorer outcomes in kidney transplant recipients. We and other previously reported that calcineurin inhibitor blood levels following dnDSA is an independent predictor of graft loss in small cohorts of patients. Whether or not this observation applies to both HLA classes of dnDSA (I and II) is undetermined.
Methods: We analyzed a cohort of 966 unsensitized patients transplanted between February 2001 and September 2017, for whom anti-HLA antibody screening was performed at 0, 1, 3, 6, 12 months and then annually post-transplant as part of their routine surveillance protocol. dnDSA were detected by flow PRA and identified by Luminex. The endpoint used was a composite of doubling of serum creatinine or graft loss. Analysis was conducted using univariable and multivariable proportional hazards models. Mean tacrolimus post transplant was used as a linear predictor and as a categorical predictor (tertiles).
Results: During the screening period, 58/966 (6.0 %) patients developed dnDSA; 18 (31%) to HLA class I only, 31 (53%) to HLA class II only, and 9 (16%) to both HLA classes. Among these, 25 patients experienced the composite outcome. The event occurred at a median of 15 months (25th-75th percentiles 5-29 months) post DSA detection. Cox modeling revealed that the risk of the composite endpoint decreased with higher mean tacrolimus levels following dnDSA detection (HR 0.83, 95% CI 0.71-0.97, p=0.02). The association remained significant following adjustment for age, sex, time post transplant and serum creatinine level (adjusted HR 0.64, 95% CI 0.50-0.83, $p<0.01$). The relationship was also consistent when restricted to patients with class I anti-HLA dnDSA (adjusted HR 0.57, $p<0.01$; n=27) or with class II dnDSA (adjusted HR 0.63, $p<0.01$; n=40). Analysis of tacrolimus levels by tertiles generated cut-offs at 5.6 and 6.8 ng/ml. Modelling using these tertiles suggested that, compared to mean levels of 6.8 ng/ml, levels <5.6 ng/ml was a strong predictor of the composite endpoint (HR 4.3; 95% CI 1.2-16.3, p=0.03; adjusted HR 19.4 95% CI 2.7-134.9, $p<0.01$). This effect was consistent for each anti-HLA class (class I adjusted HR 28.9, p=0.02; class II adjusted HR 35.7, $p<0.01$).
Conclusions: These data validate previous observation about a relationship between tacrolimus levels and graft outcome post dnDSA detection. It further suggests that tacrolimus levels below 5.6 ng/ml are associated with worse outcome in kidney recipients with dnDSA of both HLA class I and class II.
CITATION INFORMATION: Béland M., De Serres S. Higher Calcineurin Inhibitor Levels Associate with Graft Outcomes in Kidney Recipients with De Novo Donor-specific Antibodies of Either Hla Class I or II *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Béland: None. **S. De Serres:** None.

Abstract# 1044

Non-HLA Antibodies and Eplet Mismatches in Cases with Histological Picture of Antibody-Mediated Rejection with and without HLA Donor-Specific Antibodies

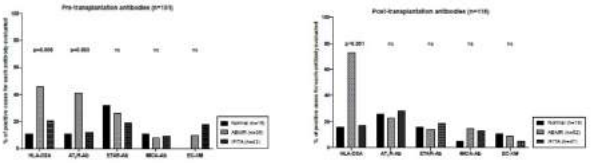
M. Crespo[1], L. Llinás[2], D. Redondo[2], C. Butler[3], J. Gimeno[4], M. Pérez-Sáez[2], A. Buxeda[2], C. Arias[2], M. Folgueiras[2], S. Sanz[2], N. Valenzuela[3], E. E. Reed[3], J. Pascual[2], *[1]Nephrology and Kidney Transplantation, Hospital del Mar, Barcelona, Spain, [2]Nephrology, Hospital del Mar, Barcelona, Spain, [3]UCLA Immunogenetics Center, UCLA, Los Angeles, CA, [4]Pathology, Hospital del Mar, Barcelona, Spain*

Purpose: Correlation between antibody-mediated rejection (ABMR) and HLA donor-specific antibodies (DSA) is strong but imperfect in kidney transplant (KT) recipients, raising the possibility of other detrimental antibodies contributing to ABMR. The role of non-HLA antibodies on outcomes is not well known.

Methods: We retrospectively assessed KT biopsies scored according to Banff'15 classification. Pre- and post-KT serum samples were checked for HLA and non-HLA antibodies (MICA-Ab, angiotensin II type 1 receptor (AT_1R)-Ab, endothelin-1 type A receptor (ETAR)-Ab and crossmatches with primary aortic endothelial cells (EC-XM)). We also analyzed HLA epitope mismatches between donors and recipients.

Results: One-hundred eighteen patients with normal (n=19), ABMR histology (n=52) or IFTA (n=47) in their biopsy were studied. Graft survival was worse in ABMR patients (p=0.003). Pre-KT HLA-DSA were more frequent in ABMR cases (p=0.006). At biopsy, 73% ABMR patients had HLA-DSA (p<0.001). Pre-KT AT_1R-Ab were more frequent in ABMR compared with IFTA and normal cases (p=0.003), without differences in other non-HLA antibodies. Both total class II and DRB1 epitope mismatches were associated with ABMR-DSA$^+$. Fourteen patients with histological ABMR (27%) had no detectable HLA-DSA post-KT and only 3 had non-HLA Ab. However, they showed similar biopsy changes and graft survival compared with ABMR-DSA$^+$. Pre- or post-KT non-HLA antibodies other than AT_1R-Ab were detected only in a small subset of ABMR ($graphic_). Multivariate analysis showed that both pre-KT HLA-DSA and AT_1R-Ab (DSA: OR: 3.39 [1.20-9.59], p=0.021; AT_1R-Ab: OR: 5.31 [1.75-16.10], p=0.003) were strong independent predictors of ABMR-DSA$^+$.

Conclusions: Despite highly prevalent HLA-DSA before and after transplantation in KT with histological ABMR, 27% of cases did not show circulating HLA-DSA. Pre-KT AT_1R-Ab associated with ABMR-DSA$^+$, but not MICA-Ab, ETAR-Ab or EC-XM$^+$. Epitope mismatch predicted both de novo appearance of DRB-DSA and ABMR-DSA$^+$. Detection of pre-KT HLA-DSA and/or AT_1R-Ab, together with HLA epitope mismatch assessment, are valuable tools for better DSA and ABMR prediction in KT patients.



Graphic. Pre and post-KT HLA and non-HLA antibodies in KT recipients with normal, ABMR or IFTA biopsies.

CITATION INFORMATION: Crespo M., Llinás L., Redondo D., Butler C., Gimeno J., Pérez-Sáez M., Buxeda A., Arias C., Folgueiras M., Sanz S., Valenzuela N., Reed E., Pascual J. Non-HLA Antibodies and Eplet Mismatches in Cases with Histological Picture of Antibody-Mediated Rejection with and without HLA Donor-Specific Antibodies *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Crespo: Grant/Research Support; Name of Commercial Interest; Reagents from One Lambda. **L. Llinás:** None. **D. Redondo:** None. **C. Butler:** None. **J. Gimeno:** None. **M. Pérez-Sáez:** None. **A. Buxeda:** None. **C. Arias:** None. **M. Folgueiras:** None. **S. Sanz:** None. **N. Valenzuela:** None. **E.E. Reed:** None. **J. Pascual:** None.

Abstract# 1045

Treatment of Refractory Chronic Active Antibody-Mediated Rejection: Improvement in Histopathology are Delayed Compared to the Reduction in Donor Specific Antibodies

K. R. Degner[1], S. Parajuli[1], F. Aziz[1], N. Garg[1], M. Mohamed[1], D. A. Mandelbrot[1], S. E. Panzer[1], L. Hidalgo[1], N. A. Wilson[1], S. R. Reese[1], K. Van Hyfte[1], W. Zhong[1], P. Nickerson[2], A. Djamali[1], *[1]University of Wisconsin, Madison, WI, [2]University of Manitoba, Winnipeg, MB, Canada*

Purpose: There are limited options for the treatment and management of refractory chronic active antibody-mediated rejection (cABMR) after kidney transplantation. Longitudinal histologic data in patients with refractory cABMR are also lacking. We hypothesized that clinical and histologic evidence of a treatment response may require longer than 3 months, our institutions standard follow up time for patients with rejection, in patients with refractory cABMR.

Methods: Kidney transplant recipients (n=8) with refractory cABMR, defined as persistent rejection despite standard treatment, underwent serial biopsies at diagnosis (index biopsy), 3, 6, and 12 months. Banff 2017 pathology, donor-specific antibodies (DSA), and serum creatinine (SCr), blood urea nitrogen (BUN), estimated glomerular filtration rate (eGFR) and urine protein creatinine ratio (UPC) were assessed at each biopsy. Treatment of rejection included pulse steroids, IVIG, and rituximab.

Results: Participants were primarily white men (88%) at an average age of 40±14.5. Index biopsy was performed an average of 4.4±3.7 years after transplant. Index biopsies were performed primarily for changes in DSA, either rising DSA or development of de novo DSA (63%). One patient lost their allograft during the 12 month follow up period due to ongoing rejection. There was a significant decline in total (6,093±5,424 vs. 2,731±4,172, p=0.04) and Class II DSA (5,845±5,366 vs. 2,731±4,172, p=0.04) between index biopsy and 3 months after treatment. In parallel, there was a decline in C4d staining at 3 months post treatment compared to index biopsy (1.6±1.5 vs. 0.4±1.1, p=0.03). Sum microvascular inflammation (*mvi*) decreased significantly at 12 months, but not sooner (3.7±1.5 vs. 2.3±1.1, p=0.05). Chronic allograft pathology (ct, ci, cv, cg scores) and kidney function in patients with a functioning allograft were stable over the course of the study period.

Conclusions: In patients with refractory cABMR, the decline in DSA precedes improvements in allograft inflammation, suggesting that benefits from therapy may not become evident upon repeat biopsy for at least one year. Larger studies of patients with refractory cABMR are needed to expand upon these observations.

CITATION INFORMATION: Degner K., Parajuli S., Aziz F., Garg N., Mohamed M., Mandelbrot D., Panzer S., Hidalgo L., Wilson N., Reese S., Van Hyfte K., Zhong W., Nickerson P., Djamali A. Treatment of Refractory Chronic Active Antibody-Mediated Rejection: Improvement in Histopathology are Delayed Compared to the Reduction in Donor Specific Antibodies *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.R. Degner: None. **S. Parajuli:** None. **F. Aziz:** None. **N. Garg:** None. **M. Mohamed:** None. **D.A. Mandelbrot:** None. **S.E. Panzer:** None. **L. Hidalgo:** None. **N.A. Wilson:** None. **S.R. Reese:** None. **K. Van Hyfte:** None. **W. Zhong:** None. **P. Nickerson:** None. **A. Djamali:** None.

Abstract# 1046

Psmp is Discriminative for Chronic Active Antibody-Mediated Rejection and Predicts Graft Risk After Kidney Transplantation

Y. Fu, P. Zhan, *Tianjin First Central Hospital, Tianjin, China*

Purpose: Chronic active antibody-mediated rejection (c-aABMR) is an intermediate process in the development of chronic antibody-mediated rejection (c-ABMR), a key problem in the long-term failure of kidney graft. PC3-secreted microprotein (PSMP), a new chemotactic cytokine recruiting macrophages, enhances fibrosis progression. However, the relationship between PSMP and chronic active antibody-mediated rejection (c-aABMR) in kidney transplantation need to be further explored. This study was to investigate the role PSMP playing on the progression of c-aABMR and c-ABMR.

Methods: In this study, a total of 29 kidney transplant recipients were included and classified into chronic active antibody-mediated rejection (c-aABMR) group (n=14), chronic antibody-mediated rejection (c-ABMR) group (n=5) and normal function group (n=10) according to their allograft biopsy pathology diagnosis. Patients demographics, kidney allograft biopsy sample fibrosis stained with HE and masson, immunohistochemistry staining of PSMP and CD68, PSMP gene-expression quantitated by real time RT-PCR and the serum and urine PSMP level were compared between three groups. The serum and urine PSMP expressions were detected by ELISA.

Results: Patients demographics results of three groups were no difference. Compared with normal groups, the allograft survival rate of c-aABMR group was significantly low (58.3% vs. 0%). Pathologic Banff scrores of three groups showed that c-aABMR group had more severe peritubular capillaritis (PTC) and tubulitis inflammation (t). Moreover,there was more fibrosis area and eGFR declined in both c-aABMR and c-ABMR groups, but no difference between the two groups. While CD68 expression was highest in c-aABMR among three groups, which was significantly positive associated with fibrosis grade in c-aABMR. Consistent with the CD68 expression, PSMP expression was significance higher in c-aABMR group than c-ABMR and normal groups. A significant correlation was found between the expression between CD68 and PSMP in c-aABMR, PSMP high expressed grafts had significantly higher t, i, c4d score and more allograft function loss compared to PSMP low expressed grafts. In addition, we found that urinary PSMP may be a candidate molecule marker for c-aABMR. Indeed, urinary PSMP concentration was significantly higher in kidney grafts pathologically diagnosed with c-aABMR than c-ABMR and normal counterparts, while no clear trend in serum. Indeed, urinary PSMP concentration was significantly higher in kidney grafts pathologically diagnosed with c-aABMR than c-ABMR and normal counterparts, while no clear trend in serum.

Conclusions: PSMP level was associated with macrophages infiltrating and fibrosis in c-aABMR which could be a promising biomarker to distinguish and predict risks of c-aABMR allograft lost.

CITATION INFORMATION: Fu Y., Zhan P. Psmp is Discriminative for Chronic Active Antibody-Mediated Rejection and Predicts Graft Risk After Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Fu: None. P. Zhan: None.

Abstract# 1047

Clazakizumab for the Treatment of Chronic Active Antibody-Mediated Rejection in Kidney Transplant Recipients: Phase 3 IMAGINE Study Design

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Purpose: Chronic active antibody-mediated rejection (CAMR) is a major cause of allograft loss with no approved drugs for its treatment. Currently, off-label regimens recommended by experts based on small clinical trials are used, reflecting the high unmet medical need for effective therapies based on well-controlled trials. Clazakizumab (CLAZA) is a high-affinity, humanized monoclonal antibody that binds IL-6 and blocks inflammation and antibody production. Small Phase 2 studies of CLAZA in kidney transplant recipients with CAMR suggest early modulation of donor-specific antibodies (DSA), stabilization of GFR, and a manageable safety profile. In CAMR, a progressive decline in kidney function is, by definition, on the pathway to graft loss. Here, we report the design of the Phase 3 IMAGINE study (NCT03744910) to evaluate the safety and efficacy of CLAZA for the treatment of CAMR.

Methods: IMAGINE is a multi-center, double-blind trial of 350 kidney transplant recipients with CAMR (Banff cg>0 with human leukocyte antigen DSA) randomized 1:1 to receive CLAZA (12.5 mg subcutaneous once every 4 weeks) or placebo (**Fig**). The event-driven trial design will follow pts for 5 years or until 221 occurrences of graft loss (primary endpoint); defined as return to dialysis, graft nephrectomy, retransplantation, eGFR <15 mL/min/1.73m^2, or death from any cause. A surrogate for graft loss, eGFR slope at 1 year, will be assessed based on prior modelling validation[1]. Secondary endpoints will include measures of PK/PD and PROs.

Results: Recruitment is ongoing across sites in N. America, Europe, Asia, and Australia.

Conclusions: Currently, no treatment has proven effective in CAMR. This pivotal Phase 3 trial includes prognostic biomarker enrichment and uniquely incorporates a surrogate endpoint for graft loss, eGFR slope at 1 year, which may accelerate the approval of a novel therapy for patients at risk of allograft loss.

References

1. Irish W. et al. *Transplantation*. 2020; Epub ahead of print. doi: 10.1097/TP.0000000000003274.

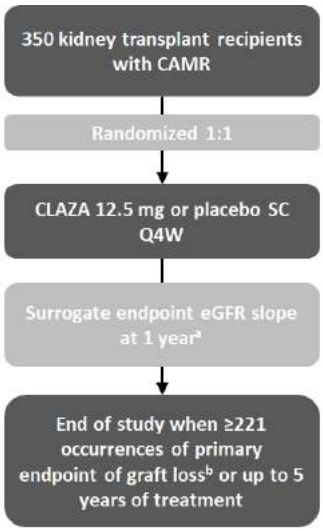

Figure. IMAGINE Study Design

[a]The trial is required to continue to the clinical end point of graft loss to obtain full regulatory approval; [b]Defined as return to dialysis, graft nephrectomy, retransplantation; or eGFR <15 mL/min/1.73m^2) or death from any cause.
CAMR, chronic active antibody-mediated rejection; eGFR, estimated glomerular filtration rate; IMAGINE, Interleukin-6 Blockade Modifying Antibody-mediated Graft Injury and Estimated Glomerular Filtration Rate Decline study; Q4W, once every 4 weeks; SC, subcutaneous.

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Abstract# 1048

Clazakizumab (clz, Anti-il-6 Antibody) Treatment Affects Il-6/il-6r Signaling by Increasing Soluble Gp130 (sgp130) in Hla-sensitized Kidney Transplant Patients (hs Ktx Pts) Treated for Chronic Antibody-mediated Rejection (cabmr)

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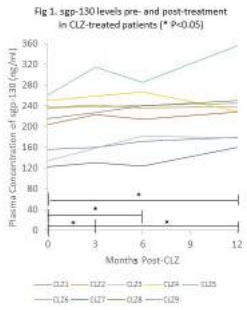
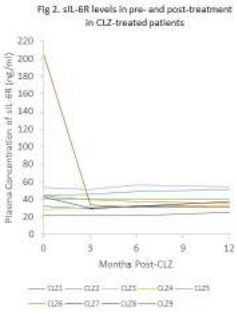
Purpose: IL-6 is a pro-inflammatory cytokine responsible for chronic vascular inflammation and a promising target for cABMR modulation. IL-6/sIL-6R complex initiates more pathogenic trans-signaling pathways via interactions with gp130 expressed on various tissues including allografts, and sgp130 is a selective inhibitor of this pathway. We previously reported the increase of plasma sgp130 level at 6 month post-treatment in HS KTx Pts treated with CLZ, and suggested its beneficial effect on cABMR modulation. Here, we report on sIL-6R and sgp130 levels further monitored until 12 months post-treatment in these CLZ-treated Pts and correlated with other clinical findings.

Methods: Plasma samples obtained pre- and post-CLZ (25mg SQ, monthly) (up to 12 months) from 9 HS KTx- Pts with biopsy proven cABMR were submitted for sgp130 and sIL-6R Luminex assays. IL-6, C-reactive protein (CRP) and DSA levels were also measured.

Results: IL-6 levels significantly increased post- vs. pre-CLZ (1113±300 vs. 17±19pg/ml, p=0.005). Near significant reduction of CRP post-CLZ (1.7±1.5 vs. 0.4±0.1μg/ml, p=0.05) in all Pts indicates that high levels of IL-6 detected post-CLZ were mostly CLZ-bound IL-6, and the IL-6/gp130 signaling was efficiently blocked by CLZ. Sgp130 levels gradually increased post-CLZ (Fig. 1), and reached the levels at 12 months post-CLZ, significantly higher than pre-CLZ levels (230±55 vs. 203±49ng/ml, p=0.03). In contrast, sIL-6R levels did not change post-CLZ (Fig. 2). Reduction of DSA and stable eGFR at 24 months post-CLZ were observed although no significant improvement of Banff score for cABMR was observed yet at 6M post-CLZ.

Conclusions: CLZ affected IL-6/IL-6R/sgp130 biology that may result in a risk for progression of cABMR. Significant increases of sgp130 post-CLZ may reduce trans-signaling, potentially reducing pathogenicity to allografts, which may contribute in part to stabilized eGFR in this patient population. A larger randomized control study is required for confirming this possibility.





CITATION INFORMATION: Shin B., Ge S., Jimenez A., Ammerman N., Vo A., Zhang R., Jordan S., Toyoda M. Clazakizumab (clz, Anti-il-6 Antibody) Treatment Affects Il-6/il-6r Signaling by Increasing Soluble Gp130 (sgp130) in Hla-sensitized Kidney Transplant Patients (hs Ktx Pts) Treated for Chronic Antibody-mediated Rejection (cabmr) *AJT, Volume 21 Supplement 3*

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Kidney

Kidney Complications: Non-Immune Mediated Late Graft Failure

Abstract# 1049

HLA Allele Association with Recurrent Iga Nephropathy After Kidney Transplantation

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Purpose: IgA nephropathy is one of the most common glomerulonephritis after kidney transplantation. The association of IgA nephropathy recurrence with recipient HLA typing is not well understood.

Methods: In this single-center study we included kidney transplant recipients with IgA Nephropathy native kidney disease from the period of 8/19/1994 to 3/1/2020. Diagnosis of IgA nephropathy was achieved by biopsy done in our center. All biopsies were 'for cause'. Recipient class I and II HLA alleles for were analyzed by using logistic regression and risk for recurrence.

Results: There were a total 238 adults with a diagnosis of IgA nephropathy in native kidneys. The mean age was 44.7 ± 13.2 years old, they were more likely to be male 169 (71%). The most common induction was T-cell depleting agent 216 (90.8%) and there were 128 (53.8%) deceased donors. In this cohort a total of 13 (5.46%) patients had biopsy proven recurrent IgA nephropathy. The recipient HLA alleles associated with increased recurrence were in HLA-CW09 (OR=9.34,p=0.01), HLA-DP105(OR=18.67,p=0.043),HLA-DP108 (OR=40.72,p=0.03); HLA-DR52*5(OR=18.7, p=0.043); HLA-DR53*3(OR=13.45,p=0.02). There was a decrease risk in HLA-B08 (OR=0.28, p=0.046), HLA-DP99 (OR=0.28, p=0.008), HLA-DRW53(OR=0.26,p=0.046). Recipient alleles HLA-A, HLA-BW, HLA-DR, HLA-DRW51 were not associated with IgA recurrence.

Conclusions: IgA nephropathy is one of the most common recurrent glomerulonephritis and in this cohort there is an association with recipient HLA alleles. Multicenter and larger studies with long follow up will required to study IgA nephropathy recurrence.

CITATION INFORMATION: Alzahabi O., Merzkani M., Murad H., Java A., Delos Santos R., Alhamad T., Malone A. HLA Allele Association with Recurrent Iga Nephropathy After Kidney Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 1050

Risk Factors and Outcome of Transplant Renal Artery Stenosis in Kidney Transplant Recipients - A Nested Case-control Study

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Purpose: Transplant renal artery stenosis (TRAS) is a treatable cause of renal allograft dysfunction. It presents commonly in the early post-transplant period with variable clinical presentation. The diagnosis is usually made on graft Doppler, yet angiography is required for confirmation. The risk factors associated with TRAS include Cytomegalovirus (CMV) infection, Delayed graft function (DGF), and prolonged cold ischemia time (CIT). However, these risk factors are less frequent in a living donor transplant. The present study aims to identify TRAS's risk factors and outcome in kidney transplant recipients in a dominant living donor program.

Methods: A nested case-control study with study period (2007-2020) December. TRAS group n-23 patients' clinical parameters are compared with age and sex-matched control groups of 92 patients in the same year as a kidney transplant. Parametric and nonparametric univariate and multivariate analysis was done.

Results: TRAS cases (n-23) presented from (15-173) with a mean of 104 days post-transplant with renal allograft dysfunction as the most common presenting features in 65% of cases. The initial diagnosis was made on graft Doppler. 20/23 patients were treated by angioplasty with stenting, and angioplasty alone was done in 3/23 patients with ostial TRAS. The duration of follow-up ranged from 6 months to 13 years. There were no interventional complications, and all recipients showed a significant reduction of Serum Creatinine (sCr) from mean sCr of 2.41 to 1.2 mg/dl. One patient died four years after intervention due to pneumonia. Hepatitis C infection, vascular reconstruction, End to side vascular anastomosis, DGF, and high immediate post-operative tacrolimus levels were independent risk factors for TRAS.

Conclusions: Early endovascular intervention amends the allograft dysfunction with an excellent long-term outcome.

Clinical Parameters			
Parameters Live / Deceased	TRAS (n-23) 19/4	Control (n-92) 80/12	Multivariate -significance
Age	38 (16-60)	38(16-60)	
Treated Hepatitis C	8	10	0.028
Arterial Reconstruction	12	11	0.005
End to side vs. end to end anastomosis	14 vs. 9	28 vs. 67	0.027
High tacrolimus level	15	27	0.005
DGF	3	1	0.010
Baseline sCr mg/dl	1.2(0.7-2)	1.2(0.6-2.4)	

CITATION INFORMATION: Choudhary D., Sharma A., Vijayvergiya R., Kasinadhuni G., Kenwar D., Singh S. Risk Factors and Outcome of Transplant Renal Artery Stenosis in Kidney Transplant Recipients - A Nested Case-control Study *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Choudhary: None. **A. Sharma:** None. **R. Vijayvergiya:** None. **G. Kasinadhuni:** None. **D. Kenwar:** None. **S. Singh:** None.

Abstract# 1051

De Novo Atypical Hemolytic Uremic Syndrome (aHUS) in Kidney Transplant Recipients from the Same Donor: Possible Role of Two Genetic Hits

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Purpose: Thrombotic microangiopathy (TMA) is an uncommon and potentially serious complication of kidney transplantation. Atypical hemolytic uremic syndrome (aHUS) is a type of TMA most often occurring as a result of dysregulation in the alternative complement pathway. While aHUS can manifest as recurrent disease following a kidney transplant, de novo post-transplant aHUS is uncommon and poorly understood.

Methods: We describe two cases of de novo aHUS occurring in both kidney transplant recipients from the same deceased donor. Recipient 1 was a 3-year-old male with ESRD due to bilateral dysplastic kidneys. Immediately following transplant, he had slow graft function complicated by severe TMA that resolved following administration of eculizumab. Genetic testing later revealed a variant in membrane-cofactor protein (MCP) thought to have a low likelihood of being related to the development of aHUS. Recipient 2 was a 33-year-old female with a history of ESRD of unknown etiology who also developed TMA in the immediate post-transplant period. A kidney biopsy was consistent with TMA and her condition resolved following administration of eculizumab (figure). A genetic panel for aHUS later revealed a homozygous deletion for complement factor H related proteins, associated with Factor H antibodies and aHUS. However, Factor H antibodies were not detected in the patient. Genetic testing was later obtained from donor tissue, revealing a variant in C3 of debatable significance.

Results: Neither donor nor receipts had evidence of TMA prior to transplantation. The possible explanation and trigger lies in the donor C3 mutation. We conjecture the donor variant C3 is a gain of function mutation which led to pre-donation setup of complement activation in the deceased donor with ischemia. Additionally, comple-

ment activation with surgery as a trigger in the immediate post-transplant period resulted in further allograft C3 expression with increased resistance to Factor H and MCP (due to recipients mutations). The overactive and uninhibited C3 resulted in downstream inflammation and endothelial damage leading to the aHUS phenotype in both recipients. We report for the first time, a two genetic hit scenario leading to de novo aHUS in two separate kidney transplant recipients from same deceased donor.
Conclusions: The case highlights the importance of obtaining genetic tests from deceased donor tissue to evaluate possible mechanisms in cases of de novo genetically mediated disease.

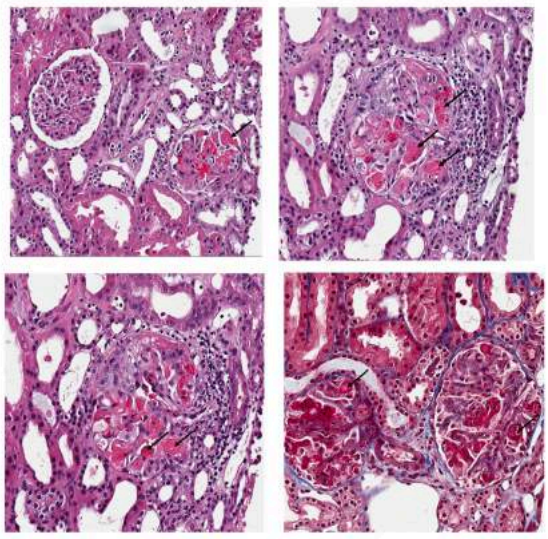

Figure: Biopsy of recipient 2. Upper right, upper left, and lower right demonstrate numerous glomerular capillary microthrombi (arrows), H&E stain. Lower left, trichrome stain.

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DISCLOSURES: C. Crane: None. **J. Sherbotie:** None. **S. Anand:** None.

Abstract# 1052

Kidney Transplantation Outcomes Over Last Six Decades- A Single-center Experience

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Purpose: During the last 6 decades, the science around kidney transplantation has evolved tremendously resulting in significant improvements in kidney allograft and patient survival. There has been path breaking advancements in the immunosuppressive regimens and the overall care of transplant patients in terms of pre-transplant cardiovascular workup, intraoperative anesthesia, intensive care, prevention, early detection and treatment of rejection and infectious complications. We studied patient and graft survival, and causes of graft loss for primary kidney transplant recipients over 6 decades.
Methods: Between Jan 1, 1960 - Dec 31, 2019, 3298 living donor (LD) and 2292 deceased donor (DD) primary kidney transplants were done (Table 1). The data was stratified by decade and donor type. Actuarial patient and death-censored graft survival determined at 1, 3, 5 and 10 years were compared. Common causes of death with function (DwF) and death-censored graft loss were compared.
Results: Overall patient survival and death-censored graft survival for both LD and DD kidney transplant recipients has improved over the last six decades (Table 1). For each decade, patient and death-censored graft survival for LD recipients are better than for DD recipients. DwF was responsible for ~50% graft loss at each interval (Table 2). For each decade, the 3 major causes of DwF were CVD, infection, and malignancy. "Chronic rejection" although decreasing, has been the most common cause of DD and LD graft loss every decade. Acute rejections and thrombosis have decreased; however, losses due to non-compliance with medications and transplant glomerulopathy has been increasing (Table 2).
Conclusions: The overall effect of improvement in patient care and immunosuppression over the last six decades have resulted in significantly reduced rates of patient and graft loss for both deceased and living donor recipients. DwF and immune-mediated processes remain the most common causes of graft loss. Our data suggests that improving long-term outcomes requires effort to reduce both DwF and death-censored graft loss.

Table 1: Deceased-donor and Living-donor Kidney Transplant Patient and Death-Censored Graft survivals from 1960s to 2010s

			% PATIENT SURVIVAL				% DEATH-CENSORED GRAFT SURVIVAL			
		n	1yr	3yr	5yr	10yr	1yr	3yr	5yr	10yr
LIVING DONOR KIDNEY TRANSPLANT RECIPIENTS	1960-69	63	74.6	69.8	65.1	57.1	81.3	79.4	71.2	64.7
	1970-79	522	89.3	79.4	74.1	58.5	85.1	83.2	81.4	77.2
	1980-89	572	95.5	92	86.5	72.3	94.9	91.4	89.5	76.8
	1990-99	764	97	93.4	89.6	74.6	96.5	93.7	89.5	79
	2000-09	885	98.1	93.9	90.7	77.8	98	93.3	90.2	79.1
	2010-19	542	99.3	96.6	94.1	84.6	98.5	95.9	93.2	88.2
			% PATIENT SURVIVAL				% DEATH-CENSORED GRAFT SURVIVAL			
		n	1yr	3yr	5yr	10yr	1yr	3yr	5yr	10yr
DECEASED DONOR KIDNEY TRANSPLANT RECIPIENTS	1960-69	45	46.9	34.2	22.1	22.2	45.4	41.6	41.6	41.6
	1970-79	356	79.5	67.1	55.1	41.6	72.4	69.7	66.8	59.6
	1980-89	534	91.8	82	75.3	54.7	87.2	79.4	74.1	63.4
	1990-99	504	93.7	89.6	77	57.1	91.3	85.8	79.4	64.8
	2000-09	378	96	91.3	86.5	62.5	97.1	93.2	87.5	74.4
	2010-19	475	97.7	94.8	91.5	77.4	97.9	94.9	90.4	76

Table 2- Causes of Graft Loss

	DECEASED DONOR KIDNEY RECIPIENTS					LIVING DONOR KIDNEY RECIPIENTS				
	1960-69	1970-79	1980-89	1990-99	2000-09	1960-69	1970-79	1980-89	1990-99	2000-09
% DEATH WITH FUNCTION	36	49	49	51	60	46	60	47	50	47
DEATH CENSORED GRAFT LOSS CAUSES (%AGE)										
"CHRONIC REJECTION"	20.7	41.8	52.3	45.8	44.7	64.7	51.8	48.0	56.8	59.4
ACUTE REJECTION	37.9	25.9	9.2	3.3	9.6	14.7	14.3	7.7	3.0	3.9
THROMBOSIS	10.3	3.2	3.3	2.3	0.9	0.0	0.0	1.8	0.3	1.3
INFECTION	6.9	1.8	2.1	0.9	1.8	0.0	1.2	2.3	1.3	4.3
NON ADHERANCE	0.0	1.3	4.6	5.3	3.5	2.9	1.0	9.0	4.7	7.8
RECURRENCE	0.0	4.4	4.6	6.1	6.1	0.0	7.7	14.5	8.0	7.4
TRANSPLANT GLOMERULOPATHY	0.0	0.0	0.0	4.2	10.5	0.0	0.0	0.0	6.3	16.9
OTHERS	24.1	19.6	23.9	28.0	22.8	17.7	22.0	16.7	17.6	19.0

CITATION INFORMATION: Dinesh A., Jackson S., Matas A. Kidney Transplantation Outcomes Over Last Six Decades- A Single-center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Dinesh: None. **S. Jackson:** None. **A. Matas:** Consulting Fee; Name of Commercial Interest; CSL Behring, CareDX, Veloxis, Jazz Pharma. Consulting Fee; Nature of Relationship; Advisory Board, Advisory Board, Consultant, Advisory Board.

Abstract# 1053

Belatacept Conversion in Proteinuric Renal Transplant Recipients: An Interventional Multi-Center Trial

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Purpose: Proteinuria develops in about 30% of kidney transplant recipients and is a strong predictor of graft loss. ACEis/ARBs can reduce proteinuria but are frequently associated with worsening hyperkalemia and reduction in estimated glomerular filtration rate (eGFR). Novel therapies are needed to reduce proteinuria and prevent graft loss in transplant recipients. While B7-1 is a well-known co-stimulatory signal that interacts with CD28 on T cells, B7-1 also plays an important role in glomerular proteinuria by promoting disease-associated podocyte migration. Abatacept has been shown to reduce proteinuria in patients with B7-1-positive glomerular disease by stabilizing β1-integrin activation in podocytes. The utility of belatacept in proteinuric kidney transplant (KT) recipients remains to be explored.
Methods: In this phase I multicenter clinical trial, we recruited EBV IgG^+ adult KT recipients at least 6 months post-transplant with an eGFR greater than 30ml/min/1.73m^2, proteinuria greater than 1g/day on CNI-based maintenance immunosuppression and no acute rejection on biopsy in the previous 6 months. Patients were converted from CNI to belatacept. The primary outcome was 25% reduction in proteinuria at 12 months.
Results: Total of 15 KT recipients were included. 87% were male, 20% were black and 73% had received a deceased donor transplant. Diabetic nephropathy was the most common cause of ESKD. At enrollment, mean (±SD) eGFR was 45.2±13 ml/min/1.73m^2, mean urine protein/creatinine ratio was 2.5±0.4 g/g and 67% were on ACEis or ARBs. At 12 months, mean (±SD) eGFR was 43.7±13 ml/min/1.73m^2 and mean proteinuria was 1.7±1.8 g/g. Primary outcome was reached in 53% of the patients. Patients without diabetes mellitus (DM) had a trend towards more reduction in proteinuria, compared to patients with DM (-1.91±2.49 vs 0.1±1.3, mean difference of -1.8 with 95% confidence interval: -0.5 to 4.1). There was no difference between systolic (134±9 vs 129±16 mmHg) and diastolic blood pressures (75±7 vs 73±9 mmHg) at 12 months compared to baseline. During the study period, 13% of patients were newly started on ACEi or ARBs. None of the patients had allograft rejection or developed new donor-specific antibodies. One patient had sudden cardiac death thought to be unrelated to the treatment. One patient had worsening of proteinuria which led to discontinuation of belatacept.

Conclusions: Belatacept conversion in proteinuric kidney transplant recipients was associated with stable allograft function and about half the patients achieved the primary outcome of 25% reduction in proteinuria. Patients without DM may experience greater reduction in proteinuria on belatacept.

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Abstract# 1054

Defining the Characteristics and Graft Outcomes of Kidney Transplant Recipients with Elevated Plasma Oxalate Level Not Due to Primary Hyperoxaluria

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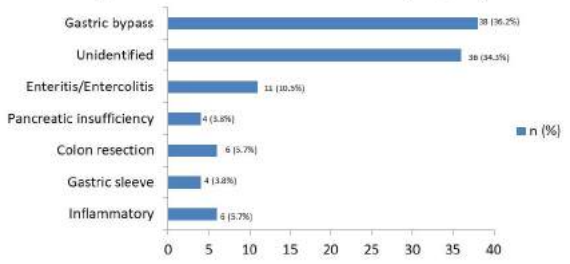
Purpose: Patients with elevated systemic oxalate burden due to enteric etiologies are at increased risk for calcium oxalate deposition causing ESRD. The objective of this study is to describe causes and graft function of kidney transplant (KTx) recipients with elevated plasma oxalate (Pox) not due to primary hyperoxaluria at our institution.

Methods: KTx recipients between 2013 to 2019 with an elevated Pox at the time of KTx evaluation were included. Chart review was performed to evaluate for enteric causes. Patients with primary hyperoxaluria (PH) were excluded

Results: 105 patients were identified. Mean age was 57.8 years, 42.9% were female, 76.2% white, and 91.4% first KTx. The most common enteric cause was Roux-en-Y gastric bypass (RYGB, 36.2%) as shown in Figure 1. 34.3% did not have an identified cause. Baseline characteristics are shown in Table 1. Patients with RYGB were significantly more likely to have diabetes (65.8%, p=0.033) but less likely to have a history of nephrolithiasis(36.8%, p=0.019) compared to patients with either unidentified (diabetes:36.1%, nephrolithiasis:52.8%) or alternative enteric cause (diabetes:45.2%, nephrolithiasis:71%) of oxalosis. Patients with RYGB had significantly higher median Pox pre-KTX than either unidentified or alternative enteric cause (15.2mcmol/L compared to 6.1mcmol/L and 11.8mcmol/L, respectively) (p= 0.032). There was no significant difference in long-term transplant outcomes noted for patients regardless of the etiology of elevated POx (with the primary transplant outcome endpoint of GFR at 1yr post-KTx). One-year GFR for patients with RGYB was 50.2±21.9mL/min/1.73m^2, compared to 53.2±18.0mL/min/1.73m^2 and 48.8±23.4mL/min/1.73m^2 for unknown and alternative enteric causes, respectively. Mean 1-year GFR for deceased donor KTx for our Transplant Center is 58.9 ±20.6ml/min/1.73m^2.

Conclusions: RYGB is the most common cause of enteric oxalosis in KTx recipients but in a third of cases, an enteric cause was never identified. There was no significant difference in GFR between the three groups; however, all groups had a lower GFR compared to the mean GFR of our transplant Center. Further studies are needed to assess the risk of enteric risk factors on long-term graft function.

Figure 1. Enteric risk factors for oxalate nephropathy



Baseline Characteristics	RYGB (n=38)	Other Enteric Causes (n=31)	Unknown (n=36)
Age (mean, SD)	59.7 (11.1)	57.6 (13.0)	55.9 (12.1)
Female (n, %)	23 (60.5%)	7 (22.6%)	15 (41.7%)
White race (n, %)	29 (76.3%)	23 (74.2%)	28 (77.8%)
Dialysis pre-KTx (n, %)	31 (86.8%)	25 (80.6%)	26 (88.9%)
History of clostridium difficile infection (n, %)	1 (2.6%)	11 (35.5%)	1 (2.8%)
Native kidney nephrolithiasis (n, %)	14 (36.8%)	22 (71.0%)	19 (52.8%)
Deceased donor transplant (n, %)	33 (89.2%)	29 (93.5%)	23 (63.9%)
Plasma oxalate >30mcmol/L (n,%)	3 (8.6%)	3 (14.3%)	1 (4.0%)

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Abstract# 1055

Transplant Center Volume in High-risk Recipient Association with Graft and Patient Survival

M. A. Merzkani, H. Murad, M. Mattu, S. Husami, M. Wang, V. Hu, S. Chang, T. Alhamad, *Transplant, Washington University, Saint Louis, MO*

Purpose: Evaluation of high-risk recipients in transplant centers involves an intensive multidisciplinary medical evaluation and requires extensive coordination amongst various teams to follow-up on these patients. Understandably, this requires well thought out protocols and structures for patient safety. In this study, we explored the association of center volume with patient and graft survival in high-risk recipients.

Methods: We reviewed OPTN data on kidney transplants on high risk recipients among 285 transplant centers between 2000 and 2016. High-risk recipients were defined as age ≥70 years old or BMI≥35 kg/m2. For each of these, transplant centers were categorized into tertiles of low, medium and high volume according to average annual transplant center volume for such transplant in high-risk recipients. The association of center volume with death censored graft loss (DCGL) and death with functioning graft (DWFG) were estimated using multivariable Cox regression including adjustment for recipient, donor, and transplant characteristics.

Results: In recipients age≥ 70 years old, that there was an increased risk for DWFG in centers with low volumes of these patients at 3 month (aHR=1.337;1.053-1.697), 1 year (aHR= 1.193;1.033-1.379), 5 year (aHR=1.116;1.035-1.203), 10 year (aHR=1.072;1.010-1.136) but not overall (aHR=1.050;0.993-1.111). In centers with medium volumes of ≥ 70 years old recipients, there was an increased risk for DWFG at 1 year (aHR=1.162;1.005-1.343); 5year (aHR=1.116;1.027-1.194); 10 year (aHR=1.072;1.025-1.151) and overall (aHR=1.079;1.021-1.141). There was no difference in of DCGL in low and medium center volume for adults ≥ 70 years old. In centers with low volume for BMI≥ 35 Kg/m^2 there was increase for DCGL at 3 month (aHR=1.556;1.299-1.863) , 1 year (aHR=1.271;1.106-1.1460), 5 years (aHR=1.138;1.045-1.238) and 10 years (aHR=1.109;1.033-1.191) and overall (aHR=1.115;1.042-1.193). In medium center volume for BMI≥ 35 Kg/m^2 there was an increased risk for DCGL at 3 months (aHR=1.323; 1.103-1.508), 10 year (aHR=1.074;1.001-1.152) and overall (aHR=1.074;1.005-1.148).

Conclusions: Kidney Transplantation of high risk recipients like those who are older and/ or with obesity requires a more thorough evaluation and structured follow up. In this study, we found there is room to improve in centers with lower and medium volume for older age recipients as well as those with BMI≥ 35 Kg/m^2 to improve patient survival. Programs may need to establish more safety- net protocols targeted on such patients.

Center Volume divide by number of Adults kidney recipients ≥ 70 years old					
Center Volume		Death-censored graft failure		Death with functioning graft	
		HR	95% CI	HR	95% CI
3M	High volume	Ref	Ref	Ref	Ref
	Low volume	1.091	0.849-1.403	1.337	1.053-1.697
	Med volume	1.015	0.787-1.309	1.262	0.992-1.607
1Y	High volume	Ref	Ref	Ref	Ref
	Low volume	1.02	0.848-1.226	1.193	1.033-1.379
	Med volume	0.922	0.765-1.111	1.162	1.005-1.343
5 Y	High volume	Ref	Ref	Ref	Ref
	Low volume	1.021	0.896-1.162	1.116	1.035-1.203
	Med volume	0.916	0.803-1.045	1.108	1.027-1.194
10 Y	High volume	Ref	Ref	Ref	Ref
	Low volume	1.013	0.902-1.100	1.072	1.010-1.136
	Med volume	0.914	0.813-1.028	1.086	1.025-1.151
Overall	High volume	Ref	Ref	Ref	Ref
	Low volume	1.024	0.913-1.150	1.05	0.993-1.111
	Med volume	0.937	0.834-1.052	1.079	1.021-1.141
Center Volume divide by number of recipients with Body Mass Index ≥ 35 Kg/m^2					
Center Volume		Death-censored graft failure		Death with functioning graft	
		HR	95% CI	HR	95% CI
3M	High volume	Ref	Ref	Ref	Ref
	Low volume	1.556	1.299-1.863	1.502	1.169-1.930
	Med volume	1.323	1.103-1.588	1.056	0.810-1.376
1Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	1.271	1.106-1.460	1.223	1.047-1.428
	Med volume	1.082	0.940-1.246	0.912	0.774-1.073
5 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	1.138	1.045-1.238	1.049	0.965-1.140
	Med volume	1.062	0.976-1.156	0.918	0.844-1.000
10 Y	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	1.109	1.033-1.191	1.028	0.965-1.096
	Med volume	1.074	1.001-1.152	0.965	0.905-1.029
Overall	High volume	Ref	Ref-Ref	Ref	Ref-Ref
	Low volume	1.115	1.042-1.193	1.026	0.967-1.088
	Med volume	1.074	1.005-1.148	0.972	0.917-1.031

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Abstract# 1056

Outcomes of Kidney Transplantation in Patients with Congenital Anomalies of the Kidney and Urinary Tract

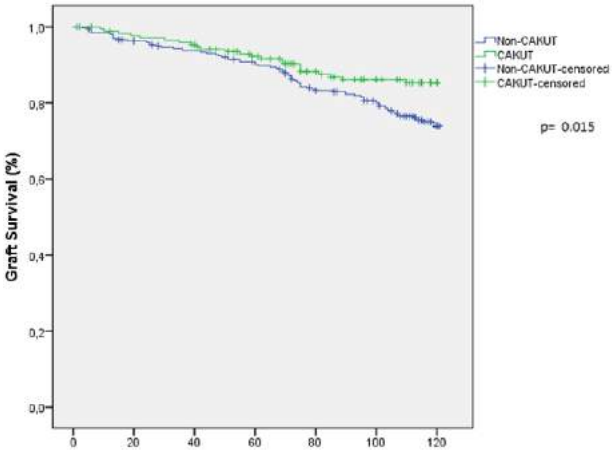
O. A. Oto[1], Y. Caliskan[2], H. Yazici[1], S. Mirioglu[3], A. Dirim[1], N. Garayeva[1], S. Safak[1], E. Demir[1], Y. Ozluk[4], A. Artan[1], A. Turkmen[1], K. Lentine[2], *[1]Nephrology, Istanbul University, Istanbul, Turkey, [2]Nephrology, Saint Louis University School of Medicine, Saint Louis, WA, [3]Nephrology, Bezmialem Vakif University School of Medicine, Istanbul, Turkey, [4]Pathology, Istanbul University, Istanbul, Turkey*

Purpose: We aimed to compare the long-term outcomes after kidney transplantation (KTx) in patients with congenital anomalies of the kidney and urinary tract (CAKUT) versus non-CAKUT causes of kidney failure.

Methods: For this observational study, 495 prevalent KTx recipients (59% male) were classified into two groups: Patients with CAKUT (n= 175) and non-CAKUT (n= 320). Baseline demographic, clinical and laboratory characteristics, as well as follow-up outcomes, were analyzed. The primary outcome was allograft loss defined as the return to dialysis or transplantation.

Results: Patients were followed for a median of 136 (86-176) months after KTx. The study groups were similar regarding recipient gender, donor age, donor type, donor gender, HLA matching, levels of pretransplant panel reactive antibody and type of maintenance immunosuppressive treatment regimens. Recipient median age was significantly lower [25.5 (20.0-30.0) vs 31.0 (25.0-39.0), p<0.001] in the CAKUT group compared to the non-CAKUT group. Groups were comparable in post-KTx events including rejection rates, types of rejection. The incidence of urinary tract infection was significantly higher in the CAKUT group than in the non-CAKUT group (20.6% vs 10.0%, p=0.003). Median eGFR on last follow up was significantly higher in the CAKUT group [62.0 (33.6-90.6) mL/min/1.73m^2] compared to non-CAKUT [46.0 (12.6-73.5) mL/min/1.73m^2] group (p<0.001). The rate of graft loss was significantly lower in the CAKUT group (16.0%) compared to non-CAKUT controls (32.0%) (p<0.001). Kaplan Meier survival analysis revealed a better 10-year unadjusted survival rate for the CAKUT group than the non-CAKUT group (p=0.015) (Fig. 1). In univariate Cox-regression analysis, it was found that the presence of CAKUT significantly reduced the risk of graft loss (HR: 0.651, CI 95% 0.460-0.92, p=0.015). Even though this predictive effect suggested a mild trend in multivariate analysis performed with potential confounding factors such as age and pretransplant dialysis duration, it did not reach statistical significance (HR: 0.714, CI 95% 0.479-1.065, p=0.099).

Conclusions: This study suggest the favorable post-KTx course of patients with CAKUT compared to patients with kidney diseases of other etiologies.



CITATION INFORMATION: Oto O., Caliskan Y., Yazici H., Mirioglu S., Dirim A., Garayeva N., Safak S., Demir E., Ozluk Y., Artan A., Turkmen A., Lentine K. Outcomes of Kidney Transplantation in Patients with Congenital Anomalies of the Kidney and Urinary Tract *AJT, Volume 21 Supplement 3*
DISCLOSURES: O.A. Oto: None. **Y. Caliskan:** None. **H. Yazici:** None. **S. Mirioglu:** None. **A. Dirim:** None. **N. Garayeva:** None. **S. Safak:** None. **E. Demir:** None. **Y. Ozluk:** None. **A. Artan:** None. **A. Turkmen:** None. **K. Lentine:** None.

Abstract# 1057

Hypercholesterolemia and Donor Age Impaired Capillary Vegf and Nitric Oxide (no) Expression and in Turn Decrease Both Microvascular Density and Tubule Villin Expression in Renal Allografts, Resulting in Poor Graft Survival

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Purpose: The role of aging and hypercholesterolemia (HC) on endothelial cells (ECs) are not well defined. Aged ECs might produce less NO and VEGF, resulting in reduced glomerular capillaries (GCs) and peritubular capillaries (PTCs). Chronic ischemia as a result of decreasing capillaries is considered a significant factor for renal injury. To understand whether the capillary loss was due to changes in angiogenic factors affected by age and cholesterol, we investigated the impact of age and cholesterol on the density of GCs and PTCs.

Methods: Among 150 patients, 63 (42%) had HC. Antibodies CD31 and HLA-DR stained to determine the mean number of GCs and PTCs. PCNA, VEGF, and NO expression of GCs and PTCs examined. EC proliferation index (PI) of GCs and PTCs assessed by PCNA. Villin expression and PI of tubules examined. Follow-up biopsies analyzed for the development of interstitial fibrosis (IF) and glomerulosclerosis (GS).

Results: The mean capillary numbers were 38,4±15,2 and 27,6±14,4 for GCs and PTCs, respectively. VEGF and NO expression of both GCs and PTCs and the PI of all capillaries decreased with increasing donor age and cholesterol (p<0.001). The PI index of ECs showed a negative correlation with the VEGF and NO expression of both GCs and PTCs (p<0.001). The number of PTCs correlated with PTCitis (r= -0,73, P<.001), PTC-VEGF expression (r= 0,73, P<0,001), PTC-NO expression (r= 0,86, P<0.001), tubular villin expression (r= -0,83, P<.001), proteinuria (r= -0,49, P<.001), hypertension (r= -0,48, P<.001), development of IF (r= -0,74, P<0.001), graft loss (r=-0,57, P<.001). The GC loss was also significantly associated with GC inflammation (r= -0,68, P<.001), GC-VEGF expression (r=0,76, P<.001), GC-NO expression (r=0,86, P<.001), tubular villin expression (r= -0,76, P<.001), proteinuria (r= -0,64, P<.001), hypertension (r= -0,43, P<.001), development of GS (r= -0,53, P<.001), graft loss (r= -0,46, P<.001).

Conclusions: A marked loss of capillary VEGF and NO expression associated with aging and HC resulted in a significant loss of GCs and PTCs. The loss of PTCs and GCs significantly correlated with the severity of the tubular injury, proteinuria, hypertension, development of IF and GS. We suggested that donor age and HC influenced graft survival negatively by impairing the microvasculature and tubular integrity in renal allografts.

CITATION INFORMATION: Ozdemir B., Akcay E., Ok Atilgan A., Haberal M. Hypercholesterolemia and Donor Age Impaired Capillary Vegf and Nitric Oxide (no) Expression and in Turn Decrease Both Microvascular Density and Tubule Villin Expression in Renal Allografts, Resulting in Poor Graft Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Ozdemir: None. **E. Akcay:** None. **A. Ok Atilgan:** None. **M. Haberal:** None.

Abstract# 1058

Impact of Donated Kidney Volume and Recipient Body Surface Area Incompatibility on the Allograft Outcomes with Pre-transplant Diabetes Mellitus

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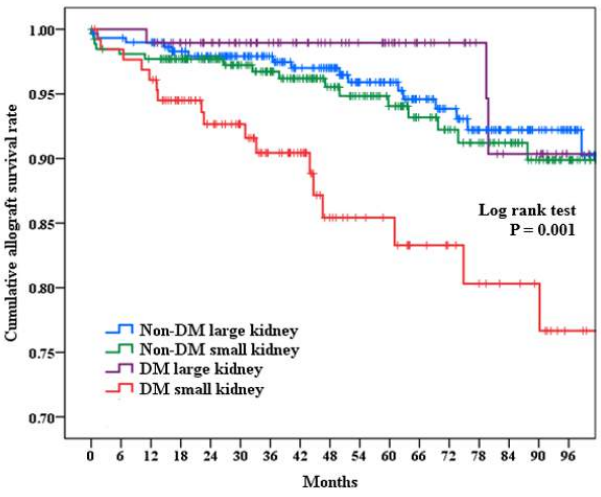
Purpose: The aim of this study was to analyze the impact on the adverse allograft outcome of transplanting relative small kidneys in patients with pre-transplant diabetes mellitus (DM).

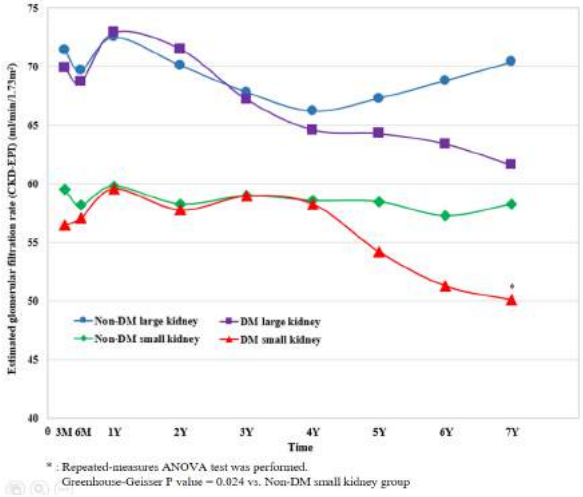
Methods: From January 2010 to December 2018, 1,290 KTs were performed in Seoul St Mary's Hospital. Of these, 788 cases of non-sensitized living donor kidney transplant recipient and donor pairs were enrolled. They were divided into 4 groups (non-DM large kidney, non-DM small kidney, DM large kidney, DM small kidney) according to the size incompatibility (donated kidney volume and recipient's body surface area ratio) and pre-transplant DM status. The primary outcome of this study was to analyze the effect of size incompatibility and pre-transplant DM status on the incidence of DCGL.

Results: There was no significant difference in the biopsy proven acute rejection rate among the 4 groups. DM small kidney group showed significantly higher DCGL rate (17/129 (13.2%), P = 0.008) than the other groups. The combined presence of pre-transplant DM and relative small kidney was an independent risk factor for DCGL (adjusted hazard ratio 2.921, P = 0.019), and these showed significant interaction with each other (P for interaction < 0.001). Moreover, renal function after 4 years of transplantation worsened faster in the DM small kidney group compared to the other groups, and allograft survival decreased after 1 year of transplantation.

Conclusions: Our results suggest that transplanting large kidneys rather than small kidneys is considered to have an advantage in terms of allograft outcome in pre-transplant DM patients, and this should be considered in donor selection.

Cox proportional hazard ratio model analysis for death censored graft loss					
	Univariable HR (95% CI)	P-value	Multivariable HR (95% CI)	P-value	P-value for interaction
Pretransplant DM (-)	Reference				
Pretransplant DM (+)	1.851 (1.057-3.243)	0.031	-	-	
Relative large kidney	Reference				
Relative small kidney	1.908 (1.085-3.357)	0.025	2.432 (1.160-5.099)	0.019	
Pretransplant DM (+) & Relative small kidney	3.176 (1.600-6.305)	0.001	2.921 (1.193-7.155)	0.019	<0.001





CITATION INFORMATION: Park Y., Lee H., Ko E., Yang C., Chung B. Impact of Donated Kidney Volume and Recipient Body Surface Area Incompatibility on the Allograft Outcomes with Pre-transplant Diabetes Mellitus *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Park: None. **H. Lee:** None. **E. Ko:** None. **C. Yang:** None. **B. Chung:** None.

Abstract# 1059

Cancer Among Kidney Transplant Recipients More Than 20 Years After Transplantation: PTLD Remains the Most Common Cancer Type Even in the Very Long-Term

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Purpose: Due to an improved patient and kidney allograft survival, cancer is increasingly recognized as the major cause of death after kidney transplantation. Cancer risk is increased by two- to four-fold in kidney transplant recipients (KTRs) and tends to be higher than in age-matched individuals from the general population. KTRs with long-term survival of more than 20 years, however, haven't been studied so far.

Methods: We followed 294 KTRs with kidney allograft survival of more than 20 years on a quarterly/yearly basis in our kidney transplant outpatient clinic. KTRs were analyzed for the development of cancer, cancer type, cancer-associated risk factors, and patient and kidney allograft outcomes.

Results: By 10, 20, and 30 years post-transplant KTRs showed an incidence of cancer of 10.4%, 14.6% and 39.9%, and an incidence of non-melanoma skin cancer (NMSC) of 10.3%, 33.5%, and 76.8%. By recipient age of 40, 60, and 80 years KTRs showed an incidence of cancer of 3.4%, 14.5%, and 55.2%, and an incidence of NMSC of 1.7%, 31.6%, and 85.2%. By 30 years post-transplant PTLD showed the highest incidence of 7.3% followed by renal cell carcinoma with 4.3%. Risk factors associated with the development of cancer included recipient age, the time on maintenance immunosuppression, and smoking. Risk factors associated with the development of NMSC included recipient age, the time on maintenance immunosuppression, and the use of thiazide diuretics. KTRs with cancer showed inferior patient survival with 25-year patient survival of 75.2% vs. 85.6%, and 30-year patient survival of 56.1% vs. 66.7%. No differences were observed concerning death-censored kidney allograft survival or the development of donor-specific antibodies (p>0.05).

Conclusions: With increasing patient and kidney allograft survival, cancer is becoming the major cause of mortality and morbidity, and PTLD remains the most common cancer type even in the very long-term. Emphasis should be placed on adherence to cancer surveillance protocols for early detection and prompt management.

CITATION INFORMATION: Schachtner T., Fuhrmann J., Mueller T. Cancer Among Kidney Transplant Recipients More Than 20 Years After Transplantation: PTLD Remains the Most Common Cancer Type Even in the Very Long-Term *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Schachtner: None. **J. Fuhrmann:** None. **T. Mueller:** None.

Abstract# 1060

Changes in Glomerular Filtration Rate (delta Egfr) within the First Year Predict Long-Term Outcomes of Renal Grafts

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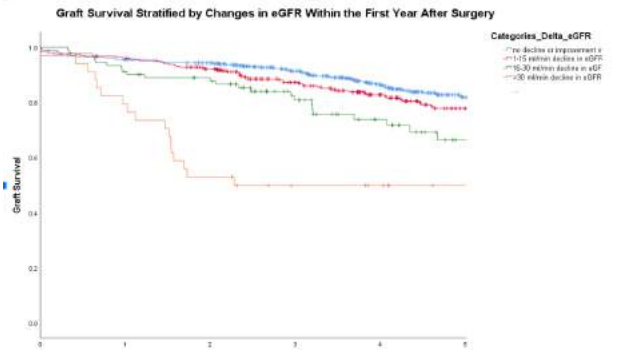
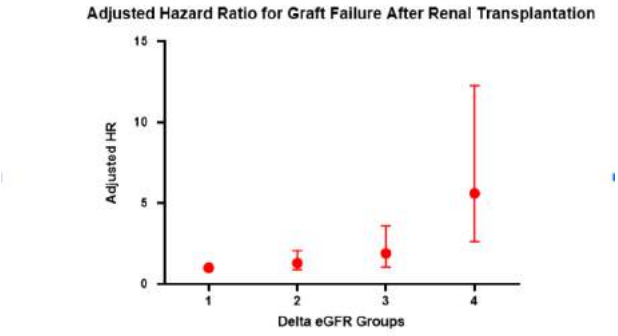
Purpose: The relationship between changes in eGFR (Delta eGFR) during the first year after renal transplantation (RT) and long-term graft survival are poorly understood. We hypothesized that Delta eGFR is an independent predictor of long-term graft outcomes.

Methods: A retrospective analysis of all live or deceased donor RT at a single center between 2013-2019 was performed irrespective of primary diagnosis of renal failure and history of previous RT. Pediatric and recipients of multivisceral transplants were excluded. Delta eGFR (ml/min) was defined as the difference between eGFR at 12 months and eGFR at 3 months after surgery. The cohort was stratified into four groups: group I (Delta eGFR <0), group II (Delta eGFR=1-15), group III (Delta eGFR 16-30), and group IV (>30 mL/min). We performed correlation and regression analyses to assess if Delta eGFR was an independent predictor of graft failure.
Results: A total of 998 patients were included. Median age was 58 years, 41% were females, 81% underwent first time RT. Hypertensive and diabetic nephropathy represented the most common indications for RT (15% and 18% respectively). 564 (56%) patients were in group I, 309 (31%), 91 (9.1%) and 34 (3.4%) in group II, III and IV respectively. At 60 months, the mean eGFR was 51 ml/min (+24), 45 (+22), 41 (+23) and 26 (+23) for Group I-IV respectively(P<0.001). 5-year graft survival was 82%, 77% 66% and 50% for Group I-IV respectively (p<0.001) (Figure 1). Cox regression analysis showed that after adjusting for recipient age, sex, ethnicity, PRA, time on dialysis and KDPI, Delta eGFR was an independent predictor for graft survival. Using Group I as reference, the adjusted HR were 1.3 (95% CI 0.89-2.06; P=0.15), 1.9 (95% CI 1.06-3.61; P=0.03), 5.6 (95%CI 2.62-12.25; P<0.001) respectively (Figure 2).
Conclusions: The degree of decline in eGFR observed during the first year after renal transplantation is an independent predictor of long-term graft function.





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DISCLOSURES: A.M. Thompson: None. **M. Zenati:** None. **S. Hariharan:** None. **M. Molinari:** None.

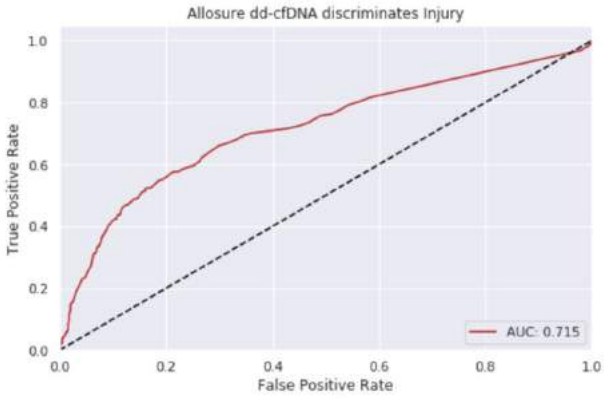
Kidney Complications: Immune Mediated Late Graft Failure

Abstract# 1061

Donor-Derived Cell-Free DNA as a Surrogate Marker for "Allograft Quiescence" After Kidney Transplantation

J. S. Bromberg[1], L. Bu[2], G. Gupta[3], I. Moinuddin[3], S. Anand[4], A. Pai[5], T. Alhamad[6], V. Bowers[7], S. Ghosh[8], W. Tian[8], E. Stites[9], *[1]University of Maryland School of Medicine, Baltimore, MD, [2]University of Minnesota, Minneapolis, MN, [3]Virginia Commonwealth University, Richmond, VA, [4]Intermountain Medical Center, Murray, UT, [5]University of Texas McGovern Medical School, Houston, TX, [6]Washington University in St. Louis, St. Louis, MO, [7]Tampa General Hospital, Tampa, FL, [8]CareDx, Brisbane, CA, [9]University of Colorado, Aurora, CO*
Purpose: Donor-derived cell-free DNA (dd-cfDNA; AlloSure®) and the association with active rejection (AR) was described by Bloom *et al*, however subsequent insights have suggested this analyte as a molecular marker of *injury* rather than specific for AR. Since prior validation demonstrated dd-cfDNA with high negative predictive value (NPV) for AR, our aim was to assess value of this biomarker for predicting *"quiescence"* across aggregated pathological diagnoses putatively associated with allograft injury.
Methods: 1092 patients from the Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219) were analyzed. All patients had dd-cfDNA (AlloSure®; CareDx) with standard post-transplant surveillance and all clinical events captured. "Injury" was defined as the aggregated diagnoses: acute tubular injury, BK nephropathy, de novo DSA, histological AR or "other pathology" as confirmed by paired biopsy ≤20 days after dd-cfDNA measurement.
Results: 341 unique patients were pooled in the "injury cohort", with a median dd-cfDNA = 0.52% (IQR:1.3%-0.25%); 693 patients with the absence of specified pathology or no prescribed biopsy were defined as the cohort with "allograft quiescence" with a median dd-cfDNA = 0.24% (IQR:0.39%-0.19%). The AUC for the allograft quiescence analysis was 0.715 [**FIGURE 1**]. A dd-cfDNA threshold of 0.5% was associated with sensitivity and specificity for quiescence of 70% and 63%, respectively.

FIGURE 1.



Conclusions: The high NPV for a low dd-cfDNA plasma level supports previous literature in clarifying an absence of significant concurrent pathology, thereby providing value in risk-stratifying the stable patient. This offers a potential *"peace of mind"* metric to both patient and clinician when developing precision medicine. Conversely, elevation of dd-cfDNA above the threshold of 0.5%, suggests development of significant allograft injury.
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Abstract# 1062

Association of Donor-Derived Cell-Free DNA with Severity of Interstitial Fibrosis and Cortical Atrophy Lesions Following Kidney Transplantation

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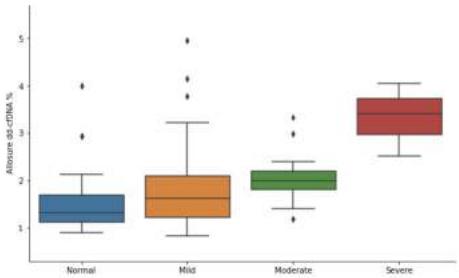
Purpose: The most common cause of kidney transplant (KT) failure is the poorly characterized histopathologic entity *"interstitial fibrosis and tubular atrophy"* (IFTA). There are no known unifying mechanisms, nor effective therapy, with diagnosis dependent on biopsy. Incidence of IFTA is ~50% at 1-yr post-KT, 70% at 2-yr, and nearly universal after 10-yr. The combination of IFTA with inflammation is associated with worsened prognosis than fibrosis alone. Considering the multifactorial pathogenesis of IFTA, the aggregation of mechanisms of injury using dd-cfDNA may allow surrogate quantification of inflammation.

Methods: 299 patients with paired donor-derived cell-free DNA (dd-cfDNA, AlloSure®; CareDx.) and biopsy (Bx) visits were examined from the Assessing dd-cfDNA monitoring insights of renal allograft with longitudinal surveillance (ADMIRAL study; clinicaltrials.gov: NCT04566055219). Bx performed ≤ 20 days after the dd-cfDNA level, combination of "protocol" and clinical" for cause". Pathology reports were centrally read and scored, and correlated with histology lesion and dd-cfDNA results. High dd-cfDNA was defined as >0.5% based on previous injury analysis based on ADMIRAL cohort. Interstitial fibrosis (ci) scores were grouped based on the Banff 2018 update. Ci(0)—Interstitial fibrosis in ≤5% of cortical area (normal), ci(1)—Interstitial fibrosis in 6-25% (mild), ci(2)—Interstitial fibrosis in 26-50% (moderate), ci(3)—Interstitial fibrosis in >50% of cortical area (severe).

Results: dd-cfDNA was significantly elevated when Bx normal patients were compared to those mild to severe (ci). Mild: p= 0.006, moderate: p= 0.01, severe: p= 0.001



	Normal	Mild	Moderate	Severe
Number of Biopsies (N)	118	100	43	5
Median AlloSure (%)	0.3	0.42	0.79	1.17

Conclusions: The Banff Classification does not provide precise definition for individual areas of interstitial fibrosis. These results demonstrate a positive correlation between severity of IFTA and allograft injury assessed using dd-cfDNA. Consideration of dd-cfDNA levels with interpretation of histology, may be a useful adjunct in the assessment of *interstitial fibrosis,* as well as metrics to measure effectiveness of potential therapies.

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Abstract# 1063

Recurrence and Outcome of Anti-GBM Glomerulonephritis After Kidney Transplantation: A Belgian Multicenter Study

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Purpose: Recurrence of anti-glomerular basement membrane (anti-GBM) glomerulonephritis (GN) in the kidney graft is a rare event, described in limited case reports and registry analysis. The aim of this study was to evaluate in a large cohort of patients with detailed data collection and long follow-up the risk of recurrence of anti-GBM disease and graft loss caused by recurrence, the risk factors associated with clinical recurrence and the long-term patient and graft survival.

Methods: Multicenter retrospective study. Inclusion criteria: patients with anti-GBM GN transplanted with a kidney between 1977 and 2015. Exclusion criteria: systemic vasculitis (except ANCA), lupus erythematosus and cryoglobulinemia. Clinical recurrence was defined as reappearance of signs of GN along with histological signs of proliferative GN and linear IgG staining on kidney biopsy, with or without anti-GBM antibodies.

Results: Fifty-three patients were included. Clinical recurrence in a first kidney transplant occurred in only one patient five years after transplantation -a prevalence rate of 1.9%- in the context of cessation of immunosuppressive drugs. The graft was lost due to recurrence. Histological recurrence with linear IgG staining on kidney biopsy in the absence of histologic signs of proliferative GN was observed in four patients, in the context of cellular rejection. Two patients lost their kidney graft from severe acute rejection; the others fully recovered. Patient survival was 100%, 94% and 89% at 5, 10 and 15 years, respectively. Overall, death-censored first graft survival rates were 88%, 83% and 79% at 5, 10 and 15 years, respectively.

Conclusions: Recurrence rate of anti-GBM glomerulonephritis after transplantation is very low, and associated with graft loss. The long-term patient and graft survival rates are excellent.

Table 2. Demographic characteristics of patients with anti-GBM mediated glomerulonephritis at first kidney transplantation (KT)

Age, y, median (P25-P75)	43 (27-59)
Anti-GBM antibodies (n=43)	0
Time between anti-GBM disappearance and KT, mo, median (P25-P75)	15 (8-31)
Donor deceased/living, n (%)	44 (83)/9 (17)
Immunosuppressive regimen	
Induction (n=46), n (%)	28 (61)
Maintenance, n (%)	
Calcineurin inhibitors	50 (96)
mTOR inhibitors	4 (8)
MMF	37 (71)
AZA	13 (25)
Corticosteroids	52 (100)

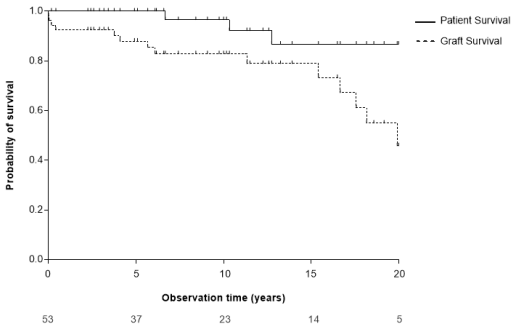
Y, years; n, number; P25-P75, 25th-75th percentile, GBM, glomerular basement membrane; mo, months.

Table 3. Post-transplant outcomes of patients transplanted for anti-GBM disease (except for recurrence)

Acute rejection, n (%)	22 (43)
Complications, n (%)	
Cardiac	13 (25)
Hypertension	39 (74)
Neoplasia	14 (27)
NODAT	9 (17)
Infection	37 (70)
Loss of first graft, n (%)	
Rejection	12 (23)
Recurrence	1 (1,9)
Renal vein thrombosis	1 (1,9)
Infection	1 (1,9)
NA	1 (1,9)
Death, n (%)	3 (5,7)
Kidney re-TP for 2nd/3rd time, n	7/1
Follow-up, mo, median (P25-P75)	122 (60-213)

n, number; NODAT, new onset diabetes after transplantation ; NA, not available ; TP, transplantation ; P25-P75, 25th - 75th percentile.

Figure 1. Kaplan-Meier curve. Patient survival and death-censored first graft survival after kidney transplantation for anti-GBM glomerulonephritis.



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Abstract# 1064

PLA2R Status and Antibody Mediated Rejection in Kidney Transplant with Membranous Nephropathy

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Purpose: Membranous nephropathy (MN) in transplanted kidney is categorized as de novo or recurrent disease. This immune complex glomerulopathy presents with varying levels of proteinuria, and antibodies against phospholipase A2 receptor (PLA2R) have been detected. The long-term outcomes of renal allografts with MN have not been well-defined. Previous studies suggest that post-transplant MN may be associated with alloimmune response. We examined the natural progression of all renal transplants at our center with biopsy-proven MN to identify risk factors for developing this disease and to explore a possible link with acute antibody mediated rejection (AMR).
Methods: We retrospectively analyzed renal transplant biopsies with MN done at our center from 2014 to 2020. Patients with systemic lupus erythematosus (SLE) were excluded from this study. Data including age, sex, race, type of transplant, etiology of ESRD, cPRA, induction agent, maintenance regimen, serum creatinine, eGFR, urine protein-to-creatinine ratio, DSA, and biopsy results were collected. If a patient had more than 1 biopsy, the patient was added to the PLA2R positive or AMR group if at least 1 biopsy suggested PLA2R positivity or acute AMR.
Results: 52 biopsies with post-transplant MN from 31 patients were included in this study. AMR was observed in 33% of the patients with de novo disease (n=15), 45% in recurrent disease (n=11), and 50% in patients with unknown cause of initial ESRD (n=4) (Table 1). PLA2R stains were positive in 40% of patients with de novo disease, 82% of recurrent group, and 60% of patients with unknown cause of ESRD. 44% of the patients with PLA2R positivity had concomitant acute AMR (n=18), while 31% of the PLA2R negative patients had AMR (n=13).
Conclusions: PLA2R positivity was statistically higher in recurrent disease than in de novo disease (p=0.018) suggesting more frequent secondary MN in the de novo group. Although not statistically significant, a trend for more frequent AMR was observed in the recurrent group (p=0.084). However, PLA2R status did not show a correlation with AMR. In addition, our results do not provide support for the hypothesized link between de novo MN and AMR.

Membranous Nephropathy, AMR, and PLA2R staining results					
	PLA2R+ and AMR	PLA2R- and AMR	PLA2R+ and No AMR	PLA2R- and No AMR	Total
De Novo	3	2	3	7	15
Recurrent	4	1	5	1	11
Unknown	1	1	2	1	5
Total	8	4	10	9	

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Abstract# 1065

Characterization of Chronic Renal Allograft Dysfunction at Single Cell Resolution

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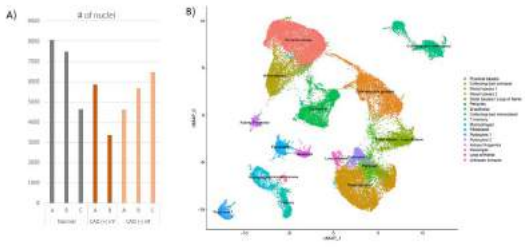
Purpose: Chronic allograft dysfunction (CAD) is one of the major complications after kidney transplantation. Hereby, we aim to assess the molecular and cellular mechanism of Chronic Allograft Dysfunction at a single cell resolution to identify potential interventions. Single-cell genomics has played unprecedented role for diagnosis and finding novel treatment methods.
Methods: We performed single nuclei sequencing from 8 kidney allograft biopsies (3 normal allografts (normal histology and normal creatinine at 24 months post-transplant), 2 Chronic Allograft Dysfunction (CAD) with inflammation, and 3 CAD without inflammation) using droplet based 10X Genomics Chromium platform. Data is analyzed on "Cell-Ranger" pipeline and "Seurat" package was used for cell clustering and cell identification. CAD classifications were done using Banff criteria.
Results: We obtained >40,000 cells in our analysis with an average of 1400 genes per cell (Fig 1a). We identified 17 different clusters in aggregated analysis. Our single-nuclei RNA-seq allow us to identify rare pericytes and kidney progenitor cells in addition to the main cell types of kidney such as tubular cells and endothelial cells (Fig 1 A-B). Interestingly, we identified significant number podocytes which cannot be detected by ordinary single-cell RNA sequencing. ARL17B and FKBP5 genes are found to be differentially expressed in several cell types including tubular cells, podocytes when CAD(- inflammation) compared to CAD(+ inflammation).
Conclusions: Our results identified pericytes and kidney progenitor cells (in addition to the main cell types of kidney such as tubular cells and endothelial cells) in patients with chronic allograft dysfunction



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Abstract# 1066

Risk Factors for Mortality in Kidney Transplant Patients Infected by Sars-cov-2 in South of Spain

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Purpose: Covid-19 pandemic has especially affected kidney transplant (KT) recipients, who are more vulnerable than the general population due to their immunosuppressive status and added comorbidities. The objetic of this study was to determine risk factors related to infection and mortality from Covid-19 in KT.

Methods: We included 53 KT who had PCR-confirmed COVID-19 infection between march 21st and november 24th, from a total of 2030 KT. Outcomes related to patient survival were analyzed.

Results: 39 (73%) patients were men, with a mean age of 56±15 years old. Median time after KT where the infection took place was 104 months (IQR: 55-160). One patient was infected 40 days after transplant. 90% were on Tacrolimus therapy and 79% on MMF. 81% of patients were hypertensive, 36% diabetic and 19% had ischemic heart disease. 65% were on ARAII treatment. Clinical presentation consisted on pneumonia (64%), fever (55%), cough (70%), dyspnoea (45%), lymphopenia (66%) and gastrointestinal symptoms (36%). 21% required intubation and admission in ICU. 8 patients were asymptomatic. 18% received Hydroxychloroquine therapy plus Azithromycin, 11% Tocilizumab, 11% Ritonavir-Lopinavir, 59% steroids, 7.7% Remdesivir and 13.5% convalescent plasma. Immunosuppression was reduced in all symptomatic patients. 10 patients (19%) died. Table 1 compares the characteristics of these patients with those who survived.

Conclusions: We concluded that mortality in KT is very high, more than reported in general population. Risk factors are patient age, time after KT, baseline renal function, the presence of pneumonia, as well as higher CRP levels at the time of diagnosis. More experience is needed to optimize our protocols and therapy for Covid-19 in KT.

Table 1: Comparison between the characteristics of patients who live and die.

	Alive (n=43)	Dead (n=10)	p
Age (years)	53± 15	67 ± 6	0,01
Time after KT (months)	178±157	93±75	0,04
BMI (Kg/m²)	28± 6	27± 3	0.7
HTA (%)	76	100	0.09
DM (%)	34	44	0.6
ARAII (%)	66	61	0.9
Tacrolimus (%)	88	100	0.5
MMF (%)	80	77	0.8
mtorI (%)	7	30	0.03
Pneumonia (%)	55	100	0.09
Gastrointestinal (%)	35	40	0.8
Fever (%)	58	66	0.9
Basal Creatinine (mg/dl)	1,4± 0,3	1,9 ± 0,7	0.01
Ferritin (ng/ml)	858 ± 577	1113 ± 752	0.4
Lymphocytes	0,8x10³±0,3 x10³	0,6x10³±0,3 x10³	0.2
CRP (mg/l)	54 ± 58	132 ± 62	0.006
Dimero D (ng/ml)	1.772 ± 2500	90.009 ± 270.799	0.05
Tozilizumab (%)	7	33	0.04
Ritonavir/Lopinavir (%)	2,3	33	0.02
Steroids (%)	52	100	0.02
Hydroxychloroquine + Azithromycin(%)	14	40	0.05
Convalescent plasma (%)	14,3	10	0.7
Remdesivir (%)	4.8	20	0.1

BMI: body mass index; CRP: c-reactive protein; ARAII: angiotensin receptor antagonist II.

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Abstract# 1067

Intermediate Outcomes Following Early Inflammatory Changes on Surveillance Biopsies

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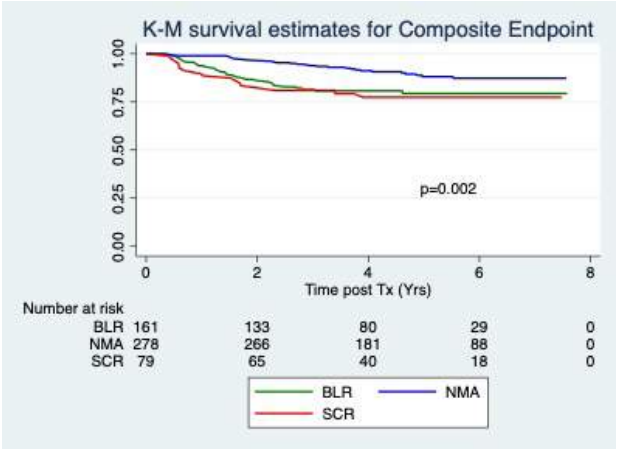
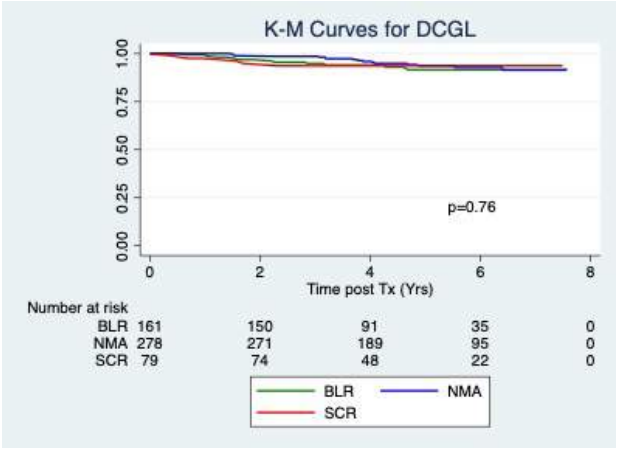
Purpose: The implications on early inflammatory changes on surveillance biopsies on intermediate and long-term outcomes is unclear.

Methods: Of the 1000 kidney transplant (live donor and deceased donor) recipients at our center between Jan 2013 through Dec 2017, we prospectively followed a cohort of 518 recipients who had 3 month surveillance biopsies. These were divided into Group 1 - no major abnormality (NMA; i0t0 and i>0;t0; n=278); Group 2 - Borderline Changes (BL-R; i≥1;t≥1 but not meeting criteria for Banff IA; n=161) and Group 3 - Subclinical T cell mediated rejection (SCR; i2t2 and higher; n=79). We excluded patients who could not undergo 3 m surveillance biopsies and those who had clinical rejections prior to index biopsy. BL-R was treated in a minority of cases with one dose of 250 mg of methylprednisolone, while SCR was treated with methylprednisolone 250 mg iv x 3. Baseline demographics between the groups including recipient age, race, sex, prior transplant and sensitization was similar between the groups. Majority of the patients received thymoglobulin induction (>95%) and maintenance IS with tac and MMF. Median period of follow up was 4.5 years (IQR 3.5-7.8). We studied the composite endpoint of subsequent clinical rejections and death censored graft loss (DCGL) in all groups and also the hard endpoint of DCGL alone.

Results: Figure 1. Figure 2.

Conclusions: 1. The hazard ratio for reaching the composite endpoint of clinical rejection or DCGL increased in the BL-R and SCR groups compared to NMA (HR 2.3; p=0.001; 95% CI 1.4-3.7). 2. The hard endpoint of DCGL was not different among the groups in the intermediate term. 3. Long term follow up will be helpful to detect any long term implications of early inflammatory changes on surveillance biopsies





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Abstract# 1068

A Case of Graft-versus-Host Disease Following Pancreas-Kidney Transplant

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Purpose: Graft-versus-host disease (GvHD) is an uncommon but often fatal complication following solid organ transplantation. It occurs when immunocompetent donor T cells are transferred to the recipient from within the graft. Most commonly encountered after small bowel and liver transplants, secondary to lymphoid tissue content, few cases have been identified following kidney-pancreas transplant.

Methods: A retrospective case review was performed to evaluate clinical presentation, treatment and response timelines, chimerism analysis, and histologic findings of gastrointestinal and bone marrow biopsies in a rare case of GvHD following simultaneous kidney-pancreas (SKP) transplant.
Results: A 38-year-old woman with past medical history of end-stage renal disease secondary to type 1 diabetes mellitus received an complicated SKP transplant. Fevers, chills, abdominal pain, and diarrhea developed one-month post-transplant. An infectious cause work up was negative. Chimeric studies displayed 23% donor T-cells. A gastrointestinal biopsy was highly suspicious for GvHD. She was treated with intravenous steroids, ruxolitinib, and extracorporeal photopheresis. Despite these interventions, chimeric studies showed a rising proportion of donor T-cells. At 6 weeks post-transplant, T cells were reported as 100% donor composition and the patient exhibited a diffuse rash. A bone marrow biopsy revealed markedly hypocellular marrow. The patient was transferred to an outside hospital for consideration of a bone marrow transplant for definitive treatment of GvHD. The patient then developed a persistent bacteremia with multi-drug resistance and Epstein Barr viremia. Rituximab was initiated for post-transplant lymphoproliferative disorder. She was transferred back to our institution after being deemed ineligible for a bone marrow transplant secondary to multiple opportunistic infections. Hospice care was initiated and the patient expired shortly thereafter.
Conclusions: This case details the clinical and pathologic findings associated with a rare case of fatal graft-versus-host disease following SKP transplant. While this diagnosis is rare in the field of solid organ transplant, particularly in SKP scenarios, early recognition and intervention may permit successful treatments in future cases.
CITATION INFORMATION: Shelat P., Alquist C. A Case of Graft-versus-Host Disease Following Pancreas-Kidney Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Shelat: None. **C. Alquist:** None.

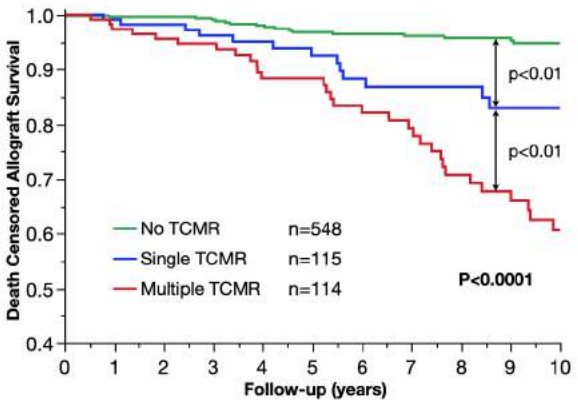
Abstract# LB 77

The Importance of Persistent and Recurrent T Cell Mediated Rejection in Tacrolimus Treated Renal Transplant Recipients

C. Rampersad[1], I. W. Gibson[2], D. N. Rush[1], D. Pochinco[3], P. E. Birk[4], A. Goldberg[4], T. Blydt-Hansen[5], M. Karpinski[1], J. Shaw[1], J. Ho[1], P. W. Nickerson[1], C. Wiebe[1], *[1]Department of Medicine, University of Manitoba, Winnipeg, MB, Canada, [2]Department of Pathology, University of Manitoba, Winnipeg, MB, Canada, [3]Shared Health Services Manitoba, Winnipeg, MB, Canada, [4]Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, MB, Canada, [5]Department of Pediatrics, University of British Columbia, Winnipeg, MB, Canada*

Purpose: Optimal follow-up after treatment for T-cell mediated rejection (TCMR) is not well-established. We sought to identify the prevalence and clinical associations of repeated TCMR events.
Methods: We retrospectively reviewed consecutive renal transplant recipients from 2001-2019 at a single-center which utilizes an early surveillance biopsy program.
Results: 2,083 biopsies were performed in 777 recipients and TCMR was detected in 229 recipients, with the majority (61%) being Banff borderline rejection. 179 recipients had a follow-up biopsy at a median of 3 months (IQR 1.3-8.5). Persistent TCMR was found in 50% of recipients at a median of 2.4 months (IQR 1.1-6.3 months). Recurrent TCMR after a negative follow-up biopsy was found in 14% of recipients at a median of 12 months (IQR 2.9-22.7). Subsequent follow-up biopsies revealed that after each additional TCMR event >50% of recipients had another TCMR. Repeated events correlated with HLA-DR/DQ alloimmune risk category. Recipients with persistent or recurrent TCMR had similar clinical outcomes and were analyzed together as recipients with "Multiple TCMR". Recipients were more likely to have repeated TCMR events if they were younger, had greater coefficient of variation in tacrolimus trough levels, or had intermediate or high alloimmune risk categorized by HLA-DR/DQ single molecule eplet mismatch scores (p=0.0003). Allograft survival and dnDSA-free survival were decreased in recipients with single TCMR compared to no TCMR, and in recipients with multiple TCMR compared to either group (p<0.0001). (Figure 1) The correlation between allograft survival and TCMR episode number was also significant in the subset whose first TCMR biopsy was Banff borderline TCMR.
Conclusions: Repeated TCMR events are common despite standard immunosuppression and correlate with dnDSA development and allograft loss. HLA molecular mismatch and recipient age at time of transplant may identify high-risk patients and help enrich patients to study novel therapies.

Figure 1. Graft Survival by number of TCMR episodes



CITATION INFORMATION: Rampersad C., Gibson I., Rush D., Pochinco D., Birk P., Goldberg A., Blydt-Hansen T., Karpinski M., Shaw J., Ho J., Nickerson P., Wiebe C. The Importance of Persistent and Recurrent T Cell Mediated Rejection in Tacrolimus Treated Renal Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Rampersad: None. **I.W. Gibson:** Grant/Research Support; If "Other" Please Explain; Canadian Institutes for Health Research (CIHR). **D.N. Rush:** Consulting Fee; Name of Commercial Interest; Astellas Pharma. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; If "Other" Please Explain; Canadian Institutes for Health Research (CIHR). **D. Pochinco:** None. **P.E. Birk:** None. **A. Goldberg:** None. **T. Blydt-Hansen:** None. **M. Karpinski:** None. **J. Shaw:** None. **J. Ho:** Grant/Research Support; If "Other" Please Explain; Canadian Institutes for Health Research (CIHR), CIHR New Investigator award. **P.W. Nickerson:** Consulting Fee; Name of Commercial Interest; Astellas Pharma and Vitaeris Inc.. Consulting Fee; Nature of Relationship; Consultant. Grant/Research Support; If "Other" Please Explain; Canadian Institutes for Health Research (CIHR), Flynn Family Chair in Renal Transplantation, Paul I. Terasaki Research Fund. **C. Wiebe:** Grant/Research Support; If "Other" Please Explain; Research Manitoba operating grant, Canadian Institutes for Health Research (CIHR), Paul I. Terasaki Research Fund.

Kidney

Kidney Paired Exchange

Abstract# 1069

An Early Look at the OPTN Kidney Paired Donation Pilot Program's New Priority Points Policy

S. E. Booker[1], R. Leishman[1], D. E. Stewart[1], T. Sandholm[2], J. Dickerson[3], M. Pavlakis[4], V. Casingal[5], *[1]United Network for Organ Sharing, Richmond, VA, [2]Carnegie Mellon University, Pittsburgh, PA, [3]University of Maryland, College Park, MD, [4]Beth Israel Deaconess Medical Center, Boston, MA, [5]Carolinas Medical Center, Charlotte, NC*

Purpose: The OPTN implemented new policy on 10/24/19 changing how Kidney Paired Donation Pilot Program (KPDPP) priority points are awarded. The policy is intended to improve equity in access to transplant for highly sensitized candidates and pairs with difficult-to-match blood types, and to prevent the donor-candidate pool from becoming dominated by difficult-to-match pairs. The policy adopted a sliding scale for CPRA points and added points for candidate and paired donor ABO.
Methods: OPTN data were analyzed for the characteristics of pairs who matched in KPDPP match runs in the first 4.5 months after policy revision ("post-policy": 10/24/19-3/12/20) compared with the year prior ("pre-policy": 10/24/18-3/12/19).
Results: Post-policy, there were fewer matches (N=181 pre-policy vs N=141 post-policy) but a higher overall match rate (3.97% vs 4.68%) (Table). There were 8 matches for highly sensitized candidates (CPRA 98-100%) pre-policy and 6 post-policy (4.9% vs 4.7% of matches); match rates for these candidates were unchanged post-policy (0.52% vs 0.56%). The match rate increased non-significantly for candidates with CPRA 80-97% (4.05% vs 6.19%; p=0.17). Matches by candidate blood type were virtually unchanged post-policy (A: 39.6% vs 37.2%; O: 39.6% vs 40.3%; B: 19.5% vs 20.2%; AB: 1.2% vs 2.3%); match rates increased non-significantly for AB candidates post-policy (3.39% vs 18.75%, p=0.06) but were similar for other candidate blood types (A: 8.11% vs 8.11%; O: 2.08% vs 2.66%; B: 5.58% vs 5.76%). Matches for pairs with type AB and type O paired donors increased post-policy while matches for pairs with type A and type B donors decreased (AB: 1.8% vs 6.2%; O: 38.4% vs 45%; A: 40.9% vs 32.6%; B: 18.9% vs 16.3%). Match rates increased for

candidates with type A, O and AB paired donors (A: 2.89% vs 3.18%; O: 6.18% vs 8.3%; AB: 1.05% vs 3.65%) and decreased for candidates with type B paired donors (3.33% vs 2.7%); no changes were statistically significant (p>0.05 for all).
Conclusions: The KPDPP priority points revisions are intended to improve matching opportunities for highly sensitized candidates and pairs with difficult-to-match blood types, and to add liquidity to the pair pool over time by not depleting easier-to-match pairs. Although initial results are not statistically significant, a net positive impact may be observable with more time; this will be further assessed.

OPTN Kidney Paired Donation Pilot Program Matches and Match Rates by Pair Characteristics and Policy Era

Pair Characteristic	Policy Era [a]	N Matches (%)	N Match Opportunities [b]	Match Rate (%) [c]	P-value [d]
Overall	Pre	181 (100)	4555	3.97	0.15
	Post	141 (100)	3015	4.68	
Candidate CPRA (%)					
0	Pre	44 (26.8)	1082	4.07	0.15
	Post	44 (34.1)	785	5.61	
1-19	Pre	24 (14.6)	400	6.0	0.51
	Post	8 (6.2)	187	4.28	
20-79	Pre	63 (38.4)	915	6.89	0.42
	Post	47 (36.4)	576	8.16	
80-97	Pre	25 (15.2)	617	4.05	0.17
	Post	24 (18.6)	388	6.19	
98-100	Pre	8 (4.9)	1541	0.52	1
	Post	6 (4.7)	1079	0.56	
Candidate ABO					
A	Pre	65 (39.6)	801	8.11	1
	Post	48 (37.2)	592	8.11	
O	Pre	65 (39.6)	3122	2.08	0.22
	Post	52 (40.3)	1956	2.66	
B	Pre	32 (19.5)	573	5.58	1
	Post	26 (20.2)	451	5.76	
AB	Pre	2 (1.2)	59	3.39	0.06
	Post	3 (2.3)	16	18.75	
Paired Donor ABO					
A	Pre	67 (40.9)	2316	2.89	0.69
	Post	42 (32.6)	1319	3.18	
O	Pre	63 (38.4)	1020	6.18	0.11
	Post	58 (45)	699	8.3	
B	Pre	31 (18.9)	932	3.33	0.54
	Post	21 (16.3)	778	2.7	
AB	Pre	3 (1.8)	287	1.05	0.06
	Post	8 (6.2)	219	3.65	

[a] Pre-policy: 10/24/18-3/12/19; post-policy: 10/24/19-3/12/20.
[b] Sum of all candidates across all match runs. Some candidates appeared in multiple match runs.
[c] Proportion of match opportunities that resulted in a match.
[d] Chi-square or Fisher's Exact test, as appropriate, for difference in match rates pre- vs post-policy.

CITATION INFORMATION: Booker S., Leishman R., Stewart D., Sandholm T., Dickerson J., Pavlakis M., Casingal V. An Early Look at the OPTN Kidney Paired Donation Pilot Program's New Priority Points Policy *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.E. Booker: None. **R. Leishman:** None. **D.E. Stewart:** None. **T. Sandholm:** None. **J. Dickerson:** None. **M. Pavlakis:** None. **V. Casingal:** None.

Abstract# 1070

Impact of Pre-Screening on OPTN Kidney Paired Donation Pilot Program Transplant and Refusal Rates

S. E. Booker[1], R. Leishman[1], J. Musick[1], M. Oley[1], T. Sandholm[2], J. Dickerson[3], M. Pavlakis[4], V. Casingal[5], *[1]UNOS, Richmond, VA, [2]Carnegie Mellon University, Pittsburgh, PA, [3]University of Maryland, College Park, MD, [4]Beth Israel Deaconess Medical Center, Boston, MA, [5]Carolinas Medical Center, Charlotte, NC*

Purpose: The OPTN Kidney Paired Donation Pilot Program (KPDPP) donor pre-screen tool allows centers to review and pre-accept or pre-refuse potential donors for individual candidates before match runs. Pre-screening is optional unless the candidate's CPRA is >=90%. The intent of pre-screening is to improve match quality and reduce match refusals, thereby increasing the number of exchanges that proceed to transplant. Our objective was to assess the impact of pre-screening on transplant and refusal rates.
Methods: We analyzed OPTN data for all KPDPP match offers from 1/1/15-12/31/19 by utilization of pre-screening. We evaluated matches by whether they were pre-accepted or unscreened; pre-refusing a donor precludes the candidate from matching with that donor during the match run.
Results: The KPDPP made 2463 match offers during the cohort including 2178 offers to KPD candidates (285 were bridge donors or exchange-ending donors). Of matches to KPD candidates, 1024 (47%) were refused, 948 (43.5%) were accepted but fell through due to a refusal elsewhere in the exchange, and 206 (9.5%) resulted in a transplant. 53.9% (N=1175) were pre-accepted; 46.1% (N=1003) were unscreened. Pre-accepted matches had a significantly higher transplant rate vs unscreened matches (11.4% vs 7.2%, p=0.0010) and a significantly lower refusal rate (42% vs 52.9%, p<0.0001). Pre-accepted matches had a significantly lower rate of refusals due to matched donor characteristics (p<0.0001) (Figure 1), notably due to fewer refusals for donor age, height/weight/BMI, and medical history (Figure 2). Crossmatch-related refusal rates were also lower for pre-accepted matches, though not statistically significant (p=0.09), driven by fewer positive virtual crossmatches and fewer matches with an unacceptable number of HLA mismatches. Pre-accepted matches also had fewer candidate-related refusals (p=0.11), driven by fewer refusals due to a candidate's involvement in a pending exchange with another KPD program.
Conclusions: Pre-screening increases the likelihood that a KPD match will proceed to transplant, though matches may still fall through due to a refusal elsewhere in the exchange. The most notable impact of pre-screening was a reduction in refusals due to matched donor characteristics, specifically age, body size and medical history. Additional voluntary or policy-required pre-screening could further reduce match refusals.

Figure 1. OPTN KPD refusal rates by utilization of pre-screening

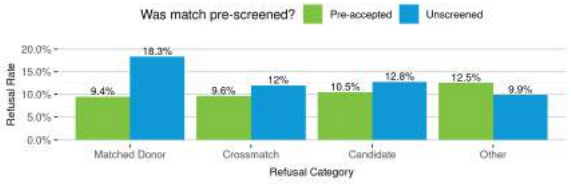
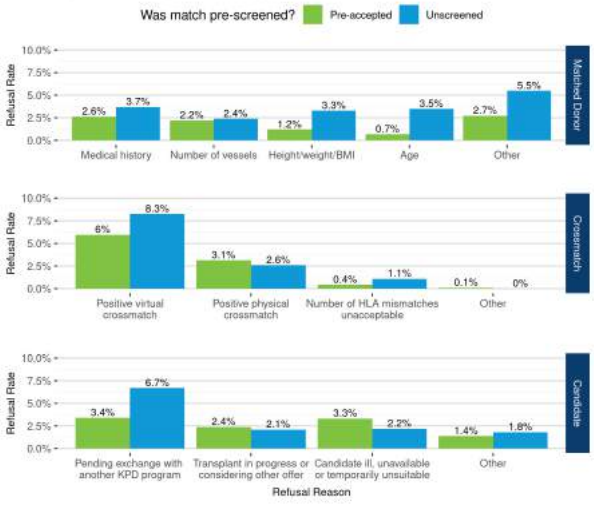


Figure 2. Matched donor-, crossmatch-, and candidate-related refusal rates by utilization of pre-screening



CITATION INFORMATION: Booker S., Leishman R., Musick J., Oley M., Sandholm T., Dickerson J., Pavlakis M., Casingal V. Impact of Pre-Screening on OPTN Kidney Paired Donation Pilot Program Transplant and Refusal Rates *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.E. Booker: None. **R. Leishman:** None. **J. Musick:** None. **M. Oley:** None. **T. Sandholm:** None. **J. Dickerson:** None. **M. Pavlakis:** None. **V. Casingal:** None.

Abstract# 1071

First Promising Results of CIAT: A New Kidney Exchange Program for Difficult-to-match Patients

M. de Klerk[1], J. Kal[1], K. Glorie[2], D. Roelen[3], M. Betjes[1], J. Wetering van de[1], M. Kho[1], J. Roodnat[1], *[1]Erasmus MC, Rotterdam, Netherlands, [2]EQI, Erasmus University, Rotterdam, Netherlands, [3]LUMC, Leiden, Netherlands*

Purpose: Computerised Integration of Alternative Transplantation (CIAT) programs was developed to increase the chances of highly immunized (HI) and longwaiting (LW) kidney transplant candidates. CIAT integrates AB0-desensitisation, HLA-desensitisation, donor-exchange, altruistic and domino-paired donation. Strict criteria were defined for selected HI (sHI) patients. sHI patients are given priority, and dependent on titers, AB0-incompatible (AB0i) and/or HLA-incompatible matching (HLAi) is allowed. Long-waiting (LW) blood type 0 candidates (>2y dialysis) can opt for an AB0i match. In a 1 center simulation of 2015-2016 , CIAT matched 8 out of 20 participating sHI patients. Desensitisation was indicated for 3 patients: 1 AB0i, 1 HLAi and 1 both AB0i and HLAi. Five transplantations could be done without desensitisation.
Methods: A 1 center pilot was established from 2017 onwards to gain logistic experience, to test the algorithm and to optimize the program. Protocols have been created and pathways were developed for recognition of sHI and LW candidates, for logistics and patient information.
Results: Between 2017-2020, 115 couples, 20 unspecified donors and 18 sHI patients were included in CIAT, 56 transplantations were accomplished: 52 compatible, and 4 AB0i transplantations. 10 sHI patients were matched. 2 HLAi transplantations were cancelled during COVID. 8 were transplanted: 5 compatible and 3 AB0i

transplantations. Their median vPRA was 95% (range 85-100), median age 54 years (range 26-76) and median waiting time 5y(range 2y- 9y). 12 LW patients were transplanted: 11 compatible and 1 AB0i, median waiting time 3y (2y- 6y). 5 unspecified donors donated to the waitlist, 15 initiated chains (9 with 1 and 6 with 2 incompatible pairs). There were 6 kidney-exchange cycles with 2 and 1 with 3 incompatible pairs. CIAT runs were performed between national runs. In the same period 16 pairs were transplanted through the national exchange program, no sHI patients were matched.

Conclusions: The pilot yields very promising results for the sHI and LW candidates. Negotiations on national implementation, replacing the current kidney exchange program, are ongoing. Extrapolation of our results to national size would mean between 16-20 sHI candidates transplanted per year. Apart from an enormous health-gain for sHI and LW patients this means a vast reduction of healthcare costs.

CITATION INFORMATION: de Klerk M., Kal J., Glorie K., Roelen D., Betjes M., Wetering van de J., Kho M., Roodnat J. First Promising Results of CIAT: A New Kidney Exchange Program for Difficult-to-match Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. de Klerk: None. **J. Kal:** None. **K. Glorie:** None. **D. Roelen:** None. **M. Betjes:** None. **J. Wetering van de:** None. **M. Kho:** None. **J. Roodnat:** None.

Abstract# 1072

"I Would Do Whatever It Took": Understanding the Motivation, Education and Experiences of Kidney Paired Donation Participants

R. Pines[1], Y. A. Iraheta[2], L. Ambriz[2], K. A. Dahmani[2], E. H. Wood[2], M. Cooper[3], A. D. Waterman[2], *[1]Santa Barbara Cottage Hospital, Santa Barbara, CA, [2]UCLA David Geffen School of Medicine, Los Angeles, CA, [3]Medstar Georgetown Transplant Institute, Washington, DC*

Purpose: To improve kidney paired donation (KPD) educational programs, we conducted semi-structured interviews to understand motivations of past recipients and donors to participate in KPD, the educational content received, and recommendations to better prepare participants, particularly those facing KPD challenges.

Methods: We interviewed 43 KPD participants [25 living donors (64% white, 64% female; 18 recipients (44% white, 39% female)]. Data from open-ended questions were analyzed using thematic analysis. Descriptive statistics were run for quantitative items.

Results: While deciding to participate in KPD was a systematic (i.e., logical, carefully considered) process for some, for most, it was a heuristic (i.e., quickly made, often emotion-based) process. Individuals became motivated to donate because of KPD's ability to help multiple people obtain transplants and receive a transplant quickly. KPD educational content received varied, with recipients reporting receiving less information than donors on many topics (Table). Although most described the helpfulness of transplant coordinators, more review of KPD educational information provided from credible sources and the opportunity to speak to a former KPD participant were recommended. Those who faced KPD challenges requested more information about the financial protections and assistance that certain KPD programs may offer, and more psychological education and support during and after KPD.

Conclusions: Educational content provided to donors and recipients about the risks and benefits of KPD varies. Standardized, health literate educational content about KPD that enables individuals considering KPD to learn from previous KPD participants may help increase informed decision making.

Table. Educational Topics

	% Received	
Benefits of KPD	**Donors**	**Recipients**
Help multiple recipients	96%	56%
Improved long-term outcomes compared to deceased donation	92%	67%
Matching of highly sensitized participants	64%	61%
Possibility of faster matching than direct donation	56%	67%
Risks of KPD		
Financial and insurance risks	100%	67%
Possibility of no contact with the donor/recipient	100%	78%
Possibility of broken chains/swaps	60%	72%
Transporting of kidneys and managing real-time swap failures	40%	67%

CITATION INFORMATION: Pines R., Iraheta Y., Ambriz L., Dahmani K., Wood E., Cooper M., Waterman A. "I Would Do Whatever It Took": Understanding the Motivation, Education and Experiences of Kidney Paired Donation Participants *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Pines: None. **Y.A. Iraheta:** None. **L. Ambriz:** None. **K.A. Dahmani:** None. **E.H. Wood:** None. **M. Cooper:** None. **A.D. Waterman:** None.

Abstract# 1073

In Search of a Better Outcome: Opting Into the Live Donor Paired Kidney Exchange Program

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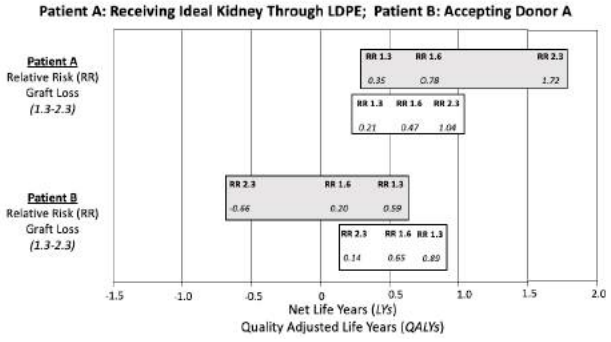
Purpose: Live donor kidney transplantation is the best option for patients with End-Stage Kidney Disease (ESKD), if a donor is available. However, this may not be the best option if a patient's donor is older and considerably smaller in weight. A patient (A) with a less than ideal donor (Donor A) might enter into a Live Donor Paired Exchange (LDPE) program with the hopes of exchanging for a better-quality organ. A second patient (B) who is in the LDPE may or may not benefit from this exchange with Donor A.

Methods: We performed a medical decision analysis using a Markov model to examine the conditions that favour patient A entering into the LDPE compared to accepting their intended Donor A directly. For the baseline case we examined Patient A and B both aged 45 years, both transplanted after 1 year in LDPE, and a risk of graft loss of 1.6 for Donor A relative to an ideal donor. We also explored circumstances where patient B also benefits by accepting a lower-quality organ from Donor A rather than remaining on the LDPE waitlist.

Results: Under select circumstances a paired exchange could benefit (more life years) both patient A and B. The net benefit (or loss) of entering the LDPE differs by recipient age, donor organ quality, likelihood of patient B being transplanted in LDPE, and likelihood of patient A finding an ideal donor in the LDPE. Under the baseline assumptions, Patient A stands to gain 0.78 LYs if transplanted in LDPE by the end of 1 year compared to undergoing directed transplantation with their current donor. There would also be a gain of 0.47 QALYs. At the same time, Patient B might gain 0.20 LYs (0.65 QALYs) by opting for a lower quality organ from Donor A compared to staying on the LDPE waitlist. In a sensitivity analysis, we varied the relative risk of the Donor A organ and show how this impacted both Patient A and B following transplant through the LDPE versus direct transplant of Patient A with the Donor A kidney, Figure 1.

Conclusions: This study shows there are ways to increase live donor utilization and effectiveness that may require changes to the LDPE process.



CITATION INFORMATION: Vinson A., Kiberd B., Tennankore K. In Search of a Better Outcome: Opting Into the Live Donor Paired Kidney Exchange Program *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.J. Vinson: Consulting Fee; Name of Commercial Interest; Paladin Labs Inc. **B. Kiberd:** None. **K.J. Tennankore:** Consulting Fee; Name of Commercial Interest; Otsuka, Janssen, AstraZeneca. Grant/Research Support; Name of Commercial Interest; Otsuka, Astellas.

Abstract# LB 79

Who Can be Matched via Kidney Exchange?

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Purpose: Valuable time and resources are spent screening medically-compatible patients and donors for kidney exchange. Exchanges with tens or hundreds of patients can have thousands of medically-compatible transplants between participating patients and donors. However, only a small number of these transplants can participate in the cyclical or chain-like swaps required by exchange. For example, a patient may have many medically-compatible donors, but cannot join with other patients/donors to form a cycle or chain; this patient is not matchable in the exchange. Exchanges can save valuable resources by focusing on matchable patients, donors, and transplants.

Methods: We study 321 exchanges from the US Organ Procurement and Transplantation Network (OPTN) from 2010-2018. We refer to patient-donor pairs and NDDs as "vertices": we count the number of matchable vertices, which is a fraction

of those with compatible transplants. We also distinguish by patient blood type and sensitization. For each patient, we count the number of compatible donors and matchable donors. Finally, we simulate a match run according to OPTN policy, and count how many vertices and transplants are matched (they would receive a match offer in the exchange).

Results: Most exchanges have over 150 vertices, and about a third of these are matchable. Fig.1A shows the total number of vertices, matchable vertices, and matched vertices (in simulation). Fig.1B shows these numbers by patient sensitization level and ABO. Less than 5% of all highly sensitized patients are matchable, though a large fraction of these are matched by OPTN policy. Most patients have many compatible donors (median=29), but 70% of patients are not matchable. Fig.1C shows a histogram of the number of compatible donors per patient, and Fig.1D shows the number of matchable donors per patient. Among matchable patients, the median number of matchable donors is 3.

Conclusions: Kidney exchanges with hundreds of patients and donors can have thousands of potential transplants, but only a small fraction of these can be matched through cycle- or chain-like swaps. We find that most patients (70%) are not matchable: they cannot participate in exchange. Furthermore, those who are matchable have a small number of matchable donors (median=3). Exchanges can focus their limited resources on matchable patients, donors, and transplants, since all others cannot participate in exchange.

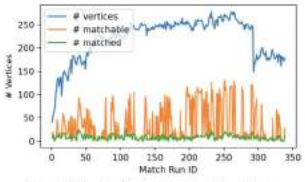
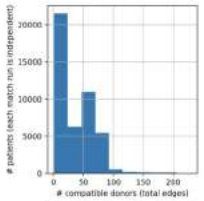


Figure 1A. Counts of *matchable* and *matched* vertices, by OPTN match run.

	Vertex Type		Total Number of Vertices	Matchable Vertices		Matched Vertices (in simulation)		% Matchable vertices that are matched
	Sensitization	ABO		#	%	#	%	
Patient/ Donor Pairs	CPRA<80	A	1612	660	40 +/- 2	467	28 +/- 2	62 +/- 4
		AB	39	32	79 +/- 11	25	62 +/- 14	75 +/- 14
		B	2364	855	36 +/- 2	333	14 +/- 1	39 +/- 3
		O	25747	7732	30 +/- 1	651	2 +/- 0	8 +/- 1
	CPRA≥80	A	10186	562	5 +/- 1	261	2 +/- 0	46 +/- 4
		AB	792	44	5 +/- 2	11	1 +/- 1	27 +/- 12
		B	7709	365	4 +/- 1	188	2 +/- 0	43 +/- 5
		O	21842	503	2 +/- 1	238	1 +/- 0	41 +/- 4
NDDs	N/A	N/A	353	353	99 +/- 1	331	93 +/- 3	94 +/- 2

Figure 1B. Counts of *matchable* and *matched* vertices, by patient sensitization and blood type.



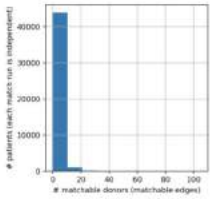


Figure 1C (top), 1D (bottom). Histograms of the number of compatible donors (top) and matchable donors (bottom) for each patient.

CITATION INFORMATION: McElfresh D., Curry M., Booker S., Stewart D., Stuart M., Leishman R., Sandholm T., Dickerson J. Who Can be Matched via Kidney Exchange? *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.C. McElfresh: None. **M. Curry:** None. **S.E. Booker:** None. **D. Stewart:** None. **M. Stuart:** None. **R. Leishman:** None. **T. Sandholm:** None. **J. Dickerson:** None.

Liver

Liver: Retransplantation and Other Complications

Abstract# 1074

Comparative Outcomes of Endovascular Interventions for Hepatic Artery Stenosis Following Adult Liver Transplantation

S. Desai[1], D. Crabtree[2], A. Parsikia[2], R. Ahuja[1], A. Desai[1], B. Natarajan[1], P. Brady[1], H. Kaul[3], K. Khanmoradi[3], R. Zaki[3], N. Chandolias[3], *[1]Interventional Radiology, Albert Einstein Medical Center - Philadelphia, Philadelphia, PA, [2]General Surgery, Albert Einstein Medical Center - Philadelphia, Philadelphia, PA, [3]Transplant Surgery, Albert Einstein Medical Center - Philadelphia, Philadelphia, PA*

Purpose: There is mounting evidence supporting interventional radiology (IR) treatment for hepatic artery stenosis (HAS) following liver transplantation to improve diminutive graft perfusion and to prevent progression to hepatic artery thrombosis. We aim to evaluate the safety and efficacy of direct hepatic artery interventions versus extrahepatic arterial embolization in the setting of HAS.

Methods: We conducted an electronic search of all hepatic artery angiograms from September 12, 2012 to September 12, 2019, and cross-matched results with orthotopic liver transplant recipients. 91 angiograms for 65 patients were found. Demographics and clinical data were collected. Inclusion criteria consisted of patients with IR intervention within 1 year of transplant and definitive angiographic findings of diminutive hepatic arterial flow secondary to HAS. Decision for mode of intervention was made after intraoperative discussion between IR and transplant surgery physicians.

Results: 36 patients undergoing 48 angiograms were included. 16 patients (average age 58 years; 62% male) underwent direct hepatic interventions and 20 patients (average age 55 years; 65% male) underwent extrahepatic embolization. Preprocedural clinical data shown in Table 1. Interventions for each treatment group illustrated in Figure 1. There was a significant difference in post-operative complications (25% vs 0%, p=0.018). Direct hepatic artery interventions had complications including dissection and in-stent thrombosis with incidence of 6.3% and 18.8%, respectively. There was no significant difference in number of additional procedures or 1- year survival (94% vs 95%).

Conclusions: Extrahepatic arterial embolization provides a significantly better safety profile, with similar efficacy, versus direct hepatic artery intervention when considering treatment for hepatic artery stenosis post orthotopic liver transplant.

Table 1: Preprocedural Clinical Data, Operational Complications and 1-year Outcomes

	Extrahepatic Embolization (*n=20*)	Direct Hepatic Artery Intervention (*n=16*)	p-value
Time between transplant and intervention, days	87	77.5	0.62
Hemoglobin, g/dL	9.45	11.15	**0.037**
Creatinine, mg/dL	1.05	1.05	0.58
ALT, U/L	95	187	0.19
AST, U/L	44.5	107	0.14
No complications	20/20 (100%)	12/16 (75%)	**0.018**
1-year survival	95%	94%	0.87

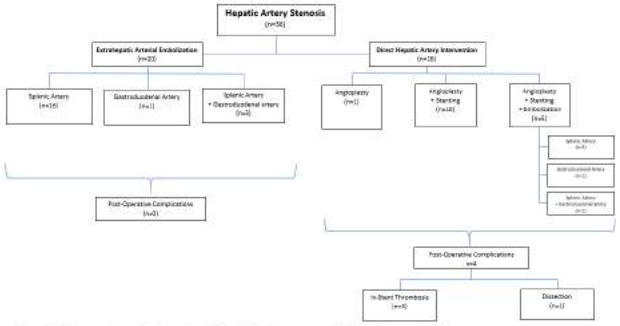


Figure 1: Different endovascular interventions following hepatic artery stenosis diagnosis on angiography

CITATION INFORMATION: Desai S., Crabtree D., Parsikia A., Ahuja R., Desai A., Natarajan B., Brady P., Kaul H., Khanmoradi K., Zaki R., Chandolias N. Comparative Outcomes of Endovascular Interventions for Hepatic Artery Stenosis Following Adult Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Desai: None. **D. Crabtree:** None. **A. Parsikia:** None. **R. Ahuja:** None. **A. Desai:** None. **B. Natarajan:** None. **P. Brady:** None. **H. Kaul:** None. **K. Khanmoradi:** None. **R. Zaki:** None. **N. Chandolias:** None.

Abstract# 1075

Impact of Social Support, Social Circumstances and Distance from Transplant Center on Post Liver Transplant Outcomes: An Analysis from a Predominantly Rural U.S. Cohort

R. Kaur[1], C. Lavender[1], E. Askew[1], S. Jafri[2], R. Thandassery[1], M. Deneke[1], *[1]University of Arkansas for Medical Sciences, Little Rock, AR, [2]Henry Ford Hospital, Detroit, MI*

Purpose: Social support and social circumstances (SSSC) are critical yet less described entities in post-orthotopic liver transplant (OLT). We aimed to describe SSSC and correlate the nature of social support with post-OLT outcomes in a predominantly rural post-OLT cohort (Arkansas, US). This study also evaluated whether disparities exist between patients' social circumstances and nature of primary support (PS).

Methods: A retrospective cohort study was done on 166 patients who had undergone OLT between January 2014 and September 2019. We attempted to characterize the SSSC of the cohort, which included the nature of PS (spouse vs. non-spouse, number of PS, and if living with PS) and social characteristics (age, gender, ethnicity, employment status, presence of psychiatric diagnosis, drug abuse, and distance of a patient's residence from the transplant center [DTC]). We also correlated nature of PS with post-OLT outcomes.

Results: There were 166 patients composed primarily of males (67.3%), mean age of 55.3 ± 10.8 years, and 86.7% Caucasian. The predominant etiology for liver disease was alcohol (32.5%). Majority of patients (58.4%) had more than 2 people for PS. 64.5% had a spouse as PS and 85.5% lived with their PS. The age at transplant (p=0.32), gender (p=0.65), ethnicity (p=0.83), etiology of liver disease (p=0.37), employment status (p=0.83), history of illicit drug use (p=0.83) and a

psychiatric diagnosis (p=0.38) did not influence the number of PS. These variables didn't influence the type of PS and patient living with PS. Mean DTC (± SD) was 89.0 ± 68.6 miles and 41.6% lived more than 100 miles from the transplant center. The outcomes of OLT analyzed, including post-OLT survival (p=0.81), prolonged hospitalization after transplant (≥ 10 days, p=0.34), 30-day readmission (p=0.83), 1-year readmission (p=0.99), 2-year readmission rates (p=0.87), and rejection at 1 year (p=0.49) and 2 years (p=0.13) did not correlate with number of PS. These outcomes also didn't correlate with the type of PS or the patient living with the PS. Analysis of DTC trended towards worsened post-OLT outcomes including 30-day readmission (p=0.08), number of hospitalizations in 2 years (p=0.08) and rejection in 2 years (p=0.07), but did not correlate with other outcomes like post-OLT survival (p=0.89), prolonged hospitalization (p=0.44), number of hospitalizations in 1 year (p=0.71) and rejection in 1 year (p=0.34).

Conclusions: Established SSSC remains imperative when undergoing liver transplantation. Distance from transplant center appears to be a critical component in this, which may correlate with early readmissions after OLT (30 days), increased readmissions (at 2 years) and rejection on long term follow up (2 years). Future studies may evaluate the role of telemedicine visits on improving these outcomes in predominantly rural cohorts.

CITATION INFORMATION: Kaur R., Lavender C., Askew E., Jafri S., Thandassery R., Deneke M. Impact of Social Support, Social Circumstances and Distance from Transplant Center on Post Liver Transplant Outcomes: An Analysis from a Predominantly Rural U.S. Cohort *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Kaur: None. **C. Lavender:** None. **E. Askew:** None. **S. Jafri:** None. **R. Thandassery:** None. **M. Deneke:** None.

Abstract# 1076

Subjective Cognition Among Liver Transplant Recipients

D. Ko[1], M. S. Dietrich[2], K. A. Gifford[3], S. H. Ridner[2], *[1]School of Nursing, Northeastern University, Boston, MA, [2]School of Nursing, Vanderbilt University, Nashville, TN, [3]Department of Neurology, Vanderbilt University Medical Center, Nashville, TN*

Purpose: Regular assessment of cognition is highly suggested to facilitate the early detection and treatment of cognitive impairment in the liver transplant (LT) population. While objective cognitive assessment is a gold standard diagnostic tool for cognitive impairment, it may not be feasible in LT practice since objective measures are often time-consuming. Subjective cognition, patients' self-ratings or caregivers' ratings of cognition for patients, can be used as an alternative to objective assessment. This cross-sectional, single-center study examined correlations between subjective and objective cognition in LT recipients.

Methods: A total 60 pairs of adult LT recipients (median age = 61) and their respective caregivers (median age = 59) participated in this study. The Everyday Cognition (ECog) was used to assess subjective global and domain-specific cognition, by measuring perceived difficulties in performing daily activities. The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS), Trail Making Test parts A&B, Digit Span Backward, and Rey-Osterrieth Complex Figure were used to assess objective global and domain-specific cognition of LT recipients. Agreement between LT recipients and caregivers on subjective cognition was examined using the intraclass correlation coefficient (ICC) and the reliable change index. Correlations between subjective and objective cognition were examined using Spearman's rho correlation.

Results: LT recipients reported few difficulties in performing daily activities. ICCs between LT recipients' and caregivers' subjective cognition scores were rather low (ICC = 0.48 for global score; 0.35-0.56 for domain scores) and agreements within reliable ranges were approximately 50%. Rather weak but significant correlations were found between subjective and objective cognitive scores. Recipients' ECog memory scores were correlated with RBANS immediate and delayed memory scores (r_s = -0.27 and -0.33, both $p < .05$); caregivers' ECog global and attention scores were respectively correlated with RBANS global and attention scores (r_s = -0.27 and -0.33, both $p < .05$).

Conclusions: Findings demonstrate the potential utility of subjective cognition, reported either by recipients and/or caregivers, as a screening tool for expeditiously identifying recipients who are at risk of or experiencing cognitive impairment. Since recipients and caregivers may provide supporting but unique information, clinicians should consider including both of them in cognitive assessment.

CITATION INFORMATION: Ko D., Dietrich M., Gifford K., Ridner S. Subjective Cognition Among Liver Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Ko: None. M.S. Dietrich: None. **K.A. Gifford:** None. **S.H. Ridner:** None.

Abstract# 1077

Serum Phosphatidylethanol is Superior to Urine Ethyl Glucuronide for Diagnosis of Alcohol Relapse in Liver Transplant Recipients

N. Lim[1], T. Leventhal[1], M. Thomson[1], M. Hassan[1], J. Thompson[1], S. Chinnakotla[2], V. Kirchner[2], T. Pruett[2], R. Kandaswamy[2], V. Humphreville[2], A. Adams[2], J. Lake[1], *[1]Divison of Gastroenterology, Hepatology and Nutrition, University of Minnesota, Minneapolis, MN, [2]Divison of Transplantation, University of Minnesota, Minneapolis, MN*

Purpose: Liver transplantation (LT) for alcohol-related liver disease (ALD) is increasing. The primary issue in these patients is often recidivism, therefore screening for ETOH use is important. Urine ethyl glucuronide (EtG) and serum phosphatidylethanol (PEth) are two highly sensitive and the most common biomarkers used in the diagnosis of ETOH relapse. We compared rates of screening for post-LT ETOH use using PEth and EtG over a 12-month period.

Methods: As part of a prospective quality improvement initiative at our center, patients who receive a LT for ALD have undergone mandatory quarterly screening for ETOH use with urine EtG for the first 12 months after LT since 2016 while any LT recipient undergoes testing if ETOH misuse is suspected. From 1st October 2019 to 30th September, we incorporated quarterly PEth testing into our protocol. Adherence to screening was defined as completion of 4 ETOH tests over the first 12 months after LT. A positive EtG test was defined as EtG>500ng/ml whereas a positive PEth test was defined as PEth>20ng/ml, both levels indicative of significant ETOH use. Positive tests resulted in the activation of a protocol involving the patient's RN coordinator, hepatologist, social worker and chemical dependency resources.

Results: 70 adult patients underwent LT over the study period. 38 patients were transplanted for ALD: 36 patients with ETOH cirrhosis and 2 patients with acute ETOH hepatitis. Median age at LT was 53, 25 (66%) patients were male, 30 (83%) patients were white and median MELD at LT was 29. 31 (81.6%) patients had mental illness prior to LT. Adherence to ETOH screening was 52% for EtG and 87% for PEth, p= 0.0008. There were 2 positive EtG tests compared to 13 positive PEth tests, p= 0.025, over the study period. 7 (19.4%) patients had a positive ETOH test with 4/7 (57.1%) patients adhering to the positive test protocol, although no patients started chemical dependency treatment. Of note, there were 30 positive tests (6 positive EtG and 24 positive PEth) over the study period in 22 patients transplanted prior to October 1st 2019, up to 13 years after LT.

Conclusions: ETOH relapse remains an important issue in a large proportion of patients who undergo LT for ALD, even several years after LT. Screening for ETOH use is significantly higher when using PEth compared to EtG while PEth is significantly better at detecting ETOH relapse. Although identification of ETOH misuse is an essential step, initiation of patients into chemical dependency treatment is a separate, significant challenge.

CITATION INFORMATION: Lim N., Leventhal T., Thomson M., Hassan M., Thompson J., Chinnakotla S., Kirchner V., Pruett T., Kandaswamy R., Humphreville V., Adams A., Lake J. Serum Phosphatidylethanol is Superior to Urine Ethyl Glucuronide for Diagnosis of Alcohol Relapse in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Lim: None. **T. Leventhal:** None. **M. Thomson:** None. **M. Hassan:** None. **J. Thompson:** None. **S. Chinnakotla:** None. **V. Kirchner:** None. **T. Pruett:** None. **R. Kandaswamy:** None. **V. Humphreville:** None. **A. Adams:** None. **J. Lake:** None.

Abstract# 1078

Biliary Complications Following Adult Deceased Donor Liver Transplantation: Risk Factors and Implications at a High-Volume US Center

A. Matar, K. Ross-Driscoll, L. Kenney, H. Wichmann, J. F. Magliocca, W. H. Kitchens, *Emory Transplant Center, Atlanta, GA*

Purpose: Biliary leaks and anastomotic strictures comprise the majority of biliary complications (BCs) following liver transplantation. Most case series of BCs in adult deceased donor liver transplant are older studies from an era when biliary T-tube usage was common, limiting their application to contemporary transplant practices. Indeed, few large contemporary case series of BCs in adult deceased donor liver transplant (DDLT) recipients exist in the literature. We examined the pre-transplant and intra-operative risk factors associated with BCs at a high-volume tertiary care center and determined the impact of these BCs on their long-term post-transplant outcomes.

Methods: We retrospectively reviewed all adult patients undergoing a DDLT from a donor after brain death at Emory University between January 1, 2015 and December 31, 2019.

Results: 647 patients underwent DDLT during the study period with a median follow-up of 2.5 years. A total of 27 bile leaks (4.2%) and 69 biliary strictures (10.7%) were detected. Whereas bile leaks were detected a median of 4 days after transplant (range: 0-65 days), biliary strictures were detected a median of 139 days after transplant (range: 5-1060 days). Biliary complications are often defined as presenting early (occurring <30 days post-transplant) or late (occurring >30 days post-transplant). Of patients who developed a bile leak, only 11.1% presented late, whereas 87% of biliary strictures presented late. Risk factors associated with biliary strictures included alcoholic cirrhosis as the etiology of liver failure. Risk factors for

bile leaks included viral hepatitis as etiology of liver failure and MELD exception points. Utilization of biliary stents was strongly associated with development of both bile leaks and biliary strictures (RR= 2.25, 95% CI 1.39-3.57). In our series, 77% of biliary leaks were managed surgically through either a revision of the biliary anastomosis (42.3%) or conversion to a Roux-en-Y hepaticojejunostomy (19.2%). "Early" bile leaks diagnosed prior to POD 14 (n = 19) were exclusively managed surgically (100%), while "late" biliary leaks (n = 7) were managed primarily endoscopically (71%). In contrast, the vast majority of anastomotic strictures were definitively managed endoscopically (95.7%), with a mean of 3.2 procedures per patient. Post-transplant, biliary leaks significantly increased the risk of subsequent episodes of acute rejection (RR= 2.47, 95% CI 1.04-5.93) but did not impact patient survival. In contrast, biliary strictures did not impact acute rejection rates but was associated with a significantly reduced patient survival at one- and four-years post-transplant (RR= 5.70, 95% CI 2.4-13.5).

Conclusions: BCs are a major source of morbidity and mortality following DDLT. Comprehensive analyses from high-volume centers are needed to identify risk factors for BCs to facilitate improved outcomes.

CITATION INFORMATION: Matar A., Ross-Driscoll K., Kenney L., Wichmann H., Magliocca J., Kitchens W. Biliary Complications Following Adult Deceased Donor Liver Transplantation: Risk Factors and Implications at a High-Volume US Center *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Matar: None. **K. Ross-Driscoll:** None. **L. Kenney:** None. **H. Wichmann:** None. **J.F. Magliocca:** None. **W.H. Kitchens:** None.

Abstract# 1079

Predictive Factors of the Hepatic Artery Thrombosis in Liver Transplantation Through the Analysis of Donor Characteristics

M. M. Pascale[1], G. Moschetta[2], G. Bianco[2], F. Frongillo[2], E. Nure[2], F. Giovinazzo[2], S. Agnes[2], *[1]General Surgery and Liver Transplant Unit, Fondazione, Roma, Italy, [2]General Surgery and Liver Transplant Unit, Fondazione "Policlinico A. Gemelli" UCSC - Rome, Roma, Italy*

Purpose: Hepatic artery thrombosis (HAT) is one of the most severe complications after liver transplantation. It is treated as soon as possible to avoid irreversible time-dependent graft dysfunction.The early finding of arterial complications can lead to an improvement in transplant outcome, through specific clinical surveillance for high-risk cases.The detection of predictive factors for HAT is thus crucial for post-transplant management, with significant repercussions on the survival of the graft and the patient.This work aims to investigate the relationship of donor-related factors with the onset of HAT after liver transplantation.

Methods: Consecutive liver transplants performed in our Center from November 2006 to July 2020 were retrospectively investigated.The donor parameters considered as predictive factors for HAT were 14: age, gender, body mass index (BMI), alcohol or tobacco abuse, diagnosis of diabetes, hypertension, dyslipidaemia, pre-mortem hypotension or cardiac arrest, pre-mortem use of high-dose (nor)epinephrine, cause of death, cold ischemia time (CIT).The donors were divided according to the post-transplant development of HAT.Categorical variables were compared with the Pearson chi-square test, while continuous variables were analyzed with Student's T test.Predictive features were analyzed with a binary logistic regression

Results: In the considered period, 359 liver transplants were performed in our center. The incidence of HAT in the population was 4.1%. The recipients, grouped according to the detection of HAT, showed no demographic or clinical differences. Examining the factors related to the donor, a relationship of HAT was found with death from anoxia (p=0.036), with the over-50 age (p=0.037), with a positive history of cardiovascular disease (p=0.044) or diabetes mellitus (p=0.038).Multivariate analysis of significant parameters showed a strong correlation with post-transplant development of HAT (p <0.0001).

Conclusions: HAT is one of the most dreaded complications after liver transplantation. It can result in a primary non-function of the graft in the absence of prompt treatment.The development of predictive factors is a good strategy to optimize the search for arterial complications.Our data indicated a good reliability of the donor's cardiovascular risk factors (age over 50, heart disease, diabetes mellitus, death from anoxia) on the transplant outcome, more reliable when present together.Through the transplant, the graft is moved in the recipient together with its pre-existing history.

CITATION INFORMATION: Pascale M., Moschetta G., Bianco G., Frongillo F., Nure E., Giovinazzo F., Agnes S. Predictive Factors of the Hepatic Artery Thrombosis in Liver Transplantation Through the Analysis of Donor Characteristics *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.M. Pascale: None. **G. Moschetta:** None. **G. Bianco:** None. **F. Frongillo:** None. **E. Nure:** None. **F. Giovinazzo:** None. **S. Agnes:** None.

Abstract# LB 81

Hepatic Artery Thrombosis and Liver Transplantation: Patient Management and Candidate Selection for Re-transplantation

H. Fernandez, A. Wall, A. Gupta, E. Martinez, J. Bayer, G. McKenna, N. Onaca, R. Ruiz, C. Spak, G. Testa, *Baylor University Medical Center, Dallas, TX*

Purpose: Hepatic artery thrombosis (HAT) is a severe complication in liver transplantation (OLTX). Re-OLTX for patients with HAT has been met with controversy due to uncertain long-term outcomes. Patient selection for re-OLTX has not been defined.

Methods: This is a retrospective review of patients undergoing OLTX between 1985-2016. A total of 4172 OLTX were performed, 265 identified with HAT. Recipient demographics, complications, allograft/patient survival, and re-OLTX outcomes were analyzed. OLTX cases were then divided into: Group 1 (HAT <28 days), Group 2 (28 days-1year) and Group 3 (> 1 year).

Results: Graft loss rate for patients with HAT within the first year of OLTX was 67.3%, while the mortality rate was 80.2%. Group 1 patients most commonly presented with sepsis, while Group 3 patients mainly presented with biliary complications. On multivariate analysis, recipient age and antibiotic usage were significant in patient survival. HAT patient survival was lower than non-HAT patients, with Group 1 patients having the lowest patient survival within the first two years (Figure 1). Patient survival for re-OLTX was similar for patients undergoing re-OLTX for indication of HAT, versus all other causes (Figure 2). Group 1 patient survival was lower at all time points compared to all other groups for patients with or without re-OLTX. Group 2 patient survival at 1 month, 3 months, 1 year were similar with and without re-OLTX, however, the 5-year survival with re-OLTX was significantly lower. Group 3 patients with and without re-OLTX had similar survival at all time points.

Conclusions: Graft and patient survival are critically dependent on the time of HAT diagnosis, and the entire clinical picture should be considered prior to re-OLTX, as this may prove detrimental to patient survival. Sepsis, antibiotic therapy, and recipient age are important when considering re-OLTx in Group 1 patients. Long-term survival of Group 2 patients should be considered when discussing re-OLTX in this subset of patients. Group 3 patients should be treated with non-surgical management. In the face of donor shortage, it is imperative to determine the role of re-OLTX in management of HAT patients.

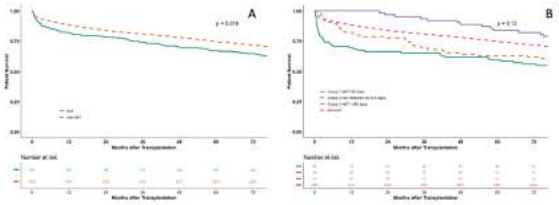


Figure 1. Patient survival a) HAT (all groups) vs. non-HAT patients b) overall survival of Group 1/2/3 vs. non hat patients

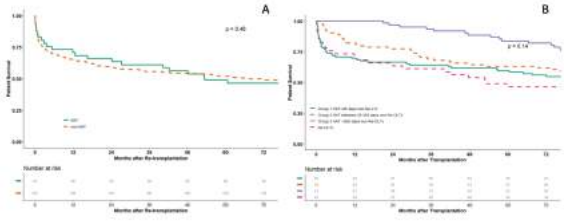


Figure 2. Patient survival a) re-OLTX for HAT vs. all other causes b) Group 1/2/3 non re-OLTX vs. re-OTLX patients

CITATION INFORMATION: Fernandez H., Wall A., Gupta A., Martinez E., Bayer J., McKenna G., Onaca N., Ruiz R., Spak C., Testa G. Hepatic Artery Thrombosis and Liver Transplantation: Patient Management and Candidate Selection for Re-transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Fernandez: None. **A. Wall:** None. **A. Gupta:** None. **E. Martinez:** None. **J. Bayer:** None. **G. McKenna:** None. **N. Onaca:** None. **R. Ruiz:** None. **C. Spak:** None. **G. Testa:** None.

Liver

Liver: Kidney Issues in Liver Transplantation

Abstract# 1080

Development of Novel Multivariable Logistic Regression Model for Predicting Acute Kidney Injury After Liver Transplantation

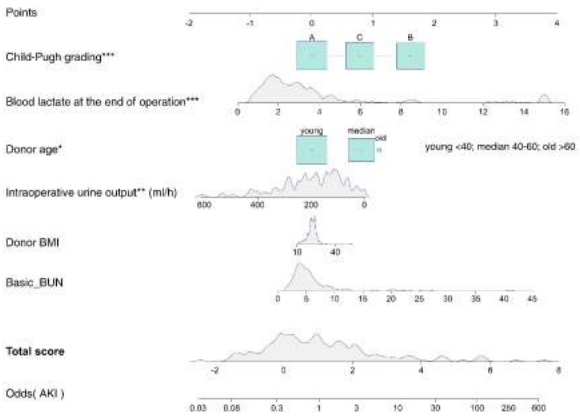
H. Chen, Y. Nie, Q. Zhao, X. He, *Organ Transplant Center,, The First Affiliated Hospital, Sun Yat-sen University, Guangzhou, China*

Purpose: Acute kidney injury (AKI) is a common early complication after liver transplantation, but there are no related predictive tools or models at present. The purpose of this study is to find out the risk factors related to the occurrence of AKI and establish a predictive model.

Methods: A retrospective analysis of patients with end stage liver disease who received liver transplantation in Organ Transplant Center, The First Affiliated Hospital of Sun Yat-sen University from 2016 to 2017 was performed. Univariate and multivariate logistic regression were used to identify factors associated with the occurrence of AKI, and a diagnostic nomogram was generated.

Results: A total of 223 patients with complete medical records were included and 111 patients suffered AKI after transplantation, accounting for 49.8% of the included cases. Univariate and multivariate analysis confirmed that blood lactate at the end of operation($P < 0.001$), Child-Pugh grading($P < 0.001$) and intraoperative urine output ($P = 0.005$) of recipients as well as age of donor($P = 0.02$) were independent predictors of AKI. A diagnostic nomogram with a c-statistic 0.803 was established.

Conclusions: Independent predictors of the occurrence of AKI in patients after liver transplantation include blood lactate at the end of operation, Child-Pugh grading and intraoperative urine output of recipients as well as age of donor. This is the frst study to develop a nomogram exclusively for AKI after liver transplantation that may predict occurrence in future studies.



CITATION INFORMATION: Chen H., Nie Y., Zhao Q., He X. Development of Novel Multivariable Logistic Regression Model for Predicting Acute Kidney Injury After Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Chen: None. **Y. Nie:** None. **Q. Zhao:** None. **X. He:** None.

Abstract# 1081

Non-Alcoholic Fatty Liver Disease in Non-Liver Transplant Patients

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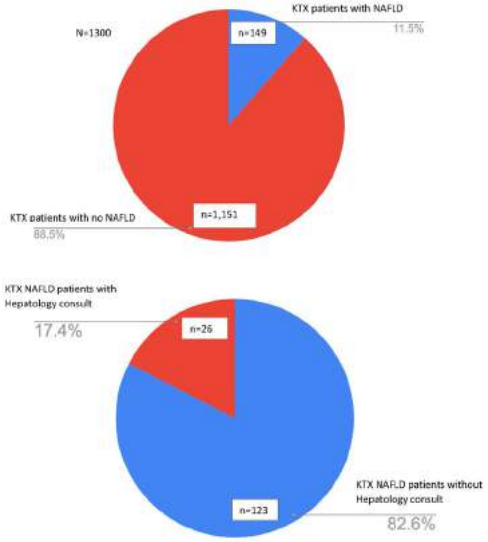
Purpose: The global prevalence of non-alcoholic fatty liver disease (NAFLD) is rising at an alarming rate, driven in large part by an increased incidence of diabetes and obesity. NAFLD is currently the number one cause for liver transplantation in the U.S. It has also been shown to have effects on patients undergoing transplants for other organs such as kidneys and pancreas. The purpose of our study was to evaluate the prevalence of fatty liver in non-liver transplant patients, looking particularly at kidney transplants.

Methods: We conducted a single-center retrospective cohort study of patients undergoing kidney transplants from January 2015 to December 2019. Patient data were obtained from the United Network for Organ Sharing (UNOS) as well as our hospital's electronic medical record system. Patient records were reviewed at the time of transplant to one year after transplant. Patients under 18 years of age at the time of transplant were excluded from our study. The presence of fatty liver was determined via radiological imaging. Our primary endpoint was the prevalence of NAFLD outside of known end-stage liver disease in kidney transplant patients.

Results: Of the 1300 kidney transplant patients, 149 (11.5%) were found to have a fatty liver noted before or after their initial kidney transplant. Abdominal ultrasound was the primary imaging technique utilized for diagnosis. The mean age of patients was 53 years for NAFLD and 51 years for non-NAFLD patients. Of the 149 patients with a fatty liver, 30 (20.1%) underwent a living donor transplant, 144 (96.6%) had diabetes and only 17.4% of NAFLD patients received a hepatology consult.

Conclusions: This study emphasized the need to diagnose and understand post-transplant outcomes for NAFLD patients in the kidney transplant population as well as increase efforts to ensure patients with fatty liver receive consultations from specialists/hepatologists. With NAFLD currently being the number one indication for liver transplants, undiagnosed NAFLD patients are at risk of developing health complications if left untreated and may require a liver transplant.



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Abstract# 1082

A Significantly Shorter Waiting Time to Subsequent Kidney Transplant After Liver Transplant by Using Safety Net Policy

P. Homkrailas, S. Bunnapradist, *Medicine, David Geffen School of Medicine at UCLA, Los Angeles, CA*

Purpose: In August 2017, a new simultaneous liver-kidney transplant (SLK) allocation policy and medical eligibility criteria were introduced. These criteria aim to avoid dual organ transplant in patients who may recover their native kidney function. For patients whose renal function fail to recover by 60 days after liver transplant, a "safety net" policy has been introduced to increase the priority of liver transplant recipients on kidney waiting list. Here we compared waiting time to kidney transplant among patient whose develop acute kidney injury (AKI) requiring dialysis during liver transplant peri-operation before and after safety net policy.

Methods: The OPTN/UNOS data from 1987-2020 of patient who were listed and had received liver transplant alone which developed AKI requiring dialysis within 30 days before or after liver transplant were included. Patients who were listed for SLK were excluded. Study populations were grouped according to safety net priority offer into before and after safety net policy.

Results: A total of 8,617 patients who had received liver transplant were listed for kidney transplant. Five hundred and twenty-six patients who had received dialysis within 30 days before or after liver transplant were listed for kidney transplant. There were 446 patients listed before safety net policy and 80 patients listed after safety net policy which 255 (57.2%) and 43 (53.8%) of them subsequently received kidney transplant, respectively. There were 280 patients (62.8%) and 80 patients (100%) listed for subsequent kidney transplant within 1 year before and after safety net policy, respectively. Seventy-three patients (16.4%) died while waiting for kidney transplant before safety net policy and 4 patients (5.0%) died while waiting after safety net policy. Before safety net policy, patients were listed for kidney transplant 255 (0-2472) days after liver transplant compared to 170 (0-363) days after safety net policy ($p=0.06$). Median waiting time to kidney transplant were 1,006 days before safety net policy and 241 days after safety net policy ($P<0.001$). There were 65.1% and 90.7% of subsequently transplanted patients receiving kidney transplant within 1 year before and after safety net policy, respectively ($p<0.001$).

Conclusions: After a safety net policy was introduced, patients who deemed a candidate for kidney transplant were listed within 365 days to take an advantage of safety net priority offer. None of them were listed after 365 days post liver transplant. Waiting time to kidney transplant after safety net policy were significantly shorter compared to before safety net policy with a significantly higher proportion of patients receiving kidney transplant within 1 year.

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Abstract# 1083

Perioperative Terlipressin Therapy Reduces the Risk of Acute Kidney Injury Post-Living Donor Liver Transplantation - A Systematic Review and Meta-analysis

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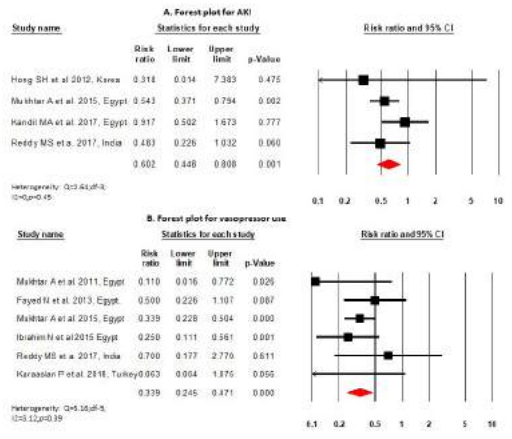
Purpose: Acute kidney injury (AKI) after liver transplantation precludes calcineurin inhibitors' therapy and is associated with poor outcomes. Terlipressin (Tp) has mortality benefit in pre-transplant patients with AKI; however, the data on perioperative use of Tp and its effect on post-transplant outcomes has not been systematically reviewed.

Methods: A comprehensive search of electronic databases from 2000/01/01 to 2020/10/31 was performed. Studies reporting the use of Tp in the perioperative period were included. We considered the random model risk ratio (RR) as the primary result unless I^2<50%. The primary aim was to assess the risk of AKI post-transplant. The secondary was to assess the need for renal replacement therapy (RRT), vasopressors, blood loss during surgery, hospital stay, and in-hospital mortality.

Results: A total of nine studies reporting 711 patients undergoing LDLT were included for analysis. Males-83%. Tp was given for a mean duration of 53.44±28.61 hours post-surgery. Tp reduced the risk of post-transplant AKI by 60% (RR-0.6; 95%CI-0.44-0.8; p=0.001) among 166 patients who received Tp compared to 269 control (C) patients among four studies (I^2=0; p=0.45) (Fig. A). Need of RRT was similar in Tp (n=135) and C (n=238) group (RR-0.75 (0.35-1.56); p=0.44) among 3 studies (I^2=0; p=0.75). Tp therapy reduced the risk of vasopressor use by 33% (0.24-0.47; p<0.001) among six studies (I^2=3.12; p=0.39), which reported 240 patients in the Tp group and 342 in the control group. (Fig. B) Blood loss was similar in both groups (-302.12 ±215.32; p=0.16) among four studies (I^2=43.16; p=0.15) which reported. There was no mortality benefit with Tp [RR-1.08 (0.48-2.42);p=0.84)] among two articles, which reported in-hospital mortality among 147 and 242 patients in T and C groups, respectively. Mean hospital stay was also similar in both groups [-0.94 (-2.24 to 0.35) ;p=0.15] among 4 studies (I^2=52.5; p=0.09) which reported hospital stay among 424 patients. Mean ICU stay was also similar in both the groups [0.08 (0.42 to 0.18) ;p=0.84] among 4 studies (I^2=82.83; p<0.001) which reported 465 patients. Only one study reported adverse events (bradycardia) to Tp.

Conclusions: Perioperative Tp therapy reduces the risk of post-transplant AKI and the need for vasopressor treatment. However, its use is not associated with a reduction in hospital stay, need for RRT, or mortality. Future extensive, randomized studies are required to assess the beneficial role of Tp on post-transplant outcomes.



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Abstract# 1084

Comparison of Allograft Outcomes in SLK Transplant Patients with and without ESLD: A UNOS Database Analysis

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Purpose: Simultaneous liver and kidney transplants (SLKT) have started to gain ground in the treatment of liver disease with associated acute or chronic kidney disease. In certain metabolic liver diseases with resultant kidney failure, SLKT is performed to help improve kidney graft survival, when the liver function is seemingly normal. Primary hyperoxaluria (PH), a rare autosomal recessive liver disease that leads to kidney failure and is the most common cause of metabolic liver disease treated with SLKT.

SLKT is known to provide immunological protection for kidney allograft, as compared to kidney alone, for unclear reasons. In this analysis, we compared the allograft survival in patients with and without End-Stage Liver Disease and explored whether this immune tolerance is enhanced by the presence of ESLD pre-transplant, similar to how bone marrow transplant patients undergo a preparative regimen to create an environment conducive to long-term engraftment.

Methods: We conducted a retrospective analysis of UNOS database (2000-2019) among SLKT recipients who had a diagnosis of Oxalosis or Cirrhosis. To prevent the selection bias, only younger patients with age<40 years were selected for the study in both groups. Graft survival time and graft failure rate were measured using Kaplan Meier analysis.

Results: Of the total of 365 patients, 116 (31.8%) were in the Oxalosis group and the remaining 249 were in the cirrhosis group. Patients in the Oxalosis group were younger, had lower BMI, higher rate of delayed graft function (48.3% vs 26.9%, p<0.001), increased dialysis vintage time and less preemptive transplants (Table 1). There was no difference in acute rejection rates, death censored kidney graft survival at 1st, 3rd, 5th and 10th year between the groups.

Conclusions: Among the SLKT recipients, young patients with liver cirrhosis had similar graft and patient outcomes compared to patients with metabolic liver disease, who otherwise had normal liver function pre-transplant. This could be due to shorter ESRD duration in cirrhosis patients pre-transplant. The presence of ESLD pre-transplant does not appear to affect the rate of allograft rejection in SLKT recipients.

Figure 1: Kaplan Meier death censored kidney graft survival

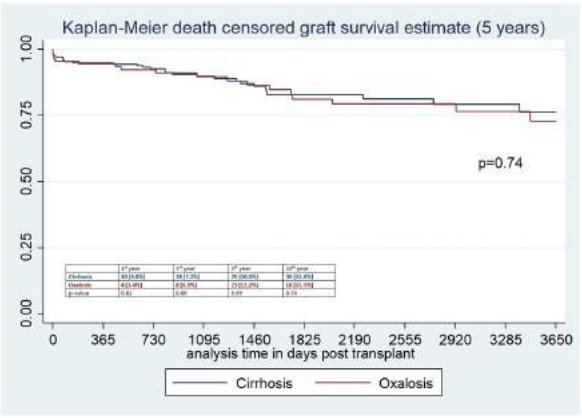

Table 1: Baseline characteristics

	Cirrhosis [n=249]	Oxalosis [n=116]	p-value
Age [Mean, SD]	33 [7.2]	18 [10.7]	<0.001
Delayed Graft function	67 [26.9%]	56 [48.3%]	<0.001
Dialysis duration pre Tx	132 [41 – 323]	358 [211 – 608]	<0.001
Preemptive	61 [24.5%]	10 [8.6%]	<0.001
Total Bili (Mean, SD)	11.1 [13.3]	0.5 [0.57]	<0.001
Encephalitis (listing to transplant)	161 [64.7%]	11 [9.5%]	<0.001
Ascites (Listing to transplant)	208 [83.5%]	23 [19.8%]	<0.001
Acute rejection [Kidney]	25 [10.0%]	16 [13.8%]	0.29

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Abstract# 1085

The Combined Effects of Simultaneous Portal Vein Thrombosis and Renal Dysfunction in Liver Transplant Recipients

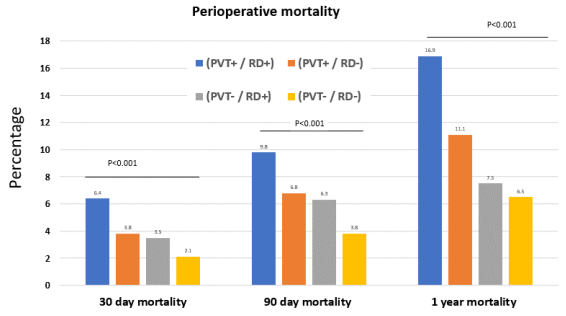
M. Molinari[1], C. F. Carillo[2], D. Dongling[1], D. Jorgensen[1], S. Dharmayan[1], C. Kaltenmeier[1], H. Liu[1], J. Behari[1], V. Rachakonda[1], S. Ganesh[1], C. Hughes[1], A. Tevar[1], H. Al Harakeh[1], B. Emmanuel[1], A. Humar[1], R. Bataller[1], [1]*University of Pittsburgh Medical Centre, Pittsburgh, PA,* [2]*Medicine, University of Pittsburgh Medical Centre, Pittsburgh, PA*

Purpose: Simultaneous portal vein thrombosis (PVT) and renal dysfunction (RD) have unknown effects after liver transplant (LT). We analyzed the outcomes of patients with simultaneous PVT/RD after LT for nonalcoholic steatohepatitis (NASH) and for alcoholic liver disease (ALD), the two most common indications for LT in the US.

Methods: Data from the UNOS Star files were used to identify adult recipients (≥18 years) of deceased donors LT with NASH or ALD. Patients with ABO incompatibility, non-hepatocellular carcinoma malignancies, partial grafts, and multi-visceral transplants were excluded. RD was defined as serum creatinine ≥1.5 mg/dL or the need for dialysis. Student's t-test, chi-square, ANOVA, Kaplan-Meier, log-rank test, Cox regression, logistic and Poisson regression were used for statistical analyses.

Results: Between 2006 and 2016, the percentage of patients undergoing LT with PVT, RD, and simultaneous PVT/RD went from 7.2% to 11.3% (P<0.001), from 33.8% to 39.2% (P<0.001) and from 2.4% to 4.5% (P<0.001) respectively. Recipients with simultaneous PVT/RD had a 30-days, 90-days and at 1-year mortality of 6.4%, 9.8% and 16.9% in comparison to 2.1%, 3.8% and 6.5% in patients without PVT or RD (P<0.001). The 5-year survival of recipients without PVT or RD was 82.1% (95% CI 80.9-83.3). For patients with RD alone, the 5-year survival was 75.5% (95% CI 74.3-77.5), for patients with PVT alone was 74.8% (95%CI 71.9-77.9) and for patients with simultaneous PVT/RD was 71.1% (95% 70.1-73.9) (All pairwise comparisons: P<0.05). Cox regression analysis showed that PVT, RD and simultaneous PVT/RD were independent risk factors after adjusting for recipient age, sex, ethnicity, diabetes, BMI, MELD, history of previous abdominal surgeries, ascites, TIPSS, spontaneous bacterial peritonitis, donor age, and year of transplantation. The adjusted hazard ratio for RD was 1.45 (95% CI 1.30-1.61; P≤0.0001), for PVT was 1.29 (95% CI 1.05-1.58; P=0.012), and for simultaneous PVT/RD was 2.11 (95% CI 1.73-2.56; P≤0.0001).

Conclusions: The number of patients undergoing LT for ALD or NASH with PVT, RD, and simultaneous PVT/RD has increased over time. PVT, RD and simultaneous PVT/RD are associated with increased perioperative mortality and inferior long-term survival. The effects of simultaneous PVT/RD are more pronounced in patients with NASH than in LT recipients with ALD



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Abstract# 1086

Combined Liver-Kidney Transplantation in Adults With End-Stage Liver Disease: Risk Factors in Patients with Chronic Kidney Disease Stages 3-5, Not on Maintenance Dialysis

A. Santos, E. Bueno, M. Leghrouz, *University of Florida, Gainesville, FL*

Purpose: We aimed to identify the risk factors for combined liver-kidney transplantation (CLKT) vs. liver transplantation alone (LTA) in end stage liver disease (ESLD) patients with estimated glomerular filtration rate (eGFR) <60 ml/.min, not on dialysis.

Methods: Using OPTN data, we studied adult ESLD patients who received deceased-donor CLKT [N=2016 (12.9%] or LAT [N=13,588 (87.1%)] in July 2002-Mar 2016 with a 4-point modification of renal disease (MDRD) equation-estimated glomerular filtration rate (e-GFR) of below 60 ml/min (stratified into CKD stage 3: 30-59 ml/min, CKD stage 4: 15-39 ml/min, and CKD stage 5: <15 ml/min) and not on maintenance dialysis (NOD). The outcome of the study was CLKT or LAT. We reported odds ratio (OR) and 95% confidence interval (CI) for CLKT vs. LTA associated with recipient, donor, and clinical variables.

Results: Out of 15, 604 CLKT and LTA recipients with MDRD-eGFR <60 ml/min. 8,784 (56.3%) had CKD stage 3; 4,916 (31.5%) had CKD stage 4; and 1,891 (12.1%) had CKD stage 5. CKD stages 5 and 4 at WL and transplant were the strongest risk factors for CLKT vs. LTA (FIG.1). Strong non-renal risk factors for CLKT vs. LTA were WL-time, Black recipients, liver re-transplant, and DM (**TAB. 1**). Factors associated with stronger likelihood of LTA vs. CLKT were WL-MELD >35, donor age>60 years, WL-MELD 31-35, female recipient's sex, and hepatocellular carcinoma (**FIG. 1 & TAB 1**). Transplant center volume rank in the middle or highest tertile was associated with a lower likelihood of CLKT vs. LTA than the lowest tertile (**FIG. 2, TAB. 1**).

Conclusions: Advanced CKD, waitlist time, AA ethnicity, previous liver transplant and DM are strong risk factors favoring CLKT vs. LTA.

Risk Factor	95%CI LL-UL	OR	
Wait Time>2 Yr	2.94-4.91	3.80	Favors CLKT
Wait Time> 1-2Yr	2.58-3.97	3.20	
Black Recip.	2.45-3.51	2.90	
Wait Time 0.5-1 Yr	2.32-3.31	2.77	
Re-transplant , liver	1.39-1.99	1.66	
Diabetes, Recip	1.36-1.72	1.53	
Hispanic Recip.	1.24-1.72	1.46	
Non-US Citizen	1.03-1.85	1.38	
Prev Abdom Surg	1.15-1.46	1.29	
BMI <21, Recip.	1.02-1.60	1.27	
Era 2009-2016	1.01-1.28	1.14	
Donor Age>60 Yr	0.20-0.32	0.25	Favors LTA
Female Recipient	0.43-0.54	0.48	
HCC	0.35-0.81	0.53	
Ctr 3rd tertile (total liver Txp)	0.62-0.89	0.74	
BMI > 30, Recip.	0.64-0.84	0.74	
Donor Age 40-60 Yr	0.67-0.84	0.75	
BMI 26-29, Recip	0.68-0.91	0.78	
Ctr 2nd tertile (total liver Txp)	0.64-0.95	0.78	
CIT 6-10 Hr Liver	0.71-0.90	0.80	
Private Insurance	0.75-0.95	0.84	

TABLE 1. Non-Renal Risk Factors for Combined Liver & Kidney Transplantation (CLKT) versus Liver Transplantation Alone (LTA)

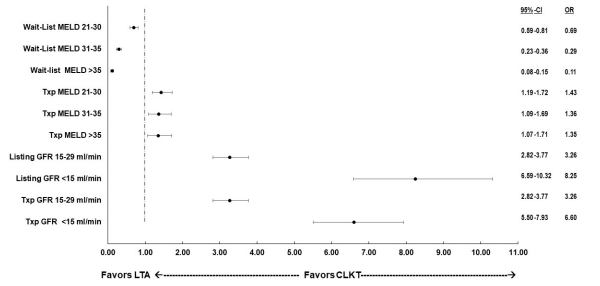
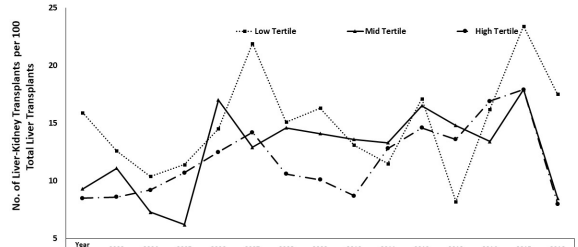


FIGURE 1. MELD and estimated GFR as Risk Factors for Combined Liver & Kidney Transplantation

LTA: liver transplantation alone CLKT: combined liver & kidney transplantation



Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Low Tertile	15.9	12.6	10.4	11.4	14.5	21.9	15.1	16.3	13.1	11.5	17.1	8.2	16.2	23.4	17.5
Mid Tertile	9.3	11.1	7.3	6.2	17	12.9	14.6	14.1	13.6	13.3	16.5	14.8	13.4	17.9	8.5
High Tertile	8.5	8.6	9.2	10.7	12.5	14.2	10.6	10.1	8.7	12.8	14.6	13.6	16.9	17.9	8

FIGURE 2. Annual Combined Liver-Kidney Transplant Rates Expressed as Percentage of Total Liver Transplants in Volume Tertile Categories

2016 Data- partial, not whole year

CITATION INFORMATION: Santos A., Bueno E., Leghrouz M. Combined Liver-Kidney Transplantation in Adults With End-Stage Liver Disease: Risk Factors in Patients with Chronic Kidney Disease Stages 3-5, Not on Maintenance Dialysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Santos: None. **E. Bueno:** None. **M. Leghrouz:** None.

Abstract# 1087

Obesity is a Risk Factor for Progression to Kidney Transplant Waitlisting After Liver Transplantation

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Purpose: Non-alcoholic steatohepatitis (NASH) has emerged as a leading cause of cirrhosis, and obesity-associated comorbid conditions, including renal disease have become more prevalent. Obesity predisposes the kidney to hyperfiltration injury, potentially impairing recovery from acute kidney injury. Prospective identification of patients at risk for renal dysfunction has been limited by poor performance of renal function estimating equations among cirrhotics. To better understand the relationship between obesity at time of liver transplantation and likelihood of renal disease progression, we examined likelihood of listing for kidney transplantation (KT) after liver transplant alone (LTA) by obesity class.

Methods: Utilizing data from SRTR (2005-2018), 68,607 LTA recipients were studied. Fine and Gray competing risks models were used to analyze the association of obesity at time of LTA with likelihood of subsequent listing for KT.

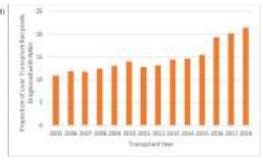
Results: 27.4% of LTA recipients were obese (BMI≥30kg/m2) and were 10% more likely to require listing for KT following LTA compared to non-obese (aHR: 1.10, 95%CI: 1.01-1.20). This risk increased with obesity class, with no significant risk difference among recipients with Class I obesity but 37% higher risk among Classes II and III (BMI: ≥35kg/m^2) recipients compared to non-obese (aHR: 1.37, 95%CI: 1.17-1.56). Moreover, recipients with Classes II and III obesity at time of LTA compared to non-obese were 57% more likely to be listed for KT within their first year post-LTA (aHR: 1.57, 95%CI: 1.18-2.10).

Conclusions: These findings suggest obesity was a risk factor for failure of renal recovery and/or renal disease progression post-LTA and may further confound identification of renal dysfunction and/or prediction of renal recovery among cirrhotics.

Table 1. Adjusted risk of listing for kidney transplant within various times since transplant (competing risks model)

	One year		Three years		Five years	
	aHR (95% CI)*	P	aHR (95% CI)*	P	aHR (95% CI)*	P
Characteristic						
BMI ≥ 30 (ref: BMI <30)	1.06 (0.89-1.26)	0.52	1.08 (0.96-1.22)	0.19	1.11 (0.99-1.25)	0.05
Obesity (ref: BMI < 30)						
Class I (30-34.9)	1.03 (0.83-1.28)	0.79	0.98 (0.83-1.16)	0.79	0.97 (0.83-1.12)	0.64
Classes II and III (≥35)	1.57 (1.18-2.10)	0.002	1.44 (1.19-1.75)	<0.00 1	1.37 (1.16-1.63)	<0.001

* adjusted for age at transplant, race, gender, diabetes type, previous abdominal surgery, MELD score, liver diagnosis (NASH yes/no), eGFR at transplant



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Abstract# LB 82

Chances of Renal Recovery in Liver Only Transplant Recipients Who Were Eligible for Simultaneous Liver-Kidney Transplant

J. Cui[1], A. Spann[2], A. Shingina[2], H. M. Schaefer[3], J. C. Slaughter[4], S. Alexopoulos[5], M. Izzy[2], *[1]Internal Medicine, Vanderbilt University Medical Center, Nashville, TN, [2]Gastroenterology, Hepatology, and Nutrition, Vanderbilt University Medical Center, Nashville, TN, [3]Nephrology, Vanderbilt University Medical Center, Nashville, TN, [4]Biostatistics, Vanderbilt University Medical Center, Nashville, TN, [5]Hepatobiliary Surgery and Liver Transplantation, Vanderbilt University Medical Center, Nashville, TN*

Purpose: Progressive decline in renal function is common among patients with end-stage liver disease. Liver transplant (LT) candidates can often develop severely impaired renal function which prompts the consideration of simultaneous liver kidney transplantation (SLKT). In 2017, the United Network for Organ Sharing (UNOS) recommended SLKT in patients with GFR <30 ml/min after being <60 ml/min for at least 90 days. This study aims to assess the post-LT renal recovery in patients who met UNOS criteria for SLKT, yet received liver alone.

Methods: We performed a retrospective records review of adult patients who underwent LT between 1/1/2009 to 12/31/2018 at a North American Center. Liver only recipients whose last GFR before LT was <30 ml/min after being <60 ml/min for more than 90 days were included. Demographic, clinical, and laboratory data were collected. Partial recovery was defined as post-LT GFR increase to 30-60 ml/min and full recovery was defined as increase to >60 ml/min.

Results: Of 800 patients who underwent LT during the observation period, 123 patients had GFR <30 ml/min pre-LT and of them only 34 had GFR <60 ml/min preceding LT by 90 days or longer. Median age was 63 years. Females constituted 59% of the cohort. Following liver transplant, 20 patients (59%) had partial recovery and 10 patients (29%) had full recovery within a median of 6 and 61 days, respectively. Among baseline characteristics including comorbidities, abnormal radiologic appearance of the kidneys pre-LT, reflective of chronic disease, was the only predictor of lack of recovery (p=0.03). All initial immunosuppressive regimens were tacrolimus-based. On last follow up after a median of 4.8 years, 15 patients (44%) still had GFR >30 ml/min while 19 (56%) patients were on dialysis, awaiting kidney transplant, or received kidney transplant. Patients with pre-LT unrecovered AKI or HRS had the highest likelihood of recovery on last follow up (OR 4.7, p=0.03).

Conclusions: LT candidates who meet UNOS criteria for SLKT yet undergo LT only still have a remarkably high chance for post LT renal recovery, approaching 90% on short-term. A large proportion of patients can sustain recovery long-term. The use of the 2 to 12 month Safety Net for kidney transplant post-LT is an important consideration for those with potentially recoverable renal dysfunction pre-LT as opposed to SLKT.

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DISCLOSURES: J. Cui: None. **A. Spann:** None. **A. Shingina:** None. **H.M. Schaefer:** None. **J.C. Slaughter:** None. **S. Alexopoulos:** None. **M. Izzy:** None.

Liver

Liver: Cirrhosis - Portal Hypertension and Other Complications?

Abstract# 1088

Transplant-free Survival in Alcohol-related Liver Disease (ALD) Patients Presenting with First Evidence of Ascites

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Purpose: The development of ascites is a poor prognostic sign for patients with cirrhosis. The factors associated with transplant-free survival at initial presentation with ascites in patients with alcohol-related liver disease (ALD) are currently unknown. We thus aimed to identify these factors in order to direct limited resources to those patients with ALD at highest risk of needing transplant or dying.

Methods: Adult patients with ascites in the "Evaluating Alcohol Use in Alcohol-related Liver Disease prospective cohort study" (NCT03267069 clinicaltrials.gov) were identified from 2016-2020. Transplant status and death were tracked in patients' charts from time of enrollment through June 2020. Demographic, clinical, and laboratory factors at initial ascites presentation were identified as potential predictors of transplant-free survival. Fisher's exact test and Wilcoxon rank sum test were conducted to test the association between predictors and transplant/death status. Cox proportional hazards models were used to identify significant predictors of transplant/death status. Predictors with p<0.1 in the univariable model were included in the final model.

Results: A total of 98 patients were identified. Median (IQR) follow up time was 2.6 years (1.5 - 4.6). By last follow up, 45/98 (46%) had either been transplanted or died. Of patients that survived without transplant, 45% had resolution or clinical improvement of ascites. Variables associated with transplant/death were non-employed status, presence of encephalopathy, number of portal hypertension complications, presence of cirrhosis on histology (p<0.01) and male sex, BMI, Model for End-stage Liver Disease (MELD) score, Maddrey's Discriminant Function, lower ALT, higher total bilirubin, higher INR, and presence of hepatitis on histology (p<0.05). In the multivariable Cox proportional hazards model, younger age (HR 0.92, p<0.05), higher BMI (HR 1.12, p<0.01), and higher comorbidity burden (HR 2.32, p<0.005) were associated with increased likelihood of transplant/death. Mean age was significantly different when outcome groups were separated into transplant (53.2), death (62.8), and transplant-free survival (57.9) (p<0.05).

Conclusions: Higher comorbidity index and BMI at time of initial presentation with ascites were associated with increased likelihood of transplant/death. While younger age appears to be associated with increased likelihood of transplant/death, this likely reflects the younger population of patients that are selected for transplant, as mean age of transplant patients was the lowest of all groups.

CITATION INFORMATION: Fahoum K., Shen N., Basu E., Lee J., Kaplan A., Salajegheh A., Rosenblatt R., Jesudian A., Lucero C., Fortune B., Safford M., Brown R. Transplant-free Survival in Alcohol-related Liver Disease (ALD) Patients Presenting with First Evidence of Ascites *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Fahoum: None. **N.T. Shen:** None. **E. Basu:** None. **J. Lee:** None. **A. Kaplan:** None. **A. Salajegheh:** None. **R. Rosenblatt:** None. **A. Jesudian:** None. **C. Lucero:** None. **B. Fortune:** None. **M.M. Safford:** Salary; Name of Commercial Interest; Amgen Inc. Salary; If "Other" Please Explain; Salary support for investigator initiated research. **R.S. Brown:** None.

Abstract# 1089

Identification of Molecular Markers for Liver Cirrhosis by Single-nucleus Rna Sequencing

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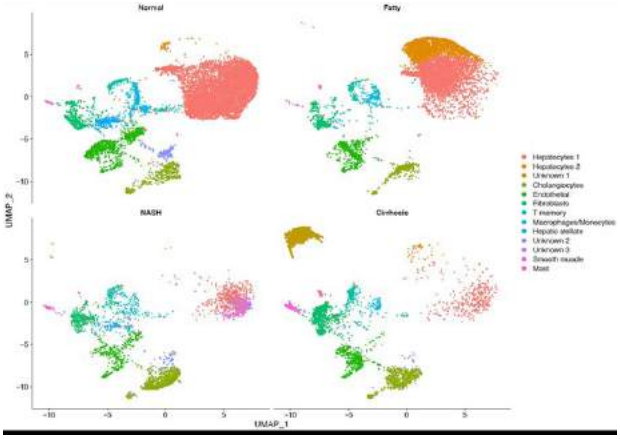
Purpose: Non-alcoholic fatty liver disease (NAFLD) is characterized by metabolic syndrome and the accumulation of fat in the liver cells (hepatocytes) leading to inflammation and potentially cirrhosis. Hereby, we assessed the use of single-cell/nucleus genomics to identify the molecular and cellular mechanisms of fibrosis/cirrhosis caused by NASH at single cell resolution.

Methods: Single cell or nucleus sequencing identifies the genomic and transcriptomics information from individual cells using next-generation sequencing (NGS) platform. We isolated single nuclei from fresh-frozen (FF) samples including normal, fatty, fibrotic and cirrhotic liver tissues (NASH cirrhosis). We used 10x Genomics Chromium Platform and generated data in their Cell-Ranger Pipeline. Unsupervised "Seurat" package was used to generate cluster and cell identification.

Results: We identified two different hepatocyte clusters in fatty liver samples. Furthermore we observed a significant decrease of healthy number of hepatocytes in NASH and cirrhotic samples due to the replacement of epithelial cells with fibrotic cell. Replacement of those cells has been correlated with the elevated level of CACNA1C, CFTR, COL4A1, and COL4A2. Interestingly, there was a distinct class of unknown cells in cirrhotic livers that deserve further investigation (Fig 1).

Conclusions: In this study, we identified different cell/nucleus clustering on the liver sample type, ranging from normal to cirrhotic, highlighting the cellular shift occurring during different stages of liver disease leading to NAFLD-Cirrhosis



CITATION INFORMATION: Kuscu C., Kuscu C., Akram M., Shetty A., Maluf D., Eason J., Mas V. Identification of Molecular Markers for Liver Cirrhosis by Single-nucleus Rna Sequencing *AJT, Volume 21 Supplement 3*

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Abstract# 1090

Algorithms to Identify Alcoholic Hepatitis Hospitalizations in Patients with Cirrhosis

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Purpose: With the rising proportion of patients receiving liver transplantation for alcoholic hepatitis, it is important to identify methods of ascertaining hospitalizations with alcoholic hepatitis to facilitate research using large administrative databases.

Methods: This was a retrospective study using data from patients with cirrhosis identified between 2008 and 2016 in the Veterans Health Administration. Hospitalization data including admission laboratory data and administrative codes were obtained for each patient. We randomly sampled charts from patient hospitalizations with abnormal liver tests or codes for alcoholic liver damage or acute hepatitis. Charts were manually adjudicated for the presence or absence of alcoholic hepatitis as the gold standard using published criteria. Several *a priori* algorithms were then evaluated to determine the positive predictive value (PPV) of each, as well as the 95% confidence interval (CI).

Results: A total 355 randomly sampled patient hospitalizations were manually adjudicated, 36% or which were determined to have alcoholic hepatitis. The median age was 57 years (interquartile range [IQR] 53, 62), 96.9% male, with 78.3% alcohol or alcohol plus hepatitis C virus as the primary etiologies of liver disease. Evaluating four series of algorithms (**Table**), a combination of a diagnostic code for alcoholic hepatitis and supportive laboratory findings yielded ≥90% PPV, with >95% PPV using optimized laboratory cut points.

Conclusions: We have identified algorithms to identify alcoholic hepatitis hospitalizations with extremely high PPV. These may be used in retrospective studies incorporating large administrative datasets.

Algorithm	Algorithm Positive (N)	PPV (%)	95% CI
1 – Abbreviated Clinical Criteria			
AST >50 & <400, ratio>1.5, bilirubin>3	214	51.9	45.0 - 58.7
AST >110 & <435, ratio>1.5, bilirubin>3	132	61.4	52.5 - 69.7
AST >110 & <435, ratio>2.0, bilirubin>3	112	64.3	54.7 - 73.1
AST >110 & <435, ratio>2.0, bilirubin>5	90	70.0	59.4 - 79.2
2 – ICD Criteria (code for alcoholic hepatitis)	99	71.7	61.8 - 80.3
3 – Abbreviated Clinical OR ICD Criteria			
AST >50 & <400, ratio>1.5, bilirubin>3	243	49.0	42.5 - 55.4
AST >110 & <435, ratio>1.5, bilirubin>3	178	57.3	49.7 - 64.7
AST >110 & <435, ratio>2.0, bilirubin>3	163	60.1	52.2 - 67.7
AST >110 & <435, ratio>2.0, bilirubin>5	144	63.2	54.8 - 71.1
4 – Abbreviated Clinical AND ICD Criteria			
AST >50 & <400, ratio>1.5, bilirubin>3	70	**90.0**	80.5 - 95.9
AST >110 & <435, ratio>1.5, bilirubin>3	53	**94.3**	84.3 - 98.8
AST >110 & <435, ratio>2.0, bilirubin>3	48	**93.8**	82.8 - 98.7
AST >110 & <435, ratio>2.0, bilirubin>5	45	**95.6**	84.9 - 99.5

** Ratio refers to AST to ALT ratio*

Abbreviations: ICD = International Classification of Diseases, AST = aspartate aminotransferase, ALT = alanine aminotransferase; PPV = positive predictive value; CI = confidence interval

CITATION INFORMATION: Panchal S., Kaplan D., Goldberg D., Mahmud N. Algorithms to Identify Alcoholic Hepatitis Hospitalizations in Patients with Cirrhosis *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Panchal: None. **D. Kaplan:** None. **D. Goldberg:** None. **N. Mahmud:** None.

Abstract# 1091

Longitudinal Quality of Life Assessment in Liver Transplant - Feasibility Study and Early Results

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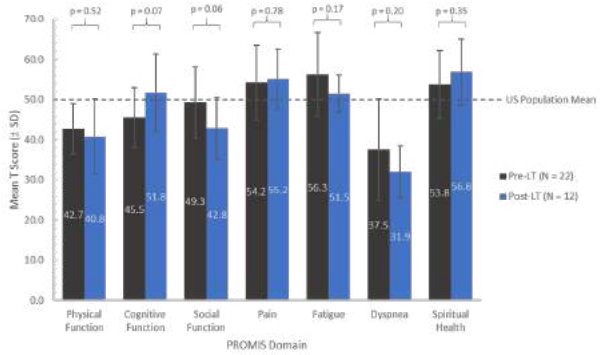
Purpose: In addition to survival, quality of life (QoL) is critical to optimizing care in liver transplantation (LT). Although QoL is associated with clinical outcomes in other settings, QoL assessments are not part of routine transplant care, and little is known about longitudinal changes pre- and post- LT. Furthermore, assessments performed by clinic staff can be time-consuming and cost prohibitive. Therefore, we aimed to measure QoL in pre- and post LT patients via brief monthly self-assessments.

Methods: A prospective single-center study included patients with cirrhosis evaluated for LT 1/2018 - 10/2020; both pre- and post- LT patients were included. Recruitment began in 10/2020 and is ongoing. The NIH Patient Reported Outcomes Measurement Information System (PROMIS) is used to measure QoL through online computerized adaptive tests (CATs) emailed to patients at baseline and repeated monthly. All PROMIS measures are reported as t scores referenced to the general US population with a mean of 50 and an SD +/- 10. A score above 50 indicates that a subject has a higher degree of the domain relative to the general US population.

Results: 39 patients were enrolled from 10/14 to 11/19 2020 [expected enrollment by 6/21 (ATC 2021) is 135]. 87% of patients completed all baseline surveys, 36% were female, 82% were White, 3% Black and 13% Hispanic. Etiology of cirrhosis was NASH (41%), ETOH (28%), HCV/HBV (18%), Biliary (13%), and Other (23%). 27 (69%) were pre-LT with a mean MELD 14.9 +/- 5.5 and 12 (31%) were post-LT with mean time since transplant of 1.9 months (range 0-5). The sample is not yet powered to show significance, but trends in the pre vs post LT comparison show an increase in perceived cognitive function (+6.3), and reduction of dyspnea (-5.6) and fatigue (-4.8), as well as increased spiritual health (+ 3). Pre/post LT physical function remains below the general population (42.7/40.8) while pain remains high (54.2/55.2) and social function drops (49.3/42.8). (Figure 1)

Conclusions: PROMIS CATs can successfully be used to measure QoL in pre- and post- LT patients via online self-assessments without assistance by a coordinator. Early results show high response rates (87%) and trends in changes pre- and post- LT, which are promising as enrollment continues. Change in QoL domain scores over time and association with adverse clinical outcomes will be examined as monthly data is collected. Thus, PROMIS CATs may provide a cost-effective way to longitudinally assess QoL in LT patients and optimize outcomes.

Figure 1: QoL Across PROMIS Domains



CITATION INFORMATION: Siddiqui O., Polineni P., Thuluvath A., Loftus C. Longitudinal Quality of Life Assessment in Liver Transplant - Feasibility Study and Early Results *AJT, Volume 21 Supplement 3*

DISCLOSURES: O.M. Siddiqui: None. **P. Polineni:** None. **A.J. Thuluvath:** None. **C. Loftus:** None.

Abstract# 1092

Blood Pressure Variability Immediately After Liver Transplant Predicts the Likelihood of Long-Term Cardiovascular Events

K. N. Truitt[1], K. Chen[2], Y. Yano[3], D. Gregory[4], L. B. VanWagner[5], *[1]Northwestern Memorial Hospital, Chicago, IL, [2]Harvard University, Cambridge, MA, [3]Duke University School of Medicine, Durham, NC, [4]Northwestern University Feinberg School of Medicine, Chicago, IL, [5]Northwestern University Feinberg School of Medicine, Northwestern University Feinberg School of Medicine, Chicago, IL*

Purpose: Cardiovascular disease is a leading cause of mortality in liver transplant recipients (LTRs). Adequate blood pressure (BP) control within one year after liver transplant (LT) is associated with improved survival and decreased cardiovascular events (CVEs). However, in clinical practice, extreme values of BP are often discarded, and the lowest or mean value is chosen as the "true" BP. In older adults and among perioperative cardiac surgery patients, this BP variability, independent of mean BP, is associated with adverse outcomes. Whether BP variability is associated with CVEs in LTRs is unknown.

Methods: We conducted a longitudinal cohort study of adult LTRs within a large tertiary care network in the United States between 2010-2016. Day-to-day BP variability within the first 60 days after LT was measured utilizing variability independent of the mean (VIM). To assess the association between early post-LT BP variability and future CVEs, we used Cox proportional hazard regression. Models were adjusted for mean BP, age, sex, race, time-varying BP medication use, and pre-transplant diabetes and atherosclerotic cardiovascular disease (ASCVD).

Results: Among 195 LTRs (32.3% female, 10.8% black, mean age 55.6 years), 19.0% had a CVE within a mean follow up of 3.01 years (standard deviation (SD) 2.08). The average range in systolic BP was 20.89 mmHg (SD 13.60) and diastolic BP was 12.65 mmHg (SD 6.55). Increased systolic BP variability was associated with a decreased risk of CVEs (Hazard Ratio (HR) 0.95, 95% confidence interval (CI) 0.92-0.99). This was particularly true for males (HR 0.95, CI 0.90-0.99) and patients with pre-LT ASCVD (HR 0.94, CI 0.88-0.98). There was a trend towards decreased mortality among male LTRs (HR 0.95, CI 0.09-1.01), but not females. Increased diastolic BP variability was also associated with a decreased risk of CVEs (HR 0.86, 0.78-0.95); specifically for persons younger than 65 (HR 0.87, CI 0.79-0.97), males (HR 0.85, CI 0.76-0.94), and persons without pre-LT diabetes (HR 0.90, CI 0.80-1.00) or ASCVD (HR 0.77, CI 0.65-0.91).

Conclusions: Increased BP variability, independent of mean BP, is associated with decreased CVEs in LTRs, while it is associated with adverse outcomes in other populations. We postulate that increased BP variability reflects a better vascular recovery in persons undergoing LT, but further research is needed.

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DISCLOSURES: K.N. Truitt: None. **K. Chen:** None. **Y. Yano:** None. **D. Gregory:** None. **L.B. VanWagner:** Consulting Fee; Name of Commercial Interest; W. L. Gore & Associates. Consulting Fee; Nature of Relationship; consultant. Grant/Research Support; Name of Commercial Interest; W. L. Gore & Associates. Grant/Research Support; Nature of Relationship; investigator-initiated research.

Abstract# LB 83

Loneliness in Adults Awaiting Liver Transplantation at 7 U.S. Transplant Centers During the Covid-19 Pandemic

K. Berry[1], D. Kent[1], S. Seetharaman[1], R. Wong[1], Y. Mohamad[1], F. Yao[1], M. Duarte[2], B. Boyarsky[3], R. Rahimi[4], A. Duarte-Rojo[5], M. Kappus[6], M. Volk[7], D. Ladner[8], D. Segev[3], M. McAdams-DeMarco[3], E. Verna[9], D. Ganger[8], J. C. Lai[1], *[1]UCSF, San Francisco, CA, [2]Johns Hopkins, Baltimore, CA, [3]Johns Hopkins, Baltimore, MD, [4]Baylor, Dallas, TX, [5]Pittsburgh, Pittsburgh, PA, [6]Duke, Durham, NC, [7]Loma Linda, Loma Linda, CA, [8]Northwestern, Chicago, IL, [9]Columbia, New York, NY*

Purpose: Loneliness, defined by the National Academy of Medicine as "a subjective feeling of being isolated", has recently emerged as a strong predictor of adverse health effects and is of increasing concern given the COVID-19 pandemic. We aimed to characterize loneliness in patients with end-stage liver disease (ESLD) awaiting liver transplantation (LT).

Methods: We surveyed adult ambulatory cirrhosis patients awaiting LT at 7 U.S. sites during the COVID-19 pandemic (May2020-Jan2021) using the validated UCLA Three-Item Loneliness Scale by phone or video. Participants were asked to report if they felt: 1) they lack companionship, 2) left out, or 3) isolated using a 3-point scale (1=hardly ever, 2=some of the time, or 3=often). Participants were classified as "lonely" if they reported a score of ≥2 in at least 1 category. Frailty was assessed with the Liver Frailty Index (LFI); "frail"=LFI≥4.4. Logistic regression was used to associate loneliness and other factors.

Results: Of 454 participants, 36% were female, median age was 60 years (IQR 53-64), median MELDNa was 14 (IQR 10-19), and 14% were frail. 181 (40%) met criteria for "lonely" in at least 1 category; 49 (11%) met criteria for "lonely" in all 3 categories. Compared to those who were not lonely, those who reported feeling lonely were younger (58 v. 61y) and more likely to be female (46% v. 29%), frail (19 v. 11%), or have hepatic encephalopathy (62 v. 50%). There were no differences by race/ethnicity, disease etiology, ascites, or MELDNa score. In univariable analysis, age (OR 0.97, 95% CI 0.96-0.99), female sex (OR 2.16, 95% CI 1.46-3.21), frailty (OR 1.88, 95% CI 1.09-3.2), and hepatic encephalopathy (OR 1.60, 95% CI 1.09-2.35) were associated with loneliness. After multivariable adjustment, younger age (OR 0.97, 95% CI 0.95-0.99), female sex (OR 1.95, 95% 1.30-2.90), and frailty (OR 1.5, 95% CI 1.2-1.96), remained significantly associated with loneliness.

Conclusions: During the COVID-19 pandemic, loneliness was prevalent in patients with ESLD awaiting LT (40%). This is similar to rates reported in the general population (20-50%) during the pandemic, despite LT candidates being a select subgroup in which social support is a criterion for listing. In our cohort, younger age, female sex, and frailty were independently associated with loneliness. These data lay the foundation for future work investigating the extent to which loneliness impacts health outcomes in LT patients, as it does in the general population, and how targeting loneliness in interventions may facilitate improvements in frailty.

CITATION INFORMATION: Berry K., Kent D., Seetharaman S., Wong R., Mohamad Y., Yao F., Duarte M., Boyarsky B., Rahimi R., Duarte-Rojo A., Kappus M., Volk M., Ladner D., Segev D., McAdams-DeMarco M., Verna E., Ganger D., Lai J. Loneliness in Adults Awaiting Liver Transplantation at 7 U.S. Transplant Centers During the Covid-19 Pandemic *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Berry: None. **D. Kent:** None. **S. Seetharaman:** None. **R. Wong:** None. **Y. Mohamad:** None. **F. Yao:** None. **M. Duarte:** None. **B. Boyarsky:** None. **R. Rahimi:** None. **A. Duarte-Rojo:** None. **M. Kappus:** None. **M. Volk:** None. **D. Ladner:** None. **D. Segev:** None. **M. McAdams-DeMarco:** None. **E. Verna:** None. **D. Ganger:** None. **J.C. Lai:** None.

Liver

Liver: Immunosuppression and Rejection

Abstract# 1093

Changes in Liver Transplant Volume and Induction During the Covid-19 Era

T. Alhamad, J. Wellen, K. Lentine, M. Doyke, W. Chapman, Y. Al-Hosni, D. Axelrod, S. Chang, *Washington University School of Medicine in St. Louis, Saint Louis, MO*

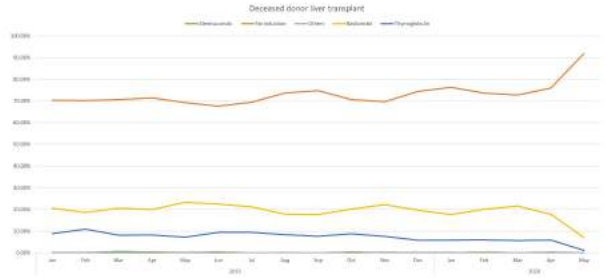
Purpose: The rapid spread and high infectivity of COVID-19 resulted in disruption of transplant procedures at many centers, including pauses in living donor transplantation and limitation of life-saving transplants to candidates with highest need. We examined the contemporary trend of liver transplant, donor volume, and recipient induction regimens prior and during the pandemic.

Methods: Data on liver transplant procedures from the national organ registries, Organ Procurement and Transplantation Network, 1/1/2019-5/31/2020) and Scientific Registry of Transplant Recipients (6/1/2020-9/30/2020) were used. We excluded multiple organ transplantation.

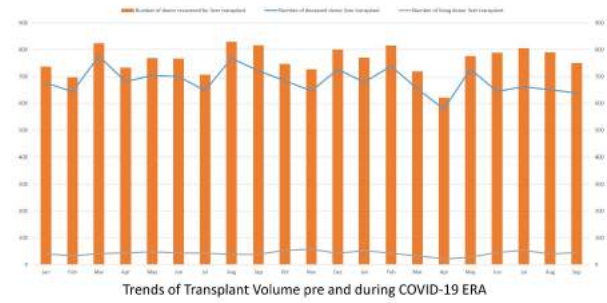
Results: There were 6,316 liver transplant performed between Jan 2020 and Sep 2020, compared to 5,972 in the same period in 2019. The volume of deceased donor liver transplant plummeted in March, reached a nadir in April, and increased starting from May to return to the level similar to the same month in 2019. Similar trends

were seen for the liver organs that were recovered for transplant. For induction regimens, there was a decrease in the use of thymoglobulin and basiliximab, and an increase of no induction regimen, which usually involves intravenous steroids without antibody induction. Figure 1. Figure 2

Conclusions: While there is a decrease in the use of thymoglobulin and basiliximab, there is no evidence that avoiding induction agents will result in better outcomes if transplant recipients get exposed to SARS-CoV-2 shortly after transplant. More data is needed to examine the risk and severity of infection according to induction therapy.



Trends of Inductions in Liver Transplant Recipients



Trends of Transplant Volume pre and during COVID-19 ERA

CITATION INFORMATION: Alhamad T., Wellen J., Lentine K., Doyke M., Chapman W., Al-Hosni Y., Axelrod D., Chang S. Changes in Liver Transplant Volume and Induction During the Covid-19 Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Alhamad: None. **J. Wellen:** None. **K. Lentine:** None. **M. Doyke:** None. **W. Chapman:** None. **Y. Al-Hosni:** None. **D. Axelrod:** None. **S. Chang:** None.

Abstract# 1094

Evaluation of the Conversion from Tacrolimus to Sirolimus in Liver Transplant Recipients

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Purpose: The purpose of this study was to compare outcomes in liver transplant patients maintained on standard calcineurin inhibitor (CNI) therapy with tacrolimus versus those converted to a CNI-free regimen with sirolimus.

Methods: This single center, retrospective study evaluated outcomes in liver transplant patients from January 1, 2015 to June 10, 2020 at the Emory Transplant Center. Inclusion criteria for the study included liver transplant recipients who were 18 years or older and either maintained on tacrolimus or converted to sirolimus. The two-cohort design of this study included an intervention group composed of patients undergoing conversion therapy from tacrolimus to sirolimus and a control group consisting of matched patients maintained on tacrolimus therapy. The primary endpoint was estimated glomerular filtration rate (eGFR) at 6- and 12-months post-transplant.

Results: Of the 1452 patients that met inclusion criteria, 244 patients underwent conversion from tacrolimus to sirolimus. Tacrolimus patients were matched to sirolimus patients based on transplant indication, age, and renal function. As a result, the study included a total of 488 patients. Baseline characteristics were similar between groups. The mean age of patients was 61 years, and a majority of patients were Caucasian. The leading indications for transplant included hepatitis C, alcoholic cirrhosis, nonalcoholic steatohepatitis (NASH), and hepatocellular carcinoma. The mean eGFR at baseline was 67 mL/min/1.73m2 for the tacrolimus group and 60 mL/min/1.73m2 for the sirolimus group. At 6 months post-transplant, the mean eGFR for the tacrolimus group was 61 mL/min/1.73m2 compared to 54 mL/min/1.73m2 in the sirolimus group. Additionally, at 12 months post-transplant the mean eGFR for the tacrolimus group was 62 mL/min/1.73m2, while the mean eGFR for the sirolimus group was 57 mL/min/1.73m2. A greater decline in eGFR from baseline to 12 months was observed in patients maintained on tacrolimus at 5 mL/min/1.73m2 compared to patients switched to sirolimus at 3 mL/min/1.73m2. Biopsy proven acute rejection was observed more frequently in sirolimus patients at 15% compared to tacrolimus patients at 12%. The sirolimus group also experienced greater increases in total cholesterol, triglycerides, and blood pressure at 12 months.

Conclusions: Overall renal function as measured by eGFR was greater for patients maintained on standard CNI therapy post-transplant; however, a greater decline in eGFR from baseline to 12 months occurred in the tacrolimus group. Alternatively, graft rejection was observed more frequently in the sirolimus group when compared to tacrolimus. Previous studies among kidney transplant recipients have shown that conversion from tacrolimus to sirolimus resulted in renal recovery, however additional studies are needed to determine the potential benefits of this conversion therapy in liver transplant recipients.

CITATION INFORMATION: Bakhtiari H., Todd S., Snyder H., Lo D., Flynn M. Evaluation of the Conversion from Tacrolimus to Sirolimus in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Bakhtiari: None. **S. Todd:** None. **H. Snyder:** None. **D. Lo:** None. **M. Flynn:** None.

Abstract# 1095

Early Reduction of Tacrolimus Trough Levels Improves Long-term Kidney Function without Increase in Incidence of Acr

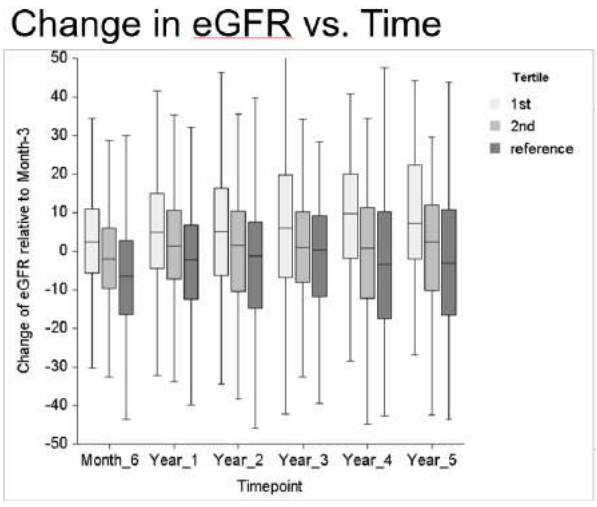
M. Chen[1], B. Loza[1], A. Chang[1], R. Byfield[2], K. Olthoff[1], A. Shaked[1], *[1]Department of Surgery, University of Pennsylvania, Philadelphia, PA, [2]Data Analytics Center, Penn Medicine Information Systems, University of Pennsylvania Health System, Philadelphia, PA*

Purpose: We examined the impact of clinical practice management of tacrolimus trough levels in liver transplant recipients on kidney function and incidence of rejection in the first 5 years after transplantation.

Methods: Serial tacrolimus trough levels, eGFR, and the incidence of acute rejection were collected on adult liver transplant recipients at 6 months and yearly up to 5 years after transplantation (n=874). Change in tacrolimus levels at each time point was correlated with change in eGFR, and with incidence of rejection.Participants were divided into tertiles based on magnitude of adjustment in tacrolimus trough dosing from baseline (defined as 3 months after surgery) with levels at 6 months and yearly from one to five years. Primary endpoint was change in eGFR at 6 months and subsequently at 1 year intervals compared to baseline post-transplant eGFR. Secondary endpoint was rejection episodes at various time intervals. Patients age at transplant, sex, year of transplant, pre-transplant eGFR, tacrolimus trough levels at baseline, and dialysis status were included as covariates in the regression analysis.

Results: Participants with the greatest reduction in tacrolimus trough dosing (first tertile) showed improvement in eGFR compared to the patients with the least reduction in tacrolimus doing (the third or reference tertile) across all time points. This was most apparent at 6 months and 1 year after transplantation (increase in eGFR by 8.79±1.37 mL/min and 7.83±1.66 mL/min, respectively), and remained consistent over the study time period. There was a statistically significant increase in percentage of participants requiring dialysis at 4 and 5 years in the reference group (with least tacrolimus adjustment) (6.9% and 10.3%, respectively). There was no difference in the incidence of rejection across tertiles at one year (2.0% vs. 2.0% vs. 3.5%, p = 0.43).

Conclusions: Early and sustained reduction in tacrolimus levels after transplantation were associated with long term improvement in kidney function, with no increase incidence of rejection. Minimal changes levels led to higher incidence of end-stage kidney failure.



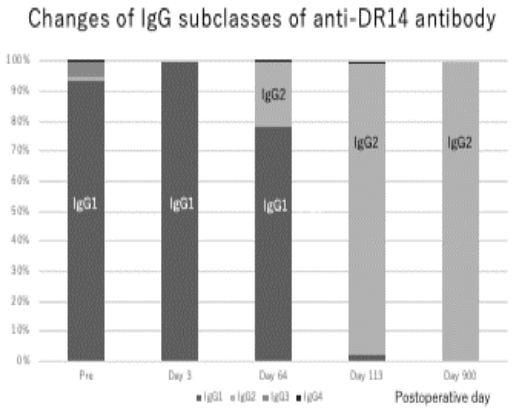
CITATION INFORMATION: Chen M., Loza B., Chang A., Byfield R., Olthoff K., Shaked A. Early Reduction of Tacrolimus Trough Levels Improves Long-term Kidney Function without Increase in Incidence of Acr *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Chen: None. **B. Loza:** None. **A. Chang:** None. **R. Byfield:** None. **K. Olthoff:** None. **A. Shaked:** None.

Abstract# 1096

Dynamics of IgG Subclass as a Mechanism of Desensitization Using Rituximab for Presensitized Patients Undergoing Living Related Liver Transplantation

H. Egawa[1], K. Ide[2], T. Ishizuka[3], H. Ohdan[4], Y. Kotera[1], T. Kato[1], A. Ohmori[1], Y. Hirata[1], G. Shibuya[1], S. Yamashita[1], S. Ariizumi[1], *[1]Tokyo Women's Medical University, Tokyo, Japan, [2]Surgery, Hiroshima University, Hiroshima, Japan, [3]Clinical Laboratory, Tokyo Women's Medical University, Tokyo, Japan, [4]Hiroshima University, Hiroshima, Japan*

Purpose: Although impact of preformed HLA-related donor specific antibody (DSA) and necessity of desensitization in liver transplantation (LT) has been recognized, mechanisms of desensitization in LT is not clarified yet.Aim: To examine mechanisms of desensitization for preformed DSA in living related liver transplantation (LDLT).
Methods: Patients and Method: Six patients whose MFI of LABScreen single test of class 1 or class 2 DSA was greater than 10,000 underwent desensitization treatment using rituximab with a dose of 375 mg/m^2 2 weeks before LDLT, whether cytotoxic direct crossmatch (CDC) is positive (n=3) or negative (n=3). As immunological assessments, CDC (T cell, B cell worm and B cell cold), flow crossmatch test (FCXM), flow PRA test, LABScreen single test for patients with positive PRA, and LABScreen complement test (C1q test) for positive CDC samples were examined. Further, IgG subclass analysis was added to 3 patients (#1, #2, #3) whose CDC turned to negative. The minimum follow-up period was 560 days after LT.
Results: Results: The value of T cell/B cell CDC was 100%/100% in #1 and #3, and 0%/100% of #2. In #1, T cell CDC turned 0% after POD 3. B cell CDC (warm/cold) was remained 100%/100% until POD 64, 30%/0% on POD114 and 0%/0% on POD 900. FCXM-IgG turned to negative on POD114 but remained positive on POD900. Single bead MFI of DSA (A33, B44, B51, DR13, DR14) was over 10,000 before LT and decreased with fluctuation after LT and 0, 3,916, 8,457, 2,932, and 2,847 on POD 900, respectively. MFI of C1q test turned to 0 on POD 3. IgG subclass analysis showed persistent domination of IgG1 in A33, B44, B51 DSAs and switching from IgG1 dominant to IgG2 dominant after LT in DR13 and DR14 DSAs. On the other hand, values of CDC, FCXM-IgG, single bead MFI and C1q test changed harmonically and IgG subclass was IgG1 dominant in #2 and #3.
Conclusions: Discussion: In #1, Subclass switch from IgG1 from IgG2 could contribute to diminishing of complement activation of Class 2 DSA, while decrease of total amount of antibody with dominance of IgG1 could contribute in class 1 DSA of #1 and class 1 and 2 in #2 and #3.Conclusion: Subclass dynamism could be a possible mechanism of desensitization.



CITATION INFORMATION: Egawa H., Ide K., Ishizuka T., Ohdan H., Kotera Y., Kato T., Ohmori A., Hirata Y., Shibuya G., Yamashita S., Ariizumi S. Dynamics of IgG Subclass as a Mechanism of Desensitization Using Rituximab for Presensitized Patients Undergoing Living Related Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Egawa: None. **K. Ide:** None. **T. Ishizuka:** None. **H. Ohdan:** None. **Y. Kotera:** None. **T. Kato:** None. **A. Ohmori:** None. **Y. Hirata:** None. **G. Shibuya:** None. **S. Yamashita:** None. **S. Ariizumi:** None.

Abstract# 1097

Quantifying the Interaction Between Posaconazole and Tacrolimus in Liver Transplant Recipients: A Practical Approach

B. Lane[1], U. Kaszubski[1], A. Freeman[1], B. Wise[1], L. Hutchinson[1], M. Janusek[1], G. Therapondos[2], H. Bohorquez[3], S. Anders[1], *[1]Pharmacy, Ochsner Medical Center, New Orleans, LA, [2]Hepatology, Ochsner Medical Center, New Orleans, LA, [3]Transplant Surgery, Ochsner Medical Center, New Orleans, LA*

Purpose: The interaction between tacrolimus (FK) and posaconazole (POSA) is well documented, however the extent of this interaction and the practical management has yet to be fully described post-liver transplant. Literature evaluating this interaction has been hindered by small sample sizes, limited patient populations, use of various POSA formulations and little evidence describing the timing of the interaction. Recent construction at this institution prompted the use of POSA due to its coverage of mold species. The goal of this study is to quantify the interaction between FK and delayed release POSA tablets.
Methods: This was a single-center, retrospective study that included adult liver transplant recipients between 8/1/17 - 9/1/20. The primary endpoint was the difference in the day 5 FK C/D in the POSA group compared to a control. Secondary endpoints included the incidence of acute kidney injury (AKI), biopsy proven acute rejection (BPAR) within one month of azole discontinuation, length of stay, frequency of a patient having one or more supra- or subtherapeutic FK trough, and therapeutic troughs by day 2 & 5.
Results: A total of 217 patients were included. Baseline demographics were similar between groups. Day 5 FK C/D with POSA was approximately three-fold that of the control group. The effects of this interaction impacted the day 2 FK C/D but had a more pronounced effect on the day 5 FK C/D. The POSA group was more likely to have a therapeutic trough (5-15 ng/mL) by day 2 & 5 and at time of hospital discharge. This group was also more likely to have a supratherapeutic trough, however this did not result in a higher incidence of AKI. Upon discontinuation of POSA, this group was highly likely to experience a subtherapeutic level, however this did not lead to more BPAR.
Conclusions: This study is the first to evaluate this interaction in post-liver transplant recipients utilizing delayed release POSA tablets in combination with FK. Concomitant therapy resulted in a three-fold increase in FK C/D compared to a control, supporting the empiric dose reduction per the package insert to maintain similar FK trough concentrations. Impacts of this interaction were observed as early as day 2 however the effects continued upwards of day 5, requiring a significantly lower weight-based FK dose.

Table 1. Baseline demographics

Characteristic	POSA (n=41)	Control (n=176)	p-value
Age (years), mean (±SD)	55.1 (12.54)	56.6 (10.61)	0.49
Sex (male), n (%)	29 (71)	130 (74)	0.68
Weight (kg), mean (±SD)	89.5 (22.7)	87.4 (20.2)	0.51
Donation after cardiac death donor, n (%)	9 (22)	33 (19)	0.64
Race, n (%)			0.65
Caucasian	36 (88)	146 (83)	
African American	3 (7)	22 (13)	
Other	2 (5)	8 (4)	

Table 2. FK C/D

	POSA (n=41)	Control (n=176)	p-value
Day 2 FK C/D, mean (± SD)	2.39 (± 1.67)	1.53 (± 1.25)	**0.0003**
Day 5 FK C/D, mean (± SD)	3.04 (± 2.67)	0.94 (± 1.11)	**<0.0001**

Table 3. Secondary endpoints

	POSA (n=41)	Control (n=176)	p-value
AKI during concomitant antifungal therapy, n (%)	13 (32)	41 (23)	0.26
BPAR within 1 month of discontinuation of antifungal therapy, n (%)	3 (7)	13 (7)	0.99
Length of stay (days), mean (±SD)	11.1 (7.06)	9.1 (6.16)	0.052
FK dose on day 2 (mg/kg), mean (± SD)	0.03 (± 0.015)	0.04 (± 0.02)	**0.0006**
FK dose on day 5 (mg/kg), mean (± SD)	0.04 (± 0.02)	0.09 (± 0.05)	**<0.0001**
Therapeutic FK trough by day 2, n (%)	25 (61)	70 (40)	**0.003**
Therapeutic FK trough by day 5, n (%)	28 (68)	71 (40)	**0.012**
No therapeutic FK trough by discharge, n (%)	2 (5)	60 (34)	**0.0004**
With antifungal therapy, n (%) *			
Supratherapeutic FK trough (>15 ng/mL)	20 (49)	40 (23)	**<0.001**
Subtherapeutic FK trough (< 5 ng/mL)	31 (76)	162 (92)	**0.003**
Post-antifungal therapy, n (%) *			
Supratherapeutic FK trough (>15 ng/mL)	3 (7)	20 (11)	0.45
Subtherapeutic FK trough (<5 ng/mL)	38 (93)	74 (42)	**<0.00001**

*Frequency of ≥1 supra- or subtherapeutic trough

CITATION INFORMATION: Lane B., Kaszubski U., Freeman A., Wise B., Hutchinson L., Janusek M., Therapondos G., Bohorquez H., Anders S. Quantifying the Interaction Between Posaconazole and Tacrolimus in Liver Transplant Recipients: A Practical Approach *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Lane: None. **U. Kaszubski:** None. **A. Freeman:** None. **B. Wise:** None. **L. Hutchinson:** None. **M. Janusek:** None. **G. Therapondos:** None. **H. Bohorquez:** None. **S. Anders:** None.

Abstract# 1098

Highly Sensitized Simultaneous Liver-kidney Transplant Recipients Show a Reduction in Panel Reactive Antibodies and No Kidney Rejection 1-year Post-transplant

M. Moaddab, J. V. Nolte Fong, C. M. Mobley, A. Saharia, M. J. Hobeika, R. McMillan, S. G. Yi, R. J. Knight, A. Gaber, R. Ghobrial, *Houston Methodist Hospital, Houston, TX*

Purpose: The liver is unique in that it is considered an immunologically tolerant organ against graft destruction by antibodies. Simultaneous liver-kidney transplantation (SLKT) are often performed under the assumption that the liver confers an immunologic protection to a kidney allograft. This study evaluated outcomes on pre-SLKT allosensitization in highly sensitized recipients.

Methods: This single-center, retrospective study assessed SLKT recipients between January 2016 - June 2019. We defined high sensitization as panel reactive antibody (PRA) levels greater than 50%. Pre-existing and *de novo* donor specific antibodies (DSA) were trended 15 months post-transplant. Rejection rates, serum creatinine and patient survival within the first year post-transplant were assessed. Human leukocyte antigen testing was performed via single antigen beads with a 2,000 mean fluorescence intensity (MFI) cut-off for positivity. No desensitizing strategies occurred pre- or post-SLKT.

Results: Ten SLKT patients were highly sensitized and included in the analysis. A 71% class I and 56% class II average reduction in PRA was observed from baseline to 1-year post-transplant. Four patients had pre-existing DSAs, all of which cleared by three months post-SLKT. Five patients had *de novo* DSA formation, three of which had clearance and two with persistent DSAs. No biopsy-proven kidney rejections and 2 (20%) acute cellular liver rejections occurred. Graft and patient survival was 100% 1-year post-SLK.

Conclusions: SLKT in highly sensitized recipients does not result in post-transplant kidney rejection at 1 year. Despite rejection in 20% of the liver allografts, no grafts were lost. A liver allograft may confer a protective benefit to a kidney allograft in sensitized SLKT recipients.

Figure 1. Class I and Class II post-SLKT

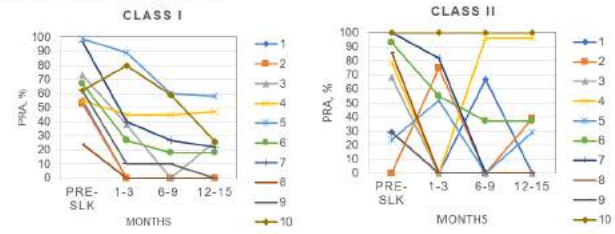


Table 1. One-Year Rejection, Serum Creatinine and Patient Survival in SLKT Recipients

Patient	Kidney Rejection	Liver Rejection	Serum Creatinine, mg/dL	Patient and Graft Survival
1	None	None	1.29	Yes
2	None	None	1.1	Yes
3	None	Acute cellular	0.9	Yes
4	None	None	1.2	Yes
5	None	None	1	Yes
6	None	Acute cellular	1.4	Yes
7	None	None	0.8	Yes
8	None	None	1.2	Yes
9	None	None	1.56	Yes
10	None	None	2.5	Yes

CITATION INFORMATION: Moaddab M., Nolte Fong J., Mobley C., Saharia A., Hobeika M., McMillan R., Yi S., Knight R., Gaber A., Ghobrial R. Highly Sensitized Simultaneous Liver-kidney Transplant Recipients Show a Reduction in Panel Reactive Antibodies and No Kidney Rejection 1-year Post-transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Moaddab: None. **J.V. Nolte Fong:** None. **C.M. Mobley:** None. **A. Saharia:** None. **M.J. Hobeika:** None. **R. McMillan:** None. **S.G. Yi:** None. **R.J. Knight:** None. **A. Gaber:** None. **R. Ghobrial:** None.

Abstract# 1099

Varicella Hepatitis Mimicking Immune Checkpoint Inhibitor-induced Liver Toxicity

M. J. Weiss[1], X. Zhang[2], E. K. Spengler[1], *[1]Gastroenterology and Hepatology, University of Wisconsin, Madison, WI, [2]Pathology, University of Wisconsin, Madison, WI*

Purpose: Nivolumab is an anti-PD-1 monoclonal antibody belonging to a class of immune checkpoint inhibitors (ICI) used for many malignancies. A major limitation to their use is immune-related adverse events (irAEs) that lead to organ-specific inflammation that can be fatal if not promptly recognized and treated with aggressive immunosuppression. Immune-mediated acute liver injury (ALI) is a well described irAE and is often treated empirically. We describe a case highlighting the importance of early liver biopsy in patients not responding to treatment for immune checkpoint inhibitor-induced liver injury.

Methods: N/A

Results: A 70 year-old man with stage IIA esophageal squamous cell carcinoma status-post neoadjuvant chemo/radiation therapy and esophagectomy was treated with nivolumab. One month post-treatment he was admitted with likely nivolumab-induced myocarditis and was treated with methylprednisolone 1 mg/kg IV daily and one dose of infliximab. At discharge he was placed on an oral steroid taper. He had no liver injury during this stay.

He returned within a week with abdominal pain and ALI with AST 2020 U/L, ALT 1750 U/L, bilirubin 3.2 mg/dL, alkaline phosphatase 211 U/L, INR 1.3. CT was unrevealing. He was treated with methylprednisolone and infliximab for suspected ICI-induced irAE. Thrombosis, autoimmune hepatitis, CMV and EBV were excluded. ALI worsened and hepatology was consulted (AST 3970 U/L, ALT 2883 U/L, alkaline phosphatase 203 I/L, bilirubin 5.4 mg/dL, INR 1.9). A liver biopsy was recommended, but he suffered cardiac arrest and expired the following day. Autopsy revealed disseminated varicella zoster virus (VZV) infection involving the liver (Fig. 1), lung, heart, bowel, esophagus and kidney.

Conclusions: Recognition of immune-mediated liver injury has increased with the growing use of ICI, leading to protocoled immunosuppression regimens designed to empirically treat these often severe liver injuries. Unfortunately, these protocols are often initiated by oncology without hepatology involvement. Although this has simplified treatment and decreased the need for biopsy, it has removed hepatology from the care of patients with ALI. As this case highlights, patients receiving ICI are at risk of other forms of ALI, including drug-induced liver injury, cancer infiltration, infections and thrombosis. Hepatologists should advocate for complete evaluation of all patients with ALI. Biopsy should be considered early if they do not improve as expected.

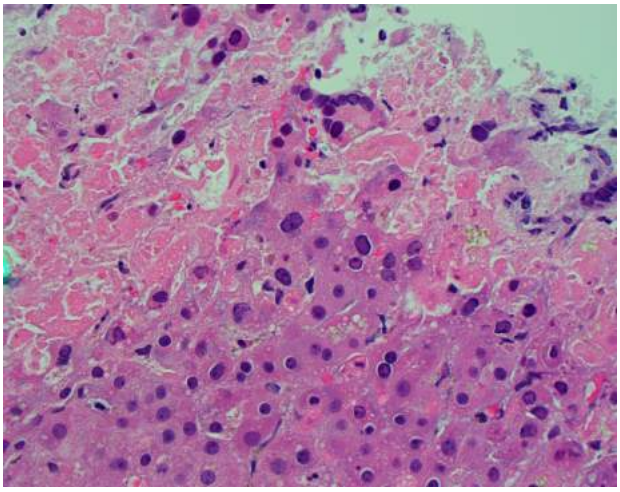


Figure 1. Liver H & E. Areas of confluent necrosis with viral cytopathic effect.

CITATION INFORMATION: Weiss M., Zhang X., Spengler E. Varicella Hepatitis Mimicking Immune Checkpoint Inhibitor-induced Liver Toxicity *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.J. Weiss: None. **X. Zhang:** None. **E.K. Spengler:** None.

Liver

Liver: Recipient Selection

Abstract# 1100

Early Portal Vein Ligation in the Setting of Shorter Hepatectomy May Contribute to Better Surgical Outcomes in Deceased Donor Liver Transplantation

K. Delvecchio, T. Kitajima, A. Mohamed, S. Yeddula, M. Tayseer, T. Ivanics, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Henry Ford Hosptial, Detroit, MI*

Purpose: Few published reports have suggested lower blood loss in association with early portal vein ligation (e-PVL) during liver transplantation surgery, however there are currently no studies describing the outcomes with respect to hepatectomy duration or the relationship of e-PVL to recipient hepatectomy time (ePVL/H ratio). The aim of this study is to evaluate possible effects of shortened hepatectomy in conjunction with e-PVL on surgical and post-transplant outcomes.

Methods: We evaluated adult deceased donor liver transplants between 2013-2018. Patients undergoing re-transplant, multiorgan or living donor liver transplantation

were excluded. Possible effects of hepatectomy and additionally e-PVL on surgical and post-transplant outcomes were assessed. Patients were categorized into 2 groups: shorter (<90 minutes) and longer hepatectomy groups (≥90 minutes).

Results: A total of 451 patients were eligible. Median PVL and hepatectomy time were 90 and 129 minutes, respectively. Of these 451 patients, 57 and 384 were categorized into the shorter and longer hepatectomy groups. Recipient characteristics, including MELD score, were similar between two groups. Shorter-hepatectomy group had significantly shorter PVL time (47 vs 97 minutes, P<0.001) and lower e-PVL/H ratio (0.60 vs 0.72, P<0.001). The shorter hepatectomy group had lower amount of RBC (2 vs 4 units, P=0.014) and FFP (4 vs 6 units, P=0.007) transfusion and shorter cold ischemia time (4.8 vs 5.1 hours, P=0.049). One-year patient survival was comparable (97.9% vs. 91.8%, P=0.100). Longer hepatectomy time, but not PVL, was associated with an increased risk of one-year post-transplant mortality (HR 1.01 [per minute], p=0.021).

Conclusions: In the setting of shortened recipient hepatectomy, early portal vein ligation with respect to hepatectomy duration may contribute to improved surgical outcomes.

CITATION INFORMATION: Delvecchio K., Kitajima T., Mohamed A., Yeddula S., Tayseer M., Ivanics T., Collins K., Rizzari M., Yoshida A., Abouljoud M., Nagai S. Early Portal Vein Ligation in the Setting of Shorter Hepatectomy May Contribute to Better Surgical Outcomes in Deceased Donor Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Delvecchio: None. **T. Kitajima:** None. **A. Mohamed:** None. **S. Yeddula:** None. **M. Tayseer:** None. **T. Ivanics:** None. **K. Collins:** None. **M. Rizzari:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **S. Nagai:** None.

Abstract# 1101

Liver Transplantation in Septuagenarians

L. Egbert[1], D. Das[1], S. Ohara[2], J. Wagler[3], G. Mahdi[4], B. Aqel[5], A. Moss[5], K. S. Reddy[5], C. Jadlowiec[5], *[1]Mayo Clinic Alix School of Medicine, Scottsdale, AZ, [2]Valleywise Health General Surgery Residency Program, Phoenix, AZ, [3]HonorHealth John C. Lincoln, Phoenix, AZ, [4]Mayo Clinic Alix School of Medicine, Phoenix, AZ, [5]Mayo Clinic, Phoenix, AZ*

Purpose: The average age of liver transplant (LT) recipients has continued to increase. In spite of this, with the ongoing organ shortage, liver transplantation in the elderly remains controversial. Our goal was to assess the outcomes of LT recipients who were 70 years or older.

Methods: We assessed LT recipients 70 years of age or older who received a LT at our center between January 2015 and June 2020.

Results: During this period, 144 patient ≥70 years were evaluated for LT at our center; 54.2% were denied candidacy, 35.4% were approved and transplanted, 5.6% were approved but then delisted, and 4.9% remain active awaiting LT. Of the 697 LT performed at our center during this time, 45 (6.5%) were in recipients who were 70 years or older. Of these 45 recipients studied, 7 underwent a simultaneous liver-kidney transplant. Four recipients (8.9%) were re-transplants. The most common indications for LT were nonalcoholic steatohepatitis (NASH) (28.9%) and alcohol-related liver disease (20.0%); 26.7% had hepatocellular carcinoma (HCC). The average Model for End Stage Liver Disease (MELD) score was 21.2±8.0. Comorbidities studied included diabetes (28.9%), hypertension (26.7%), and coronary artery disease (11.1%). Assessments of functional ability prior to LT included 6-minute walk test (341.6±96.3 meters) and Karnofsky score (median 80.0). Donation after cardiac death (DCD) donors were utilized in 33.3% of transplants. Median intensive care unit (ICU) length of stay (LOS) was 1 day; hospital LOS was 6 days. The majority of LT recipients were discharged home (n=37, 82.2%) with 13.3% requiring acute rehabilitation and 2.2% requiring a skilled nursing facility. One-year patient survival was 97.8% and one-year graft survival was 93.3%.

Conclusions: There has been an increase in the number of patients ≥70 years referred for LT. With appropriate pre-transplant assessment, septuagenarians undergoing LT can have favorable outcomes. Age itself should not be an absolute contraindication for pursuing liver transplantation.

Recipient Demographics	
	Septuagenarian LT Recipients (n=45)
Age (median)	71.3±1.4 (71.0)
Female	12 (26.7%)
MELD (median)	21.2±8.0 (22.0)
SLK recipients	7 (15.6%)
Re-LT recipients	4 (8.9%)
6 minute walk (meters)	341.6±96.3
Karnofsky score (median)	80.0

CITATION INFORMATION: Egbert L., Das D., Ohara S., Wagler J., Mahdi G., Aqel B., Moss A., Reddy K., Jadlowiec C. Liver Transplantation in Septuagenarians *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Egbert: None. **D. Das:** None. **S. Ohara:** None. **J. Wagler:** None. **G. Mahdi:** None. **B. Aqel:** None. **A. Moss:** None. **K.S. Reddy:** None. **C. Jadlowiec:** None.

Abstract# 1102

Implementation of a High-risk Medication Report for Waitlisted Liver Transplant Candidates

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Purpose: Use of high-risk medications (HRMs) at the time of liver transplant may lead to delays in surgery or peri-operative complications (bleeding, drug-drug interactions (DDI), impaired healing, lapse in therapy). Additionally, patient-specific serologies may require time-sensitive pharmacological intervention to prevent recurrent disease. HRMs identified include direct-oral anticoagulants (DOAC), dual antiplatelet therapy (DAPT), mammalian target of rapamycin inhibitors (mTORi), buprenorphine-containing therapies, and methadone. The goal of this QI project is to describe the initial development and implementation of electronic medical record (EMR) generated reports that identify HRMs, allergies and serologies in waitlisted liver transplant candidates (LTCs) in real-time.

Methods: This prospective, quality improvement project was implemented in August 2020 at a 1000-bed academic medical center. Reports identified HRMs, allergies and serologies in real time for LTCs via EMR) data-extraction reports with supplemental chart review. Reports were compiled into a spreadsheet with interprofessional notification to ensure appropriate intervention prior to transplantation. Time to intervention and action taken are reported using descriptive statistics.

Results: A total of 62 LTCs were identified to be high risk secondary to HRM, allergy or positive HBsAg serology between September to December 2020. Interventions were recorded as seen in Table 1. Time to intervention deemed as addition of alert in EMR or medication issue resolved. The most common medication-related interventions included medication discontinued (11), note added to patient chart (9), changing to preferred therapy (3), and updating medication list with discontinuation (1).

Conclusions: Solid organ transplant candidates have multiple providers and variable wait times prior to transplantation, where real-time EMR reviews of LTCs may help facilitate time-appropriate intervention prior to transplantation. Future efforts include expanding EMR review to all solid organ transplant waitlist candidates, with information extraction to be adjusted for relevance per organ.

Table 1. Results

High Risk Scenario	Patients Identified	Successful Interventions	Median Time to Intervention (days +/- IQR)	Deferred Organ Offers Given HRM[7]
DAPT Therapy[1]	4	1	55	0
DOAC Therapy[2]	14	8	31 +/- 25.5	0
MTORi Therapy[3]	1	1	62	0
MAT Therapy[4]	19	5	32 +/- 32	0
HIV DDI Therapy	2	1	30	0
HBsAg[+] Recipient[5]	17	8	42.5 +/- 28	N/A
IS/OI Therapy Allergy[6]	6	0	N/A	0

1: dual antiplatelet therapy; 2: direct oral anticoagulant; 3: mammalian target of rapamycin inhibitor; 4: medication assisted treated; 5: hepatitis B surface antigen positive; 6: immunosuppression/opportunistic infection; 7: high-risk medication

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Abstract# 1103

Can an Organ Survive for More Than 100 Years Between Donor and Recipient

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Purpose: It has been hypothesized that parenchymal grafts have a longer life expectancy than the cardio-cerebro-vascular system. We investigated the occurrence of deceased-donor liver (DDOLT), deceased-donor renal (DDRT), and living-donor renal allografts (LDRT) that have achieved or come close to 100 years of physiologic function in the donor and recipient.

Methods: All adult single-organ transplants from donors > 70 years of age, DDOLT (n=5,427), DDRT (n=2605), and LDRT (n=616) reported to UNOS/OPTN from 10/87 to 03/20 were evaluated. LDOLT were not considered due to the relative novelty of this procedure. Allograft survival was calculated according to the equation: Overall Survival = Allograft Age at Donation + Allograft Survival; it was categorized as age of 90-<95 years, 95-<100 years, or >=100 years and longer. Graft survival was defined as function time to date, most recent follow-up or death, re-listing for transplant, or (for kidney transplants) initiation of renal replacement therapy. Multivariate analysis assessed predictors of physiologic allograft survival in liver and kidney transplants.

Results: Table 1 shows the characteristics and outcomes. Outcome of DDOLT increased over time in general and 336 grafts showed physiological function > 90 years; in 14 cases the duration of function was > 100 years. The longest function time is 106.3 years and counting. Likewise, DDRT and LDRT allograft survival

improved throughout the study period: 33 DDRT and 12 LDRT were still functioning at 90 years. In contrast to DDOLT, only 2 LDRT graft reached the 100 year mark. Multivariate analysis of each cohort verified that good donor and recipient management factors are potential predictors of allograft longevity.$$Table1

Conclusions: Organ longevity in 2 different individuals exceeding 100 physiologic years is possible. It represents a small but increasing minority of grafts in transplant recipients. It is expected that more grafts will reach this mark with increasing follow-up time. The observation of extended longevity is higher among liver vs. kidney allograft recipients. Increases in allograft longevity between DDRT and LDRT are similar over time but more common in LDRT.

	DD OLT	DD RT	LD RT
Total # Txs	5,427 (3.3%)	2,605 (0.9%)	616 (0.4%)
Graft survival			
1 Year	78.9%	80.3%	91.6%
5 Years	60.4%	51.1%	66.3%
10 Year	43.5%	21.6%	43.0%
Total Allograft survival			
90-<95 Years	320 (20%)	28 (1.1%)	9 (1.5%)
95-<100 Years	73 (4%)	5 (0%)	1 (0.2%)
≥100 Years	14 (1%)	-	2 (0.3%)
Donor Age [Years]	74 [70-93]	72 [70-88]	71 [70 -84]
Male donor [%]	46	44	47
Recipient Age [Years]	58 [18-81]	65 [21-87]	68 [21-84]
Male gender [%]	61	60	60

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Abstract# 1104

Regional Trends in Liver Transplantation for Nonalcoholic Steatohepatitis

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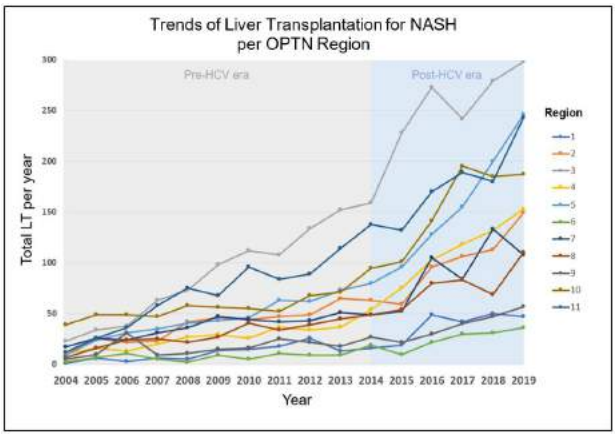
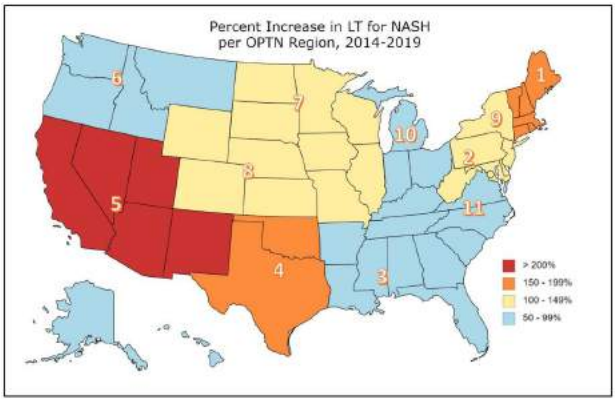
Purpose: This study aims to evaluate regional trends in liver transplantation (LT) among adults in the United States (US) with nonalcoholic steatohepatitis (NASH), with particular emphasis on changing trends before and after introduction of direct-acting antiviral agents for hepatitis C (HCV).

Methods: Using data from the United Network for Organ Sharing (UNOS) LT database, we evaluated diseased donor liver transplants and waitlist registration for patients listed for transplant with NASH cirrhosis in the US between January 1, 2004, and December 31, 2019. Main outcomes included national and regional trends in liver transplant and waitlist registration for NASH. Regional data was stratified as established by the Organ Procurement and Transplantation Network (OPTN).

Results: Between 2004-2019, the annual total number of LT for NASH increased consistently. A total of 11,198 transplants were performed on patients listed for NASH during the study period, the majority (57.0%) of which were transplanted in the post-HCV treatment era between 2014 and 2019. OPTN Region 3 performed the most total LT for NASH over the study period (n=2314), while Region 6 performed the least total LT for NASH (n=218). Every OPTN region showed an increase in total number of LT performed over the study period, with the majority of regions growing most precipitously between 2014-2019. In the post-HCV era, annual LT for NASH grew the most in OPTN Region 5 (207.5%), followed by Region 1 (193.8%) and Region 4 (183.3). Regions 2 (136.5%), 8 (124.5%), 7 (120.4%), and 9 (111.1%) showed relatively moderate growth in total LT between 2014-2019, while Regions 10 (96.8%), 6 (89.5%), 3 (87.4%), and 11 (76.1%) showed mild growth in LT for NASH.

Conclusions: Total LT for patients with NASH has dramatically increased in the US particularly since 2014, suggesting changing trends of transplantation allocation in the post-HCV era. Heterogeneity of regional growth rate in LT for NASH may be accounted by the regional variation in prevalence of NASH and regional LT policies for NASH. The consistent growth of LT for NASH across all OPTN regions demonstrates a paradigm shift of future liver transplantation.





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Abstract# 1105

Implementation of an Alcohol Screening Program Identifies Active Pre-transplant Drinking and Allows Engagement in Chemical Dependency Treatment

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Purpose: Alcohol (ETOH) is an important cause of cirrhosis in the US today. Screening patients for ETOH use prior to LT is important to identify and treat ETOH misuse. We report the findings from the implementation of a ETOH screening program for pre-LT patients at our center.

Methods: As part of a QI initiative starting on 6/1/2016, all patients undergoing LT evaluation had one-time testing for ETOH use, while patients undergoing LT evaluation for ALD underwent mandatory quarterly screening for ETOH use, with urine ethyl glucuronide (EtG). Any LT evaluation patient underwent EtG testing whenever ETOH misuse was suspected. Adherence to screening was defined as completion of one-time EtG testing in all LT evaluation patients and completion of quarterly EtG tests until LT or waitlist removal. A positive test was defined as urine EtG>500ng/ml, indicative of significant ETOH use. In the event of a positive test, the LT evaluation was placed on hold and a protocol was initiated. Upon satisfactory completion of the protocol, LT evaluation was resumed or the patient was re-activated on the LT waiting list.

Results: 868 patients started a LT evaluation from 6/1/2016 to 9/30/2020. Median age at LT evaluation was 58, 538 (62%) patients were male, 281 (33%) patients had ALD and 670 (78%) patients were white. 177 patients were listed for ALD- median age 56, 126 (71%) male and 147 (83%) white. Adherence rates to one-time screening for all LT evaluation patients and routine EtG testing in patients listed for ALD were high but decreased in 2020 (Table 1). Reasons for non-adherence included inpatient LT evaluation, hemodialysis & patient refusal. 31 patients were EtG(+) over the study period- 4 patients with NASH, 4 patients with HCV and 1 patient

with AIH. In patients listed for ALD, 8/177 (4.5%) patients had a positive EtG test. 8/31 (25.8%) patients completed chemical dependency treatment after EtG(+) and 3/31 (9.67%) patients later underwent LT.

Conclusions: ETOH screening is feasible and successfully identifies patients actively engaging in ETOH consumption, even in patients with no formal diagnosis of ALD. Implementing systematic ETOH screening in pre-LT patients identifies patients at highest risk for post-LT relapse and provides a comprehensive framework for additional chemical dependency resources to allow the best chance of post-LT success.

Table 1- Adherence to ETOH Screening

Year	All LT Evaluation	Listed ETOH
2016	73/97 (75%)	25/28 (89%)
2017	133/171 ((78%)	25/26 (96%)
2018	164/210 (78%)	46/48 (96%)
2019	183/223 (82%)	50/55 (91%)
2020	105/167 (63%)	15/20 (75%)
p-value (trend)	0.0003	0.09

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Abstract# 1106

Serum Phosphatidylethanol is Superior to Urine Ethyl Glucuronide for Detection of Alcohol Use in Pre-transplant Patients

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Purpose: More patients are presenting for liver transplant (LT) evaluation for alcohol-related liver disease (ALD). Detection of ETOH use has significant implications for patients undergoing LT evaluation. Urine ethyl glucuronide (EtG) and serum phosphatidylethanol (PEth) are the two most common biomarkers validated in patients with cirrhosis. We compared rates of screening for ETOH use using EtG and PEth in pre-LT patients over a 12-month period.

Methods: As part of a QI initiative starting on 6/1/2016, all patients undergoing LT evaluation had one-time testing for ETOH use, while patients undergoing LT evaluation for ALD underwent mandatory quarterly screening for ETOH use with EtG. All patients got EtG testing if ETOH misuse was suspected. From 10/1/2019 to 9/30/2020, we incorporated quarterly PEth testing into our protocol. Adherence to screening was defined as completion of quarterly testing for ETOH use until LT or waitlist removal. EtG(+) was defined as EtG>500ng/ml whereas PEth(+) was defined as PEth>20ng/ml, both levels indicative of significant ETOH use. In the event of a positive test, the LT evaluation was placed on hold and a protocol was initiated. Upon satisfactory completion of the protocol, LT evaluation was resumed or the patient re-activated on the LT waiting list.

Results: 226 patients started LT evaluation for any cause of liver disease over the study period while 31 patients with ALD were ultimately listed for LT. Median patient age at LT evaluation was 57, 132 (58%) patients were male and 186 (83%) patients were white. In patients listed for ALD, median age was 46, 19 (61%) patients were male and 27 (87%) patients were white. 146 (65%) patients undergoing LT evaluation had one-time ETG testing whereas 191 (85%) patients had PEth testing, p<0.0001. 24 (77%) patients listed for ALD were adherent to ETOH screening using EtG compared to 31 (100%) patients for PEth, p<0.0001. There were 7 patients who were EtG(+) over the study period compared to 16 who were PEth(+) for all patients undergoing LT evaluation, p= 0.057. 3 patients were both EtG & PEth(+). In the ALD patients, 0 were EtG(+) compared to 4 PEth(+) in 3 patients (2 patients with ETOH hepatitis). 6/23 (26%) patients with positive ETOH tests started chemical dependency treatment while 1/23 (4.3%) patient later underwent LT. An additional 10 patients who started LT evaluation before the study period were PEth(+).

Conclusions: Ease of testing makes PEth superior to EtG for both initial and routine screening for ETOH use in patients undergoing evaluation or listed for ALD. PEth is also superior for detection of ETOH misuse in these patients. For these reasons, our center has retired EtG for PEth to screen for ETOH use in patients undergoing LT evaluation.

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Abstract# 1107

A Shift in Paradigm: Phosphatidylethanol Testing to Monitor for and Address Alcohol Recidivism Following Liver Transplantation

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Purpose: Phosphatidylethanol (PEth) is a phospholipid that forms in the presence of ethanol with a long half-life compared to other alcohol detection tests. PEth testing is highly sensitive and specific and has become an important factor in the process of pre-transplant evaluation as well as post-transplant follow-up. We evaluated the role of PEth in identifying recidivism and the impact of psychological intervention in identified patients.

Methods: We performed a retrospective study at a large tertiary care center of all patients who had alcohol recidivism after liver transplant demonstrated by a positive PEth test between 1/2018 and 1/2020. PEth test was considered positive if level was > 20 ng/dl. Intervention by psychologic counseling and relapse prevention was offered and patients were followed to assess if they were able to abstain from alcohol following intervention.

Results: A total of 20 patients (mean age 53.35 ± 8.97 years) were identified. All patients were white, and 14 (70%) were males. 17 patients (85%) had prior known alcoholic liver disease, 1 had nonalcoholic steatohepatitis (NASH), and 2 patients had cryptogenic liver disease. 19 patients had liver cirrhosis prior to transplant, and one had acute alcoholic hepatitis. 4 of the patients had pre-transplant PEth test and they were all negative. Mean PEth level post-transplant was 406 ng/ml. 11 patients agreed to undergo a psychological intervention to aid in alcohol cessation including relapse prevention (7/11), Alcoholic Anonymous (AA, 2/11), inpatient rehab + AA sessions (1/11), and relapse prevention + AA (1/11). 8 out of the 11 patients undergoing intervention reported abstinence on subsequent visits, however a follow-up PEth test was positive in 2 patients out of those 8 patients. 9 patients did not receive any intervention and continued to drink. 3 out of 9 had PEth test and it was positive (mean PEth level 297 ng/ml). 5 out 20 patients had graft rejection and only 1 of those 5 underwent a psychosocial intervention and stopped drinking. 2 patients died; both continued to drink post-transplant. One died of acute alcoholic hepatitis and was from the no intervention group, while the other underwent an intervention but nonetheless continued to drink and died due to a falling accident.

Conclusions: PEth test has been largely implemented in the process of liver transplant evaluation and post-transplant follow-up to ensure abstinence and compliance with the transplant requirements. It has recently played a role in pre-transplant evaluation. In this study, we found that PEth testing identified patients who had recidivism and those who continued to use alcohol despite undergoing relapse prevention. Larger studies are needed to accurately evaluate the benefit of broader PEth testing in post-liver transplant follow-up.

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Abstract# 1108

Recent Trends and Outcomes of Liver Transplantation for Non-alcoholic Steatohepatitis versus Alcohol Liver Disease in the United States: Obesity Might be Protective

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Purpose: Nonalcoholic steatohepatitis (NASH) and alcohol liver disease (ALD) are rapidly growing indications for liver transplantation (LT). The recent trends and outcomes in NASH and ALD are limited.

Methods: We analyzed data from the United Network for Organ Sharing (UNOS) between 2002 and 2016. We excluded hepatitis C virus co-infection and compared the trends and outcomes in NASH and ALD.

Results: 19,581 LTs were performed during the study period, of which 8,289 LTs were for NASH and 11,292 LTs were for ALD. Compared to ALD, NASH group had older median recipient age (60 vs 55, p<0.01), female dominance (44 vs 22%, p<0.01), high percentage of Caucasian (81 vs 78%, p<0.01) and higher median BMI (32 vs 28, p<0.01). In NASH, Pre-LT diabetes rate was significantly higher, but ventilation rate and dialysis rate were significantly lower (66 vs 21%; 3.5 vs 5.1%; 16 vs 17%; p<0.01, respectively). Compared to ALD, the outcomes of NASH were inferior in five-year graft survival and five-year overall survival (77 vs 78%,

p=0,03; 80 vs 81%, p<0.01). In cox regression multivariable analysis for five-year graft survival, higher recipient age, male, Caucasian, pre-LT diabetes, pre-LT dialysis, ventilation on LT, Transjugular intrahepatic portosystemic shunt (TIPS), portal vein thrombosis (PVT), higher MELD score, African American or Hispanic donor and higher donor risk index (DRI) were significantly associated with negative outcomes. Hispanic or Asian recipient, higher recipient BMI and recent transplant year had significantly protective effects. The etiology of NASH vs ALD did not show significant difference in multivariable analysis (p=NS).

Conclusions: NASH and ALD had comparable post-transplant outcomes in graft survival and overall survival. Pre-transplant diabetes, dialysis, ventilation status, TIPS, PVT and DRI were associated with poor outcomes. We also showed the improvement of LT in recent years and protective effects of recipient BMI.

Table 1 Baseline characteristics of the study population

	NASH	ALD	
N	8,289	11,292	P
Age (IQR)	60 (55 – 65)	55 (48-61)	<0.001
Female, n (%)	3,668 (44.3)	2,499(22.1)	<0.001
Race, n (%)			
Caucasian	6,700 (80.8)	8,846 (78.3)	<0.001
African American	178 (2.1)	394 (3.5)	
Hispanic	1,152 (13.9)	1,725 (15.3)	
Asian	153 (1.8)	192 (1.7)	
BMI (IQR)	32.1 (28.2-36.2)	27.9 (24.6-31.8)	<0.001
Waiting list days (IQR)	89 (21-263)	46 (11-180)	<0.001
Pre-LT diabetes, n (%)	5,473 (66)	2,417 (22)	<0.001
Ventilation, n (%)	289 (3.5)	575 (5.1)	<0.001
Pre-LT dialysis, n (%)	1,287 (15.5)	1,965 (17.4)	<0.001
TIPS, n (%)	774 (9.3)	1,099 (9.7)	0.363
SBP, n (%)	555 (6.7)	1,187 (10.5)	<0.001
PVT, n (%)	593 (7.2)	496 (4.4)	<0.001
L*-MELD (IQR)	17 (13 – 24)	17 (13-24)	<0.001
R$-MELD (IQR)	22 (16 – 29)	21 (16-29)	<0.001
Donor age (IQR)	43 (28 – 56)	43 (27-56)	0.079
Donor Female, n(%)	3,379 (40.8)	4,429 (39.2)	0.030
Race, n (%)			
Caucasian	5,612 (67.7)	7,548 (66.8)	<0.001
African American	1,443 (17.4)	1,854 (16.4)	
Hispanic	905 (10.9)	1,502 (13.3)	
Asian	187 (2.3)	232 (2.1)	
Donor BMI (IQR)	26.9 (23.4-31.1)	26.6 (23.4-30.7)	<0.001
Donor HCV, n(%)	12 (0.2)	16 (0.1)	0.54
Donor Risk Index (IQR)	1.59(1.37-1.91)	1.56 (1.35-1.88)	<0.001

SBP: spontaneous bacterial peritonitis, PVT: portal vein thrombosis, L* - Listing, R$ - Most recent,

Table 2 Cox regression multivariate analysis

Variables	B (S.E.)	Hazard Ratio (95%CI)	P
Age (per 10)	0.16 (0.02)	1.18 (1.14 - 1.22)	<0.001
Male	0.18 (0.04)	1.20 (1.12 – 1.29)	<0.001
BMI (per10)	-0.10 (0.03)	0.90 (0.86 - 0.95)	<0.001
Race			0.015
Caucasian	REF	REF	
African American	0.07 (0.09)	1.07 (0.90-1.29)	0.43
Hispanic	-0.11 (0.05)	0.89 (0.82-0.98)	0.02
Asian	-0.29 (0.13)	0.75 (0.57-0.97)	0.03
Pre-LT diabetes	0.24 (0.03)	1.27 (1.19 – 1.35)	<0.001
Ventilation	0.50 (0.07)	1.65 (1.45 – 1.88)	<0.001
Pre- LT Dialysis	0.14(0.05)	1.15 (1.04 – 1.27)	<0.001
TIPS	0.16 (0.05)	1.17 (1.06 -1.30)	0.002
PVT	0.35 (0.06)	1.42 (1.26-1.61)	<0.001
R$- MELD (per 10)	0.11 (0.02)	1.11(1.07-1.16)	<0.001
Donor Male	-0.06 (0.03)	0.94 (0.89 – 1.00)	0.067
Donor Race			0.009
Caucasian	REF	1.0 (REF)	
African American	0.14 (0.04)	1.15 (1.06-1.25)	<0.001
Hispanic	0.12 (0.05)	1.12 (1.02-1.24)	0.017
Asian	0.07 (0.11)	1.07 (0.87-1.32)	0.52
DRI	0.43 (0.04)	1.54 (1.42 – 1.67)	<0.001
Year of Transplant	-0.04 (0.004)	0.96 (0.95 - 0.97)	<0.001

PVT: portal vein thrombosis, R$ - Most recent, DRI: donor risk index

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Abstract# 1109

Variation of Liver and Kidney Transplant Practice and Outcomes During Public Holidays in the United States

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Purpose: The outcomes of liver transplant (LT) and kidney transplant (KT) have been shown to be unaffected by the time of transplant surgery whether done during weekends, or summer months. The possible effects of public holidays on organ transplant practice and outcomes have not been fully investigated. This study aims to compare the rates of liver and kidney transplant (LT, KT) during public holidays and explore whether post-transplant outcomes differ.

Methods: We assessed the rates of single-organ, deceased LT and KT from 2010-2019 for recipients age ≥18 years using the UNOS database. Public holidays included Easter, Memorial Day, July 4th, Labor Day, Thanksgiving, and Christmas/New-Years (winter holidays). Patients were grouped by transplantation during public holidays ±3 days (LT: n=7640; KT: n=15,143) and non-holiday periods (LT: n=50,129, KT: n=98,313). Risk of graft loss, death-censored kidney graft loss, and mortality at 1-month, 1-year, 3-year, and 5-year were analyzed using multivariable Cox regression models.

Results: KT and LT recipient characteristics were similar between public holidays and non-holidays. The transplant activity did not differ between public holidays and non-holidays for LT (16.6 vs 15.9 transplants/day; p=0.42) and KT (30.9 vs 31.1 transplants/day; p=0.5). In LT donors, the holiday group had the **smaller** proportion of cold ischemia time (CIT) > 8 hr (15.2% vs 17.2%; p<0.001), higher donor risk index (DRI) >1.6 (42.0% vs 43.6%, p=0.009; Table 1A), and smaller proportion of marginal donors (DCD or >70 years, 19.2% vs 21.1%; p=0.001). In KT donors, the holiday group had the larger proportion of younger donors <50 years (73.1% vs 71.5%; p=0.001), shorter CIT ≤16 hr (47.5% vs 46.5%; p=0.021), and Kidney Donor Profile Index ≤0.42 (49.9% vs 48.9%; p=0.027; **Table 1B**). After adjusting for donor and recipient factors, LT during public holidays was associated with a lower risk of 5-year mortality (HR 0.92 [0.86-0.98], p=0.01; **Figure 1**). Regarding KT, similar post-transplant outcomes (graft loss, death-censored graft loss, mortality) were found between holidays and non-holidays.

Conclusions: While LT or KT activity was not affected by public holidays, long-term outcomes in LT performed during public holidays were significantly better compared to the non-holiday group, most likely due to more conservative graft selection.

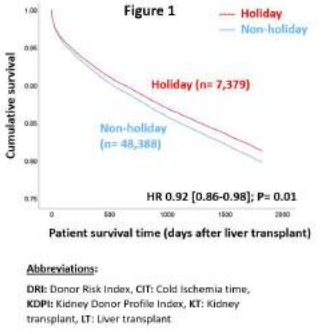
Donor characteristics for LT (**Table 1A**) and KT (**Table 1B**). **Figure 1**- Kaplan-Meier survival curve for 5-year LT patient survival using cox regression model.

Table 1A

	Liver transplant		
	Holiday	Non-holiday	p-value
Liver CIT			<0.001
LT ≤8 hr n (%)	6469 (84.8)	41459 (82.8)	
LT >8 hr n (%)	1162 (15.2)	8636 (17.2)	
DRI			0.009
≤1.6 n (%)	4409 (58.0)	28042 (56.4)	
>1.6 n (%)	3188 (42.0)	21649 (43.6)	

Table 1B

	Kidney transplant		
	Holiday	Non-holiday	p-value
Kidney CIT			0.021
KT≤16 hr n (%)	7191 (47.5)	45696 (46.5)	
KT>16 hr n (%)	7952 (52.5)	52617 (53.5)	
KDPI			0.027
≤0.42 n (%)	7550 (49.9)	48018 (48.9)	
>0.42 n (%)	7580 (50.1)	50102 (51.1)	



Abbreviations:
DRI: Donor Risk Index, **CIT:** Cold Ischemia time, **KDPI:** Kidney Donor Profile Index, **KT:** Kidney transplant, **LT:** Liver transplant

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Abstract# 1110

Liver Transplant in Adult Recipients Using Pediatric Deceased Donor Liver Grafts

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Purpose: The aim of this study is to evaluate the outcomes following liver transplantation (LT) in adults using grafts from a pediatric deceased donor.

Methods: A retrospective, single-center study identifying adult LT using pediatric (≤12 years) deceased donor liver grafts (PD group) was conducted from 2013-2020. A 1:2 case-control match was performed to identify adults receiving a graft from an adult donor ≥18 years (AD group) in the same period based on recipient age (±10 years), model for end-stage liver disease (MELD) score at transplant (±5 points) and indication for LT. Patient data was obtained through electronic medical records chart review. Early complication rates were identified and graded using Dindo-Clavien classification. Graft and patient survival were assessed by Kaplan-Meier curves.

Results: 479 patients were identified. From those, 12 patients received a graft from a deceased pediatric donor and were matched with 24 adults receiving a graft from an adult donor. Recipient mean age, body mass index (BMI), and MELD were similar between groups. Male gender was significantly higher in the AD group compared with the PD group (20 (83.3%) vs 4 (33.3%), p=0.003). Alcohol related cirrhosis was the most common indication for transplant in both groups, followed by hepatocellular carcinoma, seen in 50% and 33.3% of recipients in each group, respectively. As expected, donor mean (SD) age and donor BMI were significantly higher in the AD group (47.13 (± 15.87) vs 8.83 (± 2.72), p=0.001 and 28.70 (± 6.16) vs 17.0 (± 2.67), p=0.032, respectively). Cold ischemia time and warm ischemia time were similar between groups. There was no recipient mortality in the PD group, while one (4.2%) recipient in the AD group died two months after LT. According to Dindo-Clavien classification, no significant difference was found among groups. Three (25%) patients developed minor complications in the PD group, versus 7 (29.1%) in the AD group. Major complications (≥3b) were seen in 4 patients in both groups (33.3% vs 16.7%, respectively). The most common complication was bile duct stricture in both groups, seen in 3 (25%) and 4 (16.7%) recipients in the PD group and AD group, respectively (p=0.55). Hepatic artery thrombosis was seen in 2 patients (16.7%) within the first week, successfully managed by thrombectomy and hepatic artery reconstruction without the need of re-transplantation in the PD group and in one (4.2%) in the AD group, (p=0.2). Graft and patient survival at 1-, 3-, and 5- year were similar among groups for all time periods (100% vs 96%, p=0.48).

Conclusions: We observed an excellent patient and graft survival in liver transplantation with pediatric deceased donor livers into adult recipients. Careful donor recipient matching and close monitoring for potential biliary and vascular complications is crucial to achieve acceptable outcomes.

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DISCLOSURES: P. Vargas: None. **C. Argo:** None. **H. Zachary:** None. **M. Stotts:** None. **N. Intagliata:** None. **P. Northup:** None. **S. Pelletier:** None. **J. Oberholzer:** None. **N. Goldaracena:** None.

Liver

Liver: Hepatocellular Carcinoma and Other Malignancies

Abstract# 1111

Given the Potential Impact on Liver Transplant Selection, Revisiting the Current Standard of Diagnosis of Hepatocellular Carcinoma

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Purpose: The current standard of diagnosis of hepatocellular carcinoma (HCC) relies on non-invasive radiographic methods, namely computerized tomography (CT) and/or magnetic resonance imaging (MRI). However, independent studies conducted in Missouri, Belgium, and South Korea have suggested radiology may be insufficient as a stand-alone diagnosis method for HCC. Hence, we investigated the effectiveness of current diagnosis standards of HCC at MedStar Georgetown University Hospital (MGUH).

Methods: We analyzed 130 patients who underwent liver biopsy (n=40), partial hepatectomy (n=28), or liver explant (n=62) at MGUH from December 2017 to June 2019 with a corresponding in-house radiologic study. We compared the pathology reports with their corresponding radiology reports to determine MGUH's effectiveness in detecting HCC based on the current Liver-Imaging Reporting and Data System version 2018 (LI-RADS v2018).

Results: Of the 130 cases analyzed, 118 cases were histologically confirmed HCC, of which 100 were correctly identified on radiology (100/118; 84.7%). The remaining 18 cases of confirmed HCC showed discrepancy with the radiology reports, to include 6 benign (6/18; 33%) and 12 non-HCC neoplasms (12/18; 67%), such as cholangiocarcinoma, lymphoma, and sarcoma, with a total discrepancy rate of 15.3% (18/118). In the residual 12 of 130 cases, 7 were histologically confirmed to be benign (completely normal or bile duct adenoma), of which 5 cases (5/7; 71.4%) were misdiagnosed as HCC by radiology. Our results revealed an overall radiology negative predictive value of 21.7% and a positive predictive value of 93.5% for HCC diagnosis.

Conclusions: Our study provides supporting evidence, in conjunction with several of its contemporary studies, that the current LI-RADS v2018 guidelines require a further amendment to include histologic confirmation of the HCC diagnosis.

Table 1. Comparing pathology and radiology diagnosis of 130 cases analyzed in study

Biopsy (40) / Hepatectomy (28) / Total explant (62)		
Pathology Diagnosis	**Radiology Diagnosis**	**# of Cases**
Benign (7)	Benign	1
	HCC	5
	Lymphoma	1
Cholangiocarcinoma (5)	Benign	1
	Malignancy	2
	HCC	2
HCC (118)	Benign	6
	Sarcoma	1
	Cholangiocarcinoma	2
	Malignancy	9
	HCC	100

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DISCLOSURES: K. Amarell: None. **B. Fisher:** None. **B. Park:** None. **K. Ko:** None. **B. Kallakury:** None.

Abstract# 1112

Pilot Evaluation of Prognosis After Liver Transplantation in Patients with a History of Hepatocellular Carcinoma and Pd-1 Inhibition

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Purpose: The successful applications of programmed death protein-1 (PD-1) inhibitors in cancer therapy has led to an expanding use of immunotherapy in oncolog Liver transplantation (LT) is considered the most effective treatment for end stage liver diseases (ESLD) including HCC. However, the applications of PD-1 inhibitors in cancer patients would be controversial with LT. In this article, we have firstly described the clinical characteristics, imaging findings, and outcomes of 5 LT patients who had a History of HCC and PD-1 Inhibition.

Methods: Data of 5 cases who were diagnosed with HCC and received a LT after applications of PD-1 inhibition were analyzed. Doses and cycles of PD-1, preoperative and postoperative characteristics were compared and analyzed.

Results: The mean time difference between the last treatment of PD-1 inhibition and LT was 63.80±18.26 days. One patient had a recurrence in liver, vertebrae and lungs after 7 months. All patients displayed normal liver function in the latest follow-up. No acute allograft rejections were occurred in all patients.

Conclusions: PD-1 inhibitor may be safe to be used tin the treatment of HCC before LT when the time difference is sufficient. Further investigations are needed for any convincing results.

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Abstract# 1113

Effects of TIPS on Transplant Outcomes for HCC

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Purpose: The purpose of this study is to examine effects of TIPS placement on response to locoregional therapy (LRT) and clinical outcomes after liver transplantation in HCC patients.

Methods: Adults who had TIPS placed prior to HCC diagnosis who underwent LT for HCC at a single center from 2014-2020 were included. Presence of TIPS and LRT response were collected from chart review of multi-phase cross-sectional abdominal imaging prior to LT, and tumor characteristics were collected via explant pathology. Clinical outcomes were assessed. Covariates of interest included age, sex, etiology of HCC, body mass index, MELD-Na after LRT, timing from TIPS to LRT, number of LRT treatments, and timing from HCC diagnosis to LT.
Results: Of 303 patients who underwent LT for HCC at a single center from 2014-2020 and met eligibility for the study, 13 (4.3%) had TIPS placed prior to diagnosis of HCC, and 1 (0.03%) had TIPS placed while undergoing LRT but prior to LT. Of the 13 patients with TIPS prior to HCC diagnosis, the mean age at HCC diagnosis was 60.4 years, and the sample was 92.3% male (12 of 13). 10 (76.9%) patient received at least one LRT prior to LT, and 5 (38.5%) underwent 2 or more LRTs. Post-LT survival among patients with TIPS was excellent, with 100% survival rate and no HCC recurrence on follow up imaging. Zero TIPS patients displayed post-LT hepatic vasculature complications within 1 year of LT. Calculated RETREAT scores ranged from 0 to 2, with the most common score being 1 (76.9% [n=10]). Overall post-transplant HCC-free survival and post-transplant complication rates were superior to overall HCC transplant data at the center (100% 3-yr survival with a functioning graft vs 87.34% expected 3-yr survival with a functioning graft unadjusted for patient and donor characteristics).
Conclusions: Presence of TIPS does not appear to increase post-LT complications, nor does TIPS affect HCC recurrence and recurrent-free survival. Overall post-transplant HCC-free survival and low post-transplant complication rates may be attributable to tumor biological behavior, low AFP, and low RETREAT scores among HCC patients with TIPS.

Characteristic	Patients with TIPS prior to HCC (N=13)
Age at HCC diagnosis (yr)	60.4 (63.2 - 56.9)
Indication for TIPS	
Refractory ascites	4
Acute variceal bleed	8
Recurrent variceal bleeding	2
TIPS placement to HCC diagnosis (days)	678 (242 - 1653.5)
HCC diagnosis to LT (days)	493 (248 - 631.5)
Median largest viable lesion (cm)	2.30 (2.00 - 3.30)
RETREAT Score	
0	2
1	10
2	1
Survival to date	13 (100%)
Median post-LT survival (yr)	4.4 (3.1 - 4.7)

CITATION INFORMATION: Hanlon C., Toy D., Liu Y., Zhou S., Zhou K., Kahn J., Yuan L. Effects of TIPS on Transplant Outcomes for HCC *AJT, Volume 21 Supplement 3*
DISCLOSURES: C.L. Hanlon: None. **D. Toy:** None. **Y. Liu:** None. **S. Zhou:** None. **K. Zhou:** Grant/Research Support; Name of Commercial Interest; Gilead. **J. Kahn:** None. **L. Yuan:** Grant/Research Support; Name of Commercial Interest; Intercept, Genfit.

Abstract# 1114

Immunotherapy of Dc-cik Cells in Patient with Hepatocellular Carcinoma Recurrence Following Liver Transplantation

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Purpose: Dendritic cells (DCs) and cytokine-induced killer (CIK) cells, components of anti-cancer therapy, have shown clinical benefits and potential to overcome chemotherapeutic resistance in some cancer patients. However, only fewer experience published about the safety and efficacy of DC/CIK in the transplant patients. We would like to share our experiences of DC/CIK therapy in the transplant patients.
Methods: Until November 12th, 2020, 8 patients receiving DC/CIK therapy for hepatocellular carcinoma recurrence or metastasis (Table 1). 6 patients already received liver transplantation, but another 2 patients did not. 6 patients already completed DC/CIK treatment courses and another 2 patients are processing. Almost all patients even received other therapies, like checkpoint inhibitor, target therapy, trans-arterial chemoembolization or radiotherapy. Images and laboratory data are used to evaluate the patient's response.
Results: Of 6 patients with complete DC/CIK therapy, the survival days are 58 days to 184 days. Images and laboratory data approve 1 patient with complete responses (CR). 1 patient is approved as partial response (PR), and 3 patients stay with stable disease (SD). 1 patient is approved as progressive disease (PD). 2 patients already died because of infection and disease progression later. No patient develops any rejection or cytokine release syndrome.
Conclusions: Multidisciplinary therapy is a favored treatment option for HCC patients now right, like checkpoint inhibitor therapy and target therapy together or local treatment and target therapy. However, checkpoint inhibitor is still relatively contra-indication to the transplant patient because of potential graft rejection. Thus, DC/CIK could be another alternative therapy. In our experiences, DC/CIK is safe and has potential efficacy in the transplant patient.

No.	Age / Gender	History	Response (until Nov. 12th, 2020)	Status/survival days (since last DC/CIK therapy)	Cause of Death
1	57/M	• LDLTx before and then recurrence and metastases • DC/CIK Combine with target therapy and Anti-PD-1 therapy.	Stable disease (SD)	Alive / 184 days	-
2	61/M	• LDLTx before and then recurrence and metastases • DC/CIK Combine with TACE and local radiotherapy of LN metastases	Stable disease (SD)	Alive / 181 days	-
3	61/M	• DDLTx and then recurrence and metastases • Received tumor excision • DC/CIK Combine with TACE, target therapy and Anti-PD-1 therapy	Stable disease (SD)	Death/ 117 days	Infection
4	54/M	• LDLTx and then intrahepatic recurrence • DC/CIK Combined with TACE	Complete response (CR)	Alive / 127 days	-
5	45/M	• No LTx • Hepatectomy, TACE and target therapy before • Did not combine with other therapy	Partial response (PR)	Death / 58 days	Liver failure
6	39/F	• No LTx or hepatectomy • DC/CIK Combine with Anti-PD-1 therapy and target therapy, clinical trial	Progressive disease (PD)	Alive / 114 days	-

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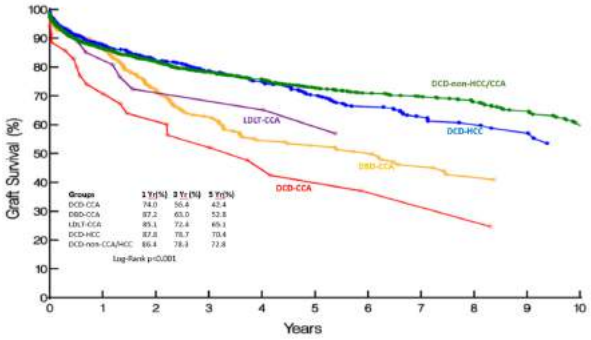
DISCLOSURES: S. Hsu: None. **L. Jeng:** None. **H. Yang:** None. **A. Thorat:** None.

Abstract# 1115

Impact of Donation After Circulatory Death Donor Allografts on Outcomes Following Liver Transplantation for Cholangiocarcinoma

S. Kumar[1], S. Lin[2], J. D. Schold[2], *[1]Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates, [2]Department of Quantitative Health Sciences, Cleveland Clinic Foundation, Cleveland, OH*

Purpose: Improvements in the management of extra-hepatic cholangiocarcinoma (CCA) resulted in allocation of a standardized model for end-stage liver disease (MELD) exception score for liver transplantation (LT) in 2009 for selected patients who completed an approved neoadjuvant chemoradiation protocol. Limited data exists regarding donation after circulatory death (DCD) grafts in CCA despite higher reported incidence of biliary complications. We compared outcomes following DCD LT in CCA (DCD-CCA) with deceased donor (DBD-CCA) and living donor LT (LDLT-CCA), as well as DCD in Hepatocellular carcinoma (DCD-HCC) and indications other than HCC or CCA (DCD-non-CCA/HCC).
Methods: Using SRTR, retrospective study cohorts were constructed over the time period 2009-2019. Primary outcome measures were graft and patient survival. A chi-square test was used for categorical and Student's t-test for continuous variables. Survival comparison was performed using the Kaplan-Meier method with log-rank test and multivariable analysis of outcomes using Cox proportional hazard models.
Results: 425 recipients underwent LT for CCA over the study period: DCD-CCA: 36 (8.5%), DBD-CCA: 361 (85%), LDLT-CCA: 28 (6.5%). 884 and 3101 recipients respectively underwent DCD-HCC and DCD-non-CCA/HCC. All CCA groups were comparable with respect to donor, recipient variables, cold ischemia time (except LDLT-CCA) and time from listing to LT. Mean lab MELD in DCD-CCA was lower than DBD-CCA (12.9 vs 14.3, p=0.02) and DCD-non-CCA/HCC (12.9 vs 19.6; p<0.0001), but comparable to DCD-HCC (12.9 vs 13; p=0.27). Observed graft survival in DCD-CCA was lower than DBD-CCA and LDLT-CCA (Fig 1). However patient survival in the 3 CCA groups was comparable: DCD-CCA, DBD-CCA, LDLT-CCA (%): 1 Yr: 82.2 vs 89.2 vs 88.7; 3 Yr: 64.4 vs 65.1 vs 75.4; 5 Yr: 55.8 vs 55.1 vs 67.9 (p=0.44). Outcomes in DCD-CCA were also inferior to DCD-HCC and DCD-non-CCA/HCC. On multivariable analysis, while cold ischemia time was predictive of both graft and patient survival in CCA, recipient DCD status was only predictive of graft (HR (95% CI): 1.69 (1.03-2.76), p=0.03), but not patient survival (HR (95% CI): 1.39 (0.81-2.37), p=0.22).
Conclusions: Even though graft survival following DCD LT in CCA is inferior to DBD and LDLT, patient survival is comparable. Consideration of DCD in CCA may confer a survival advantage when weighed against likelihood of wait-list drop out in carefully selected recipients with a time-sensitive need for LT.



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DISCLOSURES: S. Kumar: None. **S. Lin:** None. **J.D. Schold:** None.

Abstract# 1116

Review of 10-Year Liver Explant Pathology Impact on Outcomes in a Single Center

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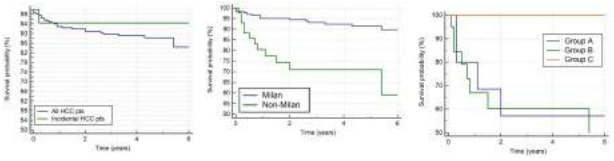
Purpose: Explant pathology (EP) is an important prognostic factor after liver transplantation (LT) for hepatocellular carcinoma (HCC). The purpose of this study was to correlate EP findings with outcomes following LT over a 10-year period in a region 5 institution.
Methods: All LT cases with HCC on EP from Jan. 1, 2010 through Dec. 31, 2019 were identified. Retrospective review was conducted and the following data collected: EP including size, number, histology and differentiation of the tumor(s) as well as the presence of lymphovascular invasion. Additional data included patient demographics, pre-operative imaging and outcomes. Survival was analyzed using the standard Kaplan-Meier method. Separate analysis was conducted for patients in whom HCC was an incidental finding.
Results: 285 patients met the above inclusion criteria including 19 (6.7%) who did not have a formal diagnosis of HCC pre-operatively. Among the 19 patients, 3 had suspicious lesions, 1 had an elevated serum alpha-fetoprotein with a negative imaging study, and the remaining 15 patients had no evidence of HCC. Among the 16 patients with no radiographic lesions, the incidental tumor on explant was small (Median 1.2cm, Average 1.3cm [0.8cm to 2cm]) with the median value of one tumor per patient (average 1.5). 6 patients had well-differentiated HCC, and the remaining 10 had moderately differentiated HCC. Overall, these 19 patients had an excellent survival when compared to all the study patients as a group (Figure 1). Among the 285 explants, 239 met Milan criteria (MC), and 46 patients did not for the following reasons: lymphovascular invasion (n=20), number and/or size of tumors or local direct invasion (n=14), and non-HCC tumors (n=12). Patients who met the MC had 1 and 5-year survivals of 95% and 90% compared to 78% and 62% for those who did not meet the MC ($p < 0.0001$) (Figure 2). Survival analysis of the 3 sub-groups showed that those patients with non-HCC or microscopic invasion had a significantly worse outcome than those who did not meet the MC due to the tumor's macroscopic features alone (Figure 3).
Conclusions: Incidental HCC on EP did not appear to have a negative survival impact likely due to the early nature of the cancer disease. Among the patients who did not meet the MC, those with non-HCC or microscopic invasion had a worse outcome, suggesting that tumor biology and evidence of microscopic invasion are more critical prognostic factors than macroscopic aspects of the tumor including direct local extrahepatic invasion.



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DISCLOSURES: Y.K. Kwon: None. **L. Sher:** None. **S. Khemichian:** None. **J. Kahn:** None. **Y. Genyk:** None.

Abstract# 1117

Intrahepatic Spatial Location of HCC Recurrence Following Loco-regional Therapy for Solitary Tumors Predicts a Higher Oncologic Risk & Increased Recurrence Post-transplant

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Purpose: Loco-Regional therapy (LRT) for hepatocellular carcinoma (HCC) patients is an established bridge to Orthotopic Liver Transplantation (OLT). However, no large cohort data exist correlating patterns of spatial recurrence within the liver Post-LRT and HCC recurrence post-transplant. Recurrences in segments away from the original tumor would represent de-novo HCC or intra-hepatic spread. Intuitively, this pattern of recurrence would represent a higher oncologic risk than patients that recur in the same or adjacent areas of the liver. Patients with solitary tumors represent an ideal group to evaluate this response. Therefore, we hypothesized that patients with solitary tumors undergoing LRT that have recurrences of HCC away from the original segment of the tumor carry a higher oncologic risk & increased recurrence post-OLT.
Methods: From a database of 645 patients who had OLT for HCC we identified 508 patients who had LRT pre-OLT. 74 had cancer recurrence post-OLT. Of these 20 cases had a single tumors within Milan criteria pre-first LRT. We matched them with patients who did not have a recurrence post-OLT based on etiology, MELD, AFP and tumor size pre-first LRT. Tumor data was recorded after reviewing imaging pre-and post- each LRT as well as pre-transplant. Demographics, etiology, AFP and NLR (at each LRT), and explant tumor pathology post-OLT was recorded.
Results: Median age of all patients was 59years and 74% were male. Neutrophil-Lymphocyte ratio (NLR) was no different prior to 1st LRT between groups (2 +/- 1 vs. 2 +/- 1) but was significantly higher pre-OLT in recurrers (5+/-6 vs 2+/-1; p=0.05). Median AFP levels of both groups was 25 pre-LRT and stayed unchanged pre-OLT. No differences existed in mean number of LRTs between groups (2 +/- 1 vs. 2 +/- 1) . Percent patients with >=3 LRTs was 36% vs 39% in Recurrers and Controls respectively. However, location of recurrence was distant from tumor in a greater proportion of recurrers (50%vs 12,5%, p=0.07). Explant pathology showed higher grade (82% vs 28%, p<0.05) and larger tumor size (5+/-2 vs 3+/-2; p<0.05) in recurrers. Interestingly, on explant only 50% of recurrers and 59% of non-recurrers had single tumors.
Conclusions: These data show that HCC patients with solitary lesions within Milan criteria need multiple LRTs and the number of LRTs do not predict who recurs. However, a pattern of recurrence distant from the original tumor bearing segment of the liver is present in patients that recur. Patients with these patterns of recurrence have higher tumor grade on final pathology. Finally, while an altered immune response, represented by NLR, was not present pre-LRT -patients that develop distant liver segment recurrences generate an elevated NLR. Therefore, we conclude that patients with solitary tumors undergoing LRT that have recurrences away from the original segment of involved tumor carry a higher oncologic risk & increased recurrence post-OLT.
CITATION INFORMATION: Mathur A., Baughan E., Haider S., Griesemer A., Kato T., Emond J. Intrahepatic Spatial Location of HCC Recurrence Following Loco-regional Therapy for Solitary Tumors Predicts a Higher Oncologic Risk & Increased Recurrence Post-transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Mathur: None. **E. Baughan:** None. **S. Haider:** None. **A. Griesemer:** None. **T. Kato:** None. **J. Emond:** None.

Abstract# 1118

Improving Liver Transplantation Outcomes for Hepatitis C Associated Hepatocellular Carcinoma in Direct-Acting Antiviral Therapy Era

K. Okumura, H. Sogawa, G. Veillette, D. John, T. Diflo, R. Bodin, D. C. Wolf, S. Nishida, *Surgery, Westchester Medical Center/New York Medical College, Valhalla, NY*

Purpose: Direct-acting antiviral (DAA) therapy has transformed the outcomes of liver transplantation(LT) in patients with hepatitis C virus (HCV). The aim of this study was to analyze the effect of DAA treatment for HCV-associated hepatocellular carcinoma (HCC) in LT.
Methods: We analyzed data from the United Network for Organ Sharing between 2012-2016. We defined as pre-DAA era between 2012-2013 and DAA era between 2014-2016. We included the patients confirmed as HCC on explant and evaluated demographics and the tumor features on explant of HCC during the study periods.
Results: 7,716 liver transplants for HCC were performed during the study periods and HCV-associated HCC were 4,778 (62%). In DAA era, median recipient age was older and median days of waiting list were longer (61 vs 59; 258 vs 222 days p<0.01, respectively). Pre-LT treatment rate was higher and AFP before transplant was lower (95.8 vs 92.8 %; 13 vs 8 ng/ml p<0.01, respectively). For donor, median donor's age, donor BMI and rate of HCV significantly increased in DAA era (42 vs 41; 26.9 vs 26.6; 13.9% vs 9.1%, p<0.01, respectively). In pathology, there was no significant difference in high risk features (p=NS), however, rate of completed tumor necrosis was significant higher in DAA era (20.6 vs 15.8%, p<0.01). Compared to pre-DAA era, one-year graft survival and patient survival were same (90.7% vs 89.7%; 90.8% vs 89.8%, p=NS, respectively), however, three-year graft survival and patient survival had significantly improved in DAA era. (85.0% vs 80.8%; 86.9% vs 83.3%, p<0.01, respectively). In cox regression multivariable analysis, DAA era

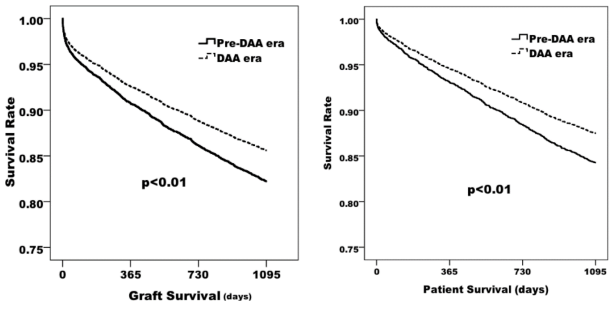
(hazard ratio [HR], 0.79; p<0.01), pre-LT diabetes (HR, 1.31; p<0.01), high AFP per 100 (HR, 1.03; p<0.01), high MELD score per 10 (HR, 1.16; p=0.04), histologic grade (HR 1.29; p<0.01), high risk features (HR, 1.70; p<0.01), and high DRI (HR, 1.50; p<0.01) had significantly impacted for three-year graft survival. Pre-transplant treatment and donor HCV status did not affect the outcomes.

Conclusions: DAA has a significant impact of LT. In DAA era, graft survival and patient survival for HCV associated HCC have been significantly improving.

Baseline characteristics of the study population etiology on HCC with HCV

N	Pre DAA 2012-2013 1,757	DAA 2014-2016 3,021	p
Age (IQR)	59 (56-63)	61 (58-64)	<0.001
Female, n (%)	385 (21.9)	612 (20.3)	0.184
Race, n(%)			0.572
White	1,197 (68.1)	2,045 (67.7)	
Black	224 (12.7)	383 (12.7)	
Hispanic/Latino	245 (13.9)	433 (14.3)	
Asian	75 (4.3)	115 (3.8)	
BMI (IQR)	28.1 (25.2-31.5)	28.0 (25.0-31.6)	0.850
Waiting list days (IQR)	222 (102-431)	258(136-462)	0.009
Pre-LT diabetes, n (%)	456 (26.0)	844(28)	0.147
AFP (IQR)	13 (6-40)	8 (5-22)	<0.001
Pre-LT treatment, n(%)	1,630(92.8)	2,893(95.8)	<0.001
L*-MELD (IQR)	10 (8-13)	10 (7-12)	<0.001
R§- MELD (IQR)	11 (8-15)	11 (8-14)	0.340
≥1 high-risk features¥, n(%)	625(35.6)	1,053(34.9)	0.637
> 3 tumors, n(%)	225(13.7)	411(14.3)	0.625
Largest tumor size, cm (IQR)	2.5(1.9-3.5)	2.6(1.8-3.7)	0.010
Vascular invasion, n(%)	256(14.6)	393(13.0)	0.137
Histologic grade, n(%)			<0.001
Complete tumor necrosis	278(15.8)	621(20.6)	
Well-differentiated	433(24.6)	634(21.0)	
Moderate	805(45.8)	1,423(47.1)	
Poorly	135(7.7)	221(7.3)	
Outside Milan criteria, n(%)	485(29.6)	907(31.5)	0.191
Outside UCSF criteria, n(%)	386(22.0)	733(24.3)	0.077
Donor age (IQR)	41 (26-53)	42 (29-54)	<0.001
Donor Female, n(%)	688 (39.2)	1173 (38.8)	0.830
Race, n(%)			0.597
White	1,144 (65.1)	1,990 (65.9)	
Black	312 (17.8)	514 (17.0)	
Hispanic/Latino	239 (13.6)	384 (12.7)	
Asian	39 (2.2)	72 (2.4)	
Donor BMI (IQR)	26.6 (23.4-30.5)	26.9 (23.6-31.4)	<0.001
Donor HCV, n(%)	159 (9.1)	419 (13.9)	<0.001
Donor Risk Index (IQR)	1.51 (1.31-1.78)	1.52 (1.32-1.82)	0.246

L* - Listing, R§ - Most recent
¥ - high-risk features included following:>3 tumors, largest tumor>5cm, presence of vascular invasion, presence of metastases, and poor differentiation of tumor



CITATION INFORMATION: Okumura K., Sogawa H., Veillette G., John D., Diflo T., Bodin R., Wolf D., Nishida S. Improving Liver Transplantation Outcomes for Hepatitis C Associated Hepatocellular Carcinoma in Direct-Acting Antiviral Therapy Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Okumura: None. **H. Sogawa:** None. **G. Veillette:** None. **D. John:** None. **T. Diflo:** None. **R. Bodin:** None. **D.C. Wolf:** None. **S. Nishida:** None.

Abstract# 1119

The Role of Histone Acetylation/methylation Mediated Epigenetic Modifications in the Pathogenesis of Non-alcoholic Steatohepatitis-associated Liver Carcinogenesis

P. K. Rajan[1], U. Utibe-Abasi[1], J. D. Sanabria[1], M. Banerjee[2], G. Smith[1], M. S. Schade[1], J. Sanabria[1], K. Sodhi[1], S. Pierre[2], Z. Xie[2], J. I. Shapiro[2], J. Sanabria[1], *[1]Department of Surgery, Marshall University, Huntington, WV, [2]Marshall Institute for Interdisciplinary Research (MIIR), Marshall University, Huntington, WV*

Purpose: Hepatocellular carcinoma (HCC) is one of the most aggressive human cancers and is characterized by an acquisition of multiple abnormal phenotypes driven by epigenetic alterations. Epigenetic changes including histone modifications are associated with uncontrolled cell growth and proliferation, and even initiation and progression of HCC from chronic inflammation with or without fibrosis in the liver. Among others, NASH and ASH are two major risk factors as both of them may develop cirrhosis and HCC if left untreated. Most of the existing clinical and experimental reports provide only a snapshot of abnormal histone modifications in HCC rather than their dynamic changes. This makes it difficult to elucidate the significance of these changes in the development of HCC. In the present study, we investigated the role of histone acetylation/methylation mediated alterations using in vitro cell line and high fat diet animal model of NASH-derived liver carcinogenesis.

Methods: In vitro studies were done using hepatocellular carcinoma cell lines, HEP3B and SNU 475, treated with different doses of pNaKtide at different time points. C57BL/6 female mice were exposed to normal mouse chow (NMC), HFD and HFD± pNaKtide for 24 weeks. HCC mice were exposed to graded doses of pNaKtide. The acetylated and tri methylated H3K9 in cell lysates and liver homogenates were quantitatively measured by ELISA. Expression of H3acetylK9 and H3tri-methyl K9 proteins were performed by confocal-microscopy on immuno-stained livers from HCC and NASH. Significant differences among groups were established at p<0.05 using ANOVA/t-test.

Results: The amount of acetylated and tri methylated H3K9 were found to be significantly increased in untreated hepatocellular carcinoma cells and were significantly decreased by pNaKtide treatment. In line with these in vitro results, the increased amount of acetylated and tri methylated H3K9 in the liver of NASH and HCC mice were found to be significantly decreased by pNaKtide administration. The immunofluorescence analysis of H3acetylK9 and H3tri-methyl K9 proteins further confirmed our findings.

Conclusions: In summary, the pivotal role of concurrent activation of acetylation and tri methylation of H3K9 in the pathogenesis of NASH associated HCC, as evidenced by our findings, explore their potential for translation into therapeutics by epigenome reprogramming.

CITATION INFORMATION: Rajan P., Utibe-Abasi U., Sanabria J., Banerjee M., Smith G., Schade M., Sanabria J., Sodhi K., Pierre S., Xie Z., Shapiro J., Sanabria J. The Role of Histone Acetylation/methylation Mediated Epigenetic Modifications in the Pathogenesis of Non-alcoholic Steatohepatitis-associated Liver Carcinogenesis *AJT, Volume 21 Supplement 3*

DISCLOSURES: P.K. Rajan: None. **U. Utibe-Abasi:** None. **J.D. Sanabria:** None. **M. Banerjee:** None. **G. Smith:** None. **M.S. Schade:** None. **J. Sanabria:** None. **K. Sodhi:** None. **S. Pierre:** None. **Z. Xie:** None. **J.I. Shapiro:** None. **J. Sanabria:** None.

Abstract# 1120

Excellent Pathological Response with Gemcitabine-based Protocol in Patient with Hilar Cholangiocarcinoma

A. Saharia[1], R. McMillan[1], S. Kodali[1], M. Javley[2], C. M. Mobley[1], M. J. Hobeika[1], A. Shetty[1], D. W. Victor[1], R. McFadden[1], M. Abdelrahim[1], K. Heyne[1], A. O. Gaber[1], R. M. Ghobrial[1], *[1]Houston Methodist Hospital, Houston, TX, [2]MD Anderson Cancer Center, Houston, TX*

Purpose: The standard treatment for hilar cholangiocarcinoma is using 5FU along with brachytherapy and external beam radiation. The downside of this regimen is the uncertain timing of radiation which makes the hilar dissection challenging. Gemcitabine and platinum-based therapy has emerged as a standard of care for cholangiocarcinoma. We looked into the pathological response to treatment using this regimen in our past 5 consecutive patients.

Methods: A retrospective analysis of the 1) mode of diagnosis 2) duration of induction with gemcitabine and cisplatin 3) duration of maintenance treatment with either gemcitabine or with capecitabine and 4) pathological response to treatment in the explanted liver was made.

Results: The five patients received gemcitabine-platinum and no external beam radiation. All patients maintained disease stability and underwent deceased donor liver transplantation based on the UNOS criteria for hilar cholangiocarcinoma. The patients had excellent pathological response to treatment.

Conclusions: The availability of radiation free, gemcitabine/ platinum based protocol gives us an additional tool in the management of hilar cholangiocarcinoma. Single agent gemcitabine or capecitabine are safe to give for long term maintenance. If the long term outcomes parallels that of Mayo protocol, this may become the standard of care. This protocol may have higher surgeon acceptability because it offers a radiation free surgical field.

Patient Characteristics and Pathology							
Age / Sex	Primary Sclerosing Cholangitis (Y/N)	Mode of Diagnosis	Time from Dx to OLT	Induc-tion	Radia-tion (Y/N)	Mainten-ance Chemo	Final Path
62 / M	Y	FISH	22 mo	4 Cycles Gem/ Cis	N	Gem 16 mo	ypT0N0
72 / F	N	Biopsy with adenoCa	21 mo	9 Cycles Gem/ Oxali	Y (Brachy)	Cape 7 mo	ypT1N0
74 / M	Y	FISH	12 mo	6 Cycles Gem/ Cis	N	Gem 3 mo	ypT0N0
61 / M	Y	FISH	12 mo	6 Cycles Gem/ Cis	N	Gem 4 mo	ypT0N0
64 / M	N	Brushings with adenoCa	5 mo	4 Cycles Gem/ Cis	N	Gem 2 mo	ypT2N0

CITATION INFORMATION: Saharia A., McMillan R., Kodali S., Javley M., Mobley C., Hobeika M., Shetty A., Victor D., McFadden R., Abdelrahim M., Heyne K., Gaber A., Ghobrial R. Excellent Pathological Response with Gemcitabine-based Protocol in Patient with Hilar Cholangiocarcinoma *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Saharia: None. **R. McMillan:** None. **S. Kodali:** None. **M. Javley:** None. **C.M. Mobley:** None. **M.J. Hobeika:** None. **A. Shetty:** None. **D.W. Victor:** None. **R. McFadden:** None. **M. Abdelrahim:** None. **K. Heyne:** None. **A.O. Gaber:** None. **R.M. Ghobrial:** None.

Abstract# 1121

Liver Transplantation Following Checkpoint Inhibitor Therapy - Timing is Everything

G. T. Schnickel[1], J. Parekh[1], Y. Kono[2], J. Berumen[1], V. Ajmeera[2], K. Mekeel[1], *[1]Division of Transplant and Hepatobiliary Surgery, Department of Surgery, University of California San Diego, San Diego, CA, [2]Division of Gastroenterology, Department of Medicine, University of California San Diego, San Diego, CA*

Purpose: Use of checkpoint inhibitors (CPI) prior to liver transplantation has not been well studied and limited case reports describe a risk of early graft failure secondary to immune mediated hepatic necrosis. However, with CPIs approved as first line therapy for unresectable hepatocellular carcinoma (HCC), the number transplant recipients receiving treatment with CPIs will increase. Therefore, we aimed to explore the association between time from last CPI administration and allograft outcomes in a case series of three liver transplant recipients.
Methods: We reviewed the charts of patients that received liver transplantation following treatment with checkpoint inhibitor therapy for HCC between January 1, 2018 and November 1, 2020. All transplants were performed with caval sparing technique and received standard three-drug immunosuppression of steroid taper, tacrolimus, and mycophenolate mofetil. Two patients received induction with rATG 3mg/kg. All biopsies were reviewed by a single pathologist and rejection classified by Banff criteria.
Results: Three patients underwent liver transplantation after receiving CPI therapy for HCC. All three patients received Nivolimab 240mg every 2 weeks the first month, then 480mg every 4 weeks thereafter. Time from last dose of CPI to transplant ranged from 10 days to 3 months. The 2 patients with less than 3 months from last dose of CPI to transplant developed ACR and substantial hepatic necrosis. Patient A's graft was salvaged after treatment with steroids, 9mg/kg rATG + rituximab. Patient B was re-transplanted for graft failure after failing treatment with steroids, rATG, and plasmapheresis. This patient also developed significant early ACR after re-transplant. Patient C with three months from last dose of CPI to transplant had consistent excellent graft function with no episodes of ACR.
Conclusions: Pretransplant use of CPI therapy for HCC confers a high risk for acute cellular rejection, antibody mediated rejection and immune mediated hepatic necrosis, which can lead to a high risk of graft loss and patient death. Time from the last dose of CPI to transplant may mitigate the risk for adverse immune mediated outcomes and a waiting period of at least 3 months warrants further evaluation.

Recipient Characteristics/outcomes			
	A	B	C
Duration of CPI	8 months	18 months	8 months
Time from last CPI to transplant	10 days	5 weeks	3 months
Time to biopsy	14 days	12 days	n/a
Biopsy results	ACR5/9, 20%necrosis	ACR 4/9, 60%necrosis	n/a
Treatment	rATG, steroids, rituximab	rATG, steroids, plasmapharesis	n/a
graft outcome	salvaged	re-transplant	stable function
patient outcome	alive	alive	alive

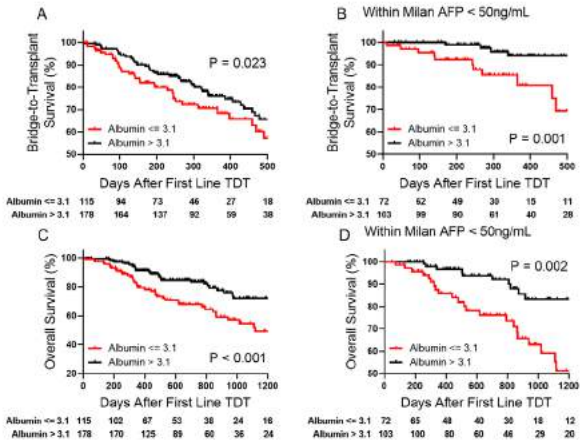
CITATION INFORMATION: Schnickel G., Parekh J., Kono Y., Berumen J., Ajmeera V., Mekeel K. Liver Transplantation Following Checkpoint Inhibitor Therapy - Timing is Everything *AJT, Volume 21 Supplement 3*
DISCLOSURES: G.T. Schnickel: None. **J. Parekh:** None. **Y. Kono:** None. **J. Berumen:** None. **V. Ajmeera:** None. **K. Mekeel:** None.

Abstract# 1122

Albumin Level Prior to Liver-Directed Therapy is a Risk Factor of Waitlist Tumor Progression Independent of HCC Burden

P. Thevenot, K. Nunez, T. Sandow, M. Hibino, P. Wright, J. Patel, D. Fort, A. Cohen, *Ochsner Health, New Orleans, LA*

Purpose: Milan Criteria, α-fetoprotein (AFP), and MELD score at diagnosis influence prognosis in bridge to transplant (BTT) hepatocellular carcinoma (HCC). With HCC surveillance many patients are diagnosed within Milan with both low AFP and MELD. Albumin level decreases in the progression of cirrhosis-associated immune dysfunction toward a state of immune paralysis, which may have important implications liver-directed therapy (LDT). In this study, we examine albumin as a risk factor for tumor progression following LDT, particularly in ideal BTT patients within Milan with a low AFP.
Methods: Retrospective study of patients receiving first-line LDT as a BTT within a single system (April 2016 - March 2020). Parameters were analyzed prior to first-line LDT and patients monitored for BTT survival and BTT outcome.
Results: Analyzed were 294 treatment naive HCC patients with median age of 63 years (IQR 59 - 66 years) and demographics of 75% male with predominant hepatitis C etiology (66%). Patients were 80% within Milan with 69% having an AFP ≤ 50 ng/mL. Study endpoint was reached in 186 patients: 33% transplanted, 30% dropout due to tumor progression, with 25% censored and 12% waitlist active at data analysis. Albumin level stratified 0.3 g/dL tiers from < 2.9 g/dL to > 3.8 g/dL revealed that lower albumin levels directly correlated with history of decompensation requiring intervention (P<0.001) with incremental rise in MELD-Na score with decreasing albumin tier (P<0.001). However, there was no association between albumin level and Milan status (P=0.121) or AFP level (P=0.377). In multivariate analysis controlling for Milan and AFP, albumin level was independently associated with BTT survival (HR 0.79, 95% CI 0.66 - .93) and BTT outcome (OR 0.70, 95%CI 0.53 - 0.92). In patients within Milan with an AFP < 50 ng/mL, albumin ≤ 3.1 g/dL was associated with a significant decrease in bridge to transplant survival (P = 0.001).
Conclusions: Low serum albumin at HCC diagnosis identifies patients with high risk of post-treatment tumor progression. This increased risk may be due to immune paralysis in cirrhosis-associated immune dysfunction.



CITATION INFORMATION: Thevenot P., Nunez K., Sandow T., Hibino M., Wright P., Patel J., Fort D., Cohen A. Albumin Level Prior to Liver-Directed Therapy is a Risk Factor of Waitlist Tumor Progression Independent of HCC Burden *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Thevenot: None. **K. Nunez:** None. **T. Sandow:** None. **M. Hibino:** None. **P. Wright:** None. **J. Patel:** None. **D. Fort:** None. **A. Cohen:** None.

Abstract# 1123

Outcomes of Surgical Resection versus Liver Transplantation in Hilar Cholangiocarcinoma

M. K. White[1], F. Aucejo[2], A. Moro[2], K. Sasaki[2], K. Stephans[3], B. Estfan[4], C. Quintini[2], B. Eghtesad[2], K. Hashimoto[2], F. Masato[2], C. Miller[2], K. Menon[5], *[1]Cleveland Clinic, Cleveland, OH, [2]General Surgery, Cleveland Clinic, Cleveland, OH, [3]Radiation Oncology, Cleveland Clinic, Cleveland, OH, [4]Oncology, Cleveland Clinic, Cleveland, OH, [5]Gastroenterology & Hepatology, Cleveland Clinic, Cleveland, OH*

Purpose: To compare the outcomes of patients with hilar cholangiocarcinoma (hCCA) who underwent either surgical resection or liver transplantion (LT).

Methods: All hCCA patients who underwent resection or LT between 2010-2020 were included. Standard diagnostic criteria for hCCA were used. Surgical resectability was based on the likelihood of R0 resection and extent of tumor invasion into bile ducts (up to the second order branching)and vessels. Patients with nonresectable tumors underwent the LT protocol with neoadjuvant chemoradiation/brachytherapy, staging laparotomy and maintenance chemotherapy until LT. For LT , the lesion had to be located at the hilum with stricture above the cystic duct, with no evidence of metastasis, mass lesion less than or equal to 3cm and negative regional lymph node biopsies on endoscopic ultrasound. Survival of patients was evaluated with Kaplan Meier curves.

Results: Twenty-six patients underwent surgical resection of hCCA and 22 patients underwent the LT protocol with 15 (68%) undergoing LT. Of the patients who underwent surgical resection, 13 (50%) are still alive. Sixteen (73%) patients who were enrolled in the LT protocol are alive and 14 (93%) patients who underwent LT are alive. On an intention to treat analysis, Kaplan Meier analysis showed no difference in survival between the two groups. However, there was a significant improvement in survival in patients who underwent LT compared to resection (93% vs 50% probability of survival at 5 years, P=0.04).

Conclusions: Patients who complete the neoadjuvant chemoradiation protocol and undergo LT have a significantly higher a survival rate compared to those undergoing resection. However, on an intention to treat basis, the overall survival of patients undergoing the LT protocol is comparable to patients who undergo surgical resection. All patients with unresectable hCCA may benefit from neoadjuvant chemoradiation followed by LT.

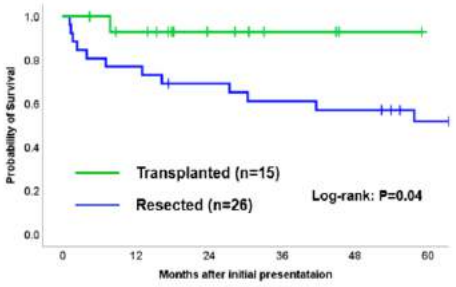


FIGURE 2. Kaplan-Meier curve showing overall survival of patients who underwent tumor resection compared to patients who completed the LT protocol to transplant.

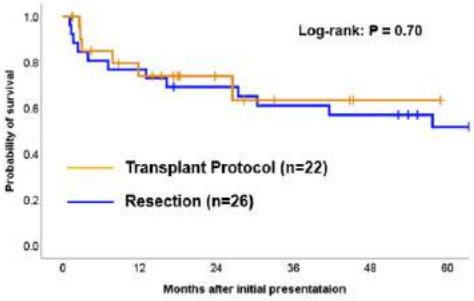


FIGURE 1. Kaplan-Meier curve showing overall survival of patients with hCCA who underwent tumor resection compared to patients who entered the LT protocol.

CITATION INFORMATION: White M., Aucejo F., Moro A., Sasaki K., Stephans K., Estfan B., Quintini C., Eghtesad B., Hashimoto K., Masato F., Miller C., Menon K. Outcomes of Surgical Resection versus Liver Transplantation in Hilar Cholangiocarcinoma *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.K. White: None. **F. Aucejo:** None. **A. Moro:** None. **K. Sasaki:** None. **K. Stephans:** None. **B. Estfan:** None. **C. Quintini:** None. **B. Eghtesad:** None. **K. Hashimoto:** None. **F. Masato:** None. **C. Miller:** None. **K. Menon:** None.

Liver

Liver: Hepatobiliary Surgery

Abstract# 1124

The Surgical Experience and Treatment Options for Hepatic Cystic Disease

M. Crowley[1], K. Robichaux[2], A. Kumar[1], J. Buggs[3], J. Sokolich[4], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of South Florida, Tampa, FL, [3]Transplant Surgery, Tampa General Hospital, Tampa, FL, [4]Hepatobiliary Surgery, Valley Presbyterian Hospital, San Fernando Valley, CA*

Purpose: Benign hepatic cysts may require surgical removal when symptomatic particularly in the setting of genetic disorders such as autosomal dominant polycystic kidney disease (ADPKD) or autosomal dominant polycystic liver disease (PCLD) which may also be called isolated PLD. Operations for symptomatic hepatic cysts can include liver transplantation. The purpose of this study was to compare outcomes in patients with hepatic cysts treated with liver transplantation and or fenestration.

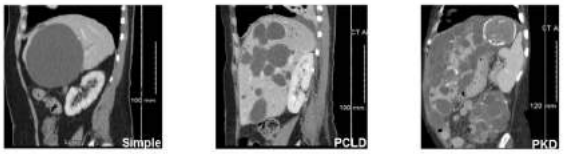
Methods: A retrospective chart review was conducted which included all patients treated surgically for hepatic cystic disease at a single center from June 2011 to May 2020. Treatment groups were divided into those that received fenestrations versus liver transplants. Data were obtained from electronic health records and analyzed with IBM-SPSS version 26. Statistical significance was set at a p-value of less than 5%.

Results: A total of 35 patients were included, 26 underwent fenestration, and 9 had liver transplantation. There were no significant differences in sex, race, age, or BMI between the fenestration and transplant groups. Creatinine and MELD scores were significantly higher in the transplant arm (p<.039, .021 respectively). All transplant patients had ADPKD and greater than 5 cysts removed. Only half the fenestration group had ADPKD, and 27% had greater than 5 cysts removed. The 30-day complication rate was higher in the transplant group (33%) vs. fenestration (4%). The complications included bile leaks, respiratory distress, and exploratory laparotomy. Five (19%) fenestrations required more than one operation and only one (4%) of the 5 patients had ADPKD.

Conclusions: Cyst fenestration and liver transplants may be used to treat symptomatic liver cysts. Liver transplantation is typically reserved for patients with genetic disorders such as ADPKD and isolated PLD, which are associated with a large number of cysts. Patients with ADPKD, even those that require kidney transplants make excellent candidates for fenestration when applicable.

Figure 1. Hepatic Cysts

Right, patient with a large benign simple cyst. Middle, patient with isolated PLD Left, patient with ADPKD



CITATION INFORMATION: Crowley M., Robichaux K., Kumar A., Buggs J., Sokolich J. The Surgical Experience and Treatment Options for Hepatic Cystic Disease *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Crowley: None. **K. Robichaux:** None. **A. Kumar:** None. **J. Buggs:** None. **J. Sokolich:** None.

Abstract# 1125

Admission to the Intensive Care Unit Post-liver Transplantation: One Academic Center's Experience

C. D. Santos, A. Grek, T. Krider, *Transplant Critical Care, Mayo Clinic, Jacksonville, FL*

Purpose: Historically, liver transplant (LT) patients have been admitted directly from the operating room (OR) to the intensive care unit (ICU) for post-operative complex hemodynamic and respiratory monitoring. For nearly two decades, our institution has utilized a fast-track program in which select LT patients are extubated in the OR and admitted to the post anesthesia care unit (PACU) followed by subsequent admission to the medical ward. Those patients who require intraoperative continuous

renal replacement therapy (CRRT), diagnosed with Hepatopulmonary Syndrome (HPS) or Porto-pulmonary Hypertension (PoPH) are automatically transferred to ICU post-operatively. Here we describe the profile of our LT patients admitted directly to the ICU from the OR post-LT over the past year.

Methods: A review of the electronic medical record was performed for all liver transplant patients who were admitted to the ICU post-operatively from October 1, 2019 to October 1, 2020.

Results: During the above timeframe, 113 adult deceased donor LTs were performed, 78 (69%) of which were admitted to the ICU post-operatively. Of those admitted to the ICU, 11 received simultaneous liver-kidney transplants, 1 received a simultaneous liver-heart transplant, and 6 received simultaneous LT and sleeve gastrectomy. Of the remaining 60 LT cases, the top three reasons for post-operative admission to the ICU included: post-operative vasopressor requirements or hemodynamic instability in 44 (73.3%) cases, intra-operative continuous renal replacement therapy (CRRT) in 17 (28.3%) cases, and pre-operative ICU admission in 11 (18.3%) cases. Alternative reasons for OR to ICU transfer included: intra-operative bleeding (6, 10%), reintubation or inability to extubate (3, 5%), intra-operative cardiac arrest (2, 3.3%), HPS(2, 3.3%), PoPH (1, 1.7%), and uncontrolled hypertension (1, 1.7%). The majority of OR to ICU cases received donations by brain death (51, 85%) with an average intra-operative transfusion requirement of 8.75 units of red blood cells (median 8 units).

Conclusions: We aimed to understand those defining patient characteristics which required admission to the ICU to better understand if there are modifiable risk factors to minimize ICU admissions with the goal of better utilizing ICU beds during the COVID 19 pandemic. Further research is necessary to determine safety in moving those patients with intraoperative CRRT to the floor rather than an automatic ICU admission.

CITATION INFORMATION: Santos C., Grek A., Krider T. Admission to the Intensive Care Unit Post-liver Transplantation: One Academic Center's Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.D. Santos: None. **A. Grek:** None. **T. Krider:** None.

Liver

Liver: Living Donor Liver Transplant and Partial Grafts

Abstract# 1126

Machine Learning Informs Utility-Based Non-Directed Living Liver Donor Allocation

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Purpose: To maximize non-directed living liver donor graft utility, we developed analytic models predicting 10-year graft survival post liver transplant (LT).

Methods: We analyzed OPTN living liver donor and recipient data (1/2000-12/2019), with follow up to 3/2020. Data included: liver graft type (partial right, partial left, partial left lateral [segments 2&3]), 7 donor & 21 recipient factors, CIT, and donor-to-recipient body surface area (BSA) ratio. To accommodate data complexity with many variables and interactions, we constructed random forest survival models predicting 10-year graft survival for each of the 3 graft types, and variable selection to optimize the c-statistic. Data for each graft type was split into training and test sets. Survivals for predicted groups were calculated by Kaplan-Meier analyses.

Results: The data included 6328 live liver donors (4621 partial right, 644 partial left, 1063 partial left lateral). Of these, 21% (n=1328) were adult to child, 79% (n=5000) were adult to adult. Most partial left lateral grafts (95%) went to children, and the majority of partial right grafts (98%) went to adults. Donor-to-recipient BSA ratio was an important survival predictor in all 3 graft type models (degree of importance in the models was: partial left lateral>partial left>partial right). Variables common to all 3 graft types were: malignant diagnosis, medical location at the time of LT (inpatient/ICU), and moderate ascites. Biliary atresia diagnosis was of high importance in partial left and left lateral graft models, but of no importance in the partial right graft model. Re-transplant status was only important in the partial right graft model. The best c-statistic was 0.70 for the partial left lateral model, and 0.63 and 0.61 for partial left and partial right models, respectively.(Fig. 1) To compare model predictions to actual survival, the 10-year graft survival predictions were stratified into upper quartile versus the combined lower quartiles. The upper quartile group in each model had significantly better 10-yr graft survival than the lower quartile groups, ($p<0.005$).

Conclusions: Our utility-based models identify and stratify potential recipients for non-directed living donor livers based on the predicted 10-year graft survivals, while accounting for complex donor-recipient interactions. There is an unmet need for evidence to help guide living liver donor programs to more objectively allocate non-directed living donor livers, and these analyses set the stage for further investigation into this important area.

Figure 1. Order of importance of variables for each graft model (1 highest → 10 lowest)

Recipient Variables	Left Lateral Graft Model	Left Graft Model	Right Graft Model
Female	.	.	3
Dx: Biliary Atresia	1	2	.
Dx: Metabolic	.	8	.
Dx: Malignant	10	9	7
Retransplant	.	.	5
Diabetes	.	3	2
Inpatient at LT	8	6	10
ICU at LT	5	4	9
Lab MELD 31-40 at LT	4	.	1
Serum Albumin	.	7	.
Life Support at LT	3	.	11
Moderate Ascites	7	1	4
CMV Positive serostatus	9	.	6
Donor:Recipient BSA	2	5	8
ABO Compatible Recipient-Donor	6	.	.
c-statistic	0.7	0.63	0.61

CITATION INFORMATION: Bambha K., Perkins J., Sturdevant M., Biggins S., Bakthavatsalam R., Healey P., Dick A., Reyes J. Machine Learning Informs Utility-Based Non-Directed Living Liver Donor Allocation *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Bambha: None. **J. Perkins:** None. **M. Sturdevant:** None. **S.W. Biggins:** None. **R. Bakthavatsalam:** None. **P. Healey:** None. **A. Dick:** None. **J. Reyes:** None.

Abstract# 1127

Elevated BMI (>28) and High Titer ANA are the Most Common Causes of Abnormal Selective Pre-donation Liver Biopsies in Living Liver Donors

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Purpose: The aim of this study is to assess the diagnostic yield of selective pre-donation liver biopsy in living donor liver candidates and its impact on donor selection.

Methods: We reviewed all liver biopsies performed at our center from 8/1/2016 to 10/5/2020 as part of living donor liver evaluation. Donors underwent pre-donation protocol biopsy if any of the following were present: BMI≥28 kg/m^2, positive anti-nuclear or smooth muscle antibody, 1st degree relative of recipient with autoimmune liver disease (AILD) (PSC, PBC, AIH), heterozygote (Hz) for alpha-1-antitrypsin (A1AT) deficiency, steatosis on cross-sectional imaging, or at discretion of evaluating hepatologist. All donors who did not meet criteria for pre-donation biopsy underwent intraoperative biopsy at time of donation.

Results: A total of 70 pre-donation liver biopsies were performed (27% of donors evaluated during this time). The leading indication for biopsy was BMI>28 (43%), ANA (27%), 1st degree relative with AILD (17%), A1AT Hz (13%). A total of 19 patients (27%) had abnormal biopsies. Of these, 11 (16% of total donors biopsied) were excluded from donation based on biopsy results. Steatohepatitis was the most common histologic abnormality that precluded donation (5/11) followed by non-specific portal inflammation (3/11). Of 30 patients with a BMI>28, 6 had abnormal biopsies (including 4 who had steatohepatitis). Of 18 patients with positive ANA, only 3 had abnormal biopsies, all of whom had high titer ANA (≥1:160). Of 12 patients biopsied due to 1st degree relative with AILD (included 4 with positive ANA), all had normal biopsies. No patients that were A1AT heterozygotes (9) had abnormal biopsies (including PAS-D granules). No major complications of donor biopsies were reported. All intraoperative donor biopsies of individuals that did not meet criteria for pre-donation biopsy were normal.

Conclusions: Liver biopsy remains an important component of living liver donor evaluation, however, more focused patient selection criteria should be considered and ideally, be informed by additional multicenter studies.

CITATION INFORMATION: Cisek J. Elevated BMI (>28) and High Titer ANA are the Most Common Causes of Abnormal Selective Pre-donation Liver Biopsies in Living Liver Donors *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Cisek: None.

Abstract# 1128

Update on Domino Liver Transplants - A Registry Report

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Purpose: The ongoing shortage of livers in the setting of a growing waiting list remains a challenge in transplantation. First introduced in 1996, domino liver transplantation offers an option for patients with metabolic diseases to undergo a deceased donor liver transplant and utilize their native liver for a different patient with liver failure. Long-term analysis from a national US cohort is yet to be described.

Methods: Between 1996 to 2019, 210 domino liver transplants were reported to UNOS from 45 centers. Donor and recipient characteristics were analyzed. Overall

actuarial survival and liver graft failure were estimated using Kaplan-Meier. The 20-year study period was divided into 4 eras (1996-01, 2002-08, 2009-14, 2015-19) and overall and graft survival were compared using log-rank tests.

Results: Donor and recipient characteristics are summarized in Table 1. Most recipients (94%) underwent a primary transplant. The most common underlying disease in adult donors was amyloidosis (85%); in pediatric donors, maple syrup urine disease (84%). The most common reason for transplant in adult recipients was cirrhosis (69.3%), followed by liver malignancy (21.2%), and metabolic disease (2.2%). Of the adult recipients, 90% received the liver from an adult donor; in children, 45% of liver grafts came from adult donors. Overall survival and graft failure rates were similar between recipients and donors. Although there was a trend towards improved overall and graft survival in later years (2009-19), the differences were not statistically significant.

Conclusions: Domino liver transplants are a safe strategy for increasing availability of livers with patient and graft survival and graft rates comparable to deceased donor liver transplants.

210 Domino Transplants		Domino Liver Donor	Domino Liver Recipient
Category	Adult	179	187
	Pediatric	31	23
Transplant	Primary	210 (100%)	200 (95%)
	Secondary	-	8 (4%)
	Tertiary	-	2 (1%)
Age (Median, Range)			
Adult		53 [18-72]	61 [18-76]
Pediatric		10 [0 - 17]	8 [0-16]
Race	White	146 (73%)	160 (76%)
	Black	16 (8%)	11 (5%)
	Other/Unknown	48 (19%)	39 19%)
Male Gender N (%)		132 (63%)	132 (63%)
MELD/PELD (Median, Range)			
Pediatric		7 [6 - 41]	15 [6 – 28]
Adult		-4 [-10 - 14]	10 [-8 – 47]
Pediatric Patient Survival			
1 year		97.1%	100%
5 year		97.1%	100%
10 years		97.1%	100%
Adult Patient Survival			
1 year		92.2%	88.8%
5 year		70.9%	72.5%
10 years		48.6%	52.3%

Table 1: Basic characteristics of domino liver donors and domino liver recipients

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DISCLOSURES: R. Gruessner: None. **J. Renz:** None. **A. Gruessner:** None.

Abstract# 1129

The Landscape of Non-Directed Living Liver Donation in the United States

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Purpose: Non-directed donation (NDD) for kidney transplantation has increased substantially over the past decade, however the landscape of NDD for liver transplantation has yet not been described. Here, we quantify changes in liver NDD over time and characterize NDD liver donors and recipients.

Methods: We retrospectively analyzed SRTR data between 2000-2019 and compared 133 NDDs liver donors and recipients to 2725 directed living liver donors (DLD) and recipients.

Results: There were 133 liver NDD donors during our study period, increasing from 1% of all LDLTs in 2014 to 3% in 2017 and 2018, and then 10% of LDLTs in 2019 (Figure 1). Compared to DLDs, NDDs were younger (35 vs 40, p=0.002), more likely to be college educated (87.2% vs 76.5%, p=0.004), White (92.5% vs 77.8%, p<0.001), and have a lower BMI (24.9 vs 26.1, p=0.001) (Table 1). Compared to DLD recipients, recipients of NDDs were more often pediatric (39.1% vs 15.7% p<0.001) and had public insurance (51.1% vs. 32%, p<0.001). In comparison to DD recipients, more Black transplant candidates received an NDD liver (10.5% vs 4.1%, p=0.008) (Table 2).

Conclusions: NDD LDLT has increased substantially over time and pediatric patients are prioritized recipients. As liver NDD continues to expand, it is essential to understand historical trends to guide equitable allocation of NDD liver grafts.

Table 1. Donor Characteristics, stratified by donor type

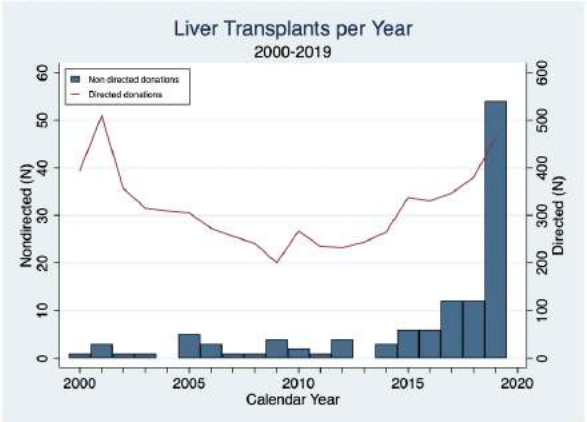
Factor	Directed Donor (n= 2,725)	Non-Directed Donor (n= 133)	p-value
Age, median (IQR)	40 (31, 48)	35 (28, 44)	**<0.01**
Male	1,234 (45.3%)	63 (47.4%)	0.7
Race			
White	2,119 (77.8%)	123 (92.5%)	
Black	119 (4.4%)	0 (0.0%)	
Hispanic/Latino	347 (12.7%)	4 (3.0%)	**<0.001**
Other	140 (5.1%)	6 (4.5%)	
Education			
High school or less	550 (20.2%)	17 (12.8%)	
College or more	2,084 (76.5%)	116 (87.2%)	**<0.01**
Unknown	91 (3.3%)	0 (0.0%)	
BMI at transplant, median (IQR)	26.1 (23.5, 28.7(	24.9 (22.2, 27.5)	
<=25	1,037 (38.9%)	68 (51.1%)	
(25-30]	1,225 (45.9%)	57 (42.9%)	**0.001**
>30	404 (15.2%)	8 (6.0%)	

Table 2. Recipient Characteristics, stratified by donor type

Factor	Directed Donor (n= 2,725)	Non-Directed Donor (n= 133)	p-value
Age at transplant			
<18	428 (15.7%)	52 (39.1%)	
[18-40]	403 (14.8%)	16 (12.0%)	**<0.001**
(40-50]	364 (13.4%)	10 (7.5%)	
(50-60]	707 (25.9%)	25 (18.8%)	
>60	823 (30.2%)	30 (22.6%)	
Male	1,464 (53.7%)	60 (45.1%)	0.06
Race			
White	2,115 (77.6%)	95 (71.4%)	
Black	112 (4.1%)	14 (10.5%)	**<0.01**
Hispanic/Latino	366 (13.4%)	15 (11.3%)	
Other	132 (4.8%)	9 (6.8%)	
BMI at transplant*	26.5 (23.3, 30.1)†	26.2 (23.4, 30.31)‡	
<=25	841 (37.8%)	29 (36.7%)	0.96
(25-30]	806 (36.2%)	30 (38.0%)	
>30	579 (26.0%)	20 (25.3%)	
Diagnosis			
Viral hepatitis	293 (10.8%)	5 (3.8%)	
Fatty liver	434 (15.9%)	19 (14.3%)	
Alcoholic cirrhosis	344 (12.6%)	12 (9.0%)	
HCC	215 (7.9%)	9 (6.8%)	**0.013**
Other	1,434 (52.6%)	88 (66.2%)	
Unknown	5 (0.2%)	0 (0.0%)	
Insurance			
Public	873 (32.0%)	68 (51.1%)	
Private	1736 (63.7%)	62 (46.6%)	
Other	58 (2.1%)	0 (0.0%)	**<0.001**
Unknown	58 (2.1%)	3 (2.3%)	
MELD at transplant, median (IQR)§	17 (11, 23)	16 (10, 24)	0.095
Days on waitlist, median (IQR)	127 (61, 260)	139 (69, 298)	0.421

*BMI calculated for recipients 18 years or older with available height and weight measurements; excluding 73 adult recipients with missing or false BMI
†Excludes 71 adult recipients including 65 with missing BMI, 2 with BMI <14, and 4 with BMI > 50 (n = 2,226).
‡Excludes 2 adult recipients with missing BMI (n= 79)
§ Excludes 37 directed donor transplant recipients including 3 with missing MELD score and 34 listed as temporarily inactive.

Figure 1. Number of transplants per year, by donor type (2000-2019)



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Abstract# 1130

Outcomes of Robotic Living Donor Right Hepatectomy in Liver Transplant Recipients: A Systematic Review and Meta-analysis

E. Lincango-Naranjo[1], E. Garces-Delgado[2], P. Solis-Pazmino[3], H. Alexander-Leon[4], G. Restrepo-Rodas[2], R. Mancero-Montalvo[2], C. J. Ponce[2], R. Cadena-Semanate[2], R. Vargas-Cordova[5], G. Herrera-Cevallos[6], A. Villarreal-Juris[7], S. Vallejo[1], C. Liu-Sanchez[8], L. P. Prokop[9], A. D. Guerron[10], O. J. Ponce[1], D. Moris[11], *[1]Knowledge and Evaluation Research Unit, Mayo Clinic, Rochester, MN, [2]Universidad Internacional del Ecuador, Quito, Ecuador, [3]Department of Otolaryngology-Head and Neck Surgery, Stanford University, Stanford, CA, [4]Universidad de las Americas, Quito, Ecuador, [5]Hospital General San Francisco IESS, Quito, Ecuador, [6]Hospital Metropolitano, Quito, Ecuador, [7]Universidad Central del Ecuador, Quito, Ecuador, [8]Universidad Peruana Cayetano Heredia, Lima, Peru, [9]Mayo Clinic Libraries, Mayo Clinic, Rochester, MN, [10]Department of Surgery, Duke University, Durham, NC, [11]Department of surgery, Duke University, Durham, NC*

Purpose: Living donor adult-to-adult liver transplantation (LT) has emerged as a feasible alternative to deceased donors. Advances in hepatobiliary surgery have allowed the introduction of robotic approaches to potentially decrease morbidity and mortality of recipient patients. Recent reports have evaluated the safety of robotic living donor right hepatectomy (RLDRH). We aimed to evaluate the outcomes of LT recipients after RLDRH compared to laparoscopic (LADRH) and open (ODRH) living donor right hepatectomy

Methods: A systematic search of several databases (e.g. MEDLINE) from inception to September 2020 was conducted. Experimental or observational comparative studies assessing the outcomes of LT recipients older than 18 years undergoing RLDRH versus ODRH or LADRH were included. CLARITY tool was used to assess the risk of bias of observational studies. Mean differences (MD) and relative risks (RR) and their 95% confidence interval (CI) were calculated with random-effects and restricted-maximum likelihood estimator for continuous and dichotomous outcomes

Results: Four studies were included. These studies had unclear risk of bias. A total of 151 LT recipients received liver after RLDRH (mean age=56.5 ±0.3), 118 after LADRH (mean age=53.8 ±11.2) and 248 after ODRH (mean age=55.3 ±6.7). The mean MELD score in RLDRH was higher than that of LADRH and ODRH (18.8 ±4.9; 16.2 ±8.3; 17.2 ±6.4). The indications for surgery reported in two studies were mostly hepatocellular carcinoma n=135 and end stage liver disease n=97, nonalcoholic steatohepatitis n=44. Only one study comparing RLDRH to LADRH found no differences in Clavien-Dindo complication (CD) I-II (RR: 1.00 95%CI 0.53, 1.87), III-IV (RR: 0.66 95%CI 0.39, 1.11) and mortality (RR: 2.27 95%CI 0.14-35.59). Likewise, four studies comparing RLDRH to ODRH found no difference in CD I-II (RR: 1.34 95%CI 0.71, 2.55), III-IV (RR: 0.71 95%CI 0.43, 1.16) and mortality risk (RR: 1.20 95%CI 0.55, 2.62)

Conclusions: RLDRH in recipient seems to be a safe approach with non-inferior outcomes compared to LADRH and ODRH. Experimental studies are needed to confirm this findings

CITATION INFORMATION: Lincango-Naranjo E., Garces-Delgado E., Solis-Pazmino P., Alexander-Leon H., Restrepo-Rodas G., Mancero-Montalvo R., Ponce C., Cadena-Semanate R., Vargas-Cordova R., Herrera-Cevallos G., Villarreal-Juris A., Vallejo S., Liu-Sanchez C., Prokop L., Guerron A., Ponce O., Moris D. Outcomes of Robotic Living Donor Right Hepatectomy in Liver Transplant Recipients: A Systematic Review and Meta-analysis *AJT, Volume 21 Supplement 3*

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Abstract# 1131

Is Low Systemic Fibrinolytic Activity During the Anhepatic Phase Liver Transplant Surgery Associate with the Dreaded Post-Operative Complication of Hepatic Artery Thrombosis?

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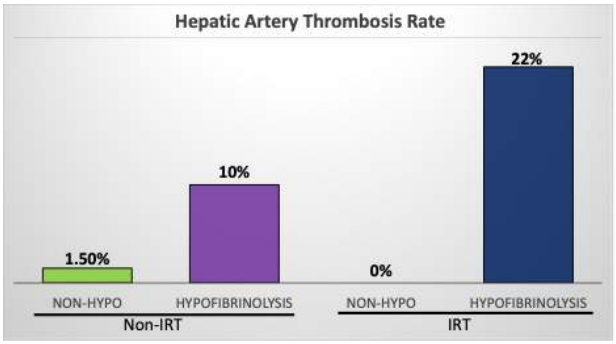
Purpose: Removal of the native liver during transplantation results in impaired clearance of clot degrading proteins and activation of fibrinolysis as appreciated by Starzl in the 1960s. Hypofibrinolysis (lack of activation of the fibrinolytic system when anticipated) has been associated with thrombotic complications in non-transplant patients. Hypofibrinolysis in liver transplantation has not previously been evaluated, and would be presumed to increase the risk of hepatic artery thrombosis (HAT), particularly in living donor grafts or when arterial reconstruction is needed in cadaveric donors. We hypothesize that hypofibrinolysis during the anhepatic phase of surgery would be associated with an increased risk of HAT.

Methods: Consenting adult liver transplant recipients underwent a research thrombelastography (TEG) 15-minutes after portal vein ligation (anhepatic) to evaluate systemic fibrinolytic activity. Fibrinolysis activity was quantified by the amount of clot strength lost from peak clot strength in 30-minutes (LY30). A receiver operating characteristic curve (ROC) was used to identify a threshold for hepatic artery thrombosis (HAT) using the Youden index with the anheptic TEG LY30. Patient with the need for hepatic arterial reconstruction or received a living donor graft were classified as increased risk of thrombosis(IRT).

Results: 130 liver transplant patient recipients with a median laboratory na-MELD of 22 on the day of surgery were included in the analysis. IRT was present in 14%. HAT occurred in 5% of patients in which the rate was doubled in the IRT group (11%). The ROC Youden index identified a LY30 of <1% as a predictor of HAT (which defined hypofibrinolysis). Hypofibrinolysis was detected in 38% of patients. HAT occurred in 12% of patients with hypofibrinolysis vs 1.5% of patients that generated a fibrinolytic response (p=0.015). Patients with IRT and hypofibrinolysis had a 22% rate of HAT vs 0% in those that generated a fibrinolytic response (Figure). This same elevated HAT rate in hypofibrinolysis was also seen in patient with normal risk vascular anastomoses (10% hypo vs 1.5% Figure).

Conclusions: Hypofibrinolysis (anhepatic TEG LY30 < 1%) predicts increased risk of HAT. Attenuating HAT warrants further work to understand both mechanisms behind these findings and evaluating interventions, while avoiding excessive bleeding risk.



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Abstract# 1132

Adult Deceased Donor Liver Transplantation with Split Liver Grafts vs Whole Liver Grafts. A Single-Center Experience

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Purpose: The present study aims to report outcomes of adults following SLT in a single-center and compare this selected group with adults recipients following whole liver transplantation.

Methods: Between 2010 and 2019, SLT conducted at a single-center were identified retrospectively by electronic medical records review. A 1:1 case-control match was performed to match patients following split liver transplant and adult patients receiving a whole liver graft in the same period. The random match analysis was based on recipient age (±10 years), MELD (±5 points), and indication for transplant. Demographic variables, surgical variables, postoperative outcomes and long-term complications in the two groups of patients were compared.

Results: Twenty-one SLT were performed during the study period (SLT group) and 21 adults receiving a whole liver (WL group) were randomly generated. The median (IQR) age at transplant was 59 (49-63) for the SLT group and 59 (52-64) for the WL group (p=0.35). Recipient male gender proportion was higher, but not statistically different, in the WL group (52.4% vs 38.1% respectively;p=0.35). Recipient BMI (SLT=25.4 (23.8-28.2) vs WL=28 (23.8-32.7); p=0.11) and MELD (SLT= 23 (16-27) vs. WL= 25 (16.5-28); p=0.95) at transplant were similar between groups. The most common indication for liver transplant was Alcohol induced cirrhosis found in 7 (33.3%) recipients, followed by HCV cirrhosis in 4 (19%) and NASH in 3 (14.3%) recipients in both groups. Donor age (WL= 47 (33.5-66) vs. SLT= 16 (15-22) years, p=<0.001) and donor BMI (WL= 25.5 (21.3-31.2) vs SLT= 22.9 (20-24.7), p=<0.002) were significantly higher in the WL group compared to SLT group. Length of stay, ICU stay and readmission within 30 days post-transplant were similar between both groups. Re-transplantation occurred in one (4.8%) patient in

the SLT group. This consisted of a patient who received a right lobe split liver and subsequently developed HAT within the first 7 days after LT. No recipients in the WL group were re-transplanted. No mortality occurred in neither of the groups. Graft survival at 1-, 3- and 5- year were similar between groups (100% vs 95% for all time periods, p=0.31). Patient survival at 1-, 3- and 5- year were 100% in both groups.
Conclusions: SLT represents a feasible option to expand the donor pool with favorable outcomes in well-selected adult recipients.
CITATION INFORMATION: Vargas P., Argo C., Zachary H., Stotts M., Intagliata N., Northup P., Pelletier S., Oberholzer J., Goldaracena N. Adult Deceased Donor Liver Transplantation with Split Liver Grafts vs Whole Liver Grafts. A Single-Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: P. Vargas: None. **C. Argo:** None. **H. Zachary:** None. **M. Stotts:** None. **N. Intagliata:** None. **P. Northup:** None. **S. Pelletier:** None. **J. Oberholzer:** None. **N. Goldaracena:** None.

Abstract# 1133

No Benefit of Antithymocyte Globulin in Living Donor Liver Transplant Recipients

N. Wilson, P. Nguyen, G. Saracino, R. Patel, G. Testa, T. Sam, *Baylor University Medical Center, Dallas, TX*
Purpose: Acute rejection after liver transplant is associated with increased risk of graft failure and mortality. Reports on rejection rates in living donor liver transplants (LDLT) rarely delineate patients who received rabbit antithymocyte globulin (rATG) as induction therapy. This study analyzes outcomes in LDLT recipients with regard to induction and maintenance immunosuppression received.
Methods: This single-center, retrospective cohort analysis included LDLT transplanted 01/2012 to 08/2020. Patients who died within 7 days or were re-transplanted within 30 days of LDLT were excluded. A protocol change in 2019 eliminated the use of rATG induction, delayed calcineurin inhibitor (CNI) initiation, and extended the corticosteroid taper for all liver transplant patients. All patients were started on mycophenolate mofetil 1000 mg twice daily or equivalent. Rejection was defined as biopsy-proven or clinically diagnosed based on lab values. Infection was assessed at 3 and 6 months by provider notes, medications, and lab results.
Results: Baseline characteristics and outcomes are shown in Table 1. rATG induction was given to 47 LDLT recipients, and 50 received no antibody induction. No significant differences in demographics were noted aside from a trend toward higher MELD-Na score in the rATG group. CNI initiation was significantly earlier in the rATG group. No significant differences were noted in rejection, graft survival, patient survival, renal function, infections, or readmissions between the two groups. Time to rejection, patient survival, and graft survival showed no differences.
Conclusions: In LDLT recipients, there was no noted benefit or harm in the use of rATG induction with regard to rejection, infection, renal function at 3 months, or 1 year patient or graft survival. Outcomes were overall similar compared with no antibody induction and empiric CNI delay to 1 to 3 days post-LDLT. No induction may be considered in living donor liver transplant and provides a cost savings opportunity.

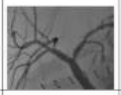
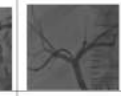
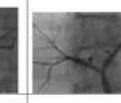
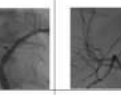
	No rATG (N = 50)	rATG (N = 47)	P value
Baseline Characteristics			
Recipient age, years, median [IQR]	51 [43, 59]	55 [43, 62]	NS
Recipient gender, male, n (%)	25 (50)	26 (55)	NS
MELD-Na, median [IQR]	11 [8, 15]	13 [9, 18]	0.12
Outcomes			
Time to CNI start, days, median [IQR]	1 [1, 3]	1 [0, 1]	0.03
Rejection at 6 months, n (%)	5 (10)	5 (11)	NS
eGFR MDRD6 at 3 months, median [IQR]	68 [51, 84]	62 [46, 81]	NS
Bacterial infection at 6 months, n (%)	24 (48)	26 (55)	NS
Viral infection at 6 months, n (%)	5 (10)	2 (4)	NS
Fungal infection at 6 months, n (%)	16 (33)	17 (36)	NS
Any infection at 3 months, n (%)	23 (46)	26 (55)	NS
Readmission rate at 3 months, n (%)	22 (44)	20 (43)	NS

CITATION INFORMATION: Wilson N., Nguyen P., Saracino G., Patel R., Testa G., Sam T. No Benefit of Antithymocyte Globulin in Living Donor Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Wilson: None. **P. Nguyen:** None. **G. Saracino:** None. **R. Patel:** None. **G. Testa:** None. **T. Sam:** None.

Abstract# LB 85

Comprehensive Intrahepatic Biliary Anatomy Underscores the Split-ability and the Origin of Biliary Leakage in Hemiliver Split Liver Transplant

J. Nguyen[1], K. Musto[1], M. Dougherty[1], R. Paz-Fugamalli[2], D. Harnois[1], *[1]Transplantation, Mayo Clinic Florida, Jacksonville, FL, [2]Radiology, Mayo Clinic Florida, Jacksonville, FL*
Purpose: Hemiliver splitting is an effective approach to optimize the number of liver allografts available for both adult and pediatric patients on liver transplant waitlist. The insidious and deadly complications of biliary leakage restrict a broader application of split liver transplantation (SLT). Here, we present a comprehensive analysis of intrahepatic biliary anatomy from a large cohort of deceased-donor whole liver transplants (DDLT) for split-ability and anatomic basis of biliary leakage in SLT.
Methods: We routinely perform post-transplant cholangiography in each DDLT. The cholangiographic images were reviewed for the 2511 DDLT from 1998 to 2012. The hepatic biliary anatomy was categorized I to IV according to the branching pattern and the number of right and left lobar hepatic duct (HD) at the liver hilum. The intrahepatic segmental bile ducts (SD) were classified as types I to IV with 0 to ≥2 SD crossing the virtual plane of hemiliver splitting.
Results: Among the 1572 DDLT that had analyzable cholangiograms, the biliary hilar anatomy included 24% of category I-A that is most optimal for splitting, 5% category I-B that has 2 HD for biliary reconstruction of the right hemilivers, 22% category I-C that is splitable but has ≥1 SD crossing the plane of parenchymal splitting potentially leading to bile leakage at the split surface, and 6% of category I-D that is not conducive for splitting. We identified the crossing of segment I bile duct into RHD, segments VII/VIII ducts into LHD, segment IV duct into RHD, and segment V duct into LHD as the potential origins for biliary leakage after SLT. The Table below summaries the 4 categories and 4 types of the hilar and segmental biliary patterns for the entire cohort.
Conclusions: In conclusion, the comprehensive assessment of intrahepatic biliary anatomy underscores ≥45% hemiliver split-ability, and accurately pinpoints the origins of bile leakage allowing for effective preemptive minimization of post-transplant biliary complications in SLT.

Hilar Biliary Category (n= 1572)		Intrahepatic biliary anatomy types			
		A (Splitable: single HD)	B (Marginal: 2 HD)	C (Marginal: ≤2 HD + 1 SD)	D (Not Splitable: (≥3 HD or ≥2 SD)
	I (n=890)	23.8% 	4.7% 	21.8% 	6.3% 
	II (n=104)	0.0%	3.8%	0.3%	2.5%
	III (n=365)	0.0%	13.7%	0.8%	8.6%
	IV (n=213)	0.0%	4.6%	0.6%	8.3%

Abbreviations: HD, (lobar) hepatic duct at the hemiliver hilum; SD, segmental duct (duct from single segment).

CITATION INFORMATION: Nguyen J., Musto K., Dougherty M., Paz-Fugamalli R., Harnois D. Comprehensive Intrahepatic Biliary Anatomy Underscores the Split-ability and the Origin of Biliary Leakage in Hemiliver Split Liver Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Nguyen: None. **K. Musto:** None. **M. Dougherty:** None. **R. Paz-Fugamalli:** None. **D. Harnois:** None.

Liver

Liver: MELD, Allocation and Donor Issues (DCD/ECD)

Abstract# 1134

Influence of Controlled Donation After Circulatory Death (cdcd) on Waiting List Mortalityfor Liver Transplantation in the Last 10 Years: The Spanish Experience

F. Alconchel, M. Royo-Villanova, J. Moya, L. Martínez-Alarcón, J. Zambudio, P. Cascales-Campos, T. Nicolás, R. Robles, F. Sánchez-Bueno, J. Pons, J. Rodríguez, A. Ríos, J. Fernández, P. Ramírez, *University Hospital Virgen Arrixaca (IMIB-Arrixaca), Murcia, Spain*
Purpose: Controlled donation after circulatory death (cDCD) provides one third of liver donors in Spain nowadays. The aim of our work is to evaluate the impact that cDCD has had on the evolution of mortality on the waiting list for liver transplant at our hospital over the last 10 years.
Methods: We retrospectively analyzed liver donation and transplant activity data at our center over the past 10 years through our records and those of the Spanish National Transplant Organization (ONT).
Results: Figure 1 shows the percentages of patients on the liver transplant waiting list who were transplanted, dropped-out from the list, or died on the list during the last 10 years (2010-2019). It should be noted that in the pre-cDCD era (before 2014) the mortality rate on the list was above 20%. However, in the age of controlled-DCD (from 2014 onwards) this percentage has decreased to 6% in 2019. As for the probability of liver transplantation per year (Figure 2), it has remained in progressive ascent despite the high rate of indication for liveer transplantation in our group (69.4 pmp, year 2018), the highest in Spain.The successful introduction of the controlled donation after circulatory death program at our hospital has reduced the mortality rate on the waiting list for liver transplants by 19% in 5 years. The probability of liver transplantation per year has increased by up to 20%.
Conclusions: Therefore, cDCD has allowed us to significantly reduce mortality on the waiting list for liver transplantation.

Figure1. Proportion of Patients on the waiting list for liver transplantation at our centre who have been transplanted, dropped out from the waiting list or have died while waiting for a liver transplant.

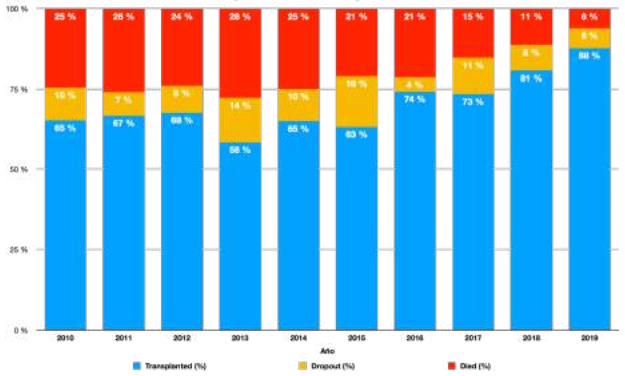
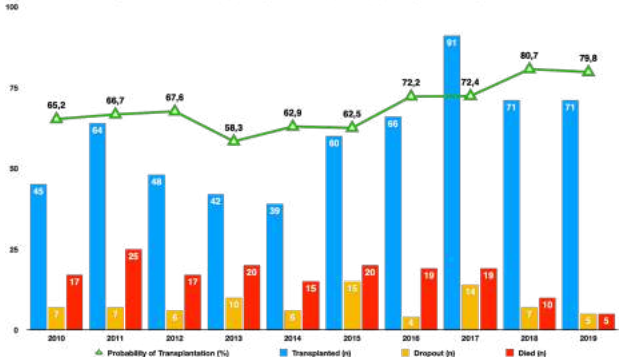


Figure 2. Total number of transplanted patients (blue), dropped from the waiting list (yellow) and deaths on the waiting list during each year. In green, the evolution of the probability of liver transplantation (%) in each year of the study is shown.



CITATION INFORMATION: Alconchel F., Royo-Villanova M., Moya J., Martínez-Alarcón L., Zambudio J., Cascales-Campos P., Nicolás T., Robles R., Sánchez-Bueno F., Pons J., Rodríguez J., Ríos A., Fernández J., Ramírez P. Influence of Controlled Donation After Circulatory Death (cdcd) on Waiting List Mortalityfor Liver Transplantation in the Last 10 Years: The Spanish Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: F. Alconchel: None. **M. Royo-Villanova:** None. **J. Moya:** None. **L. Martínez-Alarcón:** None. **J. Zambudio:** None. **P. Cascales-Campos:** None. **T. Nicolás:** None. **R. Robles:** None. **F. Sánchez-Bueno:** None. **J. Pons:** None. **J. Rodríguez:** None. **A. Ríos:** None. **J. Fernández:** None. **P. Ramírez:** None.

Abstract# 1135

Liver Simulated Allocation Model (LSAM) of a Height-Based Policy Change to Improve Sex Disparity in Liver Transplantation (LT)

S. Bernards[1], E. Lee[1], N. Leung[2], H. Zhao[2], M. Akan[3], M. Sarkar[1], S. Tayur[3], N. Mehta[1], *[1]UCSF, SF, CA, [2]City U, HK, Hong Kong, [3]CMU, Pittsburgh, PA*

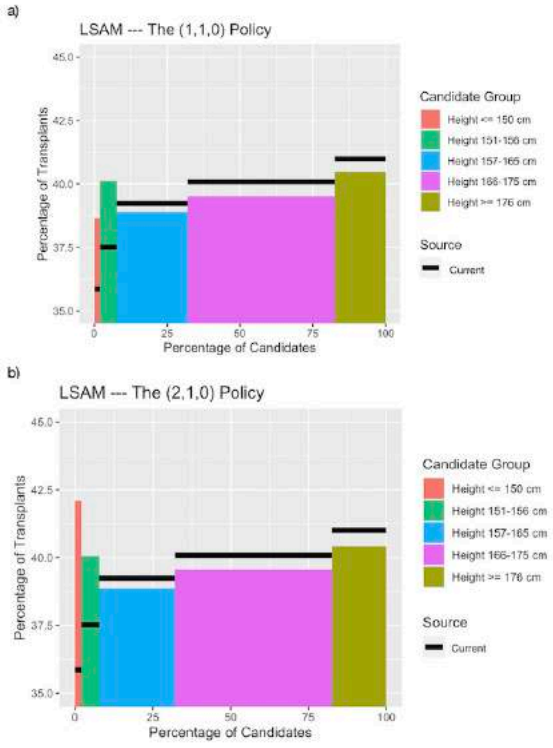
Purpose: Since the introduction of the MELD-based allocation system, women are now 30% less likely than men to undergo LT and have 20% higher waitlist mortality. These disparities are largely due to height differences in men and women though no national policies have been proposed to reduce sex disparities.

Methods: Patients were identified using the Scientific Registry of Transplant Recipients (SRTR) from 2014-2019. Patients were categorized into five groups by first dividing into thirds by height then dividing the shortest third into three groups to capture more granular differences in the most disadvantaged patients (<166 cm). We then used LSAM to model waitlist outcomes in five versions of awarding additional MELD points based on height categories compared to current policy. These scenarios award varying points to the three shortest height cohorts. For example, scenario "2,1,0" awards two additional points to the ≤150cm cohort, one to the 151-156cm cohort, and zero to the 157-165cm cohort.

Results: Patients (n=75,501) had a mean age of 55 years and median listing MELD of 15. Patients in the shortest categories were overwhelmingly female (96% of ≤150cm and 94% of 151-156cm versus 2.8% of ≥176cm). We re-demonstrated that shorter height is associated with decreased LT and increased risk of death without LT (for example, 24.5% dropout for ≤150cm and 21.6% for 151-156cm vs. 16.4% for ≥176cm). Two LSAM scenarios, "1,1,0" and "2,1,0" resulted in the greatest improvement in LT and death percentage for the shortest candidates with the least negative impact on taller candidates (Table, Figure). The patients who benefitted most in these two scenarios were patients ≤150cm and 151-156cm. For example, in the "1,1,0" scenario, LT for patients ≤150cm increased from 35.9% to 38.7% and death decreased from 11% to 10.7% with minimal impact on patients ≥176cm whose LT percentage went from 41% to 40.5% and death from 8.4% to 8.5%.

LSAM outcomes after 10 replications of current policy and 3 replications of the proposed policies.							
				LSAM Outcomes (LT % / Death without LT %)			
Height Group (centi-meters)	Number of LT candidates (%) (n=75,501)	Current	(1,0,0)	(1,1,0)	(1,1,1)	(2,1,0)	(3,2,1)
≤ 150	1,537 (2.0%)	35.9/ 11.0	39.6/ 10.3	38.7/ 10.7	38.1/ 10.5	42.1/ 9.9	43.3/ 9.7
151 - 156	4,369 (5.8%)	37.5/ 9.7	37.0/ 9.7	40.1/ 9.3	39.4/ 9.4	40.1/ 9.3	42.0/ 9.0
157 - 165	18,588 (25%)	39.2/ 9.4	39.1/ 9.3	38.9/ 9.4	41.4/ 9.1	38.9/ 9.4	41.2/ 9.1
166 - 175	25,984 (34%)	40.1/ 8.7	39.7/ 8.7	39.5/ 8.7	38.7/ 8.9	39.5/ 8.7	38.4/ 8.9
≥ 176	25,023 (33%)	41.0/ 8.4	40.7/ 8.5	40.5/ 8.5	39.7/ 8.7	40.4/ 8.6	39.2/ 8.8

Figure: (a) Visual representation of change in LT percentage after awarding one additional point each to the ≤ 150cm and 151-156 cm cohorts OR (b) two additional points to the ≤ 150cm cohort and one to the 151-156 cm cohort.



Conclusions: Awarding an additional 1-2 MELD points to the shortest 8% of LT candidates would improve waitlist outcomes for women with minimal impact on men. This strategy should be considered in national policy allocation in an effort to address sex-based disparities in LT.

CITATION INFORMATION: Bernards S., Lee E., Leung N., Zhao H., Akan M., Sarkar M., Tayur S., Mehta N. Liver Simulated Allocation Model (LSAM) of a Height-Based Policy Change to Improve Sex Disparity in Liver Transplantation (LT) *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Bernards: None. **E. Lee:** None. **N. Leung:** None. **H. Zhao:** None. **M. Akan:** None. **M. Sarkar:** None. **S. Tayur:** None. **N. Mehta:** None.

Abstract# 1136

Utilization of Pre-Procurement Donor Liver Biopsy in Donation-after-circulatory-Death Liver Transplantation

A. C. Bolognese[1], N. Neidlinger[1], C. Sparks[2], A. Schneider[2], A. M. D'Alessandro[1], D. P. Foley[1], *[1]Department of Surgery, Division of Transplantation, University of Wisconsin School of Medicine and Public Health, Madison, WI, [2]UW Organ and Tissue Donation, Madison, WI*

Purpose: Careful selection of suitable DCD donor livers is critical to obtain optimal transplant outcomes. In order to identify potentially suitable livers prior to DCD recoveries, we perform routine pre-procurement image-guided percutaneous liver biopsies with surrogate consent on potential DCD liver donors, with the exception of young donors with BMI < 25 kg/m^2 and without risk factors for or signs of liver disease. The purpose of this study was to examine the impact of pre-procurement liver biopsy on utilization of livers from DCD donors.

Methods: We retrospectively reviewed demographics, liver histology, and liver disposition of DCD donors who underwent pre-procurement liver biopsy from January 2000 through December 2019.

Results: Over a 20-year period, 219 DCD donors underwent pre-procurement liver biopsy. Twenty-eight (12.8%) donors were ruled out for liver donation based on biopsy findings, while 191 (87.2%) were deemed suitable for liver recovery and transplant. Of those donors ruled out for transplant based on histology, 11 (39.3%) were under 50 years old, and 10 (35.7%) had BMI < 30 kg/m^2; four (14.3%) were under 50 years old with a BMI < 30 kg/m^2. Of those with acceptable biopsies, 66 (34.6%) were over 50 years old and 16 (8.4%) were over 60 years old. Seventy-two (37.7%) donors with acceptable biopsies had a BMI > 30 kg/m^2, while 32 (16.8%) had a BMI > 35 kg/m^2. Twenty-seven (14.1%) donors with acceptable biopsies were both over the age of 50 and had BMI > 30 kg/m^2. No donors were lost due to complications from biopsy. Of the 191 livers with acceptable biopsies, 146 were successfully transplanted, 28 were deemed not suitable for transplant after recovery or intraoperative evaluation, and 17 were not recovered due to prolonged warm ischemia time or inability to allocate prior to recovery.

Conclusions: Pre-procurement liver biopsy ruled out 12.8% of DCD donor livers for transplant prior to recovery, and facilitated the successful recovery and transplant of two-thirds of potential DCD donor livers. Over half of livers ruled out by biopsy were from donors under age 50 and/or with BMI < 30 kg/m^2, while the majority of those donors with acceptable biopsies were 50 years or older and/or obese. Pre-procurement biopsy is a useful technique for evaluating potential DCD liver donors, allowing the surgeon to rule out unsuitable donors prior to deploying resources, and to identify usable livers that might otherwise be ruled out for transplant based on donor age or BMI. Consideration of liver biopsy in this group benefits organ procurement organizations and transplant centers by maximizing organ utilization and optimizing resource deployment.

CITATION INFORMATION: Bolognese A., Neidlinger N., Sparks C., Schneider A., D'Alessandro A., Foley D. Utilization of Pre-Procurement Donor Liver Biopsy in Donation-after-circulatory-Death Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.C. Bolognese: None. **N. Neidlinger:** None. **C. Sparks:** None. **A. Schneider:** None. **A.M. D'Alessandro:** None. **D.P. Foley:** None.

Abstract# 1137

A Comparison Between Combined Liver Kidney Transplants to Liver Transplants Alone: A Systematic Review and Meta-analysis

S. Bouari[1], E. A. Rijkse[1], H. J. Metselaar[2], M. W. van den Hoogen[3], J. N. Ijzermans[1], J. de Jonge[1], W. G. Polak[1], R. C. Minnee[1], *[1]Surgery, Division of HPB & Transplant Surgery, Erasmus MC, Rotterdam, Netherlands, [2]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, Netherlands, [3]Internal Medicine, Section of Nephrology and Transplantation, Erasmus MC, Rotterdam, Netherlands*

Purpose: Since the introduction of the Model for End-stage Liver disease (MELD) criteria in 2002, more combined liver kidney transplants are performed. Until 2017, no standard allocation policy for CLKT (Combined Liver Kidney Transplant) was available and each transplant center decided eligibility on a case-by-case basis for CLKT or Liver Transplant Alone (LTA). The aim of this systematic review was to compare the clinical outcomes of CLKT and LTA in patients with and without renal dysfunction.

Methods: We compared patient and graft survival in CLKT and LTA by conducting a systematic literature review from January 2000 through July 2020. To provide equal comparisons, we stratified our analyses into two groups according to whether renal dysfunction was also present in the LTA recipients.

Results: In total eleven studies were included in this review. Three studies compared CLKT to LTA in the presence of renal dysfunction and showed no significant difference in mortality risk at 1, 3 and 5 years (RR 1.03 [CI 0.97-1.09]; RR 1.06 [CI 0.99-1.13]; RR 1.08 [CI 0.98-1.19] respectively). Two studies compared CLKT to LTA in risk of liver graft loss at 1 and 3 years with a significant difference in favor of CLKT at 3 years (RR 1.10 [CI 0.93-1.30]; RR 1.15 [CI 1.08-1.24] respectively). Seven studies compared CLKT to LTA without renal dysfunction, showing no significant difference in mortality risk or risk of graft loss.

Conclusions: In conclusion, CLKT seems to be an appropriate therapeutic option for patients with both end stage liver and renal dysfunction. However, more data is necessary which KDIGO stage of renal dysfunction benefit the most from CLKT.

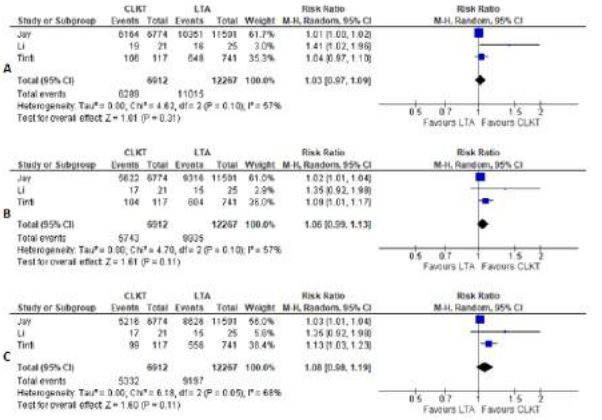


Figure 1: CLKT compared to LTA in patients with renal dysfunction. A: 1 year mortality risk. B: 3 year mortality risk. C: 5 year mortality risk.

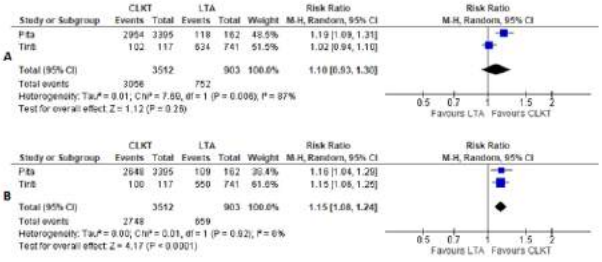


Figure 2: CLKT compared to LTA with renal dysfunction. A: 1 year risk of graft loss. B: 3 year risk of graft loss.

CITATION INFORMATION: Bouari S., Rijkse E., Metselaar H., van den Hoogen M., Ijzermans J., de Jonge J., Polak W., Minnee R. A Comparison Between Combined Liver Kidney Transplants to Liver Transplants Alone: A Systematic Review and Meta-analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Bouari: None. **E.A. Rijkse:** None. **H.J. Metselaar:** None. **M.W. van den Hoogen:** None. **J.N. Ijzermans:** None. **J. de Jonge:** None. **W.G. Polak:** None. **R.C. Minnee:** None.

Abstract# 1138

Center Cost is Not a Barrier to Aggressive Utilization of DCD Livers

L. M. Brewer, D. M. Faulkner, A. J. Logan, J. M. Sneddon, G. N. Brock, N. Singh, W. K. Washburn, A. D. Schenk, *The Ohio State University Wexner Medical Center, Columbus, OH*

Purpose: Only 7% of livers transplanted in 2018 were from deceased from cardiac death (DCD) donors and only a minority of transplant centers aggressively utilize DCD donors. Not every attempted DCD procurement results in a transplant and costs associated with nonproductive DCD procurements are often viewed as a disincentive to aggressive DCD utilization. We examine productive DCD procurement rate from a purely financial perspective.

Methods: We reviewed all DCD liver offers received in one year at The Ohio State University Wexner Medical Center beginning February 2019. We analyzed offer characteristics and collected cost and reimbursement data associated with procurement attempts and completed transplants. We then modelled the rate of productive DCD procurements required to maintain net financial neutrality.

Results: 431 DCD liver offers were received. 57 offers (13.2%) were pursued and 36 successful transplants were performed (63% of total pursued). Pursued donors were located an average of 86 miles from our center (min 8, max 417). 47 organs were pursued using ground transportation and 10 utilizing air travel. For livers transplanted the average donor age was 36 and average BMI was 28. 48% of utilized donors were PHS increased risk and 14% were HepC NAT (+). Transplant recipients had a median MELD of 27 and 16% had HCC. Total reimbursements covered total procurement costs and with our 63% conversion rate a net positive margin was maintained.

Conclusions: Aggressive pursuit of livers from DCD donors allowed for a 35% expansion of our transplant volume. Our productive DCD conversion rate was 63%. 36 additional lives were saved using DCD livers without adverse financial impact on our transplant center.

CITATION INFORMATION: Brewer L., Faulkner D., Logan A., Sneddon J., Brock G., Singh N., Washburn W., Schenk A. Center Cost is Not a Barrier to Aggressive Utilization of DCD Livers *AJT, Volume 21 Supplement 3*

DISCLOSURES: L.M. Brewer: None. **D.M. Faulkner:** None. **A.J. Logan:** None. **J.M. Sneddon:** None. **G.N. Brock:** None. **N. Singh:** None. **W.K. Washburn:** None. **A.D. Schenk:** None.

Abstract# 1139

Post-Transplant Outcomes Comparing A2 Incompatible to Compatible Deceased Donor Liver Transplant Recipients

T. Chiang, M. A. Eagleson, S. Bae, J. Garonzik-Wang, D. Segev, A. B. Massie, *Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD*

Purpose: Transplantation of A2 livers into type O and B recipients (A2i DDLT) is a growing modality to increase access to DDLT for O and B candidates. Most studies on the safety of A2i DDLT in conjunction with their induction agents have been single-center. We sought to explore A2i DDLT outcomes on a national scale.

Methods: Using SRTR data 1/2005-9/2020, we compared acute rejection and graft and patient survival in 763 A2i recipients vs 48,445 ABO-compatible (A2c) recipients using inverse probability of treatment weights to adjust for recipient confounders (demographics, BMI, cause of ESLD, MELD, calendar year). We compared outcomes stratified by induction agent (steroid only, thymoglobulin, basiliximab, others or multiple) among A2i.

Results: The number of A2i DDLT per year increased from 6 in 2000 to 82 in 2019 (Figure 1). A2i recipients spent less time on waitlist (A2i median (IQR) 60 (8-286) days vs A2c 89 (16-288) days, p<0.001) and had higher MELD at allocation (26 (15-34) vs. 20 (13-29), p<0.001). A2i recipients had longer length of stay after DDLT (12 (7-18)d vs 9 (7-16)d, p<0.001). Risk of acute rejection prior to discharge was higher among A2i (9.1% vs. 5.1%, weighted odds ratio (wOR)=$_{1.46}1.96_{2.64}$, p<0.001), but was otherwise comparable between the two groups at 6-months (9.4% vs. 8.7%, wOR=$_{0.88}1.19_{1.61}$, p=0.3), 1-year (12.3% vs. 11.6%, wOR=$_{0.87}1.14_{1.49}$, p=0.3), 2-year (14.7% vs. 13.6%, wOR=$_{0.91}1.17_{1.50}$, p=0.2) follow-up. Post-DDLT patient survival (wHR=$_{0.79}0.95_{1.13}$, p=0.5) and graft survival (wHR=$_{0.84}0.99_{1.17}$, p=0.9) were also comparable between groups (Figure 2). 16.1% and 11.7% of A2i received basiliximab and thymoglobulin as induction, respectively. There was no evidence of improved acute rejection or patient/graft survival for patients who received non-steroid induction agents.

Conclusions: Utilization of A2i DDLT has increased substantially over time. Transplant candidates who accepted A2i DDLT had shorter time to transplant, and generally comparable outcomes with A2c recipients. Our data support the continued practice of A2i DDLT to increase access to DDLT for type O and B candidates.

Figure 1
Yearly Counts of A2i DDLT

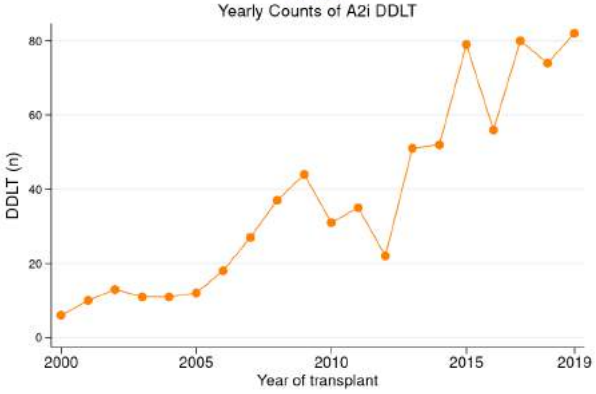


Figure 2
Mortality

CITATION INFORMATION: Chiang T., Eagleson M., Bae S., Garonzik-Wang J., Segev D., Massie A. Post-Transplant Outcomes Comparing A2 Incompatible to Compatible Deceased Donor Liver Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Chiang: None. **M.A. Eagleson:** None. **S. Bae:** None. **J. Garonzik-Wang:** None. **D. Segev:** Consulting Fee; Name of Commercial Interest; Sanofi, Novartis, Jazz Pharmaceuticals, Veloxis. Honoraria; Name of Commercial Interest; Sanofi, Novartis, Jazz Pharmaceuticals, Veloxis. **A.B. Massie:** None.

Abstract# 1140

Clinical Analysis of the Prognosis After Receiving a Liver Graft That Abandoned Transplantation Due to Poor Graft Conditions in the Centers Allocated as a Priority

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Purpose: LT has the limitation of lack of donors compared to those waiting for a transplant. Depending on the recipient's condition, even liver grafts with poor conditions may need to be transplanted. This study was conducted to analyze the prognosis after liver transplantation that abandoned transplantation due to poor graft conditions at the preceding centers.

Methods: From January 2010 to September 2020, Deceased-donor liver transplantation (DDLT) was performed in 160 patients in our center. Among them, 121 patients (allocated group) were preferentially allocated to our center by KONOS and the remaining 39 patients (24.4%, abandoned group) received liver grafts that were abandoned by other transplant centers due to poor organ conditions. To compare and analyze the clinical prognosis of the allocated group and the abandoned group, various perioperative factors and postoperative outcomes were evaluated.

Results: The average ages of the allocated and abandoned groups were 52.8 and 51.3 years, respectively (p=0.38). The preoperative Model for End-stage Liver Disease (MELD) score was 27.0 ± 10.4 in the allocation group and 27.0 ±11.8 in the abandoned group (p=0.99). There was no difference between the two groups in operation time (p=0.06) and intraoperative PRC transfusion (p=0.90). There was no difference between the two groups in hospital stay (p=0.26). The period of admission to the ICU after DDLT was 12.4 days in the abandoned group, which was longer than 8.7 days in the allocated group (p=0.04). In-hospital mortality occurred in 15 patients in the allocated group, and 5 patients in the abandoned group, so there was no difference between the two groups (p=0.47). The 5-year survival rate was 73.8% in the allocated group and 72.2% in the abandoned group, with no difference between the two groups (p=0.67)

Conclusions: Even if the graft that was abandoned due to poor condition, good results can be obtained if the transplant is carried out according to the recipient state. And as a result, it is expected that the discarded graft can be reduced.

CITATION INFORMATION: Choi H., Na G. Clinical Analysis of the Prognosis After Receiving a Liver Graft That Abandoned Transplantation Due to Poor Graft Conditions in the Centers Allocated as a Priority *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Choi: None. **G. Na:** None.

Abstract# 1141

Allocation Changes and Covid Effect on Waiting Time for Liver Transplantation

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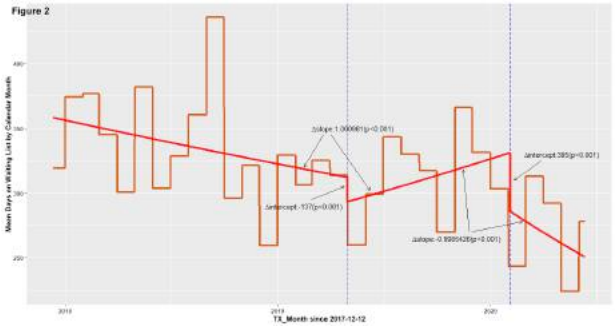
Purpose: On April 30, 2019 the National Liver Review Board (NLRB) was implemented and patients meeting criteria for hepatocellular carcinoma exception

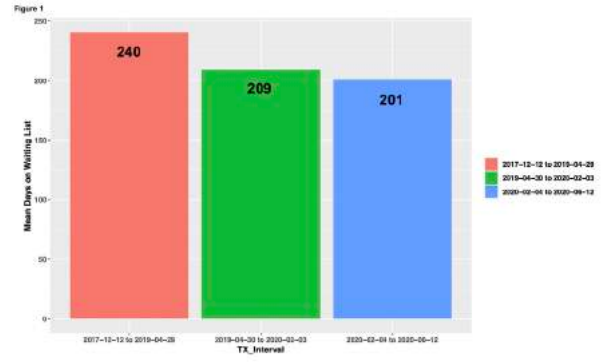
points received a score of the median MELD at transplant minus 3 (MMAT-3). On February 4, 2020 liver allocation changed to concentric circles. Approximately one month later the COVID pandemic altered liver transplantation in many regions for a period of time. It is unknown what effect these policy changes had on the wait-list time of patients for liver transplant.

Methods: We conducted a retrospective cohort study based on data from the Organ Procurement and Transplantation Network from December 2017-June 2020. Mean waiting-time was calculated for the transplants performed each month. An interrupted time-series analysis was used to examine the trend of mean waiting-time for liver transplantation from December 2017 to April 2019 (Pre-NLRB), May 2019 to January 2020 (NLRB-Alone), and February 2020 to June 2020 (Post-Allocation + COVID).

Results: In the Pre-NLRB era, the mean waiting time for liver transplantation was 240 days. For the NLRB-Alone era the mean waiting time was 209 days, and in the Post-Allocation + COVID era, the mean waiting time was 201 days (Figure 1). However, on interrupted time-series analysis, there was a significant trend in the mean waiting-time for transplant over time. The trend of the mean waiting-time increased in the NLRB-Alone era compared to the Pre-NLRB era ($p<0.001$). There was a decrease in the trend of mean waiting-time in the Post-Allocation + COVID era ($p<0.0001$) (Figure 2).

Conclusions: The NLRB and allocation change for liver transplantation has impacted the waiting time. The trend of the waiting time increased after the NLRB and MMAT-3 policy was implemented. After the allocation change, the trend of the waiting time for liver transplant has had a decreasing trajectory. The allocation change coincided closely with the COVID pandemic, which may have temporarily impacted the waiting-time for transplantation. More data is needed about the long-term impact of allocation changes on wait-list time for liver transplantation.





CITATION INFORMATION: Dageforde L., Yuan Q., Elias N. Allocation Changes and Covid Effect on Waiting Time for Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Dageforde: None. **Q. Yuan:** None. **N. Elias:** None.

Abstract# 1142

Short Waiting Time is Not Associated with Decrease in Disease-free Survival in Liver Transplant Recipients with HCC

J. Daum[1], N. Gupta[1], B. Aqel[2], L. Mi[3], J. Harbell[4], *[1]School of Medicine, Mayo Clinic Arizona, Phoenix, AZ, [2]Hepatology, Mayo Clinic Arizona, Phoenix, AZ, [3]Biostatistics, Mayo Clinic Arizona, Phoenix, AZ, [4]Transplant Surgery, Mayo Clinic Arizona, Phoenix, AZ*

Purpose: Studies have suggested that shorter waiting times (WT) for liver transplant (LT) in patients with hepatocellular carcinoma (HCC) may be associated with increased HCC recurrence and decreased disease-free survival. MELD exception points are granted after patients have waited 6 months to address disparity in access for LT candidates without HCC. In this study, we aim to assess the outcome of LT (overall and disease free survival) in HCC patients who were transplanted without the proposed 6-month delay.

Methods: Retrospective review was conducted on all patients who underwent LT for HCC at our institution from 2014 to 2019. Patients with incidentally diagnosed with HCC on explant, those with living donors, and second time transplant recipients were excluded. Data was collected on characteristics of recipients and donors, MELD at transplant, WT with HCC, locoregional therapies, and tumor characteristics. WT was determined by either time from listing to transplant or time from HCC diagnosis to transplant, whichever was shorter. Survival analyses were conducted using Cox regression models and Kaplan Meier curves.

Results: 153 patients underwent LT during the study period: 102 had <6 months WT and 51 >6 months WT. Median WT was 1.9 months (IQR 0.9-3.6) vs 9.1 months (IQR 6.6-16.2) in the two groups. Patients with shorter WT had a significantly lower median MELD at transplant (22) than those who waited longer (28) ($p<0.0001$). However, those transplanted with shorter WT were not more likely to receive a DCD vs DBD donor ($p=0.150$). The 1 year disease free survival for those with shorter WT was 88.2% vs 96.1% for longer WT ($p=0.143$). The HCC recurrence rate was 7.8% in both WT groups ($p=1.0$). WT did not impact disease-free survival (Figure 1). Those with high risk HCC, however, had decreased disease-free survival (HR 3.33 (CI 1.36, 8.18)) ($p=0.030$) compared to patients with low risk HCC. Interestingly, AFP level, tumor stage at diagnosis and pathologic stage on explant were not associated with disease-free survival ($p=0.359$, $p=0.329$ and $p=0.203$).

Conclusions: Shorter WT to transplant did not significantly impact disease-free survival in patients with HCC. Moreover, shorter WT did not influence whether the patient received a DBD or DCD donor. Using extended criteria donors, patients with HCC and favorable tumor response had similar disease free survival when compared to those transplanted with 6 month delay.

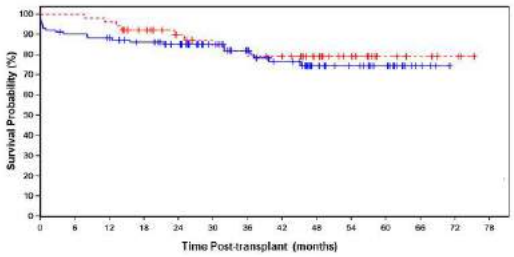


Figure 1: Disease-free Survival for HCC Transplant Recipients Waiting <6 months vs >6 months. Solid line indicates patients with waiting time < 6 months, dashed line indicates patients with > 6 months waiting time. For waiting time > 6 months, Adj HR 0.50 (95% CI 0.21-1.20). Logrank P-value 0.5233

CITATION INFORMATION: Daum J., Gupta N., Aqel B., Mi L., Harbell J. Short Waiting Time is Not Associated with Decrease in Disease-free Survival in Liver Transplant Recipients with HCC *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Daum: None. **N. Gupta:** None. **B. Aqel:** None. **L. Mi:** None. **J. Harbell:** None.

Abstract# 1143

Time-averaged Oxygen Saturation During Donor Agonal Phase is Associated with Post-transplant Hepatic Graft Survival

K. C. Eddinger[1], E. M. Sonnenberg[1], A. Kayastha[2], N. Mahmud[3], D. E. Schaubel[2], P. L. Abt[1], *[1]Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, [2]Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA, [3]Gastroenterology, Hospital of the University of Pennsylvania, Philadelphia, PA*

Purpose: Livers harvested from donors after cardiac death (DCD) are subjected to a period of relative warm ischemia during the agonal phase. There have been no large-scale studies correlating donor hemodynamics and oxygen saturation time-series data during the agonal phase with post-transplant graft outcomes.

Methods: UNOS data was utilized to identify DCD liver donors and their respective recipients. Donor and recipient demographic and clinical data, as well as recipient follow-up data were also available. Donor hemodynamic time-series data collected in the operating room during the agonal phase was provided by UNOS. The time-averaged agonal phase oxygen saturation was calculated by integrating the oxygen saturation curve between withdrawal and cross-clamp, and dividing by the length of this period. Cox regression was utilized to investigate the effects of time-averaged oxygen saturation on hepatic graft failure. Standard recipient and donor clinical and demographic characteristics were also included in the model.

Results: The hemodynamic profiles of 1967 DCD liver donors between 2013 and 2019 were analyzed. A mean of 11.5 data points were recorded for each patient during the agonal phase. Greater time-averaged oxygen saturation was found to be protective in terms of hepatic graft survival; each increase in average oxygen saturation by 5% was associated with a decrease in risk of graft failure by 3.3% ($p = 0.030$).

Conclusions: Agonal phase oxygen saturation profiles in DCD liver donors appear to be correlated with post-transplantation hepatic graft survival. Improved understanding of agonal phase hemodynamic changes and the effect on long-term graft outcomes may help to inform organ selection and expand the donor pool.

CITATION INFORMATION: Eddinger K., Sonnenberg E., Kayastha A., Mahmud N., Schaubel D., Abt P. Time-averaged Oxygen Saturation During Donor Agonal Phase is Associated with Post-transplant Hepatic Graft Survival *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.C. Eddinger: None. **E.M. Sonnenberg:** None. **A. Kayastha:** None. **N. Mahmud:** None. **D.E. Schaubel:** None. **P.L. Abt:** None.

Abstract# 1144

Marginal Allografts in Liver Transplantation Have Very Limited Impact on Length of Stay

C. Goff[1], T. Zhang[1], M. McDonald[1], A. Anand[1], N. Galvan[2], F. Kanwal[3], G. Cholankeril[2], R. Hernaez[3], J. A. Goss[4], A. Rana[2], *[1]Department of Student Affairs, Baylor College of Medicine, Houston, TX, [2]Division of Abdominal Transplantation, Michael E DeBakey Department of General Surgery, Baylor College of Medicine, Houston, TX, [3]Division of Gastroenterology and Hepatology, Department of Medicine, Baylor College of Medicine, Houston, TX, [4]Liver Center, Division of Abdominal Transplantation, Department of General Surgery, Baylor College of Medicine, Houston, TX*

Purpose: The purpose of this study was to determine the effect on recipient length of hospital stay following transplantation with marginal allografts as specified by 6 different definitions.

Methods: 50,155 patients who received transplants from 2012 to 2020 were retrospectively analyzed through hospital discharge in this multi-center cohort study using the United Network for Organ Sharing database. Length of stay was defined as the time from transplant to discharge and was analyzed using Kaplan-Meier survival curves and multivariable Cox regression. Six different definitions were used to classify an allograft as being "marginal": 90th percentile Donor Risk Index allografts, Donation after Cardiac Death donors, national share donors, donors over 70, donors with >30% macrovesicular steatosis, or 90th percentile Discard Risk Index donors. Standard criteria donors were defined as not meeting any of these definitions.

Results: Of the 50,155 patients who received liver transplantation from 2012-2020, 24% (n=12,124) received organs that were classified as marginal. Recipients of marginal allografts had significantly lower laboratory Model for End-stage Liver Disease (MELD) scores with an average of 19.9 compared to 23.3 for recipients of standard allografts ($p < 0.001$). The use of allografts from Donation after Cardiac Death donors, national share donors, 90th percentile Donor Risk Index donors, 90th percentile Discard Risk Index donors, and donors older than 70 did not lead to a prolonged length of stay. However, the use of fatty liver allografts (macrovesicular steatosis >30%) was associated with a prolonged length of stay (hazard ratio, 0.93 [95% CI, 0.87 - 0.99]) (hazard ratio > 1 associated with earlier discharge). Cold ischemia time was associated with a shortened length of stay when less than 6 hours (hazard ratio, 1.09 [95% CI, 1.07 - 1.11]) and increased length of stay when greater than 12 hours (hazard ratio, 0.82 [95% CI, 0.76 - 0.89]).

Conclusions: Liver transplant centers can be more aggressive in their use of extended criteria donors with limited fear of increasing length of stay and its associated healthcare costs.

CITATION INFORMATION: Goff C., Zhang T., McDonald M., Anand A., Galvan N., Kanwal F., Cholankeril G., Hernaez R., Goss J., Rana A. Marginal Allografts in Liver Transplantation Have Very Limited Impact on Length of Stay *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Goff: None. **T. Zhang:** None. **M. McDonald:** None. **A. Anand:** None. **N. Galvan:** None. **F. Kanwal:** None. **G. Cholankeril:** None. **R. Hernaez:** None. **J.A. Goss:** None. **A. Rana:** None.

Abstract# 1145

Outcomes of DCD Allografts in Liver Transplant Recipients with HCC

N. Gupta[1], J. Daum[1], B. Aqel[2], L. Mi[3], J. Harbell[4], *[1]School of Medicine, Mayo Clinic Arizona, Phoenix, AZ, [2]Hepatology, Mayo Clinic Arizona, Phoenix, AZ, [3]Biostatistics, Mayo Clinic Arizona, Phoenix, AZ, [4]Transplant Surgery, Mayo Clinic Arizona, Phoenix, AZ*

Purpose: Early studies demonstrated inferior survival for liver transplant (LT) recipients with hepatocellular carcinoma (HCC) who received allografts from donation after cardiac death (DCD) donors vs donation after brain death (DBD) donors. DCD livers have been proposed as a way to decrease waiting time to transplantation. However, prior studies demonstrated increased risk of recurrence with shorter waiting times. The purpose of this study was to examine the impact of using DCD grafts on transplant waiting time, and graft and patient survival for recipients with HCC when compared to DBD recipients.

Methods: Retrospective review was conducted on all patients who underwent LT for HCC at our institution from 2014 to 2019. Exclusion criteria were: living donor transplants, re-transplants, and incidental HCC diagnosis on explant. Data was collected on recipient and donor demographics, transplant and donor characteristics, tumor characteristics, and patient and graft outcomes. Survival analyses were conducted on HCC recurrence, graft failure, and death using Cox regression models and Kaplan Meier curves.

Results: 153 patients underwent LT: 53 received a DCD organ and 100 received a DBD organ. The median transplant MELD for DCD recipients was 24.0, and for DBD recipients was 25.0 (p=0.99). 66% of DCD recipients received exception points, while 58% DBD recipients had exception points (p=0.39). There was no significant difference in AFP or tumor stage at diagnosis for DCD vs DBD recipients. The mean time from listing to transplant for DCD recipients was 7.2 months vs 5.8 months for DBD recipients (p=0.02). The HCC recurrence rate in DCD recipients was 5.7% vs 9.0% in DBD recipients (p=0.54). Multivariate analysis did not show a difference in overall (HR 1.40 (CI 0.52, 3.79) p=0.506) or disease free survival (HR 1.72 (CI 0.74, 4.00) p=0.207) for patients who received exception points. Overall and disease free survival was similar for patients who received DCD vs DBD allografts (Figure 1).

Conclusions: Overall patient survival and disease free survival was not affected by the use of DCD grafts. MELD exception at time of transplant was not associated with a higher likelihood of receiving a DBD graft. Transplant waiting time was longer in recipients of DCD grafts, though overall transplant waiting time and MELD score at transplant were low, reflecting the aggressive donor selection approach at our institution.

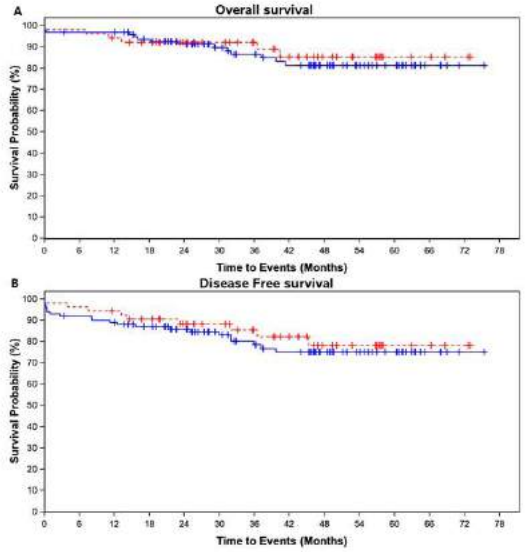


Figure 1. Survival Analysis for HCC Patients Receiving DCD vs DBD Liver Allografts
A) Overall survival for DCD (dashed line) vs DBD (solid line). HR 0.70 (95% CI 0.26-1.87). Logrank p = 0.66. B) Disease free survival for DCD (dashed line) vs DBD (solid line). HR 0.77 (95% CI 0.35-1.69). Logrank p = 0.54

CITATION INFORMATION: Gupta N., Daum J., Aqel B., Mi L., Harbell J. Outcomes of DCD Allografts in Liver Transplant Recipients with HCC *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Gupta: None. **J. Daum:** None. **B. Aqel:** None. **L. Mi:** None. **J. Harbell:** None.

Abstract# 1146

Geographic Divergence in Waitlist Registration and Trends in Waitlist Removal for Liver Transplantation in Patients with Nonalcoholic Steatohepatitis (NASH)

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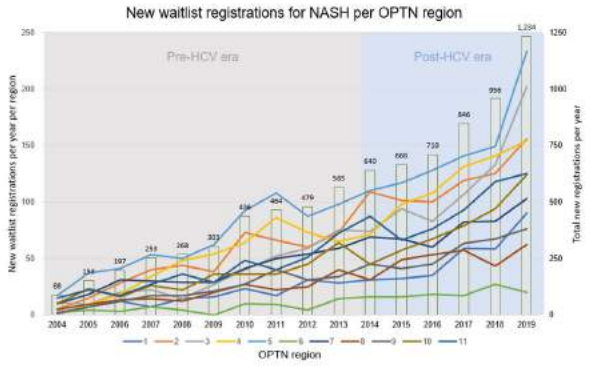
Purpose: This study aims to evaluate regional trends of waitlist (WL) registrations and removal for liver transplantation (LT) among United States (US) adults listed for nonalcoholic steatohepatitis (NASH).

Methods: We evaluated annual WL data for new transplant registrations listed for NASH in the US between January 1, 2004, and December 31, 2019 using deidentified data from the United Network for Organ Sharing (UNOS) LT database. Regional data was stratified as established by the Organ Procurement and Transplantation Network (OPTN).

Results: Between 2004-2019, a total of 9,030 new WL registrations were listed for NASH, 53.6% (4,842) of which were registered between 2014 and 2019. New WL registration for NASH increased consistently over time, from 83 new WL registrations for NASH in 2004 to 1345 in 2019. A total of 8,415 registrations were removed from the WL during the study period. The most common reasons for WL removal were death (29.69%), deterioration of condition (26.69%), or improvement

of condition (7.30%). Of patients who died before receiving LT, the most common causes of death were multiorgan failure (29.09%), sepsis (9.84%), or cardiovascular-related issues (8.76%).

Conclusions: There has been a substantial increase in new WL registrations for patients with NASH since 2004 throughout all OPTN regions. Total number of NASH patients awaiting LT has more than doubled and new WL registration for NASH has increased precipitously since 2014, potentially due to increasing diagnostic awareness of NASH and the introduction of highly effective antiviral therapy for HCV. These trends are likely to diminish in the future as HCV infection nears eradication. Over 50% of NASH WL registrations were removed due to death or clinical deterioration. Among this group, common causes of death were multiorgan failure, sepsis, or cardiovascular comorbidity. Future efforts must identify ways to meet this increasing demand for NASH-related LT while more effectively identifying high-risk NASH patients awaiting LT to improve WL mortality.



Characteristics of Patients Removed from Waitlist		
Reason for waitlist removal	**# of patients**	**Percent**
Died	2498	29.69
Condition deteriorated	2246	26.69
Condition improved	614	7.30
Transferred to another center	205	2.44
Refused transplant	138	1.64
Unable to contact candidate	94	1.12
Removed in error	11	0.13
Other	2609	31.00
Total	8415	100

Cause of Death of Patients Awaiting Transplant		
Cause of Death	**# of Patients**	**Percent**
Multi-organ failure	727	29.09
Sepsis	246	9.84
Cardiovascular	219	8.76
Hemorrhage	119	4.76
Pulmonary	114	4.56
Other infection	111	4.44
Cerebrovascular	54	2.16
Spontaneous bacterial peritonitis	21	0.84
Renal	20	0.80
Malignancy	15	0.60
Other	853	34.13
Total	2499	100

CITATION INFORMATION: Hanlon C., Saberi B., Yuan L. Geographic Divergence in Waitlist Registration and Trends in Waitlist Removal for Liver Transplantation in Patients with Nonalcoholic Steatohepatitis (NASH) *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Hanlon: None. **B. Saberi:** None. **L. Yuan:** Grant/Research Support; Name of Commercial Interest; Intercept, Genfit.

Abstract# 1147

Waitlist Outcomes for Exception Candidates Following the Implementation of MMaT/250 Score

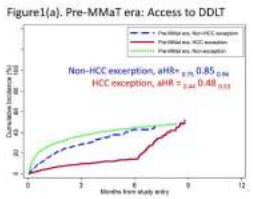
T. Ishaque[1], J. G. Wang[1], S. Karhadkar[2], D. Segev[1], A. B. Massie[1], *[1]Johns Hopkins Medical Institutions, Baltimore, MD, [2]Temple University, Philadelphia, PA*

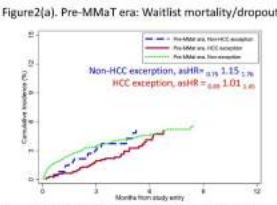
Purpose: Starting in May 2019, exception points were allocated based on DSA-level median-MELD-at-transplant (MMaT/DSA). In February 2020, the exception point system was further modified based on MMaT within 250 nautical miles (MMaT/250). Our aim was to describe subsequent changes in transplant and mortality rates for exception and non-exception candidates.

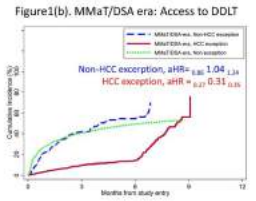
Methods: Using SRTR data on 26,992 adult, first-time, active, DDLT waitlist registrants, we compared DDLT rates in non-HCC exception vs. HCC-exception vs. non-exception candidates using Cox regression in three eras: Pre-MMat (02/01/2018-01/31/2019), MMaT/DSA (05/01/2019-02/03/2020), and MMaT/250 (02/04/2020-08/30/2020). In addition, we compared waitlist mortality/dropout risk among non-HCC exception, HCC-exception, non-exception candidates of the same allocation priority using Fine and Gray method after accounting for the competing risk of transplantation.

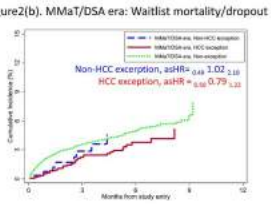
Results: During pre-MMat era, Non-HCC exception candidates had 15% (aHR= $_{0.75}$ 0.85 $_{0.96}$) lower access to DDLT compared to non-exception candidates; similar DDLT rate in MMaT/DSA-era (aHR= $_{0.86}$ 1.04 $_{1.24}$) and then attenuated to 38% lower access to DDLT in MMaT/250 era (aHR=$_{0.48}$ 0.62 $_{0.80}$) (Figure 1). HCC-exception candidates had 52 % (aHR=$_{0.44}$ 0.48 $_{0.53}$), 69% (aHR=$_{0.27}$ 0.31 $_{0.35}$) and 79% (aHR=$_{0.17}$ 0.21 $_{0.25}$) lower access to DDLT compared to non-exception candidates during pre-MMat , MMaT/DSA and MMaT/250 era , respectively. Non-HCC exception and non-exception candidates with the same allocation MELD had comparable risk of death/dropout during pre-MMaT and MMaT/DSA eras (Figure 2). However, under MMaT/250, non-HCC exception patients had twice as much risk of death/dropout compared to non-exception patients (asHR= $_{1.06}$ 2.08 $_{4.06}$); risk was potentially elevated for HCC exception patients although not statistically significant (asHR = $_{0.93}$ 1.67 $_{3.01}$) (Figure 2).

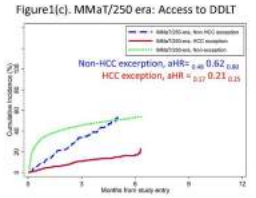
Conclusions: Following the implementation of MMaT/250 score, access to DDLT was attenuated for both Non-HCC exception and HCC exception candidates. In addition, the policy change appeared to have substantially increased risk of death/dropout for non-HCC exception candidates compared to non-exception candidates. The COVID-19 pandemic may have influenced death/dropout in the MMaT/250 era.

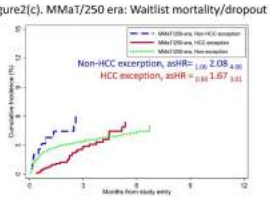












CITATION INFORMATION: Ishaque T., Wang J., Karhadkar S., Segev D., Massie A. Waitlist Outcomes for Exception Candidates Following the Implementation of MMaT/250 Score *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Ishaque: None. **J.G. Wang:** None. **S. Karhadkar:** None. **D. Segev:** None. **A.B. Massie:** None.

LIVER

Abstract# 1148

Extreme Hyponatremia as a Risk Factor for Early Mortality After Liver Transplantation in the MELD-Sodium Era

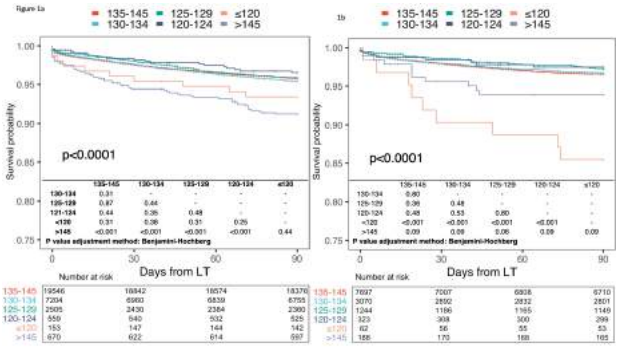
T. Ivanics[1], S. Leonard-Murali[1], H. Mouzaihem[1], D. Moonka[2], T. Kitajima[1], S. Yeddula[1], T. Shamaa[1], M. Rizzari[1], K. Collins[1], A. Yoshida[1], M. Abouljoud[1], S. Nagai[1], *[1]Division of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI, [2]Division of Gastroenterology and Hepatology, Henry Ford Hospital, Detroit, MI*

Purpose: The impact of hyponatremia on waitlist and post-transplant outcomes following the implementation of MELD-Na based liver allocation remains unclear. We sought to evaluate waitlist and post-liver transplant (LT) outcomes in patients with hyponatremia before and after implementation of MELD-Na based allocation.

Methods: Adult primary LT candidates between 2009 and 2019 were identified in the OPTN/UNOS database. Multi-organ transplants and re-LT were excluded. Two eras were defined: before and after implementation of MELD-Na based allocation. Patients were categorized into the following groups: extreme hyponatremia (≤120 mEq/L), severe hyponatremia (121-124), moderate hyponatremia (125-129), mild hyponatremia (130-134), normal sodium (135-145), and hypernatremia (>145). 90-day waitlist outcomes and post-LT survival were compared according to era and sodium concentration using Fine-Gray and Cox proportional hazard models.

Results: 87,845 patients were included in waitlist outcome analyses (N=64,911[pre-MELD-Na], N=22,934[post-MELD-Na]). In the pre-MELD-Na era, extreme hyponatremia at listing was associated with increased risk of 90-day waitlist mortality (HR:2.08,p<0.001) and lower likelihood of transplant within 90-days (HR:0.63,p<0.001). In the post-MELD-Na era, patients with extreme hyponatremia had a similar risk of waitlist mortality (HR:1.02,p=0.95) and likelihood of transplant (HR:0.90,p=0.48) as patients with normal serum sodium. Post-LT outcome analyses included 30,639 and 12,585 patients in pre and post-MELD-Na eras. While extreme hyponatremia was not associated with post-LT mortality in the pre-MELD-Na era, it was an independent risk factor for 90-day post-LT mortality in the post-MELD-Na era. (HR:5.20,p<0.001).

Conclusions: With the introduction of MELD-Na based allocation, waitlist outcomes have improved in patients with extreme hyponatremia but paradoxically been associated with worse short-term post-LT survival.



CITATION INFORMATION: Ivanics T., Leonard-Murali S., Mouzaihem H., Moonka D., Kitajima T., Yeddula S., Shamaa T., Rizzari M., Collins K., Yoshida A., Abouljoud M., Nagai S. Extreme Hyponatremia as a Risk Factor for Early Mortality After Liver Transplantation in the MELD-Sodium Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Ivanics: None. **S. Leonard-Murali:** None. **H. Mouzaihem:** None. **D. Moonka:** None. **T. Kitajima:** None. **S. Yeddula:** None. **T. Shamaa:** None. **M. Rizzari:** None. **K. Collins:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **S. Nagai:** None.

Abstract# 1149

Long-term Outcomes of Donation After Cardiac Death and Living Donor Liver Transplant for Primary Sclerosing Cholangitis: An Analysis of UNOS Registry from 2002-2020

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Purpose: Use of donation after circulatory death (DCD) grafts is a reported risk factor for worse outcomes after liver transplant (LT) for primary sclerosing cholangitis (PSC) due to increased biliary complications. However, outcomes comparing DCD, donation after brain death (DBD) donors, and living donor LT (LDLT) have not been fully studied in a recent cohort. This study aims to assess outcomes of LT for PSC with each graft type.

Methods: Using OPTN/UNOS data, we analyzed LT patients with PSC or primary biliary cholangitis (PBC) between 2002 and 2020. Patients with status 1A, multi-organ or re-transplant were excluded. One, 5, and 10-year graft survival (GS) were compared between PSC and PBC groups. Next, outcomes were compared between DBD-LT, DCD-LT, and LDLT in each group. In PSC, the three types of donor grafts were compared for cause of graft loss. Finally, transplant outcomes were analyzed in early era (2002-2010) and late era (2011-2020). Risks were adjusted by recipient variables.

Results: 3,946 PSC and 2,675 PBC patients were eligible. Among PSC patients, 3,099 (78.5%), 151 (3.8%), and 696 (17.7%) received DBD-LT, DCD-LT and LDLT. One, 5, and 10-year GS were similar between PSC and PBC. In PSC, DCD-LT had significantly higher risk of 1, 5, and 10-year graft loss than DBD-LT (1-year: HR 1.87, p=0.007, 5-year: HR 1.74, p=0.001, 10-year: HR 1.60, p=0.003) whereas LDLT had similar risks of 5 and 10-year graft loss. In contrast, outcomes were comparable between donor types in PBC. As a cause of graft loss in PSC, DCD-LT had a significantly higher incidence of biliary complications and PSC recurrence than other graft types (**Table**). In DCD of PSC, the risk of 5-year recurrence was relatively higher in early era than in late era. 16.5% of DCD-LT lost grafts because of PSC recurrence or biliary issues vs 4.5% in DBD-LT and 5.1% in LDLT. Incidence of re-transplant was highest in DCD-LT (DCD-LT 18.5% vs DBD-LT 10.2% vs LDLT 10.6%, p=0.005). This finding was more prominent in early era whereas the risk of 3 and 5-year graft loss was similar among all graft types in late era (**Figure**).

Conclusions: In PSC patients, the outcomes of the use of DCD grafts has improved over time although it was associated with worse post-transplant outcomes because of relatively higher recurrence and biliary complications in the earlier era. This finding was not seen in PBC. LDLT had similar outcomes to DBD-LT. The use of DCD grafts is an option for PSC with appropriate donor selection.

Table. Incidence of graft loss according to the causes in PSC patients

		DBD	DCD	LDLT	p
1-year	Biliary complications*	19 (0.6)	5 (3.3)	5 (0.7)	0.003
	Diffuse cholangiopathy**	0	2 (1.3)	3 (0.4)	<0.001
	Recurrent PSC	4 (0.1)	2 (1.3)	0	0.001
5-year	Biliary complications*	35 (1.1)	11 (7.3)	8 (1.1)	<0.001
	Diffuse cholangiopathy**	9 (0.2)	2 (1.3)	3 (0.4)	0.026
	Recurrent PSC	50 (1.6)	10 (6.6)	8 (1.1)	<0.001
10-year	Biliary complications*	40 (1.3)	11 (7.3)	8 (1.1)	<0.001
	Diffuse cholangiopathy**	7 (0.2)	2 (1.3)	8 (1.1)	0.001
	Recurrent PSC	93 (3.0)	12 (7.9)	20 (2.9)	0.003

*before 3/31/2015
**after 3/31/2015 (UNOS registry)

Figure. Adjusted risk of graft loss in PSC in each era

CITATION INFORMATION: Kitajima T., Nagai S., Ivanics T., Shamaa T., Collins K., Rizzari M., Yoshida A., Abouljoud M., Moonka D. Long-term Outcomes of Donation After Cardiac Death and Living Donor Liver Transplant for Primary Sclerosing Cholangitis: An Analysis of UNOS Registry from 2002-2020 *AJT, Volume 21 Supplement 3*

DISCLOSURES: T. Kitajima: None. **S. Nagai:** None. **T. Ivanics:** None. **T. Shamaa:** None. **K. Collins:** None. **M. Rizzari:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **D. Moonka:** None.

Abstract# 1150

Pre-transplant Prognostic Nutritional Index Predicts Short-term Outcomes After Liver Transplantation

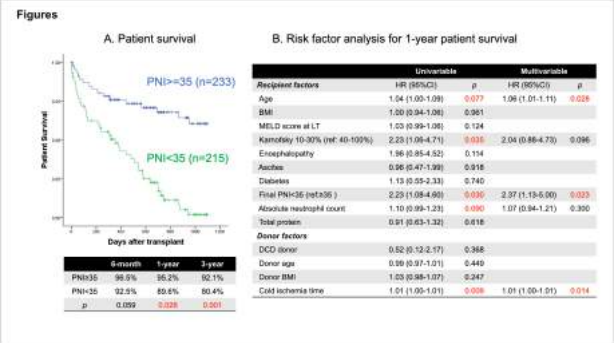
E. Lisznyai, T. Kitajima, K. Delvecchio, A. Mohamed, S. Yeddula, T. Shamaa, T. Ivanics, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, S. Nagai, *Transplant Institute, Henry Ford Hospital, Detroit, MI*

Purpose: To understand the importance of pre-transplant nutritional status in optimizing liver transplant outcomes.

Methods: The prognostic nutritional index (PNI) is a serum marker of nutrition and inflammation. We hypothesized pre-transplant PNI would predict short-term post-LT outcomes in deceased donor liver transplant (DDLT) patients. 451 patients underwent primary DDLT between 2013-2018 at our center. Re-transplants, multi-organ transplants and living donor liver transplants were excluded. Pre-transplant PNI = (10)*[albumin (g/dL)] + (0.005)*[Total Lymphocyte Count (/μL)]. PNI was analyzed as both a continuous and categorical variable. ROC curves yielded an optimal PNI cutoff of 35 to compare short-term outcomes between PNI≥35 and PNI<35 cohorts. Risk factors for patient death within 1-year were analyzed using Cox regression models and adjusted by recipient factors at LT.

Results: Multivariable analysis associated PNI with 1-year survival as a continuous variable (HR=0.94, 95% CI=0.90-0.98; p=0.007). Of 451 patients, 215 (47.7%) had PNI<35. MELD score at time of transplant was higher in PNI<35 (22 vs. 19; p=0.028). Recipient age, gender, BMI, donor age, rates of diabetes mellitus and donors after cardiac death were equivocal. PNI<35 demonstrated lower 1-year survival (89.6% vs. 95.2%; p=0.026, **Figure A**). After risk adjustment, PNI<35 showed higher risk of 6-month (HR=2.44; p=0.047) and 1-year death (HR=2.47; p=0.018). Multivariable analysis revealed PNI<35 at LT (HR=2.37; p=0.023) was an independent risk factor for patient death within 1 year (**Figure B**).

Conclusions: Lower pre-transplant PNI portended worse short-term survival in DDLT patients. PNI may be useful in evaluating pre-transplant nutritional status and optimizing LT outcomes.



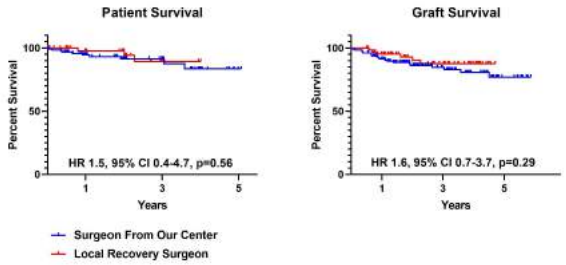
CITATION INFORMATION: Lisznyai E., Kitajima T., Delvecchio K., Mohamed A., Yeddula S., Shamaa T., Ivanics T., Collins K., Rizzari M., Yoshida A., Abouljoud M., Nagai S. Pre-transplant Prognostic Nutritional Index Predicts Short-term Outcomes After Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Lisznyai: None. **T. Kitajima:** None. **K. Delvecchio:** None. **A. Mohamed:** None. **S. Yeddula:** None. **T. Shamaa:** None. **T. Ivanics:** None. **K. Collins:** None. **M. Rizzari:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **S. Nagai:** None.

Abstract# 1151

Role of Recovering Surgeon in DCD Liver Transplant Outcomes

E. Macdonough, K. Pont, B. Aqel, K. Valenti, W. Hewitt, A. Moss, K. S. Reddy, C. Jadlowiec, *Mayo Clinic, Phoenix, AZ*

Purpose: Donation after cardiac death (DCD) liver transplant (LT) outcomes have continued to improve. Variability in outcomes has been attributed to center and recovering surgeon experience. The aim of this study was to assess DCD LT outcomes utilizing surgeons from a large volume DCD center versus local recovering surgeons.
Methods: We assessed 196 DCD LT at our center spanning the years of 2015 to 2020. Multivisceral DCD transplants were excluded.
Results: During this period, there were 129 DCD LT recovered utilizing a surgeon from our center (65.8%) and 67 procured by a local recovery surgeon (34.2%). There were no differences in recipient age (p=0.43) or Model for End Liver Disease (MELD, 20.9±6.0 vs. 20.6±6.2, p=0.77). There likewise were no differences in donor age (p=0.12) and warm ischemia time (WIT) (21.6±6.7 vs. 21.7±4.8, p=0.86). Cold ischemia time was longer for livers recovered utilizing local recovery surgeons (6.4±1.3 vs. 5.2±0.9, p<0.0001). There were no differences in early allograft dysfunction (EAD) (Bili ≥10, p=0.28; INR ≥1.6 p=0.70, AST>2000, p=0.33), primary nonfunction rates (0.8% vs. 0.0%, p=0.47) and ischemic cholangiopathy (IC) treated with endoscopy alone (17.1% vs. 11.9%, p=0.35). In total, all-cause IC at any timepoint, including >1 year, requiring re-transplantation was 7.1%. For IC in the absence of hepatic artery (HA) issues, re-transplant rates in the first year were 0.8% for grafts recovered by our center versus 3.0% for those procured by local recovering surgeons (p=0.23). For all-cause IC, including grafts with HA issues, re-LT rates were 3.9% for grafts recovered by our center and 3.0% for those procured by local surgeons (p=0.75). There were no differences in patient (HR 1.5, 95% CI 0.4-4.7, p=0.56) or graft (HR 1.6, 95% CI 0.7-3.7, p=0.29) survival. One-year graft survival for livers recovered by our center was 91.5% compared to 95.5% for grafts with local recovery.
Conclusions: Excellent DCD LT outcomes can be achieved with the utilization of local recovery surgeons as long as WIT is minimized. Center experience with managing DCD grafts plays a more significant role compared to the role of the recovering surgeon in DCD outcomes. There may be an opportunity to increase utilization of DCD livers by expanding usage of local recovery surgeons.



Post-Transplant Outcomes			
	Recovery Surgeon From Our Center n=129	**Local Recovery Surgeon** n=67	***P* value**
Hospital LOS, median (days)	6.0	6.0	0.71
Day 7 T. Bili ≥10 (mg/dL)	5 (3.9%)	5 (7.5%)	0.28
Day 7 INR ≥1.6 (U/L)	3 (2.3%)	1 (1.5%)	0.70
AST >2000 first week	104 (80.6%)	50 (74.6%)	0.33
PNF	1 (0.8%)	0 (0.0%)	0.47
Cholangiopathy requiring endoscopy	22 (17.1%)	8 (11.9%)	0.35
All-cause cholangiopathy requiring re-LT within 1 year	5 (3.9%)	2 (3.0%)	0.75

CITATION INFORMATION: Macdonough E., Pont K., Aqel B., Valenti K., Hewitt W., Moss A., Reddy K., Jadlowiec C. Role of Recovering Surgeon in DCD Liver Transplant Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Macdonough: None. **K. Pont:** None. **B. Aqel:** None. **K. Valenti:** None. **W. Hewitt:** None. **A. Moss:** None. **K.S. Reddy:** None. **C. Jadlowiec:** None.

Abstract# 1152

The Survival Benefits of Using Marginal Allografts in Liver Transplantation

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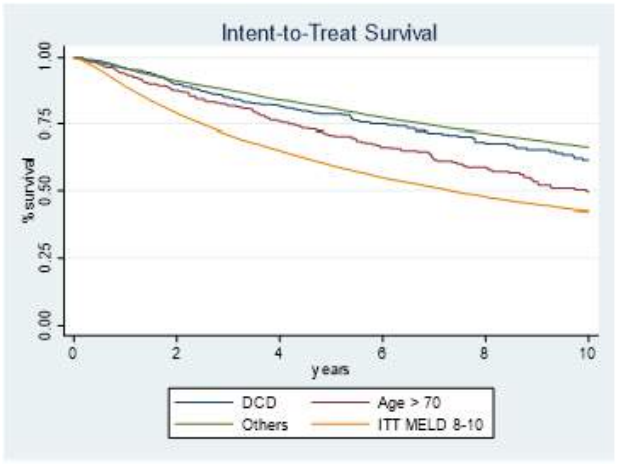
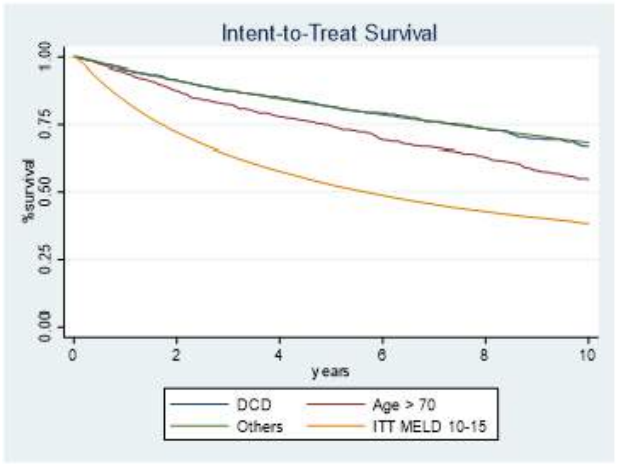
Purpose: Our study assessed whether using marginal allografts at initial time of listing provided similar or greater survival benefit versus waiting on the transplant waitlist for a "non-marginal" allograft.
Methods: We used the United Network for Organ Sharing (UNOS) database to retrospectively analyze 156,646 liver transplant recipients, excluding patients cross-listed for other transplants. We stratified the patients into three ranges based on their MELD scores: 8-10 (n = 33,891), 10-15 (n = 74,191), 15-18 (n = 48,564). Within each MELD range, patients were divided into four groups. Within a range, the first three groups were patients who were transplanted with an allograft from 1) a donation after circulatory death, 2) a donor between 70-100 years of age, or 3) all other allografts not in the first two categories. The fourth category is distinct from the first three as these are patients who were listed with an initial MELD score within the MELD range but were not transplanted within that MELD range. Within each MELD range, we performed a Kaplan-Meier time-to-event survival analysis with death as our primary outcome. Statistical significance was determined using log-rank testing (Stata Corp).
Results: Figure 1 contains our survival curves for each MELD range, and table 1 provides agranular view of 10-year survival values for the four categories within each MELD range. Furthermore, Table 1 displays statistically significant differences as calculated using the log-rank test for equality of survival functions within each MELD range. Across all three MELD ranges, all four survival curves differed from every other survival curve ($p < 0.05$) aside from DCD vs. all other allograft donations. Notably, across all three MELD ranges, patients who remained on the waitlist with a given MELD score had worse 10-year survival vs. all three other categories of patients who received DCD, donors > 70, or other allografts at that same MELD score.
Conclusions: In patients with MELD scores as low as 8, this analysis demonstrates that there is significant benefit gained by using marginal allografts in patients who would otherwise remain on the waitlist as their condition deteriorates until a non-marginal allograft is procured.





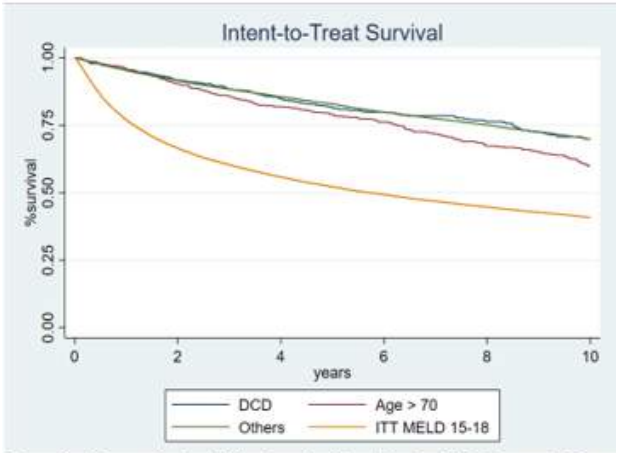


Figure 1: 10-year Kaplan-Meier Survival Analysis for MELD Scores: 8-10

Table 1: 10-year Kaplan-Meier Liver Transplant Survival

MELD Score		Type of Allograft	10-year Survival (%, 95% Confidence Interval)
8-10	MELD at Transplant	DCD[a]	61.6 (55.4 - 67.2)
		Donor Age >70 years[b]	49.6 (43.1 - 55.8)
		All other allografts[a]	66.6 (65.3 - 67.9)
	MELD at Listing[c]		42.5 (41.5 - 43.4)
10-15	MELD at Transplant	DCD[a]	66.8 (62.8 - 70.4)
		Donor Age >70 years[b]	54.8 (51.0 - 58.5)
		All other allografts[a]	68.2 (67.4 - 69.0)
	MELD at Listing[c]		38.1 (37.5 - 38.7)
15-18	MELD at Transplant	DCD[a]	69.9 (65.6 - 73.9)
		Donor Age >70 years[b]	59.8 (55.3 - 64.1)
		All other allografts[a]	69.8 (68.9 - 70.8)
	MELD at Listing[c]		40.9 (40.1 - 41.6)

Note: Within a MELD Score range, unique superscripts denote a statistically significant difference ($p < 0.05$)

CITATION INFORMATION: Malik T., Godfrey E., Rana A. The Survival Benefits of Using Marginal Allografts in Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: T.H. Malik: None. **E.L. Godfrey:** None. **A. Rana:** None.

Abstract# 1153

When One Size Does Not Fit All: Geographically Heterogeneous Liver Distribution

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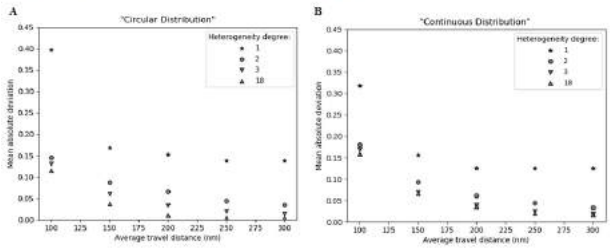
Purpose: The new liver allocation system prioritizes distribution within acuity circles, instead of within DSAs. Acuity circles have the same radius around all donor hospitals across the U.S. Allowing acuity circles around each hospital to have their own customized radii might reduce the geographic disparity in the liver supply/demand ratio.[SG1] We explored the effect of a heterogeneous system with an increasing number of alternative radii for acuity circles. Similarly, we explored the effect of continuous distribution policies with an increasing number of alternatives for the weight given to geographic.

Methods: Using 07/2013-06/2017 SRTR data, we compared circular (continuous) distribution schemes using a uniform radius (geographic distance weight) across the U.S., with schemes using an increasing number of alternatives for the radii (weights). We built an optimization model that designed distribution schemes that minimize the variation (mean absolute deviation) in the liver supply/demand ratio between transplant centers.

Results: For circular (continuous) distribution, when using two radii (distance weight) alternatives, instead of one, the variation in liver supply to demand ratio decreased from 0.153 (0.126) to 0.066 (0.061) having livers travel 200 nm on average (Fig. 1). Maintaining a similar level of variation in the liver supply/demand ratio, the average liver travel could be reduced from 200 nm to 150 nm when distributing organs using 18 different circle radii or distance weights instead of three (Fig.1). Donor hospitals in fairly isolated areas like California, Texas, Florida, or Washington were sharing livers locally to nearby transplant centers. On the contrary, many donor hospitals in the Midwest and Southeast could share organs broadly to boost transplant rates in distant undersupplied centers (Fig.2).

Conclusions: Geographically heterogeneous liver distribution schemes can reduce variation in the liver supply/demand ratio among transplant centers and reduce transportation burden. The latter potential diminishes fast with heterogeneity of the scheme.

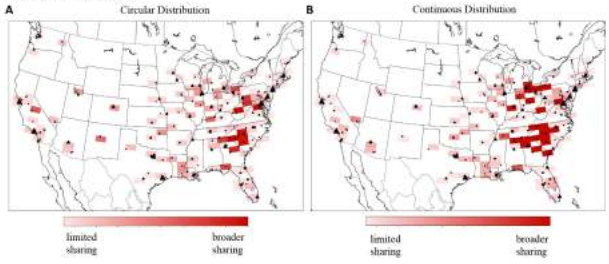
Figure 1. Mean absolute deviation (MAD)* of liver supply/demand ratio among transplant centers for "Circular Distribution" (A) and "ContinuousDistribution" (B) schemes with varying heterogeneity degree,** where livers traveled 100, 150, … , 300 nm on average.



* The Mean absolute deviation (MAD) describes the variation in liver supply/demand ratios among transplant centers.

** Heterogeneity degree is the number of different circle sizes or proximity score functions allowed in the policy to assign to all donor hospitals; for instance, the heterogeneity degree equal one denotes geographically homogenous distribution, while heterogeneity degree equal three indicated we used three different circle sizes or proximity score functions to vary sharing in different locations.

Figure 2. Heat maps show how broadly the livers are shared for the optimized "Circular Distribution" scheme (A) and the "Continuous Distribution" scheme (B) with heterogeneity degree* 18 where livers travel 200 nm on average. Data of 181 (10%) the largest donor hospitals, accounting for 50% liver supply.



* Heterogeneity degree is the number of different circle sizes or proximity score functions allowed in the policy to assign to all donor hospitals; for instance, the heterogeneity degree equal one denotes geographically homogenous distribution, while heterogeneity degree equal three indicated we used three different circle sizes or proximity score functions to vary sharing in different locations.

CITATION INFORMATION: Mankowski M., Gentry S., Segev D., Trichakis N. When One Size Does Not Fit All: Geographically Heterogeneous Liver Distribution *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.A. Mankowski: None. **S. Gentry:** None. **D. Segev:** None. **N. Trichakis:** None.

Abstract# 1154

Evaluation of Increasing Liver Discard Rate and Waiting List Drop-Off in Post-MELD Era

R. Matsumoto[1], K. Halazun[2], J. Emond[1], B. Samstein[2], R. S. Brown Jr.[2], L. Dove[1], T. Kato[1], *[1]Center for Liver Disease and Transplantation, Columbia University Irving Medical Center, New York, NY, [2]Center for Liver Disease and Transplantation, Weill Cornell Medical Center, New York, NY*

Purpose: As number of donors and transplant cases rises each year, it is important to evaluate not only post-transplant survival rate but also the organ utilization rate and the waiting-list mortality. In addition, it is known that current regulatory criteria could potentially encourage risk-averse behavior by transplant centers and could affect the organ utilization rate.

Methods: Adult post-liver transplant (LT) survivals, intention-to-treat (ITT) survivals, DRI (Donor Risk Index), waiting-list (WL) drop-off rates and organ discard rates were studied in the post-MELD era using the Scientific Registry Transplant Recipients (SRTR) database and Stata software. We divided the era in five different cohorts (C1: 2002-2006, C2: 2007-2009, C3: 2010-2012, C4: 2013-2015, C5: 2016-2018). We calculated the organ discard rate as total number of cases in which organs were not used for transplant divided by total number of cases that were authorized to donation. We also defined the incidence of waitlist removal due to death and condition deterioration as the WL drop-off rate.

Results: The discard rate was significantly higher in the most recent cohort compared to other cohorts ($p<0.05$) in spite of DRI being stable for the past 10 years. The number of discard organ (discard rate) was 6068 (24.88%), 6536 (24.9%) and 8028 (25.74%) in C3, C4 and C5, respectively. The mean DRI for entire donors was 1.360, 1.3631,1.367, whereas DRI for discarded organ was 1.439,1.441, 1.447 in C3, C4 and C5, respectively ($p>0.1$). From early to recent years, the LT survival has been significantly improving. The 1-year post-LT survival was 77.04%, 80.99%, 83.4%, 87.15%, 88.72% in C1, C2, C3, C4, and C5 respectively. However, there was a significant increase in WL drop-off rate in recent cohorts. (24.69 vs 29.5 vs 32.14 vs 32.69 vs 37.78 100 person-years.) Moreover, there was no significant improvement in ITT survival. One-year ITT survival was 70.29%, 70.30%, 68.15%, 69.52%, and 70.76% in C1, C2, C3, C4, and C5 respectively.

Conclusions: Although post-liver transplant survival rate has been improving significantly, WL drop-off rate has been increasing. In addition, despite the DRI for discarded organs being stable throughout the past 10 years, the discard rate has been rising. These outcomes may be the result of centers avoiding high-risk transplants aiming to increase the post-transplant survival. The effect of new liver allocation policy has yet to be determined.

CITATION INFORMATION: Matsumoto R., Halazun K., Emond J., Samstein B., Brown Jr. R., Dove L., Kato T. Evaluation of Increasing Liver Discard Rate and Waiting List Drop-Off in Post-MELD Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Matsumoto: None. **K. Halazun:** None. **J. Emond:** None. **B. Samstein:** None. **R.S. Brown Jr.:** None. **L. Dove:** None. **T. Kato:** None.

Abstract# 1155

Survival Adult Liver Transplantation: Experience in a Latinoamerican High Complexity Center. 15 Years with More Than 500 Transplants

C. A. Murcia, N. Ramirez, M. E. Ramos, C. Benavides, J. Rivera, G. Mejia, *Transplant Unit, Fundación Cardioinfantil, Bogotá, Colombia*

Purpose: Liver disease is one of the main causes of chronic disease morbidity and mortality in the world and liver transplantation is the only curative intervention once patients reach the terminal stage. We describe the experience our center during 15 years of performing liver transplantation in adults. Our objective was to carry out a descriptive analysis of our population, as well as a survival analysis that allowed us to compare ourselves with international standards.

Methods: This is a retrospective report which includes a cohort of adult patients who went into liver transplantation from 2005 to July 2020 at the Fundacion Cardioinfantil. We performed a descriptive analysis evaluating patient survival using the Kaplan Meyer method.

Results: This study included 532 patients, 97% undergoing transplantation with a deceased donor and 3% with a living donor, 50.1% were women and the remaining were men. The mean age at the time of transplantation was 52.3 years. The main indication for transplantation was non-cholestatic cirrhosis, the majority of the patients had a MELD Score less than 15. 6% of the patients were transplanted in acute liver failure. Overall survival was 89.3%, 84.9%, 81.9%, at the 1st, 3rd and 5th year respectively.

Conclusions: Patients undergoing liver transplantation in our center have had satisfactory results comparable with international standards. This is explained by the multidisciplinary work, the experience acquired during more than 15 years, the development and update in surgical techniques, immunosuppression regimens, organ allocation, donor selection, optimization of pre-operative status, and postoperative surveillance.

CITATION INFORMATION: Murcia C., Ramirez N., Ramos M., Benavides C., Rivera J., Mejia G. Survival Adult Liver Transplantation: Experience in a Latinoamerican High Complexity Center. 15 Years with More Than 500 Transplants *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.A. Murcia: None. **N. Ramirez:** None. **M.E. Ramos:** None. **C. Benavides:** None. **J. Rivera:** None. **G. Mejia:** None.

Abstract# 1156

Early Effects of Acuity Circle-Based Liver Allocation During Covid-19 Pandemic in the United States

S. Nagai, T. Ivanics, T. Kitajima, M. Shamaa, M. Lu, S. Yeddula, K. Collins, M. Rizzari, A. Yoshida, M. Abouljoud, *Henry Ford Hospital, Detroit, MI*

Purpose: One month before the COVID-19 pandemic was declared, liver transplant (LT) allocation in the US was updated (February 4th, 2020), by introducing the acuity circle (AC)-based model. This study evaluated the early effects of the AC-based allocation on waitlist outcomes.

Methods: Adult candidates listed between January 1st, 2019, and June 30th, 2020, were evaluated. Two periods were defined according to the listing date (pre- and post-AC), and 90-day waitlist outcomes were compared. Data was censored if none of the events had occurred before the end of the period. The median transplant MELD score of each state was calculated, and states were defined as low-(<25th%ile), mid-(25th-75th%ile), and high-(>75th%ile) MELD regions. In addition, transplanted patients were categorized into 3 groups according to their final MELD score (6-14, 15-28, 29+). Organ sharing and donor characteristics were compared between eras.

Results: 12,546 and 3,932 candidates in pre and post-AC eras were eligible. The post-AC era was associated with significantly lower 90-day waitlist mortality (HR=0.75, 95%CI=0.62-0.90; p=0.002) and higher transplant probability (HR=1.19, 95%CI=1.10-1.29; p<0.001). When outcomes were assessed in each MELD region group, improvement in outcomes was significant in mid-MELD regions, but not in other MELD regions. Among 5,971 and 772 transplanted in the pre and post-AC eras, national sharing significantly increased in all groups (overall: 7.4% to 32.5%, P<0.001). In contrast, a significant increase and decrease in the proportion of donation-after-circulatory-death (DCD)-LT was observed in the low- and mid-MELD regions, respectively. Another subgroup analysis showed that national sharing significantly increased in those with a score of 15-28 (7.6% to 22.1%, P<0.001) and 29+ (5.0% to 39.6%, P<0.001), but not in those with score of 6-14 (15.7% to 22.7%, P=0.11). Patients with a MELD score 15-28 received DCD-LT more frequently in post-AC era, but not in those with a score of 29+. (**Table**).

Conclusions: Despite the COVID-19 pandemic, AC-based allocation improved waitlist outcomes in mid-MELD regions. While other regions had comparable out-

comes, aggressive utilization of DCD might offset possible negative effects of the AC-based model and/or pandemic in low-MELD regions. Organ acceptance practice may be significantly changed in certain regions/patient populations such as DCD acceptance for patients with mid MELD score in lower MELD regions. It is crucial to carefully monitor possible effects of those changes on post-transplant outcomes.

Proportion of DCD-LT in pre and post-AC eras			
	Pe-AC era	Post-AC era	P value
Overall	537/5971 (9.5%)	78/772 (10.3%)	0.48
Low-MELD regions	249/2034 (12.5%)	48/259 (18.8%)	0.006
Mid-MELD regions	222/2704 (8.8%)	18/343 (5.4%)	0.03
High-MELD regions	66/1233 (5.7%)	12/170 (7.2%)	0.45
Patients with MELD 6-14	55/389 (19.6%)	6/22 (35.3%)	0.121
Patients with MELD 15-28	318/2447 (13.9%)	56/267 (21.5%)	0.001
Patients with MELD 29+	74/2286 (3.3%)	11/462 (2.4%)	0.33

CITATION INFORMATION: Nagai S., Ivanics T., Kitajima T., Shamaa M., Lu M., Yeddula S., Collins K., Rizzari M., Yoshida A., Abouljoud M. Early Effects of Acuity Circle-Based Liver Allocation During Covid-19 Pandemic in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Nagai: None. **T. Ivanics:** None. **T. Kitajima:** None. **M. Shamaa:** None. **M. Lu:** None. **S. Yeddula:** None. **K. Collins:** None. **M. Rizzari:** None. **A. Yoshida:** None. **M. Abouljoud:** None.

Abstract# 1157

Liver Transplant Outcomes Using Nationally Allocated Grafts

S. Ohara[1], B. Lizaola-Mayo[2], P. Morgan[2], D. Das[3], J. Wagler[4], K. S. Reddy[2], B. Aqel[2], A. Moss[2], C. Jadlowiec[2], *[1]Valleywise Health General Surgery Residency Program, Phoenix, AZ, [2]Mayo Clinic, Phoenix, AZ, [3]Mayo Clinic Alix School of Medicine, Scottsdale, AZ, [4]John C Lincoln, Phoenix, AZ*

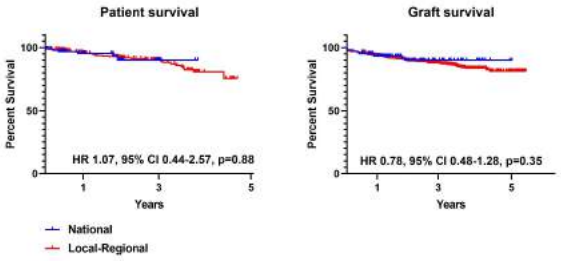
Purpose: There is national variation in acceptance criteria and utilization of livers across transplant centers. Data pertaining to outcomes of liver grafts declined by local and regional centers that go on to be placed nationally remains limited.

Methods: We assessed 617 liver transplants (LT) at our center spanning the years of 2015 through June 2020. Multivisceral and living donor LT were excluded.

Results: During this period, 109 (17.7%) nationally allocated liver allografts were used compared to 508 (82.3%) from local and regional donors. Recipients of nationally allocated livers had lower Model for End Stage Liver Disease (MELD) scores (18.2± 7.1 vs. 22.8±8.6, p<0.0001). A higher percentage of nationally allocated livers came as post-cross clamp offers (29.4% vs. 13.4%, p<0.0001); 14.7% came from donation after cardiac death donors (p=0.18). Cold ischemia time (CIT) was higher for national offers (7.9±1.9 vs. 5.8±1.7, p<0.0001) and a local recovery surgeon was more often utilized (66.1% vs. 38.6%, p<0.0001). There were no differences in hospital length of stay (p=0.89). Early allograft dysfunction (AST>2000) was more common in nationally allocated grafts (p<0.0001) however there were no differences in the rate of primary nonfunction (1.8% vs. 0.6%, p=0.19). There were no differences in patient (HR 1.07, 95% CI 0.44-2.57, p=0.88) or graft (HR 0.78, 95% CI 0.48-1.28, p=0.35) survival.

Conclusions: Despite longer CIT and geographic challenges, outcomes from nationally allocated liver allografts are excellent and comparable to those seen from local and regional donors.

Post-Transplant Outcomes			
	National n=109	**Local-Regional** n=508	***P* value**
ICU LOS, median (days)	1.0	1.0	0.10
Hospital LOS, median (days)	5.0	6.0	0.89
Day 7 T. Bili ≥10 (mg/dL)	5 (4.6%)	26 (5.1%)	0.82
Day 7 INR ≥1.6	4 (3.7%)	17 (3.4%)	0.87
AST >2000 (U/L) first week	58 (53.2%)	258 (25.2%)	<0.0001
Peak AST (U/L)	2974±2341	2969±2439	0.99
PNF	2 (1.8%)	3 (0.6%)	0.19



CITATION INFORMATION: Ohara S., Lizaola-Mayo B., Morgan P., Das D., Wagler J., Reddy K., Aqel B., Moss A., Jadlowiec C. Liver Transplant Outcomes Using Nationally Allocated Grafts *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Ohara: None. **B. Lizaola-Mayo:** None. **P. Morgan:** None. **D. Das:** None. **J. Wagler:** None. **K.S. Reddy:** None. **B. Aqel:** None. **A. Moss:** None. **C. Jadlowiec:** None.

Abstract# 1158

Assessing Liver Transplant Outcomes Utilizing Post-Cross Clamp Offers

K. Pont[1], E. Macdonough[1], D. Das[2], K. Valenti[1], P. Morgan[1], B. Aqel[1], A. Mathur[1], A. Moss[1], K. S. Reddy[1], C. Jadlowiec[1], *[1]Mayo Clinic, Phoenix, AZ, [2]Mayo Clinic Alix School of Medicine, Scottsdale, AZ*

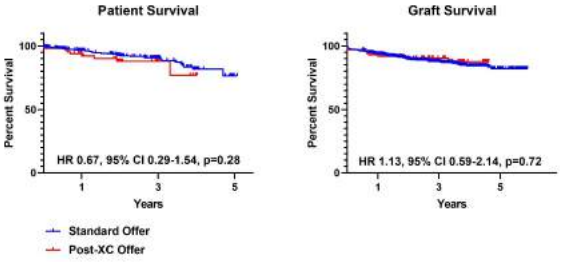
Purpose: With the ongoing organ shortage, there has been increased interest in utilizing post-cross clamp (XC) liver allografts as a means of expanding the donor pool. Limited data exists on the outcomes of these allografts.

Methods: We assessed 613 liver transplants (LT) at our center spanning the years of 2015 through June 2020. Multivisceral and living donor LT were excluded.

Results: During this period there were 101 post-XC LT (16.5%) and 512 standard XC LT (83.5%). There were no differences in recipient age (p=0.46) or sex (p=0.41). Model for End Stage Liver Disease (MELD) scores were lower for post-XC recipients (18.5±8.1 vs. 22.7±8.5, p<0.0001). Post-XC offers came from younger donors (p=0.002), were more likely to be from donation after brain death donors (93.1%, p<0.0001) and be regional (55.4%) or national (31.7%) offers (p<0.0001). Cold ischemia time (CIT) was higher for post-XC LT (p<0.0001). Post-XC grafts were more likely to have moderate-severe steatosis (15.8% vs. 8.8%, p=0.03). There were no differences in recipient hospital length of stay (p=0.71) or incidence early allograft dysfunction between the two groups (Bili ≥10, p=0.63; INR ≥1.6, p=0.32; AST >2000, p=0.35). For post-XC offers, 1-year patient survival was 95.0% versus 95.9% in standard XC offers (HR 0.67, 95% CI 0.29-1.54, p=0.28). One-year graft survival was 93.1% versus 93.2% (HR 1.13, 95% CI 0.59-2.14, p=0.72).

Conclusions: Outcomes utilizing post-XC liver allografts are good. Appropriate recipient selection, dedicated procurement coordinators and preparedness of the surgical teams with anticipation of longer CIT are important variables that allow for the successful utilization of post-XC liver offers.

Post-Transplant Outcomes			
	Standard Offer n=512	**Post-XC Offer** n=101	***P* value**
ICU LOS, median (days)	1.0	1.0	0.64
Hospital LOS, median (days)	6.0	5.0	0.71
Day 7 T. Bili ≥10 (mg/dL)	26 (5.1%)	4 (4.0%)	0.63
Day 7 INR ≥1.6	17 (3.3%)	4 (4.0%)	0.32
AST >2000 first week (U/L)	258 (50.4%)	56 (55.5%)	0.35
Peak AST (U/L)	2937±2407	3099±2485	0.54
PNF	3 (0.6%)	2 (2.0%)	0.15



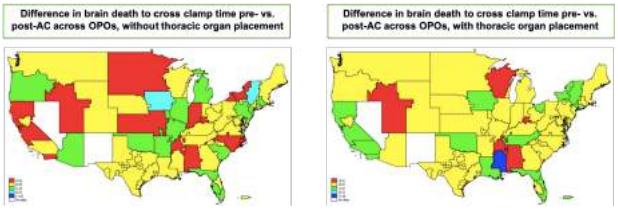
CITATION INFORMATION: Pont K., Macdonough E., Das D., Valenti K., Morgan P., Aqel B., Mathur A., Moss A., Reddy K., Jadlowiec C. Assessing Liver Transplant Outcomes Utilizing Post-Cross Clamp Offers *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Pont: None. **E. Macdonough:** None. **D. Das:** None. **K. Valenti:** None. **P. Morgan:** None. **B. Aqel:** None. **A. Mathur:** None. **A. Moss:** None. **K.S. Reddy:** None. **C. Jadlowiec:** None.

Abstract# 1159

Impact of Liver Acuity Circles on Timing of Donor Procurements

R. Radhakrishnan, D. Goldberg, *University of Miami, Miami, FL*

Purpose: The Acuity Circles (AC) policy in liver transplantation led to broader organ sharing, whereby many organ procurement organization (OPOs) had to coordinate organ offers and donor procurement schedules with a greater number of transplant centers. These changes may have delayed the time from brain death to organ recovery in a variety of ways, including: increased number of possible 'local' recipients, logistics in working with new centers, and logistics of travel to for procuring teams from further away. We sought to evaluate the association between implementation of the AC policy and donor procurement timing (time from brain death declaration to cross clamp).
Methods: Retrospective study using Organ Procurement and Transplantation Network (OPTN)/United Network for Organ Sharing (UNOS) data. We included all brain-dead donors where the liver was transplant and procurement occurred in a donor service area (DSA) with a liver transplant centers. We divided the data into two periods: 8/8/2019-2/3/2020 (pre-AC) and 3/5/2020-8/31/2010 (post-AC), allowing for a 1-month run-in period for centers and OPOs to adjust to the AC policy. We fit multivariable mixed-effects linear regression models (primary outcome: time from brain death declaration to cross-clamp) adjusting for factors associated with donor organ acceptance that may increase time/logistics (e.g., donor age, concurrent thoracic organ placement), and viability (including donor age, BMI, and serum total bilirubin) and performed marginal standardization to calculate the OPO-level measures of time from brain death to cross-clamp pre- vs post-AC.
Results: In multivariable models, the difference in time from brain death-to-cross clamp time for liver donors increased by an average of more than 2 hours after implementation of AC (beta coefficient: 2.17, 95% CI: 1.37, 2.97; p<0.001). The magnitude of the difference in brain death to cross clamp time pre- vs. post-AC varied across OPOs, however the median time increased in every OPO when there was no current thoracic organ placement, and 55/56 OPOs when there was concurrent thoracic organ placement [Figure].
Conclusions: Implementation of the AC policy was associated with significantly increased donor delays, as measured by the timing from brain death declaration to cross clamp. Future research is needed to quantify whether these delays impacted graft outcome, OPO costs, ICU bed utilization, and family perspectives on the donation process.



CITATION INFORMATION: Radhakrishnan R., Goldberg D. Impact of Liver Acuity Circles on Timing of Donor Procurements *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Radhakrishnan: None. **D. Goldberg:** None.

Abstract# 1160

Patient Feedback of a Patient and Family Decision Support Tool for Liver Organ Offer Decisions

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Purpose: For liver transplant candidates on the waiting list, deciding to accept a donor organ with known or potential risk factors can be stressful and can lead to declined offers. Current education for patients and family often takes place during transplant evaluations and can be overwhelming and result in low retention and poor understanding of donor quality. Prior feedback from surgeons and hepatologists (n=20) informed the initial content of a decision support tool for patients and family, including multiple topics to convey concepts about the donor pool, the donor match, the process for reviewing offers, and donor risks. We sought pilot evaluations from transplant coordinators and liver transplant candidates to improve usefulness and relevance.
Methods: Pilot interviews with liver transplant coordinators and candidates included discussions about current patient education and a review of mockups of a decision support tool. Questionnaires collected participant demographics. Mockups included a series of static images representing a website design to prepare patients and family for an organ offer decision. Initial images describe general topics [Figure 1], followed by specific donor types and risks. Interviews were conducted remotely via video streaming, and audio was recorded. Qualitative feedback on graphics, text, and navigation was summarized to inform future development of an interactive tool.
Results: 4 transplant coordinators and 9 transplant candidates participated in pilot interviews for the current development phase. Each interview lasted approximately 1 hour. Feedback on the graphic style was positive and reinforced the benefit of a patient-friendly aesthetic. Participants considered the content an appropriate overview of the donor offer process. Participants had varying views of the offer process prior to reviewing the tool, but consistently reported the review was beneficial. A preferred dissemination strategy was to share with patients after an evaluation as a review when MELD scores suggest an offer is feasible. Mockups were iteratively refined based on feedback.
Conclusions: New decision support tools for offer decisions may address gaps in patient counseling, in particular after evaluations. Stakeholder feedback supports ongoing development of an interactive tool to help patients and family prepare for an offer decision.

Table 1: Patient excerpts from pilot interviews

Prior to review of decision support tool	During or after review of decision support tool
"My understanding is my coordinator will call and tell me that they have a liver waiting for me or they have a match ready, and that's really all I know about that."	"Yeah, that is the big one. You want to have [the review] done ahead of time."
"I would say I would be readily accepting of [an offer] because like I said, I would be pretty sick by the time I got a dead donor."	"I like it. It's well laid out. I really like the illustrations."
"I haven't learned about any kind of risk factors, as far as how it would relate individually to me."	"The writing is simple enough, it's not too packed with information, it's just the basics and it's brief enough, but it covers all the information."
"One thing that never occurred to me is the possibility of informed that there's a liver available and then being told ... that there might be some risk... And then I would have to decide whether or not to accept, whether the benefits outweigh the risk. And the idea of having to make that decision had never crossed my mind until just now."	"I'm terrible in the moment asking questions... because my brain kind of freezes up. And so this is good, I like this [practice offer] concept a lot."
"I feel a lot of mixed feelings about it, which translate into, for me stress and anxiety."	"I wish I had been told a lot of this because like a lot of my family had questions similar to this for me and I'm just like, 'I don't know; all I know is that we're banking on a living donor and if that doesn't work out then I'm not really sure.'"
	"And for me, I think it's helpful to have it driven home that before an offer is even made, your doctor has looked at this and thinks it's a good idea for you--because I personally put a lot of faith in my doctor"
	"The feeling I get from these pages is that if you need one and you're offered one, you better take it, because you might not get offered again."
	"It has decreased my anxiety and just kind of organized things in my brain, I guess, more."

Figure 1: Example mockup page of decision support tool showing an overview of the donor pool.

CITATION INFORMATION: Schaffhausen C., Chu S., Bruin M., Chinnakotla S., Lake J., Israni A. Patient Feedback of a Patient and Family Decision Support Tool for Liver Organ Offer Decisions *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Schaffhausen: None. **S. Chu:** None. **M. Bruin:** None. **S. Chinnakotla:** None. **J. Lake:** None. **A. Israni:** None.

Abstract# 1161

Liver Transplantation with Super Obese Donors (BMI≥50) Grafts: An Acceptable Pathway to Expand the Donor Pool. Analysis of the OPTN/UNOS Liver Transplant Registry

P. Vargas[1], C. Argo[2], H. Zachary[2], M. Stotts[2], N. Intagliata[2], P. Northup[2], J. Oberholzer[1], S. Pelletier[1], N. Goldaracena[1], *[1]Transplant Surgery, University of Virginia Health System, Charlottesville, VA, [2]Gastroenterology and Hepatology, University of Virginia Health System, Charlottesville, VA*

Purpose: We aimed to analyze the impact of donor body mass index (BMI) on recipient morbidity and survival following liver transplantation (LT).
Methods: The UNOS-STAR database was queried to identify adult patients undergoing LT from 2010-2019. Records of recipients and donors <18 years, donors with BMI <18, transplants before 2010, split-LT, living donors LT, DCD and multi-organ transplants were excluded from the analysis. Graft outcomes were analyzed by univariate analyses. Graft and patient survival were assessed by Kaplan-Meier curves.
Results: 45,721 patients were identified. Of these, 45,300 patients received a graft from a donor with BMI<50 (BMI<50 group) and 421 from a super obese donor (BMI≥50 group). Recipients median (IQR) age (57 (51-63) vs 58 (52-64), p=0.11) and BMI (28.1 (24.6-32.4) vs 29 (25.5-33.3), p=0.43) were similar in the donor BMI<50 group vs donor BMI≥50 group, respectively. Proportion of males among groups were significantly higher in the donor BMI≥50 group (79.1% vs 67.4%, p=<0.001). Donor mean age was significantly higher in the donor BMI≥50 group

(47 (38-55) vs 44 (30-56), p=<0.001). By definition donor BMI was significantly higher in the donor BMI≥50 group (54.1 (51.7-57.6) vs 27.1 (23.8-31.4), p=<0.001). Proportion of donor males were significantly higher in the BMI<50 group (59.0% vs 24.9%, p=0.001). The percentage of liver biopsy performed was significantly higher in the BMI≥50 group (83.4% vs 41.5%, p=<0.001). Among those with liver biopsy, the median (IQR) of reported percentage of macrosteatosis was 10% (4-20) in the donor BMI≥50 group vs 5% (0-10) in the donor BMI <50 group, p=<0.001). Macrosteatosis ≥30% was present in 56/339 (16%) in the donor BMI≥50 group vs 1626/17940 (8.6%) in the donor BMI<50 group, p=<0.001. Mean CIT was similar between groups. Median length of stay after LT was significantly longer in the donor BMI<50 group (10 (0-737) vs 9 (0-126) days, p=<0.001). Graft failure, recipient death and re-transplant rates were similar between groups (5.7%, 16.9% and 2.5% for the donor BMI<50 group and 5.7%, 14.7% and 2.6% in the donor BMI≥50 group, respectively, p=0.61). Graft and patient survival at 1-, 3- and 5- year were similar between groups (89%, 79%, 73% vs 88%, 81%, 71%, p=0.83, and 91%, 81%, 75% vs 91%, 83%, 71%, p=0.87, in the donor BMI <50 group vs donor BMI≥50 group, respectively).

Conclusions: The use of grafts from super obese donors can safely expand the organ pool in selected recipients. Grafts from super obese donors should not be rule out based solely on their BMI and biopsy of these grafts might play an important role in the decision-making process.

CITATION INFORMATION: Vargas P., Argo C., Zachary H., Stotts M., Intagliata N., Northup P., Oberholzer J., Pelletier S., Goldaracena N. Liver Transplantation with Super Obese Donors (BMI≥50) Grafts: An Acceptable Pathway to Expand the Donor Pool. Analysis of the OPTN/UNOS Liver Transplant Registry *AJT, Volume 21 Supplement 3*

DISCLOSURES: P. Vargas: None. **C. Argo:** None. **H. Zachary:** None. **M. Stotts:** None. **N. Intagliata:** None. **P. Northup:** None. **J. Oberholzer:** None. **S. Pelletier:** None. **N. Goldaracena:** None.

Abstract# LB 86

Assessing the Impact of the New Liver Allocation Policy on Transplant Center and Organ Procurement Organization Logistics

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Purpose: In February 2020, a new policy for liver allocation was instituted in an effort to reduce geographic disparity in median MELD at transplant. To accomplish this, the use of geographic prioritization based on Organ Procurement and Transplantation Network (OPTN) donor service areas (DSAs) and regions was abandoned in favor of prioritization incorporating acuity circles around the donor hospital. Modelling for acuity circle-based allocation prior to policy implementation demonstrated a significant increase in travel time and travel distance, which may affect the cost of procurement and organ cold ischemia time. The purpose of this study was to assess this impact at our OPO and transplant center.

Methods: A retrospective analysis was performed that included all liver procurements managed by the Louisiana Organ Procurement Association (LOPA) and all liver transplant recipients at Ochsner Health between 1 January 2019 to 12 December 2020. A comparison of logistical considerations pre- and post-policy implementation were evaluated. Differences were determined using Welch t-test in R with a 95% confidence level as the cutoff.

Results: For the study period, a total of 246 livers were allocated by the OPO prior to the change in allocation policy compared to 188 livers after. Based on donor service area, the percentage of livers allocated to local recipients pre-policy change was 73% compared to 51% post-policy (p<0.001). The mean transport distance for livers allocated by the OPO pre-policy was 195 miles compared to 213 miles post-policy (p=0.45). At Ochsner Health, for the same period, 221 liver transplants were performed pre-policy and 148 liver transplants post-policy. Based on donor service area, 53% of recipients received a local donor pre-policy compared to 46% post-policy (p=0.17). The mean transport distance pre-policy was 260 miles compared to 273 miles post-policy (p=0.67). Finally, the mean cold ischemia time for the donor liver was 310 minutes pre-policy compared to 305 minutes post-policy (p=0.49).

Conclusions: Even with modeling to suggest a significant increase in transport distance as a result of the new liver allocation policy, our data suggest that did not occur for our transplant center or for livers allocated to other centers by our OPO. This is despite a significant reduction in the percentage of organs allocated to local recipients. Similarly, we did not observe a change in cold ischemia time for livers transplanted at our center. It is likely that the effect of this policy on transport distance will be highly variable based on transplant center location and the geographic distribution of other centers in proximity. As a result, the burden of increased transport time, increased transport cost, as well as the possibility of increased cold ischemia time will impact transplant centers differently.

CITATION INFORMATION: Sawyer W., Gracon A. Assessing the Impact of the New Liver Allocation Policy on Transplant Center and Organ Procurement Organization Logistics *AJT, Volume 21 Supplement 3*

DISCLOSURES: W.P. Sawyer: None. **A. Gracon:** None.

Abstract# LB 87

Improved Patient Survival in DCD Liver Transplantation

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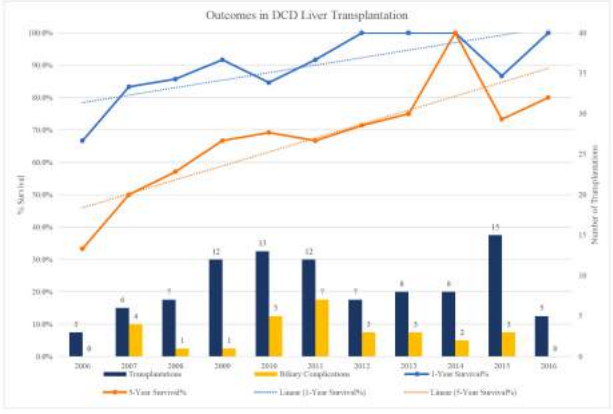
Purpose: We aim to investigate longitudinal outcomes in DCD liver transplantation over a 10-year period and elucidate trends in patient survival, biliary complication rates, and complication severity.

Methods: Our cohort included DCD liver transplantations from 2006 to 2016. Donors that were not type III DCD and re-transplantations were excluded. We collected data on patient and donor characteristics, complication rates and severity up to 1 year post-transplant, and 1- and 5- year patient survival. Patients were separated into high and low complication groups based on comprehensive complication index (CCI), with a high level of complication defined as a CCI above 26.2. Linear and logistic regression and Fisher's exact test were used when appropriate.

Results: Of 1046 liver transplantations conducted between 2006-2016 at our institution, 96 (9.2%) were first time transplantations using type III DCD organs. Transplantation volume trended upwards over time. Donor and recipient characteristics including MELD score did not differ over time. One-year survival trended upwards (p=0.16) and five-year survival significantly improved over time (p=0.04). Complication severity (p=0.21) and biliary complication rates (p=0.45) did not differ over the time period and had no clear trend. (Figure 1) A total of 29 (30.2%) patients had biliary complications following discharge, including 17 (17.7%) patients with ischemic cholangiopathy. Three (3.1%) patients required re-transplantation, with 2 (2.1%) due to ischemic cholangiopathy. The 1- (89.6% vs. 91.0%, p=0.86) and 5-year patient survival (62.1% vs. 73.1%, p=0.28) did not differ between those with and without biliary complications.

Conclusions: These data show that transplantation volume and 1-year survival trended upwards and 5-year survival has significantly improved at our institution. This improvement has occurred without a change in biliary complication rates or overall complication severity, and patients with biliary complications were shown to survive comparably to those without. This suggests that, although biliary complications may occur in a large proportion of patients, current treatments for these complication are effective and the rate of graft failure requiring re-transplantation is low. Our data also may suggest improved peri- and post-operative care, resulting in improved outcomes. Thus, DCD liver transplantation remains a viable option and may continue to comprise a growing number of transplantations.



CITATION INFORMATION: Bushara O., Alhalel J., Azad H., Cerri T., Zafer S., Caicedo J. Improved Patient Survival in DCD Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: O. Bushara: None. **J. Alhalel:** None. **H. Azad:** None. **T. Cerri:** None. **S. Zafer:** None. **J.C. Caicedo:** None.

Liver: Pediatrics

Abstract# 1162

Living Donor versus Deceased Donor Pediatric Liver Transplantation: A Systematic Review and Meta-Analysis of Outcomes

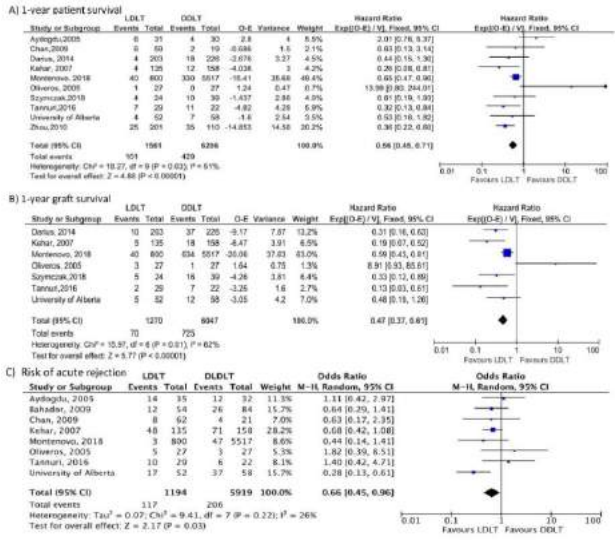
A. Barbetta[1], C. Butler[2], S. Barhouma[2], R. Hogen[1], B. Roque[1], H. Schillperoort[3], G. Meeberg[4], J. Shapiro[5], Y. Kwon[1], R. Kohli[6], J. Emamaullee[1], *[1]Surgery, abdominal transplat, University of Southern California, Los Angeles, CA, [2]University of Southern California, Los Angeles, CA, [3]Norris Medical Library, University of Southern California, Los Angeles, CA, [4]Department of Surgery, University of Alberta, Edmonton, AB, Canada, [5]Department of Surgery,, University of Alberta, Edmonton, AB, Canada, [6]Department of Pediatrics, University of Southern California, Los Angeles, CA*

Purpose: Reduced size deceased donors and living donor liver transplantation (LDLT) can help address the organ shortage for pediatric liver transplant candidates. Concerns regarding technical challenges and the risk of postoperative complications have been raised when using segmental grafts in children, leading to variable practice patterns in utilization of these grafts. We sought to compare outcomes for pediatric LDLT and DDLT via systematic review and meta-analysis.

Methods: A systematic literature search was performed to identify studies reporting outcomes of pediatric (<18 year) LDLT and DDLT published between 2005-2019. Unpublished data from an additional high-volume Canadian center were included. Perioperative and survival outcomes were pooled and compared using fixed- and random-effects models.

Results: Overall, 2518 abstracts were screened, and 10 studies met criteria for inclusion. In total, 1622 pediatric LDLT and 6326 pediatric DDLT patients from four continents were examined. LDLT recipients had superior overall survival when compared to DDLT recipients at 1, 3, and 5-years post-LT [1year HR: 0.56 CI 95% 0.45-0.71, p<0.0001] (Fig 1A). Similarly, LDLT resulted in superior graft survival at all time points post-LT when compared to DDLT [1-year graft survival, HR: 0.47 95% CI: 0.37-0.61, p<0.0001] (Fig 1B). LDLT was associated with higher PELD at LT. There was no difference in the rate of post-LT vascular or biliary complications, while LDLT was associated with lower rates of acute cellular rejection [OR: 0.66 (95% CI: 0.45-0.96), p=0.03] (Fig 1C).

Conclusions: Our global meta-analysis demonstrates that LDLT offers many advantages when compared to DDLT in children and suggests that LDLT should continue to be expanded to optimize outcomes in pediatric liver transplant recipients.



CITATION INFORMATION: Barbetta A., Butler C., Barhouma S., Hogen R., Roque B., Schillperoort H., Meeberg G., Shapiro J., Kwon Y., Kohli R., Emamaullee J. Living Donor versus Deceased Donor Pediatric Liver Transplantation: A Systematic Review and Meta-Analysis of Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Barbetta: None. **C. Butler:** None. **S. Barhouma:** None. **R. Hogen:** None. **B. Roque:** None. **H. Schillperoort:** None. **G. Meeberg:** None. **J. Shapiro:** None. **Y. Kwon:** None. **R. Kohli:** None. **J. Emamaullee:** None.

Abstract# 1163

Immunologic Benefits of Maternal Living Donor Allografts in Pediatric Liver Transplantation: Less Rejection Episodes and No Evidence of De Novo Allosensitization

A. Barbetta[1], G. Meeberg[2], B. Rocque[1], S. Barhouma[3], S. Gilmour[4], F. Faytrouni[5], O. Guttman[5], P. Campbell[4], J. Shapiro[2], J. Emamaullee[1], *[1]Surgery, Abdominal Transplant, University of Southern California, Los Angeles, CA, [2]Surgery, University of Alberta, Edmonton, AB, Canada, [3]University of Southern California, Los Angeles, CA, [4]University of Alberta, Edmonton, AB, Canada, [5]University of British Columbia, Vancouver, BC, Canada*

Purpose: Living donor liver transplantation (LDLT) offers improved graft and patient survival in pediatric liver transplant (LT) recipients. Prior studies have suggested immunological advantage when using maternal living liver donors (LLDs), with less rejection episodes. It is unclear if this benefit extends to reduce risk of developing donor-specific antibody (DSA) and crossmatch positivity among maternal donors and child recipient pairs. The aim of this study was to evaluate immunologic outcomes following pediatric LT, comparing maternal LLD grafts to non-maternal LLD and deceased donor (DD) grafts.

Methods: Children (<18 years) who underwent LT between January 2005-December 2017 at a single, high volume center where retrospective crossmatch is routinely performed were evaluated. Patients were divided in 3 groups according to type of graft received (maternal LLD, non-maternal LLD, and DD). Clinical variables and outcomes were compared using the Fisher exact test for categorical variables and Kruskal-Wallis test for continuous variables. Patient and graft survival were analyzed using the Kaplan-Meier method.

Results: A total of 110 pediatric LT recipients met inclusion criteria. In the study period, 58 (52.7%) children received a DD graft, 34 (10.9%) received non-maternal LLD and 18 (16.4%) received a maternal LLD graft. There were no differences in demographics, PELD, medical status at transplant, ABO compatibility, or crossmatch positivity among the three groups. Children receiving living liver donor graft were less likely to develop rejection when compared to the DD group (DD 71.2% vs Maternal LLD 46.7% vs non-maternal LLD32.4%, p=0.001). Among patients were tested for pre-transplant DSA, 6 DD recipients, 2 maternal and 2 non-maternal LLD recipients had pre-formed DSA. Post-transplant, de novo DSA were identified in 5 DD and 3 non-maternal LLD recipients. No recipients of maternal LLD grafts developed de novo DSA. Only 4 patients had both pre-formed and de-novo DSA, but none of the patients with positive DSA developed antibody mediated rejection. There were no differences in overall patient and graft survival among the three cohorts.

Conclusions: These data support the concept of immunologic benefit of maternal LLD in pediatric LT, with lower rates of rejection and no evidence of allosensitization post-LT. Recipients of maternal LLD grafts be examined as potential candidates for immunosuppression minimization and withdrawal protocols

CITATION INFORMATION: Barbetta A., Meeberg G., Rocque B., Barhouma S., Gilmour S., Faytrouni F., Guttman O., Campbell P., Shapiro J., Emamaullee J. Immunologic Benefits of Maternal Living Donor Allografts in Pediatric Liver Transplantation: Less Rejection Episodes and No Evidence of De Novo Allosensitization *AJT, Volume 21 Supplement 3*

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Abstract# 1164

Post Pediatric Liver Transplant Immunosuppression: What's the Caregivers' Perspective?

I. D. Batsis[1], J. C. Bucuvalas[1], E. Eisenberg[2], J. Lau[2], S. Feng[3], E. Perito[4], *[1]Pediatric Hepatology, Mount Sinai Hospital, NY, New York, NY, [2]Patient and Family Engaged Partners, SPLIT, New York, NY, [3]Pediatric Transplant Surgery, UCSF, San Francisco, CA, [4]Pediatric Hepatology, UCSF, San Francisco, CA*

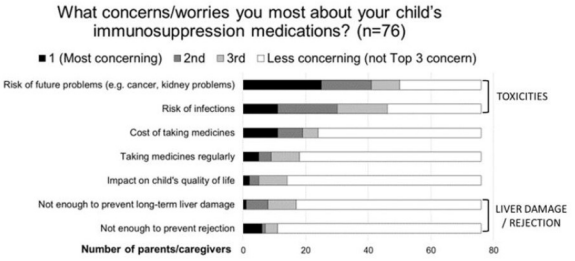
Purpose: For children with liver transplants (LT), achieving an "ideal outcome" is a balancing act: too little immunosuppression (IS) begets graft injury; too much IS begets systemic toxicities. Our aim was to delineate the patient/family perspective on this critical tightrope.

Methods: A brief, 13 question survey (English) was sent to parents/guardians of children who had LT at <18yo via patient advocacy group listservs (Society of Pediatric Liver Transplant, Starzl Network for Excellence in Pediatric Transplant) and social media (Facebook, Twitter). Caregivers were asked to prioritize their top concerns; rate their level of concern/level of certainty about IS complications and rejection from 1 (not concerned or completely uncertain) to 10 (extremely concerned or absolutely certain).

Results: 76 caregivers responded. Children had LT at 0-2y (77%), 3-11y (16%), 12-18y (7%). At survey, median recipient age was 4y (IQR 2-9y; range 0-22y); 73% were currently receiving IS monotherapy. Caregivers' top concerns about IS were related to IS toxicity and infection risk (FIG). 46% were more concerned about IS complications than rejection, vs only 17% more concerned about rejection than IS toxicity; 37% were equally concerned. Among caregivers of children receiving IS monotherapy, more worried about IS toxicity than rejection, 48% expressed equal

concern for both. Caregiver's level of concern about rejection was higher for children on more than 1 (28%) vs 1 IS agent (72%): median (IQR) scores of 85 (61-100) vs 70 (47-90); p=0.07. Time since LT (0-4yrs vs >4yrs) was not associated with concern level for rejection or IS complications. Caregivers were significantly more certain that their child's IS regimen was correct to prevent rejection than mitigate IS toxicity: scores of 90 (70-100) vs 65 (40-87); p<0.005. Neither time since LT nor number of IS medications were associated with caregivers' certainty levels.

Conclusions: Caregivers of children with LTs are more concerned that IS risks toxicity than rejection. In parallel, they are more certain that IS dosing is appropriate to prevent rejection than to avoid toxicity. In the integrated, patient-centered model of active patients/caregivers and receptive clinicians, understanding the caregiver perspective in long-term IS management is critical and can help guide management toward ideal outcomes, as caregiver priorities and concerns may differ from their providers.



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Abstract# 1165

Developmental Characteristics and Haemodynamics After Pediatric Donor to Adult Recipients in Liver Transplantation

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Purpose: The developmental characteristics and hemodynamics of pediatric liver allografts transplanted into adult recipients remain unclear and deserve exploring.

Methods: Records from adult recipients undergoing liver transplantation between January 2015 and December 2019 who received whole grafts from pediatric (<14 years, Experimental group) or adult (18-35 years, Control group) donors were reviewed.

Results: The study comprised 312 subjects, divided between the pediatric (n = 67) and adult donor (n = 245) groups. The 1, 3 and 5-year recipient survival rates were 87.3%, 83.3%, and 83.3% in the pediatric group, and 88.6%, 85.7%, and 85.7% in the adult group. One adult recipient receiving a pediatric allograft developed small-for-size liver syndrome (SFSS) post-transplantation. There was no difference in the incidence of portal vein thrombosis, biliary complications, primary graft non-function, or prolonged cholestasis between the two groups. As expected, the recipients in the pediatric group had a lower graft-to-recipient weight ratio (GRWR) (1.16±0.32) and graft weight (GW)/ estimated recipient liver weight (ERLW) (0.73±0.23) than the adult group (2.25±1.70, 1.45±0.40, p<0.01). Evaluation at 1 year from transplant demonstrated that the recipient's right hepatic oblique diameter, diameter of main portal vein (DPV) and resistance index (RI) were not significantly different between the two groups (P>0.05). The velocity of the main portal vein (VPV) and velocity of Hepatic artery (VHA) in the pediatric group was almost always higher than the adult group throughout the first year of transplantation, but eventually all returned to normal range.

Conclusions: The pediatric donor liver can be successfully used in adult recipients with well-matched conditions. There were no significant differences in postoperative hemodynamics and the grafts developed and functioned normally.

CITATION INFORMATION: Chen M., Xiaohong L., Xitao H., Zhitao C., W. J. Developmental Characteristics and Haemodynamics After Pediatric Donor to Adult Recipients in Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Chen: None. L. Xiaohong: None. **H. Xitao:** None. **C. Zhitao:** None. **J. W.:** None.

Abstract# 1166

Portal Vein Challenges in Pediatric Liver Transplantation: The Utility of Interposition Grafts as an Acceptable Management Strategy

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Purpose: To examine our single center experience in the operative management of pediatric liver transplantation (LT) patients with challenging portal vein (PV) anomalies.

Methods: We retrospectively reviewed the records of LTs performed at Children's Hospital Los Angeles from 2004-2020. The incidence of portal vein thrombosis (PVT), atresia (PVA), and hypoplasia (PVH), operative management, and post-operative outcomes were noted. The Yerdel classification was used to classify PVT. We analyzed survival outcomes using a Kaplan-Meier estimator.

Results: From 2004-2020, 330 pediatric LTs were performed. 22 patients (7%) had PVT (4 grade 1, 10 grade 2, 2 grade 3, 5 de-novo intra-operative, 1 unclassified), 1 (0.3%) patient had PVA, and 11 (3%) patients had PVH. The prevalence of PVT and PVH was highest in patients with BA followed by hepatoblastoma (Figure 1). 10 of 11 PVHs and one case of Abernathy malformation (PVA) were managed with a cadaveric external iliac vein interposition graft (CVG). 15 of 22 PVTs (1/4 grade 1, 8/10 grade 2, 2/2 grade 3, 3/5 de-novo) were managed with CVG. The remainder of the PVTs were managed with thrombectomy. One CVG was performed for a short PV. There was no statistically significant difference in post-operative PV complications (11% (3/27) vs. 0% (0/8); p = 1.00), re-operation for bleeding (3.7% (1/27) vs. 12.5% (1/8); p = 0.41), or LOS (30 vs. 36 days; p = 0.77) between the patients managed with CVG and those without. There were no post-operative PV complications observed in living donor grafts. Median follow up was 1381 days. There was no statistically significant difference in graft or patient survival between patients managed with CVG and those without (Figure 2).

Conclusions: PVT, PVA, and PVH can present as challenging cases in pediatric LT. A primary construct with or without thrombectomy should be utilized when amenable. However, many circumstances arise when thrombectomy is inadequate or the native vessel itself is of critically small caliber. As we have shown, such instances can safely and successfully be managed utilizing a CVG with excellent outcomes.

Figure 1: Patient Characteristics:

	CVG	No CVG	p-value
Patients	27	8	
Mean age (yr)	4.8	7.3	0.39
Mean weight (kg)	18.4	22.3	0.64
Mean lab PELD	15	13	0.75
Biliary atresia	14	2	0.24
Hepatoblastoma	5	3	0.35
Budd Chiari	1	0	
Primary sclerosing cholangitis	1	1	
Congenital Hepatic Fibrosis	1	1	
Abernathy malformation	1	0	
Other	4	1	
Portal Vein Anomaly			0.22
PVT	15	7	
Grade 1	1	3	
Grade 2	8	2	
Grade 3	2	0	
De novo	3	2	
Unclassified	1	0	
PVA	1	0	
PVH	10	1	
Short portal vein	1	0	
Living donor graft	8	2	1.00
Left lateral segment	8	0	
Left lobe	1	1	
Right lobe	0	1	
Deceased donor graft	18	6	1.00
Left lateral segment	13	2	
Whole allograft	5	4	

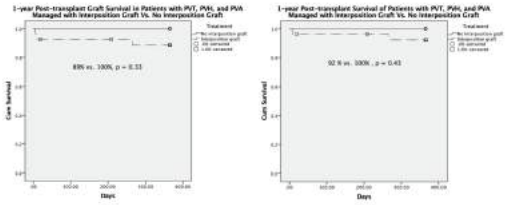

Figure 2: 1-year Post-transplant Graft and Patient Survival in Patients with PVT, PVH, and PVA Managed with CVG vs. No CVG

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Abstract# 1167

Adults Undergoing First Time Liver Transplantation with Biliary Atresia: An Analysis of the United Network for Organ Sharing Database

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Purpose: Although biliary atresia (BA) is the most common indication for liver transplantation in children, there is no published data on outcomes for individuals who survive into adulthood with their native liver. In order to better counsel this subset of patients as they transition from pediatric to adult care, we utilized national transplant registries over a 16-year period to characterize waitlist and post-transplant outcomes.

Methods: We conducted a retrospective analysis of all candidates on the United Network for Organ Sharing (UNOS) waitlist from February 2002 until September 2018 listed for first liver transplant with a primary diagnosis of BA, and with transplant occurring after the candidate's 18th birthday. We performed a 5:1 propensity matched analysis for recipients with other chronic liver diseases.

Results: Over the 16-year range of the study, 283 individuals met criteria for inclusion for the analysis. 26 (9.2%) died on the wait list, and 158 (55.8%) were transplanted. The remainder were still listed at time of analysis or removed for no longer requiring transplant. Median age at end-event was 24.8 years. Individuals who died on the waitlist had higher MELD scores, fewer exceptions, and were over-represented by Black and Hispanic race. The majority of candidates transplanted in adulthood for BA were in their 3rd decade of life and waited for a transplant more than 3 years on average. 8% had a TIPS in place and more than 5% had a co-diagnosis of hepatocellular carcinoma. Post-transplant outcomes were comparable to individuals with BA transplanted in childhood and with adults on the waitlist with cholestatic liver disease.

Conclusions: Patients surviving into adulthood with BA and their native liver may require transplantation beyond the 2nd decade of life. The majority of these transplants are occurring at or after a transition of healthcare teams and healthcare coverage. Despite these challenges, post-transplant graft and survival outcomes are excellent.

CITATION INFORMATION: Hsu E., Perkins J., Horslen S., Dick A., Blondet N., Reyes J. Adults Undergoing First Time Liver Transplantation with Biliary Atresia: An Analysis of the United Network for Organ Sharing Database *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Hsu: Grant/Research Support; Name of Commercial Interest; Abbvie. Grant/Research Support; Nature of Relationship; Research Support. **J. Perkins:** None. **S.P. Horslen:** None. **A.A. Dick:** None. **N.M. Blondet:** None. **J.D. Reyes:** None.

Abstract# 1169

Clearance of Viral RNA and DNA and Antibody Response Following Administration of Live Attenuated Measles and Varicella Vaccines in Children with Chronic Liver Disease

S. Kemme[1], A. Weinberg[2], A. G. Feldman[1], *[1]Children's Hospital Colorado, Denver, CO, [2]University of Colorado Denver, Denver, CO*

Purpose: Guidelines recommend waiting four weeks between live vaccine administration and transplantation; however, there is little data to support this waiting period and it often results in delay in transplantation, passage on an optimal organ, or foregoing the opportunity to vaccinate. The purpose of this project is to 1) define the time post-vaccination at which measles and varicella viruses become undetectable in the blood of children with liver disease and 2) determine whether children with chronic liver disease awaiting transplant mount a protective immune response to live vaccines.

Methods: 6 children with chronic liver disease were enrolled and demographic and clinical information were collected. Viral PCRs for measles and varicella were measured weekly for four weeks post-vaccines. Antibodies (Ab) were measured pre-vaccine and again four weeks post-vaccines.

Results: 6 children (2 with Biliary Atresia, 2 with Alagille Syndrome, 1 with PFIC, and 1 with undefined cirrhosis) received live vaccines between 6-13 months of age. All patients cleared measles and varicella by two weeks post-vaccines. A majority of children mounted a protective antibody response against measles and varicella. (Table 1)

Conclusions: In this pilot study, no children with chronic liver disease were viremic for measles or varicella beyond two weeks post-vaccination and a majority mounted a protective antibody response. This suggests the four week waiting interval between vaccines and transplant may be unnecessary.

Table 1: PCR and Antibody Results

Subject # (Age at Vaccination)	#1 (12 mo)	#2 (11 mo)	#3 (6 mo)	#4 (13 mo)	#5 (13 mo)	#6 (12 mo)
Measles PCR	Pos wk 1; Neg wks 2-4	Neg wks 1-4	Neg wks 1-4	Neg wks 1-4	Pos wk 1; Neg wks 2-4	Pos wk 1; Neg wks 2-4
Varicella PCR	Pos wk 2; Neg wks 1, 3, & 4	Pos wk 1; Neg wks 2-4	Neg wks 1-4	Neg wks 1-4	Neg wks 1-4	Neg wks 1-4
Measles Ab Pre-Vaccination	Not yet available	Not protected	Not protected	Not protected	Not protected	Not yet available
Measles Ab Post-Vaccination	Not yet available	128 EU/mL	136 EU/mL	117 EU/mL	73 EU/mL	Not yet available
Varicella Ab Pre-Vaccination	Not yet available	Not protected	Not protected	Not protected	Not protected	Not yet available
Varicella Ab Post-Vaccination	Not yet available	2.49	2.25	1.07*	1.67	Not yet available

* VZV antibody ≥ 1.1 index value indicates immunity, 0.9-1.1 index value is equivocal

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DISCLOSURES: S. Kemme: None. **A. Weinberg:** None. **A.G. Feldman:** None.

Abstract# 1170

Outcomes After Abo Incompatible Pediatric Liver Transplantation are Comparable to Abo Identical/compatible Transplant

C. Lemoine, K. Brandt, R. Superina, *Division of Transplant and Advanced Hepatobiliary Surgery, Ann & Robert H. Lurie Children's Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL*

Purpose: In order to evaluate if the incidence of vascular and biliary complications as well as patient and graft survival in ABO incompatible (ABOi) liver transplant (LT) are comparable to ABO compatible/identical (ABOc) LT, we reviewed our institutional experience with ABOi LT, comparing the early and modern eras of our program, and then comparing ABOi LT outcomes to those after ABOc LT.

Methods: A retrospective review of all patients who received an ABOi LT at our institution was performed (1997-2020). Two eras were created for comparison (early: 1997-2008, modern: 2009-2020). A pair-matched comparison was also done with patients who received an ABOc LT at our institution (matching criteria: transplant year, age and PELD score/status at transplant, indication for LT). Independent t-test, Chi-square test, and Kaplan-Meier survival curves were used for statistical analysis ($p<0.05$ considered significant).

Results: 17 patients (9 female) received 18 ABOi LT (3 retransplants). Median age at transplant was 7.4 months (1.1-28.9). At the time of LT, 66.7% patients (12/18) were listed as status 1 (status 1 before 2002, or status 1A or 1B after 2002). The 6 other patients had a median PELD score at transplant of 36.5 (27-48). Hepatic artery thrombosis (HAT) occurred in one patient (5.6%), there were 2 cases of portal vein thrombosis (PVT) (11.1%), and 4 biliary complications (22.2%). Patient and graft survival improved in the ABOi modern era, although not significantly: early patient survival, 5/8, 62.5% vs. modern 8/9, 88.9%, (p=0.20), and early graft survival, 5/8, 62.5% vs. modern 8/10, 80.0%, (p=0.41). In the pair-matched comparison, frequency of complications was similar (HAT: ABOi 1/18, 5.6% vs. ABOc 3/18, 16.7%, p=0.29; PVT: ABOi 2/18, 11.1% vs. ABOc 4/18, 22.2%, p=0.37; biliary complications: ABOi 4/18, 22.2%, vs. ABOc 1/18, 5.6%, p=0.15). Overall patient (ABOi 13/17, 76.5% vs. ABOc 14/17, 82.4%, p=0.62) and graft (ABOi 12/18, 66.7% vs. ABOc 13/18,

72.2%, p=0.72) survival were also similar. Patient and graft survival was 100% in the non-status 1 ABOi patients, compared to 67% (p=0.11) and 58% (p=0.063) respectively for ABOi patients who were status 1.

Conclusions: ABO incompatible liver transplants in children < 1-year of age and high PELD scores have excellent outcomes and should be used routinely. Status 1 infants have similar patient and graft survival and complication rates to ABO compatible or identical transplants. ABO incompatible transplants should be utilized more frequently in order to prevent deaths on the waiting list or deterioration of children with high PELD scores.

CITATION INFORMATION: Lemoine C., Brandt K., Superina R. Outcomes After Abo Incompatible Pediatric Liver Transplantation are Comparable to Abo Identical/compatible Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Lemoine: None. **K. Brandt:** None. **R. Superina:** None.

Abstract# 1171

Thrombotic and Hemorrhagic Complications Associated with Postoperative Anticoagulation After Pediatric Liver Transplantation

C. Lemoine, K. Brandt, R. Superina, *Division of Transplant and Advanced Hepatobiliary Surgery, Ann & Robert H. Lurie Children's Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL*

Purpose: In order to determine the efficacy of post-liver transplant (LT) anticoagulation protocols in reducing the occurrence of arterial thrombosis (HAT) and other vascular complications in children, we compared the rate of thrombotic complications after LT and the incidence of bleeding complications associated with both prophylactic and therapeutic post LT anticoagulation protocols.

Methods: A retrospective review of our prospectively collected LT database was performed over a 5-year period (2014-2018). At our institution, heparin is used in all patients after LT but therapeutic dosing is used only when a patient has had a thrombotic event during or after LT or had less than ideal hepatic artery or portal venous flow at the end of the LT. Results were compared between prophylactic (Ppx) vs. therapeutic (Tx) heparin groups. Independent t-test and Chi-square test were used for statistical analysis ($p<0.05$ considered significant).

Results: 69 patients received 73 LT. Median age and weight at LT were 2.3 years (40 days-18.9 years) and 13.4 kg (3.3-88.9). The Ppx protocol was used in 52/73 (71.2%) LT. Heparin was stopped in 10/52 patients in the Ppx group (19.2%) due to bleeding compared to 8/21 (38.1%) in the Tx group (Ppx vs. Tx, p=0.090). Within the first 72 hours after LT, the blood transfusion requirements were similar in both groups (Ppx 25.5±42.3 cc/kg vs. Tx 37.0±43.2 cc/kg, p=0.30). The number of patients requiring massive transfusion within 72 hours post LT was not significantly different (Ppx 4/52 7.7% vs. Tx 4/21 19.0%, p=0.16). Patients from the Tx group were taken back to the operating room (OR) more frequently for complications related to bleeding (Ppx 7/52, 13.5%, vs. Tx 10/21, 47.6%, p=0.002). Patients in the Ppx group were taken back to the OR for bleeding significantly sooner after LT (Ppx 1.7±1.6 vs. Tx 4.2±2.0 days, p=0.015). Overall, 4/73 transplants had HAT (5.5%): 1/52 (1.9%) in the Ppx vs. 3/21 (14.3%) in the Tx group (p=0.036). 3 HAT occurred in patients already on Tx protocol due to concerns with hepatic artery flow or thrombosis at the time of LT. Portal vein thrombosis (PVT) occurred in 5 occasions (5/73, 6.8%). All PVT occurred in patients from the Tx group (Ppx 0/52, 0%, vs. Tx 5/21, 23.8%, p<0.001). There were no hepatic venous outflow obstruction events. Median follow-up was 2.3 years (15 days-5.6 years). Overall patient (Ppx 96.2% vs. Tx 95.2%, p=0.86) and graft (Ppx 92.3% vs. Tx 81.0%, p=0.16) survival were not statistically different between groups.

Conclusions: The use of an anticoagulation protocol after pediatric liver transplantation was associated with a low rate of hepatic artery and portal vein thrombosis. Therapeutic anticoagulation was associated with more bleeding complications, but without adversely affecting patient or graft survival.

CITATION INFORMATION: Lemoine C., Brandt K., Superina R. Thrombotic and Hemorrhagic Complications Associated with Postoperative Anticoagulation After Pediatric Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Lemoine: None. **K. Brandt:** None. **R. Superina:** None.

Abstract# 1172

Perivenular Fibrosis After Pediatric Liver Transplant

J. Lew, S. Cho, S. Feng, E. R. Perito, *UCSF, San Francisco, CA*

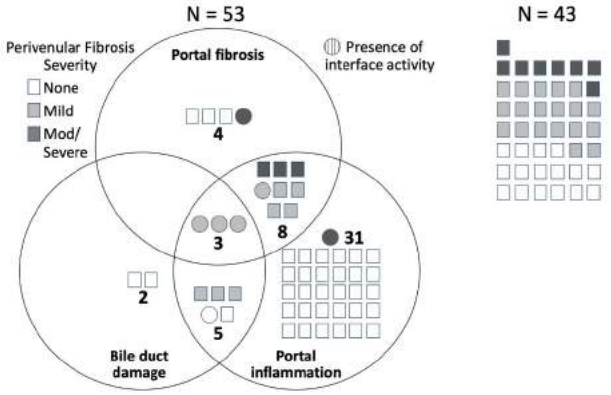
Purpose: Graft fibrosis is a concerning long-term complication after pediatric liver transplant (LT) and though perivenular (PV) fibrosis is common, its likelihood of progression and clinical significance are unclear; we seek to investigate PV fibrosis prevalence and both clinical and histologic associations.

Methods: We conducted a single-center, retrospective, cohort study of children (0-18 years at LT) who had undergone surveillance liver biopsies (2006-2020). Biopsies were reviewed and scored for 15 features according to a standardized protocol by 2 pathologists. PV fibrosis was scored as 0, none; 1, mild; or 2, moderate/severe.

Results: We reviewed 96 children (56% male; 49% biliary atresia; 55% partial grafts; 31% living donors) who underwent 118 surveillance biopsies; 22 had 2 biopsies. First biopsy was done at median (IQR) 8.7 (5.1-13.4) years after LT with ALT 27 (20-41) U/L and GGT 15 (12-32) U/L; 43%, 44%, and 13% showed no, mild, and moderate/severe PV fibrosis. Neither PV fibrosis presence nor severity was associated with donor or graft type, bile duct damage, portal inflammation or portal fibrosis (FIG). The 22 paired biopsies were separated by median 4.6 (3.0-5.5) yrs. PV fibrosis regressed for 8 and progressed for 5. Among regressors 3, 3, and 2 had increased, stable, and reduced immunosuppression, respectively. Among progressors, 1, 2, and 2 had increased, stable, and reduced immunosuppression, respectively. No progressors had portal fibrosis or interface activity on either biopsy, nor vascular or biliary complications between biopsies.

Conclusions: PV fibrosis is present in the majority of pediatric LT surveillance (normal liver tests) biopsies but is most commonly mild and remains stable over time. PV fibrosis is not associated with histologic features of rejection. Longitudinal study of sequential biopsies is needed to understand the causes and impact of PV fibrosis, and to inform its impact on long-term immunosuppression management.

FIG: Perivenular Fibrosis in Pediatric LT Surveillance Biopsies



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DISCLOSURES: J. Lew: None. **S. Cho:** None. **S. Feng:** None. **E.R. Perito:** None.

Abstract# 1173

Peripheral Lymphocyte Profiling and Increased Risk of EBV Infection in Pediatric Liver Transplant Recipients

V. M. Novara Gennuso[1], T. Miloh[2], *[1]Pediatrics, Miller School of Medicine-University of Miami, Miami, FL, [2]Pediatrics, Miami Transplant Institute, Miami, FL*

Purpose: Epstein-Barr virus "EBV" infection and post-transplant lymphoproliferative disorders "PTLD" are significant comorbidities in the post-transplant "PT" setting, especially in pediatrics. The synergy among T cell subpopulations (e.g. CD4+ T-helpers, CD8+ T-cytotoxic) modulates immune response. The rationale behind this study was to assess whether peripheral lymphocyte subtype analysis of different subsets was associated with increased risk of EBV infection in children PT.

Methods: Between Feb 2010 and Jan 2020, 174 patients received a liver transplant "LT". 39 of these patients (22.4%) had lymphocyte subset profiling at some point. These patients were reviewed 3 months before positive EBV status or 2 months after positive EBV status. EBV positivity was defined as plasma PCR levels >158 copies/mL. EBV PCR was checked monthly in the first year PT, every 3 months in the second year PT, and annually after the third year PT. Reactivation was designated as IgG positive at time of LT, and new viral infection, as IgG negative at time of LT. Statistical significance of values was obtained using the regression analysis tool in Microsoft Excel by comparing the average of peripheral lymphocyte profiles of positive EBV and non EBV patients.

Results: 8/39 patients who met inclusion were EBV positive (20.5%). 7 (87.5%) had reactivation, and 1 had new viral infection. The average time from LT to positive EBV was 3.9 years. The average age at LT was 1.2 years for positive EBV patients in comparison to 3.4 years for non EBV patients. Indications for LT: 3 had diagnosis of Biliary Atresia, 2 Ornithine Transcarbamylase deficiency, 1 Graft failure, 1 Maple Syrup Urine disease, and 1 Crigler-Najjar syndrome. All EBV positivity led to decreased immunosuppression. There was no PTLD noted. Lymphocyte profiling is shown in Table 1. Overall, EBV positive patients had lower circulating T cells (68.7%), higher B cells (20.9%) and Natural Killer cells (9%). CD4 T Helper lymphocytes were higher in positive EBV patients (31.4%). The CD4/CD8 ratio cells were the highest in positive EBV patients (1.7) and lowest in non EBV patients (1.2). ($P<.001$ Table 1).

Conclusions: CD4 T Helper lymphocytes were higher in positive EBV and the CD4/CD8 ratio was significantly higher during active EBV infection and reactivation. Therefore, the risk of concomitant rejection is lower and decreased immunosuppression is well tolerated. Future larger controlled studies are needed to validate these findings and may offer development of non-invasive markers to diagnose EBV infection.

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DISCLOSURES: V.M. Novara Gennuso: None. **T. Miloh:** None.

Abstract# 1174

Paired Surveillance Biopsies Over >4 Years from a Multi-Center Cohort of 78 Long-Term Pediatric Liver Transplant Recipients

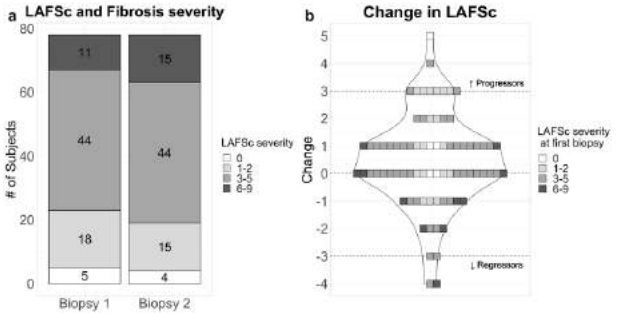
E. R. Perito[1], E. Persyn[2], J. Bucuvalas[3], J. E. Squires[4], M. Martinez[5], S. Mohammad[6], A. J. Demetris[4], S. Feng[1], *[1]UCSF, San Francisco, CA, [2]King's College, London, United Kingdom, [3]Mt. Sinai School of Medicine, NY, NY, [4]U of Pittsburgh, Pittsburgh, PA, [5]Columbia U, NY, NY, [6]Northwestern U, Chicago, IL*

Purpose: Progressive liver fibrosis threatens graft and patient longevity for children after liver transplantation (LT). Previous studies are limited to single-center, cross-sectional analyses. To address this knowledge gap, we examined prevalence of progressive allograft fibrosis in sequential surveillance biopsies from 78 pediatric LT recipients from 11 centers.

Methods: Biopsies from 78 children (43 prospectively, 35 retrospectively, 0 LT for viral or autoimmune hepatitis) assessed by 1 central pathologist; paired biopsies compared side-by-side. Serum ALT and GGT levels were <40 U/L, index biopsy ≥4 yrs after LT, 2nd biopsy ≥4 yrs later. Fibrosis was staged by the liver allograft fibrosis score (LAFSc 0-9; 0 none, mild 1-2, moderate 3-5; severe 6-9) on H&E, trichrome stains. Significant fibrosis progression or regression was defined as LAFSc increase or decrease by ≥3.

Results: Of 78 children, 51 were male, 44 had biliary atresia, 50 had living donors. Index biopsy was done at a median (IQR) 8.2 (5.9-11.6) yrs after LT with 89% on immunosuppression monotherapy, ALT 24 (19-35), GGT 15 (12-22) U/L. Fibrosis was none/mild in 29%, moderate in 56%, and severe in 14%. 2nd biopsy was done a median (IQR) of 4.7 (4.3-5.1) yrs later, at 13.8 (10.9-16.8) after LT, with 91% on monotherapy, ALT 25 (19-37), and GGT 17 (14-28) U/L. The majority (56%) had minimal LAFSc change (-1, 0, +1; FIGURE): 10 (13%) progressed (7 mild to mod) and 4 (5%) regressed (mod to mild). After adjusting for baseline LAFSc, progression was associated with younger age at LT [median (IQR) 0.7 (0.6-1.0) vs. 1.3 (0.6-2.0) yrs; p=0.02] but not with donor/graft type, time from LT to 1st or 2nd biopsy, time between biopsies, or ALT/GGT/inflammation at 1st biopsy. None had biliary or vascular complications. 8 of 10 with progression were on less IS at 2nd biopsy, as were 33% of those with stable/improved fibrosis.

Conclusions: In our multicenter cohort, at 8 and 14 years after LT, only 14% and 19% respectively, of surveillance biopsies showed severe fibrosis. Progression was uncommon, seen in only 13%. This differs distinctly from previously reported cohorts, which may reflect a more modern, tacrolimus-based regimen and the subset of children studied. Our low prevalence of severe or progressive fibrosis suggests that non-invasive fibrosis assessment could be a useful adjunct in long-term monitoring for children with normal transaminases.



CITATION INFORMATION: Perito E., Persyn E., Bucuvalas J., Squires J., Martinez M., Mohammad S., Demetris A., Feng S. Paired Surveillance Biopsies Over >4 Years from a Multi-Center Cohort of 78 Long-Term Pediatric Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: E.R. Perito: ; Alibreo, Shire. **E. Persyn:** None. **J. Bucuvalas:** None. **J.E. Squires:** None. **M. Martinez:** None. **S. Mohammad:** Other; Name of Commercial Interest; Albirieo. Other; Nature of Relationship; Advisory Committee. **A.J. Demetris:** None. **S. Feng:** None.

Abstract# 1175

A Pediatric Liver Allograft with an Occult Urea Cycle Defect Carrier Mutation Causing Delayed Graft Function and Metabolic Crisis After Liver Transplantation

A. Peters, M. Rezvani, C. Prada, K. Campbell, *Cincinnati Children's Hospital Medical Center, Cincinnati, OH*

Purpose: We report an interesting case of delayed graft function following pediatric liver transplantation, which was attributed to previously unrecognized urea cycle carrier genetic defect in the allograft liver.

Methods: This is a retrospective chart review.

Results: A 5 month old African-American female infant with blood type AB+ underwent whole organ ABO-compatible deceased donor liver transplantation for unpalliated biliary atresia. The donor was a 17 month old African-American female infant, blood type A+, with no significant past medical history. The transplant operation itself was uncomplicated and only the skin layer of the abdomen was closed. The recipient was extubated on post-operative day (POD) 1, however, later that day was somnolent and hyperreflexic concerning for hepatic encephalopathy. Laboratory values were concerning for primary nonfunction of the allograft, with ALT 2397, AST 3318, INR 6.68, Ammonia 144, and lactate was normal. The recipient was re-intubated and continuous renal replacement therapy for clearance of ammonia was initiated on POD2-4. The recipient was listed for retransplantation at status 1A for primary nonfunction. However, lab indices slowly improved with ammonia level 36, AST 37, ALT 271, and INR 1.03 by POD6. The recipient returned to the OR on POD 6 for fascial closure. An opportunistic liver biopsy showed steroid effect on hepatocytes, normal liver architecture, mild canalicular cholestasis, and no evidence of hepatocyte necrosis or acute cellular rejection. The recipient's allograft function slowly recovered and she was removed from the transplant list. Due to hyperammonemia despite CRRT, the question was raised regarding a potential urea cycle defect present in the allograft liver. After communicating with the organ procurement organization, DNA was obtained from remaining donor PBMC. Genetic testing for urea cycle defects was performed, which showed that the donor liver carried a heterozygous pathogenic mutation in the *ASL* gene encoding the urea cycle enzyme, arginosuccinase. This enzyme catalyzes the breakdown of arginosuccinate into fumarate and arginine. Individuals who are homozygous for *ASL* mutations have frequent metabolic crises in response to catabolic states including illness and fasting. Carriers can also have crises under extreme metabolic stress. It is thought that the ischemia-reperfusion stress on the allograft liver led to a metabolic crisis in the recipient that masqueraded as primary nonfunction. With supportive care the recipient made a full recovery. LFT normalized and she was discharged from the hospital on POD 39.

Conclusions: When faced with rare complications following liver transplantation including primary nonfunction, metabolic liver disease within the allograft should be considered. Genetic testing on remaining DNA from the donor can confirm the presence of metabolic disease.

CITATION INFORMATION: Peters A., Rezvani M., Prada C., Campbell K. A Pediatric Liver Allograft with an Occult Urea Cycle Defect Carrier Mutation Causing Delayed Graft Function and Metabolic Crisis After Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Peters: None. **M. Rezvani:** None. **C. Prada:** None. **K. Campbell:** None.

Abstract# 1176

Macrosteatosis in the US Pediatric Deceased Liver Donor Population, 2005-2018

J. Purvis, D. Dhall, C. McLeod, S. Sheikh, R. Cannon, K. Frey, J. Locke, B. Orandi, *University of Alabama School of Medicine, Birmingham, AL*

Purpose: The pediatric obesity epidemic is associated with early signs of non-alcoholic fatty liver disease (NAFLD) such as increased hepatic macrosteatosis and liver enzymes. In adults, donor macrosteatosis in liver allografts is associated with graft loss, but this association has not been examined in pediatric donors.

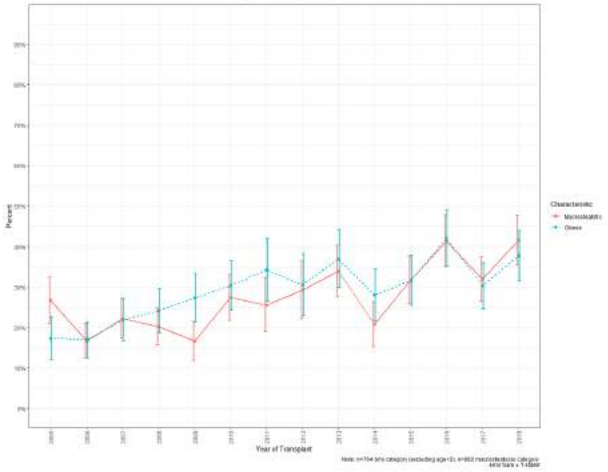
Methods: Our study included all pediatric potential whole liver donors from 2005-2018 who had a liver biopsy in the Scientific Registry for Transplant Recipients (SRTR) (n = 862) and their recipients (n = 862). Macrosteatosis was abstracted from biopsy reports uploaded to DonorNet and compared to values in the SRTR standard analytic file. If the biopsy report was missing, the SRTR value was used. If the two sources differed, the value in the biopsy report was used preferentially. Recipients of pediatric macrosteatotic liver grafts (>5% macrosteatosis; n = 193) were matched 1:1 to recipients of pediatric non-macrosteatotic grafts (<5% macrosteatosis) by propensity score matching on donor and recipient variables. All-cause graft loss was estimated via Kaplan-Meier analysis and a Cox proportional hazards model was fit with adjustment by covariates that remained unbalanced after matching.

Results: From 2005-2018, there was a significant increase in the proportion of biopsied pediatric liver donors with macrosteatosis (26.7% in 2005 and 41.5% in 2018; P < 0.001), consistent with a significant increase in pediatric donor BMI over the study period (Figure 1). Over the study period, the median degree of macrosteatosis among macrosteatotic donors was 10% (IQR 5-30). From 2005-2018, the proportion of biopsied deceased pediatric whole liver donors >2 years old were obese based on BMI percentile for age and sex increased from 17.3% to 37.7% (P = 0.002). On Kaplan-Meier analysis, there were no significant differences in all-cause graft loss

between the two groups at 90 days (stratified log-rank, P = 0.14) or 8 years (stratified log-rank, P = 0.27) post-transplant. A Cox proportional hazards model also showed no significant difference between the groups at 90 days (HR = 0.48; 95% CI = 0.18-1.27) or 5 years (P > 0.05) post-transplant.

Conclusions: Pediatric liver donors between 2005-2018 became more obese with a greater proportion of macrosteatosis. Macrosteatosis did not appear to adversely affect outcomes, but if current trends in obesity and macrosteatosis continue, this might change.

Trend of macrosteatosis and obesity in biopsied pediatric liver donors 2005-2018



CITATION INFORMATION: Purvis J., Dhall D., McLeod C., Sheikh S., Cannon R., Frey K., Locke J., Orandi B. Macrosteatosis in the US Pediatric Deceased Liver Donor Population, 2005-2018 *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Purvis: None. **D. Dhall:** None. **C. McLeod:** None. **S. Sheikh:** None. **R. Cannon:** None. **K. Frey:** None. **J. Locke:** None. **B. Orandi:** None.

Abstract# 1177

Temporal Changes in Renal Function Predict Waitlist Death or Deterioration in Pediatric Liver Transplantation

N. Thalji, L. Thalji, S. Ibrahim, T. Diwan, P. Kamath, J. Heimbach, *Mayo Clinic Rochester, Minnesota, Rochester, MN*

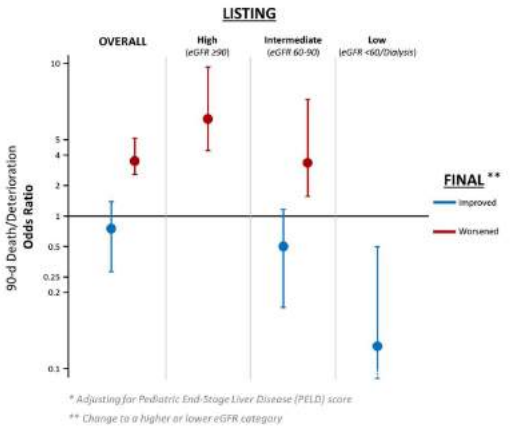
Purpose: Renal dysfunction at the time of listing predicts inferior waitlist outcomes in pediatric liver transplant candidates, independent of the Pediatric End-Stage Liver Disease (PELD) score. We test the hypothesis that temporal changes in post-transplant listing renal function also impact waitlist death or deterioration.

Methods: We studied all pediatric patients <12 years old registered for liver-only transplantation in the United States between Feb 2002-Dec 2018. Status 1A listings were excluded. Patients were stratified into categories of high (eGFR≥90mL/min/1.73m^2), intermediate (eGFR 60-89 mL/min/1.73m^2) or low eGFR (eGFR<60mL/min/1.73m^2 or on dialysis) at transplant registration. Multivariable logistic regression models were used to assess the impact of improving and worsening eGFR on 90-day waitlist death/deterioration.

Results: A total of 4,578 patients met study criteria. Median (inter-quartile) age was 1 (0-3) year, and 50% (2,267) were male. Overall, 80% (3,654) of patients proceeded to transplant, and 6.5% (298) died or deteriorated beyond transplantability. At listing, 80.5% (3,553) had high eGFR, 14.6% (644) had intermediate eGFR, and 4.9% (217) had low eGFR. At waitlist removal, renal function had improved to a higher eGFR category in 7.1% (315) of patients, and 14.9% (658) had worsening of renal function to a lower eGFR category, compared to listing measurements. Adjusting for PELD score, odds of 90-day waitlist death/deterioration markedly increased in patients with worsening eGFR versus those in whom it was unchanged (OR 3.71, 95%CI 2.67-5.16; p<0.001). This was clear in subsets with high (OR 6.41, 95%CI 4.24-9.66) or intermediate eGFR (OR 3.51, 95%CI 1.60-7.69) at transplant listing (both p<0.001). Though a trend toward favorable 90-day outcomes in patients with improved eGFR did not reach significance for the overall cohort, in those with the lowest category eGFR at listing, improvements in renal function were associated with an 8-fold reduction in odds of 90-day death/deterioration (OR 0.13, 95%CI 0.04-0.48; p=0.002). (Figure)

Conclusions: Worsening waitlist renal function independently predicts 90-day death/deterioration in pediatric liver transplant candidates. In those with the lowest eGFR at registration, temporal improvements in renal function were associated with favorable outcome. These data highlight prognostic merits of aggressively managing waitlist kidney dysfunction, while further supporting integration of renal function parameters in the process of liver allocation to pediatric transplant candidates.

Probability of 90d Wait-List Death or Deterioration by Listing and Final Renal Function *



CITATION INFORMATION: Thalji N., Thalji L., Ibrahim S., Diwan T., Kamath P., Heimbach J. Temporal Changes in Renal Function Predict Waitlist Death or Deterioration in Pediatric Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Thalji: None. **L. Thalji:** None. **S. Ibrahim:** None. **T. Diwan:** None. **P. Kamath:** None. **J. Heimbach:** None.

Abstract# 1178

Clinically Evident Portal Hypertension (CEPH) is Associated with Low IGF-1 in Children with Chronic Liver Disease

B. Whitehead[1], S. Mohammad[1], S. Kelly[1], J. Josefson[2], L. Mithal[3], E. M. Alonso[1], *[1]Division of Gastroenterology, Hepatology and Nutrition, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [2]Division of Endocrinology, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, [3]Division of Infectious Disease, Ann and Robert H. Lurie Children's Hospital of Chicago, Chicago, IL*

Purpose: Children with chronic liver disease exhibit growth hormone resistance which is an additional risk factor for sarcopenia and growth failure in this vulnerable population. Low IGF-1 is associated with multiple negative effects including fatigue in other pro-inflammatory states, such as inflammatory bowel disease. Portal hypertension has not yet been studied as a risk factor for low IGF-1.

Methods: Children ages 3 months to 18 years with chronic liver disease were enrolled from an ambulatory clinic at a single center. Patients with comorbidities affecting intestinal inflammation or the growth hormone axis were excluded. Clinical data, nutritional assessmen, and serum samples for IGF-1 were obtained at enrollment. Patients were categorized by the presence or absence of portal hypertension using published criteria for CEPH. IGF-1 Z scores were analyzed as both continuous and dichotomous variable with low IGF-1 defined as Z score < -2. Low mid upper arm circumference (MUAC) was defined as Z score <-1. For children >5 years, both child and guardian completed the PedsQL Multidimensional Fatigue Scale (PedsQL MF) and were compared with a published cohort of 157 healthy children.

Results: 27 patients with median age 12.2 years were enrolled with the most common diagnoses being autoimmune hepatitis/primary sclerosing cholangitis and biliary atresia. 37% (n=10) patients had CEPH. The median IGF-1 Z score was -1.5. Children with CEPH had lower IGF-1 compared to patients without CEPH (p .003). Median height and weight Z scores in our cohort were close to 0 and when tested linearly, had no association with IGF-1. Low MUAC was associated with low IGF-1 (p .036). Median PedsQL MF scores from child and parent proxy were 63.89 and 75.70 respectively. Both were significantly lower compared to healthy children. Low IGF-1 levels were significantly associated with child reported fatigue (p .028).

Conclusions: Children with CEPH have low IGF-1 even in this population of stable patients with preserved linear growth. Lower IGF-1 Z scores are associated with an increased burden of child reported fatigue. Next steps will include measurement of serum cytokines and evaluation of the relationship between a pro-inflammatory state and IGF-1 Z scores.

Table 1

	Median (IQR) N=27	Healthy Children N=157	P Value
Age (years)	12.2 (7.5,14.9)	13.55 (11.88,15.43)	
Female	N=18 (66%)	N=83 (53%)	
Diagnosis	BA N=8 AIH/PSC N=16 Other N=3		
Clinically Evident Portal Hypertension (CEPH)	Yes N=10 (37%)		
Weight Z Score	0.24 (-0.06, 0.74)		
Height Z Score	-0.08 (-0.37, 0.275)		
MUAC Z Score (N=20)	-0.55 (-1.04, 0.11)		
IGF-1 Z Score	-1.5 (-2.4, -0.8)		
Parent Proxy Total Fatigue Score (N=24)	75.70 (56.60, 92.01)	88.89 (79.17,97.22)	.002
Child Total Fatigue Score (N=20)	63.89 (50.34, 79.17)	83.33 (73.61, 91.67)	<.001

CITATION INFORMATION: Whitehead B., Mohammad S., Kelly S., Josefson J., Mithal L., Alonso E. Clinically Evident Portal Hypertension (CEPH) is Associated with Low IGF-1 in Children with Chronic Liver Disease *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Whitehead: None. **S. Mohammad:** None. **S. Kelly:** None. **J. Josefson:** None. **L. Mithal:** None. **E.M. Alonso:** None.

Abstract# 1179

Hepatoportoenterostomy versus Primary Liver Transplantation for Biliary Atresia: A Review of the National Experience

D. Yoeli[1], R. A. Choudhury[1], S. S. Sundaram[2], C. L. Mack[2], J. P. Roach[3], F. M. Karrer[4], M. E. Wachs[1], M. A. Adams[1], *[1]Transplant Surgery, University of Colorado and Children's Hospital Colorado, Aurora, CO, [2]Pediatric Gastroenterology, Hepatology and Nutrition, University of Colorado and Children's Hospital Colorado, Aurora, CO, [3]Pediatric Surgery, University of Colorado, Aurora, CO, [4]Pediatric Surgery, University of Colorado and Children's Hospital Colorado, Aurora, CO*

Purpose: Kasai hepatoportoenterostomy (HPE) followed by liver transplantation (LT) if needed is the standard of care for children with biliary atresia (BA). Some, however, have advocated for primary liver transplantation (pLT) as a superior treatment approach. The aim of this study was to characterize the rate of pLT in the treatment of BA and compare outcomes of pediatric candidates with BA listed for liver transplantation with and without prior HPE using the national Scientific Registry of Transplant Recipients (SRTR)/Organ Procurement and Transplantation (OPTN) database.

Methods: The SRTR/OPTN database was retrospectively reviewed for all children with BA listed for primary liver transplant between March 2002 and December 2017. Candidates were categorized as pLT if they had not undergone previous abdominal surgery prior to listing. A multivariable Cox regression was performed to determine risk for waiting list mortality and post-transplant graft survival.

Results: 3,006 patients with BA were listed for LT during the study period. Only 11% of these candidates had not undergone previous abdominal surgery. Candidates without prior abdominal surgery were younger, smaller, had higher calculated PELD/MELD scores, and were more commonly female, non-White, and without private insurance. Candidates without prior abdominal surgery had higher risk for waiting list mortality (adjusted HR 0.53, 95% CI 0.34 - 0.84, p = 0.007). Among those that successfully underwent LT, there was no significant difference in graft survival by prior surgery status (p = 0.6).

Conclusions: Liver transplant candidates with BA initially treated with HPE had lower risk of death on the waiting list. HPE should remain the gold standard of care for children with BA, followed by LT if needed for progressive disease.

Figure 1. Waiting List Survival (p = 0.001)

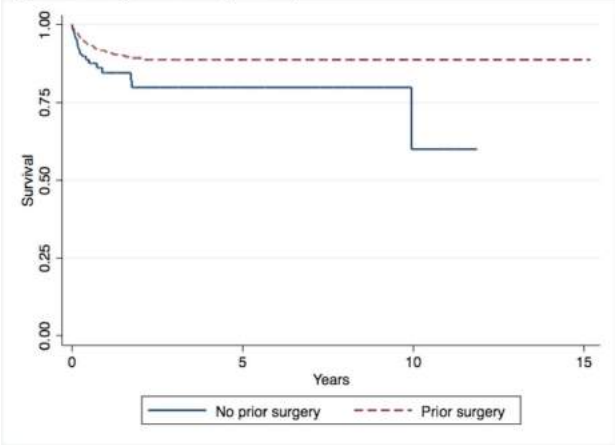


Table 1. Candidate Characteristics at Listing by Previous Abdominal Surgery Status

Mean (SD)/ n (%)	No Previous Abdominal Surgery (n = 327, 11%)	Previous Abdominal Surgery (n = 2,679, 89%)	P-Value
Age, years	1.04 (3.03)	1.72 (3.70)	**0.002**
Weight, Kg	9.73 (10.38)	11.73 (12.45)	**0.005**
Female	215 (66%)	1,587 (59%)	**0.02**
Race/Ethnicity			**0.001**
White	131 (40%)	1,327 (50%)	
Black	77 (24%)	436 (16%)	
Hispanic	65 (20%)	580 (22%)	
Asian	35 (11%)	208 (8%)	
Other	19 (6%)	128 (5%)	
Private insurance	134 (41%)	1,256 (47%)	**0.04**
Calculated MELD/PELD score	14.51 (11.22)	11.55 (10.63)	**< 0.001**
Listing score including exception points			**< 0.001**
≤ 15	166 (51%)	1,686 (63%)	
16-30	120 (37%)	782 (29%)	
> 30	17 (5%)	81 (3%)	
Status 1	18 (6%)	91 (3%)	
TIPS	2 (1%)	13 (1%)	0.7
Mechanical ventilation	4 (1%)	80 (3%)	0.07
Dialysis	2 (1%)	14 (1%)	0.8

SD = standard deviation; MELD = model for end-stage liver disease; PELD = pediatric end-stage liver disease; TIPS = transjugular intrahepatic portosystemic shunt

CITATION INFORMATION: Yoeli D., Choudhury R., Sundaram S., Mack C., Roach J., Karrer F., Wachs M., Adams M. Hepatoportoenterostomy versus Primary Liver Transplantation for Biliary Atresia: A Review of the National Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Yoeli: None. **R.A. Choudhury:** None. **S.S. Sundaram:** None. **C.L. Mack:** None. **J.P. Roach:** None. **F.M. Karrer:** None. **M.E. Wachs:** None. **M.A. Adams:** None.

Abstract# 1180

Impact of Pediatric Living Donor Liver Transplant Center Volume on Waiting List and Post-Transplant Outcomes

D. Yoeli, R. A. Choudhury, H. B. Moore, T. L. Nydam, M. E. Wachs, E. A. Pomfret, M. A. Adams, *Transplant Surgery, University of Colorado School of Medicine and Children's Hospital Colorado, Aurora, CO*

Purpose: The aim of this study was to compare pediatric liver transplant (pLT) waiting list and post-transplant outcomes by center pediatric living donor liver transplant (pLDLT) volume.

Methods: The UNOS database was retrospectively reviewed for all children listed for pLT from March 2002 through December 2017. High pLT volume was defined as ≥ 100, medium volume as 10 - 99, and low volume as < 10 pLT during the study period. High LDLT volume was defined as ≥ 10, low LDLT volume as 1-9, and no LDLT as zero LDLT performed during the study period.

Results: 9,767 pediatric candidates were listed for pLT and 7,136 pLT were performed during the study period, with 928 (13%) pLDLT. 26 centers were high, 37 were medium, and 40 low pLT volume. 23 centers were high pLDLT volume, 33 were low pLDLT volume, and 47 performed no pLDLT. 17 of the 26 (65%) high pLT volume centers were also high pLDLT volume. Upon multivariable Cox regression, high pLDLT volume was significantly protective against waiting list mortality, independent of center pLT volume (adjusted HR 0.78, 95%CI 0.63 - 0.96, p = 0.02). Post-pLT recipient and graft survival was significantly greater at high pLDLT volume centers in comparison to centers with low and no pLDLT volumes (**Figures 1 & 2**).

Conclusions: Pediatric transplant centers with high living donor liver transplants volumes achieve superior waiting list and post-transplant survival outcomes, independent of overall pediatric liver transplant volume.

Figure 1. Recipient survival by pLDLT center volume (p < 0.001)

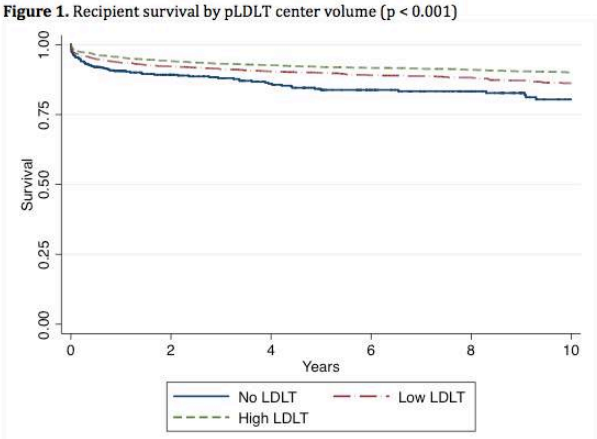
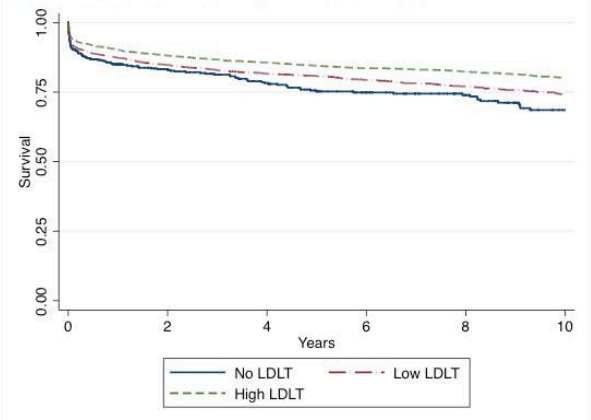


Figure 2. Graft survival by pLDLT center volume (p < 0.001)



CITATION INFORMATION: Yoeli D., Choudhury R., Moore H., Nydam T., Wachs M., Pomfret E., Adams M. Impact of Pediatric Living Donor Liver Transplant Center Volume on Waiting List and Post-Transplant Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Yoeli: None. **R.A. Choudhury:** None. **H.B. Moore:** None. **T.L. Nydam:** None. **M.E. Wachs:** None. **E.A. Pomfret:** None. **M.A. Adams:** None.

Abstract# LB 88

Intestinal Insufficiency May Affect Outcomes After Pediatric Liver Transplantation

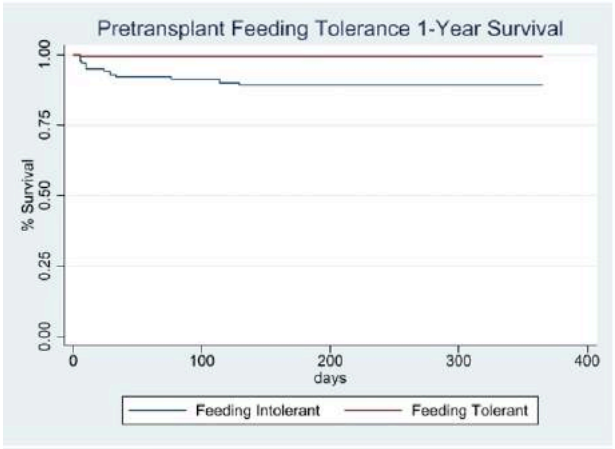
A. K. Batra, M. Desai, J. Yang, K. Cummins, H. Oden-Brunson, H. Ling, S. Beer, J. Goss, N. Galvan, *Surgery, Baylor College of Medicine, Houston, TX*

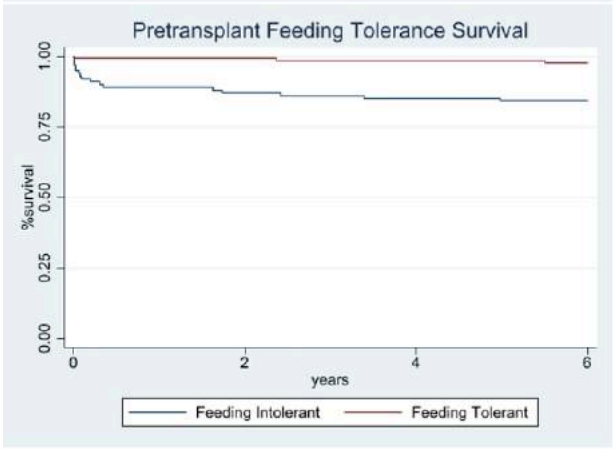
Purpose: The purpose of this study is to determine if pre-transplant feeding intolerance is associated with poorer post-OLT (orthotopic liver transplant) outcomes in pediatric liver transplant recipients, in the setting of limited published literature on the relationship between intestinal integrity and liver transplant outcomes.

Methods: A retrospective cohort study was performed on 248 pediatric patients who received orthotopic liver transplants between 2012 and 2019. 59 variables were collected which included lab values and perioperative complications such as thrombotic events, post-transplant infection, repeat laparotomy, ascites, gastrointestinal bleed (GI), and renal support. Patients were then categorized into feeding tolerant (n=154, n=171 pre- and post-op, respectively) or intolerant (n=94, n=77 pre-op and post-op, respectively) groups, based on several factors including their tolerance of feeds by mouth, tube feeds, or total parental nutrition. Chi-square tests were used to analyze the association between pre-transplant feeding intolerance and each of the outcome variables. Kaplan-Meier survival curves demonstrated 99% and 97% survival at 1 and 6 years in the feeding tolerant group, respectively, and 86% and 79% survival in the feeding intolerant group at 1 and 6 years, respectively.

Results: Bivariate analysis showed that pre-transplant feeding intolerance was significantly associated with post-transplant feeding intolerance, hepatic artery thrombosis, portal vein thrombosis, renal support, prolonged intubation, post-transplant infection, ascites, GI bleed, mortality, at a significance level of .05 for each. Variables that were assessed for association but were not found to be significantly associated include repeat laparotomy and ileus.

Conclusions: The results showed that pre-transplant feeding intolerance is associated with multiple post-transplant abdominal complications such as mortality and post-transplant infection. The implications of this highlights the importance of intestinal integrity reflected as feeding tolerance as a guide to perioperative risk stratification and care.





CITATION INFORMATION: Batra A., Desai M., Yang J., Cummins K., Oden-Brunson H., Ling H., Beer S., Goss J., Galvan N. Intestinal Insufficiency May Affect Outcomes After Pediatric Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.K. Batra: None. **M. Desai:** None. **J. Yang:** None. **K. Cummins:** None. **H. Oden-Brunson:** None. **H. Ling:** None. **S. Beer:** None. **J. Goss:** None. **N. Galvan:** None.

Liver

Liver: Large Data and Artificial Intelligence

Abstract# 1181

Application of Linear Discriminant Analysis (lda) to Differentiate Acute Rejection (ar) and Acute Dysfunction Non-Rejection (adnr) in Liver Transplant Recipients

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Purpose: Blood-based biomarkers distinguishing acute-rejection (AR) from other causes of graft dysfunction (acute dysfunction non-rejection (ADNR)) would have significant clinical applicability in liver transplant (LT) management. However, the high dimensionality of omics data, scarcity of clinical samples and individual diversity in gene expression levels decreases our power to detect disease-specific biomarkers. A logical first step to address these aforesaid issues is performing dimension-reduction and projection of data into a lower dimension space (2D or 3D), reflecting natural clustering of same-class samples. In our work we developed a Linear Discriminant Analysis (LDA) based classifier to differentiate AR and ADNR, using blood gene expression levels in LT patients.

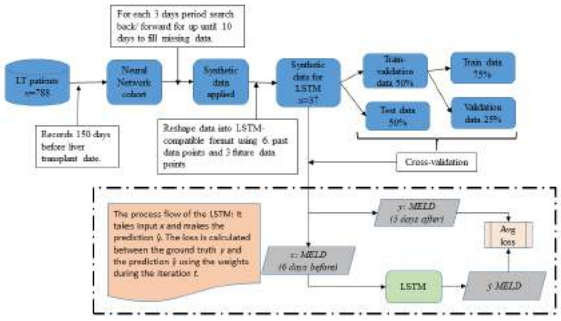
Methods: A commonly used unsupervised technique (PCA), only works when interclass variance is higher than intraclass variance. In our work we used a supervised technique (LDA), which projects data into a lower dimension space and facilitates

grouping of same-category data points. We obtained the gene expression data of 91LT recipients (43 AR, 48 ADNR), from two previously published studies (CTOT14 and Northwestern University biorepository); and a symmetrical uncertainty filter was applied prior to LDA to remove highly correlated probes that destabilize the model. Transcriptome profiles based on whole blood samples were time-matched with biopsy results, whose phenotypes were directly determined from these studies.
Results: We found that supervised methods outperformed unsupervised techniques in our heterogeneous human clinical data. Subsequently, we developed an LDA based classifier to classify AR and ADNR cases in LT recipients with graft dysfunction. The classifier had overall accuracy in the training set of 83.5% (76/91) in leave-one-out cross-validation. Sensitivity was 93.0% (40/43) and specificity was 75.0% (36/48); PPV was 76.9% (40/52), and NPV was 92.4% (36/39).
Conclusions: Our work resulted in a highly accurate classifier to distinguish AR and ADNR; with clinical applications in allowing for non-invasive detection and treatment of AR with higher certainty and safety than current clinical tools.
CITATION INFORMATION: Miller M., Sinha R., Weems J., Holman J., Altrich M., Kleiboeker S., Levitsky J. Application of Linear Discriminant Analysis (lda) to Differentiate Acute Rejection (ar) and Acute Dysfunction Non-Rejection (adnr) in Liver Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: **M. Miller:** Salary; Name of Commercial Interest; Viracor-Eurofins. Salary; Nature of Relationship; Employee. **R. Sinha:** Salary; Name of Commercial Interest; Viracor-Eurofins. Salary; Nature of Relationship; Employee. **J. Weems:** Salary; Name of Commercial Interest; Viracor-Eurofins. Salary; Nature of Relationship; Employee. **J. Holman:** Salary; Name of Commercial Interest; Transplant Genomics. Salary; Nature of Relationship; Employee. **M. Altrich:** Salary; Name of Commercial Interest; Viracor-Eurofins. Salary; Nature of Relationship; Employee. **S. Kleiboeker:** Salary; Name of Commercial Interest; Viracor-Eurofins. Salary; Nature of Relationship; Employee. **J. Levitsky:** None.

Abstract# 1182

Artificial Neural Network Application for MELDNa Prediction

L. Pruinelli[1], M. Nguyen[1], S. Olson[1], J. Zhou[1], J. Schold[2], T. Pruett[1], S. Ma[1], G. Simon[1], *[1]University of Minnesota, Minneapolis, MN, [2]Cleveland Clinic Foundation, Cleveland, OH*
Purpose: The adoption of MELDNa decreased 90-days mortality on patients waiting for liver transplant (LT); however, there are no tools available to predict MELDNa trajectories progression over time. We aim to predict MELDNa for patients at any time on the waiting list based on previous scores; thus, providing additional resources for transplant centers and organ reallocation and provide patients' estimated MELDNa progression. A stacked Long Short-Term Memory (LSTM) was applied to predict the next MELDNa for individual patients.
Methods: A retrospective cohort of patients who underwent LT from 2006 and 2019 was derived from UMN Clinical Data Repository that includes electronic health records from the M Health Fairview. Data includes demographic, medical diagnoses, billed procedures, laboratory results, medications, notes, and flowsheet measures for >2.5 million patients. Cohort selection, data preparation steps, and modeling is shown in the figure below. We build the model by stacking 2 layers of LSTM models. The model' parameters are optimized using Keras Tuner, and performance measured using R^2 and *MSE*. Data management and analysis was performed inside the Minnesota Super Computing using Python 3.0.
Results: The LSTM model has R^2 of 0.64 and *MSE* of 0.03 suggesting current and previous MELDNa scores are able to explain 64% the next MELDNa at a certain point time, with an error between expected and predicted of 3%. Applying LSTM to a given MELDNa of a cohort of patients, we can use the past 6 days MELDNa to predict future 3 days MELDNa scores with reliable accuracy.
Conclusions: In this model, we use optimized numbers to demo model performance and show the potential for MELDNa prediction while on the waiting list. The number of past data points and future data points could be optimized for maximum model performance or pre-selected, depending on practical demands. In the near future, based on the current state (including other factors, such as health status, comorbidities) of the patient, we will be able to optimize a model in a way that can predict how much MELDNa will change and how fast the change will take place with high accuracy. A model able to predict MELDNa over time could influence waiting list management, organ allocation and patient engagement into their own care, while estimating resources allocation and care delivery.



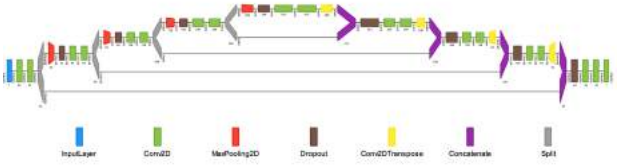
CITATION INFORMATION: Pruinelli L., Nguyen M., Olson S., Zhou J., Schold J., Pruett T., Ma S., Simon G. Artificial Neural Network Application for MELDNa Prediction *AJT, Volume 21 Supplement 3*
DISCLOSURES: **L. Pruinelli:** None. **M. Nguyen:** None. **S. Olson:** None. **J. Zhou:** None. **J. Schold:** None. **T. Pruett:** None. **S. Ma:** None. **G. Simon:** None.

Abstract# LB 84

Deep Learning Based Automatic Liver Volume Estimation and Segmentation via U-net Convolutional Neural Network

B. Marlatt[1], R. Pettit[2], J. Havelka[1], S. J. Corr[3], A. Rana[2], *[1]InformAI, Houston, TX, [2]Baylor College of Medicine, Houston, TX, [3]Houston Methodist, Houston, TX*
Purpose: To create a deep learning model to accurately perform abdominal organ segmentation and volumetric measurements on existing donor and recipient imaging for size matching.
Methods: The U-Net deep learning image processing algorithm has previously demonstrated success at accurately sectioning out relevant features from standardized medical images. We implemented this method to identify the borders of livers used in solid organ transplantation. Using publicly available CT DICOM scan images from the Liver Tumor Segmentation Challenge (2017) and the 3D Image Reconstruction for Comparison of Algorithm Database (2015) consortiums, we accessed and harmonized 151 abdominal computed tomography scans. For each 3D CT scan, a board-certified radiologist had previously annotated the margins of the liver within the abdominal cavity. We split these data into 64% training, 16% validation, and 20% test sets. After training our U-Net system on these data, we measured the accuracy with which the model identified livers using a Sørenson-Dice coefficient, which measures degree of overlap between predictions and the ground truth. After identifying the borders of the liver with U-Net in 3-dimensional voxels, we multiplied the summed voxels contained in the liver by the X and Y dimensions as well as the CT slice thickness to reconstruct a full organ volume estimate.
Results: The U-Net model was trained against the Radiologist sectioned CT liver images contained in the training and validation datasets and performance of the model was evaluated against the test dataset. The U-Net model was able to accurately identify the border of the liver with a Dice coefficient of 0.968 in the validation set. The Dice coefficient represents the degree of predicted versus observed overlap and can be interpreted as a 96.8% overlap accuracy. Our calculated volume estimates differed from the Radiologist identified standard liver tracings with a percent error of 4.54% $\pm$ a standard deviation of 4.49% when testing on the test set.
Conclusions: Precise volume estimation of livers from CT scans is accurate using a U-Net deep learning architecture. Appropriately deployed, a U-Net algorithm is precise and quick, making it suitable for incorporation into the pre-transplant clinician decision making workflow. Side by side recipient and donor volumetric measurements can greatly facilitate size matching and prevent inefficiencies in organ allocation and reduce discard. This is especially important in pediatric populations where size matching can be difficult to estimate.

Figure 1: U-Net convolutional neural network architecture for the segmentation of livers in CT scans. (Image rendered with Net2Vis)



CITATION INFORMATION: Marlatt B., Pettit R., Havelka J., Corr S., Rana A. Deep Learning Based Automatic Liver Volume Estimation and Segmentation via U-net Convolutional Neural Network *AJT, Volume 21 Supplement 3*
DISCLOSURES: **B. Marlatt:** None. **R. Pettit:** None. **J. Havelka:** None. **S.J. Corr:** None. **A. Rana:** None.

Lung: All Topics

Abstract# 1195

BK Virus-associated Nephropathy as a Cause of Renal Failure Post-lung Transplantation

A. Arjuna, M. T. Olson, B. Buddhdev, R. Tenorio, A. Omar, S. Tokman, *Norton Thoracic Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Purpose: BK virus-associated nephropathy (BKVAN) is a common cause of renal dysfunction early after renal transplant. BKVAN is much rarer in non-renal solid organ transplant, where data regarding diagnosis and management is limited. We present 2 cases of renal failure secondary to biopsy-proven BKVAN in lung transplant recipients.

Methods: We reviewed the infectious courses of BK viremia in two bilateral lung transplant recipients from our center: a 59-year-old female transplanted in July 2019 (patient A), and a 76-year-old female transplanted in September 2016 (patient B), both secondary to IPF.

Results: Patient A had an uneventful early postoperative course with preserved renal function (baseline serum creatinine: 0.98 mg/dL) up to 5 months post-transplant while receiving tacrolimus for maintenance immunosuppression and trimethoprim-sulfamethoxazole for *Pneumocystis* pneumonia prophylaxis. At 5 months, an acute rise in serum creatinine (1.42 mg/dL) was observed and attributed to her medication regimen. Despite altering her medications, serum creatinine continued to rise (2.52-3.21 mg/dL). Investigation for infectious causes revealed elevated BK viral loads in plasma (260,000 copies/mL), prompting a renal biopsy which demonstrated tubules staining positive for BK virus with tubulointerstitial fibrosis - consistent with BK-VAN. Leflunomide was initiated with gradual viral clearance. Her serum creatinine has since trended down (2.26 mg/dL), but remains elevated from baseline. Patient B also had an uneventful postoperative course, with stable allograft function through 3 years post-transplant. At 38 months, she was admitted for decline in lung function secondary to *Nocardia* infection requiring prolonged hospital stay. Gradual rise in serum creatinine was observed over the course of the next two months (baseline: 1.6 mg/dL), attributed to medications. Despite altering her regimen, serum creatinine continued to rise (2.34-3.10 mg/dL), prompting investigation that revealed BK viremia (39,000 copies/mL). Renal biopsy findings were consistent with BKVAN, and leflunomide was initiated with gradual viral clearance; serum creatinine remains elevated (2.7 mg/dL) from baseline.

Conclusions: BKVAN can lead to irreversible kidney injury in lung transplant recipients despite reduction in immunosuppression, leflunomide therapy, and reduction in viral load.

CITATION INFORMATION: Arjuna A., Olson M., Buddhdev B., Tenorio R., Omar A., Tokman S. BK Virus-associated Nephropathy as a Cause of Renal Failure Post-lung Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Arjuna: None. **M.T. Olson:** None. **B. Buddhdev:** None. **R. Tenorio:** None. **A. Omar:** None. **S. Tokman:** None.

Abstract# 1196

Antibody-mediated Rejection and Sponge Effect in a Redo Lung Transplant Recipient: A Case Report

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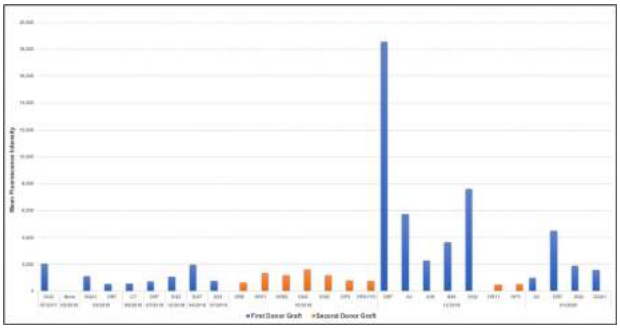
Purpose: Antibody-mediated rejection (AMR) typically presents with elevated titers of circulating donor specific antibodies (DSA) and increased mean fluorescence intensity (MFI), a surrogate marker for antibody titers. However, patients with AMR may rarely have scant DSAs in circulation partly due to the "sponge effect" related to DSAs binding to human leukocyte antigen (HLA) molecules within the lung.

Methods: We report the case of an 18-year-old female lung transplant recipient with cystic fibrosis who ultimately required retransplantation and developed circulating DSA directed toward the first allograft, but detected in circulation only after retransplantation.

Results: Figure 1 depicts the MFI of post-transplant DSA to donor HLA. Two months after primary transplant, the patient developed de novo-DSA requiring monthly intravenous immunoglobulin infusions. Pulmonary function remained otherwise stable through the first post-transplant year, but declined insidiously over the following few months. At 19 months post-transplant, she was admitted for acute hypoxemic respiratory failure, necessitating prolonged hospital stay. Redo bilateral lung transplant was performed at 23 months from the primary operation. Following retransplant, serum DSA analysis showed persistent DSAs to mismatched HLA of both the first and second donor allograft. She was treated for probable AMR, and despite aggressive intervention, succumbed to RAS phenotype CLAD.

Conclusions: The present case draws attention to a rare finding of sponge effect in a patient with AMR leading to allograft failure. We conclude that the absence of circulating DSAs does not rule out AMR. We also postulate that circulating DSAs directed toward a first allograft may drive AMR after retransplant due to cross-reactive epitopes.



CITATION INFORMATION: Arjuna A., Olson M., Tokman S., Walia R., Mohanakumar T., Hashimi A., Smith M., Bremner R., Omar A. Antibody-mediated Rejection and Sponge Effect in a Redo Lung Transplant Recipient: A Case Report *AJT, Volume 21 Supplement 3*

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Abstract# 1197

Impact of Positive Donor Cultures on Postoperative Lung Transplantation Infectious Outcomes

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Purpose: Transmission risk of microbes present in donor lungs at time of donation to lung transplant recipients (LTR) is unclear. Infection is the second highest cause of 30-day (d) mortality, and the first between 30d-1 year after lung transplant (LT). Guidelines for donor derived infections in transplant recommend 7-14d of antibiotics (ABX) in recipients of bacteremic donors. There are limited data assessing transmission of non-blood donor infections and outcomes post-LT.

Methods: We reviewed LTR from 2016-2020 with positive donor cultures from any culture site. Patients were excluded if they had cystic fibrosis, a multiorgan or redo LT, or active infection at time of LT. Protocol post-op ABX included vancomycin and cefepime x7d with extension to 14d if positive donor cultures were reported. Our primary outcome was incidence of *C. difficile* (*C. diff*) and infections due to multi-drug resistant organisms (MDRO) within 90d post-LT. Secondary outcomes included *C. diff* and MDRO by 30d, characterization of transmissions, length of stay, ABX regimens, and 90d mortality.

Results: Of 83 included patients, *C. diff* and MDRO each occurred in 11% (n=9) of LTR within 90d. Donor cultures were 96% bacterial and 94% were derived from lungs/sputum. Immediate organism clearance (organism identified in donor culture but not found in LTR cultures) occurred in 83% of LTR (n=69). Of the donor-derived organisms from the 14 LTR that grew through post-op ABX, all were bacteria and isolated to respiratory infections (RI); *S. aureus* accounted for 71% of detected organisms. No RIs progressed to bacteremia. There were no cases of *C. diff* and 4 cases of MDRO in these positive RI LTR; 2 MDRO were donor-derived. Median duration of post-op ABX was 14d (IQR 11-18) in these positive RI LTR vs 11d (IQR 9-15) in those who demonstrated immediate clearance. Positive RI LTR demonstrated organism clearance after a median of 4d (IQR 3-6). No donor urinary tract or bloodstream infections were transmitted.

Conclusions: While incidence of *C. diff* and MDRO within 90d was low and did not appear to be correlated with ABX duration, LTR may still benefit from decreased ABX duration given immediate clearance did occur in 83% of LTR. Because LTR with donor-derived organisms were able to clear them by 4d, an extended duration of ABX may not be necessary. High rates of *S. aureus* detection may be due to donor colonization presenting as positive assays without apparent disease, and did not appear to affect post-LT outcomes. Our study suggests that extended ABX past 7d may not be necessary in LT patients with gram (+) respiratory cultures or in LT patients with non-respiratory and/or non-bacteremic donor cultures.

Table 1. Baseline Demographics

	LTRs with positive donor cultures (N=83)	LTRs with immediate clearance (n=69)	LTRs positive for donor-derived organism (n=14)
Age, years, median (IQR)	61 (54 – 66)	62 (53 – 66)	58 (55 – 65)
Male, n (%)	52 (63)	43 (62)	9 (64)
Race, n (%)			
Caucasian	55 (66)	43 (62)	12 (86)
African American	16 (19)	15 (22)	1 (7)
Lung transplant indication*, n (%)			
A: obstructive lung disease	26 (31)	20 (29)	6 (43)
B: pulmonary vascular disease	9 (11)	8 (12)	1 (7)
C: infectious lung disease	--	--	--
D: restrictive lung disease	48 (58)	41 (59)	7 (50)
Double lung recipient, n (%)	64 (77)	53 (77)	11 (79)
Induction, n (%)			
Basiliximab	77 (93)	64 (93)	13 (93)
Rabbit anti-thymocyte globulin	6 (7)	5 (7)	1 (7)
Donor culture site, n (%)			
Pulmonary/sputum	78 (94)	64 (93)	14 (100)
Bloodstream	2 (2)	2 (3)	--
Urinary	3 (4)	3 (4)	--
Most common donor culture organisms, n (%)			
Staphylococcus aureus	45 (54)	35 (50)	10 (71)
Streptococcus species	8 (10)	18 (26)	--
Klebsiella species	7 (8)	6 (8)	2 (14)

*per International Society of Heart and Lung Transplant Lung Allocation Score
LTR, lung transplant recipient; IQR, interquartile range

Table 2. Primary and Secondary Outcome Results

	All LTRs with positive donor cultures (N=83)	LTRs with immediate clearance (n=69)	LTRs positive for donor-derived organism (n=14)
Primary Outcomes			
C. difficile infection within 90 days of LT, n (%)	9 (11)	9 (13)	--
Multidrug resistant infection within 90 days of LT, n (%)	9 (11)	7 (10)	4 (29)
Secondary Outcomes			
C. difficile infection within 30 days of LT, n (%)	6 (7)	6 (9)	--
Multidrug resistant infection within 30 days of LT, n (%)	9 (11)	8 (12)	1 (7)
Donor organism detected in LTR, n (%)			
Staphylococcus aureus	10 (71)	--	10 (71)
Methicillin-susceptible *S. aureus*	9 (90)	--	9 (90)
Klebsiella pneumonia	2 (14)	--	2 (14)
Pseudomonas aeruginosa	1 (7)	--	1 (7)
Enterobacter aerogenes	1 (7)	--	1 (7)
Length of stay, days, median (IQR)			
Postoperative ICU	6 (3 – 12)	6 (3 – 12)	5 (4 – 9)
Total hospital	20 (16 – 29)	20 (15 – 29)	23 (17 – 32)
Post-LT antibiotic duration, days, median (IQR)			
Total antibiotics	12 (9 – 15)	11 (9 – 15)	14 (11 – 18)
Gram-negative coverage	11 (9 – 15)	11 (9 – 15)	13 (11 – 17)
Gram-positive coverage	8 (6 – 10)	8 (6 – 9)	6 (5 – 11)
Mortality within 90 days, n (%)	4 (5)	2 (3)	2 (14)
Infectious cause	1 (25)	--	1 (50)
Non-infectious cause	3 (75)	2 (100)	1 (50)

LTR, lung transplant recipient; LT, lung transplant; IQR, interquartile range; ICU, intensive care unit

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Abstract# 1198

Long-Term Renal Outcomes in Lung Transplant Recipients- A Single-Center Five-Year Experience

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Purpose: The increased longevity in Lung transplant (LTx) has led to an upsurge in chronic medical comorbidities, including Acute kidney injury (AKI), Chronic kidney disease (CKD) and End stage renal disease (ESRD). Our research aims to understand the magnitude of the AKI/CKD problem in LTx recipients and its long-term implications over five years.
Methods: We conducted a retrospective chart review of 171 adults with LTx from January 2014 to January 2019 with a follow-up of at least six months. Primary outcomes were prevalence of CKD/ESRD, AKI as a risk factor for CKD, length of stay [LOS] during index hospitalization and association of CKD with cardiovascular morbidity, and all-cause mortality.
Results: A total of 171, 161, 153, 47, and 12 recipients formed the cohort at baseline, six, 12, 36, and 60 months, respectively. Baseline median creatinine was 0.8mg/dL, and eGFR was 90 mL/min/1.73m2. The odds of CKD development in patients with an AKI during index hospitalization versus no AKI was 6.22 [2.87 to 13.06, p-value < 0.0001]. Patients with AKI during index hospitalization had an increased length of hospital stay. The mean difference in length of stay in patients with AKI compared to no AKI was 15.8 +/- 6.6, p-value < 0.0001. The difference between mean tacrolimus trough between AKI and non-AKI was 1.064, but it was not statistically significant (p-value = 0.067). The supratherapeutic tacrolimus levels are an important cause of AKI but might not be the only etiology, and thus the results should be interpreted with caution. The eGFR drastically decreased from transplant, and 94%, 40%, 33%, 21%, and 14% had an eGFR of > 60 mL/min/1.73m2 at baseline, 6, 12, 36, and 60 months, respectively. By six months, 60% [96 out of 161] patients were labeled as CKD, which rose to 86% [10 out of 12] at 60 months. 19% required Renal replacement therapy (16% dialysis and 3% Kidney transplant) by the end of the study. The median number of dialysis treatment was five during index hospitalization but was as high as 203. The odds ratio of all causes mortality in patients with CKD compared to non-CKD was 3.36 [1.44 to 8.64, p-value = 0.005]. In our cohort, 43% of patients have a baseline history of Cardiovascular disease (CVD), and 25% developed new-onset CVD during five years of follow-up. However, there were no increased odds to develop CVD in patients based on CKD [odds ratio 1.2, p-value = 0.63]. Only 15% of CKD patients were being followed by outpatient nephrologists. The diagnostic modalities of CKD like Urinalysis, Urine protein creatinine ratio, renal biopsy, and imaging were poorly utilized.
Conclusions: Our study is the first to evaluate the prevalence and long-term complications associated with CKD post-Lung transplant over a five-year follow-up period. Basic/translational studies to delineate the mechanism of development of CKD and large prospective trials to understand the long-term effect on Lung transplant recipients are warranted.
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DISCLOSURES: M. Doraiswamy: None. **E. Obole:** None. **P. Singh:** None. **T. Pesavento:** None.

Abstract# 1199

A Case-Match Cohort Comparison of the Safety and Efficacy of Basiliximab for Immunosuppression Holiday in Lung Transplant Patients

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Purpose: Post-transplant complications related to calcineurin inhibitors (CNI) maintenance immunosuppression (MI) may require interim alternative therapies. The goal of this study is to evaluate the safety and efficacy of basiliximab (BAS) when CNI MI is held due to adverse effects (AEs) including renal (RT) and hematologic toxicity (HT) compared to a case-match cohort.
Methods: This was a retrospective single-center case-match (CM) analysis of lung transplant recipients (LTR) hospitalized between January 2016 and July 2020, found to have CNI related AEs, comparing LTRs receiving BAS for CNI holiday to those who did not. The primary endpoint was rejection free survival (biopsy-proven or presumed rejection) at 6 months post-intervention for toxicity. Additional endpoints include recovery from CNI toxicity, infection, and progression to bronchiolitis obliterans syndrome (BOS). Toxicity analysis was expressed as degree of recovery.
Results: Forty-four LTRs were included and are described in Table 1. Baseline characteristics were not statistically different. Of LTRs, the BAS group experienced lower rejection free survival (64 % vs 91%) at 6 months, compared to the CM group (p=0.042; Figure 1). The BAS group experienced more infections at 6 months compared to the case-match group (95% vs 82%).
Conclusions: BAS therapy as an interim CNI holiday may lead to improved long-term toxicity recovery, however an increased risk of rejection must be weighed against these benefits.

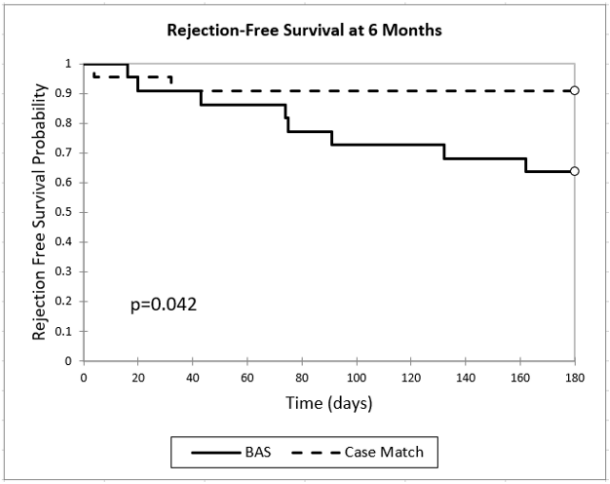
Table 1. Baseline Characteristics and Initial Results

BASELINE CHARACTERISTICS AT TIME OF TOXICITY ADMISSION	BAS	Case Match
Gender – male, n (%)	13 (59)	14 (64)
Race/ Ethnicity		
White	19 (86)	19 (86)
African American	1 (5)	1 (5)
Other[1]	2 (9)	2 (9)
Lung Transplant Indication		
CF[2]	1 (5)	3 (13)
ILD[3]	13 (59)	14 (64)
PAH[4]	2 (9)	0 (0)
COPD[5]	6 (27)	5 (23)
RESULTS	**BAS**	**Case Match**
Toxicity Admission LOS (days)[10]	32 +/- 47#	15 +/- 18
Presenting Toxicity, n (%)		
Nephrotoxicity	14 (64)	14 (64)
Hematologic Toxicity	5 (23)	5 (23)
Nephro + Heme Toxicity	3 (13)	3 (13)
Offending Agent, n (%)		
CNI only	18 (82)	22 (100)
CNI + mTORi	3 (11)	0 (0)
RT Recovery (≥50%)		
At Discharge	11 (65)	11 (65)
At 6 months	10 (59)	8 (47)
HT Recovery (≥50%)		
At Discharge	3 (38)	1 (13)
At 6 months	6 (75)	6 (75)

	BAS	Case Match
Lung Transplant LAS[6]	44.5 +/- 17.04#	42.5 +/- 17.5
Presence of BOS/CLAD[9] (yes)	3 (13)	2 (9)
FEV1 (L)	1.56 +/- 0.85#	2.08 +/- 0.69#
Infection at Time of Toxicity	15 (68)	18 (82)
MI Regimen		
CNI	22 (100)	22 (100)
mTORi	4 (18)	0 (0)
Antiproliferative	8 (36)	5 (23)
Steroids	22 (100)	22 (100)
	BAS	**Case Match**
New BOS at Time of Analysis, n (%)	3 (13)	3 (13)
Level of Care During Toxicity		
ICU	9 (41)	6 (27)
Floor	13 (59)	16 (73)
6-Month All-Cause Mortality, n (%)	9 (41)	7 (32)
Micro-Confirmed Infection	17 (77)	10 (46)
Presumed Infection	4 (18)	8 (36)
No treated Infection	1 (5)	4 (18)
Infection Source		
PNA[12]	13 (59)	9 (41)
IAI[13]	1 (5)	5 (23)
SSTI[14]	1 (5)	2 (9)
UTI[15]	1 (5)	0 (0)
BSI[16]	3 (13)	2 (9)
Viremia	2 (9)	0 (0)

1: Other includes Asian, Hispanic, American Indian, and unknown; 2: Cystic fibrosis; 3: Interstitial lung disease; 4: Pulmonary arterial hypertension; 5: Chronic obstructive pulmonary dysfunction; 6: Lung Allocation Score; 7 Single orthotopic lung transplant; 8: Bilateral orthotopic lung transplant; 9: Bronchiolitis obliterans syndrome/ chronic lung allograft dysfunction; 10; Length of stay; 11: Three patients experienced polymicrobial infections; 12: Pneumonia; 13: Intra-abdominal infection; 14: skin and soft tissue infection; 15: urinary tract infection; 16: Bloodstream infection with unknown source *: Mean +/- standard deviation; #: median +/- interquartile range

Figure 1 Rejection Free Survival at 6 Months



CITATION INFORMATION: Eiting M., Clark J., Astor T., Palafox J., Rogers Marks C., Waldman G. A Case-Match Cohort Comparison of the Safety and Efficacy of Basiliximab for Immunosuppression Holiday in Lung Transplant Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.M. Eiting: None. **J.E. Clark:** None. **T.L. Astor:** None. **J. Palafox:** None. **C. Rogers Marks:** None. **G. Waldman:** None.

Abstract# 1200

Therapeutic Enoxaparin Dosing in Lung Transplant Recipients

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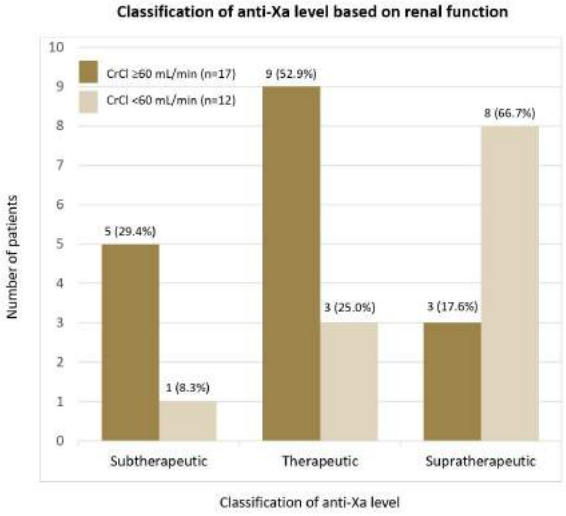
Purpose: Enoxaparin 1 mg/kg subcutaneously every 12 hours for therapeutic anticoagulation is known to increase rates of supratherapeutic anti-Xa levels in lung transplant recipients (LTRs). Since enoxaparin is renally eliminated, this risk may be higher in patients with renal impairment. Our protocol uses enoxaparin 0.8 mg/kg every 12 hours in LTRs. This study aims to evaluate anti-Xa levels using the current protocol and whether these levels are impacted by renal function.

Methods: This single center, retrospective analysis included LTRs from 11/2017-8/2020 who received therapeutic enoxaparin with an anti-Xa level (drawn 3-6 hours post-injection after ≥3 doses). Therapeutic anti-Xa levels were defined as 0.6-1.0 IU/mL. LTRs with creatinine clearance (CrCl) <30 mL/min were excluded. The primary outcome was incidence of therapeutic anti-Xa levels in the cohort. The secondary outcome was incidence of therapeutic anti-Xa levels based on renal function, with renal dysfunction defined as CrCl <60 mL/min.

Results: Of 109 LTRs, 29 were included. The study cohort was median 62[56-66] years old, 78.9[67.1-86.7] kg, 65.5% male, and 48.3% received a double lung transplant. Indications for anticoagulation were venous thromboembolism (79.3%) and atrial fibrillation (20.7%). Twelve (41.4%) had CrCl <60 mL/min. Overall, the mean anti-Xa was 0.85±0.36 IU/mL, with 41.3%, 20.7%, and 37.9% in a therapeutic, subtherapeutic, and supratherapeutic range, respectively. The mean dose among LTRs with and without renal dysfunction was similar (p=0.86), however, the mean anti-Xa in the renal dysfunction group was significantly higher (p=0.005, Table). LTRs with renal dysfunction were more likely to have an anti-Xa in the supratherapeutic range (Figure).

Conclusions: A majority of LTRs did not achieve therapeutic anti-Xa levels on enoxaparin 0.8 mg/kg every 12 hours. This may be attributed to the high incidence of supratherapeutic anti-Xa levels among LTRs with renal dysfunction. A dose reduction in this population may be warranted. Further research is needed to determine the optimal enoxaparin dose in LTRs with renal impairment.

Enoxaparin dosing based on renal function			
	CrCl ≥60 mL/min (n=17)	CrCl <60 mL/min (n=12)	P value
Dose, mg/kg (mean ± SD)	0.78 ± 0.07	0.75 ± 0.11	0.86
Anti-Xa, IU/mL (mean ± SD)	0.70 ± 0.29	1.08 ± 0.34	0.005



CITATION INFORMATION: Finder S., Morrison M., Harrison K., Heeney S. Therapeutic Enoxaparin Dosing in Lung Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Finder: None. **M. Morrison:** None. **K.B. Harrison:** None. **S.A. Heeney:** None.

Abstract# 1201

Lung Transplant Outcomes Based on Immunosuppressive Regimen at Discharge: Data from the US Scientific Registry of Transplant Recipients (SRTR)

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Purpose: There is currently no FDA approved immunosuppressive regimen for lung transplant (Tx) recipients; however, patients routinely receive a calcineurin inhibitor-based regimen. The SRTR database was analyzed to provide real-world evidence of the efficacy and safety of tacrolimus-based immunosuppressive regimens post lung Tx.

Methods: Adult and pediatric recipients of a primary deceased donor lung Tx between January 1, 1999 and December 31, 2017 were followed for 3 years post Tx based on immunosuppressive regimen at discharge: immediate-release tacrolimus+mycophenolate mofetil (MMF), immediate-release tacrolimus+azathioprine (AZA), cyclosporine (CYA)+MMF, or CYA+AZA. The primary outcome was the composite endpoint of graft failure or death (all cause) at 1 year post Tx. Cox proportional hazard models were used to test for baseline characteristics associated with a greater risk of graft failure or death in adults.

Results: Data were available for 26,080 lung Tx recipients (25,355 adults; 725 pediatrics). The most common discharge immunosuppressive regimen was immediate-release tacrolimus+MMF in both groups. Post-Tx outcomes are shown in Tables 1 (adults) and 2 (pediatrics). Adult and pediatric lung Tx patients receiving immediate-release tacrolimus+MMF had a cumulative incidence of graft failure or death at 1 year post Tx of <9% (graft survival >91%) and the lowest rejection rates at 3 years, without increased risk of infection or malignancy. Factors associated with a greater risk of graft failure or death in adults receiving immediate-release tacrolimus+MMF included: recipient age ≥65 years, single lung Tx, hospital stay >24 days, BMI <18.5 kg/m^2, serum creatinine ≥1.0 mg/dL, donor age ≥55 years and donor race (Black). Factors associated with a lower risk of graft failure or death included: age at Tx 35-49 years, recipient race (Black), post-Tx hospital stay ≤14 days and CMV-negative donors. The risk of graft failure or death was significantly greater in adults receiving CYA+MMF or CYA+AZA compared with immediate-release tacrolimus+MMF.

Conclusions: Use of immediate-release tacrolimus+MMF as the discharge immunosuppressive regimen in lung transplant recipients increased substantially from 1999-2017, and was associated with higher 1-year graft survival and numerically lower rates of rejection at 3 years versus CYA+MMF and CYA+AZA.

CITATION INFORMATION: Fitzsimmons W., Erdman J., Wolfram J., Nimke D., Croy R., Wang X., Weaver T., Schladt D. Lung Transplant Outcomes Based on Immunosuppressive Regimen at Discharge: Data from the US Scientific Registry of Transplant Recipients (SRTR) *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Fitzsimmons: ; Astellas Pharma, Inc. **J. Erdman:** Salary; Name of Commercial Interest; Astellas Pharma, Inc. Salary; Nature of Relationship;

Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc. **J. Wolfram:** Salary; Name of Commercial Interest; Astellas Pharma Europe BV. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc. **D. Nimke:** Salary; Name of Commercial Interest; Astellas Pharma, Inc. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc. **R. Croy:** Salary; Name of Commercial Interest; Astellas Pharma, Inc. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc. **X. Wang:** Salary; Name of Commercial Interest; Astellas Pharma, Inc. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc. **T. Weaver:** Salary; Name of Commercial Interest; Chronic Disease Research Group. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc. **D. Schladt:** Salary; Name of Commercial Interest; Chronic Disease Research Group. Salary; Nature of Relationship; Employee. Other; Name of Commercial Interest; Astellas Pharma, Inc. Other; Nature of Relationship; The study was sponsored by Astellas Pharma, Inc.

Abstract# 1202

Textbook Outcome: A Novel Metric in Lung Transplantation Outcomes

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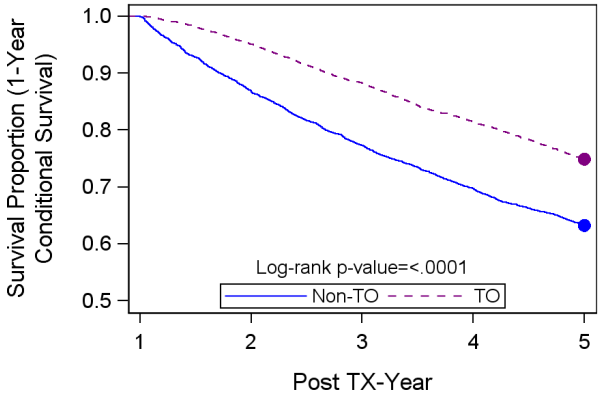
Purpose: Lung transplant programs are typically assessed based on 1-/3-year survival, however other factors such as quality of life, freedom from rejection and oxygen, etc., are important factors to recipients and the health care system. Thus, we defined a "textbook outcome" (TO) for lung transplant recipients as one without major complication as an ideal post-transplant course, and examined the association with long-term survival.

Methods: All primary, adult lung transplants from 5/1/05-12/31/17 were identified with the SRTR dataset. TO was defined as absence of mortality, retransplant, graft failure, dialysis, treated rejection in the 1st year, length of stay <31 days, and no airway dehiscence, post-transplant stroke, or use of oxygen at 1-year, and forced ejection volume at 1 second (FEV1) greater than the 50% predicted at 1 year. Recipient and transplant characteristics were analyzed. Kaplan-Meier analysis with the log-rank test examined long term survival for patients surviving >1 year (conditional survival).

Results: 14,842 patients were identified and 7,319 (49.3%) had a TO. Patients not achieving a TO typically failed to satisfy 2 or more criteria. Characteristics that were significantly associated with TO included white race, not being hospitalized prior to transplant, decreased median ischemic time, or diagnosis of obstructive disease or cystic fibrosis (p<0.01; Table). At 1 year the FEV1 was greater in patients who achieved a TO (81% Predicted) as compared to those who did not (64% Predicted). Conditional survival analysis revealed significantly increased survival at 5 years in patients who achieve TO (p<0.01; Figure).

Conclusions: Textbook outcome is a novel means of examining patient outcomes in lung transplantation and adds further meaning to short term survival, the current standard of success. Given the association of TO with increased long-term survival and an improved FEV1 at 1-year, patients achieving a TO appear to have an increased quantity and potentially quality of life. Further examination and validation of this metric is warranted.



Variable	All Patients (n=14842)	Textbook Outcome (n=7319)	Non-Textbook Outcome (n=7523)	P-Value
Age	59 (49 - 65)	59 (50 - 65)	59 (49 - 65)	0.07
Male sex	8711 (58.7%)	4323 (59.1%)	4388 (58.3%)	0.37
Race				
White	12209 (82.3%)	6121 (83.6%)	6088 (80.9%)	**<0.01**
Black	1361 (9.2%)	575 (7.9%)	786 (10.4%)	
Other	1272 (8.6%)	623 (8.5%)	649 (8.6%)	
Hospitalized Prior to Transplant				
Not Hospitalized	11665 (78.6%)	6231 (85.1%)	5434 (72.2%)	**<0.01**
Hospitalized Not In ICU	1421 (9.6%)	610 (8.3%)	811 (10.8%)	
In Intensive Care Unit	1756 (11.8%)	478 (6.5%)	1278 (17.0%)	
Diagnosis				**<0.01**
Obstructive	4335 (29.2%)	2271 (31.0%)	2064 (27.4%)	
Restrictive/IPF	7969 (53.7%)	3807 (52.0%)	4162 (55.3%)	
Cystic Fibrosis	1924 (13.0%)	1012 (13.8%)	912 (12.1%)	
Pulmonary Hypertension	614 (4.1%)	229 (3.1%)	385 (5.1%)	
Center Volume	493 (288 - 785)	493 (291 - 785)	493 (271 - 810)	0.09
Distance Traveled	126 (19 - 334)	105 (16 - 307)	157 (24 - 351)	**<0.01**
Ischemia time	5.1 (4.0 - 6.2)	4.9 (3.9 - 6.0)	5.3 (4.2 - 6.5)	**<0.01**
Length of Stay (Days)	18 (12 - 35)	13 (10 - 18)	35 (19 - 54)	NA
In Hospital Mortality	1037 (7.0%)		1037 (13.8%)	NA
Postop Dialysis	1312 (8.9%)		1312 (17.6%)	NA
Postop Stroke	466 (3.2%)		466 (6.3%)	NA
Chronic Dialysis at 1 Year	260 (2.0%)		260 (4.4%)	NA
FEV1 at 1 Year	75 (60 - 90)	81 (68 - 95)	64 (48 - 80)	NA

CITATION INFORMATION: Ganapathi A., Whitson B., Mokadam N., Keller B., Logan A., Brock G., Washburn K., Schenk A. Textbook Outcome: A Novel Metric in Lung Transplantation Outcomes *AJT, Volume 21 Supplement 3*

DISCLOSURES: **A.M. Ganapathi:** ; Allergan. **B.A. Whitson:** Consulting Fee; Name of Commercial Interest; Abbott Laboratories. Consulting Fee; Nature of Relationship; Consultant. Other; Name of Commercial Interest; Transmedics OCS. Other; Nature of Relationship; Clinical Events Committee. **N.A. Mokadam:** Consulting Fee; Name of Commercial Interest; Abbott, Syncardia, Medtronic. Consulting Fee; Nature of Relationship; Consultant, Consultant, Consultant. **B.C. Keller:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Advisory Board. Grant/Research Support; Name of Commercial Interest; Care Dx, Breath Therapeutics, Natera. Grant/Research Support; Nature of Relationship; Research Funding, Research Funding, Research Funding. **A. Logan:** None. **G. Brock:** None. **K. Washburn:** None. **A.D. Schenk:** None.

Abstract# 1204

Lung Transplantation After Ex-Vivo Lung Perfusion versus Static Cold Storage: A Single Institution Cost Analysis

S. E. Halpern[1], S. J. Kesseli[2], S. Au[1], M. K. Krischak[1], D. G. Olaso[1], H. Smith[3], G. Tipton[2], I. Jamieson[3], J. C. Haney[2], J. A. Klapper[2], M. G. Hartwig[2], *[1]Duke University School of Medicine, Durham, NC, [2]Surgery, Duke University Medical Center, Durham, NC, [3]Office of Finance, Duke Transplant Center, Durham, NC*

Purpose: Ex-vivo lung perfusion (EVLP) allows for reconditioning of "marginal" lung grafts and extended lung preservation. However, EVLP is costlier than cold storage. We compared perioperative outcomes and index hospitalization costs among matched EVLP and non-EVLP lung transplant (LTx) recipients to explore whether upfront device costs may be offset by reduced postoperative costs.

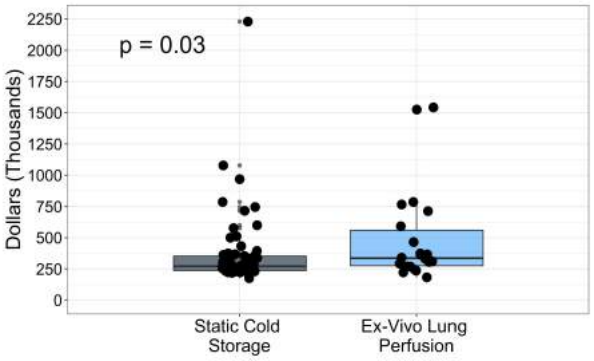
Methods: LTx recipients at our institution who received donor lungs that underwent EVLP were eligible for inclusion. Patients without cost data were excluded. A group of non-EVLP bilateral LTx recipients was matched 1:3 (nearest neighbor) based on age at LTx, disease group, lung allocation score, and history of prior LTx. Perioperative outcomes and index hospitalization costs were compared between EVLP and non-EVLP groups using descriptive statistics.

Results: 22 EVLP and 66 non-EVLP LTx recipients were included. Total preservation time was median 840 vs 415 minutes for EVLP and non-EVLP lungs, respectively (p<0.01). Median EVLP time was 313 minutes. EVLP lungs had lower pre-procurement PaO_2/FiO_2 ratios than non-EVLP lungs (median 334 vs 444, p<0.01) and were more likely to come from DCD donors (27.3% vs 10.6%, p=0.056). Post-LTx ICU stays were longer among EVLP patients; other outcomes were similar between groups (**Table**). Excluding device-specific costs, direct variable and total index hospitalization costs were higher among EVLP vs non-EVLP patients (direct variable: median $200,404 vs $157,852, p=0.047; total: median $336,290 vs $271,306, p=0.03) (**Figure**). EVLP patients incurred higher inpatient pharmacy and diagnostic testing costs than non-EVLP patients, the latter mostly representing bronchoscopies.

Conclusions: In this institutional analysis, EVLP LTx recipients incurred higher index hospitalization costs than non-EVLP LTx recipients. Further investigation is needed to better understand financial implications of EVLP as a facilitator of donor pool expansion and improved logistics in an era of broader lung sharing.

Table. Post-transplant perioperative outcomes stratified by use of ex-vivo lung perfusion.			
Characteristic	Static Cold Storage N = 66	Ex-Vivo Lung Perfusion N = 22	P-value
Reintervention within 30 days	10 (15.2%)	5 (22.7%)	0.4
Surgical	9 (13.6%)	5 (22.7%)	
Interventional radiology or pulmonology	1 (1.5%)	0 (0%)	
Grade 3 primary graft dysfunction at 72 hours	4 (6.1%)	1 (4.5%)	0.8
Post-operative extracorporeal membrane oxygenation	10 (15.2%)	4 (18.2%)	0.7
Extubated in >48 hours	18 (27.3%)	10 (45.5%)	0.08
Tracheostomy within 7 days	10 (15.2%)	5 (22.7%)	0.4
Reintubated during transplant hospitalization	9 (13.6%)	6 (27.3%)	0.1
Renal replacement therapy during transplant hospitalization	8 (12.1%)	5 (22.7%)	0.2
Intensive care unit readmission within 30 days	8 (12.1%)	4 (18.2%)	0.5
Hospital readmission within 30 days	19 (28.8%)	5 (22.7%)	0.6
Post-transplant ICU length of stay (days)	3.00 [2.00, 9.75]	6.00 [4.00, 19.8]	**0.04**
Post-transplant hospital length of stay (days)	20.0 [15.0, 32.8]	27.0 [18.5, 48.0]	0.08
Acute rejection within 30 days	17 (25.8%)	3 (13.6%)	0.2
Mortality within 90 days	2 (3.0%)	1 (4.5%)	>0.9
Presented as median (interquartile range) for continuous variables and frequency (proportion) for categorical variables.			

Figure. Total index hospitalization costs stratified by use of ex-vivo lung perfusion.
Data displayed as median (line) with interquartile range (box).



CITATION INFORMATION: Halpern S., Kesseli S., Au S., Krischak M., Olaso D., Smith H., Tipton G., Jamieson I., Haney J., Klapper J., Hartwig M. Lung Transplantation After Ex-Vivo Lung Perfusion versus Static Cold Storage: A Single Institution Cost Analysis *AJT, Volume 21 Supplement 3*
DISCLOSURES: S.E. Halpern: None. **S.J. Kesseli:** None. **S. Au:** None. **M.K. Krischak:** None. **D.G. Olaso:** None. **H. Smith:** None. **G. Tipton:** None. **I. Jamieson:** None. **J.C. Haney:** None. **J.A. Klapper:** None. **M.G. Hartwig:** Consulting Fee; Name of Commercial Interest; Bridge to Life, Paragonix, Medtronic, Biomedinnovations, Intuitive Surgical. Consulting Fee; Nature of Relationship; Consultant.

Abstract# 1205

Pre-Procurement Cardiac Arrest in Lung Allograft Donors and Effects on Recipient Outcomes

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Purpose: This study seeks to help expand the lung transplant donor pool by demonstrating the safe use of lung allografts from donors who underwent pre-procurement cardiac arrest (PPCA) in the hopes of lowering the high waitlist mortality in lung transplantation.
Methods: This study is a retrospective analysis of 278 lung transplant recipients at a single center from 2013 to 2018. Donor demographics, cause of death, and signs of early lung injury were determined by reviewing original medical records as well as records from the United Network of Organ Sharing. Recipient hospital records were extracted to review recipient demographics and clinical outcomes.
Results: Of the 278 lung transplant recipients included in this study, 120 received lung allografts from donors who experienced PPCA. Donors who underwent PPCA were more likely to have a history of tobacco abuse ($p = 0.001$) and were more likely to be smoking at the time of procurement ($p = 0.007$). There were no significant differences in recipient demographics or intraoperative variables between the two groups. In regard to short-term clinical outcomes, the PPCA group demonstrated shorter median time spent on mechanical ventilation ($p < 0.01$), shorter initial hospital stays ($p = 0.05$), lower rates of postoperative tracheostomy ($p < 0.01$), and a lower chance to be on extracorporeal membrane oxygenation for greater than 48 hours ($p = 0.04$). When comparing the survival of the two groups, recipients with PPCA allografts had better survival at 1-year post-transplant ($p = 0.04$), but there was no significant difference in survival at 3-years ($p = 0.97$) and 5-years ($p = 0.64$). Additionally, Kaplan-Meier analysis showed no difference in mortality between the two groups ($p = 0.35$).
Conclusions: PPCA in the donor does not lead to worse clinical outcomes in lung transplant recipients. Select short-term clinical outcomes and 1-year survival were better in recipients of PPCA donor allografts, and long-term outcomes showed no significant difference between the two groups. Based on the results of this study, lung allografts from donors who suffered PPCA should not be regarded as inherently inferior as they can be used to provide equivalent clinical outcomes in recipients when compared to other donor allografts.
CITATION INFORMATION: Hathaway T., Klipsch E., Roe D., Hage C., Duncan M., Mangus R. Pre-Procurement Cardiac Arrest in Lung Allograft Donors and Effects on Recipient Outcomes *AJT, Volume 21 Supplement 3*
DISCLOSURES: T.J. Hathaway: None. **E.C. Klipsch:** None. **D. Roe:** None. **C. Hage:** None. **M. Duncan:** None. **R.S. Mangus:** None.

Abstract# 1206

Incidence and Risk Factors for Nonmelanoma Skin Cancer in Lung Transplant Recipients

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Purpose: The purpose of this study is to identify the incidence of nonmelanoma skin cancer (NMSC) post lung transplantation and to examine the relationship between risk factors for NMSC and the time to development of NMSC post lung transplantation.
Methods: A retrospective, single center study of lung transplant recipients transplanted between 2000 and 2019 was conducted to compare patients with a diagnosis of NMSC post transplantation (NMSC group) to those that did not develop NMSC post transplantation (control group). Patients were excluded if <18 years, had a previous lung transplant, or received a multi-organ transplant. Continuous and categorical variables were compared using T-tests and Chi-squared tests.
Results: Of the 654 patients that met inclusion criteria (NMSC group=154), 614 were Caucasian, 332 were male, and the mean age at transplant was 57.7 ± 10.4 years. The most common indications for transplant were COPD/emphysema (n=302), IPF/UIP (n=254), and cystic fibrosis (n=47). The incidence of NMSC post lung transplant was 23.5% and the mean time to development of NMSC was 4.89 ± 3.71 years. Risk factors that correlated with development of NMSC included male gender (OR=1.61, p=0.011), Caucasian race (OR=13.8, p<0.001), rejection treatment with T-cell depleting agents (OR=2.08, p=0.001), and history of NMSC prior to transplant (OR=23.5, p<0.001). Cumulative days of exposure to maintenance immunosuppression and antifungal agents were also different between the NMSC and control groups for azathioprine (932 v. 290, p<0.001), mycophenolate (1625 v. 898, p<0.001), sirolimus (870 v. 272, p<0.001), tacrolimus (2429 v. 1296, p<0.001), and voriconazole (157 v. 88, p<0.001). Linear regression analyses were performed to assess the relationship between cumulative days of immunosuppression and the time to development of NMSC. Cumulative days of tacrolimus (569+0.002*[days], R^2=0.674, p<0.001), azathioprine (1456+0.002*[days], R^2=0.195, p<0.001), mycophenolate (1007+0.002*[days], R^2=0.449, p<0.001), and sirolimus (1507+0.002*[days], R^2=0.178, p<0.001) correlated with a faster onset of NMSC post transplantation.
Conclusions: We identified strong predictors for the development of NMSC in lung transplant recipients, as well as the time to development of NMSC. A risk prediction model for the development of NMSC in lung transplant recipients is currently under development based on this large cohort of patients.
CITATION INFORMATION: Holdren G., Lushin E., Duncan M., Hage C. Incidence and Risk Factors for Nonmelanoma Skin Cancer in Lung Transplant Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: G. Holdren: None. **E. Lushin:** None. **M. Duncan:** None. **C. Hage:** None.

Abstract# 1207

Postoperative Tracheostomy as a Predictor of Poor Clinical Outcomes in Lung Transplantation

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Purpose: Tracheostomies are commonly performed postoperatively in lung transplant recipients to provide ventilation for prolonged periods, and with relatively few studies detailing these patients' outcomes and survival as compared to the general recipient population, this study seeks to determine if postoperative tracheostomy is a marker for worse clinical outcomes in lung transplant recipients.
Methods: This is a retrospective analysis of 278 lung transplant recipients at a single center from 2013 to 2018. The original medical records as recorded by the onsite coordinator were reviewed along with records from the United Network of Organ Sharing to determine donor demographics, cause of death, and any evidence of early lung injury. Recipient demographics and clinical outcomes were extracted from hospital records.
Results: Of the 278 patients included in this study, 42 underwent postoperative tracheostomy. Predictors of need for tracheostomy were higher lung allocation scores ($p < 0.001$), recipient hospitalization prior to transplant ($p <0.001$), and higher pre-transplant mean pulmonary artery pressures in recipients ($p = 0.001$). Additionally, patients who required a tracheostomy were more likely to have a delayed surgical closure of the chest ($p < 0.001$) and require over a liter of packed red blood cells intraoperatively ($p < 0.001$). In regard to short-term outcomes, they were more likely to require use of extracorporeal membrane oxygenation for greater than 48 hours ($p < 0.001$), spent longer time on the ventilator ($p < 0.001$), had longer hospital stays

($p < 0.001$), were more likely to require reintubation ($p < 0.001$), and had higher rates of atrial arrhythmias ($p < 0.001$). In comparison to the control group, the tracheostomy group had decreased survival rates at 1-year ($p < 0.001$) and 3-years ($p = 0.01$) but showed no significant difference at 5-years ($p = 0.22$). Kaplan-Meier analysis showed that recipients with postoperative tracheostomies had significantly higher mortality rates as compared to controls ($p = 0.01$).

Conclusions: In this cohort of patients, need for postoperative tracheostomy was associated with more critically-ill patients as well as difficult intraoperative courses. Patients requiring tracheostomy also experienced worse short-term outcomes and decreased survival for the first 3 years after transplant. This data suggests that postoperative tracheostomy could be a predictor of worse clinical outcomes after lung transplantation.

CITATION INFORMATION: Klipsch E., Hathaway T., Roe D., Hage C., Duncan M., Mangus R. Postoperative Tracheostomy as a Predictor of Poor Clinical Outcomes in Lung Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: E.C. Klipsch: None. **T.J. Hathaway:** None. **D. Roe:** None. **C. Hage:** None. **M. Duncan:** None. **R.S. Mangus:** None.

Abstract# 1208

Mortality from Fulminant Myocarditis in Multi-organ Transplant Recipient with Covid-19

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Purpose: Novel coronavirus infection has been rarely described in multi-organ transplantation. This case highlights the poor prognosis associated with cardiac involvement by SARS-Cov-2 in transplantation, despite resolution of respiratory infection.

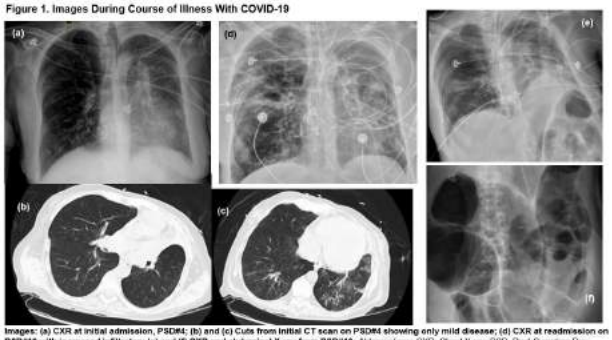
Methods: Case report from retrospective chart review.

Results: The patient is a 48 year old woman with end stage lung and renal disease. In late 2019, the patient underwent a bilateral lung transplant and simultaneous kidney transplant. Postoperative period was noted for multiple readmissions for post-obstructive pneumonia. By early March 2020 she had made a good functional recovery. In late March the patient's husband, who worked as a ride-share driver, developed fevers and cough but continued working. Four days later, the patient developed fevers and a productive cough. This is considered her first day of COVID-19 symptoms. Subsequent days will be referred to as 'post-symptom days' (PSD#). She presented on PSD#4 with a fever of 102.8 F. The patient's COVID test was positive. During her five-day hospitalization, she remained afebrile, and she was weaned off oxygen. Echocardiogram was normal. She continued to do well clinically and was asymptomatic at discharge, with oxygen saturation of 100% on room air.

Two days later (PSD#10), the patient returned with hypoxia requiring intubation. She rapidly went into complete heart block, requiring CPR and cardioversion. Her previously normal LVEF was now 25%, with global hypokinesis. Acute phase reactant levels were markedly elevated. Lab-work indicated acute cardiac, liver and kidney injury, consistent with COVID-19-induced fulminant myocarditis and cardiogenic shock. CXR showed patchy bilateral infiltrates concerning for superimposed bacterial pneumonia. Through PSD#13, she required maximal doses of vasopressors. On PSD#14, we administered IV tocilizumab. She had mild clinical improvement. On PSD#16, she suddenly decompensated, developing atrial fibrillation. X-rays showed dilated loops of bowel with pneumatosis. An emergent bedside laparotomy was performed. Her entire small bowel and colon was ischemic, with extensive necrosis. Shortly after, the patient developed asystole and was pronounced dead.

Conclusions: Inflammatory or hypoxic disruption of myocardial pericytes in COVID-19 can result in microvascular dysfunction and cardiac ischemia which can precipitate heart failure. In the setting of a cytokine storm, this can lead to profound systemic shock and multisystem organ failure, with potentially fatal consequences in transplant recipients.

Figure 1. Images During Course of Illness With COVID-19



Images: (a) CXR at initial admission, PSD#4; (b) and (c) Cuts from initial CT scan on PSD#4 showing only mild disease; (d) CXR at readmission on PSD#10 with increased infiltrates; (e) and (f) CXR and abdominal X-ray from PSD#16; Abbreviations: CXR, Chest X ray; PSD, Post-Symptom Day

CITATION INFORMATION: Mahendraraj K., Kim I., Todo T., Brennan T., Nissen N., Kosari K., Voidonikolas G., Ramzy D. Mortality from Fulminant Myocarditis in Multi-organ Transplant Recipient with Covid-19 *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Mahendraraj: None. **I. Kim:** None. **T. Todo:** None. **T. Brennan:** None. **N. Nissen:** None. **K. Kosari:** None. **G. Voidonikolas:** None. **D. Ramzy:** None.

Abstract# 1209

Creating a Lung Transplant Program Search Tool Tailored to Patient Characteristics

W. T. McKinney[1], C. R. Schaffhausen[1], M. Bruin[2], S. Chu[2], J. Snyder[3], M. Hertz[4], M. Valapour[5], B. Kasiske[6], A. Israni[1], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]College of Design, University of Minnesota, Minneapolis, MN, [3]Scientific Registry of Transplant Recipients, Minneapolis, MN, [4]Medical School, University of Minnesota, Minneapolis, MN, [5]Pulmonary Medicine, Cleveland Clinic, Cleveland, OH, [6]Nephrology, Hennepin Healthcare, Minneapolis, MN*

Purpose: Criteria for selecting lung transplant candidates and donors vary between programs and evolve as clinical practice advances. This variation impacts patient outcomes and the experiences of patients in need of lung transplant. Existing public reports, such as the Scientific Registry of Transplant Recipients (SRTR) program-specific reports (PSR) are not easily interpreted by patients and do not offer customization to individual patients. We aimed to evaluate lung transplant patients' feedback on prototypes of an online search tool that provides users with patient-specific information on waitlist and transplant outcomes from SRTR.

Methods: We conducted 3 focus groups and 2 interviews with lung transplant recipients and candidates, respectively (n=22). Participants reviewed printouts of the SRTR PSR and prototypes of a patient-specific search tool to evaluate its efficacy for identifying variations between transplant programs that can improve access and reduce wait times (Figures 1). Participants were also asked to reflect on their own decision making and experiences when selecting a transplant program.

Results: Feedback on prototypes of the patient-specific search was positive and included recommendations for improving the tool's efficacy for decision making. Participants revealed a range of experiences related to healthcare decision making and patient education that bring into relief anxieties about accessing the transplant waitlist (Table 1). Knowledge gaps around candidate acceptance practices and apprehensions about having to relocate for transplant care compounded anxieties around decision making.

Conclusions: Patients value a tool that communicates patient-specific information on program-level variations in waitlist and transplant outcomes and variations in donor acceptance practices. The patient-specific search tool will be available at www.transplantcentersearch.org.

Figure 1: Example of Patient-specific search results showing the volume of recipients over age 65 in Custom Search drop-down menu

CITATION INFORMATION: McKinney W., Schaffhausen C., Bruin M., Chu S., Snyder J., Hertz M., Valapour M., Kasiske B., Israni A. Creating a Lung Transplant Program Search Tool Tailored to Patient Characteristics *AJT, Volume 21 Supplement 3*

DISCLOSURES: W.T. McKinney: None. **C.R. Schaffhausen:** None. **M. Bruin:** None. **S. Chu:** None. **J. Snyder:** None. **M. Hertz:** None. **M. Valapour:** None. **B. Kasiske:** None. **A. Israni:** None.

Abstract# 1210

Evaluation of Pepsin in Bronchoalveolar Lavage Fluid Post-lung Transplantation: Implications of Detection

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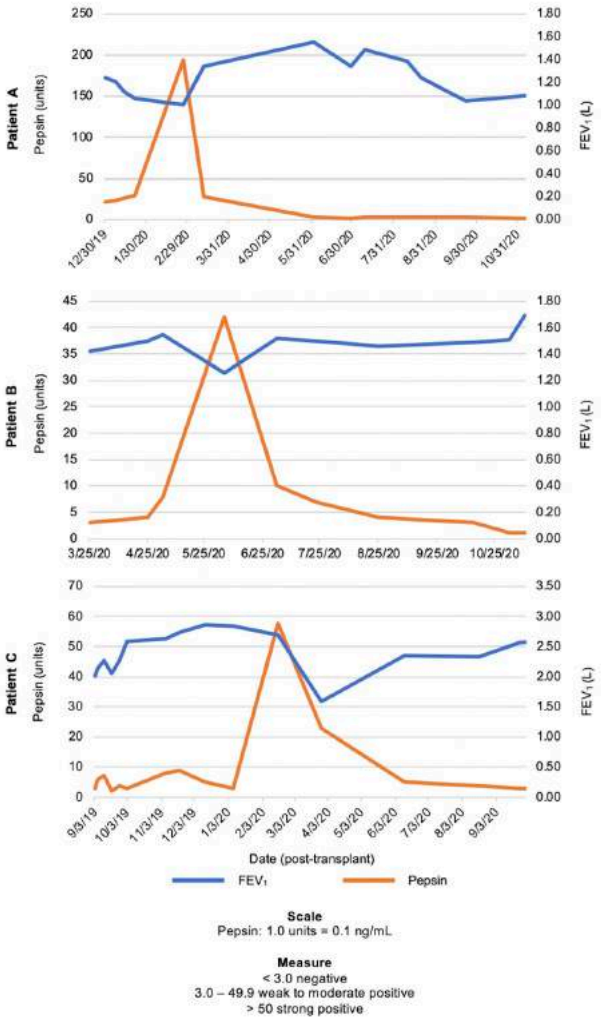
Purpose: This preliminary investigation in three lung transplant recipients aimed to measure pepsin, as a marker of gastric microaspiration, in bronchoalveolar lavage fluid (BAL) fluid, and relate its detection to gastroesophageal reflux disease (GERD) status, acute cellular rejection (ACR) episodes, and trends in pulmonary function.

Methods: We analyzed BAL washings and transbronchial biopsies obtained during post-transplant surveillance bronchoscopies for quantitative pepsin levels and acute rejection episodes, respectively. Gastroesophageal function was evaluated pre-transplant and at 3-months post-transplant. Our preliminary investigation included three bilateral lung transplant recipients with pre-transplant GERD (DeMeester scores ≥14.7): 48-year-old female with scleroderma-related interstitial lung disease (patient A), 76-year-old male with combined pulmonary fibrosis and emphysema (patient B), and 73-year-old male with nonspecific interstitial pneumonia (patient C).

Results: Pre-transplant GERD evaluation revealed esophageal peristalsis, delayed esophageal emptying, and DeMeester score of 50.0 in patient A, and mild

esophageal dysmotility in patients B and C, with DeMeester scores of 32.4 and 17.5, respectively. One-month transbronchial biopsy findings were consistent with mild (A2B0) ACR in patient A, and no ACR in patients B and C. Post-transplant GERD evaluation revealed esophageal aperistalsis and DeMeester score of 86.7 in patient A, hypertensive lower esophageal sphincter with normal motility, but DeMeester score of 27.8 in patient B, and grossly normal esophageal function without GERD in patient C. Six-month transbronchial biopsies did not show ACR in any patients. One-year and 15-month transbronchial biopsies were available for patient C and showed two episodes of mild (A2B0) ACR. Elevated pepsin quantities detected in BAL washings and pulmonary function trends are shown in Figure 1.

Conclusions: These early findings demonstrate the utility of measuring pepsin quantity in BAL fluid post-lung transplant. Its quantity on serial detection in lung transplant recipients may have relation to GERD status, acute rejection episodes, and pulmonary function. It also provides confirmatory evidence of reflux-induced microaspiration.



CITATION INFORMATION: Olson M., Rogers C., McAnally K., Arjuna A. Evaluation of Pepsin in Bronchoalveolar Lavage Fluid Post-lung Transplantation: Implications of Detection *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.T. Olson: None. **C. Rogers:** None. **K. McAnally:** None. **A. Arjuna:** None.

Abstract# 1211

A Retrospective Analysis of the Safety and Efficacy of Apixaban After Lung Transplant

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Purpose: Atrial arrhythmias and venous thromboembolism (VTE) are common after lung transplant. While direct acting oral anticoagulants (DOACs) have become anticoagulants of choice in atrial arrhythmias and VTE, safety and efficacy have not been established in lung transplant, where drug interactions with DOACs are also often present. This study sought to evaluate outcomes with apixaban use after lung transplant.

Methods: We retrospectively reviewed consecutive adult lung transplant recipients between October 15, 2015 and December 31, 2018. Patients were included if they received apixaban for 30 days or more for VTE or atrial arrhythmias, and had 12 months of documented follow-up from the start of apixaban. The primary outcome was a composite of adverse events defined as major bleeding, clinically relevant non-major bleeding (CRNMB), recurrent or breakthrough VTE, and stroke. Bleeding was classified as major or CRNMB using criteria set by the International Society on Thrombosis and Haemostasis.

Results: Twenty-eight patients received apixaban. Fifteen patients received concomitant CYP3A4 or P-gp inhibitors, and 4 of these patients received strong CYP3A4 inhibitors. Six patients (20%) were started on reduced doses for drug interactions or based on clinical judgement. The primary composite endpoint occurred in two patients (7.1%). One CRNMB event occurred in a patient with a gastrointestinal bleed secondary to gastric ulcer, and another patient developed breakthrough lower extremity DVT on apixaban. Drug interactions were not present in the patient who experienced CRNMB. Dose reduction of the loading dose was observed in the recurrent DVT event. No patient experienced a stroke during the follow-up.

Conclusions: Apixaban appears safe and effective in lung transplant patients. Appropriate dosing and adjusting for interactions are critical for optimal outcomes. Larger studies are warranted to assess long-term outcomes as well as safety and efficacy of alternative DOACs.

Table 1: Baseline Characteristics

	Atrial Fibrillation	VTE	Overall
Patients enrolled, n (%)	7 (25)	21 (75)	28 (100)
Gender			
Male, n (%)	5 (71.4)	17 (81)	22 (78.6)
Female, n (%)	2 (28.6)	4 (19)	6 (21.4)
Race			
Caucasian, n (%)	6 (85.7)	20 (95.2)	26 (92.9)
Black, n (%)	0 (0.0)	1 (5.8)	1 (3.6)
Native American, n (%)	1 (14.3)	0 (0.0)	1 (3.6)
Age, years (± SD)	64 (56-72)	64 (55.5-72)	64 (56-72)
BMI, median (IQR 25-75)	30 (23.8-30.6)	27.1 (23.6-30.7)	27.3 (23.5-30.8)
Type of Transplant			
Single, n (%)	2 (28.6)	9 (42.9)	11 (39.3)
Double, n (%)	5 (71.4)	12 (57.1)	17 (60.7)
Transplant Indication			
IPF, n (%)	4 (57.1)	10 (47.6)	14 (50)
ILD, n (%)	0 (0.0)	4 (19)	4 (14.3)
COPD, n (%)	3 (42.9)	4 (19)	7 (25)
CF, n (%)	0 (0.0)	2 (9.5)	2 (7.1)
PAH, n (%)	0 (0.0)	1 (4.8)	1 (3.6)

Table 2: Outcomes
*Bleeding severity was classified based on criteria set forth by the International Society for Thrombosis and Haemostasis

Variable	Atrial Fibrillation, n (%)	VTE, n (%)	Overall, n (%)
Severity of Bleed*			
Major bleed	0 (0.0)	0 (0.0)	0 (0.0)
Clinically relevant non-major bleed	1 (14.2)	0 (0.0)	1 (3.3)
Thrombus New Location or Recurrent			
New Location	0 (0.0)	1 (4.8)	1 (3.6)
Recurrent	0 (0.0)	0 (0.0)	0 (0.0)
Thrombus Location			
Upper extremity	0 (0.0)	0 (0.0)	0 (0.0)
Lower extremity	0 (0.0)	2 (9.5)	2 (7.1)
Pulmonary embolism	0 (0.0)	0 (0.0)	0 (0.0)
Incidence of Stroke			
Stroke while on therapy	0 (0.0)	0 (0.0)	0 (0.0)

CITATION INFORMATION: Sam T., Reininger K., Patel R., Naik C., Ausloos K., Rosenblatt R., Grazia T., Lam I. A Retrospective Analysis of the Safety and Efficacy of Apixaban After Lung Transplant *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Sam: None. **K. Reininger:** None. **R. Patel:** None. **C. Naik:** None. **K. Ausloos:** None. **R. Rosenblatt:** None. **T. Grazia:** None. **I. Lam:** None.

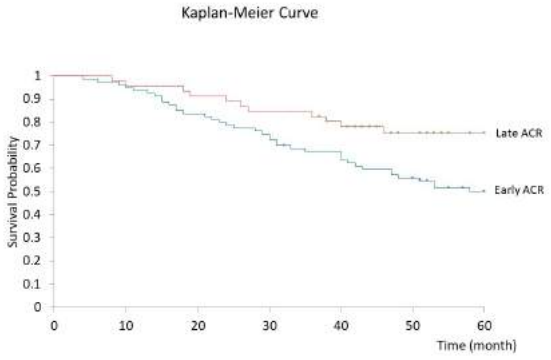
Abstract# 1212

Pathology of the Explanted Lungs and Surveillance Allograft Biopsy in 202 Lung Transplant Cases: Single Institution Experience

S. Sathirareuangchai[1], S. Moore[1], Q. Cai[1], L. De Las Casas[1], J. Joerns[2], J. Torrealba[1], *[1]Pathology, University of Texas Southwestern Medical Center, Dallas, TX, [2]Internal Medicine, University of Texas Southwestern Medical Center, Dallas, TX*

Purpose: This study correlates lung transplantation outcomes with pathologic diagnoses of explants and surveillance transbronchial allograft biopsies.
Methods: A retrospective IRB approved review of archival material from explanted lung recipients from our Department of Pathology database during the period 2013-2016 was performed. Demographic information, explant diagnoses, relevant clinical history, chronology of significant clinical events, and cause of death were retrieved. The results of surveillance allograft biopsies and serum donor specific antigen (DSA) antibodies were also reviewed. Log rank test was used to determine differences in survival among various groups.

Results: 202 patients with end-stage lung disease underwent lung transplant during the 4-year study period. The most common explant diagnoses were emphysema (n=63, 31.2%), usual interstitial pneumonia (UIP; n=62, 30.7%), and cystic fibrosis (CF; n=22, 11%). Eighty-eight (43.6%) recipients died during the study period. The most common causes of death were chronic lung allograft dysfunction (n=25, 28.4%), malignancy (n=18, 20.5%), and infection (n=17, 19.3%). Three deaths were related to Coronavirus Disease 2019 (COVID-19). The overall survival rates at 3-year and 5-year were **74.3%**, and **62.9%**, respectively. Although overall survival rates did not correlate with explant diagnoses, patients with UIP and non-specific interstitial pneumonia (NSIP) tended to have worse outcomes than those with emphysema and CF, with lower survival rates in the first year post-transplant. Allograft rejection was identified in 139 patients (68.8%). Most cases of rejection showed acute cellular rejection (ACR, n=126), while antibody-mediated rejection (AMR) was seen in 29 patients, and a combination of ACR and AMR was found in 15 patients. Patients with early ACR (≤ 90 days post- transplant, n=80) had a lower overall survival rate compared to those with late ACR (> 90 days post-transplant, n=46) with a median survival of 68 *vs.* 88 months, respectively $p<0.05$ (Figure 1). In addition, patients with AMR alone tended to have lower survival than patients with both ACR and AMR (median survival 48 *vs.* 68 months), but not significant ($p=0.07$).
Conclusions: This study demonstrates chronic obstructive pulmonary disease (COPD) as the most common indication for lung transplantation in our cohort. Early ACR was associated with adverse outcome by having lower overall survival rate.



CITATION INFORMATION: Sathirareuangchai S., Moore S., Cai Q., De Las Casas L., Joerns J., Torrealba J. Pathology of the Explanted Lungs and Surveillance Allograft Biopsy in 202 Lung Transplant Cases: Single Institution Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Sathirareuangchai: None. **S. Moore:** None. **Q. Cai:** None. **L. De Las Casas:** None. **J. Joerns:** None. **J. Torrealba:** None.

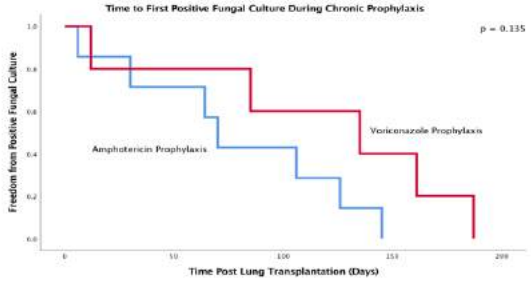
Abstract# 1213

Evaluation of Fungal Prophylaxis Post-Lung Transplantation

I. Shah[1], K. Mohrien[1], C. Rose[2], J. Au[1], *[1]Temple University Hospital, Philadelphia, PA, [2]Temple School of Pharmacy, Philadelphia, PA*

Purpose: Fungal infections are responsible for approximately 15-35% of all infections in lung transplant recipients; 80% of which are due to aspergillus or candida. At our institution, voriconazole and inhaled amphotericin B are used for primary fungal prophylaxis post-lung transplantation for a total duration of six months. The objective of this study was to compare the time to first positive fungal culture in patients receiving voriconazole or inhaled amphotericin B.
Methods: This retrospective, single-center, chart review included adult patients, who received a lung transplant at TUH between January 2012 and June 2019 and continued follow up for at least one-year post-transplantation. The primary endpoint was the time to first positive aspergillus (blood or respiratory) or candida (blood only) culture within six months of lung transplantation. Secondary endpoints included the incidence of positive fungal cultures at one-year and the need for discontinuation of prophylaxis due to adverse events.
Results: Five hundred sixty-eight patients were screened for eligibility, 439 patients were included in the efficacy analysis and 471 patients were included in the safety analysis. Voriconazole was switched to inhaled amphotericin B in 55.9% of patients receiving it for initial prophylaxis and 19.3% of patients receiving it for chronic prophylaxis due to adverse events. The most common reasons for the switch were altered mental status and elevated liver function tests, respectively.

Figure 1: Time to first positive fungal culture at 6 months



Key demographics and secondary endpoints				
Variable	All Patients (n = 439)	Amphotericin (n = 305)	Voriconazole (n = 134)	P Value
Age	64.32 ± 8.93	64.74 ± 9.07	63.35 ± 8.54	0.133
Male	290 (66.1)	205 (67.2)	85 (63.4)	0.441
Double Lung Transplant	163 (37.1)	106 (34.8)	57 (42.5)	0.171
Positive Fungal Culture	29 (6.6)	18 (5.9)	11 (8.2)	0.370
Positive Aspergillus Respiratory Culture	24 (5.5)	13 (4.3)	11 (8.2)	0.094
Positive Candida Blood Culture	5 (1.1)	5 (1.6)	0 (0)	0.329

Conclusions: Voriconazole and inhaled amphotericin B are both efficacious for fungal prophylaxis post-lung transplantation. There was no difference in the incidence of positive aspergillus cultures between prophylactic regimens. However, all five cases of candida-positive blood cultures were observed in patients receiving inhaled amphotericin B. The small number of positive cultures limit the ability to draw definitive conclusions. A significant number of patients receiving voriconazole required a change in prophylaxis due to adverse events.

CITATION INFORMATION: Shah I., Mohrien K., Rose C., Au J. Evaluation of Fungal Prophylaxis Post-Lung Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: I. Shah: None. **K. Mohrien:** None. **C. Rose:** None. **J. Au:** None.

Abstract# 1214

Tacrolimus Dose Requirements in Lung Transplant Recipients on Systemic Azole Antifungals: The Influence of Race and Transplant Indication

K. S. Walter[1], T. Wert[1], R. Coakley[2], L. J. Lobo[2], R. A. Evans[1], *[1]Department of Pharmacy, University of North Carolina, Chapel Hill, NC, [2]Department of Medicine, University of North Carolina, Chapel Hill, NC*

Purpose: CYP3A5 polymorphisms, drug interactions, and alterations in gastric absorption impact tacrolimus metabolism. This is important for those at higher risk of expressing these factors, such as African American (AA) and cystic fibrosis (CF) patients. We sought to assess the effect of race and transplant indication on tacrolimus dose requirements (TDRs) and transplant outcomes in lung transplant recipients (LTRs) initiated on a fixed tacrolimus dose and antifungal prophylaxis with a systemic azole after transplant.

Methods: All adult LTRs transplanted from 1/2015-10/2019 initiated on an equivalent tacrolimus dose posttransplant were included and stratified by race (AA or non-AA) and transplant indication (CF or non-CF). TDRs, tacrolimus levels, tacrolimus time in therapeutic range (TTR), systemic azole use, biopsy proven acute rejection (BPAR), and patient/graft survival for the first year posttransplant were evaluated.
Results: 68 LTRs were included (10 AA, 16 CF); approximately 90% were on a systemic azole at 1 and 3 months posttransplant. CF LTRs were significantly younger (32 vs 59 years) and had a mean lower body weight (53.4 vs 81.1 kg) at baseline compared to non-CF LTRs. In AAs, TDRs were significantly higher throughout the first year posttransplant, while in CF LTRs, TDRs were only significantly higher throughout the first 3 months posttransplant (Figures 1, 2). There was no difference in time to first therapeutic level or number of dose adjustments to achieve this level between groups. The majority of LTRs did not have a therapeutic tacrolimus level at discharge (55% AA vs 41% non-AA, p=0.1; 63% CF vs 73% non-CF, p=0.4). Tacrolimus TTR was similar between groups (55% AA vs 41% non-AA, p=0.1; 34% CF vs 45% non-CF, p=0.2). No difference in BPAR or patient/graft survival within 12 months was observed.
Conclusions: While both AA and CF LTRs had significantly higher TDRs to maintain similar trough levels, this did not influence transplantation outcomes. Further research is needed to determine the optimal dosing strategy in these patient populations immediately posttransplant.

Figure 1. African American Tacrolimus Dose Requirements

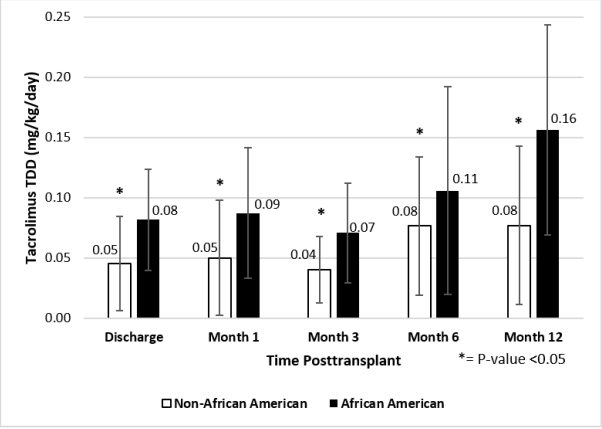
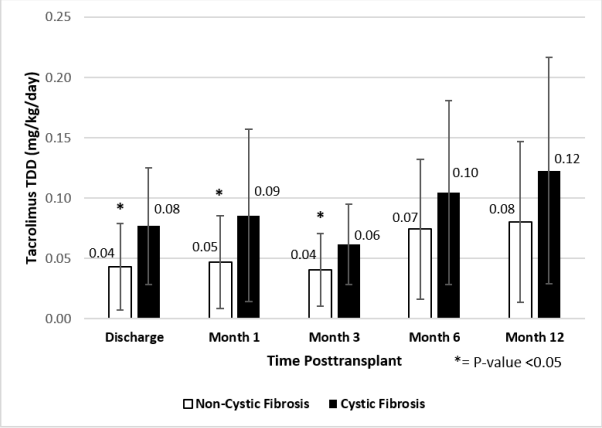


Figure 2. Cystic Fibrosis Tacrolimus Dose Requirements



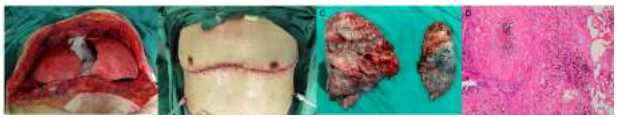
CITATION INFORMATION: Walter K., Wert T., Coakley R., Lobo L., Evans R. Tacrolimus Dose Requirements in Lung Transplant Recipients on Systemic Azole Antifungals: The Influence of Race and Transplant Indication *AJT, Volume 21 Supplement 3*
DISCLOSURES: K.S. Walter: None. **T. Wert:** None. **R. Coakley:** None. **L.J. Lobo:** None. **R.A. Evans:** None.

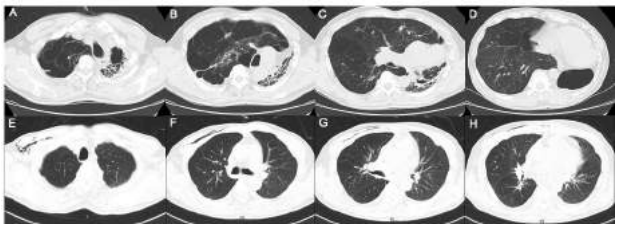
Abstract# 1215

Bilateral Lung Transplantation for Destroyed Lungs with Asymmetric Thorax

B. Yue, J. Chen, *Wuxi People's Hospital Affiliated to Nanjing Medical University, Wuxi, China*

Purpose: Destroyed lungs can cause mediastinal displacement, asymmetric chest deformity, and high risk and difficulty of surgery. Until now, there are few reports about bilateral lung transplantation for destroyed lungs with asymmetric thorax. In this paper, we report two methods of bilateral lung transplantation for destroyed lungs with asymmetric thorax and introduce our clinical experience.
Methods: A total of six patients with destroyed lungs from 2005-2020 were included in the study. Six candidates received bilateral LT in this period of time at Wuxi Center. Clinical data of the three patients were collected to investigate the safety and feasibility of the surgery.
Results: Three patients used the anterolateral incision in the lateral position without transecting the sternum while three patients used the clam-shell incision in the supine position with transecting the sternum. Only one patient in the lateral position group was assisted by V-A ECMO during the operation; three patients in the lateral position group underwent size-matched lung transplantation. The right upper lobe, right lower lobe, and left upper lobe were removed respectively. In the supine position group, only one patient underwent size-matched lung transplantation, with the right middle lobe removing. For the other two patients, we separated mediastinal adhesions to promote mediastinal reposition. All patients were successfully transferred to ICU for monitoring and treatment.Patients in the lateral position group had more blood loss, operation time, and postoperative hospital stay compared to the supine position group. However, there was no significant statistical difference. One month after the operation, CT illustrated that the donor's lung was well expanded, and the mediastinum was reset.
Conclusions: It is safe and feasible with sufficient preoperative preparation and evaluation for patients with destroyed lungs. The surgical method in the supine position can restore the mediastinum by loosening the mediastinal adhesions, contributing to preserving the lung function of the donor's lung to the greatest extent. The surgical method in the lateral position has a better field of vision and is easier to remove the destroyed lung, especially for patients with old tuberculosis.





CITATION INFORMATION: Yue B., Chen J. Bilateral Lung Transplantation for Destroyed Lungs with Asymmetric Thorax *AJT, Volume 21 Supplement 3*
DISCLOSURES: B. Yue: None. **J. Chen:** None.

Abstract# LB 89

Incidentally Detected Malignancies in Lung Explants: Single Center Case Series

D. Razia, A. Arjuna, L. Schaheen, J. Huang, M. Smith, R. Bremner, R. Walia, *Thoracic Surgery and Lung Transplantation, Norton Thoracic Institute, St. Joseph's Hospital and Medical Center, Phoenix, AZ*

Purpose: Thoracic malignancies are difficult to prospectively diagnose in patients with end-stage lung disease due to complex radiologic features. We present a series of lung transplant (LTx) recipients with incidentally diagnosed malignancies in native lung explants.
Methods: For this retrospective series, we reviewed our LTx registry over 10 years (2011-2020) for malignancy on the lung explant. Histopathology, computed tomography (CT), and positron emission tomography (PET) scans were recorded. Before LTx, a new or expanding pulmonary nodule (PN) was defined as a CT correlative lesion. Endpoints were survival, acute cellular rejection (ACR), and antibody-mediated rejection (AMR).
Results: Of 855 LTx recipients during the study period, 1.3% (n=11) had an explant malignancy. The median age was 68 years, and 55% (n=6) were ex-smokers (median, 25 pack-years). A CT correlative lesion was present in 3 patients; PET demonstrated a metabolically inactive PN in 2 of the patients, and a biopsy in the third suggested coccidiomycosis. The median (range) time between CT and LTx was 58 (16-414) days. All LTx were bilateral. The predominant explant histology was adenocarcinoma (AC; Table 1). The median (range) tumor size was 2.7 (0.4-19)

cm. Nodal involvement was seen in 36% (N1 in 3 patients and N2 in 1). Mycophenolate mofetil was stepped down in all patients, and everolimus was used in 18% (n=2) of patients. Cisplatin and pemetrexed chemotherapy was used in 2 patients, and palliative radiation in 2. ACR was present in 27% (n=3) of patients and AMR was treated in 18% (n=2). Overall, 55% (n=6) of patients were alive, 45% (n=5) of whom were cancer-free (CF). Mean survival was 26±25 months.

Patient	Lung disease	Explant histology	Stage	Alive	Survival (mo)	Outcome/ cause of death
1	COPD	Invasive AC	IIA	No	48	M
2	COPD	AC (acinar)	IB	Yes	86	CF, ACR
3	COPD	Invasive AC (papillary)	IB	Yes	24	CF
4	COPD	Keratinizing SCC	IA1	Yes	5	CF
5	IPF	AC	IA1	No	7	Failure to thrive
6	IPF	AC (papillary)	IIB	No	48	M, ACR
7	IPF	Invasive AC (lepidic), in AC in situ	IIIA	No	5	M
8	IPF	Follicular lymphoma	Low grade	Yes	31	CF
9	IPF	Invasive nonmucinous AC (lepidic)	IIB	Yes	9	CF
10	CPFE	AC (acinar, micro-papillary)	IIIB	Yes	13	M, AMR
11	CPFE	Invasive AC (acinar, lepidic)	IIIA	No	12	M, ACR, AMR

Conclusions: Explanted native lungs can have incidentally detected primary malignancy. Pneumonectomy was curative in squamous cell carcinoma (SCC) and lymphoproliferative disorders. For AC, metastases (M) and allograft rejection from changes in immunosuppression were major causes of a guarded prognosis. Recipients with explant cancers ≥ stage III had poor short-term survival.

CITATION INFORMATION: Razia D., Arjuna A., Schaheen L., Huang J., Smith M., Bremner R., Walia R. Incidentally Detected Malignancies in Lung Explants: Single Center Case Series *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Razia: None. **A. Arjuna:** None. **L. Schaheen:** None. **J. Huang:** None. **M. Smith:** None. **R. Bremner:** None. **R. Walia:** None.

All Organs

Non-PTLD/Malignancies

Abstract# 1246

Use of Immune Checkpoint Inhibitors in Solid Organ Transplant Recipients: A Scoping Review

A. G. Anderson, M. Eubank, K. Murray, *University of Missouri, Columbia, MO*

Purpose: Immune checkpoint inhibitors (ICI) are an emerging treatment for numerous advanced diseases, but their safety and efficacy in immunosuppressed transplant patients is not known. This study undertakes a scoping review of research on ICI use in solid organ transplant (SOT) recipients to determine: 1) What is the effect of ICI on SOT recipients?; 2) What factors influence the effect of ICI on SOT recipients?

Methods: Data Sources: Searches of PubMed, Scopus and MEDLINE were performed with language restrictions on September 1, 2020. **Study Selection**: Any studies that reported the use of ICI in patients with a history of SOT were included irrespective of study design. **Data Extraction**: Three reviewers independently screened citations and performed data abstractions. A variety of variables were extracted from each publication. **Data Synthesis**: Of the total 549 screened articles, 50 articles met inclusion criteria with a sum of 101 cases of ICI use in patients with a history of SOT.

Results: Graft rejection occurred in 42% (n=42) of the cases. Kidneys were the most commonly rejected organ (n=28) with PD-1 inhibitors being the often-implicated etiology (n=32). Nearly 100% of the cases of graft rejection transpired within 2 months of ICI initiation. Patients on steroid monotherapy had higher rejection rates (72%, n=13) versus those on a steroid plus one or more immunosuppressive agents. In cases where graft preservation was pursued, salvage occurred 33% of the time (n=9). Regardless of graft outcomes, patient outcomes were overall poor due to advanced disease. In cases where patient outcome was reported, 71% (n=39) died directly from disease progression.

Conclusions: ICI offer a promising therapeutic alternative to traditional chemoradiation for patients with advanced malignancies. However, their use in patients with a history of SOT poses a significant risk to the transplanted organ and cancer outcomes are worse in patients with SOT. Future studies are needed to delineate the risk and benefit more clearly.

CITATION INFORMATION: Anderson A., Eubank M., Murray K. Use of Immune Checkpoint Inhibitors in Solid Organ Transplant Recipients: A Scoping Review *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.G. Anderson: None. **M. Eubank:** None. **K. Murray:** None.

Abstract# 1247

Pd-1 Inhibitor Treatment in Solid Organ Transplant Patients with Metastatic Cancer

C. Chung[1], H. Ko[1], H. Kim[1], K. Choi[1], A. Han[1], S. Min[1], H. Kang[2], J. Ha[1], *[1]Department of Surgery, Seoul National University College of Medicine, Seoul, Korea, Republic of, [2]Department of Pediatrics, Seoul National University College of Medicine, Seoul, Korea, Republic of*

Purpose: Solid organ transplant patients due to chronic immunosuppression have an increased risk of de novo cancer. Immune checkpoint inhibitors have been recently developed to treat cancer, however, solid organ transplant recipients with cancer have been excluded from clinical trials due to risk of rejection and graft failure. The purpose of our study was to evaluate the outcomes of immune checkpoint inhibitor therapy in solid organ transplant patients with metastatic cancer

Methods: Solid organ transplant patients with metastatic cancer who underwent immune checkpoint inhibitor treatment until 2020 at Seoul National University hospital were retrospectively reviewed. We evaluated the tumor response, rejection, graft failure and overall survival after PD-1 treatment, either nivolumab or pembrolizumab.

Results: Total of six solid organ transplant recipients, 2 kidney and 4 liver transplant, with metastatic cancer who received PD-1 inhibitor treatment were included in the study. The type of primary cancer consisted of 2 hepatocellular carcinomas, 2 skin cancers and 2 lung cancers. 4 patients were diagnosed with cancer more than 10 years after transplantation (124.30-288.63 months) and the other two patients at 7.50 and 17.33 months. There was an addition of mTOR inhibitor after cancer diagnosis for 3 patients, however, there was no change in the immunosuppressive regimen after PD-1 inhibitor treatment for all six patients. The median overall survival was 9.18 (2.73-16.80) months since the start of PD-1 inhibitor treatment. There was no rejection or graft failure. Only 2 out of the 6 patients with stable disease continued more than 4 cycles and eventually all six patients showed progression of disease. There were two deaths related to infections such as atypical pneumonia and sepsis due to urinary tract infection.

Conclusions: Solid organ transplant recipients had no rejections or graft loss after PD-1 inhibitor treatment for metastatic cancer. Further multicenter retrospective studies are needed to evaluate the efficacy and rejection risk of PD-1 treatment in transplant population.

CITATION INFORMATION: Chung C., Ko H., Kim H., Choi K., Han A., Min S., Kang H., Ha J. Pd-1 Inhibitor Treatment in Solid Organ Transplant Patients with Metastatic Cancer *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Chung: None. **H. Ko:** None. **H. Kim:** None. **K. Choi:** None. **A. Han:** None. **S. Min:** None. **H. Kang:** None. **J. Ha:** None.

Abstract# 1248

Cancer-Specific Mortality in Solid Organ Transplant Recipients with a Prior Cancer Diagnosis

E. Engels[1], G. Haber[1], A. Hart[2], C. Lynch[3], J. Li[4], K. Pawlish[4], B. Qiao[5], K. Yu[1], R. Pfeiffer[1], *[1]Natl Cancer Inst, Bethesda, MD, [2]Univ of Minnesota, Minneapolis, MN, [3]Univ of Iowa, Iowa City, IA, [4]New Jersey Dept of Health, Trenton, NJ, [5]New York State Dept of Health, Albany, NY*

Purpose: A history of cancer is increasingly common among solid organ transplant candidates, and transplant-associated immunosuppression may increase recurrence risk. We assessed whether transplantation was associated with an elevated mortality among cancer patients.

Methods: Using linked data from the US transplant registry and 13 cancer registries, we compared overall and cancer-specific mortality among cancer patients with vs. without a subsequent transplant. We used Cox regression in cohort and matched control analyses, controlling for demographic factors and cancer stage.

Results: The study included 10,524,326 cancer patients with 17 cancer types; 5425 (0.05%) subsequently underwent transplantation. The median time from cancer diagnosis to transplantation was 4.17 years. Transplantation was associated with elevated overall mortality for most cancers, especially for cervical, testicular, and thyroid cancers (adjusted hazard ratios [aHRs] 3.43-4.88). In contrast, as shown in the table for selected cancer sites, transplantation was not associated with elevated cancer-specific mortality for any cancer site, and we observed inverse associations for patients with breast cancer (aHRs 0.65-0.67), non-Hodgkin lymphoma (0.50-0.51), and myeloma (0.39-0.42).

Conclusions: Among US cancer patients, an increase in overall mortality associated with transplantation is due to adverse effects of end-stage organ disease and transplant-related medical complications. However, there was no elevation in cancer-specific mortality, likely reflecting careful candidate selection. These results support current practices involving wait times and thorough evaluation of potential transplant candidates with previous cancer diagnoses.

CITATION INFORMATION: Engels E., Haber G., Hart A., Lynch C., Li J., Pawlish K., Qiao B., Yu K., Pfeiffer R. Cancer-Specific Mortality in Solid Organ Transplant Recipients with a Prior Cancer Diagnosis *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Engels: None. **G. Haber:** None. **A. Hart:** None. **C. Lynch:** None. **J. Li:** None. **K. Pawlish:** None. **B. Qiao:** None. **K. Yu:** None. **R. Pfeiffer:** None.

Abstract# 1249

Review of Outcomes After Diagnosis of Malignancy in Kidney Transplant Patients: Unos Database

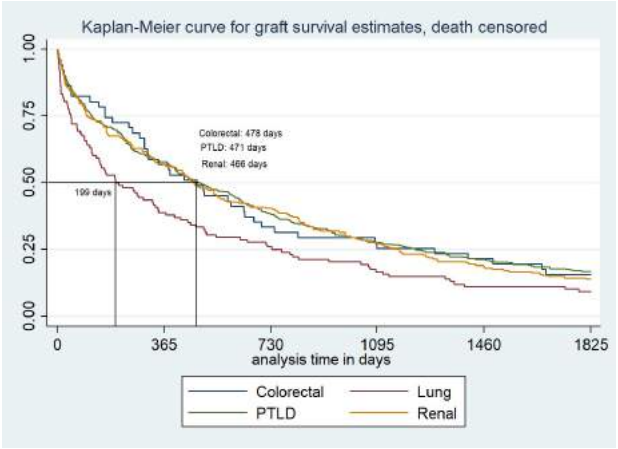
H. Patel[1], N. Agrawal[1], R. Gupta[1], P. Geetha[2], A. Abdul Razzack[3], F. Cardarelli[1], *[1]Transplant Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [2]Nephrology, Beth Israel Deaconess Medical Center, Boston, MA, [3]Medicine, Dr. NTR University of Health Sciences, Vijaywada, India*

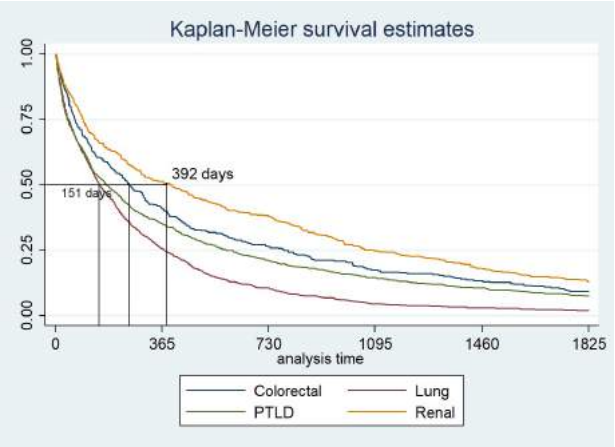
Purpose: Malignancy is the third major cause of death among transplant recipients. Among the transplant recipients, Patient and kidney transplant outcomes after the diagnosis of malignancy are not well described. With this study we review incidences and outcomes of Colorectal, Lung, PTLD, and Renal malignancy after transplant.

Methods: It is a retrospective study of patients of who received transplant from January 2000 to December 2018 using UNOS/OPTN database. Incidence of each malignancy have been measured at 5 years and 10 years of transplant. Kaplan Meier curve was used for time to event analysis (graft and Patient outcomes). Additionally, we sought to identify the causes of graft failure among these recipients.

Results: Total 12,764 (5.5%) of patients have suffered malignancy (non-squamous/basal cell skin carcinoma) after transplant. During first 5 years of transplant, Incidence of Colorectal, Lung, PTLD, and Renal malignancies were 2.99, 9.21, 15.61 and 8.55 per 10,000 person years, respectively. Rate of graft failure was 10.3%, 7.6%, 19.9%, and 18.8% respectively among these patients.

Conclusions: In this study, kidney transplant recipients who are diagnosed with lung malignancy have the lowest patient and graft survival, compared to PTLD, colorectal and renal malignancy. PTLD has the highest incidence rate in the first 5 years of transplant; however, between 5-10 years from transplant lung malignancy has the highest incidence followed by PTLD, renal and colorectal malignancies. The most common cause of graft failure in this patient population is chronic rejection, followed by malignancy complications and acute rejection.





Graft and Patient survival rate and time after malignancy				
Malignancy	Death censored graft failure	Diagnosis to graft survival time (days)	Total number of deaths	Time from Diagnosis to death (days)
Colorectal	**51 [10.3%]**	**478 [163 – 1292]**	**304/494 [61.5%]**	**254 [68 – 781]**
Lung	**108 [7.6%]**	**199 [45 – 733]**	**1190/1416 [84%]**	**151 [45 – 373]**
PTLD#	**386 [19.9%]**	**471 [118 – 1226]**	**950/1936 [49.1%]**	**175 [41 – 585]**
Renal	**210 [18.8%]**	**466 [100 - 1169]**	**396/1115 [35.5%]**	**392 [95 – 1089]**

CITATION INFORMATION: Patel H., Agrawal N., Gupta R., Geetha P., Abdul Razzack A., Cardarelli F. Review of Outcomes After Diagnosis of Malignancy in Kidney Transplant Patients: Unos Database *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Patel: None. **N. Agrawal:** None. **R. Gupta:** None. **P. Geetha:** None. **A. Abdul Razzack:** None. **F. Cardarelli:** None.

Deceased Donor Management and Intervention Research

Abstract# 1250

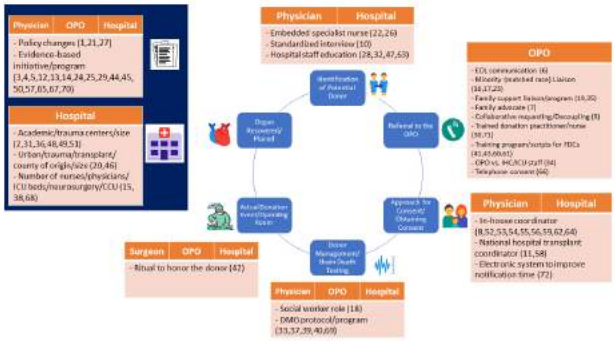
Hospital-Level Metrics and Interventions to Increase Deceased Organ Donation: A Systematic Review

M. Castillo-Angeles[1], G. Li[2], P. Bain[3], A. Salim[1], J. T. Adler[1], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Brandeis University, Waltham, MA, [3]Harvard Medical School, Boston, MA*

Purpose: The shortage of transplantable organs available for the ever-growing transplant waiting list is well-described. Efforts to ameliorate this have predominantly focused on improving processes and interventions at multiple levels in the organ donation process, but no comprehensive review of hospital-level factors exists. We undertook a systematic review of the literature to better understand what is known and what is not known about hospital-level factors associated with successful organ donation.

Methods: We searched four electronic databases (PubMed, Embase, CINAHL, Web of Science, Health Business Elite, and Google scholar) and conference abstracts for articles on any hospital-level factors associated with the final outcome of organ donation (PROSPERO CRD42020187080). Editorials, letters to the editor, and reviews without original data were excluded. Our main outcomes were conversion rate, donation rate, number of organs recovered, number of donors, and consent rate.

Results: Our search yielded 2,203 studies, and after a thorough assessment, 72 articles were included in this systematic review. Studies were thematically categorized into 1) Hospital-level interventions associated with metrics of organ donation; these included patient- and family-centric measures (i.e. standardized interviews, collaborative requesting and decoupling, and dedicated in-house coordinators), and donor management goals that significantly increased conversion rates by up to 64%; 2) Hospital-level multi-stage programs/policies; which increased consent rates between 30 and 50%; and 3) Hospital characteristics and qualities; being an academic center, trauma center and larger hospital correlated with higher consent and conversion rates. Figure shows the contribution of these studies at each step in the donation process.



Conclusions: There is a lack of well-designed studies on hospital-level factors and interventions associated with organ donation. The use of thoughtful, patient- and family-centric approaches to consent generally is associated with more organ donors. Future work can build on what is known about the hospital role in organ donation to first collaborate with OPOs, and then to use this knowledge and collaboration to improve OPO performance.

CITATION INFORMATION: Castillo-Angeles M., Li G., Bain P., Salim A., Adler J. Hospital-Level Metrics and Interventions to Increase Deceased Organ Donation: A Systematic Review *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Castillo-Angeles: None. **G. Li:** None. **P. Bain:** None. **A. Salim:** None. **J.T. Adler:** None.

Abstract# 1251

Public Perceptions of Presumed Consent for Organ Donation in Canada: A Qualitative Descriptive Study of Public Comments from News Articles

D. E. Fox[1], M. Donald[2], C. Chong[1], R. R. Quinn[3], P. E. Ronksley[1], M. J. Elliott[3], N. N. Lam[3], *[1]The Department of Community Health Sciences, The University of Calgary, Calgary, AB, Canada, [2]Cumming School of Medicine, The University of Calgary, Calgary, AB, Canada, [3]The Cumming School of Medicine and Department of Community Health Sciences, The University of Calgary, Calgary, AB, Canada*

Purpose: In 2019, two Canadian provinces (Alberta and Nova Scotia) became the first jurisdictions in North America to pass presumed consent legislation to increase deceased donor organ transplantation. Under this law, adults will be presumed to consent to organ donation unless they register an opt-out decision. Public trust and support for the policy is critical to its success and fears and misconceptions need to be identified and addressed.

Methods: We performed a qualitative descriptive study to explore public perceptions and perceived implications of presumed consent for organ donation in Canada. We extracted public comments from online articles published by 4 major Canadian news outlets about the presumed consent policy from January 2019 to July 2020. Articles were excluded if they: 1) were not in the English language, 2) had no comments, or 3) did not focus primarily on presumed consent. Comments linked to the articles were imported into NVivo. Conventional content analysis (i.e., coding and grouping similar concepts and developing themes) was completed independently by two authors.

Results: We identified 180 news articles; 36 were eligible for study inclusion and contained a total of 4,357 comments for data analysis. Three primary themes emerged: polarized positions on the bill, perceived implications of the bill, and questions or concerns to address. The majority of commenters appeared to be either for or against the bill, with few people reporting neutral views. This resulted in tensions between the two sides. The perceived positive implications of the bill included: a) it aligned with the views of the majority of Canadians, b) it had lifesaving and financial benefits, and c) it was a timely and sensible solution. The perceived negative implications included the bill being: a) a violation of rights, b) having the potential for abuse, and c) it being a slippery slope (e.g. it could lead to a monetized organ trade). Improving government transparency and communication, clarifying questions and concerns, and providing evidence for the bill were identified as key concerns that need to be addressed prior to implementation.

Conclusions: Public perceptions of the presumed consent bill for organ donation in Canada are influenced by various factors. If the presumed consent laws are meant to increase organ donation and transplantation, public education and support will be important to ensure successful implementation.

CITATION INFORMATION: Fox D., Donald M., Chong C., Quinn R., Ronksley P., Elliott M., Lam N. Public Perceptions of Presumed Consent for Organ Donation in Canada: A Qualitative Descriptive Study of Public Comments from News Articles *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.E. Fox: None. **M. Donald:** None. **C. Chong:** None. **R.R. Quinn:** None. **P.E. Ronksley:** None. **M.J. Elliott:** None. **N.N. Lam:** None.

Abstract# 1252

Donor CPR and Solid Organ Transplantation

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Purpose: In 2010, the American Heart Association and Emergency Cardiac Care (AHA ECC) set a 10-year impact goal of doubling cardiac arrest survival by 2020. The intention of cardiopulmonary resuscitation is always to save the life of a patient; however, some studies suggest donor CPR may improve outcomes in recipient graft survival. The purpose of this study was to determine if the number of organ donors receiving CPR would correlate with the efforts of the AHS ECC impact goal of doubling cardiac arrest survival from 2010 to 2020.

Methods: We conducted a retrospective study of the CPR status of deceased organ donors from January 2010 to December 2019. Deidentified publicly available data from the United Network for Organ Sharing (UNOS) was utilized for the analysis. Patients were grouped by donation year. A sub-analysis was performed on the recipients of kidneys from donors who received CPR during our study period.

Results: There were N=90,689 donors in our 10-year study. Figure 1 demonstrates the increase in donors who received CPR from 35% (2,689/7,765) in 2010 to 55% (6,361/11,560) in 2019, (p=0.014) We then analyzed the 47,029 organ donors who received CPR with kidneys utilized for transplantation. Figure 2 demonstrates a 2.4-fold increase in the number of females who received a kidney transplant from a donor who received CPR in 2010 (1,609) vs. 2019 (3798). There was a 2.5-fold increase for male patients who received a kidney transplant from a donor who received CPR in 2010 (2354) vs. 2019 (5,821), p<0.001. In Figure 3 we analyzed the organ donors who received CPR by race/ethnicity and found that the rate of CPR more than doubled in all ethnic groups over the course of the study (p<0.001).

Conclusions: In conclusion, the number of organs from donors who received CPR more than doubled over the past decade correlating with the goal of the AHA ECC efforts to double the survival of cardiac arrest. Lives were saved because more people received successful CPR and lives were saved because more organs were transplanted from donors who received CPR for males and females and across all ethnic groups.

Figure 1.

Donor CPR by Year

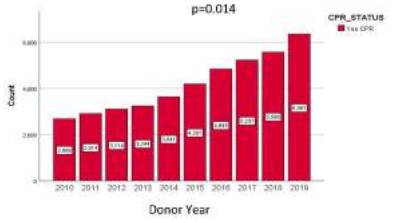


Figure 2.

Donor CPR by Gender

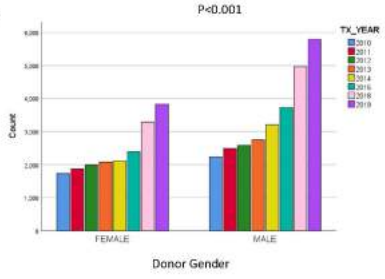
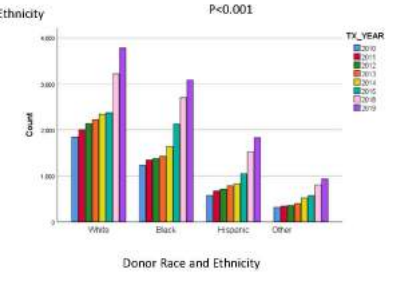


Figure 3.

Donor CPR by Race/Ethnicity



CITATION INFORMATION: Larsen E., Cardoza K., Robichaux K., Kumar A., Bowers V., Buggs J. Donor CPR and Solid Organ Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Larsen: None. **K. Cardoza:** None. **K. Robichaux:** None. **A. Kumar:** None. **V. Bowers:** None. **J. Buggs:** None.

Abstract# 1253

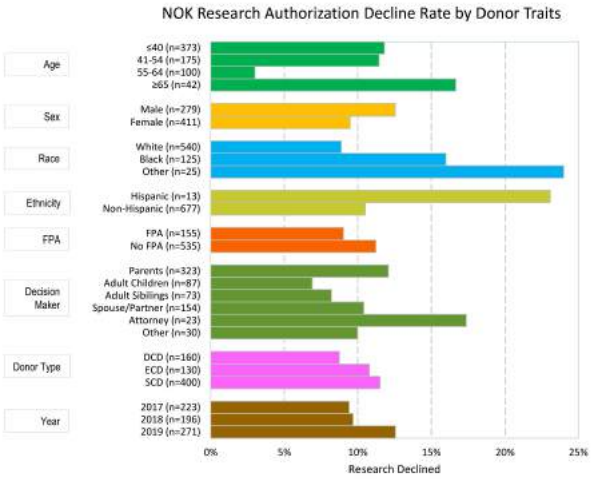
Variation in Next of Kin Authorization for Research in Deceased Donor Organ Transplantation: Experience at One Organ Procurement Organization

K. L. Lentine[1], C. Jones[1], W. Cheungpasitporn[2], R. Rothweiler[3], H. Xiao[1], M. Ortigosa-Goggins[4], G. Marklin[3], R. B. Mannon[5], *[1]Saint Louis University, St. Louis, MO, [2]Mayo Clinic, Rochester, MN, [3]Mid-America Transplant, St. Louis, MO, [4]University of Miami, Miami, FL, [5]University of Nebraska, Omaha, NE*

Purpose: Research related to deceased donor interventions seeks to address diverse questions to improve the use and outcomes of organ gifts for transplantation. Consent for deceased donor research is obtained from the next of kin (NOK) authorizing donation or through first-person authorization (FPA), but to date, there is limited information on patterns of research authorization or how decline rates may impact access to new information for certain groups.

Methods: We performed a retrospective chart review of all deceased organ donors from 1/2017-12/2019 at a large Midwestern organ procurement organization. We determined FPA authorization status, NOK relationship, and final research authorization using the Critical Organ documents and FPA registration records. Multivariable logistic regression analysis was used to assess the association between donor factors and research authorization (adjusted odds ratio, $_{95\%\ LCL}$ aOR $_{95\%\ UCL}$).

Results: Medical records for 688 deceased donors in the study period were reviewed. Of these, 659 (95.5%) had an organ recovered for transplant. Overall, research authorization was provided in 89.2% of donations and declined in 10.8%. Compared to white donors, research decline was higher for Black (16.0% vs 8.9%; aOR, $_{1.05}1.90_{3.43,}$ p=0.05) and other non-white donors (24.0% vs 8.9%; aOR, $_{1.21}3.31_{9.06,}$ p=0.05). Unadjusted research decline was higher for Hispanic donors (23.1% vs 10.5%), but decline was not significantly different with adjustment. Compared to donors age <40, research decline was lower for donors aged 55-64 (3.0% vs 11.8%; aOR, $_{0.07}0.24_{0.84,}$ p=0.05), but higher for donors age 65 and older (16.7% vs 11.8%; aOR, $_{0.95}3.61_{13.79,}$ p=0.05). Ultimate research decline trended lower when donor had provided FPA (9.0% vs 11.2%; aOR, $_{0.24}0.51_{1.08,}$ p=0.05). There was no significant association of research authorization with NOK relationship to donor, donor sex, donor type, or year of donation.



Conclusions: Deceased donor research authorization decline is higher for Black, other non-white donors, and donors older than age 65. These findings may inform educational interventions for both staff and families to improve research authorization rates and increase opportunities to provide science for vulnerable groups.

CITATION INFORMATION: Lentine K., Jones C., Cheungpasitporn W., Rothweiler R., Xiao H., Ortigosa-Goggins M., Marklin G., Mannon R. Variation in Next of Kin Authorization for Research in Deceased Donor Organ Transplantation: Experience at One Organ Procurement Organization *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.L. Lentine: Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Consulting. Honoraria; Name of Commercial Interest; Sanofi. Honoraria; Nature of Relationship; Speaker. **C. Jones:** None. **W. Cheungpasitporn:** None. **R. Rothweiler:** None. **H. Xiao:** None. **M. Ortigosa-Goggins:** None. **G. Marklin:** None. **R.B. Mannon:** Honoraria; Name of Commercial Interest; Vitaerris/CSL Behring.

Abstract# 1254

Intensivist-Performed Transesophageal Echocardiography as a Screen for Organ Donation: A Four-Year, Single-Center Experience

K. M. Madden[1], T. C. Wray[2], K. Rainbird[1], I. Tawil[2], T. Dettmer[2], K. Azevedo[2], R. Venkataramani[3], J. Marinaro[2], *[1]New Mexico Donor Services, Albuquerque, NM, [2]Emergency Medicine, University of New Mexico Health Sciences Center, Albuquerque, NM, [3]Anesthesiology, University of New Mexico Health Sciences Center, Albuquerque, NM*

Purpose: Echocardiography is required for deceased heart donation, and transthoracic echocardiography is the traditional practice. At our institution, intensivists perform transesophageal echocardiography (TEE) and since 2016, intensivist TEE has been the primary evaluation method in brain dead (BD) heart donation. We aimed to determine our institution's potential donor heart transplant outcomes after intensivist-performed TEE.

Methods: A retrospective review of eligible BD donors with heart donation potential who underwent TEE was performed to evaluate the TEE interpretation, if the heart was allocated, and if the heart was ultimately transplanted. We also evaluated likelihood of transplant if a repeat TEE was performed.

Results: From 01/01/2016 to 11/09/2020, 74 TEEs were performed on 62 eligible BD donors with heart donation potential. 48 (77%) hearts were allocated, of which 41 had TEEs read as normal. 29 (60%) were ultimately transplanted. Of the 19 hearts allocated but not transplanted, 11 (58%) were read by the intensivist as normal. Table 1 lists reasons eligible donor hearts with normal TEEs were not transplanted. Of the 12 donors requiring a second TEE due to reduced systolic function, the heart was not allocated for 1 (8%). Of the remaining 11, 7 were ultimately transplanted (64%).

Conclusions: Intensivist-performed TEE at our institution resulted in the majority of donor hearts evaluated ultimately being transplanted over the four years studied. Future studies will compare intensivist-evaluated donor heart transplant outcomes with those of the prior transthoracic echocardiography driven era, as well as further examine the optimal time for the first TEE, or the repeat TEE, based on the data we have gathered.

Table 1: Donor Hearts with Normal TEE Not Transplanted (n=11)

Reason	Number of Donor Hearts (%)
List ran, no potential recipient identified	4 (36%)
Significant coronary artery disease on cardiac catheterization	3 (27%)
New vasopressor requirement prior to procurement	2 (18%)
Donor/recipient size mismatch noted in OR	1 (9%)
Development of new right ventricular dysfunction prior to OR	1 (9%)

CITATION INFORMATION: Madden K., Wray T., Rainbird K., Tawil I., Dettmer T., Azevedo K., Venkataramani R., Marinaro J. Intensivist-Performed Transesophageal Echocardiography as a Screen for Organ Donation: A Four-Year, Single-Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: K.M. Madden: None. **T.C. Wray:** None. **K. Rainbird:** None. **I. Tawil:** None. **T. Dettmer:** None. **K. Azevedo:** None. **R. Venkataramani:** None. **J. Marinaro:** None.

All Organs

Non-Organ Specific: Organ Preservation/Ischemia Reperfusion Injury

Abstract# 1255

Ex Situ Heart Perfusion and Standard of Care Cold Storage Differentially Affect the Ischemic Secretome of Donor Hearts in Perfusates but Not the Reperfusion Response in Recipient Plasma

E. Chichelnitskiy[1], B. Wiegmann[2], N. Ledwoch[1], F. Ius[2], F. Wandrer[1], J. Kühne[1], K. Beushausen[1], J. Keil[1], S. V. Rojas[2], W. Sommer[2], C. Kühn[2], I. Tudorache[2], M. Avsar[2], A. Haverich[2], G. Warnecke[2], C. S. Falk[1], *[1]MHH, Institute of Transplant Immunology, Hannover, Germany, [2]MHH, Department for Cardiothoracic, Transplantation and Vascular Surgery, Hannover, Germany*

Purpose: Various allograft preservation procedures influence the donor organ status that may be reflected by the cytokine/chemokine microenvironment in heart transplant (HTx) recipients. In addition, the microenvironment in perfusion solutions may be informative in terms of organ function. Therefore, we aimed to compare the secretomes in recipient plasma and perfusates of two cohorts of HTx patients whose hearts were either preserved using *ex situ* heart perfusion (ESHP) or standard of care (SOC) cold static preservation in order to identify potential biomarker candidates for heart preservation.

Methods: Using multiplex techniques, we measured 50 cytokines/chemokines, growth and adhesion factors in recipient plasma before (pre), after (T0), 24 h and 3 weeks after HTx. Donor hearts were preserved either by ESHP (n=30) or SOC (n=22) procedures.
Results: Using unsupervised cluster analyses, the top 10 plasma cytokines and chemokines were identified, clearly separating T0 from other time points after HTx, reflecting a reperfusion injury-specific pattern. Surprisingly, ESHP or SOC heart preservation did not have a significant impact on these inflammatory plasma profiles at T0, T24 or 3 wks. The two strongest discriminators separating T0 from other time points i.e. IFN-γ, SCGF-β (all $p \leq 0.05$) were detected in both ESHP and SOC recipients at comparable concentrations. In contrast, the preservation method clearly affected the cytokine/chemokine profile in perfusates highlighted by higher concentrations of IL-6, IFN-γ, CXCL10, TNF-α, IL-10, IL-1RA, CXCL12, PDGF, G-CSF (all $p \leq 0.05$) in ESHP compared to SOC samples.
Conclusions: Although ESHP or SOC preservation did not affect the reperfusion response in plasma at T0 after HTx, normothermic oxygenated preservation of donor hearts was accompanied by secretion of pro- and anti-inflammatory cytokines, chemokines that may affect long-term functionality and longevity of the graft. With a better understanding of molecular changes during ESHP, we expect to identify biomarker candidates for improved organ function pre HTx.
CITATION INFORMATION: Chichelnitskiy E., Wiegmann B., Ledwoch N., Ius F., Wandrer F., Kühne J., Beushausen K., Keil J., Rojas S., Sommer W., Kühn C., Tudorache I., Avsar M., Haverich A., Warnecke G., Falk C. Ex Situ Heart Perfusion and Standard of Care Cold Storage Differentially Affect the Ischemic Secretome of Donor Hearts in Perfusates but Not the Reperfusion Response in Recipient Plasma *AJT, Volume 21 Supplement 3*
DISCLOSURES: E. Chichelnitskiy: None. **B. Wiegmann:** None. **N. Ledwoch:** None. **F. Ius:** None. **F. Wandrer:** None. **J. Kühne:** None. **K. Beushausen:** None. **J. Keil:** None. **S.V. Rojas:** None. **W. Sommer:** None. **C. Kühn:** None. **I. Tudorache:** None. **M. Avsar:** None. **A. Haverich:** None. **G. Warnecke:** None. **C.S. Falk:** None.

Abstract# 1256

Combined Liver and Lung Transplantation with Extended Normothermic Liver Preservation Using Transmedics Organ Care System (OCS)™ Liver: A Single Center Experience

J. Konel[1], M. Shamaa[2], O. Shamaa[2], A. Elsabbagh[2], T. Kitajima[2], T. Ivanics[2], K. Delvecchio[2], A. Mohamed[2], S. Yeddula[2], K. Collins[2], A. Yoshida[2], M. Abouljoud[2], S. Nagai[2], M. Rizzari[2], *[1]Wayne State University School of Medicine, Detroit, MI, [2]Henry Ford Transplant Institute, Detroit, MI*

Purpose: Combined liver-lung transplantation (CLLT) is indicated in patients who cannot survive single-organ transplantation alone. Ex-situ normothermic machine perfusion (NMP) has been used to increase the pool of suboptimal donors and has been previously used for extended normothermic lung preservation in CLLT. We aim to describe our single-center experience using the 'Transmedics Organ Care System (OCS) ™ liver' for extended normothermic liver preservation in CLLT.
Methods: Medical records were queried for patients at our center that underwent CLLT from 2015-2020.
Results: [Values shown are represented as mean (standard deviation, range)]: Four CLLTs were performed from 2015 to 2020 including 3 male and 1 female recipients, age 50 (±13.7, 31-61) years (Table 1). Indications for lung transplantation include: (1) cystic fibrosis (CF), (1) severe bronchiectasis, and (2) interstitial pulmonary fibrosis. Indications for liver transplantation include: (1) biliary cirrhosis secondary to CF, (1) cirrhosis secondary to autoimmune hepatitis, (1) alcoholic cirrhosis, and (1) cryptogenic cirrhosis. The lung was transplanted first for all patients. Recipient characteristics at transplant: Mean forced expiratory volume in 1 second (FEV1) was 51% (±22, 29-78) and Model for End-Stage Liver Disease was 12 (±3.7, 8-16). The livers were donated after brain death with donor age of 34 (±9.4, 25-46) years and cold ischemia time 566 (±38, 545-623) minutes. Ex-vivo pump time for the livers was 411 (±38, 364-456) minutes (Table 2). Mean hospital stay was 34 days (±18, 14-161). Over a median follow-up of 201 days, patient and graft survival remain at 100%, though 50% of liver grafts had biopsy-proven acute cellular rejection.
Conclusions: CLLT is a viable treatment option for patients with severe two-organ failure. Normothermic extended liver preservation is a safe method to prolong perfusion time and preserve the liver during combined liver and lung transplantation.

	Patient #1	Patient #2	Patient #3	Patient #4
Age at transplant (yr)	31	59	61	49
BMI at transplant	20.3	28.8	29.6	21.5
Sex	Male	Male	Male	Female
MELD score at transplant	16	8	10	14
Operative time for liver transplant (min)	335	493	205	330
Liver cold ischemia time (min)	623	545	546	548
Acute Cellular rejection	Yes, biopsy proven on 8/18/20	No	No	Yes, biopsy proven on 1/14/19, 2/28/20
AST (IU/L)				
Days 1-7 (mean ± SD)	280 ± 353	230 ± 296	582 ± 615	102 ± 66
30 days	21	18	17	15
6 months	21	32	19	35
Bilirubin (mg/dL)				
Days 1-7 (mean ± SD)	1.19 ± 0.43	2.23 ± 0.72	1.64 ± 0.64	3.21 ± 3.18
30 days	0.3	0.5	0.3	0.4
6 months	0.7	0.8	0.2	0.7
INR				
Days 1-7 (mean ± SD)	1.43 ± 0.3	1.74 ± 0.92	1.36 ± 0.21	1.21 ± 0.15
30 days	1.03	1.02	1.1	1.01
6 months	1.02	1.04	1.07	0.98
Lactate Days 1-3 (mean ± SD)	2.45 ± 0.64	3.47 ± 3.17	2.37 ± 1.97	1.77 ± 1.25

Table 1 - Recipient and donor characteristics. Abbreviations: min, minutes; yr, year; SD, standard deviation; MELD, Model for End-Stage Liver Disease.

	Patient #1	Patient #2	Patient #3	Patient #4
Total ex-vivo pump time	456	413	364	412
Weight of liver (kg)	1.7	2.1	2.0	1.7
Pump Flow/100 g (mL/min)	68	83	93	82
Initial/Final hepatic arterial flow (mL/min)	470/1010	670/1600	680/780	370/820
Mean (SD) hepatic arterial flow (mL/min)	936 (71)	878 (48)	791 (38)	819 (113)
Initial/Final hepatic artery mean pressure (mm/hg)	72/90	32/34	44/42	65/59
Mean (SD) hepatic artery mean pressure (mm/hg)	78 (5.1)	36.2 (1.4)	44 (1.8)	65 (3.5)
Initial/Final portal venous flow (mL/min)	470/1020	1090/840	1180/1440	1030/1300
Mean (SD) portal venous flow (mL/min)	884 (97)	1475 (89)	1339 (96)	1164 (64)
Initial/Final portal vein mean pressure (mm/hg)	23/10	2/2	9/5	4/3
Mean (SD) portal vein mean pressure (mm/hg)	13 (4.0)	2.3 (0.5)	4.9 (0.9)	3.0 (0.4)
Initial/Final lactate (mmol/L)	6.2/0.83	4.2/0.38	7.6/1.99	1.76/2.17

Table 2 - Transmedics Organ Care System (OCS)™ liver pump information. All initial measurements are at target temperature of 33.9° Celsius.

CITATION INFORMATION: Konel J., Shamaa M., Shamaa O., Elsabbagh A., Kitajima T., Ivanics T., Delvecchio K., Mohamed A., Yeddula S., Collins K., Yoshida A., Abouljoud M., Nagai S., Rizzari M. Combined Liver and Lung Transplantation with Extended Normothermic Liver Preservation Using Transmedics Organ Care System (OCS)™ Liver: A Single Center Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Konel: None. **M. Shamaa:** None. **O. Shamaa:** None. **A. Elsabbagh:** None. **T. Kitajima:** None. **T. Ivanics:** None. **K. Delvecchio:** None. **A. Mohamed:** None. **S. Yeddula:** None. **K. Collins:** None. **A. Yoshida:** None. **M. Abouljoud:** None. **S. Nagai:** None. **M. Rizzari:** None.

Abstract# 1257

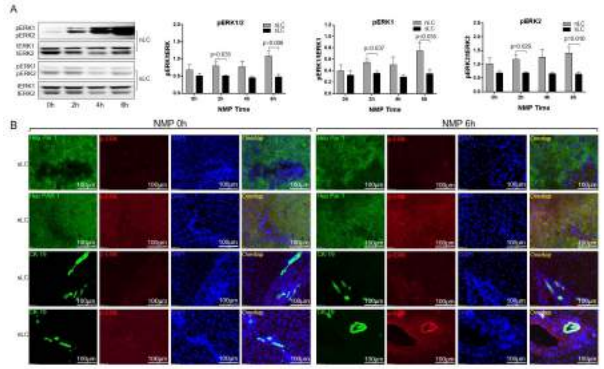
Dual Lactate Clearance in the Liver Viability Assessment During Normothermic Machine Perfusion

M. Xu[1], F. Zhou[1], O. Ahmed[1], J. Shin[1], Y. Zhu[1], G. Upadhya[1], K. Byrnes[2], B. Wong[1], J. Kim[1], Y. Lin[1], W. Chapman[1], *[1]Department of Surgery, Washington University, St. Louis, MO, [2]Department of Pathology and Immunology, Washington University, St. Louis, MO*

Purpose: Liver normothermic machine perfusion (NMP) has been increasingly performed as a tool of organ preservation and to evaluate donor function. The perfusate lactate clearance (LC) is considered as one of the useful indicators of liver viability assessment during NMP. However, the applicable scope and potential mechanisms of LC remain poorly defined.
Methods: We studied the extracellular signal-regulated kinases (pERK1/2) pathway, lactate dehydrogenase A (LDHA), ischemic time, perfusate and bile chemistry, steatosis, hepatic glycogen, inflammatory cell infiltration, necrosis, and apoptosis of the OrganOx Metra device-perfused discarded human livers with successful lactate clearance (sLC, n=5) compared with non-sLC (nLC, n=5) in the perfusate (<2.2mmol/L at 2hr NMP).
Results: We found that the expression of LDHA was significantly higher in the livers with sLC than in the livers without at 2hr NMP ($p=0.031$). In contrast, the pERK1/2 level was substantially higher in the nLC livers than in the sLC livers at 2hr and 6hr NMP (Fig.A, $p=0.035$ and 0.006, respectively). Immunostaining showed that up-regulation of pERK1/2 was in both the hepatocytes and cholangiocytes in the nLC livers (Fig.B). We also found that sLC was associated with a marginally higher glycogen restoration than nLC at 2hr NMP ($p=0.065$). Furthermore, bile

lactate levels in sLC livers were cleared into the normal range at 6hr NMP, but the bile lactate levels were inconsistent in the livers with nLC. H&E staining suggested that the necrosis scores were higher in the nLC than in the sLC livers at 0hr and 6hr NMP (p=0.047 and 0.053, respectively).

Conclusions: The dual lactate clearance in the perfusate and bile can be helpful in evaluating the hypoxic injury of hepatocytes and cholangiocytes following the NMP of discarded human livers.



CITATION INFORMATION: Xu M., Zhou F., Ahmed O., Shin J., Zhu Y., Upadhya G., Byrnes K., Wong B., Kim J., Lin Y., Chapman W. Dual Lactate Clearance in the Liver Viability Assessment During Normothermic Machine Perfusion *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Xu: None. F. Zhou: None. **O. Ahmed:** None. **J. Shin:** None. **Y. Zhu:** None. **G. Upadhya:** None. **K. Byrnes:** None. **B. Wong:** None. **J. Kim:** None. **Y. Lin:** None. **W. Chapman:** None.

Abstract# 1258

Intravenous Immunoglobulin Protects Liver Allograft from Ischemia Reperfusion Injury in Human Liver Transplantation

S. Yokota, J. C. Alonso-Escalante, R. P. Tindall, K. R. Tabar, L. Machado, T. Uemura, N. L. Thai, *Department of Surgery, Allegheny General Hospital, Pittsburgh, PA*

Purpose: Ischemia/reperfusion (I/R) injury following prolonged cold storage has a significant impact on early and late human liver transplantation (LTx) outcomes. Prevention of I/R injury would improve the outcome of LTx and potentially expand the limited donor pool by allowing the wider use of marginal organs. Intravenous immunoglobulin (IVIG) has immunomodulatory effects and has been shown to decrease rate of acute rejection in LTx recipients. However, the role of IVIG in prevention of I/R injury is unclear. The aim of this study is to examine if intraoperative IVIG administration would be protective against I/R injury after adult LTx.

Methods: We conducted a retrospective study of deceased donor LTx recipients between 2017-2018 at our center. We compared recipients who received a dose of IVIG intraoperatively (IVIG group, median dose 500mg/kg, n=35) with recipients who did not (control group, n=34). We used the United Network of Organ Sharing data to obtain donor characteristic (age, gender, donation after circulatory death, serum ALT before donor surgery) and conducted chart review of recipients' characteristic data (age, gender, Model for End-Stage Liver Disease Score, indication for LTx), intraoperative variables, postoperative data (serum transaminases, acute rejections, graft survival, patient survival) to compare clinical outcomes between the two groups.

Results: Donor and recipient characteristics were similar between control and IVIG group. Operative time (402 minutes vs 386 minutes), estimated blood loss (2000ml vs 2525ml), units of transfusion (8 units vs 9 units), cold ischemia time (302 minutes vs 286 minutes), and warm ischemia time (31 minutes vs 31 minutes) were not statistically different (all expressed as median, p>0.05). There were no significant differences in intraoperative hemodynamic parameters (mean arterial, pulmonary artery, and central venous pressures) between the two group (p>0.05). Control group had significantly higher level of ALT at 3 hour (390±43 vs 257±28 U/L, p=0.007), 10 hours (359±50 vs 247±36 U/L, p=0.02), and AST at 3 hour (729±96 vs 451±39 U/L, p=0.005) after reperfusion compared to IVIG group; IVIG group had >30% reduction in I/R injury. There was no significant difference in the rate of acute rejection (p=0.47) and recipients` survival (p=0.25, Log rank).

Conclusions: These novel data indicate that intraoperative IVIG administration may be protective against I/R injury after LTx. The result of this study would serve as a foundation for future prospective studies to determine the effect of IVIG in prevention of I/R injury after LTx.

CITATION INFORMATION: Yokota S., Alonso-Escalante J., Tindall R., Tabar K., Machado L., Uemura T., Thai N. Intravenous Immunoglobulin Protects Liver Allograft from Ischemia Reperfusion Injury in Human Liver Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Yokota: None. **J.C. Alonso-Escalante:** None. **R.P. Tindall:** None. **K.R. Tabar:** None. **L. Machado:** None. **T. Uemura:** None. **N.L. Thai:** None.

Abstract# 1259

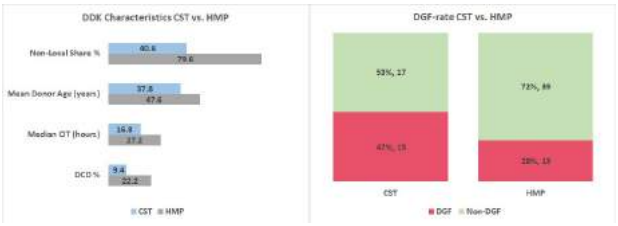
Mitigating the Adverse Impact of Broader Kidney Sharing with Hospital-based Machine Perfusion

Y. Yushkov, B. R. Schleich, T. Carrea, V. Wadhera, M. J. Goldstein, *Hackensack University Medical Center, Hackensack, NJ*

Purpose: The new UNOS kidney allocation changes effective December 2020 will be removing the geographic limits of donation service areas (DSA) and UNOS regions favoring a zone of 250 nautical miles (NM) from the donor hospital. Transplant centers with low waiting times will have access to fewer deceased donor kidneys (DDK) compared to transplant centers in neighboring DSAs with longer waiting times. This change will dramatically reduce locally allocated organs and broaden the sharing distance of lifesaving DDKs for our patients. In order to mitigate the risk of prolonged cold ischemic time (CIT) and to increase utilization of nationally shared kidneys, our center created a hospital-based machine preservation center utilizing hypothermic machine perfusion (HMP) in January of 2020. Implementation of HMP allowed improved evaluation of organs with higher KDPI and increased acceptance of kidneys with longer CIT. It is likely that organ procurement organizations might be less inclined to provide HMP with broader sharing of kidneys, making hospital access to HMP more vital. To our knowledge, only five centers in the US utilize hospital-based HMP.

Methods: A retrospective study compared characteristics and immediate outcomes of two groups of DDKs transplanted between January through October 2020: DDKs preserved with cold storage technique (CST) (N=32), and DDKs preserved using HMP (N=66). After organ evaluation on HMP, due to the higher machine-measured renal resistance and biopsy results, 12 (18.18%) kidneys were discarded and excluded from the study leaving this cohort with 54 kidneys.

Results: Despite having a higher non-local share, a higher mean donor age, a higher median cold ischemic time (CIT), and a higher DCD rate), patients that received HMP kidneys have a significantly lower delayed graft function (DGF) and shorter median length of stay (LOS) compared to patients that received DDKs preserved with CST (p<0.01). No kidney in either cohort had primary non-function.



Conclusions: HMP allowed us to get better access to non-local DDKs as it expanded our ability to evaluate nationally allocated kidneys that were locally declined, improved organ flush characteristics, alleviated risk of prolonged CIT while optimizing kidney function, and improved organ utilization. Other benefits included reduced hospital costs due to reduced LOS and DGF as well as transplanting patients faster and thus decreasing waitlist mortality and disease progression.

CITATION INFORMATION: Yushkov Y., Schleich B., Carrea T., Wadhera V., Goldstein M. Mitigating the Adverse Impact of Broader Kidney Sharing with Hospital-based Machine Perfusion *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Yushkov: None. **B.R. Schleich:** None. **T. Carrea:** None. **V. Wadhera:** None. **M.J. Goldstein:** Honoraria; Name of Commercial Interest; Speakers Bureau. Honoraria; Nature of Relationship; Speaker.

All Organs

Non-Organ Specific: Disparities to Outcome and Access to Healthcare

Abstract# 1260

Removal of Race Factor in Egfr Decreases Disparities in Preemptive Listing for Kidney Transplantation

Y. Al-Salmay, N. Jandovitz, M. Abate, A. Baez, E. Molmenti, A. Fahmy, N. Breslin, L. Teperman, V. Nair, *Organ Transplantation, Northwell Health, Manhasset, NY*

Purpose: GFR < 20 is required for kidney transplant listing. The Chronic Kidney Disease-Epidemiology Collaboration (CKD-EPI) and the Modification of Diet in Renal Disease (MDRD) equations for estimating GFR incorporate serum creatinine, age, sex and a correction factor for Black race. The aim of this study was to investigate whether eGFR equations contribute to disparities in preemptive listing of black patients.

Methods: We identified all patients added to our kidney transplant waiting list since 2008. GFR at the time of listing was obtained for patients listed preemptively. MDRD equation was used to calculate eGFR until February 2015 then CKD-EPI.

GFR for non-Black patients was modified using the Black race correction factor (1.212 for MDRD, 1.159 for CKD-EPI). The number of patients listed before and after modification was compared in every race/ethnic group.

Results: Among 410 patients on the waiting list, 166 (41%) patients were pre-emptively listed. Black patients made up 36% of the waitlist of whom 29% were preemptively listed. White patients made up 24% of the waitlist of whom 62% were preemptively listed (Table 1).After eGFR modification, a total of 35 patients had an eGFR >20 ml/min and would not qualify for preemptive listing. All non-Black races saw a decrease in preemptive listing.After adjusting for age and gender, White patients had a 4-fold increase in odds of preemptive listing, compared to Black ($p<0.001$). There was a trend towards increased odds of preemptive listing for Asians compared to Black (OR 1.65, p value 0.068). After modification of GFR the OR between White race and preemptive listing decreased to 2.9 ($p<0.001$), and the trend towards higher preemptive listing in Asians disappeared.

Conclusions: Our observations suggest the magnitude of racial disparity in pre-emptive listing would be reduced if race-based calculation of eGFR was removed.

Table 1: Racial distribution of patients on the preemptive kidney transplant waitlist

	Total Waitlist n=410	Listed Pre-emptive n=166			Listed Pre-emptive after eGFR modification n=131		
Race	n (%)	n (%)	Odds Ratio	p-value	n (%)	Odds Ratio	p-value
Black	147 (36)	42 (29)	ref		42 (29)	ref	
White	100 (24)	62 (62)	4.08	<0.001	44 (54)	2.89	<0.001
Asian	98 (24)	39 (39)	1.65	0.07	29 (33)	1.22	0.49
Hispanic	65 (16)	23 (35)	1.37	0.32	16 (27)	2.89	0.93

CITATION INFORMATION: Al-Salmay Y., Jandovitz N., Abate M., Baez A., Molmenti E., Fahmy A., Breslin N., Teperman L., Nair V. Removal of Race Factor in Egfr Decreases Disparities in Preemptive Listing for Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y. Al-Salmay: None. **N. Jandovitz:** None. **M. Abate:** None. **A. Baez:** None. **E. Molmenti:** None. **A. Fahmy:** None. **N. Breslin:** None. **L. Teperman:** None. **V. Nair:** None.

Abstract# 1261

Impact of Bacterial Infection on HLA Allosensitization Among Kidney Recipients on the Waitlist

D. P. Cina[1], K. R. Sherwood[2], S. Dobrer[2], J. Wong[3], F. Fenninger[2], M. Kadatz[4], P. Keown[4], J. Lan[4], *[1]Department of Urologic Sciences, University of British Columbia, Vancouver, BC, Canada, [2]University of British Columbia, Vancouver, BC, Canada, [3]Department of Laboratory Medicine, Vancouver General Hospital, Vancouver, BC, Canada, [4]Department of Nephrology, University of British Columbia, Vancouver, BC, Canada*

Purpose: The clinical relevance of HLA allosensitization associated with bacterial infection remains poorly defined. The primary objective of this study is to determine the incidence, characteristics, and clinical relevance of post-infectious de novo HLA antibodies (dnHLA) in a cohort of kidney candidates.

Methods: This retrospective study includes adult kidney patients on the waitlist who (1) had a documented bacterial infection; (2) received a HLA antibody assessment via single-antigen bead (SAB) testing pre- and post-infection; (3) had no other sensitizing events between pre- and post-infectious SAB tests. Epitope analysis was performed using HLA Matchmaker v02. Pathogenic epitopes were identified using IEDB.org.

Results: Overall, n=9/30 (30%) developed dnHLA Ab with an average rise in cPRA of 53.2±39.8% (Fig 1). The most common route of infection was PD peritonitis (5/9), with Enterococcus being the most commonly cultured organism. The majority of antibodies were class I, but class II antibodies had a higher median MFI compared with class I (p=?) (Fig 2). In contrast, among patients with pre-existing antibodies only class I antibodies showed an increase in MFI post-infection but not class II. There were no clear cross-reactivity patterns to the dnHLA Ab that formed post-infection. Due to limited data in IEDB, epitopes could not be matched to any of the infectious pathogens.

Conclusions: In this small but well-characterized cohort of waitlisted kidney transplant patients, a significant proportion of patients developed dnHLA Ab after bacterial infection with a concomitant rise in cPRA that could diminish access to transplant. The lack of cross-reactive patterns to these dnHLA Ab indicate they are less likely to be antigen-specific. The MFI strength of these antibodies permit surrogate crossmatches/absorption studies to further evaluate their clinical relevance.

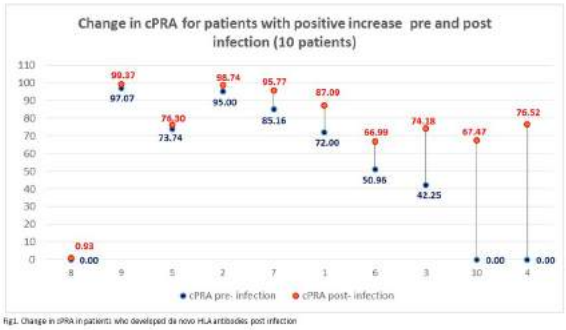


Fig1. Change in cPRA in patients who developed de novo HLA antibodies post infection

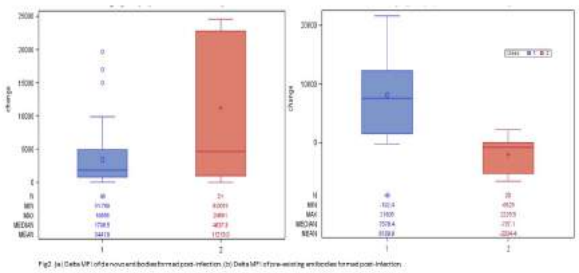


Fig2. (a) Delta MFI of de novo antibodies formed post-infection. (b) Delta MFI of pre-existing antibodies formed post-infection.

CITATION INFORMATION: Cina D., Sherwood K., Dobrer S., Wong J., Fenninger F., Kadatz M., Keown P., Lan J. Impact of Bacterial Infection on HLA Allosensitization Among Kidney Recipients on the Waitlist *AJT, Volume 21 Supplement 3*

DISCLOSURES: D.P. Cina: None. **K.R. Sherwood:** None. **S. Dobrer:** None. **J. Wong:** None. **F. Fenninger:** None. **M. Kadatz:** None. **P. Keown:** None. **J. Lan:** None.

Abstract# 1262

Solid Organ Transplant Telehealth Utilization Significantly Increased During the Covid-19 Pandemic: Experience at a Single, Large Volume Center

R. Forbes, K. Kumm, H. O'Dell, K. Smith, L. Smith, A. Dreher, H. Schaefer, B. Concepcion, *Vanderbilt University Medical Center, Nashville, TN*

Purpose: During the COVID-19 pandemic, telehealth utilization has allowed for the delivery of healthcare while protecting patients, caregivers, healthcare workers, and the community from exposure. We examined the effect of the COVID-19 pandemic on utilization of telehealth in the care of all solid organ transplant patients in all phases of transplant care at our center.

Methods: All patients seen at Vanderbilt University Medical Center for solid organ transplant during any phase of care (referral, evaluation, waitlist, or post-transplantation) from July 1, 2019 through October 31, 2020 were included in this retrospective analysis. Patients seen from July 1, 2019 through February 29, 2020 were identified as a Pre-COVID-19 era cohort. Patients seen from March 1, 2020 through October 31, 2020 were the COVID-19 era cohort. Pretransplant phases of care included referral, evaluation and waitlist; those transplanted were considered posttransplant. Telehealth visits included telemedicine, defined as those conducted by face-to-face (F2F) videoconferencing, and telephone.

Results: Total visit number for all solid organs (kidney, liver, heart, lung, and pancreas) were similar between eras (12585 vs. 13677) [Figure]. There was a significant increase in the use of telehealth in the COVID-19 era for all organ types with the pre-era ranging from 1.2-4.3% while post ranged from 22.4-45.6% [Table]. Telemedicine was not used during the pre-COVID-19 era and its use increased to 17.5-23.7% of all visits by organ type during the COVID-era.

Conclusions: The COVID-19 pandemic has accelerated the use of telehealth in all phases and types of solid organ transplantation. The use of telemedicine although increased represents a minority of total visits and the increased use of telephone visits suggest barriers may remain to more widespread adoption of F2F technology that warrant further investigation.

ALL ORGANS

% of Telehealth Visits (Telemedicine +Telephone) By Solid Organ Type						
	Pre-	COVID-19	Era	COVID-19	Era	
	Tele-medicine	Tele-phone	Tele-health	Tele-medicine	Tele-phone	Tele-health
Kidney	0	1.7	1.7	18.6	14.2	32.8
Liver	0	2.1	2.1	22	20	42
Heart	0	4.3	4.3	17.5	4.9	22.4
Lung	0	1.4	1.4	23.7	21.9	45.6
Pancreas	0	1.2	1.2	19.5	14	33.5

Number of Visits by Solid Organ Type and Phase of Transplant Care by Pre-COVID-19 and COVID-19 Eras

	PRE-COVID-19 ERA			COVID-19 ERA		
	July 2019-February 2020			March 2020-October 2020		
	Pre-Transplant	Post-Transplant	Total	Pre-Transplant	Post-Transplant	Total
Kidney	**1198**	**5785**	**6983**	**1291**	**6174**	**7465**
Office Visit	1176	5685	6861	851	4167	5018
Telemedicine	0	0	0	229	1162	1391
Telephone	22	100	122	211	845	1056
Liver	**160**	**1669**	**1829**	**218**	**1970**	**2188**
Office Visit	154	1637	1791	138	1134	1270
Telemedicine	0	0	0	59	423	482
Telephone	6	32	38	23	413	436
Heart	**320**	**2547**	**2867**	**385**	**2520**	**2905**
Office Visit	306	2439	2745	293	2001	2294
Telemedicine	0	0	0	75	442	517
Telephone	14	108	122	17	127	144
Lung	**98**	**559**	**657**	**111**	**737**	**848**
Office Visit	96	552	648	47	414	461
Telemedicine	0	0	0	36	165	201
Telephone	2	7	9	28	158	186
Pancreas	**55**	**194**	**249**	**55**	**166**	**221**
Office Visit	54	192	246	40	107	147
Telemedicine	0	0	0	10	33	43
Telephone	1	2	3	5	26	31
	1831	**10754**	**12585**	**2060**	**11617**	**13677**

CITATION INFORMATION: Forbes R., Kumm K., O'Dell H., Smith K., Smith L., Dreher A., Schaefer H., Concepcion B. Solid Organ Transplant Telehealth Utilization Significantly Increased During the Covid-19 Pandemic: Experience at a Single, Large Volume Center *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Forbes: None. **K. Kumm:** None. **H. O'Dell:** None. **K. Smith:** None. **L. Smith:** None. **A. Dreher:** None. **H. Schaefer:** None. **B. Concepcion:** None.

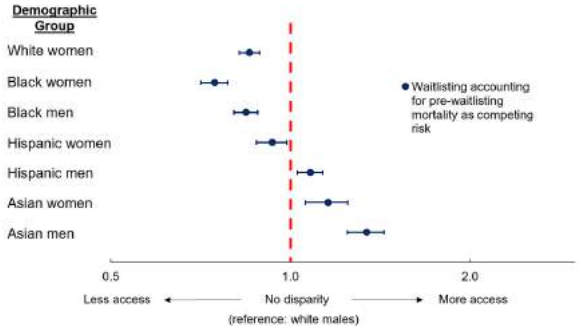
Abstract# 1263

Racial/ethnic and Sex Disparities in Renal Transplant Waitlisting Accounting for Pre-Waitlist Mortality

R. Hamoda[1], R. Patzer[2], M. Saunders[1], *[1]University of Chicago, Chicago, IL, [2]Emory University, Atlanta, GA*

Purpose: The purpose of this study was to assess racial/ethnic and sex differences in access to the renal transplant deceased donor waiting list among incident dialysis patients, accounting for pre-waitlisting mortality as a competing risk.
Methods: After excluding prior renal transplant recipients (n=1,291) and pre-emptive transplants (n=522), we identified a retrospective cohort of all incident adult dialysis patients from January 1, 2015 - December 31, 2016 and followed this cohort through December 31, 2018 via the United States (US) Renal Data System. We used adjusted Fine Gray sub-distribution hazards regression with median imputation to assess racial/ethnic and sex differences in waitlisting accounting for pre-waitlist mortality as a competing risk and adjusting for demographic, clinical and socioeconomic factors.
Results: Among 129,910 US incident dialysis patients, 16.2% (n=20,993) were waitlisted and 26.8% (n=34,814) died before waitlisting. White men (n=42,150, 32.4%) and white women (n=28,293, 21.8%) represented the largest demographic groups among incident dialysis patients, followed by Black men (n=18,200, 14.0%) and Black women (n=15,612, 12.0%). The proportion of waitlisting within each group was highest among Asian men (33.1%) and white men (30.0%), while Black women (17.0%) and white women (14.6%) had the lowest waitlisting proportion. The proportion of pre-waitlisting deaths within each group was highest among white women (58.0%), white men (58.0%), and black women (51.7%), and lowest among Asian males (38.9%). In adjusted analyses accounting for pre-waitlist mortality, Black women (hazard ratio (HR): 0.73, 95% confidence interval (CI): 0.70, 0.77), Black men (HR: 0.82, 95% CI: 0.78, 0.86), white women (HR: 0.86, 95% CI: 0.82, 0.89), and Hispanic women (HR: 0.91, 95% CI: 0.86, 0.96) experienced reduced likelihood of waitlisting compared to white men. (Figure 1).
Conclusions: Racial/ethnic and sex disparities in access to waitlisting for renal transplantation remain after accounting for pre-waitlisting mortality, particularly among female and Black dialysis patients. Notably, Black women appear to experience a compounded disadvantage in access to waitlisting compared to their white female and Black male counterparts. Future work should intervene on improving early access to transplant education, referral, and medical evaluation for these demographic groups.

Figure 1: Racial-ethnic and sex disparities in renal transplant waitlisting among 2015-2016 incident dialysis patients in the United States by demographic group accounting for pre-waitlist mortality as a competing risk



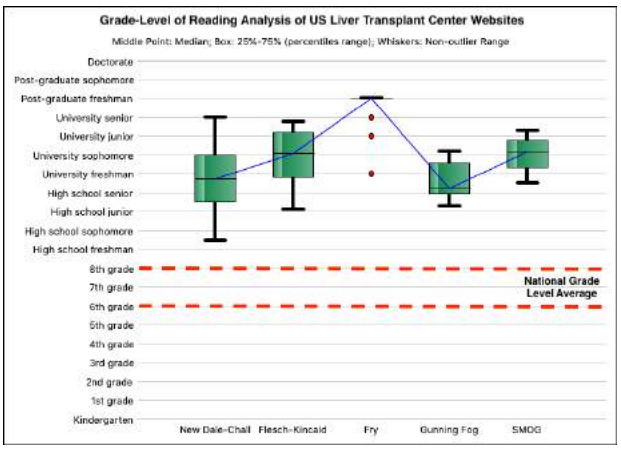
CITATION INFORMATION: Hamoda R., Patzer R., Saunders M. Racial/ethnic and Sex Disparities in Renal Transplant Waitlisting Accounting for Pre-Waitlist Mortality *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. Hamoda: None. **R. Patzer:** None. **M. Saunders:** None.

Abstract# 1264

Are Liver Transplant Center Websites Accessible to All?

C. E. Jacobson[1], R. Olmeda Barrientos[2], M. A. Anderson[3], M. J. Englesbe[3], S. A. Waits[3], V. S. Valbuena[3], *[1]University of Michigan Medical School, Ann Arbor, MI, [2]University Of California – Riverside, School of Medicine, Riverside, CA, [3]Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

Purpose: Ensuring equitable access to transplant center information is an important step in combating health disparities in liver transplantation. This study aimed to assess liver transplant center website readability to determine whether their content was accessible to all patients.
Methods: US liver transplant centers (n=145) were screened by 2019 transplant volume, and the top 14 centers were selected for initial evaluation. The content of each center's liver transplant website was evaluated for readability ease and the education level required to understand the material presented. We used five validated readability tests: New Dale-Chall, Flesch-Kincaid, Flesch Reading Ease, Fry, and Simple Measure of Gobbledygook (SMOG).
Results: The average education level required to comprehend the patient-facing information in this selection of liver transplant center websites was a college undergraduate education. This measure ranged from high school sophomore to doctorate level. On a readability scale of 0-100 (0= most difficult to read, 100= easiest to read), the average website readability ease was 35. Comparable readability and grade-level results were obtained with the additional readability tests performed.
Conclusions: The patient information provided by 14 high volume liver transplant center websites was difficult to read and required an educational level far above the average U.S. national literacy level of 6th-8th grade. We plan to assess the remaining 126 liver transplant center websites and analyze how well they reflect the demographics in their regions based on educational level, race, and alternative languages to English.



CITATION INFORMATION: Jacobson C., Olmeda Barrientos R., Anderson M., Englesbe M., Waits S., Valbuena V. Are Liver Transplant Center Websites Accessible to All? *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.E. Jacobson: None. **R. Olmeda Barrientos:** None. **M.A. Anderson:** None. **M.J. Englesbe:** None. **S.A. Waits:** None. **V.S. Valbuena:** None.

Abstract# 1265

Regional Impact of Covid-19 on Kidney Transplant in the Southeast

C. Jay[1], B. Sharda[1], R. Helmick[2], R. Forbes[3], V. Casingal[4], R. Stratta[1], *[1]Wake Forest Baptist Health, Division of Abdominal Organ Transplantation, Winston-Salem, NC, [2]University of Tennessee Health Science Center, James Eason Transplant Institute, Memphis, TN, [3]Vanderbilt University Medical Center, Division of Kidney and Pancreas Transplantation, Nashville, TN, [4]Atrium Health, Division of Transplant Surgery, Charlotte, NC*

Purpose: Despite categorization of kidney transplantation as Tier 3b with guidelines against postponing, the impact of the COVID-19 pandemic has been profound but geographically diverse. We examined the variable impact of the pandemic on local waitlist, mortality, and transplant rates in the Southeast and the potential relationship with local disease burden.

Methods: Using SRTR data, we analyzed changes pre- and post-COVID by individual donation service area (DSA) in the Southeast, and compared this with state COVID case rates and deaths per 100,000 population according to CDC data.

Results: The highest COVID case rates occurred in TN while death rates were highest in MS [Table 1]. The largest declines in new kidney listings post-COVID occurred in ALOB and TNMS (both 38%) with MSOP having the smallest decline (9%) despite a high COVID case rate; SCOP had an increase (14%). Waitlist mortality varied greatly from a high of 80% in NCCM to a 19% decrease in TNMS. Transplant rates decreased in most DSAs, but great variation occurred from a 44% decline in NCCM to a 38% increase in TNMS.

Conclusions: There was large variability in new kidney listing, transplant rates, and waitlist mortality according to DSA in the Southeast. These changes did not directly correlate with COVID case and death rates. These findings suggest a complex interplay between population health disparities, racial demographics and urban vs rural local populations.

Table 1: COVID and kidney waitlist, transplant, & mortality rates in the Southeast U.S. according to donation service area

Donation Service Area	COVID case rate*	COVID deaths*	Change in new kidney listings†	Change in waitlist mortality rate†	Change in waitlist mortality rate†
TNMS (western TN)	4,738	59	↓ 38%	↓ 19%	↑ 38%
TNDS (central/eastern TN)	4,738	59	↓ 31%	↑ 28%	↑ 0.2%
NCCM (western NC)	3,058	46	↓ 20%	↑ 80%	↓ 44%
NCNC(central/eastern NC)	3,058	46	↓ 13%	↑ 16%	↓ 5%
SCOP	3,892	81	↑ 14%	↑ 64%	↑ 29%
MSOP	4,600	120	↓ 9%	↑ 78%	↓ 20%
ALOB	4,518	67	↓ 38%	↑ 4%	↑13%
GALL	4,093	85	↓ 15%	↑ 9%	↓9%

* https://covid.cdc.gov/covid-data-tracker/#cases_casesper100k; Cases per 100k population; 1/21/20-11/18/20

† https://www.srtr.org/reports-tools/covid-19-evaluation/; pre-COVID (8/21/2019-3/12/20) & post-COVID (3/13/20-10/3/20)

CITATION INFORMATION: Jay C., Sharda B., Helmick R., Forbes R., Casingal V., Stratta R. Regional Impact of Covid-19 on Kidney Transplant in the Southeast *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Jay: None. **B. Sharda:** None. **R. Helmick:** None. **R. Forbes:** None. **V. Casingal:** None. **R. Stratta:** None.

Abstract# 1266

Black Transplant Recipients Reside in the Most Socially Vulnerable Communities

A. C. Killian[1], M. C. McLeod[1], B. Shelton[1], R. D. Reed[1], P. MacLennan[1], H. Qu[1], B. J. Orandi[1], D. Sawinski[2], J. E. Locke[1], *[1]University of Alabama at Birmingham Hospital, Birmingham, AL, [2]Hospital of the University of Pennsylvania, Philadelphia, PA*

Purpose: Racial and socioeconomic disparities in post-transplant outcomes have been described for all solid organ recipients. While the importance of the social determinants of health on transplant outcomes is increasingly recognized, community-level vulnerability among transplant populations is not well understood. The purpose of this study was to describe and compare comprehensive social vulnerability profiles among solid organ transplants recipients.

Methods: The Scientific Registry of Transplant Recipients was utilized to identify adult, deceased donor transplant recipients of either kidney, liver, heart, or lung only between 1/1/2018-12/31/2018. Using the Centers for Disease Control and Prevention's 2018 Social Vulnerability Index (SVI), community-level social vulnerability was defined as the median SVI among census-tracts included in each recipient's zip code. Analysis of covariance (ANCOVA) was performed to determine if SVI differed among transplant types by race, controlling for patient-level characteristics. Tukey-Kramer adjustment for multiple comparisons was used to determine significant differences between transplant types.

Results: 24,566 solid organ transplant recipients were included, of which 54%, 26%, 11%, and 10% received kidney, liver, heart or lung transplant, respectively. SVI varied significantly among the different organ types ($F=194.75$, $p<.0001$). Kidney recipients were found to have significantly higher SVI (e.g. greater social vulnerability; adjusted mean SVI=0.52) compared to liver (adjusted mean SVI=0.47, $p<.0001$), heart (adjusted mean SVI=0.44, $p<.0001$), or lung recipients (adjusted mean SVI=0.44, $p<.0001$). Moreover, black recipients (adjusted mean SVI=0.52) of any organ type had higher SVI in comparison to white (adjusted mean SVI=0.42, $p<.0001$) or other race counterparts (adjusted mean SVI=0.45, $p<.0001$; Figure 1).

Conclusions: Kidney transplant recipients lived in communities with significantly greater social vulnerability compared to other solid organ transplant recipients, while black transplant recipients lived in the most socially vulnerable communities, regardless of transplant type. These data motivate further investigation to understand the interplay between recipients' environments and post-transplant outcomes among all solid organ transplants.

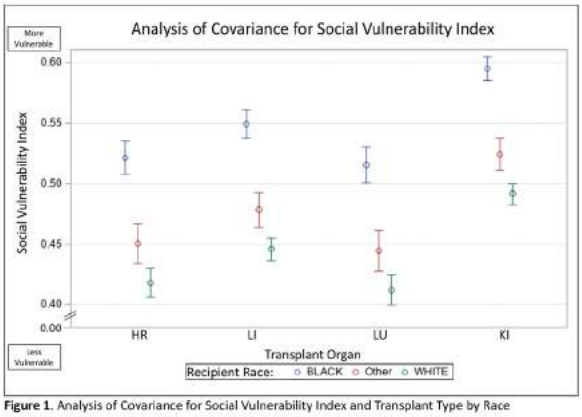


Figure 1. Analysis of Covariance for Social Vulnerability Index and Transplant Type by Race

CITATION INFORMATION: Killian A., McLeod M., Shelton B., Reed R., MacLennan P., Qu H., Orandi B., Sawinski D., Locke J. Black Transplant Recipients Reside in the Most Socially Vulnerable Communities *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.C. Killian: None. **M.C. McLeod:** None. **B. Shelton:** None. **R.D. Reed:** None. **P. MacLennan:** None. **H. Qu:** None. **B.J. Orandi:** None. **D. Sawinski:** Consulting Fee; Name of Commercial Interest; Veloxis, Natera, CareDx. Consulting Fee; Nature of Relationship; advisory board consulting, advisory board consulting, advisory board consulting. **J.E. Locke:** Consulting Fee; Name of Commercial Interest; Sanofi. Consulting Fee; Nature of Relationship; Consultant.

Abstract# 1267

Healthcare Disparities Amongst Dialysis Patients in North Carolina: Decreased Access to Transplant in Lowest Health Rank Counties

D. Leto[1], W. Irish[2], C. Haisch[2], B. Tuttle[2], D. Leeser[2], *[1]Cape Fear Valley Medical Center, Fayetteville, NC, [2]East Carolina University, Greenville, NC*

Purpose: This study measured healthcare disparities amongst the counties in North Carolina with the best compared with counties with the worst healthcare outcomes, specifically the opportunity for dialysis patients in less healthy counties to receive a kidney transplantation compared to patients in healthier counties.

Methods: This is a cross-sectional study, utilizing publicly available data from the Health Cost and Utilization Project State Inpatient Database from 2016. Kidney transplant procedures were identified using the diagnosis-related group code 652 and summarized by County. The number patients on dialysis by county was obtained from the North Carolina Division of Health Service Regulation semiannual dialysis report. Utilizing the Robert Wood Johnson Foundation County Health Rankings, we calculated the prevalence of kidney transplantation (KTx) amongst dialysis patients in the top five healthy verses the bottom five unhealthy rank counties. The proportional surgical ratio (PSR), a measure of surgical disparity, was calculated by dividing the observed number of KTx in the 5 lowest rank healthy counties (LRC) by the expected number of KTx using the 5 healthiest counties (HRC) as the standardized reference. Ninety-five percent confidence interval (CI) for the PSR was calculated using Byar approximation.

Results: In 2016 approximately 1.9 million adults lived in the HRC while approximately 246,854 lived in the LRC. Residents in the LRC are typically older, have less education, have lower income, are more likely uninsured and have higher rates of pre-existing conditions compared to residents in the HRC (Table 1). A total of 1,068 individuals in the 5 LRC were on dialysis (4.3 per 1000 population) compared to 3,264 in the 5 HRC (2.1 per 1000 population, $p<0.0001$). A total of 125 KTx were performed, 19 in the 5 LRC and 106 in the 5 HRC. The rate of KTx in HRC was 32.5 verses 17.9 per 1,000 dialysis-population in the LRC. Using HRC as the reference, the PSR for LRC is 0.55 (95% CI of 0.33, 0.85).

Conclusions: Within North Carolina, the prevalence of dialysis dependent renal failure is nearly 2.5 times higher in LRC areas while the rate of kidney transplantation is 45% lower.

Table 1: Summary of Characteristics of the Lowest and Highest Ranked Health Outcome Counties in North Carolina.

Variable	Lowest Rank Healthy Counties (LRC)	Highest Rank Healthy Counties (HRC)	P value
Mean (SD)	N=5	N=5	
Population, 2016	246,854	1,864,588	
Percent African American	39.1 (12.3)	17.4 (8.4)	0.012
Percent Age 65 or over	16.3 (2.0)	11.5 (2.0)	0.005
Median Household Income	$32,560 ($1,553)	$62,483 ($3,188)	<.001
Uninsured Adults[a]	25.2 (4.3)	19.6 (2.1)	0.034
Percent Adult Obesity[b]	36.6 (3.4)	25.4 (4.6)	0.002
Prevalence Diabetes	15.1 (1.0)	8.7 (0.6)	<.001
Percent Some College[c]	49.3 (5.1)	74.9 (5.4)	<.001

a. Percentage of people under age 65 without insurance
b. Percentage of adults that report Body mass index (BMI) ≥ 30 kg/m²
c. Percentage of adults age 25-44 with some post-secondary education

CITATION INFORMATION: Leto D., Irish W., Haisch C., Tuttle B., Leeser D. Healthcare Disparities Amongst Dialysis Patients in North Carolina: Decreased Access to Transplant in Lowest Health Rank Counties *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Leto: None. **W. Irish:** None. **C. Haisch:** None. **B. Tuttle:** None. **D. Leeser:** None.

Abstract# 1268

Knowledge and Attitudes Towards Organ Donation Among Asian Americans in Queens

M. T. Li, G. C. Hillyer, D. W. Kim, K. L. King, S. A. Husain, S. Mohan, *Columbia University, New York, NY*

Purpose: Asian Americans have the lowest organ donation registration rates in the United States (U.S.). We attempted to identify organ donation barriers among Chinese and Korean Americans by assessing their knowledge and attitudes toward organ donation.
Methods: A questionnaire assessing organ donation knowledge and awareness, religious, cultural, and social attitudes toward organ donation was distributed to Chinese and Korean American college students and the general public (18+ years) in Queens, New York between March and November 2019.
Results: Among the 514 participants, 371 (72%) were of Chinese descent and 132 (26%) were of Korean descent and 11 (2.1%) were mixed. The majority of participants were female (n=290, 56%) and born outside of the U.S. (n=321, 62%) living in the U.S. for an average of 13.8 years. Organ donation was recognized as a noble act by the majority (n=482, 94%) of the respondents, but only a minority (n=97, 19%) of the respondents were registered donors. Notably, most (n=266, 64%) of the non-registered respondents expressed willingness to register as an organ donor. Expressed willingness to donate coupled with a low median knowledge score (41%), indicated an opportunity to improve knowledge and awareness about organ donation in this population. The registered respondents had a significantly higher knowledge score (p<0.0001), more positive attitudes (p=0.0008) towards organ donation, and higher altruistic measures (p=0.032) than non-registered respondents. Factors including English language proficiency and greater level of U.S. acculturation (p=0.0038), prior familial discussions about donation (p<0.0001) and blood donation (p=0.002), and personal experience such as knowing other organ donor registrants (p<0.0001) were also associated with donor registration status. Combined measures of religious/spiritual beliefs (p=0.445) were not associated with registration status.
Conclusions: The survey identified a knowledge deficit regarding organ donation among Asian Americans and the need to adopt culturally sensitive strategies such as stimulating family discussions about organ donation and providing educational material that is preferably in their native language.

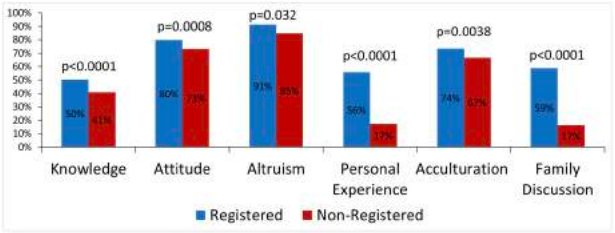


Figure 1: Factors associated with respondents' organ donation registration status

CITATION INFORMATION: Li M., Hillyer G., Kim D., King K., Husain S., Mohan S. Knowledge and Attitudes Towards Organ Donation Among Asian Americans in Queens *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.T. Li: None. **G.C. Hillyer:** None. **D.W. Kim:** None. **K.L. King:** None. **S.A. Husain:** None. **S. Mohan:** None.

Abstract# 1269

Patient Perspective of the Implementation of Virtual Medicine in a Post-kidney Transplant Clinic

S. Mann[1], M. Kadatz[1], J. Lan[1], O. Johnston[1], C. Luo[2], *[1]Medicine, Division of Nephrology, University of British Columbia, Vancouver, BC, Canada, [2]Pharmaceutical Sciences, Vancouver General Hospital, Vancouver, BC, Canada*

Purpose: COVID-19 dramatically altered the model of health care delivery for transplant recipients, necessitating the routine use of virtual medicine. This resulted in consequences for patients and providers, with potential changes on the quality and cost of care. In this study, we present survey results examining the patient perspective of virtual follow-up care in a post-kidney transplant clinic across a large geographic area in Canada.
Methods: Kidney transplant recipients followed in a multidisciplinary, post-transplant clinic in Vancouver, Canada were surveyed from April 21, 2020 - June 6, 2020, 4 weeks after the implementation of virtual medicine follow up. The survey included questions on the quality of instructions, ease of connection, quality of interaction with care provider, impact on their experience of care as well as time and cost required to attend clinic.
Results: 46% of the 169 respondents were between the age of 40 and 59, while 34% were over the age of 60. 38% were within the first year following kidney transplant. The majority were satisfied with the virtual follow up model and thought the quality of the care was improved (Fig 1). 70% of respondents reported a transit time of more than 30 minutes to attend clinic, and 34% reported costs of > $30 per visit prior to the implementation of virtual medicine (Fig 2).
Conclusions: Kidney transplant recipients were satisfied with the quality of care provided using a virtual medicine platform in this survey. The use of virtual medicine to provide care for patients decreased personal resources required to attend virtual clinics. Further study is required to determine if virtual medicine is an equally effective follow up modality in this patient population.

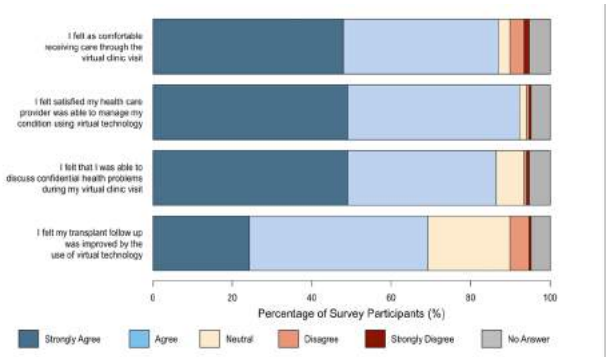


Figure 1: Results of survey describing participants perception of the impact of virtual medicine on the care they received in the post-kidney transplant clinic.

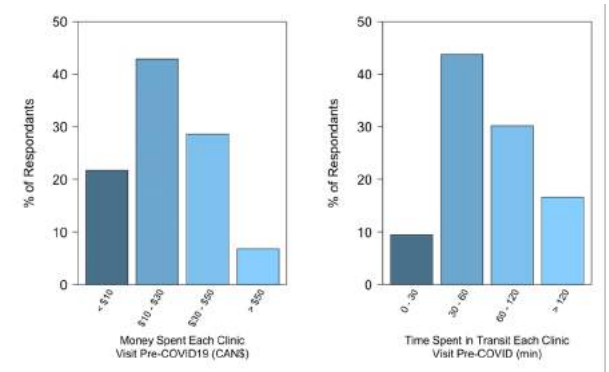


Figure 2: Results of survey describing the time and financial requirements to attend in-person post-kidney transplant clinic visits for before to the implementation of virtual health follow-up pre-COVID-19.

CITATION INFORMATION: Mann S., Kadatz M., Lan J., Johnston O., Luo C. Patient Perspective of the Implementation of Virtual Medicine in a Post-kidney Transplant Clinic *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Mann: None. **M. Kadatz:** None. **J. Lan:** None. **O. Johnston:** None. **C. Luo:** None.

Abstract# 1270

Creating a Culturally Sensitive Report Card for African American Kidney Transplant Candidates: Preliminary Results from Pilot Interviews and Focus Groups

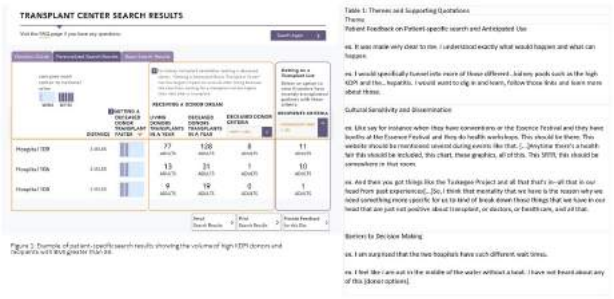
W. T. McKinney[1], M. Bruin[2], B. Kasiske[3], A. Matas[4], A. K. Israni[3], *[1]Hennepin Healthcare Research Institute, Minneapolis, MN, [2]College of Design, University of Minnesota, Minneapolis, MN, [3]Nephrology, Hennepin Healthcare, Minneapolis, MN, [4]Department of Surgery, University of Minnesota, Minneapolis, MN*

Purpose: Racial disparities in kidney transplantation continue to negatively impact African American (AA) patients despite changes to deceased donor allocation practices. AA patients are overrepresented on the waitlist for kidney transplant, face longer wait times, and worse post-transplant outcomes when compared to other communities. Today, AA patients are often unaware of how transplant programs differ and how patient-characteristics influence access to transplant. We aim to evaluate the utility of the patient-specific search of Scientific Registry of Transplant Recipients (SRTR) reports for AA patients, develop a mockup of a culturally sensitive report card, and assess effects the report card has on decision making.

Methods: Pilot interviews and focus groups with AA kidney transplant candidates were structured to collect feedback on the patient-specific search and to inform the development of the culturally sensitive report card (Figure 1). Discussions encouraged participants to consider how the patient-specific search can better serve AA candidates and how to disseminate the tool most effectively to AA patients and stakeholders.

Results: Participant feedback on the patient-specific search was largely positive. Multiple participants indicated that the patient-specific search effectively communicated variations between transplant programs and provided needed information on the availability of specific donor options. At the same time, participants reported that the addition of narratives from AA patients and information on racial disparities would improve the tool's sensitivity to their health needs. Additional themes related to limitations in existing patient education and support practices emerged alongside reflections on the tool and emphasize the potential benefit of improving the accessibility and use of patient-specific tools in consultation with providers and for personal use (Table 1).

Conclusions: Preliminary feedback from pilot interviews identified multiple suggestions for how to improve the accessibility and cultural sensitivity of the patient-specific search. Mock-ups incorporating these suggestions will be evaluated by patients and family members in future focus groups.



CITATION INFORMATION: McKinney W., Bruin M., Kasiske B., Matas A., Israni A. Creating a Culturally Sensitive Report Card for African American Kidney Transplant Candidates: Preliminary Results from Pilot Interviews and Focus Groups *AJT, Volume 21 Supplement 3*

DISCLOSURES: W.T. McKinney: None. **M. Bruin:** None. **B. Kasiske:** None. **A. Matas:** None. **A.K. Israni:** None.

Abstract# 1271

Providing Equitable Access: Language and Literacy Levels of Kidney Transplant Center Websites

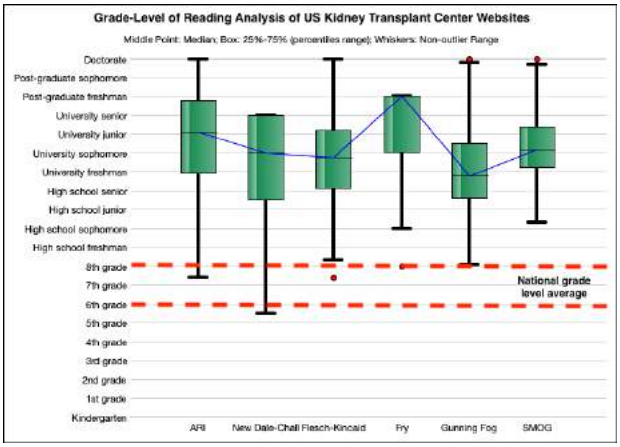
R. Olmeda Barrientos[1], C. E. Jacobson[2], V. S. Valbuena[3], M. S. Anderson[3], M. J. Englesbe[3], S. A. Waits[3], J. R. Santos-Parker[2], *[1]University Of California – Riverside, School of Medicine, Riverside, CA, [2]University of Michigan Medical School, Ann Arbor, MI, [3]Department of Surgery, University of Michigan Health System, Ann Arbor, MI*

Purpose: Health disparities exist for access to kidney transplantation. Accessibility of patient-facing transplant center resources can contribute to these disparities. Patients interact with transplant centers through multiple interfaces, with online websites being a frequently used resource. It is unknown if these websites provide equitable access to transplant center information. This study aimed to assess kidney transplant center website language and literacy levels.

Methods: US kidney transplant center websites were evaluated for language accessibility. The readability and grade level of each website's content was assessed using the following validated tests: New Dale-Chall, Flesch-Kincaid, Flesch Reading Ease, Fry, and Simple Measure of Gobbledygook (SMOG).

Results: 227 kidney transplant centers' websites were identified. 17% (38/227) provided alternative language resources. Region 4 (OK, TX) and 5 (AZ, CA, NV, NM, UT) provided the most resources (14/57), whereas region 8 (CO, IA, KS, MO, NE, WY) and 10 (IN, MI, OH) did not provide any (0/34). The average readability ease for all websites via the Flesch Reading Ease test was 38±12, ranging from 1 to 69 (0= most difficult to read, 100= easiest to read). The average grade level of reading required to understand online patient information across all kidney transplant websites was college-level education, despite the national U.S. literacy level being between 6th and 8th grade. These results were concordant across the additional tests performed.

Conclusions: Less than 20% of kidney transplant center websites provided alternative language resources, which did not reflect their respective state demographics. Websites' literacy levels are well above the national reading average. We hope to provide recommendations and guidelines to improve transplant center accessibility to patients who are non-English speaking or reading below the national literacy level.



CITATION INFORMATION: Olmeda Barrientos R., Jacobson C., Valbuena V., Anderson M., Englesbe M., Waits S., Santos-Parker J. Providing Equitable Access: Language and Literacy Levels of Kidney Transplant Center Websites *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Olmeda Barrientos: None. **C.E. Jacobson:** None. **V.S. Valbuena:** None. **M.S. Anderson:** None. **M.J. Englesbe:** None. **S.A. Waits:** None. **J.R. Santos-Parker:** None.

Abstract# 1272

Gray on the Border: A Closer Look at the Gap in Access to Kidney Transplantation for Hispanic Americans

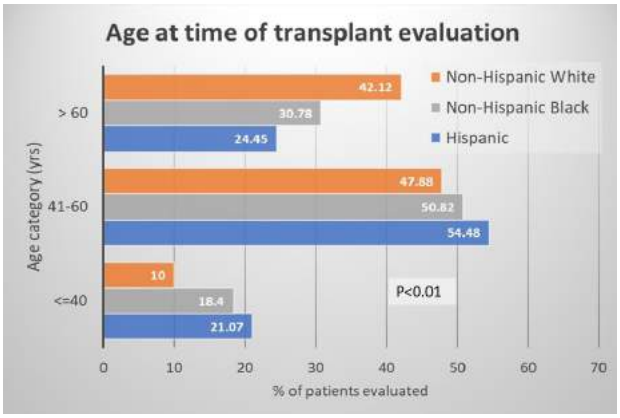
A. Padilla, M. Mujtaba, R. Samper-Ternent, S. Al Snih, N. Perez, J. Fair, R. Kulkarni, E. Polychronopoulou, M. Kueht, *University of Texas Medical Branch, Galveston, TX*

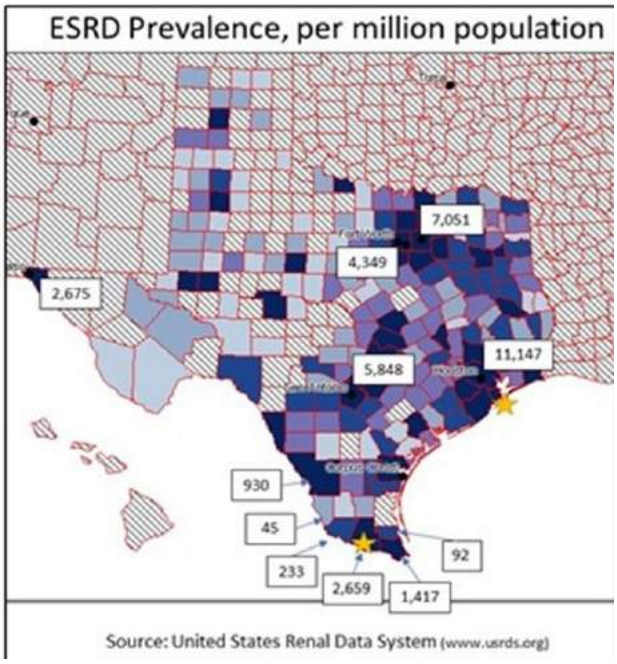
Purpose: Hispanic Americans have disproportionately reduced access to kidney transplantation that is significantly affected by longstanding cultural and geographical disparities. These disparities are multifactorial and include long distances to transplant centers and delayed referral to transplant. To mitigate this lack of access, our center operates multiple clinics across the state including in the Rio Grande Valley (RGV), a region near the Texas-Mexico border.

Methods: The study group comprised all patients evaluated for kidney transplantation between Jan 2015 and Aug 2020 at our institution. Socio-demographic characteristics, comorbidities, and time interval between declaration of ESRD and evaluation were compiled. These data were compared by race/ethnicity and between two clinical sites operated by our institution separated by over 390 miles with distinct population demographics: RGV (border) and MC (main-campus, inland). The proportion of life spent with ESRD prior to evaluation was also calculated.

Results: 2,156 patients were evaluated for kidney transplantation during the study period (RGV: 441, MC: 1723). Four percent of patients at both sites had spent at least 20% of their lives with ESRD prior to evaluation for transplant. A greater proportion of patients at RGV were Hispanic (93% vs 38%, $p<0.01$). Across both sites, Hispanic patients were significantly younger at the time of evaluation (51 vs 56 yrs, $p<0.01$). Time with ESRD at time of evaluation was significantly longer at RGV (3.3 vs 2.7 yrs, $p<0.01$). The proportion of life spent with ESRD prior to evaluation was significantly longer at RGV than MC (6.9 vs 5.7%, $p<0.01$).

Conclusions: Previous analyses of access to transplantation have focused on waitlist and transplant characteristics. This study demonstrated significant differences between both clinics at the beginning of the transplant process, the evaluation. These data support the need for continued efforts to create and maintain access to transplantation in at-risk socio-cultural groups such as Hispanic-Americans.





CITATION INFORMATION: Padilla A., Mujtaba M., Samper-Ternent R., Al Snih S., Perez N., Fair J., Kulkarni R., Polychronopoulou E., Kueht M. Gray on the Border: A Closer Look at the Gap in Access to Kidney Transplantation for Hispanic Americans *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Padilla: None. **M. Mujtaba:** None. **R. Samper-Ternent:** None. **S. Al Snih:** None. **N. Perez:** None. **J. Fair:** None. **R. Kulkarni:** None. **E. Polychronopoulou:** None. **M. Kueht:** None.

Abstract# 1273

Racial Differences in Tacrolimus Xr Dosing in De Novo Kidney Transplant Recipients

N. Patel, T. Carcella, F. Bartlett, V. Rohan, D. Taber, *Medical University of South Carolina, Charleston, SC*

Purpose: In May of 2020, our center was challenged with a nationwide shortage of tacrolimus IR, warranting implementation of a new de novo tacrolimus XR protocol. The purpose of this study is to assess two different dosing strategies of Tacrolimus XR in African American (AA) and non-AA de novo kidney transplant recipients.

Methods: This retrospective study includes adult kidney transplant recipients between May 2020 and Sept 2020.The study population was divided into two groups across two different dosing strategies:non-AA and AA and then further stratified based on initial dosing.The initial dosing strategy was to give all patients between 0.12mg/kg and 0.17mg/kg, regardless of race; the second strategy was to give 0.12 mg/kg to non-AAs and 0.15mg/kg to AAs. The primary endpoint was days to a therapeutic tac trough (>7 ng/ml).Other endpoints included dose at steady state (SS), number of doses held, dose at POD 30,time in therapeutic range (TTR) in the first month and adverse effects.

Results: A total of 122 patients were included. There was a statistically higher number of DDKT and DCD in the AA cohort. They also had a significantly higher EPTS score, HLA mismatches, longer time on dialysis, and were more likely to get induction with ATG. In initial analysis, there was a significant interaction between race and dosing strategy for the outcome of time to therapeutic level. During the initial dosing strategy, AA had a significantly longer time to achieving a therapeutic trough (6.2 vs. 4.4 days, P value 0.03). The non-AA group experienced a higher incidence of neurotoxicity compared to the AA group. After the dosing strategy was changed for AA recipients, the time to a therapeutic level decreased to 4 days with no significance between groups. The incidence of neurotoxicity continued to be higher in the non-AA group. The remining results are shown in table 1 and 2.

Conclusions: The results demonstrate that AAs can achieve a similar time to therapeutic tac trough concentrations with tacrolimus XR, as compared to non-AAs, using a race stratified dosing strategy.Future analyses are underway to assess the impact of CYP 3A5 genotype on dose requirements and time to achieve therapeutic levels.

Table 1: Outcomes Pre-dose change (Cohort 1)

	AA (N=57)	Non-AA (N=27)	P-value
Initial mg/kg dose, mean ± SD	0.14 ± 0.03	0.14 ± 0.02	0.390
Initial dose (mg), mean ± SD	12.5 ± 3.9	13.3 ± 4.04	0.329
First therapeutic level by POD 7, N (%)	17 (29.8)	5 (18.5)	0.271
First therapeutic level by POD 5, N (%)	24 (42.1)	7 (25.9)	0.151
Tac trough not at SS by POD 30, N (%)	10 (17.5)	2 (7.4)	0.215
Neurotoxicity, N (%)	17 (29.8)	19 (70)	**0.003**
GI toxicity, N (%)	37 (65)	20 (74)	0.780
Atleast 1 dose of Tac held, N (%)	23 (40.4)	17 (63)	**0.05**
Days to trough >7 ng/ml (days), mean ± SD	6.2 ± 4.6	4.4 ± 2.8	**0.03**
POD for 1st trough in range (7-12 ng/ml), mean ± SD	6.9 ± 5.2	5.4 ± 4.2	0.190
Mg/kg dose at steady state, mean ± SD	0.15 ± 0.06	0.15 ± 0.07	0.843
Dose at steady state, mean ± SD	13.3 ± 5.2	13.5 ± 5.2	0.889
Dose at steady state or POD 30, mean ± SD	13. 2 ± 4.9	13.2 ± 5.1	0.960
Number of doses held, mean ± SD	0.675 ± 1.05	1.14 ± 1.40	0.089
Tac dose POD 30, mean ± SD	13.2 ± 3.2	11.9 ± 3.9	0.154
TTR 3-30 days, mean ± SD	0.62 ± 0.22	0.69 ± 0.21	0.144

Table 2: Outcome Post dose change based on race (cohort 2)

	AA (N=19)	Non-AA (N=19)	P-value
Initial mg/kg dose, mean ± SD	0.15 ± 0.005	0.12 ± 0.007	**<0.005**
Initial dose (mg), mean ± SD	12.6 ± 2.8	9.9 ± 1.7	**0.001**
First therapeutic level by POD 7, N (%)	2 (10.5)	5 (26.3)	0.209
First therapeutic level by POD 5, N (%)	4 (21.2)	8 (42.2)	0.163
Tac trough not at SS by POD 30, N (%)	3 (15.8)	3 (15.8)	1.00
Neurotoxicity, N (%)	1 (5.3)	3 (15.8)	**0.021**
GI toxicity, N (%)	15 (79)	18 (95)	0.142
Atleast 1 dose of Tac held, N (%)	10 (52.6)	6 (31.6)	0.189
Days to trough >7 ng/ml (days), mean ± SD	4 ± 1.24	4.5 ± 2.1	0.41
POD for 1st trough in range (7-12 ng/ml), mean ± SD	5.4 ± 4.4	5.7 ± 3.07	0.767
Mg/kg dose at steady state, mean ± SD	0.14 ± 0.06	0.11 ± 0.04	0.259
Dose at steady state, mean ± SD	11.1 ± 5.9	8.8 ± 2.7	0.163
Dose at steady state or POD 30, mean ± SD	11.2 ± 5.5	8.8 ± 2.5	0.092
Number of doses held, mean ± SD	0.95 ± 1.03	0.47 ± 0.84	0.128
Tac dose POD 30, mean ± SD	12 ± 3.9	8.8 ± 1.7	**0.02**
TTR 3-30 days, mean ± SD	0.63 ± 0.24	0.74 ± 0.19	0.118

CITATION INFORMATION: Patel N., Carcella T., Bartlett F., Rohan V., Taber D. Racial Differences in Tacrolimus Xr Dosing in De Novo Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Patel: None. **T. Carcella:** None. **F. Bartlett:** None. **V. Rohan:** None. **D. Taber:** None.

Abstract# 1274

Dialysis Staff-Reported Impact of the Early Covid-19 Pandemic on Kidney Transplant Referrals and Evaluations

A. Perez[1], S. Retzloff[1], T. Browne[2], A. Cruz[3], S. Wright[3], S. Pastan[4], R. Patzer[1], *[1]Department of Surgery, Emory University School of Medicine, Atlanta, GA, [2]College of Social Work, University of South Carolina, Columbia, SC, [3]IPRO ESRD Network of the South Atlantic, Morrisville, NC, [4]Department of Medicine, Emory University School of Medicine, Atlanta, GA*

Purpose: COVID-19 has drastically impacted healthcare systems since its declaration as a pandemic in March 2020. Evidence of this impact persists among solid organ transplant programs, with vast disruptions to kidney transplant reported nationwide. Little is known about the influence of COVID-19 on early transplant steps occurring at the dialysis facility level. We sought to describe the staff-reported impact of COVID-19 on kidney transplant referrals and evaluations.

Methods: A cross-sectional survey was emailed to n=579 dialysis facility staff in ESRD Network 6 (Georgia, North Carolina, and South Carolina) in April 2020. Responses were linked to 2015-2018 Centers for Medicare and Medicaid Services Dialysis Facility Report data, and patient and facility characteristics were compared using t-tests, Wilcoxon rank-sum tests, and chi-square tests.

Results: Among 280 survey responses received from unique dialysis facilities, 28.9% of respondents disclosed that transplant referrals were affected by COVID-19, and 60.4% described transplant evaluations as affected (Table 1). When describing barriers to quality improvement activities due to COVID-19, the most prominent concerns were "dependent institutions not operating as usual" (48.6%), an "over-

whelmed healthcare system" (33.6%), and transportation issues (26.8%). Facilities were comparable with regards to patient and facility demographic, clinical, and socioeconomic characteristics.

Table 1. Quality Improvement Activities affected by COVID-19 as reported by dialysis facility staff, 4/13/2020-4/17/2020 (N=280)

Activity	N (%)
Transplant evaluations	169 (60.4)
Hosting/supporting patient support groups	144 (51.4)
Inviting patients to QAPI meetings	141 (50.4)
Vascular access placement	123 (43.9)
Peer Mentor-Mentee interaction	82 (29.3)
Transplant referrals	81 (28.9)
Peer Mentorship training	71 (25.4)
Home dialysis program referral	61 (21.8)
Home dialysis program training (for patients)	42 (15.0)
No area affected	23 (8.2)
Other	13 (4.6)

Conclusions: Our findings provide further evidence that kidney transplant has been substantially affected by the COVID-19 pandemic, even at the dialysis facility level. Policies surrounding transitions to normal operations among dialysis facilities in the Southeastern United States must consider the long-term implications of these delays related to transplant access.

CITATION INFORMATION: Perez A., Retzloff S., Browne T., Cruz A., Wright S., Pastan S., Patzer R. Dialysis Staff-Reported Impact of the Early Covid-19 Pandemic on Kidney Transplant Referrals and Evaluations *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Perez: None. **S. Retzloff:** None. **T. Browne:** None. **A. Cruz:** None. **S. Wright:** None. **S. Pastan:** None. **R. Patzer:** None.

Abstract# 1275

AM PAC Scores and Liver Transplant Resource Utilization

M. Pierpont[1], M. Gosselin[2], K. Robichaux[3], A. Kumar[1], J. Buggs[4], N. Kemmer[5], *[1]Morsani College of Medicine, University of South Florida, Tampa, FL, [2]Honors College, University of Tampa, Tampa, FL, [3]Honors College, University of South Florida, Tampa, FL, [4]Transplant Surgery, Tampa General Hospital, Tampa, FL, [5]Transplant Hepatology, Tampa General Hospital, Tampa, FL*

Purpose: Activity Measure for Post-Acute Care (AM-PAC) is a tool utilized to assess three functional domains: basic mobility, daily activities, and applied cognition. Previous studies have suggested that 6-Clicks, a shorthand form of AM-PAC, strengthens a practitioner's ability to make reliable discharge recommendations and predict hospital length of stay (LOS). The purpose of this study was to examine the correlation between AM-PAC scores (collected by both a physical therapist (PT) and an occupational therapist (OT) to LOS and discharge disposition in liver transplant patients.

Methods: A single-center retrospective chart review was conducted on patients that underwent a liver transplant from May 2019 - May 2020. All pediatric patients were excluded. Resource utilization was defined in the study as LOS and discharge disposition.

Results: Our analysis included data from 128 patient records. Liver transplant alone occurred in 117 patients, while 11 underwent liver and kidney transplants. The mean values for each score were 14.5 (PT AM-PAC score) and 16.8 (OT AM-PAC score). There was a negative correlation between LOS and PT Score (correlation coefficient -0.336, $p<0.001$) and OT score (correlation coefficient -0.398, $p<0.001$). There was a statistically significant difference in the mean score for each of the values based on the patients' disposition at the time of discharge (home vs. rehab respectively). PT AM-PAC score (16 vs 13, $p=0.008$) and OT AM-PAC score (18 vs. 15, $p<0001$).

Conclusions: Our results suggest that lower AM-PAC Scores are associated with higher resource utilization in liver transplant patients. Thus, AMPAC scores may help predict discharge dispositions and length of hospital stay. This is the first study that validates the AMPAC score as a predictor for patient outcomes in transplant therapy.

CITATION INFORMATION: Pierpont M., Gosselin M., Robichaux K., Kumar A., Buggs J., Kemmer N. AM PAC Scores and Liver Transplant Resource Utilization *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Pierpont: None. **M. Gosselin:** None. **K. Robichaux:** None. **A. Kumar:** None. **J. Buggs:** None. **N. Kemmer:** None.

Abstract# 1276

Survey of Transplantation Providers to Assess for Implicit Bias at a Single Center

C. Ramirez-Sanchez[1], A. Cardenas[2], S. Aslam[1], F. Ferguson[2], M. Vazquez[2], T. Magee[2], K. Mekeel[2], *[1]Infectious Diseases, University of California San Diego, La Jolla, CA, [2]University of California San Diego, La Jolla, CA*

Purpose: At our institution's Center for Transplantation, the Implicit Bias Working Group (IBWG), was formed with the aim to comprehend how implicit biases impact the decision making and treatment of our team members and ultimately our patients; and to develop actionable plans to mitigate bias and promote fair treatment and equitable opportunity for all.

Methods: A confidential and anonymous survey consisting of 21 questions was administered via online Qualtrics instrument to all Center of Transplantation physicians and employees (n=130). This survey assessed for respondent demographics and microaggressions, racism and bias in the work place as well as in the delivery of patient care.

Results: The IBWG provided the opportunity for 100% of staff to complete a voluntary implicit bias training, followed by a confidential survey. Of the 130 surveys delivered, 111 were completed. 56 (48%) of the surveyed team members identified as racial minorities of which, 16 (28%) members have experienced bias and/or discrimination from a team member. Of the 16 who experienced bias and/or discrimination, 10 experienced it *rarely*, 5 *occasionally* and 1 respondent did so *frequently*. More than 40% of the respondents reported having experienced bias and/or discrimination from a patient or patient's family member. These findings demonstrated the undeniable presence of bias and discrimination faced by our team members. While 41% of all respondents noted witnessing some form of bias or discrimination against another team member, only 21% stated they always felt comfortable addressing such issues.

Conclusions: After gaining more understanding of our team members' experience, there will be a focused effort on systematic education and creating a safe forum for identifying, confronting and mitigating implicit bias and its impact on team dynamics. It is imperative that team members are aware of their implicit bias and feel comfortable sharing their thoughts, witnessed events and experiences with the rest of the team and patients to better guide policy, practice, and increase the diversity of the transplant team at all levels to have a positive impact on team dynamics and patient care.

CITATION INFORMATION: Ramirez-Sanchez C., Cardenas A., Aslam S., Ferguson F., Vazquez M., Magee T., Mekeel K. Survey of Transplantation Providers to Assess for Implicit Bias at a Single Center *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Ramirez-Sanchez: None. **A. Cardenas:** None. **S. Aslam:** None. **F. Ferguson:** None. **M. Vazquez:** None. **T. Magee:** None. **K. Mekeel:** None.

Abstract# 1277

Association of Obesity and Early Post Kidney Transplantation Complications

V. Sandra, N. Sanichar, D. Tsapepas, K. L. King, J. Van Bever, K. Toma, A. Hussain, S. Mohan, *Columbia University Irving Medical Center, New York, NY*

Purpose: Although the prevalence of obesity among kidney transplant recipients is rising, there continues to be reluctance to waitlist obese candidates. We sought to determine the association between recipient body mass index (BMI) and early post-transplant complications.

Methods: Single-center, retrospective cohort study of all adult kidney transplant recipients from 2004-2020. Recipients were stratified into four BMI (at transplant) categories: normal-weight (BMI 18.5-24.9kg/m^2, n=1020), overweight (BMI 25-29.9, n=1002), moderately obese (BMI 30-34.9, n=510), and severely-to-morbidly obese (BMI ≥35, n=274). Logistic regression was used to estimate the association between BMI category and surgical-site infections (SSIs), hydronephrosis, and allograft survival.

Results: Recipients with BMI≥35 had significantly higher rates of SSIs ($p<0.001$) and hydronephrosis ($p<0.001$) compared with recipients in all other BMI categories. On multivariable analysis, recipients with BMI≥35 had increased odds of SSIs compared with normal-weight recipients (odds ratio [OR], 3.3, 95% CI 1.6-7.2, $p=0.022$), and recipients with BMI 30-34.9 and ≥35 had increased odds of early hydronephrosis (OR 1.9, 95% CI 1.1-3.2, $p=0.015$, and OR 2.3, 95% CI 1.2-4.2, $p=0.009$, respectively). While no BMI groups experienced increased odds of allograft failure, recipients who were Black, diabetic pre-transplant, and experienced delayed graft function were at increased odds on multivariable analysis. When the highest BMI group was further stratified into 39.9 and ≥40 kg/m^2 on sensitivity analysis, both groups remained significantly associated with an increased odds of surgical site infections (OR 3.2, 95% CI 1.4-7.3, $p=0.047$, and OR 3.7, 95% CI 1.3-10.6, $p=0.014$) compared to the normal weight group.

Conclusions: Obesity is associated with an increased risk of immediate post-transplant complications such as SSIs and hydronephrosis, but is not associated increased long term risk of kidney allograft failure.

BMI group (kg/m²)	Adjusted OR	95% CI	P
Surgical site infection*			
18.5 – 24.9	Ref	------	------
25 – 29.9	1.20	0.61-2.39	0.598
30 – 34.9	0.76	0.28-2.10	0.655
≥35	3.34	1.55-7.22	0.022
Early hydronephrosis*			
18.5 – 24.9	Ref	------	------
25 – 29.9	0.96	0.59-1.55	0.854
30 – 34.9	1.90	1.13-3.19	0.015
≥35	2.29	1.23-4.24	0.009
Death-censored allograft failure**			
18.5 – 24.9	Ref	------	------
25 – 29.9	1.02	0.77-1.34	0.900
30 – 34.9	1.40	0.98-2.00	0.068
≥35	1.17	0.70-1.98	0.548

*Adjusted for age, race, sex, pre-transplant diabetes, DGF, donor type (**and SSIs)

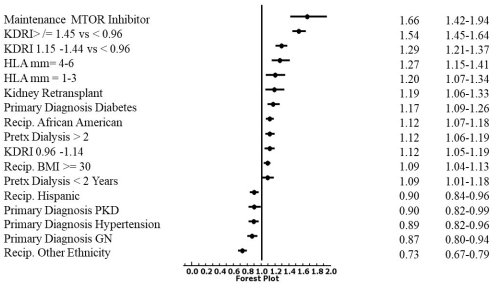
CITATION INFORMATION: Sandra V., Sanichar N., Tsapepas D., King K., Van Bever J., Toma K., Hussain A., Mohan S. Association of Obesity and Early Post Kidney Transplantation Complications *AJT, Volume 21 Supplement 3*
DISCLOSURES: V. Sandra: None. **N. Sanichar:** None. **D. Tsapepas:** None. **K.L. King:** None. **J. Van Bever:** None. **K. Toma:** None. **A. Hussain:** None. **S. Mohan:** None.

Abstract# 1278

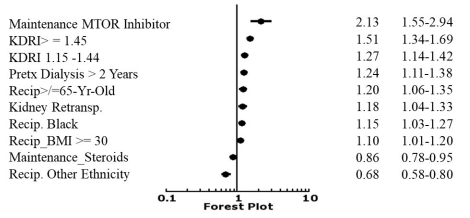
Hospitalization in the First Year After Kidney Transplantation: Analyses to Identify Common Predictors of Risk Across Recipient Sensitization Groups

A. Santos, E. Bueno, M. A. Leghrouz, *University of Florida, Gainesville, FL*

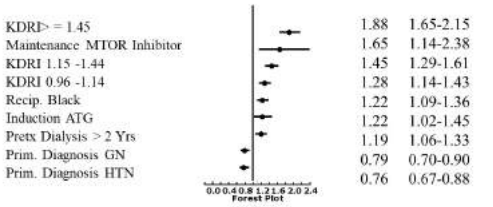
Purpose: We investigated the risk of hospitalization associated with baseline risk factors in adult deceased donor (DD) kidney transplant (KT) recipients (KTRs) stratified into calculated panel reactive antibody (CPRA) groups.
Methods: Using OPTN data, we compared the 1-yr. post-kidney transplant likelihood of hospitalization in adult DDKTRs categorized as low, intermediate, and high sensitization cohorts; corresponding to CPRA levels of <10%, 10%-79%, and >/=80%, respectively. Subsequently, we analyzed the association of baseline risk factors with the likelihood of hospitalization in the year following KT using a logistic regression model for each of the 3 cohorts.
Results: Hospitalization risk factors common to all 3 CPRA groups were: high kidney donor risk index (KDRI-Rao), mammalian target of rapamycin inhibitor (MTORI) immunosuppression, African American KTR ethnicity, and pre-transplant dialysis duration >2 years (**Figs. 1-3**). Across CPRA cohorts, KDRI-Rao >/=1.45 and MTORI regimen carried the highest risks (51%-88% and 65% -113%, respectively) of post-KT hospitalization (**Figs. 1-3**). Anti-thymocyte globulin induction is associated with higher risks of hospitalization than alemtuzumab [HR=1.08; 95% CI=1.02-1.16], (not shown in figures) and interleukin-2 receptor antagonist [HR=1.22; 95% CI=1.02-1.45], (**Fig. 3**) in the low and high sensitization cohorts, respectively.
Conclusions: The risk of first post-transplant year hospitalization may be predicted from risk factors known at the time of or at discharge after DDKT. Closer follow-up of KTR at risk may help prevent re-hospitalizations and associated adverse outcomes.



Risk Factors for All-Cause Hospitalization, First Year Post Kidney Transplant
CPRA <10% Group



Risk Factors for All-Cause Hospitalization, First Year Post Kidney Transplant
CPRA 10-79 % Group



Risk Factors for All-Cause Hospitalization, First Year Post Kidney Transplant
CPRA >/= 80 % Group

CITATION INFORMATION: Santos A., Bueno E., Leghrouz M. Hospitalization in the First Year After Kidney Transplantation: Analyses to Identify Common Predictors of Risk Across Recipient Sensitization Groups *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Santos: None. **E. Bueno:** None. **M.A. Leghrouz:** None.

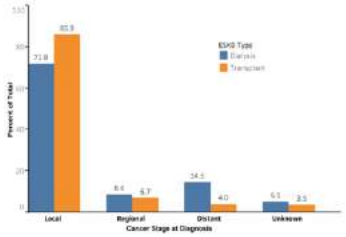
Abstract# 1279

Prostate Cancer Mortality is Not Worse Among Kidney Transplant Recipients Compared to Dialysis Patients

N. Sarabu[1], W. Dong[2], S. M. Koroukian[2], *[1]University Hospital Cleveland Medical Center, Cleveland, OH, [2]Case Western Reserve University, Cleveland, OH*

Purpose: Recent recommendations from expert panel of American Society of Transplantation (AST) state that most patients with prostate cancer (PCa) do not need to wait additional time, due to PCa, for kidney transplant (KT) even though there is limited data on how post transplant outcomes compare to dialysis patients with PCa.
Methods: Utilizing Surveillance Epidemiology End Results (SEER)-Medicare registry data, we retrospectively studied ESKD (dialysis and kidney transplant) patients (≥40 years old), who were diagnosed with prostate cancer between January 1, 2004 and September 30, 2015 after established ESKD diagnosis. Distribution of stage at diagnosis was compared between dialysis and KT using chi-square test. Time to all-cause death (OM) and time to death due to PCa (CS), by stage at diagnosis were compared using Kaplan-Meier, Cumulative Incidence Function, Cox-proportional hazards and Fine-Gray competing risk models.
Results: A total of 1959 patients met our eligibility criteria (1478 on dialysis and 481 with functioning KT). KT patients were more likely to present with local stage and less likely to present with distant stage at diagnosis than dialysis counterparts

Figure 1: Distribution of ESKD Patients With PCa (2004-2015), by Dialysis Vs. KT.



In the multivariable models, KT had 45% lower hazard of OM ($_{0.46}0.55_{0.66}$) and no difference in CS ($_{0.42}0.68_{1.11}$). Patient characteristics that were associated with worse CS included regional and distant stage at presentation, Gleason score >8, and PSA level > 20

Table 1: Selected Multivariate Associations of Overall Mortality and Prostate Cancer Specific Mortality for ESKD (dialysis and KT) Patients (2004-2015)

Variable	Adjusted Hazard Ratio for Overall Mortality, aHR (95%CI)	Adjusted Hazard Ratio for Prostate PCa specific Mortality, aHR (95%CI)
Stage		
Regional Vs. Local	**1.35 (1.07, 1.69)**	**3.04 (1.75, 5.28)**
Distant Vs. Local	**2.88 (2.31, 3.59)**	**6.20 (3.81, 10.10)**
Age at Diagnosis (%)		
65-74 Vs. 40-64	**1.52 (1.30, 1.77)**	1.15 (0.74, 1.78)
75+ Vs. 40-64	**2.15 (1.79, 2.59)**	1.35 (0.83, 2.20)
ESKD Type		
Kidney Transplant Vs. Dialysis	**0.55 (0.46, 0.66)**	0.68 (0.42, 1.11)
Gleason Score		
≥8 Vs. < 8	**1.23 (1.05, 1.44)**	**2.77 (1.76, 4.37)**
PSA Level		
>20 Vs. ≤20	1.07 (0.90, 1.28)	**1.71 (1.06, 2.75)**

Interestingly, receiving surgery or radiation was not associated with improvement in CS ($_{0.67}0.95_{1.36}$).

Conclusions: Our study shows that, compared to dialysis patients, kidney transplant recipients with prostate cancer have almost two times better overall survival but similar prostate cancer specific survival. Moreover, receiving surgery or radiation for prostate cancer is not associated with improved prostate cancer specific survival. These findings support the recent recommendation made by AST expert panel that for kidney transplant candidates with prostate cancer, no waiting prior to transplant or treatment for prostate cancer is necessary for localized and regional stages.

CITATION INFORMATION: Sarabu N., Dong W., Koroukian S. Prostate Cancer Mortality is Not Worse Among Kidney Transplant Recipients Compared to Dialysis Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Sarabu: None. **W. Dong:** None. **S.M. Koroukian:** None.

Abstract# 1280

Seeing is Believing: Efficacy of a Video-based Intervention in Improving Awareness of Skin Cancer Risk for Solid Organ Transplant Recipients

E. Shah[1], S. Michalak[1], R. Haughton[1], B. Fernandez[1], I. Ahronowitz[2], *[1]Keck School of Medicine, Los Angeles, CA, [2]Dermatology, Keck School of Medicine, Los Angeles, CA*

Purpose: Our research focuses on the efficacy of using a novel video-based intervention to educate solid organ transplant recipients on their increased risk of skin cancer. I will be referring to solid organ transplant recipients as SOTR in this abstract.

Methods: In this ongoing prospective study, SOTR from our majority-Hispanic patient population at Los Angeles County Hospital and Keck Hospital of USC seen by our dermatology department were enrolled. Participants completed a pre-intervention survey measuring their perceived risk of developing skin cancer and their sun protective behaviors. We developed an informational video in English and Spanish highlighting the increased risk posed to transplant recipients in developing non-melanoma skin cancer and preventive strategies, including sunscreen, protective clothing, self-skin checks, and dermatology follow ups. After viewing the video, patients were completed a post-intervention survey to see if their perceptions and practices regarding skin cancer had changed.

Results: A total of 48 SOTR patients were enrolled in the study. We analyzed the results 13 patients who completed both in the pre- and post- intervention survey. As shown in Figure 1, 69% of patients reported sunscreen use pre-intervention compared to 92% of patients post-intervention. In addition, 46% of patients reported an improved understanding of their skin cancer risk pre-intervention compared to 77% of patients post-intervention and 54% of patients had checked for skin cancer in the past month pre-intervention compared to 69% of patients post-intervention. Of the 48 enrolled participants, 58.8% identified as Hispanic or Latino, however of the 13 who completed the post-intervention surveys only 15.4% identified as Hispanic or Latino. We are currently enrolling more patients in hopes of achieving a more representative demographic breakdown.

Conclusions: Our study builds on prior literature which demonstrates the efficacy of video-based messaging and intervention on behavior change to reduce the risk of skin cancer in the general population as well as in SOTR. This intervention presents a cost-effective and timely method to increase awareness of skin cancer for at-risk patients. In addition, the discrepancy of Hispanic and Latino patient enrollment pre and post intervention highlights the need to address how to improve study retention of minority patients.

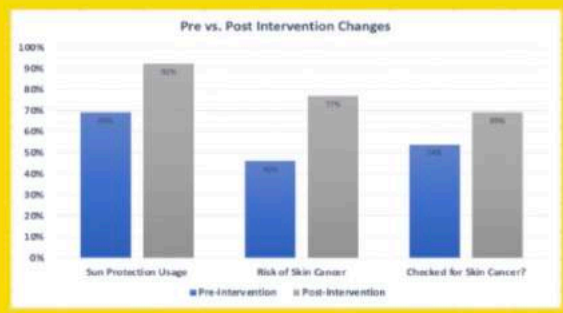


Figure 1. Survey response changes pre vs. post intervention. A) Percent of patients answering yes to use of suncreen, B) Percent of patients who perceive themselves as at elevated risk for skin cancer, C) Percent of patients who self check for skin cancer

Characteristics	No. of patients
Gender	
Male	6 (47.0%)
Female	7 (54.0%)
Age Group (yr)	
20-40	4 (30.7%)
40-60	3 (23.0%)
60-80	6 (46.3%)
Ethnicity[1]	
Not Hispanic/Latino	9 (69.0%)
Hispanic/Latino	2 (15.4%)
Race[1]	
American Indian or Alaska Native	0 (0%)
Black or African American	1 (7.75%)
Asian	3 (23.0%)
White	8 (61.5%)
Native Hawiian or Other Pacific Islander	0 (0%)
Other	0 (0%)
Education[2]	
Finished high school	1 (7.75%)
Finished college	6 (46.0%)
Advanced degree	2 (15.4%)
Organ Transplant	
Heart	2 (15.4%)
Liver	6 (46.2%)
Kidney	3 (23%)
Lung	2 (15.4%)
Pancreas	0 (0%)
Skin cancer at baseline	
Yes	4 (30.7%)
No	9 (69.3%)

Figure 2. Baseline characteristics of study sample. 48 patients were enrolled in this pilot study. 13 patients viewed the video and completed the post-intervention survey.

CITATION INFORMATION: Shah E., Michalak S., Haughton R., Fernandez B., Ahronowitz I. Seeing is Believing: Efficacy of a Video-based Intervention in Improving Awareness of Skin Cancer Risk for Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Shah: None. **S. Michalak:** None. **R. Haughton:** None. **B. Fernandez:** None. **I. Ahronowitz:** None.

ALL ORGANS

Abstract# 1281

Increased Deceased Organ Donation Rates Among Racial and Ethnic Minorities: Not Exactly. A UNOS/NHSBT UK Donor Data Analysis Over the Last Five Years

H. Sharma[1], A. Pradeep[2], A. Ditchfield[3], M. Abraham[4], P. Lominchar[5], S. Mehra[1], A. Skaro[4], *[1]Transplant and Vascular Access Surgery, Royal Liverpool University Hospital, Liverpool, United Kingdom, [2]Liver Unit, King's College, London, United Kingdom, [3]Transplant and Vascular Access Surgery, Manchester Royal Infirmary, Manchester, United Kingdom, [4]Transplant Surgery, University Of Western Ontario, London, ON, Canada, [5]Visceral Surgery, Hospital General Universitario Gregorio Marañon, Madrid, Spain*

Purpose: The recent reports suggest that organ donation from minority population have been increasing. The comparative organ donation data from the minority population reported to UNOS/NHSBT over the last five years was data mined.

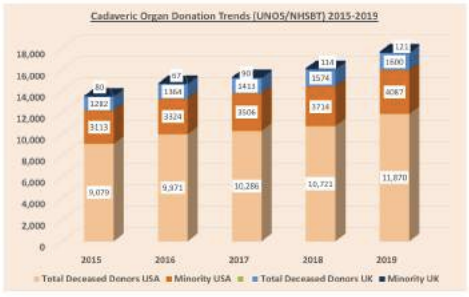
Methods: Deceased Organ donation figures from 2014/15-2019/20 were analysed. The percentage trends and organ donation probabilities of all donor groups were calculated.

Results: Total numbers of total deceased organ-donations have increased in USA (N=9079 in 2015, N=11870 in 2019) and UK (N=1298 in 2015, N=1454 in 2019). There has been an increase in donations from minorities (USA N=3113 in 2015, N=4087 in 2019; UK N=80 in 2015; N=121 in 2019). In USA, % share of organ donation from minorities has been nearly constant at approx. 33-34% , in UK the % share has marginally improved from 6.2 % in 2015 to 7.3% in 2019.

Despite the increase in total numbers, the Delta-Δ change in organ-donation from minorities compared to total organ-donation volume has shown a negative trend compared to the previous years (USA 0.72% in 2015, --0.21%in 2019; UK 0.40% in 2015; 0.32% in 2019).

Population and viewpoints of minority-populations are different in both countries, yet religious/cultural beliefs are the commonest reasons for a family declining donation.

Conclusions: Despite a marginal increase in donation numbers, the overall organ-donation from the minority-population is still low and has not kept in pace with total-donation volumes. The minority population needs more administration initiatives and education to improve organ donation.



CITATION INFORMATION: Sharma H., Pradeep A., Ditchfield A., Abraham M., Lominchar P., Mehra S., Skaro A. Increased Deceased Organ Donation Rates Among Racial and Ethnic Minorities: Not Exactly. A UNOS/NHSBT UK Donor Data Analysis Over the Last Five Years *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Sharma: None. **A. Pradeep:** None. **A. Ditchfield:** None. **M. Abraham:** None. **P. Lominchar:** None. **S. Mehra:** None. **A. Skaro:** None.

Abstract# 1282

Has the Proportional Rise in Deceased Organ Donation Rate Over Last 5 Years Been Optimal? A Data-based, Forecasting Model Analysis of UNOS/NHSBT UK Donor Data

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Purpose: The increase in deceased donor numbers since last decade has been widely reported. We aim to analyse if the trend in rise of numbers has been optimum as per the forecasting casting model based on historical organ procurement data from UNOS/NHSBT UK from 2005-2014.

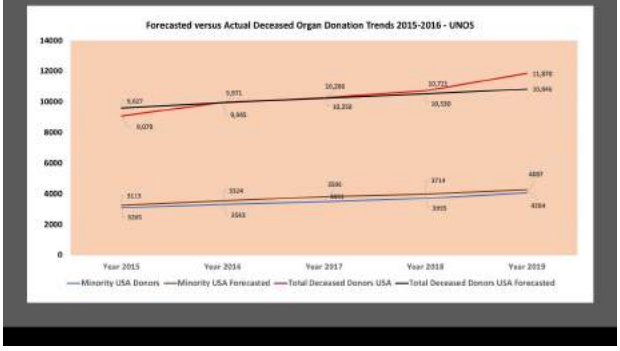
Methods: We created a Forecasting model using exponential moving average method for time-series forecasting . We compared the forecasted figures to the actual deceased donor numbers for last 5 years (2015-2019) . We also compared the forecasted versus actual donation rates in the minority population group.

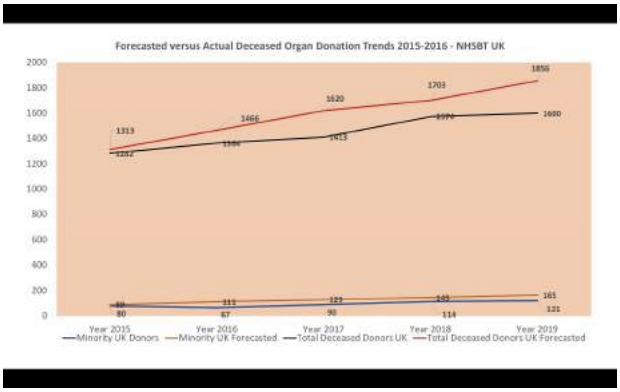
Results: The total actual versus forecasted deceased donation rates in US have kept pace p=0.46. In 2019, the actual donation numbers were in excess of forecasted digits but the actual donation rates in minority population in US have shown a negative trend compared to the forecasted figures p=0.002. In the UK, the actual donation rates were inferior compared to the forecasted numbers p=0.02. The actual organ donation rates were sub optimal in minority population p=0.007.

Conclusions: The actual total deceased organ donation rates in US exceed the forecast but fall in actual donation from minority population compared to forecasted figures indicates failure of social initiatives. The UK actual total and minority population deceased organ donation trends have fallen behind the forecasted figures. More creative initiatives are needed to involve the minority population to improve the numbers.

	Total Deceased Donors USA	Total Deceased Donors USA Forecasted	Minority USA Donors	Minority USA Forecasted	Total Deceased Donors UK	Total Deceased Donors UK Forecasted	Minority UK Donors	Minority UK Forecasted
Year 2015	9,079	9,627	3113	3265	1282	1313	80	89
Year 2016	9,971	9,945	3324	3543	1364	1466	67	111
Year 2017	10,286	10,258	3506	3834	1413	1620	90	129
Year 2018	10,721	10,530	3714	3995	1574	1703	114	145
Year 2019	11,870	10,846	4087	4284	1600	1856	121	165

Table 1 : Actual versus Forecasted Decease Donation 2015-2019 (UNOS/NHSBT UK)





CITATION INFORMATION: Sharma H., Sharma A. Has the Proportional Rise in Deceased Organ Donation Rate Over Last 5 Years Been Optimal? A Data-based, Forecasting Model Analysis of UNOS/NHSBT UK Donor Data *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Sharma: None. **A. Sharma:** None.

Abstract# 1283

Outcomes of Patients Referred for Liver Transplant Evaluation

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Purpose: National demand for liver transplants is increasing steadily, with 8,896 liver transplants performed in the USA in 2019, a 7.8% increase from 2018. The number of patients being waitlisted for liver transplant has also increased, with 12,106 waitlisted as of 11/2020. Our own transplant center saw an increase in the number of transplants from 78 (2018) to 145 (2019). The purpose of this study was to evaluate the number and location of liver transplant evaluations in a growing liver transplant program with increased volumes of patient referrals and the utilization of a transitional care clinic.

Methods: We included all adult patients referred for transplant evaluation at our center from 2018-2019 in our electronic medical records. The data was analyzed in SPSS, with significance testing performed with Fisher's exact and Pearson's chi-squared tests. A p-value of less than 0.05 was considered significant. For patients with multiple evaluation encounters, only the most recent encounter was used for analysis. For patients with multiple transplants, only the first encounter was used.

Results: There was an increase in the number of referred patients from 299 (2018) to 371 (2019). The duration from referral to evaluation decreased from 30 days (2018) to 21 days (2019), p<0.001. We found significantly decreased waitlist mortality, with 16 deaths in 2018 vs. eight deaths in 2019, p=0.035. The location of the evaluation initiation (in-patient vs. out-patient) differed from 2018 (69 in-patient vs. 230 out-patient) compared with 2019 (127 in-patient vs. 244 out-patient), p=0.002. There were significant differences in the social evaluation results with an increase in the number of incomplete evaluations (47 vs. 96) and the number of higher risk evaluations (48 vs. 84) in the two respective years of the study, p=<0.001. Lastly, there were differences in the number of psychological evaluations not completed in 2018 (53) vs. 2019 (172), p=0.001.

Conclusions: We observed statistically significant decreases in important metrics including waitlist mortality and referral to evaluation time. This is despite an increase in the number of patients deemed intermediate to high social risk, as well as an increase in the number of candidates seen initially as inpatients. The observed results correspond with the implementation of a transitional care clinic in January 2019, which provides two-week follow-up after inpatient admission and continuous outpatient monitoring. We hypothesize this clinic played a role in managing the higher load of inpatient transplant candidates and transitioning them to outpatient evaluations, producing the observed decrease in waitlist mortality and likely reducing costs.

CITATION INFORMATION: Solomon E., Waykar M., Robichaux K., Buggs J., Kumar A., Kemmer N. Outcomes of Patients Referred for Liver Transplant Evaluation *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Solomon: None. **M. Waykar:** None. **K. Robichaux:** None. **J. Buggs:** None. **A. Kumar:** None. **N. Kemmer:** None.

Abstract# 1284

Equity in Access to Kidney Transplants by Race/ethnicity in the Covid-19 Era

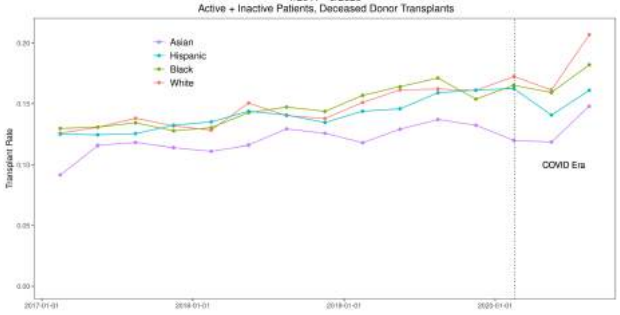
D. Stewart[1], A. Robinson[2], K. Bradbrook[2], A. Wilk[2], D. Klassen[3], *[1]United Network for Organ Sharing, Richmond, VA, [2]Research, United Network for Organ Sharing, Richmond, VA, [3]Chief Medical Officer, United Network for Organ Sharing, Richmond, VA*

Purpose: The direct impact of the COVID-19 pandemic on minority populations has been well documented, and it is conceivable that disparities in access to kidney transplants by race and ethnicity have been exacerbated during the pandemic. Barriers to transplant may have emerged due to concerns about increased susceptibility to COVID-19 among racial/ethnic minorities.

Methods: We examined quarterly trends in deceased donor kidney transplants per patient-year on the waiting list over time (1/2017-9/2020) among 4 major racial/ethnic groups (White; Black; Hispanic; Asian). Unadjusted and adjusted Poisson regressions were used to estimate transplant rates pre-COVID-19 (1/2019-3/2020) and during COVID-19 (4/2020-9/2020). In addition to race/ethnicity, adjusted models included 17 factors such as blood type, CPRA, age, gender, diagnosis, and transplant center. Median KDPI was calculated among recipients.

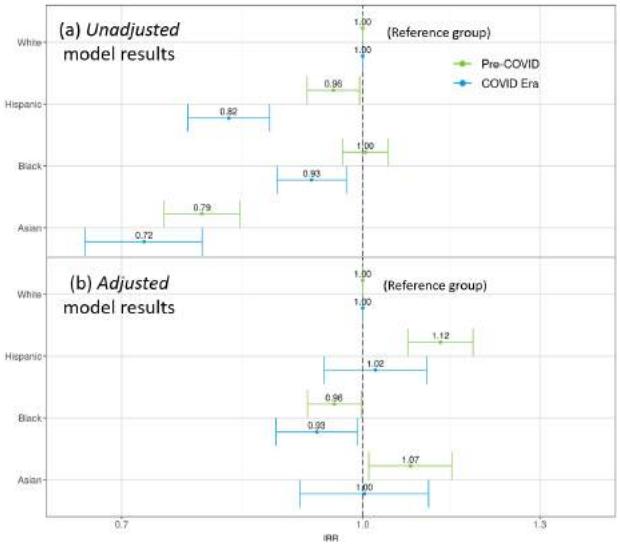
Results: For all 4 racial/ethnic groups, transplant rates rose steadily prior to COVID-19, declined initially during the pandemic, and rebounded sharply in Jul-Sep '20. However, the decline was sharpest for Hispanic candidates, and the COVID-19-era rebound was greatest for White and Asian candidates (Fig 1).

Figure 1. Kidney Transplant Rates - Quarterly Time Trends by Race/Ethnicity
1/2017 - 9/2020
Active + Inactive Patients, Deceased Donor Transplants



Relative to Whites, the transplant incidence rate ratio (IRR) declined in the COVID-19 era for minorities (race by era interaction, p=0.0006, Fig 2a). Racial/ethnic transplant rate differences, and the race by era interaction, were both substantially attenuated in risk-adjusted modeling (Fig 2b). Median KDPI remained unchanged or improved during the pandemic for both White and minority recipients.

Figure 2. Deceased Donor Kidney Transplant Incidence Rate Ratios by Race
Among Active + Inactive WL Candidates
Pre-COVID (1/2019-3/2019) vs. COVID Era (4/2020-9/2020)



Conclusions: Remarkably, the overall transplant rate surpassed pre-pandemic levels, as the transplant community has adapted remarkably well to the pandemic. But early COVID-19-era data suggest racial/ethnic disparities may have increased, particularly for Hispanic candidates. As the community continues to adapt and plan for the possibility of further pandemic impact, practices to ensure safe and equitable access to transplantation for vulnerable groups should be further developed and disseminated.

CITATION INFORMATION: Stewart D., Robinson A., Bradbrook K., Wilk A., Klassen D. Equity in Access to Kidney Transplants by Race/ethnicity in the Covid-19 Era *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Stewart: None. **A. Robinson:** None. **K. Bradbrook:** None. **A. Wilk:** None. **D. Klassen:** None.

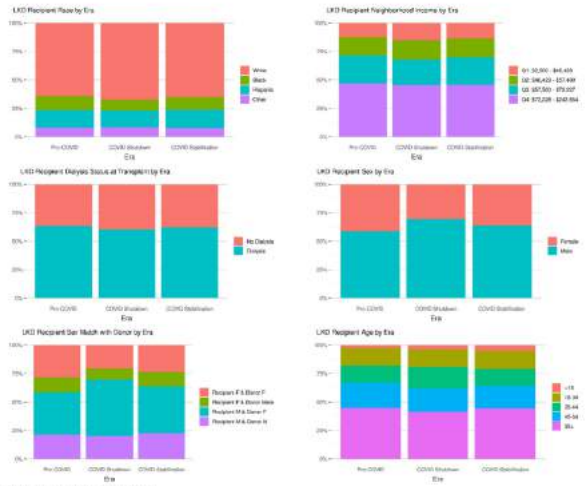
Abstract# 1285

Impact of COVID-19 Crisis on Disparities in Living Kidney Donation in the US

J. Wainright, S. Booker, J. Foutz, A. Henderson, R. Goff, L. Cartwright, D. Klassen, *Research, UNOS, Richmond, VA*

Purpose: The COVID-19 pandemic resulted in a dramatic decrease in living kidney donation (LKD) in the U.S. This study investigated the effect of the COVID crisis on characteristics of LKD recipients in the U.S.
Methods: We used OPTN transplant and LKD data to compare proportions of LKD recipients' race, SES (neighborhood income), sex, dialysis status, age, and recipient/donor sex match during 3 eras: Pre-COVID (1/1/20-3/12/20, n=1294); COVID Shutdown (3/13/20-5/9/20, n=173); and COVID Stabilization (5/10/20-11/15/20, n=2331; Table 1).
Results: Contrary to our expectations, LKD recipients' race, neighborhood income, and dialysis status at transplant did not differ by era (Figure 1a-c; Table 2). We did, however, find a significant relationship between recipient sex and era, with a higher proportion of male recipients in the COVID Shutdown and COVID Stabilization eras than in the Pre-COVID era (Figure 1d). We found a related significant association between recipient/donor sex match and era, with a higher proportion of male-recipient/female-donor transplants and a lower proportion of female-recipient/female-donor transplants in the COVID Shutdown and COVID Stabilization eras than in the Pre-COVID era (Figure 1e). There was a marginally significant relationship between recipient age at transplant and era, with a higher proportion of younger recipients in the COVID Shutdown era than in the Pre-COVID and COVID Stabilization eras (Figure 1f).
Conclusions: While we did not find expected differences in areas of current disparities such as LKD recipient race or SES, we did find that the drop in living donation caused by the COVID crisis exacerbated previously existing disparities in recipient sex and recipient/donor sex match, suggesting that COVID has not had an equal effect on all candidates.

Figure 1. Living Kidney Donor Recipients' Characteristics by COVID Era



Pre-COVID: 1/1/20-3/12/20
COVID Shutdown: 3/13/20-5/9/20
COVID Stabilization: 5/10/20-11/15/20

Table 1. Living Kidney Donor Recipients by COVID Era

	Pre-COVID n = 1294	COVID Shutdown n = 173	COVID Stabilization n = 2331
Recipient Race			
White	829 (64.1%)	115 (66.5%)	1510 (64.8%)
Black	155 (12%)	17 (9.8%)	257 (11%)
Hispanic	201 (15.5%)	26 (15%)	371 (15.9%)
Other	109 (8.4%)	15 (8.7%)	193 (8.3%)
Recipient Neighborhood Income			
Q1: $2,500 - $46,428	162 (12.5%)	26 (15%)	317 (13.6%)
Q2: $46,429 - $57,499	209 (16.2%)	29 (16.8%)	393 (16.9%)
Q3: $57,500 - $72,227	314 (24.3%)	39 (22.5%)	553 (23.7%)
Q4: $72,228 - $243,654	609 (47.1%)	79 (45.7%)	1068 (45.8%)
Recipient Sex			
Female	536 (41.4%)	53 (30.6%)	848 (36.4%)
Male	758 (58.6%)	120 (69.4%)	1483 (63.6%)
Recipient/Donor Sex Match			
Recipient F; Donor F	362 (28%)	36 (20.8%)	573 (24.6%)
Recipient F; Donor M	174 (13.4%)	17 (9.8%)	275 (11.8%)
Recipient M; Donor F	481 (37.2%)	85 (49.1%)	964 (41.4%)
Recipient M; Donor M	277 (21.4%)	35 (20.2%)	519 (22.3%)
Recipient Age Group			
<18	36 (2.8%)	7 (4%)	110 (4.7%)
18-34	199 (15.4%)	27 (15.6%)	366 (15.7%)
35-44	196 (15.1%)	33 (19.1%)	363 (15.6%)
45-54	287 (22.2%)	35 (20.2%)	463 (19.9%)
55+	576 (44.5%)	71 (41%)	1029 (44.1%)

Table 2. LKD Recipient Characteristics and COVID Era

Recipient Characteristic	X^2	df	p-value
Race	2.38	6	0.88
SES (neighborhood income)	1.74	6	0.94
Dialysis Status	0.83	2	0.66
Sex	14.51	2	<0.001
Sex Match with Donor	18.54	6	0.01
Age	15.74	8	0.05

CITATION INFORMATION: Wainright J., Booker S., Foutz J., Henderson A., Goff R., Cartwright L., Klassen D. Impact of COVID-19 Crisis on Disparities in Living Kidney Donation in the US *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Wainright: None. **S. Booker:** None. **J. Foutz:** None. **A. Henderson:** None. **R. Goff:** None. **L. Cartwright:** None. **D. Klassen:** None.

Abstract# 1286

Body Mass Index >35 Does Not Impact Kidney Transplant Outcomes or Health Related Quality of Life Despite BMI Class or Recipient Race

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Purpose: Kidney transplant [KTx] in recipients with BMI ≥ 35 remains controversial and has not often been studied in recipients with BMI ≥40. There is limited data as to whether health related quality of life [HRQOL] is adversely affected by being obese after KTx. This ambi-directional study examined the relationship between degree of obesity, KTx outcomes and HRQOL, across BMI and racial groups.
Methods: Medical records of 227 low risk, adult, KTx recipients with BMI ≥ 30, transplanted between 1/2009 & 10/2017 were retrospectively reviewed. A prospective approach allowed a 1 time HRQOL assessment for those who had not yet completed a Kidney Disease Quality of Life-36 [KDQOL-36] survey post KTx. The cohort was stratified into four obese groups: BMI 30-34.9, BMI 35-39.9, BMI 40-49.9 and BMI ≥ 50. Demographics included age, race, gender, education years and zip code. Also included were number of years post KTx, dialysis years, donor source, surgical approach, history of diabetes [DM], hypertension [HTN] or vascular disease, serum albumin at KTx, and longterm use of steroids or mTOR inhibitor. Outcome measures included patient and graft survival, serum creatinine and glomerular filtration rate at 1, 3 and 5 yrs, acute rejection, delayed graft function, and wound complications.

KDQOL-36 component scores were used to measure HRQOL and were compared to U.S. normative KDQOL-36 values. BMI was recorded at KTx, at KDQOL-36 survey and at study end. *P* values ≤ 0.05 were considered significant.
Results: Mean follow up was 4.5 yrs [± 2.76]. Overall, 61% of study participants were Black and 57% received living donor organs. Demographics were similar across BMI groups. Patient & graft survival reached 100% at 1 yr in all BMI groups, was above the current national average at 1 & 3 yrs, and was not significantly different at 3 or 5 yrs. Females had a .1512 [p=0.013] increase in patient survival and race did not negatively affect outcomes. A history of DM was associated with increased BMI [p=0.027] and correlated [r=0.2] with a 3.4% [p=0.0288] increase in death risk. Although age ≥ 51yrs [p=0.000], female gender [p=0.057] and DM [p=0.020] significantly decreased KDQOL-36 physical component scores, all KDQOL-36 component scores were at or above the normative scores for the US dialysis population. Importantly, BMI class had no significant effect on HRQOL.
Conclusions: KTx for those with BMI ≥ 35 offered graft and patient survival and HRQOL above the US normative average for transplant recipients and patients on dialysis. Obesity should not be an absolute contraindication to KTx regardless of race or degree of BMI. However, a history of DM can predict poorer recipient survival and lower HRQOL physical component scores in obese recipients, suggesting a need for rigorous DM management pre and post KTx.
CITATION INFORMATION: Walczak D., Collins E., Benedetti E. Body Mass Index >35 Does Not Impact Kidney Transplant Outcomes or Health Related Quality of Life Despite BMI Class or Recipient Race *AJT, Volume 21 Supplement 3*
DISCLOSURES: D.A. Walczak: None. **E. Collins:** None. **E. Benedetti:** None.

Abstract# 1287

Improving Well-being for Heart Transplant Recipients: Implementation of a Patient Navigator Program

K. Ramonas, K. Ramonas, *Health Navigator Foundation, San Francisco, CA*

Purpose: When surveyed, heart transplant recipients cited managing all their healthcare needs as a primary concern 83% of the time (n=23). To respond to this need, a patient navigator program was created. We aim to show that providing individualized navigator services following discharge from the hospital post heart transplant improves well-being for recipients.
Methods: All heart transplant recipients at a single center, identified prior to discharge, were eligible for enrollment and offered navigation services. The program provides individualized interventions for 4-6 weeks following hospital discharge, at no additional cost to recipients. Services provided include: immediate phone, email, or HIPAA compliant text access to a patient navigator team, personal escort to lab draws, tests and procedures, and navigator accompaniment to outpatient appointments. The navigator program also provided: medication organizers, vital sign and symptom log, meal delivery, local resource guide, caregiver support, translation services, social work support, peer networking, and community resource referrals. Average navigator time dedicated to each patient varied but ranged 1-4 hours/week. All recipients completed a pre- and post- enrollment quality of life survey as well as an exit interview about program services. We utilized the organ transplant symptom and well-being instrument (Forsberg, et al., 2012)
Results: In this pilot study, 23 patients enrolled in the program over an 18 month period and completed a pre program survey. 19 recipients completed a post program survey after receiving navigation services. Pre program, the average quality of life reported was 47 on a 100 point scale. 78% of respondents reported they could not complete desired activities. Post program, 100% of patients reported their quality of life to be better than expected. 78% believed the program contributed to their success. 90% of participants would recommend the program to others.
Conclusions: Results from this pilot suggest a positive impact of the patient navigator program in a heart transplant recipient population, particularly in its ability to meet individual needs and immediate access to a team member. Future work with a larger sample size is indicated to more fully assess the program's impact on quality of life. Preliminary data suggest implementation of a patient navigator program contributes positively to heart transplant recipients' health and well-being. Individualized navigation programs could be effective in improving well-being for a wide range of patients with critical illnesses.
CITATION INFORMATION: Ramonas K., Ramonas K. Improving Well-being for Heart Transplant Recipients: Implementation of a Patient Navigator Program *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Ramonas: None. **K. Ramonas:** None.

Abstract# 1288

Genetic versus Self-reported African Ancestry and Kidney Allograft Outcome: Analysis of Two Large Multiethnic Urban Transplant Cohorts

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Purpose: African-American (AA) kidney transplant recipients (KTx) have higher risk of rejection and failure. However, it is unknown to what extent the inferior outcomes in self-reported AAs are due to genetic versus environmental effects. Herein, we compared the effects of self-reported race versus genetic African admixture on graft outcomes.
Methods: A discovery multiethnic cohort of 1,083 KTx from Columbia University and a replication cohort of 761 kidney transplant recipients from University of Pennsylvania were genotyped with high resolution SNP arrays. African admixture proportions (AFR), a genetically-derived quantitative measure of African ancestry, was estimated with ADMIXTURE software. US census tract variables matched with participants' geocoded addresses were used to analyze the effect of neighborhood socio-economic status (SES) factors. Multivariable Cox models were used to investigate associations between African ancestry measures and time to biopsy-proven rejection and time to death-censored graft failure, with adjustments for relevant covariates. Akaike information criterion (AIC) was used to compare the models. Meta-analyses of the results in the two cohorts were computed using random-effect models.
Results: 206 and 346 self-identified AA were included in the discovery and replication cohorts, respectively. Over a median time of 78 months, 432 patients had rejection and 193 had graft failure in the discovery cohort; during a median time of 49 months, 113 patients had rejection and 121 had failure in the replication cohort. In the discovery and replication cohorts self-reported AA ancestry and AFR were associated with acute rejection and graft failure (Figure 1). AIC values show that AFR is non-inferior or slightly better predictor than self-reported AA. The HR for measures of ancestry only mildly decreased when adjusting for SES factors in both cohorts. Meta-analyses of the results confirmed that self-reported AA and AFR were associated with rejection and failure independently of clinical covariates and SES.
Conclusions: In conclusion, self-reported AA race and a genetically-derived continuous measure of African ancestry predict the risk of allograft rejection and failure in multiethnic and genetically diverse cohorts. A composite variable for US census-derived neighborhood SES did not confound the association between ancestry and either rejection or failure.

Survival models	Discovery cohort			Replication cohort			Meta-analysis	
Rejection	**HR (95% CI)**	**p**	**AIC**	**HR (95% CI)**	**p**	**AIC**	**HR (95% CI)**	**p**
Self-reported AA race	1.47 (1.18-1.83)	0.0005	5540.1	3.15 (2.04-4.87)	2.45E-07	1356.3	2.10 (1.01-4.43)	0.04
AFR	1.64 (1.22-2.19)	0.0009	5541	3.83 (2.31-6.34)	1.91E-07	1355.8	2.44 (1.07-5.59)	0.03
Self-reported AA race adjusted for SES	1.41 (1.12-1.77)	0.003	5515.2	2.71 (1.70-4.31)	2.70E-05	1357.3	1.89 (1.01-3.58)	0.04
AFR adjusted for SES	1.56 (1.14-2.14)	0.006	5516.2	3.2 (1.85-5.50)	2.86E-05	1357.4	2.16 (1.07-4.34)	0.03
Failure	**HR (95% CI)**	**p**	**AIC**	**HR (95% CI)**	**p**	**AIC**	**HR (95% CI)**	**p**
Self-reported AA race	1.42 (1.02-1.97)	0.04	2283.9	1.58 (1.05-2.38)	0.03	1184.3	1.48 (1.15-1.92)	0.003
AFR	1.48 (0.96-2.29)	0.08	2282.9	1.79 (1.12-2.87)	0.01	1183.3	1.62 (1.18-2.22)	0.003
Self-reported AA race adjusted for SES	1.32 (0.94-1.86)	0.1	2276.9	1.42 (0.93-2.17)	0.1	1182.3	1.36 (1.04-1.77)	0.02
AFR adjusted for SES	1.27 (0.88-2.01)	0.2	2278.4	1.61 (0.98-2.64)	0.06	1181.4	1.42 (1.01-1.99)	0.04

CITATION INFORMATION: Zanoni F., Neugut D., Mohan S., Gharavi A., Keating B., Kiryluk K. Genetic versus Self-reported African Ancestry and Kidney Allograft Outcome: Analysis of Two Large Multiethnic Urban Transplant Cohorts *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Zanoni: None. **D. Neugut:** None. **S. Mohan:** None. **A. Gharavi:** None. **B. Keating:** None. **K. Kiryluk:** None.

All Organs

Surgical Issues (Open, Minimally Invasive):All Organs

Abstract# 1289

Wound Infection After Kidney Transplantation: A Single Center Study

A. Demirag, J. Oberholzer, A. Agarwal, B. Rawashdeh, E. McCraken, K. Brayman, *Transplantation, University of Virginia Medical Cener, Charlottesville, VA*

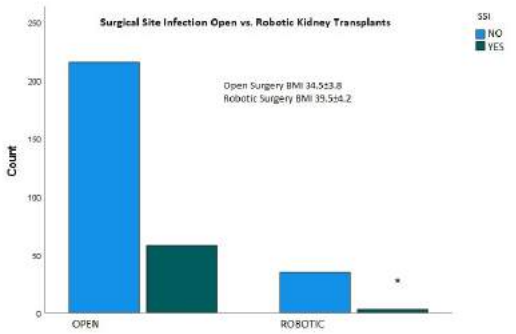
Purpose: Wound complications (WC) following kidney transplantation (KTx) consume valuable resources and may be associated with inferior short and long term graft outcomes. Known risk factors for WC include immunosuppression(IS) exposure, diabetes(DM), and obesity, as measured by body mass index (BMI). In this study, we sought to identify surgical and non-surgical factors associated with the development of WC following KTx.
Methods: 741 consecutive patients received KTx at a single center over a 6 year period and were retrospectively reviewed. Combined transplantations and children (< age 18) were excluded. Recipients were classified based on BMI at the time of transplantation: underweight (BMI < 20 kg/m2), normal weight (20 ≤ BMI < 25), overweight (25 ≤ BMI < 30), class I obese (30 ≤ BMI < 35), class II obese (35 ≤ BMI < 40) and class III obese (BMI ≥ 40). The analysis included wound (superficial or deep) or organ space infection and its association with age, gender, HLA mismatch, cold ischemic time, hypertension, DM, delay graft function and surgical technique (open versus robotic transplant(RT)). Statistical analysis was performed by SPSS and significance was set at $p<0.05$. All patients received a single dose of pre-operative antibiotic prophylaxis and thymoglobulin for induction (3-6 mg/kg). IS was administered based on transplant center protocol and maintenance IS consisted of prednisone, prograf and mycophenolate.
Results: Thirteen percent (94/741) of patients developed a post-transplant WC (28±16 days postop), 46% (43/94) of these were superficial-incisional and 54% (51/94) were deep-incisional or organ-space. The average BMI among cohort patients was 29.2 and 42% (311/741) were obese (BMI > 30) (table) Patients who developed WC had a greater mean BMI (31.4 vs 29.4, p =0.004) and were more likely to have

a history of DM (33 vs. 49%, p<0.05). RT recipients (n=39, mean BMI 39.5±4.2) showed significantly lower WC rates compared to the whole study group and group with BMI over 30(mean BMI 34±3.8) (p<0.00).

Conclusions: We identified higher BMI and DM as a risk factor for the development of WC following renal transplantation. RT was successful at lowering the higher WC infection rate in diabetic and high BMI patients.

BMI vs. Wound Complications

			wound complications		
			0	1	Total
BMIGROUP	<20	Count	36	5	41
		Expected Count	35.8	5.2	41.0
		% within BMIGROUP	87.8%	12.2%	100.0%
	20 ≤ BMI < 25	Count	150	5	155
		Expected Count	135.3	19.7	155.0
		% within BMIGROUP	96.8%	3.2%	100.0%
	25 ≤ BMI < 30	Count	211	23	234
		Expected Count	204.3	29.7	234.0
		% within BMIGROUP	90.2%	9.8%	100.0%
	30 ≤ BMI < 35	Count	144	32	176
		Expected Count	153.7	22.3	176.0
		% within BMIGROUP	81.8%	18.2%	100.0%
	35 ≤ BMI < 40	Count	76	26	102
		Expected Count	89.1	12.9	102.0
		% within BMIGROUP	74.5%	25.5%	100.0%
	BMI ≥ 40	Count	30	3	33
		Expected Count	28.8	4.2	33.0
		% within BMIGROUP	90.9%	9.1%	100.0%
Total		Count	647	94	741
		Expected Count	647.0	94.0	741.0
		% within BMIGROUP	87.3%	12.7%	100.0%



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Abstract# 1290

The Impact of Thromboelastography on Decreasing Blood Product Usage in Liver Transplantation

A. Mohamed[1], T. Kitajima[1], S. Angappan[2], K. Delvecchio[1], A. M. Elsabbagh[1], S. Yeddula[1], M. Shamaa[1], K. Collins[1], M. Rizzari[1], A. Yoshida[1], M. Abouljoud[1], J. El-Bashir[2], S. Nagai[1], *[1]Department of Transplant and Hepatobiliary Surgery, Henry Ford Hospital, Detroit, MI, [2]Department of Anesthesiology, Henry Ford Hospital, Detroit, MI*

Purpose: Liver dysfunction results in derangement of hemostasis and thrombosis. Thromboelastography (TEG) has emerged as a tool to guide resuscitative efforts. However, its utilization and application in liver transplant (LT) surgery are not well determined. We aim to identify possible effects of TEG utilization on product use and blood loss in LT.

Methods: Adult patients (age >18 years of age) who received LT between 2014 and 2020 were retrospectively reviewed. Those patients who underwent living donor, simultaneous or multi-organ transplants, re-transplants, and pediatric transplants (recipient <18 years of age) within this timeframe were excluded. Possible impact of TEG implementation on blood product use and intraoperative blood loss was analyzed. A subgroup analysis was done based on INR at transplant. The median, 75th, and 90th percentile of INR at transplant were used as cut-off values and patients were classified into four categories: no coagulopathy, mild, moderate, and severe coagulopathy groups.

Results: A total of 451 patients met inclusion criteria and were separated into TEG (n=144) vs non-TEG (n=307) groups. Background characteristics between these two groups were comparable. Overall, median blood products used were similar between TEG and non-TEG groups: pRBC (4[IQR 2-6] U vs 3[1-7] U, p=0.194); FFP (6[3-10] U vs 6[2-11] U, p=0.697); Cryoprecipitate (1[0-2] U vs 1[0-3] U, p= 0.954); platelet (1[0-2] U vs 0[0-2] U, p= 0.065). In the subgroup analysis, there was a significant decrease in product use in the TEG group with moderate coagulopathy, compared to the non-TEG group: pRBC (4.5[2.0- 6.8] U vs 7.0[6.0-10.0] U, p= 0.002); FFP (6.0[4.0-8.0] U vs 9.0[8.0-16.0] U, p=0.005); Cryoprecipitate (1.0[1.0-2.0] U vs 2.0[1.0-4.0] U, p=0.005). Tranexamic acid (TXA) use was significantly higher in the TEG group with median values of 1000 [0-1500] mg vs 0 mg (p<0.001). There was no difference in median blood loss 2750 [1200-5250] ml vs 3500 [2125-7750] ml (p=0.09). In the no, mild, and severe coagulopathy groups, there was no difference in blood product use, blood loss, or TXA use between the TEG and non-TEG groups.

Conclusions: TEG guided hemostasis and resuscitation in LT resulted in a decrease in product usage, as well as more utilization of TXA, likely by recognition of hyper-fibrinolysis, in patients with moderate coagulopathy defined as INR between 2.2 and 2.8.

CITATION INFORMATION: Mohamed A., Kitajima T., Angappan S., Delvecchio K., Elsabbagh A., Yeddula S., Shamaa M., Collins K., Rizzari M., Yoshida A., Abouljoud M., El-Bashir J., Nagai S. The Impact of Thromboelastography on Decreasing Blood Product Usage in Liver Transplantation *AJT, Volume 21 Supplement 3*

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Abstract# 1291

Benign Pneumatosis Intestinalis with Pneumoperitoneum in the Immunocompromised Patient: Three Cases

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Purpose: Isolated pneumatosis intestinalis after solid organ transplantation, as well as its surgical management in appropriate clinical context, is a well described entity. The management of concurrent pneumoperitoneum, however, is not as well understood. Consequently, we present three interesting cases of pneumatosis intestinalis with pneumoperitoneum where conservative management was warranted.

Methods: We present three cases of solid organ transplant patients demonstrating both operative and nonoperative management of benign pneumatosis intestinalis with pneumoperitoneum.

Results: Case #1: A 61-year-old male underwent deceased-donor liver transplant. The patient was found to have incidental, asymptomatic pneumoperitoneum on routine postoperative surveillance imaging at nine months, with evidence of pneumatosis intestinalis. Consequently the patient was surgically explored, resulting in no discernable cause. **Case #2**: A 75-year-old male underwent deceased-donor kidney transplant. Three months postoperatively the patient presented to clinic with diarrhea. Subsequent diagnostic imaging displayed pneumoperitoneum with pneumatosis intestinalis. This patient was also surgically explored, resulting in no discernable cause. **Case #3:** A 60-year-old female underwent a living- donor liver transplant. Eight months postoperatively she presented with incidental pneumoperitoneum and pneumatosis intestinalis. Interval imaging showed worsening pneumoperitoneum in addition to development of intraabdominal fluid collections. With the absence of identifiable cause and inconsistent symptoms this patient was successfully managed conservatively with antibiotics, percutaneous drainage and bowel rest.

Conclusions: Given the high index of suspicion for a hollow viscus perforation and the mortality associated with sepsis in the immunosuppressed patient, surgeons feel obligated to explore these subsets of patients. However, as depicted in each of the three described cases, nonoperative management is often an acceptable alternative in appropriate clinical context.

CITATION INFORMATION: Mohamed A., Delvecchio K., Kitajima T., Rizzari M., Collins K., Yoshida A., Nagai S., Denny J., Abouljoud M. Benign Pneumatosis Intestinalis with Pneumoperitoneum in the Immunocompromised Patient: Three Cases *AJT, Volume 21 Supplement 3*

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Machine Learning, Artificial Intelligence and Social Media in Transplantation

Abstract# 1292

Kidney Transplantation Management and Decision Support System

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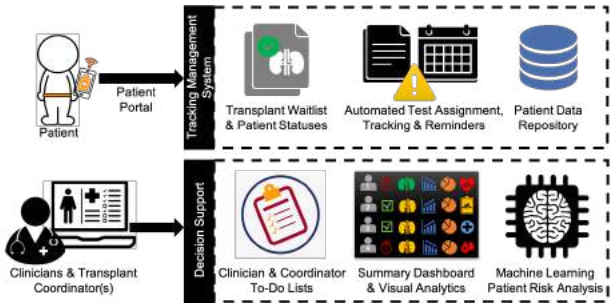
Purpose: Coordinating the management of patients' health statuses, tracking and scheduling testing, is a complicated process and involves a team of clinicians including transplant coordinators, nephrologists, surgeons and social workers. Currently, transplant coordinators must manually communicate with the other clinicians, track patient tests and follow up with patients who miss required testing. Such a process leaves a lot of room for human error and increases the burden and burnout of coordinators. Moreover, patients are confused by this process and may not be engaged in their care, resulting in worse health outcomes. To end this, we propose the development of a kidney transplant management and decision support system, which will automate test reminders, assignments and tracking, succinctly summarize and store relevant patient health statuses using a visual dashboard, and use patient data and machine learning techniques to learn a patient risk score that characterizes their risk/survivability of a kidney transplant. Such a system will improve coordination between the actors in the transplant care team, reduce transplant coordinator burnout, facilitate clinician decision making for patient treatment and waitlist decisions, and engage patients in their health management in order to improve transplant outcomes.

Methods: The tracking management system organizes the transplant waitlist and patient statuses and facilitates test assignments by suggesting specific tests for patients based on their demographic information, in order to maximize efficiency and minimize the potential for human error. It also contains a patient portal allowing patients to view their health information and test results, as well as receive reminders about upcoming appointments

Results: The decision support portion of the system facilitates clinician decision making by providing a machine learned and summary dashboards with visualizations that intelligently aggregate patient statuses. It also contains reminders and to do lists for clinicians and coordinators, contacting patients who have missed multiple tests, in order to reduce some of the burden placed on transplant coordinators.

Conclusions: The system is a prototyped and will be deployed for use at the UVA kidney Transplant Clinic. Through the use of an intelligent and automated tracking management and a decision support this system will improve clinic efficiency and reduce the potential for error for both the clinical transplant teams and their patients.



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DISCLOSURES: A. Demirag: None. **Y. Wu:** None. **J. Lamp:** None. **S. Holland:** None. **A. Routt:** None. **L. Feng:** None.

Abstract# 1293

Transplant Data Platform - An Augmented Clinical Intelligence Framework

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Purpose: UNOS, SRTR, USRDS registries are rich in patient baseline data. However, all suffer from data attrition as patients move further out post-transplant or between different health providers. These data gaps can adversely affect prognostication models of graft and patient survival and so are often augmented by other data sources. Comparative effectiveness research (CER) platforms support dataflow from multiple data centers, enabling integration from a variety of sources into a single system. However, CERs have not yet been developed for transplantation. We outline why this platform provides application for machine-learning (ML) methodology and show how a system can enrich the predictive power and accuracy of transplant data models.

Methods: Transplant data platform (TDP) utilizes cloud-computing protocols, accessing data stored in the cloud or in-house. Its triple-tier, Apache Spark-based *data lakehouse* architecture enables the storage of raw, cleaned and aggregated data. There is currently no standardization of patient data storage at different centers. Instead of enforcing a center-level data-standardization principle, TDP resolves the diversity of data-formats into a unified TIDY data matrix. This enables efficient cleaning and indexing of data in preparation for invocation by the integrated ML engine (TensorFlow). ML model-based insights are synthesized in FHIR format and future designs will support federation through a web-based portal.

Results: TDP provides an augmented intelligence framework the transplant community can utilize. The compiled data can be leveraged by clinicians to support the development of federated data stores. It supports creation of anonymized patient cohorts in a clinically definable manner, as well as through automated feature selection as part of an AI workflow. It supports genotype to phenotype relationship analyses to provide precision medicine insights. Future evolution will enable researchers to share evolving ML models through the web portal to augment clinicians' patient risk assessment.

Conclusions: TDP hosts anonymized data from registries, transplant centers and other clinical sources. Its end-to-end architecture allows data ingestion, harmonization, mapping, analysis and dissemination. Being able to support both unstructured and structured data makes it practical to work with hospital EMRs and patient records. This is important as the field considers ways to support patient linkages and longitudinal analyses when building outcome orientation models ensuring secure provenance with strong governance.

CITATION INFORMATION: Focht C., Tian W., Zeng J., Dzebisashvili N., Ghosh S. Transplant Data Platform - An Augmented Clinical Intelligence Framework *AJT, Volume 21 Supplement 3*

DISCLOSURES: C. Focht: Salary; Name of Commercial Interest; CareDx (employee). **W. Tian:** Salary; Name of Commercial Interest; CareDx (employee). **J. Zeng:** Salary; Name of Commercial Interest; CareDx (employee). **N. Dzebisashvili:** Salary; Name of Commercial Interest; CareDx (employee). **S. Ghosh:** Salary; Name of Commercial Interest; CareDx (employee).

Abstract# 1294

Machine Learning Approaches for Post-transplant Kidney Outcome Prediction

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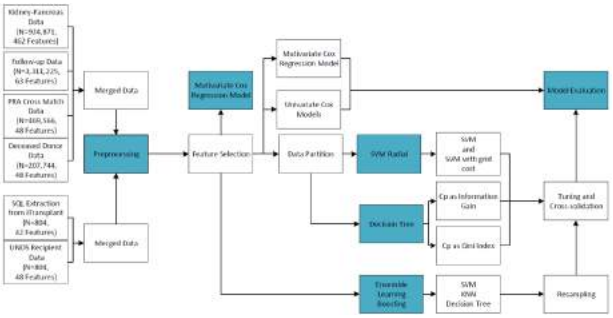
Purpose: Determine a robust prediction model for kidney graft survival based on analyzing a combination of decisive factors such as donor and recipient characteristics, biopsy, and perfusion machine parameters.

Methods: A collection of 632 locally transplanted kidneys that were recovered from deceased donors and pumped (1/1/17 - 12/31/18) were analyzed using data from an organ procurement organization (OPO) and UNOS data (see figure). A Consolidation of data preprocessing techniques, namely predictive mean matching and feature selection were employed. The data was subsequently utilized first in a survival analysis through univariate and multivariate Cox regression. A selection of machine learning algorithms was applied to the same dataset to develop a model for predicting kidney graft survival.

Results: The primary cox regression model resulted in a concordance index of 0.952, with DCD as the main predictor for graft survival (p= 0.004). Support vector machine (SVM: radial and grid of multiple cost parameters), decision tree (information gain and gini index), and ensemble learning (boosting) algorithms were applied. As a result, the ensemble learning outperformed all models by 93.7% accuracy (see table).

Conclusions: The model, that we developed, will provide an insight into making an informed decision about the transplant of kidneys considering their predicted final outcome. Furthermore, it could be used by OPOs to increase their organ utilization and possibly lowering the discard rate of kidneys.



Comparison of models performances					
Metrics	SVM Radial	SVM Grid	Decision Tree	Decision Tree Gini	Boosting
Accuracy	0.925	0.872	0.819	0.819	0.937
Sensitivity	0.882	0.794	0.588	0.588	0.895
Specificity	0.950	0.916	0.950	0.950	0.956

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DISCLOSURES: H. Ghali: None. **D. Won:** None. **S. Yoon:** None. **A. Friedman:** None.

Abstract# 1295

"hlaR," a Simplified Interface for the HLA Matchmaker Tool

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Purpose: Functional epitopes, or eplets, represent a set of amino acids within three angstroms of one another that may not be sequentially contiguous but are neighbors in three-dimensional space. The HLA Matchmaker tool, developed by Rene Duquesnoy, catalogues the eplets of each HLA allele and identifies mismatched eplets between donor:recipient pairs. The degree of eplet mismatching correlates with patient outcomes. Unfortunately, the scalability and magnitude of application has been restricted by the time and effort required at the user interface

Methods: We developed a software package using the programming language R, with capacity to build into a user-friendly web application, that dramatically reduces the effort of the end user. The tool is a compilation of several functions. HLA typing data on a population of one or many donors and recipients is read into R. The data is then converted into a consistent format using the function AlleleClean. Cleaned data are processed using the functions, CalEpletMHCI and CalEpletMHCII, which generate both a detailed output of the eplet mismatches between paired samples and a simplified output with the numerical count of mismatched eplets. Allele level mismatch can be analyzed with the function EvalAlleleMism. Finally, the AlleleTopN function generates a list of the most common alleles in the user's dataset. We demonstrate through applied vignettes the simplified workstream allowed by our R package, hlaR, accessible at https://github.com/LarsenLab/hlaR.

Results: User data input can be tailored to the intended application. The most common use of eplet data has been retrospective analysis of patient outcomes in the context of the mismatch load between recipient and donor (1 to 1). Analyzing a dataset of contrived donor recipient pairs with high-resolution HLA typed subjects, we observed equivalent results between hlaR and eplet mismatches calculated by HLAMatchmaker. Results were consistent excepting minor typographical errors traced to the excel workbook. To emulate the use of mismatch load in organ allocation, we provide an additional vignette, calculating mismatch between a single donor and a set of possible recipients or, similarly, between a set of donors and a single recipient (1 to many, many to 1).

Conclusions: Our new tool, hlaR, can provide simplified eplet data with a streamlined workflow for multiple applications. We plan to expand the functionality of this package to include imputation of low-resolution data by incorporating a query of the National Marrow Donor Program's HaploStats web application. With decreased effort from the end user, eplet matching and mismatch load data, which have been significantly associated with graft outcomes, can be further incorporated into both research and clinical use.

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DISCLOSURES: A. Johnson: None. **J. Zhang:** None. **H. Gebel:** None. **C. Larsen:** None.

Abstract# 1296

Offer Acceptance Models for Various Endpoints: Initial Response, Final Response, and Conversion from Provisional Yes to Yes

C. Martinez, M. Stuart, A. Placona, *United Network for Organ Sharing, Richmond, VA*

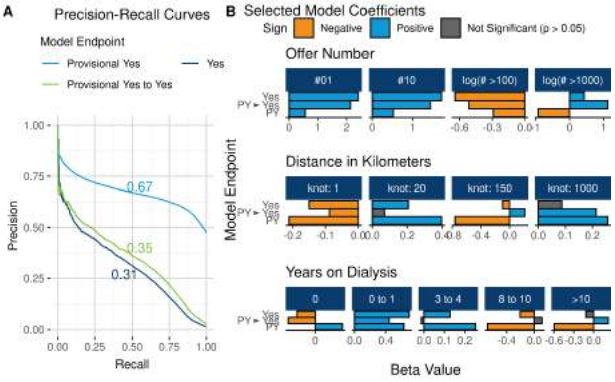
Purpose: Offer acceptance models are routinely used for program evaluation and academic research, but the focus tends to be on modelling the final offer response. We explore different endpoints within the offer process, including modeling an initial response of provisional yes (PY) and conversion from PY to yes, to determine if the models associated with these endpoints vary with respect to prediction performance and significant covariates.

Methods: We collected donor, candidate, and match run data for kidney donors between 2015 and 2019 with at least one kidney transplanted. We replicated both the offer inclusion/exclusion criteria and the model architecture used by the SRTR for evaluating offer acceptance rates. We then modelled each of the following endpoints: if the initial response was a PY, if a PY was converted to a final yes, and if the final response was a yes. Each endpoint consisted of 4 logistic regression models (one each for all pediatric donors and adult donors stratified by high/middle/low KDRI) using the same covariates as the SRTR models. We compared covariates in each model as well as their predictive performance using a holdout set of the most recent 6 months of donors in the cohort.

Results: We noted distinct prediction performance across the models (Figure 1A). The final acceptance and PY conversion models had similar precision-recall (PR) curves, but the conversion model yielded higher precision across all recall thresholds. The initial response model had markedly better prediction performance than both the final acceptance and PY conversion models with an area under the PR curve of 0.67 vs 0.31 and 0.35.

Covariates also differed in significance and magnitude between the three models. A selection of covariates beta values are shown in Figure 1B. In particular, we observed that offer number (analogous to sequence number) was relatively less impactful for the PY conversion model, but time on dialysis and distance between donor and candidate hospitals were relatively more important.

Conclusions: We analyzed the same model architecture across 3 different offer acceptance endpoints. Although some models were similar, each had distinct predictive performances. These distinctions suggest that applications using offer acceptance models may benefit from choosing a model tailored to the application context. Future research in this domain would include evaluating different model architectures and fine-tuning model parameters for each offer acceptance endpoint.



CITATION INFORMATION: Martinez C., Stuart M., Placona A. Offer Acceptance Models for Various Endpoints: Initial Response, Final Response, and Conversion from Provisional Yes to Yes *AJT, Volume 21 Supplement 3*
DISCLOSURES: C. Martinez: None. **M. Stuart:** None. **A. Placona:** None.

Abstract# 1297

Quality Improvement Surveillance by Machine Learning

J. D. Perkins[1], E. Clemens[2], M. Granich[3], J. Yeung[3], J. Reyes[1], *[1]Surgery, University of Washington, Seattle, WA, [2]Pharmacy, University of Washington, Seattle, WA, [3]Center of Clinical Excellence, University of Washington, Seattle, WA*

Purpose: The purpose of this quality study was to compare our newly developed natural language processing (NLP) machine learning surveillance algorithm in detecting the rate of rejection episodes in our liver transplant recipients to our previous electronic medical record (EMR) structured data collection system.

Methods: In 292 consecutive liver transplant recipients from 2/9/2017 to 2/4/2020 with a follow-up to 6/1/2020, 27 (10.3%) recipient were confirmed to have a rejection episode (biopsy and treatment) within 3 months of transplantation by two transplant professionals. A phrase-based NLP surveillance algorithm evaluated the transplant notes of the healthcare providers for the first three months following transplantation to label recipients with a rejection episode. The recipients labeled with a rejection episode in our EMR as entered by transplant providers during the care of these recipients were recorded.

Results: The EMR recorded events labeled 19 (70.4%) rejection episodes correctly, missed 8(29.6%) rejection episodes, and mislabeled 12 rejection episodes that were not rejection episodes. The NLP surveillance algorithm labeled 21(77.8%) rejection episodes correctly, missed 6 (22.2%), and mislabeled no rejection episode that were not rejection episodes. The kappa coefficient agreement statistics to the confirmed list for the NLP algorithm of 0.86 (CI 0.75 to 0.97) was much better than the EMR recorded events of 0.61 (CI 0.46 to 0.77).

Conclusions: Transplant programs follow many quality measures to improve their care of their patients. Following these measures have required cost and time of chart abstractors or busy clinicians directly entering these events into structure fields in the EMR. We have shown that the evolving machine learning method of phrase-based NLP is better labeling transplant recipients as having rejection events compared to recorded events in our EMR. The improved accuracy of NLP for surveillance of quality measures makes this a valuable technique for quality improvement surveillance.

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DISCLOSURES: J.D. Perkins: None. **E. Clemens:** None. **M. Granich:** None. **J. Yeung:** None. **J. Reyes:** None.

Abstract# 1298

Needs of People with Kidney Transplantation During the Covid 19 Pandemic and Its Confinement, and the Role of Communication Technologies Through the "Patient Experience"

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Purpose: During the COVID-19 pandemic, healthcare services have focused on the care of acute processes and there is a risk of not meeting the needs of complex chronic high-risk patients, such as kidney transplant patients(KT). Our goal is to understand the unmet needs/problems of KT during COVID-19 lock-down from the "patient experience" perspective, and to analyze the role of communication technologies.

Methods: Development of a survey through concepts grouped into categories (units of meaning) and synthesized into metacategories extracted after interviews with 3 stable and confined KT focus groups (videoconference; verbal informed consent). Verbatim transcription of the conversation and analysis with MAXQDA software(https://www.maxqda.com/). After validation, the surveys were compared with those of the group of CJ Atchison et al in the UK general population (authorization in order).

Results: Out of 1528 KTs, 947 answered (response rate:63%). 64.2% men, and 55% over 55years. Post-TR time:3m-5a. 115 concepts, 21 categories and 3 meta-categories were identified (in order of importance for patients: Role of technology (69%), Impact of lock-down (19%) and Contact with professionals(12%)). Our KTs have a serious concern about the disease (if infection, 38% believe that their life would be at risk; and 48% think that the infection would be serious), but not about their kidney disease (20.6%), 99.7% of KTs have taken measures of social distancing, and lock-down has not meant a change in their lifestyle (sleep, diet, exercise, and family or social relationships). On a scale of 1-6 (1 little-6 a lot), for the KTs the global impact has been 1.69, very different from that of the UK ($p<0.05$). Regarding healthcare needs, 27.7% reported having received information from the hospital, but not very useful; 42.3% have stopped doing some medical control, but only 1.92% have stopped the medication. During the pandemic, 55% contacted a specialist, by telemedicine in a 84.7% (preferring by video-call). KTs understand that technology does not replace all face-to-face technology and positively value group videoconferences (therapeutic education, dietary recommendations, physical activity).

Conclusions: KTs are people at risk, and they have serious concern about the disease, so they comply with lock-down, although this has not led to a significant change in their lifestyle. KTs value having easy access to professionals, information from the center, and consider technology a key role during lock-down. These learnings should profoundly change the way health professionals relate to patients, allowing an increase in the number of contacts and reducing face-to-face visits.

CITATION INFORMATION: Revuelta I., Palou E., Scandurra R., Oppenheimer F., Diekmann F., Escarrabill J., Bayés B. Needs of People with Kidney Transplantation During the Covid 19 Pandemic and Its Confinement, and the Role of Communication Technologies Through the "Patient Experience" *AJT, Volume 21 Supplement 3*

DISCLOSURES: I. Revuelta: None. **E. Palou:** None. **R. Scandurra:** None. **F. Oppenheimer:** None. **F. Diekmann:** None. **J. Escarrabill:** None. **B. Bayés:** None.

Pancreas

Pancreas and Islet: All Topics

Abstract# 1216

Donor-Derived Cell-Free DNA Can Differentiate Rejection versus Other Causes of Pancreas Transplant Dysfunction

N. Ali[1], J. Miles[2], Z. Stewart Lewis[1], *[1]Transplant Institute, NYU Langone Health, New York, NY, [2]CareDx, Brisbane, CA*

Purpose: Assessment and early detection of allograft injury in simultaneous pancreas and kidney (SPK) transplant recipients has clear benefits for optimizing treatment and intervention. Donor-derived cell-free DNA (dd-cfDNA) is an established biomarker for surveillance of kidney transplant recipients and an increasing body of evidence supports its utility in SPK transplantation.

Methods: SPK patients were monitored prospectively with dd-cfDNA (AlloSure, CareDx Brisbane), initiated at the discretion of the treating physician. dd-cfDNA was drawn concomitantly with standard of care laboratory testing including serum creatinine, amylase, lipase, DSA and BK PCR. Pancreatic graft dysfunction was defined by elevations in serum amylase and lipase or dysregulated glucose control.

Results: A total of 9 SPK patients were identified with a total of 49 AlloSure dd-cfDNA results. Median patient age was 48 years (range 26-56). There were 5 females (56%) recipients, 2 Caucasian (22%), 3 Black (33%) and 4 Hispanic (44%) recipients. 6 SPK patients had stable graft function and 3 SPK patients developed pancreatic graft dysfunction. The median AlloSure dd-cfDNA level in stable SPK patients was 0.18% (IQR 0.12-0.39%, Figure 1). One SPK recipient with stable pancreatic enzymes had an AlloSure dd-cfDNA level of 1.3% in the setting of sub-therapeutic tacrolimus levels, which normalized with titration of immunosuppression. Of the 3 SPK recipients with pancreatic graft dysfunction, 1 patient had an AlloSure dd-cfDNA level of 3.5% associated with clinical allograft rejection. AlloSure dd-cfDNA levels decreased to 0.14% within 1 month of empiric treatment. The remaining 2 SPK recipients with graft dysfunction had paired AlloSure dd-cfDNA levels of 0.42% and 0.52%. These patients were subsequently diagnosed with a bowel obstruction and partial splenic vein thrombosis as the cause for graft dysfunction.

Conclusions: In stable SPK recipients, AlloSure dd-cfDNA levels remain low during the post-transplant course. In this case series, AlloSure dd-cfDNA was able to differentiate allograft injury associated with rejection from alternative etiologies of graft dysfunction. Elevated dd-cfDNA levels associated with rejection and sub-therapeutic immunosuppression decreased following intervention. Further studies are required to further define reference values and response to intervention.

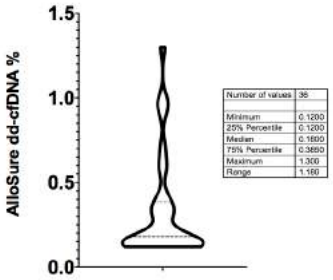


Figure 1: AlloSure dd-cfDNA distribution in stable SPK patients (36 draws from 6 unique patients).

CITATION INFORMATION: Ali N., Miles J., Stewart Lewis Z. Donor-Derived Cell-Free DNA Can Differentiate Rejection versus Other Causes of Pancreas Transplant Dysfunction *AJT, Volume 21 Supplement 3*

DISCLOSURES: N. Ali: Consulting Fee; Name of Commercial Interest; CareDx. **J. Miles:** Salary; Name of Commercial Interest; CareDx. **Z. Stewart Lewis:** Consulting Fee; Name of Commercial Interest; CareDx.

Abstract# 1217

Induction in Pancreas Transplantation: T-Cell Depletion vs. Il-2 Receptor Blockade

F. Aziz, S. Parajuli, D. Kaufman, J. Odorico, D. Mandelbrot, *University of Wisconsin, Madison, WI*

Purpose: There are limited data comparing outcomes with different induction agents in pancreas transplantation. In this study, we compare T-cell depletion to IL-2 receptor (IL2R) blockade for patient and pancreas allograft survival, rejection, and infectious complications.

Methods: We analyzed the records of all patients who underwent simultaneous pancreas- kidney (SPK) or pancreas transplant alone (PTA) at our institution between 01/01/2011 and 12/31/2017. We found no statistically significant differences between anti-thymocyte globulin and alemtuzumab recipients in patient survival, graft survival, rejection or infection, so the two groups were combined for further analysis. In addition, there were no significant differences between SPK and PTA recipients in the impact of T-depletion versus IL2R blockade on outcomes, so the two groups were combined for further analysis.

Results: Of 317 pancreas transplant recipients, 191 received induction with a T-depleting agent (139 with anti-thymocyte globulin and 52 with alemtuzumab), and 126 received induction with an IL2R blocker (basiliximab). The mean follow-up post-transplant was 5.2 ± 2.4 years. There were a total of 12 (4%) patient deaths, 6 (3%) in the T-depletion group, and 6 (5%) in the IL2R blockade group. Similarly, there were a total of 33 (17%) death censored pancreas graft failures in T-cell depleting group and 22 (17.4%) with IL2R blockade (p=0.9). No difference was detected in patient (p=0.3) or pancreas allograft (p=0.8) survival between the two groups. Also, no statistically significant difference was found in pancreas allograft rejection between the two groups (48 vs. 43; p=0.2). Bacterial and CMV infections were significantly more common in the patients who received T-cell depleting agents for induction (p=0.001, p=0.01, respectively). On multivariate analysis, history of pancreas rejection (HR=3.47, p=0.0002; 95% CI 2.02 to 5.93) and history of previously failed pancreas allograft (HR=2.0, p=0.01; 95% CI 1.18 to 4.46) were associated with increased risk of pancreas allograft loss, but choice of induction was not (HR=0.76, p=0.31; 95% CI 0.45 to 1.28). Further, on multivariate analysis, HLA-mismatching (HR=1.17, p=0.08; 95% CI 0.98 to 1.39) and CMV infection after transplant (HR=2.3, p=0.0005; 95% CI 1.45 to 3.80) were associated with increased risk of pancreas allograft rejection, but choice of induction was not (HR=0.77, p=0.22; 95% CI 0.73 to 1.10). Similarly, further analyses showed CMV infection was associated with increased risk of patient death (HR=3.84, p=0.03; 95% CI 1.11 to 13.21) but choice of induction was not not (HR= 0.88, p=0.8; 95% CI 0.27 to 2.81).

Conclusions: We suggest that IL-2 receptor blockade may be a reasonable choice of induction for pancreas transplant recipients at low immunological risk.
CITATION INFORMATION: Aziz F., Parajuli S., Kaufman D., Odorico J., Mandelbrot D. Induction in Pancreas Transplantation: T-Cell Depletion vs. Il-2 Receptor Blockade *AJT, Volume 21 Supplement 3*
DISCLOSURES: F. Aziz: None. **S. Parajuli:** None. **D. Kaufman:** None. **J. Odorico:** None. **D. Mandelbrot:** None.

Abstract# 1218

Endocrine Cell Identity and HOMA-B In Patients with Chronic Pancreatitis Undergoing Islet Auto-transplantation

C. A. Beamish[1], O. Gaber[2], O. M. Sabek[2], *[1]Surgery, Houston Mehodist Hospital, Houston, TX, [2]Surgery, Houston Mehodist, Houston, TX*

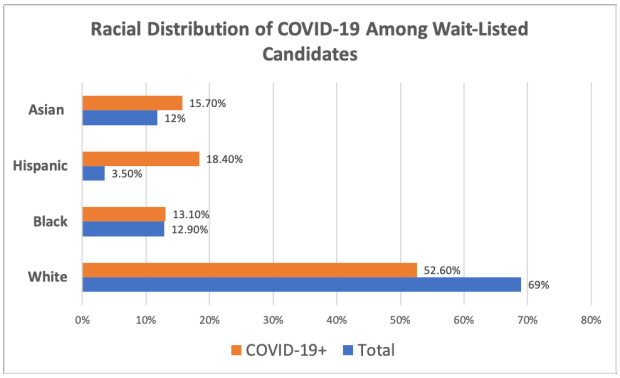
Purpose: Islet identity loss is an emergent factor in dysglycemia in diabetes, islet transplantation, and chronic pancreatitis (CP). Pancreatectomy and islet auto-transplantation (PIAT) for CP treatment is a useful model for assessing islet function in the absence of immune-suppression and to perform extensive pre-surgical metabolic testing not possible in cadaveric-sourced donor. We recently showed that in CP-PIAT patients, pre-surgical elevations in insulin resistance metrics proinsulin and HOMA-IR were associated with poorer post-surgical glycemic outcomes (insulin dependence) as well as histological islet identity loss. Here we sought to examine other measures of pre-surgical islet function and estimates of PIAT success using HOMA-β and insulin independence equations in a larger auto-transplant patient cohort.
Methods: Seven PIAT patients were assessed for β-cell function metrics, including pre- and 6-month-post-transplant HOMA-β by fasting insulin and glucose, comparison to the SUITO index using C-peptide, and proposed insulin independence by the BETA-2 score. Pancreas histology at PIAT was examined for changes in cellular maturity markers and compared with non-diabetic and T2DM donor controls.
Results: Pre-PIAT, low-HOMA-β was largely predictive of post-PIAT insulin dependence. Pre- and post-PIAT HOMA-β-CP values closely aligned with the SUITO equation, and there was a general correlation between BETA-2 score post-PIAT relative to the predicted index threshold for insulin independence. Histological data supported serological estimates of β-cell function, showing that poor HOMA-β pre-transplant corresponded with increased insulin-glucagon and insulin-vimentin colocalization, and reductions in Ins/Syp ratio, UCN3 presence, and overall islet area.
Conclusions: These data encourage further examination of islet identity peri-transplant and the association with pre-surgical serological β-cell function, as well as the use of PIAT for studying β-cell phenotype and its functional clinical implications.
CITATION INFORMATION: Beamish C., Gaber O., Sabek O. Endocrine Cell Identity and HOMA-B In Patients with Chronic Pancreatitis Undergoing Islet Auto-transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: C.A. Beamish: None. **O. Gaber:** None. **O.M. Sabek:** None.

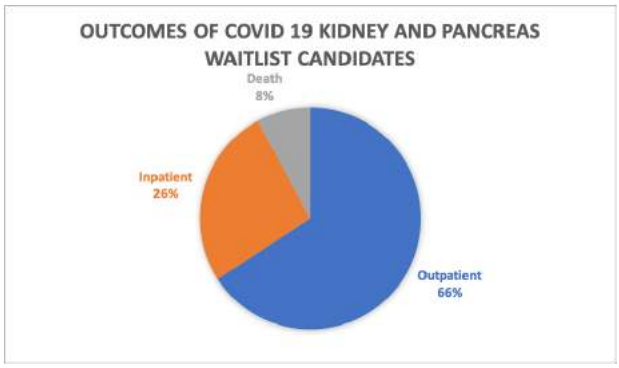
Abstract# 1219

Outcomes of Covid 19 in Candidates Waitlisted for Kidney and Pancreas Transplantation

R. El-Rifai[1], S. Riad[1], R. Belina[2], A. Matas[2], *[1]Medicine, University of Minnesota, Minneapolis, MN, [2]Surgery, University of Minnesota, Minneapolis, MN*

Purpose: The COVID 19 pandemic has posed new challenges to transplant centers. The impact has been detrimental on wait-listed ESKD patients, reducing their access to life saving kidney transplant and prolonging time on the waiting list. Waitlist status is an independent predictor of hospitalization among COVID-19 infected kidney transplant candidates and is associated with increased mortality as high as 34% in one center. In this study, we aim to characterize the impact of COVID-19 on patients waitlisted for kidney and pancreas transplant at our center.
Methods: We performed a retrospective chart review of adult candidates waitlisted for kidney transplant at our center who tested positive for COVID-19. We reviewed baseline patient demographics and co-morbidities, severity of COVID-19 illness, hospitalization rate, and mortality.
Results: 38 patients waitlisted for kidney transplant, simultaneous kidney-pancreas, pancreas transplant alone tested positive for COVID-19 between March and November 2020. Of these, 22 (71%) were listed for 1st kidney transplant, 7 (13.4%) for SPK, 6 (15.8%) for 2nd kidney transplant, 3 (7.9%) for pancreas transplant alone. COVID-19 waitlisted candidates had median age-47 years (20-75), 20 (52.6 %) males. 52.6% white, 18.4% Hispanic, 15.7% Asian, and 13% Black. Significant racial disparities were noted especially among the Hispanic population who account for only 3.4% of our waitlist candidates but seem to have increased predilection for COVID 19 infection. The vast majority 30 (78.9%) of COVID 19 waitlist patients are hypertensive; and 17 (44.7%) diabetic. 25 (65.8%) of patients were treated as outpatient, 10 (26.3%) required hospitalization and 3 (7.9%) died. Critically, of the 38, only 3 (2 pancreas waitlist; 1 kidney) have recovered sufficiently to be reactivated on the waitlist. Mean time has been 16.7 weeks (SE=2.7 weeks) (range 13-22 weeks).
Conclusions: COVID19 infection has a significant impact on candidates waitlisted for kidney and pancreas transplantation. At our center, mortality has been 7.8%, hospitalization, 26.3%. But, to date, only 7.8% have been reactivated on the waitlist, predisposing them to increased morbidity and mortality.





CITATION INFORMATION: El-Rifai R., Riad S., Belina R., Matas A. Outcomes of Covid 19 in Candidates Waitlisted for Kidney and Pancreas Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: R. El-Rifai: None. **S. Riad:** None. **R. Belina:** None. **A. Matas:** None.

Abstract# 1220

One-Year Monitoring of Changes to Kidney-Pancreas Waiting Time Criteria: An OPTN Analysis

R. C. Forbes[1], B. Plucinski[2], J. White[2], N. T. Kyaw[2], R. Kandaswamy[3], S. V. Niederhaus[4], *[1]Surgery, Vanderbilt University, Nashville, TN, [2]UNOS, Richmond, VA, [3]Surgery, University of Minnesota, Minneapolis, MN, [4]Surgery, University of Maryland, Baltimore, MD*

Purpose: In 2018, the OPTN board approved changes to kidney-pancreas (KP) waiting time criteria. KP candidates accrued waiting time if they were (1) on insulin and had a C-peptide <=2ng/mL or (2) on insulin and had a C-peptide >=2ng/mL and had a BMI <=30kg/m^2 which was the maximum allowable BMI. Since 7/11/2019 candidates must be on insulin, registered for a KP, and meeting kidney waiting time criteria.
Methods: Registrations added to the waitlist and transplants between 7/11/2018-7/10/2019 (pre-implementation) or 7/11/2019-7/10/2020 (post-implementation) were compared. Data originated from OPTN waitlist, Transplant Candidate Registration forms and Transplant Recipient Registration forms as of 10/16/2020.
Results: 1,389 registrations were added to KP and 42,229 to kidney alone (KI) waitlists (pre-implementation); 854 KP and 19,196 KI transplants performed. 1,401 registrations were added to KP and 19,493 KI waitlists (post-implementation); 814 KP and 19,493 KI transplants performed. The proportion of type 2 diabetes (T2DM) KP candidates and recipients increased from 23.29% to 27.45% and 21.41% to 27%, respectively (Table 1). Candidate mean BMI increased from 25.7 to 26.3. KP recipients with T2DM and C-peptide >2ng/mL had higher median BMIs than those with lower C-peptide. KP post-transplant outcomes stratified by ethnicity, BMI, and diabetes status remained similar. The proportion of KI candidates and recipients remained roughly unchanged. Pediatric KI organ offers increased (527 to 592 offers per 100 active patient-years) but transplants remained unchanged.
Conclusions: Changes in KP waiting time criteria did not adversely affect KI or pediatric KI candidates. Removing the BMI cutoff for obese patients with T2DM resulted in higher BMI KP transplants with equivalent post-transplant outcomes compared to lower BMI recipients. Although total KP transplants were slightly less in the post-implementation period, registrations were more and the transplant volumes were likely adversely affected by the COVID-19 pandemic.
CITATION INFORMATION: Forbes R., Plucinski B., White J., Kyaw N., Kandaswamy R., Niederhaus S. One-Year Monitoring of Changes to Kidney-Pancreas Waiting Time Criteria: An OPTN Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: R.C. Forbes: None. **B. Plucinski:** None. **J. White:** None. **N.T. Kyaw:** None. **R. Kandaswamy:** None. **S.V. Niederhaus:** None.

Abstract# 1221

Update on Pancreas Retransplantation- A Registry Analysis

A. Gruessner, J. Renz, S. Saggi, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

Purpose: A successful pancreas transplant provides patients with brittle diabetes the opportunity of good long-term metabolic control. While initially more and more retransplants were performed, the number of pancreas retransplants decreased by 75% between 2004/05 and 2018/19. This may be due to the technically demanding procedure and the suboptimal outcome in certain subgroups. We analyzed outcome of pancreas retransplants over the past 15 years.

Methods: All 1368 pancreas retransplants performed between 1/1/2004 and 12/31/2019 were included. Comprehensive univariate and multivariable models were developed to describe outcome and potential risk factors for retransplant graft outcome. To describe the impact on long term graft function in the primary graft an artificial cut point of 5 years was chosen.

Results: Between 1/1/2004 and 12/31/2019 1025 pancreas retransplants were performed (66% rePAK, 15% rePTA and 19% reSPK). The decrease in numbers was mainly due to the smaller number of rePAK. Of the primary failed transplants, the majority (58%) were SPK. Over the years, the rate of patients who lost their primary graft for immunological reason increased from 52% to 58%. This was due to the increased better long term function after primary transplant. The median time of pancreas graft function in this primary pancreas grafts increased from 49 mos to 87mos. The longest failed primary pancreas functioned for over 25 years before being retransplanted. Pancreata that failed for early technical reasons were retransplanted early as well as pancreata that functioned > 5 years. Pancreata that failed early due to immunological reasons showed the longest time between failure and retransplant.

Conclusions: With careful patient and donor selection pancreas retransplants in all 3 recipient categories can be successful. Only primary pancreas transplants that failed due to early acute rejection carried a significantly higher (early) risk for retransplant failure. The use of depleting induction therapy and the standard maintenance protocol of tacrolimus and MMF further decreased the risk of retransplant failure loss.

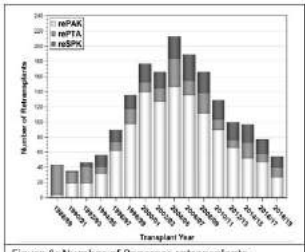


Figure 1: Number of Pancreas retransplants performed between 1988 and 2019

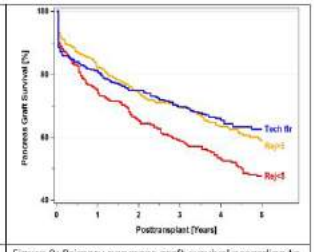


Figure 2: Primary pancreas graft survival according to cause of graft failure

CITATION INFORMATION: Gruessner A., Renz J., Saggi S., Gruessner R. Update on Pancreas Retransplantation- A Registry Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gruessner: None. **J. Renz:** None. **S. Saggi:** None. **R. Gruessner:** None.

Abstract# 1222

Development of De-novo Malignancies After Kidney and/or Pancreas Transplantation in Diabetic Patients

A. Gruessner, S. Saggi, J. Renz, R. Gruessner, *SUNY Downstate Medical Center, Brooklyn, NY*

Purpose: Transplantation of a kidney (KTA), pancreas (PTA), or a simultaneous pancreas-kidney (SPK) in a patient with end-stage organ failure is a lifesaving treatment. Patient and graft survival improved significantly over time due to more effective immunosuppressive agents; however, their long-term use increases the likelihood for developing posttransplant malignancies. This study analyzed the incidence of de-novo malignancies in diabetic patients after organ transplantation.

Methods: All primary technically successful primary pancreas and/or kidney transplants performed between 2005 and 2019 were included. Pancreas after kidney transplants were excluded: (1) the pancreas is a retransplant and (2) the time interval between the 2 transplants can be long. De-novo primary malignancies reported to UNOS/OPTN or reported as cause of graft loss or death were used. Patients with previous malignancies, lymphoproliferative disease, or donor-related malignancies were excluded. To provide comparable age distribution between KTA and SPK and PTA, all pancreas transplants were matched by age, gender, and transplant year with KTA in diabetic patients only. The Kaplan Meier Method was used to estimate the rate of malignancy over time. Descriptive statistics were performed and a multivariable risk model for the development of de-novo malignancies was developed.

Results: In 22,721 transplants (11,364 KTA, 1,013 PTA, 10,344 SPK) a total of 1,122 primary malignancies were diagnosed over time. Figure 1 shows the development in the 3 categories. At 5- (10-) years the cancer rate was 3.1% (8.3%) in KTA, 3.6% (10.4%) in SPK, and 5.3% (13.7%) in PTA (p<0.0001). Table 1 list the frequencies of the most frequently reported malignancies. Differences in the frequency between pancreas and kidney transplants were found for squamous/basal skin cancers (PTA, SPK > KTA) and cancers of the genitourinary system (KTA > SPK, PTA). Risk factor analysis identified older age and white race as the most influential risk factors followed by induction therapy with depleting antibodies.

Conclusions: In general, organ transplant recipients are at a greater risk for developing malignancies. Type and frequency of specific cancers vary between kidney and pancreas transplant recipients: Differences in type and frequency between pancreas and kidney transplants were found for squamous/basal skin cancers (PTA, SPK > KTA) and cancers of the genitourinary system (KTA > SPK, PTA). Long-term use of immunosuppression requires awareness for the development of malignancies and lifelong surveillance.

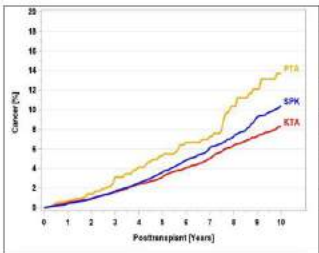


Figure 1: Time to development of a malignancy after transplantation in patients with diabetes mellitus

Malignancy	KTA	PTA	SPK
% Skin (Squamous/ Basal)	37	59	58
% Genitourinary	26	9	11
% Gastrointestinal	7	3	4
% Breast	6	4	5
% Lung	6	6	3
% Melanoma	2	4	5

Table 1: Most frequently reported malignancies

CITATION INFORMATION: Gruessner A., Saggi S., Renz J., Gruessner R. Development of De-novo Malignancies After Kidney and/or Pancreas Transplantation in Diabetic Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Gruessner: None. **S. Saggi:** None. **J. Renz:** None. **R. Gruessner:** None.

Abstract# 1223

TPIAT Outcomes in Diabetic and Non-diabetic Patients

M. A. Kanak, J. B. Spriggs, P. Coughenour, J. Kalivarathan, P. Saravanan, M. Levy, *Virginia Commonwealth University, Richmond, VA*

Purpose: Total pancreatectomy with islet auto-transplant (TPIAT) has become a mainstay treatment for patients who suffer from refractory chronic pancreatitis. It has consistently been shown to reduce narcotic dependence and improve quality of life while simultaneously maintaining partial β cell activity, thus improving glycemic control post-operatively compared to pancreatectomy alone. A subset of patients with chronic pancreatitis already have underlying diabetes prior to surgery. Outcomes for this specific subset of patients has not been independently evaluated. In this study, we performed a comparative analysis of the TPIAT outcomes for diabetic and non-diabetic patient cohorts to determine if it produces the same long-term outcomes in both populations.

Methods: A total of 77 patients who had undergone TPIAT at Virginia Commonwealth University or Baylor University and were at least 1-year post-op were included in this study. 13 of the 77 patients were diabetic before undergoing TPIAT. Analysis included comparing demographics, pre-op Islet yield, and metabolic and pain outcomes both pre-op and at 1-year post-op. Additionally, the groups were adjusted for only those with islet dose (IE islet cells/kg patient weight) that were within +/- 1 SD of the average for diabetic patients. Once adjusted, metabolic and pain outcomes were again compared at both time points to determine if any of the differences seen were due to dose of islets available for transplant.

Results: Diabetic patients had higher rates of HTN at the time of transplant (61.5% compared to 25.0% of the non-diabetic group). There were no other differences in demographic variables. There was a significantly higher average islet cell yield in non-diabetic patients. This difference was eliminated when adjusted for islet dose. There was a significantly higher basal glucose and HgBA1c both pre-op and 1-year post-op for the diabetes cohort. These differences did not resolve with adjustment for islet dose. There was no difference in pre-op basal C-peptide, pain score or equivalent narcotic dosage at either the pre-op or 1-year post-op time points. There was no difference between groups in degree of change of basal c-peptide, HgBA1c, basal glucose, or pain score.

Conclusions: 1 year following TPIAT, both diabetic and non-diabetic patients experienced a worsening of their pre-op glycemic control and improvement in pain score and narcotic dependence. However, neither group experiences a disproportionate degree of those changes. Together, these results suggest that pre-transplant diabetes should not be considered as a contraindication for TPIAT.

CITATION INFORMATION: Kanak M., Spriggs J., Coughenour P., Kalivarathan J., Saravanan P., Levy M. TPIAT Outcomes in Diabetic and Non-diabetic Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.A. Kanak: None. **J.B. Spriggs:** None. **P. Coughenour:** None. **J. Kalivarathan:** None. **P. Saravanan:** None. **M. Levy:** None.

Abstract# 1224

Comparative Outcomes of TPIAT in African American and Caucasian Patients with Chronic Pancreatitis

M. A. Kanak, J. B. Spriggs, P. Coughenour, J. Kalivarathan, P. Saravanan, M. F. Levy, *Virginia Commonwealth University, Richmond, VA*

Purpose: Total pancreatectomy with islet auto-transplantation (TPIAT) is becoming the standard of care for patients with chronic pancreatitis, as it provides pain relief and improved quality of life without the loss of glycemic control associated with total pancreatectomy alone. Despite these clear benefits and the high prevalence of chronic pancreatitis in the African American population, this procedure continues to be performed at significantly lower rates compared to the Caucasian population. In this study, we have performed a comparative analysis of the outcomes of the TPIAT procedure between African American and Caucasian patients. We hypothesize that no statistically significant differences in outcomes between these two groups indicates that the comparatively lower rate of TPIAT procedures seen in the African American population is rooted in a lack of access to high-quality healthcare and other social determinants, not worse outcomes.

Methods: A total of 84 Caucasian and 15 African American patients who had undergone TPIAT were included. Wilcoxon Rank tests were used to compare the HgbA1C, C-peptide, SUITO index, subjective pain score, and narcotic dose between these two groups at the pre-operative as well as 6-month and 12-month post-operative time periods.

Results: There were no significant differences in any of the surgical outcome measures between the two groups at either 6-month or 1-year post-operative. There were no significant differences in age at transplant or islet yield. Both Caucasian and African American patients experienced a decrease in pain score and narcotic dose at 6 months as well as an increase in basal glucose and HgBA1c.

Conclusions: These results indicate that African American patients have comparable outcomes to their Caucasian counterparts, suggesting that the disparity in the rate of TPIAT procedures performed in these two groups is contributable to social determinants such access to quality health care and the perception of physicians that African American patients can be expected to have worse outcomes comparatively. Based on these findings, we propose that physicians evaluating patients for TPIAT candidacy not use African American race as an indicator for expected surgical outcome.

CITATION INFORMATION: Kanak M., Spriggs J., Coughenour P., Kalivarathan J., Saravanan P., Levy M. Comparative Outcomes of TPIAT in African American and Caucasian Patients with Chronic Pancreatitis *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.A. Kanak: None. **J.B. Spriggs:** None. **P. Coughenour:** None. **J. Kalivarathan:** None. **P. Saravanan:** None. **M.F. Levy:** None.

Abstract# 1225

Symptoms on MTSOSD Questionnaire in Pancreas Transplantation Recipients

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Purpose: We used the Modified transplant symptom Occurrence and symptom distress scale (MTSOSD) to study side-effects of immunosuppression after Pancreas transplantation (PT) for patients with Type 1 Diabetes (T1D).

Methods: After IRB approval, we prospectively studied 17 PT recipients (Six Aim 1, 11 Aim 2). Subjects were enrolled within a month of PT and completed 3 visits over a year in Aim 1and were enrolled at least 1 year post PT and completed 2 visits one year apart in Aim 2. All subjects completed MTSOSD at these time points. MTSOSD includes 60 symptoms and is completed for frequency (5 point Likert scale never to always occurring) and distress (5 point Likert scale not at all to very much distressing) of symptoms.

Results: Aim 1- 6 recipients (3 pancreas transplant alone {PTA}, 2 simultaneous pancreas kidney transplantation {SPK} and 1 Pancreas after kidney, all 6 insulin independent{II}) were 40.2 ± 21 years old, 5F, duration of T1D 24.4 ± 17.4 yrs with 32.8 ± 21.2 days interval from PT. Aim 2-11 (9 PTA, 2SPK, 10 II, 1 insulin treated) recipients were 55.6 ± 10.1 years old, 8F, duration of T1D 33.8 ± 12.2 years, 7.2 ± 5.2 yrs interval from PT. Aim 1- laboratory testing (labs) on all 3 visits (V1, V2 & V3) was satisfactory and similar except for improvement in HbA1c 6.1± 0.8% (V1) to 5.7 ± 0.9 % (V3). At least four side effects were reported by every subject with range 4-35 (Table). In course of 1 year, 5 of 6 experienced at least one grade 4 (very much distressing) symptom. 5 subjects included one on V1, 4 on V2 (all new) and 4 subjects on V3 (3 identical to V2 and one identical to V1). Two subjects out of 4 reporting grade 4 symptoms became insulin treated over the year. No significant difference was observed between visits regarding symptom frequency and distress. For Aim 2- labs were satisfactory and similar at both visits as well. During both V1 and 2, at least one side effect was reported by every subject with range 1-53. In course of 1 year, 5 subjects out of 11 experienced at least one grade 4 symptoms; Three on V1, 4 subjects on V2 (2 new and 2 same as V1). Subject who reported 24 grade 4 symptoms on V1 and 25 on V2 was insulin treated. Significant differences were seen between V1 and 2 for two symptoms "I have felt tired "(decreased, p 0.0239) and "I have been experiencing mood swings" (increased, p 0.0341). Table: MTSOSD symptoms frequency and symptoms distress

	Aim1 (n=6)	Aim2 (n=11)			
Variables	**Visit1**	**Visit2**	**Visit3**	**Visit1**	**Visit2**
Mean number of symptoms	21.3 ± 9.2	24 ± 12.7	20.8 ± 8.2	30.9 ± 14.3	29.5 ± 15.1
Range in number of symptoms	10-31	4-35	8-29	1-53	1-53
No. of subjects reporting Grade 4 symptoms (very much distressing)	1	4	4	3	4
Mean number of grade 4 symptoms	1 ± 0	1.3 ± 0.6	1.8 ± 0.5	12.5 ± 12.7	9.3 ± 10.9
Mean number of grade 1 to 3 symptoms reported	19.5 ± 6.9	18 ± 10.5	15.2 ± 6.6	25.2 ± 12.2	21.9 ± 12.6

Conclusions: PT recipients tolerate immunosuppression well but report some immunosuppressant related side effects in the first year and subsequently after PT.

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Abstract# 1226

Diffuse Calcification Pattern in Chronic Pancreatitis Has Two Aspects in Total Pancreatectomy with Islet Autotransplantation: Bad Sign for Islet Graft Function and Good Sign for Pain Relief

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Purpose: Chronic pancreatitis (CP) is characterized by progressive inflammation and fibrosis of the pancreas. The diagnosis of CP is based on pancreatic calcifications, ductal dilatation, and atrophy visualized by imaging with computed tomography (CT) and/or magnetic resonance imaging (MRI). Pancreatic calcification has been previously identified as a major risk factor for development of diabetes in CP patients and poor islet isolation, leading to poor insulin dependence at 1 year after total pancreatectomy with islet autotransplantation (TPIAT). However, the relationship of degree of calcification to TPIAT outcome is not analyzed so far. We retrospectively classified the calcification pattern based on localization, using preoperative CT imaging of CP patients undergoing TPIAT at our center.

Methods: Our database of 200 consecutive TPIAT procedures performed between 2006 and 2020 was retrospectively reviewed. Based on CT finding, two types of calcification pattern were defined; focal calcification (FC) and diffuse calcification (DC). Glucose level, HbA1c, C-peptide level, daily insulin requirement and insulin independence rate were measured at 3, 6 and 12 months after surgery. Narcotic dose and pain score was also calculated at same time points.

Results: 37 patients were identified as calcification cases. Among these cases, FC and DC cases were 16 and 21, respectively. Preoperative HbA1c levels of DC group was significantly higher than non-calcification (NC) group (6.5±1.1 vs 5.8±0.9%, $p<0.01$), and both basal and stimulated C-peptide of DC group were significantly low compared to NC group (basal; 1.2±0.8 vs 1.9±1.2ng/ml, $p<0.05$, stimulated; 3.2±1.9 vs 6.2±3.5ng/ml, $p<0.01$). Islet isolation of DC pancreas resulted in lowest total islet yield (IEQ) among the three groups ($p<0.0001$) and insulin independent rate at 12 month in DC group was 0%. ($p<0.05$ vs NC) (Figure 1A and B). However, narcotic free rate of DC group at 12 month was 91.7%, significantly higher than other groups ($p<0.05$ vs FC or NC).

Conclusions: Simple classification of pancreatic calcification pattern based on CT findings can predict preoperative endocrine function, islet isolation results and metabolic outcomes in CP patients undergoing TPIAT. Although DC is a sign of diabetes risk after TPIAT, DC group also showed advantage on pain relief. These findings suggest TPIAT can provide beneficial effect for patients suffering from severe chronic pancreatitis with calcification.

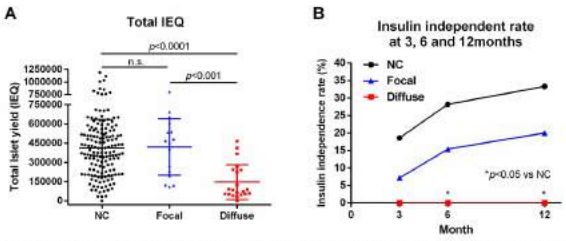

Figure 1A Scatter plot showing total islet yield (IEQ) of each patient in 3 groups. **1B** Insulin independent rate of 3 groups at 3, 6 and 12months after TPIAT.

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DISCLOSURES: Y. Liu: None. **K. Kumano:** None. **J. Mattke:** None. **C. Darden:** None. **S. Vasu:** None. **M. Lawrence:** None. **G. Testa:** None. **A. Gupta:** None. **E. Beecherl:** None. **N. Onaca:** None. **B. Naziruddin:** None.

Abstract# 1227

Dual-Agent Induction Therapy for Pancreas Transplantation: A Single-center Experience

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Purpose: The optimal induction strategy in pancreas transplantation has not been elucidated. Available evidence supports use of both basiliximab and lymphocyte depleting agents. Rabbit anti-thymocyte globulin (rATG) is associated with more infusion-related concerns such as cytokine-release syndrome, hypotension, and tachycardia, but is associated with lower rates of rejection. There is no available literature to date that describes the combined use of both agents. This study explores outcomes of traditional basiliximab induction compared to a single intraoperative dose of basiliximab to avoid adverse hemodynamic events followed by reduced dose rATG.

Methods: This is a single-center retrospective study of 24 adult simultaneous kidney-pancreas or pancreas alone transplants from January 2017 to December 2019. Historically, induction at our center was basiliximab 20mg on post-operative day 0 (POD0) and POD4. In 2018, the induction protocol was revised to single dose basiliximab POD0 followed by rATG for a total dose of 4.5mg/kg. Triple maintenance immunosuppression for all patients consisted of tacrolimus, mycophenolate mofetil (MMF), and prednisone.

Results: Seventeen patients received basiliximab alone, and 7 patients received the combination protocol of basiliximab + rATG. Baseline patient characteristics were similar between both groups (Figure 1). Mean tacrolimus trough levels were similar between groups and all patients received corticosteroids. MMF starting dose for all patients was 2g/day, with the average dose decreased to 1g/day by 12 months due to gastrointestinal side effects or bone marrow suppression. This maintenance immunosuppression was similar between groups. At 1 year, there was no difference in patient or pancreas graft survival (Figure 2). Biopsy proven acute kidney rejection (BPAR) incidence was 6% in basiliximab and 14% in the basiliximab + rATG induction group. Despite increased immunosuppression, postoperative complications and infections were not increased in the basiliximab + rATG group. Only patients who received basiliximab alone induction developed CMV viremia (n=3); however, there was more CMV seronegative mismatch within this group.

Conclusions: In this single-center study, overall outcomes of patients who underwent pancreas transplantation using two different induction regimens (basiliximab vs. basiliximab + rATG) are comparable with no increased infections in the dual induction group.

Figure 1. Baseline Characteristics

	Basiliximab (n=17)	Basiliximab + ATG (7)
Type of transplant, n (%)		
SPK	13 (76)	7 (100)
PAK	1 (6)	0
Pancreas alone	3 (18)	0
Age at transplant, years (range)	45.5 (28-63)	46.5 (28-63)
Prior transplant, n (%)	1 (6)	1 (14)
KDPI, % (range)	19 (4-52)	16 (2-52)
HLA mismatch, n (%)	5 (2-6)	4 (3-6)
Length of stay (days)	7.5 (4-84)	8 (4-84)
DGF, n (%)	0 (0)	1 (14)

Figure 2. Outcomes

1 Year Patient and Graft Survival

	Basiliximab (n=17)	Basiliximab + ATG (7)
Patient survival, n (%)	17 (100)	7 (100)
Graft survival, n (%)		
Pancreas	14 (82)	6 (86)
Kidney	16 (94)	7 (100)
Time to graft loss (days)	7.5 (0-102)	25
Post-Transplant complications*, n (%)	7 (41)	2 (29)

*complications include: pancreatic leaks, bowel perforation, GI bleed, thrombosis, NSTEMI, thrombotic microangiopathy

Rejection Outcomes

	Basiliximab (n=17)	Basiliximab + ATG (7)
MFI > 2000 at transplant, n (%)	0 (0)	2 (29)
MFI > 2000 at 1 year, n (%)	0 (0)	1 (14)
Kidney BPAR, n (%)	1 (6)	1 (14)
Time to kidney BPAR (days)	15	15
FK trough at 1 week, ng/mL	7.4 (3.5-14.8)	7.5 (1.8-14.8)
FK at 1 month	9.1 (6.3-14.4)	9.5 (6.3-14)
FK at 3 months	7.6 (4.9-15.3)	7.4 (4.9-14.4)
FK at 6 months	7.4 (2.9-10.6)	7.4 (2.9-15.7)
FK at 12 months	7.1 (2.8-10.2)	7.1 (2.8-9.4)
MMF daily dose at 1 month, mg/day	2000 (1000-2000)	2000 (1500-2000)
MMF daily dose at 3 months	1750 (750-2000)	1500 (750-2000)
MMF daily dose at 6 months	1500 (1000-2000)	1500 (0-2000)
MMF daily dose at 12 months	1000 (750-2000)	1250 (750-2000)
Maintenance corticosteroids, n (%)	17 (100)	7 (100)

Infection Outcomes

	Basiliximab (n=17)	Basiliximab + ATG (7)
CMV mismatch (D+/R-), n(%)	5 (29)	1 (14)
CMV viremia, n (%)	3 (18)	0 (0)
Time to CMV detected (days)	298 (113-321)	-
Incidence of urine BK, n (%)	7 (41)	3 (43)
Time to urine BK, n(%)	68 (41-193)	62 (35-193)

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Abstract# 1228

Impact of Insulin Therapy in Pancreas Transplantation Donors on Graft Outcomes: An Analysis of the Optn/unos Database

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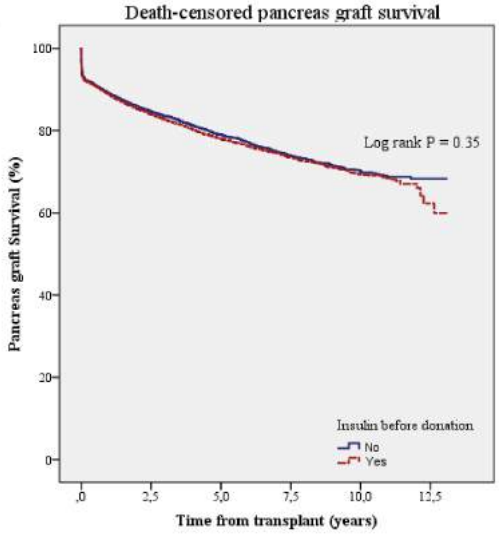
Purpose: Hyperglycemia requiring insulin treatment is frequent in critically ill patients and potential pancreas donors. Information on the impact of donor insulin use on pancreas outcomes is scarce. Thus, we explored the influence of donor insulin use on recipient and pancreas graft survival.

Methods: Retrospective study with 12841 pancreas recipients (either simultaneous pancreas-kidney, pancreas after kidney or pancreas alone) from the OPTN/UNOS registry performed between 2000 and 2017. Multivisceral recipients other than simultaneous pancreas-kidney, those transplants from a donor < 30 kg and recipients with diabetes other than type 1 or 2 were excluded. Insulin donor requirements were defined as the need for any dose of insulin within 24 hours prior to donation.

Results: A total of 7765 (60%) patients received a pancreas from a donor with insulin requirements. Pancreas graft survival (death-censored) at 1 year was similar between those who received an insulin-requiring donor and the remaining (89% vs 89%, $P > 0.05$), as well as at 5 and 10 years (78% and 69% vs 79% and 70%, respectively, $P = 0.35$)(Figure). Donor insulin therapy was not associated neither with an increased risk of recipient death (HR 0.93 [95% CI 0.80-1.07], P = 0.29) nor pancreas graft failure (HR 1.08 [95% CI 0.99-1.17], P = 0.09).

Conclusions: Insulin requirements in a potential pancreas donor is not associated, *per se*, with an impaired pancreas graft and patient survival. Thus, donors who require insulin therapy may be suitable for pancreas transplantation.



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DISCLOSURES: E. Montagud-Marrahi: None. **F. Ausania:** None. **Y. Fundora:** None. **A. Amor:** None. **E. Esmatjes:** None. **J. Ferrer:** None. **I. Revuelta:** None. **D. Cucchiari:** None. **J. Rovira:** None. **M. Musquera:** None. **C. Fondevila:** None. **F. Diekmann:** None. **P. Ventura-Aguiar:** None.

Abstract# 1229

Human Leukocyte Antigen Mismatches Between Donor-Recipient or Donor-Donor are Not Associated with Adverse Pancreas Outcomes in Pancreas After Kidney Transplant Recipients

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Purpose: A greater degree of HLA mismatch has been previously associated with inferior graft survival in kidney and pancreas transplantation. Pancreas after kidney (PAK) recipients are in a unique situation. On one hand, these recipients have been immunosuppressed for months to years before their pancreas transplant, and on the other hand, they will be exposed to new HLAs from the pancreas donor. How pancreas outcomes among HLA mismatched PAK recipients might differ depending on whether there is a mismatch between pancreas donor and recipient (PD-R) or pancreas donor and kidney donor (PD-KD) are unknown.
Methods: All primary PAK transplants between 1997 and 2019 at our center were included in this study. Patients were divided into two groups based on the degree of HLA mismatching: low (L-MM) as 0-4 and high (H-MM) as 5-6. We analyzed all (N=73) PAK for PD-R mismatch during the study period, and the subset of PAKs in whom both kidney and pancreas were transplanted at our center for PD-KD mismatch (N=37). Pancreas graft survival and rejection rates were determined over the entire time period.
Results: The mean interval between kidney and pancreas transplants in the PD-R cohort was 45.2 months. Comparing L-MM (n=39) and H-MM (n=34), we observed no difference in the overall rate of graft loss. 64% of grafts failed (46% death censored, DCGF) in the L-MM group and 62% (26% DCGF) in H-MM (p=0.84). There was also no difference in the overall rate of rejection throughout the whole period [L-MM (33%) vs H-MM (41%)], nor the severity of rejection. We observed a statistically significantly (p<0.01) earlier time to acute pancreas rejection in the H-MM group (6.8 +/- 8.7 mo) vs the L-MM cohort (29.0 +/- 36.2 mo). When stratified according to the type of pancreas transplant induction agent, we observed the overall acute rejection rates to be similar: L-MM(depletional) 33%(6/18), L-MM (IL-2RA) 33% (7/21), H-MM (depletional) 41% (7/17), and H-MM (IL-2RA) 41% (7/17). For the analyses PD-KD subset, 37 recipients had both organs transplanted at our center: 15 were in L-MM and 22 in H-MM. The mean interval between two transplants were 31.2 months. We observed no statistically significant difference in the incidence of pancreas graft loss: 53% grafts failed (27% DCGF) in L-MM and 68 % (41% DCGF) in the H-MM group (p=0.37). We observed no statistically significant difference in the incidence or severity of rejection. When stratified according to the type of pancreas transplant induction agent, the overall acute rejection rates were similar.
Conclusions: We did not find a negative impact of HLA mismatch among PAK recipients on either pancreas graft survival or rejection rates.

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DISCLOSURES: S. Parajuli: None. **D. Kaufman:** None. **B. Welch:** None. **H. Sollinger:** None. **D. Mandelbrot:** None. **J. Odorico:** None.

Abstract# 1230

Early Increases in Post-Transplant Pancreatic Enzymes are Not Associated with Inferior Patient or Graft Outcomes Among Pancreas Transplant Recipients

S. Parajuli, G. E. Leverson, B. Welch, H. Sollinger, D. Kaufman, D. Mandelbrot, J. Odorico, *University of Wisconsin, Madison, WI*

Purpose: An increase in the serum concentration of pancreatic enzymes (amylase and lipase) is commonly related to an acute inflammatory process in the pancreas graft among pancreas transplant recipients (PTRs). The association between immediate post-operative increases in pancreatic enzymes and long-term post-transplant graft and patient outcomes is unknown.
Methods: We analyzed all PTRs transplanted at our hospital between 06/2009 and 09/2018. Due to changes in the normal laboratory values for amylase (A) and lipase (L) during the study period, enzyme levels were presented as a ratio of absolute numbers to the upper limit of normal value, with value > 1 considered as abnormal. We specifically evaluated patient and graft survival based on the amylase or lipase ratios on day 1 (A1, L1) and maximum ratios within 5 days of transplant (Amax, Lmax). We also evaluated outcomes after excluding grafts that failed within 90 days of transplant.
Results: There were a total of 443 PTRs during the study period, 287 were simultaneous pancreas and kidney (SPK) recipients, and 156 solitary pancreas recipients (SP). There was a total of 102 pancreas graft failures,yet an early rise in enzymes was not associated with pancreas graft failure: A1 (HR: 1.02, 95% CI: 0.97-1.06, p=0.45); Amax (HR: 1.02, 95% CI: 0.97-1.06, p=0.46); L1 (HR: 1.0, 95% CI: 0.96-1.04, p=0.99); Lmax (HR: 1.01, 95% CI: 0.97-1.04,p=0.72). There were 46 deaths during the study period. High immediate post-transplant pancreatic enzyme levels were not associated with patient mortality: A1 (HR: 1.05, 95% CI: 0.99-1.10, p=0.08); Amax (HR: 1.05, 95% CI: 0.99-1.10, p=0.09); L1 (HR: 1.02, 95% CI: 0.98-1.06, p=0.24); Lmax (HR: 1.03, 95% CI: 0.99-1.06, p=0.07). Similarly, there were 117 PTRs with biopsy-proven pancreas rejection, and similarly, no association with early post-transplant enzyme increases was observed. Similar findings were seen when considering SPK only or SP only in separate analyses, or after excluding grafts that failed within 90 days of transplant thereby focusing on non-technical failures, or including outcomes only 1-year post transplant. Finally, we failed to reveal an association between immediate post-transplant enzyme increases with long-term functional graft outcomes as measured by C-peptide or HbA1c.
Conclusions: In this large series of PTRs, immediate post-transplant increases in pancreatic enzymes, reflecting early graft pancreatitis, possibly due to ischemia reperfusion injury, was not associated with patient survival, pancreas graft survival, rejection, or long term endocrine graft function. More studies in this field are needed.
CITATION INFORMATION: Parajuli S., Leverson G., Welch B., Sollinger H., Kaufman D., Mandelbrot D., Odorico J. Early Increases in Post-Transplant Pancreatic Enzymes are Not Associated with Inferior Patient or Graft Outcomes Among Pancreas Transplant Recipients *AJT, Volume 21 Supplement 3*
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Abstract# 1231

Early Increases in Post-Transplant Pancreatic Enzymes Are Associated with Surgical Complications Among Pancreas Transplant Recipients

S. Parajuli, G. Leverson, B. Welch, H. Sollinger, D. Kaufman, D. Mandelbrot, J. Odorico, *University of Wisconsin, Madison, WI*

Purpose: An increase in the serum concentration of pancreatic enzymes (amylase and lipase) is commonly related to an acute inflammatory process in the pancreas graft among pancreas transplant recipients (PTRs). The association between immediate post-operative increases in pancreatic enzymes and post-transplant complications is unknown.
Methods: We analyzed all PTRs transplanted at our hospital between 06/2009 and 09/2018. Due to changes in laboratory assays during the study period, enzyme levels were presented as a ratio of absolute numbers to the upper limit of normal value, with value > 1 considered as abnormal. We specifically evaluated bleeding, fluid collections (including enteric leak, enzyme leak, pancreatic ascites etc), and thrombosis complications based on the amylase or lipase ratios on day 1 (A1, L1) and maximum ratios within 5 days of transplant (Amax, Lmax). PTRs with index complications that occurred before the date of enzyme determination were excluded. We focused on technical complications which occurred within 90 days of transplant.
Results: There were a total of 443 PTRs during the study period, 287 were simultaneous pancreas and kidney (SPK) recipients, and 156 solitary pancreas recipients (SP). There were a total of 78 PTRs with complications of interest. Higher A1 (HR: 1.05, 95% CI: 1.02-1.09, p=0.004); Amax (HR: 1.06, 95% CI: 1.02-1.09, p

<0.001); L1 (HR: 1.03, 95% CI: 1.01-1.05, p=0.009); Lmax (HR: 1.03, 95% CI: 1.01-1.05,p=0.002), were associated with an increase in early complications. Similar findings were seen when considering SPK only or SP only in separate analyses. When considering specific complications such as fluid collections, bleeding or thrombosis, we observed a significant association between higher immediate post-transplant enzyme increases and fluid collection complications, whereas we did not observe a similar association with bleeding, or partial or complete thrombosis complications.
Conclusions: In this large series of PTRs, early increases in pancreatic enzymes was associated with early post-transplant surgical complications, especially post-operative fluid collections. This finding suggests cases of early perioperative enzyme increases merit consideration for early imaging investigation to mitigate detrimental outcomes.
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DISCLOSURES: S. Parajuli: None. **G. Leverson:** None. **B. Welch:** None. **H. Sollinger:** None. **D. Kaufman:** None. **D. Mandelbrot:** None. **J. Odorico:** None.

Abstract# 1232

Corticosteroid Reintroduction in Urban Simultaneous Kidney-pancreas Transplant Recipients Following an Early Corticosteroid Withdrawal Protocol

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Purpose: Approximately 30% of patients who undergo simultaneous kidney-pancreas (SKP) transplant are maintained on dual therapy with tacrolimus and mycophenolate. Long-term implications of steroid reintroduction in an early corticosteroid withdrawal (ECSWD) population remain unknown. The purpose of this study is to describe the incidence of corticosteroid reintroduction across an urban ECSWD SKP transplant population.
Methods: Adult SKP transplant recipients between 1/1/2003 - 12/31/2018 at University of Illinois Hospital & Health Sciences System were assessed. Patients were excluded if they were maintained on steroids post-SKP, had early technical failure, and had graft thrombosis. The primary outcome was to describe the incidence and indication of steroid reintroduction. Acute rejection (defined as biopsy-proven acute rejection [BPAR] or empiric treatment) between the groups. Metabolic parameters were also assessed. Death-censored graft failure (DCGF) and patient survival were compared with survival analyses.
Results: A total of 86 patients were included. Baseline demographics are detailed in Table 1. Steroids were reintroduced in 33.7% of patients at a median of 467 days (IQR 190 - 919 days) post-SKP. Steroid were restarted for infection/malignancy (65.5%), rejection (27.6%), or immunosuppression intolerance (6.9%) (Table 2). No differences were observed in metabolic parameters (Table 3). The incidence of acute rejection was significantly higher in patients with steroid reintroduction (Table 3). Patients who maintained ECSWD demonstrated less DCGF with no difference in patient survival (Table 4).
Conclusions: Steroid reintroduction most commonly occurred for infection/malignancy immunosuppression modulation. Patients that necessitated steroid resumption experienced shorter DCGS compared to those patients who were maintained on the ECSWD protocol with no adverse effects on metabolic parameters.

Table 1. Demographics Information

Variable	Whole cohort (n=86)	ECSWD (n=57)	Steroids Reintroduced (n=29)	p-value
Age at transplant, years (SD)	40.7 (10.1)	41.3 (9.9)	39.7 (10.3)	0.486
Male, n (%)	56 (65.1)	36 (66.7)	18 (62.1)	0.672
Race, n (%)				
White	20 (23.3)	16 (28.1)	4 (13.8)	
Black	39 (45.4)	22 (38.6)	17 (58.6)	0.144
Hispanic	20 (23.3)	16 (28.7)	4 (13.8)	
Asian	2 (2.3)	1 (1.8)	1 (3.5)	
Other	5 (5.81)	2 (3.51)	3 (10.3)	
Recipient BMI, kg/m2 (SD)	26.9 (5.7)	27.3 (5.8)	26.1 (5.7)	0.339
Duration of DM, years (SD)	25.2 (8.9)	26.9 (9.3)	21.6 (6.9)	0.033
Dialysis, n (%)	71 (82.6)	48 (84.2)	23 (79.3)	0.571
Peak PRA > 20%, n (%)	13 (15.1)	10 (17.5)	3 (10.3)	0.378
Repeat transplant, n (%)	5 (5.8)	5 (8.8)	0 (0)	0.163
Enteric drainage, n (%)	57 (66.3)	35 (61.4)	22 (75.9)	0.180

Table 2. Steroid Reintroduction Information

Variable	Steroids Reintroduced (n=29)
Median time to steroids re-introduced, days (IQR)	467 (190 – 919) (range 6 to 2531)
Initial steroid dose, mg	
5 mg	7 (24.1)
10 mg	21 (72.4)
15 mg	1 (3.45)
Indication for steroid re-introduction, n (%)	
Immunosuppression intolerance	2 (6.9)
Rejection	8 (27.6)
Infection/ malignancy	19 (65.5)
Median time to steroid reintroduction, days (IQR)	P = 0.079
Immunosuppression intolerance	92.5 (0 – 179)
Rejection	741 (242 – 1342.5)
Infection/ oncology	467 (190 – 831)

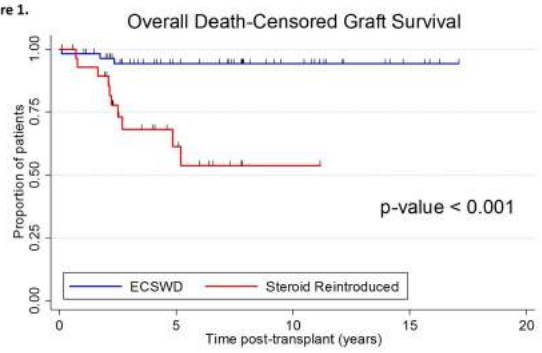
Table 3. Metabolic Outcomes

Variable	Whole cohort (n=86)	ECSWD (n=57)	Steroids Reintroduced (n=29)	p-value
Difference in BMI from SKP, median kg/m2 (IQR)				
1 year	0.3 (-1.6 – 2.2)	0.5 (-1.4 – 2.2)	0.2 (-2.1 – 2.0)	0.653
2 year	1.6 (-0.6 – 3.9)	1.6 (-0.5 – 3.9)	0.8 (-1.7 – 5.0)	0.477
5 year	2.4 (-0.4 – 5.9)	2.1 (-0.4 – 5.9)	3.6 (0.3 – 5.3)	0.904
10 year	3.5 (-0.1 – 5.4)	3.9 (-0.1 – 5.4)	1.0 (0.7 – 5.8)	0.741
Hemoglobin A1c, % (SD)				
1 year	5.4 (0.9)	5.4 (1.1)	5.3 (0.6)	0.587
2 year	5.5 (0.9)	5.4 (0.9)	5.5 (1.1)	0.871
5 year	5.5 (1.1)	5.5 (1.2)	5.5 (0.9)	0966
10 year	5.2 (0.7)	5.2 (0.6)	5.4 (0.9)	0.634
LDL, median mg/dL (SD)				
1 year	80.5 (27.8)	81.3 (28.6)	78.6 (26.1)	0.732
2 year	87.7 (33.1)	88.9 (28.1)	86.8 (43.9)	0.894
5 year	78.9 (24.8)	72.8 (23.1)	96.3 (21.4)	0.002
10 year	67.9 (34.9)	69.4 (37.3)	58.3 (3.8)	0.562
Statin prescribed, n (%)				
1 year	35/81 (43.2)	24/53 (45.3)	11/28 (39.3)	0.604
2 year	34/77 (44.2)	21/50 (46.0)	11/27 (40.7)	0.657
5 year	27/52 (51.9)	20/347 (54.1)	7/15 (46.7)	0.629
10 year	18/35 (51.4)	17/29 (58.6)	1/6 (16.7)	0.088

Table 4. Rejection, Death-censored Graft Failure, and Patient Death

Variable	Whole cohort (n=86)	ECSWD (n=57)	Steroids Reintroduced (n=29)	p-value
Median time to follow-up, years (IQR)	4.7 (2.2 – 8.1)	3.6 (2.1 – 5.1)	2.3 (1.2 – 6.9)	0.004
Overall acute rejection, n (%)	18 (20.9)	7 (12.3)	11 (37.9)	0.006
Time to first rejection episode, days (range)	212 (6 – 1295)	61 (6 – 365)	389 (16 – 1295)	0.033
Multiple rejection treatments, n (%)	8 (9.30)	1 (1.75)	7 (24.1)	0.002
Overall death-censored graft failure of first organ, n (%)	13 (15.1)	3 (5.3)	10 (34.5)	0.001
Time to death-censored graft failure of first organ, (IQR)	781 (600 – 1898)	633 (63 – 857)	796.5 (600 – 984)	0.311
Reason for death-censored graft failure of first organ, n (%)				
Insulin > 0.5 units/kg/day x 90 days	7/13 (53.9)	2/3 (66.7)	5/10 (50.0)	
Removal of graft	1/13 (7.7)	0/3 (0)	1/10 (10.0)	
Re-list for pancreas transplant	3/13 (23.1)	1/3 (33.3)	2/10 (20.0)	
Return to HD	2/13 (15.4)	0/3 (0)	2/10 (20.0)	
Overall patient death, n (%)	9 (10.47)	3 (5.26)	6 (20.7)	0.056
Time to death, (IQR)	720 (285 – 2650)	398 (34 – 5189)	889.5 (285 – 2650)	0.796

Figure 1.



CITATION INFORMATION: Pierce D., West-Thielke P., Campara M., Tang I., Spaggiari M., Tzvetanov I., Benedetti E., Lichvar A. Corticosteroid Reintroduction in Urban Simultaneous Kidney-pancreas Transplant Recipients Following an Early Corticosteroid Withdrawal Protocol *AJT, Volume 21 Supplement 3*
DISCLOSURES: D. Pierce: None. **P. West-Thielke:** None. **M. Campara:** None. **I. Tang:** None. **M. Spaggiari:** None. **I. Tzvetanov:** None. **E. Benedetti:** None. **A. Lichvar:** None.

Abstract# 1233

SPK Transplantation in HIV-positive Recipients

H. Resweber, k. nguyen, H. Curtis, J. Panichella, A. DI Carlo, S. Karhadkar, *Temple University School of Medicine, Philadelphia, PA*

Purpose: With the advent of anti-retroviral therapy in the treatment of HIV, mortality in HIV-infected individuals has become less due to complications from viral infection and more due to chronic issues such as organ failure and dysfunction. Organ transplantation has thus become a more popular therapeutic method to treat issues commonly seen in HIV+ patients. Although transplantations involving organs like livers and kidneys into HIV-infected individuals have become increasingly common over the past decade, pancreas transplantation into HIV+ recipients is rarely performed. This is despite the fact that type II diabetes and insulin resistance remain a large problem for this population.
Methods: Using the UNOS database and SPSS, we examined the 31 incidences of pancreas transplantation that have occurred in HIV+ patients in the US. All of these transplantations were simultaneous pancreas-kidney (SPK) procedures, with the first occurring in 2009 and the most recently recorded occurring in 2017.
Results: When compared to SPK transplantations in HIV-uninfected individuals over a similar timeframe, pancreas graft function was similar (80.6% for HIV+ vs 85.3% for HIV-) and pancreas graft survival was higher (583 days for HIV+ vs 533 days for HIV-) in the HIV+ recipients.
Conclusions: These results suggest that, similar to outcomes seen in kidney and liver transplantations for their respective diagnoses, pancreas transplants might provide a viable therapeutic option for the treatment of diabetes and insulin resistance in HIV+ individuals. More research has to be done on the rates of patient survival of HIV+ SPK recipients, which we found to be much lower than their HIV-uninfected counterparts (647 days for HIV+ vs 1059 days for HIV-), but the successes in both graft function and graft survival provide an optimistic outlook on the role of SPK transplantation in the treatment of common complications seen in HIV+ individuals.

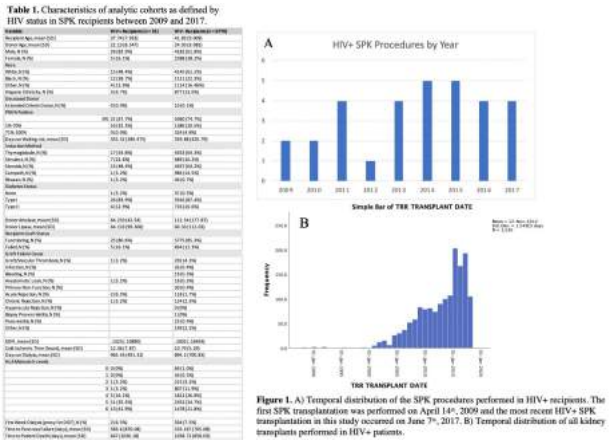


Figure 1. A) Temporal distribution of the SPK procedures performed in HIV+ recipients. The first SPK transplantation was performed on April 14th, 2009 and the most recent HIV+ SPK transplantation in this study occurred on June 7th, 2017. B) Temporal distribution of all kidney transplants performed in HIV+ patients.

CITATION INFORMATION: Resweber H., nguyen k., Curtis H., Panichella J., DI Carlo A., Karhadkar S. SPK Transplantation in HIV-positive Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Resweber: None. **K. nguyen:** None. **H. Curtis:** None. **J. Panichella:** None. **A. DI Carlo:** None. **S. Karhadkar:** None.

Abstract# 1234

Donor Derived Cell-Free DNA (dd-cfDNA) in Pancreas Transplant Recipients

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Purpose: Data on the role of DD-cfDNA after pancreas transplantation is lacking. Herein we report on our center experience with DD-cfDNA in 10 unique SPK recipients and eight pancreas alone transplants.

Methods: We retrospectively reviewed all DD-cfDNA (Prospera™) testing in simultaneous-pancreas-kidney (SPK) and solitary pancreas transplant recipients performed in 10 unique SPK recipients (11 tests) and 8 unique solitary-pancreas recipients (10 tests) between January and June of 2020 at our institution. All patients with suspected rejection underwent DD-cfDNA testing. Patients with a positive test underwent a biopsy, except for one subject with known chronic rejection. Among those with a negative test, a biopsy was performed selectively in those with a high degree of suspicion for rejection.

Results: 10 SPK recipients were tested 11 times. 8 tests were negative, and 3 tests were positive. Of the recipients with negative tests, 2 underwent kidney and 2 others underwent pancreas biopsies for results confirmation. Of the kidney biopsies, 1 biopsy showed pyelonephritis and CNI changes, and the other biopsy was negative. Of the pancreas biopsies, 1 was indeterminate for rejection, and the other was negative for cellular rejection but showed some c4d positivity without circulating DSA. Of the positive tests, 2 tests were performed on the same recipient before the biopsy, which showed moderate cellular rejection. The other positive test was confirmed with a kidney biopsy showing acute cellular rejection grade Banff IA (Table 1).8 unique solitary pancreas were tested 10 times. 2 tests were positive. Of the recipients with a positive test, 1 was not biopsied due to known chronic rejection and evidence of several DSAs at high MFI levels. The other recipient had a biopsy-proven mixed rejection that was successfully treated with subsequently negative tests (Table 2). Of the recipients with a negative test, 2 subjects had confirmatory biopsies: 1 was pancreas biopsy, and the other was kidney biopsy. Both biopsies were negative for acute rejection. All subjects with a negative test result who did not undergo a biopsy had no evidence of clinical rejection on follow up.

Conclusions: In this early report on DD-cfDNA in pancreas recipients, DD-cfDNA correlated with negative and positive biopsy results in all subjects with confirmatory biopsy. The accuracy of the test was not altered by the presence of more than one organ. While these early results are encouraging, further prospective studies are needed to confirm our results.

Table 1. SPK Recipients.

Subject	Transplant Order	Time from Transplant in Months	DD-CF-DNA Results (* Positive)	Biopsy	
				Pancreas	Kidney
1	Primary	16	<0.08%	-	-
2	Primary	15	0.90%	-	CNI-toxicity Pyelonephritis
3	Primary	17	0.18%	-	-
4	Primary	5	0.37%	Indeterminate	-
5	Primary	13	0.13%	-	Negative for Rejection
6	Previous Kidney and PAK	47	3.39%*	-	Banff IA
7	Previous Kidney	13	0.22%	-	-
8	Primary	33	0.36%	No ACMR C4d+ No DSA	-
9	Primary	40	0.29%	-	-
10	Primary	11 11.5	1.13%* 2.44%*	- Moderate ACMR	-

Table 2. Solitary Pancreas Recipients

Subject	Transplant Order	Time from Transplant in Months	DD-CF-DNA Results (* Positive)	Biopsy	
				Pancreas	Kidney
1	Primary	58	0.33%	-	-
2	Primary	83	<0.08%	-	-
3	Primary	11	<0.08%	-	-
4	Primary	11	<0.08%	Negative	-
5	2 failed Islet Transplants	50	3.95%*	-	-
6	Primary	6	<0.08%	-	-
7	Kidney	13	0.34%		Negative for Rejection
8	Primary	1 1.5 2	1.41%* 0.09% <0.08%	Mixed Rejection - -	

CITATION INFORMATION: Riad S., Sarumi H., Kandaswamy R. Donor Derived Cell-Free DNA (dd-cfDNA) in Pancreas Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Riad: Grant/Research Support; Name of Commercial Interest; Site Co-PI for a prospective study with Natera. **H. Sarumi:** None. **R. Kandaswamy:** Other; Name of Commercial Interest; Scientific Advisory Board.

Abstract# 1235

Induction Immunosuppression Efficacy in Pancreas and Kidney Transplantation in the SARS-CoV-2 Era

H. Sarumi, K. Vassar, S. Jackson, T. Pruett, R. Kandaswamy, *University of Minnesota, Minneapolis, MN*

Purpose: Lymphocyte depleting induction is associated with increased risk of infection. Our institution adopted a stratified induction protocol with the intent to decrease risk for recipients exposed to SARS-CoV-2. Baseline protocol was 6-7.5 mg/kg thymoglobulin with a 3 dose steroid taper. This was modified to a protocol based on immunologic risk. Low risk group included KTA (PRA <20%) was basiliximab 40 mg and 4 week steroid taper; intermediate group was KTA (PRA 20-80%) or SPK (PRA <80%) and consisted of thymo 2 mg/kg and basiliximab 40 mg with 4 week steroid taper; high risk group included any recipient with PRA >80%, PTA, positive DSA and induction was unchanged from the pre-SARS-CoV-2 protocol. All recipients received tacrolimus/MMF maintenance. The primary objective was to evaluate the effect of adjusting induction immunosuppression on acute cellular rejection (AR) and infection rates.

Methods: Outcomes of all adult transplants performed between March 24-October 18, 2020 were reviewed. Time to first infection and AR was analyzed using Kaplan-Meier curves. Patients were censored at the earliest of death, graft failure or 10/22/20.

Results: 81 patients were assessed: 61 KTA, 2 PTA, 18 SPK. Demographics: 69.1% Caucasian, 59.3% male, 84.0% primary transplant and 76.5% deceased donor. 2 grafts were lost: one due to thrombosis on POD 0 and the other due to primary non function. There were 2 deaths: one due to CVA/MDR TB and another due to NSTEMI. Populations of the 3 risk groups: low (16), intermediate (33) and high (32). In the low risk group there were 2 (12.5%) AR within 6 weeks of transplant. One of these patients developed AMR, BK and CMV.

The intermediate group included 6 (18.2%) recipients who developed AR. 2 of these recipients developed 2 AR episodes, the first episodes were within 4 weeks of transplant. The first had Banff 1A in addition to AMR followed by borderline AR a month after initial biopsy. The second had 2 episodes of borderline AR and that graft ultimately failed due to primary non function. Of note the pathology of the other 4 recipients was consistent with borderline AR.
There were 2 (6.3%) AR in the high risk group. The first was 1A within 6 weeks of transplant, this patient also developed EBV and CMV. The second was IIA within 3 weeks of transplant.
There was no significant difference in AR rates among these groups (log rank p-value 0.396).
No significant difference in overall infection rate (p-value 0.482), bacterial (p-value 0.906), fungal (p-value 0.553) or viral (p-value 0.494). An asymptomatic recipient tested positive for SARS-CoV-2 in the high risk group 2 months following KTA.
Conclusions: Optimal induction regimens for pancreas and kidney transplant in the SARS-CoV-2 era remain unclear. Although rejection rates in the abbreviated induction groups were slightly higher, most were borderline. Short-term infection rate did not seem to be impacted. Tailored induction regimens stratified by risk may be safe and effective during this pandemic era and beyond.
CITATION INFORMATION: Sarumi H., Vassar K., Jackson S., Pruett T., Kandaswamy R. Induction Immunosuppression Efficacy in Pancreas and Kidney Transplantation in the SARS-CoV-2 Era *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Sarumi: None. **K. Vassar:** None. **S. Jackson:** None. **T. Pruett:** None. **R. Kandaswamy:** Honoraria; Name of Commercial Interest; Natera, CareDX, Vertex Pharmaceuticals. Honoraria; Nature of Relationship; Speaker's Bureau and Advisory Board, Advisory Board, Independent Data Monitoring Committee.

Abstract# 1236

COVID-19 Presentation and Severity Within One Year of Pancreas and Kidney Transplantation

H. Sarumi, J. Fisher, B. Johnson, T. Pruett, *University of Minnesota, Minneapolis, MN*

Purpose: The current pandemic has created uncertainty of induction regimen impact upon severity of COVID-19 disease. Our experience with COVID-19 infection was reviewed to stratify outcomes of infection occurring before or after one year from transplant.
Methods: All COVID-19 PCR positive pancreas and/or kidney transplant recipients were reviewed for demographics and outcomes.
Results: 65 recipients were identified: 9 <1 year and 56 >1year post-transplant. There were clinically relevant differences between groups. In the <1 year group 100% received thymoglobulin induction and 2 (22.2%) received steroid rejection treatment 2 and 10 months prior to COVID-19 diagnosis. Of recipients > 1 year from transplant there were no rejection treatments within the year prior. Maintenance immunosuppression was CNI/MMF in 66.1%. Infection <1 year post-transplant resulted in no mortality nor worse outcomes. In fact 3 recipients were asymptomatic (tested for upcoming procedure, known exposure or admission). Mild-moderate symptoms (cough, fever) were the cause for testing in 4, but symptoms were of insufficient severity to warrant admission. All non-hospitalized patients recovered without sequala. 2 patients were hospitalized for COVID-19 disease. One recipient had a prior lung transplant and developed fever and hypoxia. Treatment with MMF reduction, dexamethasone and remdesivir permitted avoidance of intubation and discharge within a week. The other hospitalized patient was asymptomatic at positive test, but developed diarrhea and weight loss 2 weeks after initial diagnosis. Other causes of diarrhea were ruled out and it was concluded that symptoms were COVID-19 related, as PCR remained positive. There were no respiratory symptoms. Infections diagnosed >1 year after transplantation were diagnosed because of symptoms, had a higher rate of hospitalization and death. Due to small sample size, statistical significance of increased severity was not feasible.
Conclusions: With a limited experience, COVID-19 infection within the first year after transplantation does not appear to have a greater mortality or need for hospitalization after lymphocyte depletion induction contrasted to recipients acquiring COVID-19 greater than a year after transplantation.

Figure 1: Demographics

	<1 Year	>1 Year
Average Age	57.2 (46-68)	51.5 (16-82)
Sex: Male	44.4%	55.0%
Race: Caucasian	33.3%	68.0%
Deceased Donor	66.7%	48.0%
Previous transplant	11.1%	23.0%
Average BMI	28.0 (23.1-31.9)	28.7 (19.0-46.3)
Rejection Within 1 Year COVID-19	22.2%	0%

Figure 2: Outcomes

	<1 Year	>1 Year
Symptomatic	66.7%	88.0%
Decreased Graft function	0%	13.0%
Graft Loss	0%	4.0%
Hospitalization	22.0%	52.0%
Death	0%	11.0%

CITATION INFORMATION: Sarumi H., Fisher J., Johnson B., Pruett T. COVID-19 Presentation and Severity Within One Year of Pancreas and Kidney Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Sarumi: None. **J. Fisher:** None. **B. Johnson:** None. **T. Pruett:** None.

Abstract# 1237

COVID-19 Transmission within One Year from Pancreas and Kidney Recipients

H. Sarumi, J. Fisher, B. Johnson, T. Pruett, *University of Minnesota, Minneapolis, MN*

Purpose: The current pandemic has created uncertainty surrounding the transmission of COVID-19. It was recently published that in the general population, household contacts have a 53% rate of secondary infection from index patient (Grijalva et al. (2020). MMWR, 69(44), 1631.). Our experience was reviewed in an effort to understand transmission in the immunosuppressed population. The primary objective was to evaluate the effect of recent induction upon COVID-19 transmission to contacts.
Methods: A retrospective review of adult recipients with COVID-19 detected by PCR within one year of pancreas and kidney transplant was conducted. These patients were interviewed regarding the timeline of their symptoms and the symptoms and testing of household and close contacts.
Results: 9 patients were identified: 8 Kidney and 1 Kidney/panc. All were primary transplants, except one with a prior lung transplant 2 years earlier, 33.3% were Caucasian, 33.3% Black, 22.2% Asian, 11.1% Hispanic, 55.6% female, 66.7% deceased donor, BMI ranged from 23.1-31.9 and age ranged from 46-68. 66.6% were tested due to symptoms. There were no recipient deaths, graft loss, rejection or decreased graft function resulting from COVID-19. Induction immunosuppression consisted of thymoglobulin (5.2-6.4mg/kg) and 3 dose methylprednisolone. The kidney after lung received 2 mg/kg thymoglobulin. All recipients had tacrolimus/MMF maintenance. Of these recipients, 5 had a history of infection post-transplant, 2 others had concurrent infections with COVID-19. 22.2% had a history of steroid treated rejection prior to diagnosis. The time to diagnosis of COVID-19 ranged from 2 to 12 months post-transplant. All 9 recipients were the index case in their household as far as could be determined, as there were no household contacts reporting symptoms or positive tests prior to the recipient. The recipients had a total of 20 household contacts, 3 (15%) tested positive, 8 (40%) asymptomatic and tested negative, 1 (5%) developed cough but tested negative and 8 (40%) asymptomatic and not tested. In addition to household contacts there were 7 people identified as close contacts; 1 close contact was the likely source of COVID-19 to a recipient, 2 that did contract COVID-19 after recipient exposure and 4 tested negative. One recipient appeared to transmit COVID-19 to 3 contacts, 1 of whom he lived with and 2 other close contacts. There was no indication that the asymptomatic recipients transmitted COVID-19 to any contacts.
Conclusions: We found no evidence that pancreas and kidney recipients contracting COVID-19 within the first year after transplant had a higher rate of household/close contact transmission than the general population. The recipients were encouraged to wear masks and minimize contact with others. This study suggests that in a very limited sample size, the risk to family members of COVID-19 PCR positive recipients does not appear greater than the general population. Precautionary distancing and barrier measures should be used.
CITATION INFORMATION: Sarumi H., Fisher J., Johnson B., Pruett T. COVID-19 Transmission within One Year from Pancreas and Kidney Recipients *AJT, Volume 21 Supplement 3*
DISCLOSURES: H. Sarumi: None. **J. Fisher:** None. **B. Johnson:** None. **T. Pruett:** None.

Abstract# 1238

Systemic Venous versus Portal Venous Drainage in Simultaneous Pancreas-kidney Transplantation: A Matched-pair Analysis

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Purpose: Portal venous drainage of pancreatic transplant appears more physiologic compared to systemic venous drainage. However, present data does not support the superiority of one technique over the other. The study purpose was to evaluate outcomes in vascularized pancreas transplantation (PTx) with enteric exocrine drainage based on technique of venous delivery.
Methods: We retrospectively analyzed 231 simultaneous pancreas-kidney transplants (SPKTs) performed at our center between 7/2003 - 7/2019 and identified 27 that

were performed with systemic venous (iliac vein) and enteric exocrine (systemic-enteric [S-E]) drainage. These 27 patients were compared to 27 case controls with portal venous (superior mesenteric vein) and enteric exocrine (portal-enteric [P-E]) drainage matched for recipient age, gender, race, and date of transplant. All patients received similar immunosuppressive regimens and underwent standardized management protocols. Intention to treat was with P-E drainage.

Results: The 2 groups were well-matched for numerous donor, preservation, recipient, and immunological characteristics. Indications for S-E drainage were central obesity/thickened mesentery (10), unfavorable vascular anatomy (11), or surgeon preference (6). The S-E drainage group was characterized by slightly more patients ≥ 80 kg (44% S-E versus 26% P-E), with C-peptide positive diabetes (30% S-E versus 18% P-E), and with diabetes onset at >20 years of age (41% S-E versus 26% P-E, all p=NS), suggesting a Type 2 diabetes phenotype. Although the incidence of early pancreas thrombosis (3.7% S-E versus 0% P-E), early relaparotomy (30% S-E versus 22% P-E), and mean initial length of hospital stay (11 days S-E versus 8 days P-E) were numerically higher in S-E versus P-E SPKTs, none of these differences were significant. With a mean follow-up of 5 years in both groups, respective one and 3-year patient survival (100% and 96% S-E vs 100% and 100% P-E), kidney graft survival (100% and 96% S-E vs 100% and 89% P-E), and pancreas graft survival (96% and 96% S-E vs 100% and 100% P-E) rates were comparable.

Conclusions: The method of venous delivery of insulin following PTx does not appear to influence medium-term outcomes in SPKT with enteric exocrine drainage.

CITATION INFORMATION: Sharda B. Systemic Venous versus Portal Venous Drainage in Simultaneous Pancreas-kidney Transplantation: A Matched-pair Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Sharda: None.

Abstract# 1239

Achilles Heel No Longer: Marked Decline in Early Relaparotomy and Allograft Pancreatectomy Rates Following Simultaneous Kidney-Pancreas Transplantation in the Contemporary Era

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Purpose: Technical complications requiring early relaparotomy (relap) and allograft pancreatectomy (AP) have long been the Achilles heel of simultaneous kidney-pancreas transplantation (SKPT).

Methods: Single center retrospective review of all SKPTs from 11/1/01 - 8/12/20 managed with T-cell depleting antibody, tacrolimus, MMF, steroids, and enteric exocrine drainage. Anticoagulation other than ASA 81 mg was not routinely used. Early relap was defined as occurring within 3 months of SKPT. Patients (pts) were stratified into 2 sequential eras: Era 1 (E1): 11/1/01 - 5/30/13; Era 2 (E2) 6/1/13 - 8/12/20.

Results: During the period of study, 255 SKPTs were performed (E1, n=165; E2, n=90) with an overall mean follow-up of 8.1±5 years. Recipient age and donor and recipient ethnicity, gender, and BMI were comparable between eras. E1 pts received organs from older donors (E1 27 vs. E2 23 years, P<0.001) with longer pancreas graft cold ischemic times (CIT) (E1 16 vs. E2 13 hours, P=0.04). E2 pts received more imported organs (E1 16% vs. E2 27%, P=0.04). E1 pts had a higher early relap rate (E1 43% vs. E2 14%, P<0.001) and were more likely to require AP (E1 10.3% vs E2 2.2%, P=0.019). E2 pts underwent systemic venous drainage more frequently (E1 8% vs. E2 29%, P<0.001). The most common indications for early relap in E1 were pancreas thrombosis (12%), abscess/infection (12%), bleeding (4%), and leak (4%) whereas in E2 were for abscess/infection (3%), small bowel obstruction (3%), and thrombosis (2%), P=0.001. Pancreas venous drainage technique did not affect either early relap or AP rates. Actuarial death-censored pancreas graft survival rates are shown in Table 1. Mean transplant volume was 14/year for E1 and 13/year for E2; mean transplant volume in the past 3 years of E2 was 18/year.

Conclusions: Maximizing donor quality (younger donors) and minimizing CIT are paramount for reducing complications requiring either early relap or AP and for optimizing long-term pancreas graft survival following SKPT. Considering that the pancreas is the only organ for which supply exceeds demand, this can be achieved without compromising transplant volume by judicious use of imported organs.

Table 1. Death-Censored PG Survival

	1-Year	3-Years	5-Years	
E1	96%	86%	78%	
E2	98%	98%	95%	P=0.007

CITATION INFORMATION: Sharda B., Gurung K., Stratta R., Farney A., Orlando G., Jay C., Reeves-Daniel A., Mena-Gutierrez A., Sakhovskaya N., Doares W., Kaczmorski S., Magid M., Rogers J. Achilles Heel No Longer: Marked Decline in Early Relaparotomy and Allograft Pancreatectomy Rates Following Simultaneous Kidney-Pancreas Transplantation in the Contemporary Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Sharda: None. **K. Gurung:** None. **R. Stratta:** None. **A. Farney:** None. **G. Orlando:** None. **C. Jay:** None. **A. Reeves-Daniel:** None. **A. Mena-Gutierrez:** None. **N. Sakhovskaya:** None. **W. Doares:** None. **S. Kaczmorski:** None. **M. Magid:** None. **J. Rogers:** None.

Abstract# 1240

Outcomes of Simultaneous Kidney-Pancreas Transplantation in Patients with Type-I and Type-II Diabetes Mellitus

H. Shokouh-Amiri[1], M. S. Naseer[1], A. Palermini[1], D. Aultman[1], R. McMillan[1], S. Tandukar[2], N. Singh[2], G. Zibari[1], *[1]Advanced Surgery, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA, [2]Transplant Nephrology, John C. McDonald Regional Transplant Center - Willis Knighton Health System, Shreveport, LA*

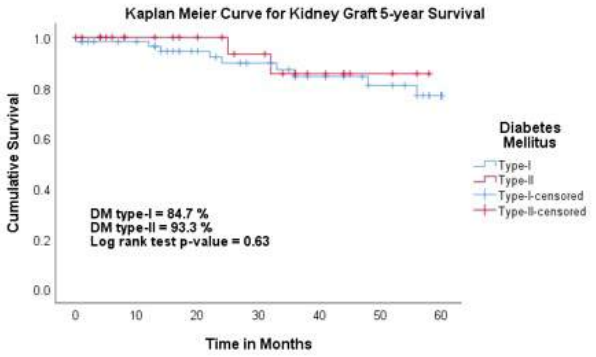
Purpose: UNOS approved simultaneous kidney-pancreas transplantation (SKPT) for type-II diabetes mellitus (DM) in Oct 2014. There is limited data comparing outcomes of SKPT in type-I versus type-II DM. The aim of this study was to measure the change in volume of SKPT since UNOS approved it for type-II DM patients and compare death-censored 5-year kidney and pancreas graft and patient survival between type-I and type-II DM patients undergoing SKPT.

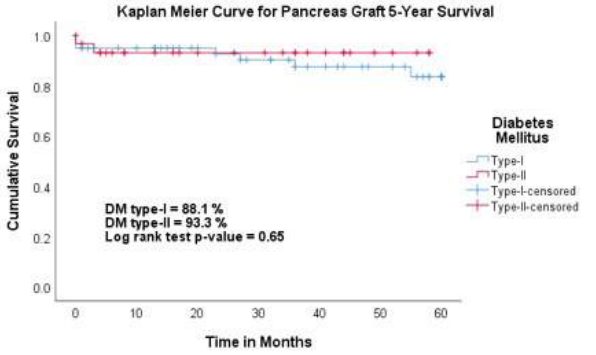
Methods: We conducted a single-center retrospective chart-review study on SKPT patients from Jan 2010 to Nov 2020 and collected data on patient demographics, BMI, c-peptide, HbA1c, and eGFR. Student's t-test for continuous variables, Chi-square test for categorical variables, and Log rank test for survival analysis were done using SPSS.

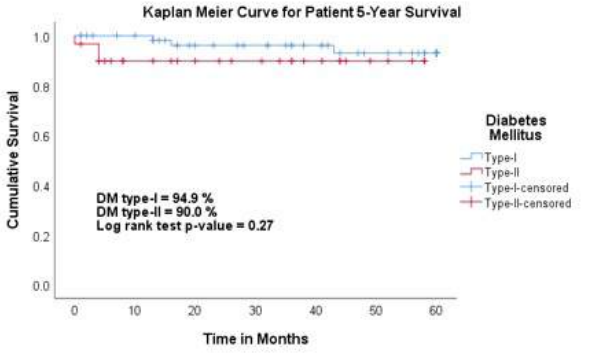
Results: Among 89 SKPT, 18 (all type-I DM) and 71 (41 type-I and 30 type-II DM) were done pre- and post-approval of SPKT for type-II DM respectively. This translated to an increase in SKPT from 3.6/year to 11.8/year (228% increase). There were no statistically significant differences in c-peptide and HbA1c levels pre- and 1-year post-SKPT. Patients with type-II DM were of older age and had higher BMI and eGFR 1-year post-SKPT. There were no statistically significant differences in death-censored kidney and pancreas graft and patient survival at 5-year post-SKPT.

Patient Demographics, Lab Parameters, and Survival Analysis

	DM type-I (n=59)	DM type-II (n=30)	P-Value
Age (Y), mean ± SD	40.2 ± 9.5	47.4 ± 8.8	<0.01
Male, % (n)	62.1 (36)	61.3 (19)	0.94
BMI (kg/m^2) Pre-SKPT, mean ± SD	25.9 ± 4.2	27.0 ± 2.8	0.15
BMI (kg/m^2) 1-Year Post-SKPT, mean ± SD	26.7 ± 4.6	32.0 ± 3.7	<0.01
eGFR (ml/min/1.73m^2) Pre-SKPT, mean ± SD	13.0 ± 8.0	13.6 ± 9.3	0.83
eGFR (ml/min/1.73m^2) 1-Year Post-SKPT, mean ± SD	62.0 ± 18.6	76.7 ± 22.6	0.04
Death-Censored 5-Year Kidney Graft/Pancreas Graft/Patient Survival, %	84.7/88.1/94.9	93.3/93.3/90.0	0.63/0.65/0.27







Conclusions: Approval of SKPT for type-II DM by UNOS led to an increase in SKPT with no differences in graft or patient survival between patients with type-I and type-II DM.

CITATION INFORMATION: Shokouh-Amiri H., Naseer M., Palermini A., Aultman D., McMillan R., Tandukar S., Singh N., Zibari G. Outcomes of Simultaneous Kidney-Pancreas Transplantation in Patients with Type-I and Type-II Diabetes Mellitus *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Shokouh-Amiri: None. **M.S. Naseer:** None. **A. Palermini:** None. **D. Aultman:** None. **R. McMillan:** None. **S. Tandukar:** None. **N. Singh:** Grant/Research Support; Name of Commercial Interest; CareDx, Transplant Genomics. Grant/Research Support; Nature of Relationship; PI on studies. Honoraria; Name of Commercial Interest; CareDx, Transplant Genomics, Viracor, Mallincrokdt, Veloxis. Honoraria; Nature of Relationship; Speaker Bureau. **G. Zibari:** None.

Abstract# 1241

Enteric Conversion After Bladder-drained Kidney-pancreas Transplantation

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Purpose: In simultaneous kidney-pancreas transplantation (SPK), bladder (BD) and enteric (ED) are both options for pancreaticoduodenal exocrine drainage. While BD provides good early and long term SPK survival, it is associated with metabolic, urological and pancreatic complications leading to need for enteric conversion (EC). We report our single center experience in SPK recipients who underwent EC after initial BD.

Methods: Between 1990 and 2019, we performed 541 SPK, of which 474 were BD and 67 were ED. We retrospectively studied patients(pts) who underwent EC. Indications for EC, time from SPK to EC, resolution of symptoms, complications and pancreas graft survival were analyzed.

Results: 56/474 pts underwent EC (11.8%). The mean time to EC was 4.5 years (yrs) (median 2.58 yrs) with intervals <1 yr = 19(33.9%), 1-5 yrs =20(35.7%), 5-10yrs=7(12.5%), 10-20yrs =10 (17.8%) . The main indication for EC was dehydration followed by recurrent urinary tract infections (UTI). 3 pts had EC for pelvic congestion syndrome, presenting as labial/scrotal edema and pelvic pain. 4/11 (36.4%) pts who had EC due to UTI had persistent UTI, 7/11 (63.6%) had resolution of UTI; the rest of the pts had complete resolution of the primary indication. 6 (10.7%) pts had surgical complications post EC and 4/6 required re-exploration with ileoduodenostomy (bailout) operation for duodenal leak. Graft rejection was observed in 3 pts (5.3%) after EC and all were done 6-12 months post-transplant, time from EC to rejection was 3weeks-39months. The mean follow-up after EC was 5.7 yrs (median 4.25 yrs). Overall pancreas graft loss (GL) occurred in 7 pts (12.5%) after EC, including 2 pancreatectomies: 1 for duodenal fistula and 1 for gastrointestinal bleed. The mean interval between EC and GL was 4.1 yrs.

Indications	Total:56 N (%)	Time to EC from Transplant Mean (yrs)	Pancreas GL N(%) 7/56(12.5%)
Urological			
Pelvic Congestion syndrome	3 (5.3%)	15.1	0
Recurrent UTI	11 (19.6%)	4.3	0
Hematuria	6 (10.7%)	8.56	1/6 (16.6%)
Pancreatitis	9 (16%)	4.29	1/9 (11%)
Metabolic			
Dehydration	14 (25%)	2	4/14 (28.5%)
Acidosis	7 (12.5%)	2.6	0
Surgical			
Leak	3 (5.3%)	0.33	1/3 (33.3%)
Other	3 (5.3%)	17.3	0

Conclusions: In this single center review of SPK pts with initial BD, the rate of EC was low at 11.8%. Persistent UTI post EC may be due to diabetes-related bladder dysfunction and in isolation should not be an indication for EC. BD may still be considered as primary drainage in SPK if indicated with the caveat of possible reoperation for EC.

CITATION INFORMATION: Sivan S., Ortigosa-Goggins M., Patel M., Morsi M., Chen L., Figueiro J., Ciancio G., Burke G. Enteric Conversion After Bladder-drained Kidney-pancreas Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Sivan: None. **M. Ortigosa-Goggins:** None. **M. Patel:** None. **M. Morsi:** None. **L. Chen:** None. **J. Figueiro:** None. **G. Ciancio:** None. **G. Burke:** None.

Abstract# 1242

Distal Allograft Pancreatectomy for Graft Salvage After Pancreas Transplantation

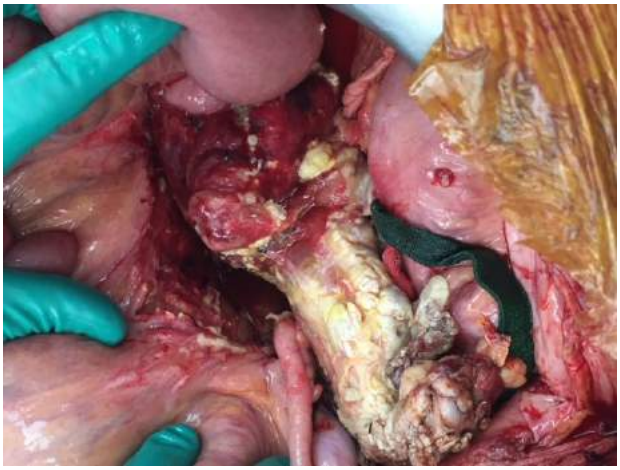
D. Soma, T. Nikumbh, A. J. Lutz, J. A. Powelson, J. A. Fridell, *Transplant Division, Department of Surgery, Indiana University School of Medicine, Indianapolis, IN*

Purpose: Early pancreas allograft failure most commonly results from vascular thrombosis. Immediate surgical intervention may permit pancreas allograft salvage, typically requiring thrombectomy. In cases of partial allograft necrosis secondary to splenic arterial thrombosis, distal allograft pancreatectomy may allow salvage of at least half of the pancreas allograft with retention of function.

Methods: The medical records for all adult patients who underwent deceased-donor pancreas transplantation at Indiana University Health University Hospital between January 2003 to October 2020 were retrospectively reviewed. Data came from the transplant recipient registry at our center and from individual electronic medical records. Simultaneous pancreas and kidney transplantation (SPK), pancreas after kidney transplantation (PAK), and pancreas transplantation alone (PTA) recipients were included.

Results: There were 710 pancreas transplants performed at Indiana University Health University Hospital between January 2003 and October 2020. During this period, four cases required distal allograft pancreatectomy for splenic artery thrombosis with necrosis of the distal pancreas. All four were SPK recipients. Their cases including post-transplant courses, are described in detail and summarized in Table 1. Three of the four maintained long-term allograft function with euglycemia independent of insulin at six months to six years of follow-up, and all patients continue to maintain normal renal allograft function.

Conclusions: Early diagnosis and early intervention are essential in order to salvage the pancreas allograft in the case of thrombosis. Distal allograft pancreatectomy can be performed safely and result in excellent long-term outcomes in select patients.



	Age at Tx	Indication for DAP	Timing of DAP	CEUS	Change in BS	Post DAP pancreatic leak	Length of stay (day)	Functional pancreas graft	Pancreas graft survival
Patient 1	38	Increased abdominal pain, Doppler US findings, CT findings	5 POD	No arterial flow in the tail	(-)	Grade B	45	(+)	6 years
Patient 2	61	Doppler US findings, BS level	1 POD	No venous flow in the tail	(+)	Biochemical leak	30	(+)	43 months
Patient 3	70	Hypotension, BS level	0 POD	Hypoperfusion in the tail	(+)		117	(-)	1 day
Patient 4	42	CEUS findings	2POD	Heterogeneous enhancement at distal body and tail	(-)	Grade B	10	(+)	6 months

CITATION INFORMATION: Soma D., Nikumbh T., Lutz A., Powelson J., Fridell J. Distal Allograft Pancreatectomy for Graft Salvage After Pancreas Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Soma: None. **T. Nikumbh:** None. **A.J. Lutz:** None. **J.A. Powelson:** None. **J.A. Fridell:** None.

Abstract# 1243

Psychosocial Outcomes 1-year Post Total Pancreatectomy and Autologous Islet Cell Transplant

J. Steel[1], A. Amin[1], M. Wijkstrom[1], A. Zureikat[1], E. Tillman[1], R. Jones[1], D. Yadav[1], A. Slivka[1], A. Phillips[1], M. Bellin[2], A. Carroll[3], A. Humar[1], *[1]University of Pittsburgh, Pittsburgh, PA, [2]University of Minnesota, Minneapolis, MN, [3]University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: A paucity of research regarding the psychosocial outcomes after-total pancreatectomy and autologous islet cell transplantation exists. The aim of the study was to examine the psychosocial outcomes of patients who have undergone total pancreatectomy and autologous islet cell transplantation at 1-year post-surgery.

Methods: Adults (>18 years), adolescents (13-18 years), and children (5-12 years) and the children's parents were administered a battery of questionnaires at the time of evaluation and 1-year post-surgery. The battery of questionnaires included the BPI, CES-D, STAI, FACT-Fatigue, PSQI, FACES, RCBC, and SF-36. Repeated measures analyses of covariance was performed to assess changes in these symptoms relative to surgery.

Results: A total of 13 adult and 15 children/adolescents with chronic pancreatitis were included in the study. Of the adults, the majority were female (53.8%), Caucasian (100%) with a mean age of 35.2 years (SD=9.8). The mean age of the child/adolescent patients was 12.3 years (SD=2.6) and the majority were female (53.3%) and Caucasian (100%). A total of 69.2% of the adults and 80% of the children and adolescents were insulin dependent at 1-year post surgery. No significant differences were observed by etiology with the exception of fatigue (Wilks' Lambda=4.86, p=0.037) and SF-36 general health (Wilks' Lambda=9.27, p=0.011) with those having cryptogenic or substance use related etiologies having greater fatigue and poorer general health when compared to those with cystic fibrosis at 1-year post-surgery. Patients who underwent robotic-assisted surgery reported better general health than patients who underwent open surgery (Wilks' Lambda=6.0, p=0.040) at 1-year. After adjusting for age, improvements on the SF-36 social functioning (Wilks' Lambda=6.8, p=0.032); pain (Wilks' Lambda=24.9, p=0.001), and general health were observed (Wilks' Lambda=5.4, p=0.045) 1-year post-surgery. For the children and adolescents, reductions in pain (Wilks' Lambda=6.8, p=0.04), pain interference (Wilks' Lambda=14.3, p=0.04), and fatigue were observed (Wilks' Lambda=7.2, p=0.032) at 1-year post surgery.

Conclusions: While few transplant centers offer this treatment, the reduction in pain and improvement in quality of life suggests this may be a viable treatment option for those with chronic pancreatitis. Future cost-effectiveness research is needed to understand changes in health care utilization and costs after surgery.

CITATION INFORMATION: Steel J., Amin A., Wijkstrom M., Zureikat A., Tillman E., Jones R., Yadav D., Slivka A., Phillips A., Bellin M., Carroll A., Humar A. Psychosocial Outcomes 1-year Post Total Pancreatectomy and Autologous Islet Cell Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Steel: None. **A. Amin:** None. **M. Wijkstrom:** None. **A. Zureikat:** None. **E. Tillman:** None. **R. Jones:** None. **D. Yadav:** None. **A. Slivka:** None. **A. Phillips:** None. **M. Bellin:** None. **A. Carroll:** None. **A. Humar:** None.

Abstract# 1244

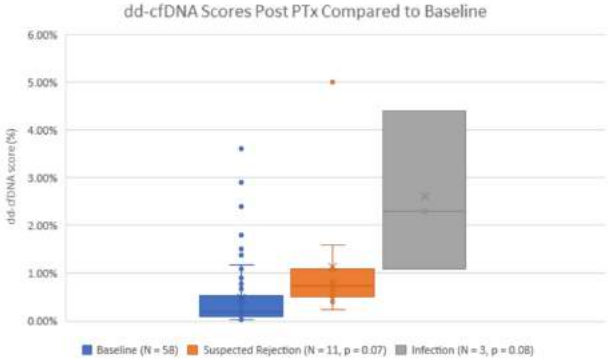
Baseline Levels of Dd-cf Dna After Pancreas Transplantation: Using Dd-cfdna as an Indicator for Pancreas Rejection and Biopsy Avoidance

A. Yoo, I. Qian, A. Riedel, C. Cazac, A. Bartosic, J. S. Bromberg, J. Scalea, *Department of Surgery, Division of Transplant, University of Maryland School of Medicine, Baltimore, MD*

Purpose: Donor-derived cell-free DNA (dd-cfDNA) testing, which has been previously validated for monitoring kidney transplant (KTx) rejection, may provide an alternative to pancreas biopsy that prevents morbidity and graft loss; in turn, we sought to determine for the first time baseline dd-cfDNA levels in pancreas transplant (PTx) recipients.

Methods: Blood samples up to 19 months post-PTx were collected from 28 participants.

Results: 25 patients received SPK, 3 received PTA, from whom 72 dd-cfDNA samples were collected of which 58 were used for baseline calculations. Three patients were excluded for infection and 11 for rejection. No patients died. Median dd-cfDNA scores peaked at 0.53% within one-month post-transplantation (range 0.20%-2.90%; mean 1.00±0.9%), then decreased to 0.20% (range 0.03%-3.60%; mean 0.45±0.8%). Median dd-cfDNA was 0.20% in patients without infection (range 0.03%-3.60%; mean 0.49±0.7%), and 2.3% with infection (range 1.10%-4.40%; mean 2.60±1%). Five patients underwent pancreas biopsy for cause (elevated lipase). Of these, three showed acute T cell mediated rejection (rejection rate 12%). The median dd-cfDNA score was higher with rejection (0.73%).



Conclusions: While median and mean levels of normal dd-cfDNA in KTx recipients are currently defined as <1.0%, baseline dd-cfDNA levels among PTx recipients show a median level of <1.0%, but a higher mean, particularly within one-month post-transplantation (1.00±0.9%). Elevation in dd-cfDNA may also correlate with pancreas rejection. Confirmation of these correlations and definition of normal cutoffs will require accruing more patients to our study.

CITATION INFORMATION: Yoo A., Qian I., Riedel A., Cazac C., Bartosic A., Bromberg J., Scalea J. Baseline Levels of Dd-cf Dna After Pancreas Transplantation: Using Dd-cfdna as an Indicator for Pancreas Rejection and Biopsy Avoidance *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Yoo: None. **I. Qian:** None. **A. Riedel:** None. **C. Cazac:** None. **A. Bartosic:** None. **J.S. Bromberg:** Grant/Research Support; Name of Commercial Interest; CareDx. Grant/Research Support; Nature of Relationship; Funded by CareDx for this study. **J. Scalea:** None.

Abstract# LB 90

Donor Derived Cell Free DNA Identifies Rejection in Simultaneous Pancreas Kidney Transplant Recipients

M. Williams[1], S. Ghosh[2], L. L. Jenkins[2], M. Hertl[1], S. Saltzberg[3], V. Peev[3], E. Chan[1], E. Hollinger[1], E. Schadde[1], O. Olaitan[1], *[1]Department of Surgery, Rush University Medical Center, Chicago, IL, [2]CareDx, Inc., Brisbane, CA, [3]Department of Internal Medicine, Rush University Medical Center, Chicago, IL*

Purpose: Increased level of donor-derived cell-free DNA (dd-cfDNA) has proven to be a sensitive marker for allograft rejection after solid organ transplant, particularly heart and kidney; the aim of this study was to determine the role of dd-cfDNA in diagnosing rejection after simultaneous pancreas-kidney (SPK) transplant.

Methods: We performed a single-center prospective cohort study of all SPK recipients starting in November 2019. Dd-cfDNA was measured using AlloSure (CareDx, Inc. Brisbane CA). Rejection events were diagnosed either clinically or with biopsy, and are specified in the results. Median values are provided with the interquartile range (IQR) for larger samples or the range when $n \leq 10$. Delta values were calculated using the dd-cfDNA value at the time of the rejection event and the lowest value prior to the event. Correlation between dd-cfDNA and lipase was determined by Pearson's correlation coefficient.

Results: 43 patients were included for analysis. Median number of dd-cfDNA visits per patient was 10, with 366 visits in total. In patients without rejection, median dd-cfDNA across all visits was 0.2% (n=290, IQR 0.15% - 0.39%). Among patients who were treated for rejection (n=8), median dd-cfDNA at the time of event was 3.5% (range 1.2% - 7.4%), and median delta dd-cfDNA was 506% (range 45% - 3764%). Of the 8 rejection events, 5 were diagnosed clinically and 3 were confirmed with biopsies, which demonstrated antibody mediated rejection (AMR) in kidney, AMR in kidney and pancreas, and mixed AMR/cellular rejection in pancreas. Their dd-cfDNA values were 1.6%, 3.2%, and 3.7%, respectively. 10 additional biopsies were performed which did not demonstrate rejection. At the time of negative biopsy, median dd-cfNDA was 0.37% (range 0.12% - 0.65%). Across all patients, there was a weak correlation between lipase and dd-cfDNA ($r=0.25$, $p<0.0001$). Notably, one patient with biopsy-confirmed pancreas rejection demonstrated lipase = 22 and dd-cfDNA = 3.2%. Conversely, another patient with lipase = 1100 and dd-cfDNA = 0.55% was biopsied and found to have pancreatitis.

Conclusions: Dd-cfDNA demonstrates promise in differentiating allograft rejection from non-rejection events in SPK recipients. Prospective surveillance of dd-cfDNA should be considered in this population, and could provide data for further investigation.

CITATION INFORMATION: Williams M., Ghosh S., Jenkins L., Hertl M., Saltzberg S., Peev V., Chan E., Hollinger E., Schadde E., Olaitan O. Donor Derived Cell Free DNA Identifies Rejection in Simultaneous Pancreas Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Williams: None. **S. Ghosh:** Salary; Name of Commercial Interest; CareDx. **L.L. Jenkins:** Salary; Name of Commercial Interest; CareDx. **M. Hertl:** None. **S. Saltzberg:** None. **V. Peev:** Consulting Fee; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Speaker. **E. Chan:** None. **E. Hollinger:** None. **E. Schadde:** None. **O. Olaitan:** Consulting Fee; Name of Commercial Interest; CareDx. Consulting Fee; Nature of Relationship; Advisory Committee Member. Grant/Research Support; Name of Commercial Interest; CareDx. Honoraria; Name of Commercial Interest; CareDx. Honoraria; Nature of Relationship; Speaker.

Abstract# LB 91

Controlled Donation After Circulatory Death Pancreas Transplantation in Spain. Initial Experience

J. Ferrer-Fàbrega[1], R. Muñoz[2], J. Ruiz[3], D. Casanova[4], F. Sánchez-Bueno[5], J. Pérez-Daga[6], C. Fernández-Rivera[7], M. Gómez[8], F. Castillo[9], R. López-Andújar[10], J. Maupoey[10], J. Briceño[11], J. Sánchez-Hidalgo[11], Á. Arjona[11], A. Álvarez[12], A. Alarcó[13], A. Bravo[13], R. García[1], R. Rull[1], M. López-Boado[1], P. Ventura-Aguiar[14], F. Diekmann[14], D. Paredes[15], J. García-Valdecasas[1], J. Fuster[1], C. Fondevila[1], B. Domínguez-Gil[2], *[1]Hepatobiliopancreatic Surgery and Transplantation Department, Hospital Clínic Barcelona, Barcelona, Spain, [2]Organización Nacional de Trasplantes (ONT), Madrid, Spain, [3]Department of Nephrology., University Hospital Marques de Valdecilla. University Cantabria, Santander., Santander, Spain, [4]Department of Surgery, University Hospital Marques de Valdecilla, University Cantabria, Santander., Santander, Spain, [5]Department of General, Visceral and Transplantation Surgery., Clinic and University Hospital Virgen de la Arrixaca. IMIB-ARRIXACA. Murcia., Murcia, Spain, [6]Department of Surgery, Hospital Regional de Málaga. Málaga., Málaga, Spain, [7]Department of Nephrology., Complexo Hospitalario Universitario de A Coruña. A Coruña, A Coruña, Spain, [8]Department of Surgery, Complexo Hospitalario Universitario de A Coruña. A Coruña, A Coruña, Spain, [9]Department of Surgery, University Hospital Marques de Valdecilla. University Cantabria, Santander., Santander, Spain, [10]Hepato-Pancreatico-Biliary Surgery and Transplant Unit, La Fe University Hospital. Valencia, Valencia, Spain, [11]Department of Surgery, Hospital Universitario Reina Sofía. Córdoba, Córdoba, Spain, [12]Department of Nephrology., Hospital Universitario de Canarias. Tenerife., Tenerife, Spain, [13]Department of Surgery, Hospital Universitario de Canarias. Tenerife., Tenerife, Spain, [14]Renal Transplant Unit, Hospital Clínic Barcelona, Barcelona, Spain, [15]Coordination Department, Hospital Clínic Barcelona, Barcelona, Spain*

Purpose: To report on the Spanish Pancreas Transplantation experience in controlled donation after circulatory death (cDCD) by analyzing the normothermic regional perfusion (NRP) and super-rapid recovery

Methods: Data from January 2015 to December 2020 were analyzed regarding pancreas transplantations using cDCD donors

Results: Some 471 pancreas transplants were performed, 20 being from cDCD donors.NRP was used in 18 pancreases.The median functional WIT was 10 (7-15.5) min. NRP was run for 113.5 (91.5-134.5) minutes. Pancreas cold ischemia was 412.5 (330-636.7) minutes. **S**urgical complications were present in 70% of cases.Two patients of the NRP group presented with primary pancreas graft non-function. After a median follow-up of 13.6 (5.6-36.4) months, the 1 and 5-year overall pancreas survival rate was 85% for the whole series, 83.3% for NRP group and 100% for SSR group.Overall 1 and 5-year patient survival was 94.7%, with no group differences

Conclusions: To date, this is the largest series describing the use of postmortem NRP in cDCD pancreas transplantation, providing competitive results in terms of graft/patient survival

CITATION INFORMATION: Ferrer-Fàbrega J., Muñoz R., Ruiz J., Casanova D., Sánchez-Bueno F., Pérez-Daga J., Fernández-Rivera C., Gómez M., Castillo F., López-Andújar R., Maupoey J., Briceño J., Sánchez-Hidalgo J., Arjona Á., Álvarez A., Alarcó A., Bravo A., García R., Rull R., López-Boado M., Ventura-Aguiar P., Diekmann F., Paredes D., García-Valdecasas J., Fuster J., Fondevila C., Domínguez-Gil B. Controlled Donation After Circulatory Death Pancreas Transplantation in Spain. Initial Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Ferrer-Fàbrega: None. **R. Muñoz:** None. **J. Ruiz:** None. **D. Casanova:** None. **F. Sánchez-Bueno:** None. **J. Pérez-Daga:** None. **C. Fernández-Rivera:** None. **M. Gómez:** None. **F. Castillo:** None. **R. López-Andújar:** None. **J. Maupoey:** None. **J. Briceño:** None. **J. Sánchez-Hidalgo:** None. **Á. Arjona:** None. **A. Álvarez:** None. **A. Alarcó:** None. **A. Bravo:** None. **R. García:** None. **R. Rull:** None. **M. López-Boado:** None. **P. Ventura-Aguiar:** None. **F. Diekmann:** None. **D. Paredes:** None. **J. García-Valdecasas:** None. **J. Fuster:** None. **C. Fondevila:** None. **B. Domínguez-Gil:** None.

Non-Organ Specific: Pharmacogenomics / Pharmacokinetics

Abstract# 816

Characterization of SGLT2 Inhibitor Use After Abdominal Transplant

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Purpose: Post solid organ transplantation, diabetic kidney disease (DKD) can progress due to recurrent pre-transplantation diabetes or the development of post-transplantation diabetes mellitus (PTDM). This portends a higher risk of cardiovascular (CV) morbidity and mortality. Sodium-glucose cotransporter 2 inhibitors (SGLT2i) have been shown to slow DKD progression and decrease CV morbidity and mortality. Studies regarding the use of SGLT2i in abdominal transplant recipients (ATRs) are limited. This is a study to characterize the use of SGLT2i in ATRs.

Methods: This is a single-center, retrospective analysis of ATRs initiated on SGLT2i. Chart review was performed to study demographics as well as assess for acute kidney injury (AKI), urinary tract infection (UTI), CV events, change in weight, hemoglobin A1c (HbA1c), and baseline kidney function.

Results: SGLT2i were used in 20 ATRs, including 11 liver-, 8 kidney-, and 1 kidney after liver recipients. Recipients were white (55%) and male (65%), with an average age of 62 ± 7 years. Most patients had pre-transplant diabetes and 4 patients had PTDM (20%). Most patients were started on SGTL2i post-transplant at a median time of 48 months (IQR 30 - 82). Three patients were on SGLT2i pre-transplant. The most common agent was empagliflozin (55%). Most patients were initiated on SGLT2i by their endocrinologist (80%) or primary care physician. All patients were on additional therapy for blood glucose control, with a majority on insulin (89%). Most patients were maintained on a calcineurin inhibitor-based regimen (90%). After a median time from initiation to 378 months (IQR 168 - 588), average HbA1c and weight were lower and no differences were observed in kidney function (Table 2). AKI episode occurred in four patients, of which three were on diuretics. Uncomplicated UTI with Aerococcus occurred in one patient, with no episodes of fungal UTI. No episodes of amputation, CV event, or death were observed in this cohort

Conclusions: Our retrospective analysis shows SGLT2i can be effectively and safely used in ATRs to derive the kidney and cardiac benefits. Larger clinical trials with long term follow up are warranted

Table 1: Patient and transplant demographics

Demographic	N= 20
Ethnicity – n (%)	
African American	5 (25)
White	11 (55)
Unknown	4 (20)
SGLT2 Inhibitor Type – n (%)	
Canagliflozin (Invokana)	2 (10)
Dapagliflozin (Farxiga)	7 (35)
Empagliflozin (Jardiance)	11 (55)
Use of Other Therapies – n (%)	
ACE inhibitors/ ARB	9 (45)
Use of diuretics	8 (40)
ACE inhibitor/ARB plus diuretic	5 (25)

Table 2. Outcomes after initiation of SGLT2i

Outcome	N= 20
UTI Episodes* – n (%)	1 (5)
AKI Episodes – n (%)	4 (20)
A1c – % ± SD	
At initiation of SGLT2	8.3 ± 2.1
At time of evaluation	8.0 ± 2.5
Weight – kg ± SD	
At initiation of SGLT2	93 ± 26
At time of evaluation	89 ± 23
Serum creatinine – mg/dL ± SD	
At initiation of SGLT2	1.1 ± 0.3
At time of evaluation	1.1 ± 0.3
eGFR – mL/min/1.73m² ± SD	
At initiation of SGLT2	64.9 ± 16.8
At time of evaluation	64.1 ± 17.3

*Occurred in kidney transplant recipient

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Abstract# 817

Systematic Evaluation of Immunosuppressant Drug Tolerability in Lung Transplant Recipients with Short Telomere Syndrome

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Purpose: Lung transplant recipients with short telomere syndrome are at high risk of hematologic complications. Consequently, patients with short telomere syndrome may require more frequent dose adjustments and an overall reduction of immunosuppression after transplant. It is not known if this is linked with an immunologic consequence such as higher rejection rates or development of donor specific antibody (DSA).

Methods: This was a single center, retrospective, 2:1 matched cohort study. Patients were matched for transplant date within 1 year, age at transplant within 5 years, and sex. Patients who survived less than 1 year post-transplant were excluded. Data were collected for 1 year post-transplant on all patients, with the exception of one short telomere patient and two matched controls who had not yet reached the one-year mark. Primary outcomes were median number of calcineurin inhibitor (CNI) target trough reductions and anti-metabolite dose reductions. Additional outcomes included number of patients experiencing severe anemia (hemoglobin < 8 grams per deciliter), leukopenia (white blood cell count < 3000 cells per cubic millimeter), neutropenia (absolute neutrophil count < 1000 cells per microliter), thrombocytopenia (platelet count < 100,000 per microliter), biopsy proven rejection (BPAR), and development of DSA.

Results: Fifteen patients were included in the study, 5 patients with short telomere syndrome and 10 matched controls. Baseline characteristics are summarized in Table 1 and study outcomes in Table 2. There was no difference in the median number of CNI target trough reductions (2 vs. 2.5, p=0.95) or median number of anti-metabolite dose reductions (2 vs. 2.5, p=0.618). While a greater percentage of short telomere patients experienced leukopenia, neutropenia, and thrombocytopenia, it did not reach statistical significance in this small sample. There was no difference in BPAR or DSA.

Conclusions: Short telomere patients did not require significantly more dose adjustments to immunosuppressant medications or experience significantly more adverse effects when compared to non-short telomere patients 1-year post-transplant.

Table 1: Baseline Characteristics

	Short Telomere (n= 5)	Control (n= 10)
Age (median, range)	54 [52-71]	58 [51-69]
Sex (number, %)		
Male	5 (100)	10 (100)
Race (number)		
White	3	5
Hispanic	0	4
Middle Eastern	2	1
Primary Diagnosis (number, %)		
Idiopathic Pulmonary Fibrosis	4 (80)	2 (20)
Interstitial Lung Disease	1 (20)	5 (50)
Other	0	3 (30)
Lungs Transplanted (number, %)		
Double	5 (100)	9 (90)

Table 2: Results

	Short Telomere (n= 5)	Control (n= 10)	P-value
Median CNI goal trough reductions (number, IQR range)	2 (2-3)	2.5 (1-4)	P=0.95
Median Anti-metabolite dose reductions (number, IQR range)	2 (2-3)	2.5 (1-3)	P=0.618
Anemia (number, %)	3 (60)	8 (80)	P=0.560
Leukopenia (number, %)	5 (100)	7 (70)	P=0.505
Neutropenia (number, %)	3 (60)	2 (20)	P=0.251
Thrombocytopenia (number, %)	4 (80)	4 (40)	P=0.282
Biopsy-proven rejection (number, %)	1 (20)	1 (10%)	P=1.00
Development of DSA (number, %)	2 (40)	3 (30)	P=0.708

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Abstract# 818

Unclear Implications of Tacrolimus Time in Therapeutic Range as a Predictor of Acute Rejection in Renal Transplant Recipients Undergoing Early Corticosteroid Withdrawal

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Purpose: Tacrolimus (TAC) demonstrates a wide intra- and inter-patient variability (IPV) necessitating therapeutic drug monitoring. The purpose of this study is to determine the impact of tacrolimus time in therapeutic range (TTR) in renal transplant (RT) recipients undergoing early corticosteroid withdrawal (ECSWD).

Methods: Adult RT recipients at University of Illinois Hospital & Health Sciences System between 1/1/2015 - 12/31/2018 were included. Patients were excluded if they underwent ABO incompatible RT, positive flow crossmatch RT, died <90 days post-RT, were lost to follow-up <12 months post-RT, and deviated from standard institution protocol. TAC TTR was calculated using the Rosendaal method with protocol goal TAC levels (erroneous levels were excluded). High TTR (TTR-H) was defined as ≥75% based on the median of the cohort. Primary outcome was to compare the incidence of acute rejection (AR) between TTR-H and low TTR (TTR-L) 12 months post-RT. Secondary outcomes included comparing the incidence of donor-specific antibodies (DSA) and *de novo* DSA (dnDSA) and eGFR. Multivariate analyses were conducted to assess risk factors for dnDSA formation and AR.

Results: Demographics are represented in Table 1. Acute rejection rates were similar between groups (TTR-H 20.4% vs TTR-L 18.9%, p=0.799). Rejection subtype, DSA, and eGFR comparisons are detailed in Table 2. Positive DSA post-transplant (OR 3.62 95% CI 1.41 - 9.26, p=0.007) was associated with a higher AR at 12 months post-RT (Table 3). Mycophenolate dose reduction/discontinuation (OR 2.82 CI

95% 1.13 - 6.97, p=0.025) and AR (OR 2.99, 95% CI 1.09 - 8.18, p=0.032) were associated with increased dnDSA formation within 12 months of RT. Tacrolimus TTR did impact AR or dnDSA formation in univariate or multivariate modeling.
Conclusions: In an ECSWD population, there was no difference in AR 12-months post-RT between TTR-H and TTR-L. There was a higher incidence of DSA at 1-year post-transplant in those with reduced mycophenolate dosing and history of acute rejection. Ideal population utility of tacrolimus TTR remains to be defined in RT with future studies.

Table 1. Demographics

	Overall (n=193)	High TTR (n=98)	Low TTR (n=95)	p-value
Age at transplant, mean (SD)	51.7 (±13.2)	51.7 (±12.5)	51.8 (±13.9)	0.829
Male, n (%)	133 (68.9)	73 (74.5)	60 (63.2)	0.089
Black race, n (%)	100 (51.8)	47 (48)	53 (55.8)	0.276
BMI >35 kg/m2, n (%)	73 (37.8)	40 (40.8)	33 (34.7)	0.384
Repeat transplant, n (%)	11 (5.73)	4 (4.1)	7 (7.4)	0.333
Deceased donor renal transplant, n (%)	76 (39.4)	43 (43.9)	33 (34.7)	0.194
PRA Class I >10%, n (%)	42 (21.8)	15 (15.3)	27 (28.4)	0.027
PRA Class II >10%, n (%)	23 (11.9)	7 (7.1)	16 (16.8)	0.038
Pre-transplant DSA, n (%)	29 (15.0)	8 (8.2)	21 (22.1)	0.007
KDPI, mean (SD)	47.3 (±24.1)	44.8 (±22.6)	50.1 (±25.6)	0.319
DCD Donor, n (%)	13 (6.7)	6 (6.1)	7 (7.4)	0.656
Induction immunosuppression, n (%)				
Alemtuzumab	21 (12.2)	12 (12.2)	9 (9.5)	0.225
Rabbit anti-thymocyte globulin	114 (59.1)	52 (53.1)	62 (65.3)	
Basiliximab	58 (30.1)	34 (34.7)	24 (25.3)	
Tacrolimus formulation at POD 21 post-transplant, n (%)				
Tacrolimus IR	54 (27.9)	31 (31.6)	23 (24.2)	0.115
Tacrolimus XL	59 (29.0)	32 (32.7)	24 (25.3)	
Tacrolimus XR	83 (43.0)	35 (35.7)	48 (50.5)	

Table 2. Rejection, donor specific antibody, and allograft outcomes within 12 months post-renal transplantation

Variable	Overall (n=193)	High TTR (n=98)	Low TTR (n=95)	p-value
Acute rejection at 12 months, n (%)	38 (19.7)	20 (20.4)	18 (18.9)	0.799
All BPAR at 12 months, n (%)	25 (12.95)	11 (11.2)	14 (14.7)	0.468
BPAR ACR at 12 months, n (%)	7 (3.6)	2 (2.0)	5 (5.3)	0.231
BPAR AMR at 12 months, n (%)	22 (11.4)	11 (11.2)	11 (11.6)	0.938
Time to first acute rejection, days (IQR)	51.5 (16 – 206)	30 (13.5 – 146)	99 (21 – 210)	0.214
Time to first BPAR, days (IQR)	101 (52 – 221)	105 (52 – 261)	99 (23 – 210)	0.661
Pre-transplant DSA, n (%)	29 (15.0)	8 (8.2)	21 (22.1)	0.007
DSA assessed post-transplant, n (%)	131 (67.9)	59/98 (60.2)	72/95 (75.8)	0.020
Post-transplant DSA (pre-existing and de novo), n (%)	50/131 (38.2)	19/59 (32.6)	31/72 (43.1)	0.203
Multiple DSA, post-transplant, n (%)	12/50 (24.0%)	3/19 (15.6)	9/31 (29.0)	0.287
De novo DSA, n (%)	30/131 (22.9)	14/59 (23.7)	16/72 (22.2)	0.838
Estimated GFR, ml/min/1.73^2 (SD)				
1 month	50.2 (19.1)	49.6 (19.2)	50.7 (19.0)	0.696
3 month	56.9 (18.6)	57.9 (19.4)	55.9 (17.7)	0.489
6 month	60.7 (19.0)	61.1 (20.2)	60.2 (17.7)	0.775
12 month	60.5 (19.8)	60.9 (21.4)	60.1 (17.9)	0.809

Table 3. Multivariate logistic regression analysis for assessing acute rejection 12 months post-transplant

Univariate analysis			Multivariate Analysis		
Variable	OR (95% CI)	P-value	Variable	OR (95% CI)	P-value
Tacrolimus TTR% (increasing by 10%)	0.94	0.513			
Age at transplant (continuous variable)*	0.98	0.174	Age at transplant (continuous variable)	0.97 (0.93 – 1.00)	0.124
Female*	1.83	0.104			
Black race*	2.05	0.057	Black race	1.82 (0.68 – 4.94)	0.235
BMI (continuous variable)*	1.02	0.166	BMI (continuous variable)	1.03 (0.99 – 1.08)	0.113
Deceased donor renal transplant	0.85	0.650			
HLA match	0.99	0.946			
Peak PRA > 10%*	1.92	0.105			
Pre-transplant DSA	1.44	0.447			
Lymphodepleting induction*	2.69	0.038			
Mycophenolate dose reduction/ discontinuation	0.90	0.799			
DSA positive post-transplant (pre-existing and de novo)*	4.12	0.005	DSA positive post-transplant (pre-existing and de novo)	3.62 (1.41 – 9.26)	0.007

Table 4. Multivariate logistic regression for the development of de novo DSA at 12 months post-transplant

Univariate analysis			Multivariate Analysis		
Variable	OR (95% CI)	P-value	Variable	OR (95% CI)	P-value
Tacrolimus TTR% (increasing by 10%)	0.94	0.540			
Tacrolimus CV% (continuous variable)	2.79	0.583			
Age at transplant (continuous variable)	0.99	0.832			
Female	0.71	0.472			
Black race*	2.12	0.084	Black race	1.51	0.376
BMI (continuous variable)	1.02	0.251			
Deceased donor renal transplant	0.88	0.766			
HLA match	0.98	0.885			
Peak PRA > 10%	0.72	0.522			
Lymphodepleting induction	1.12	0.709			
Mycophenolate dose reduction or discontinuation*	2.61	0.025	Mycophenolate dose reduction or discontinuation	2.82	0.025
Acute rejection within 12 months post-transplant*	2.65	0.039	Acute rejection within 12 months post-transplant	2.99	0.032

TTR = time in therapeutic range; CV% = coefficient of variation; BMI = body mass index; PRA= panel reactive antibodies; DSA = donor specific antibody
All factors with a p< 0.20 in univariate analysis were entered into multivariate analysis. Backward stepwise selection was used to identify final model.

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Abstract# 819

Impact of the Transplant Clinical Pharmacist in an Outpatient Transplant Clinic

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Purpose: Pharmacist involvement in the outpatient transplant clinic setting has been correlated with improved patient outcomes in single organ cohort studies. Direct clinical pharmacist involvement began in the outpatient transplant clinic at our institution in early 2018. Our study aim was to evaluate the impact of transplant clinical pharmacists' interventions within a multi-organ post-transplant clinic.
Methods: Patients discharged from their transplant admission between August 1, 2016 and August 1, 2019 were reviewed. Patients were placed in one of two cohorts based on the presence or absence of a transplant pharmacist outpatient note within 30 days of transplant discharge in addition to receiving standard provider follow up. Patients in each cohort were matched 1:1 by organ type. The primary outcome of this study was to determine the probability of any all-cause hospital encounter 90 days post-transplant discharge. Secondary endpoints included hospital admission encounters, emergency department encounters, biopsy confirmed organ rejection, blood pressure, blood glucose, protocol-driven prophylactic medication renal dosing, and all-cause mortality.
Results: During the study period, a total of 600 patients were evaluated with 300 included in each cohort. The study population included higher risk patients: 508 (84.7%) pretransplant hypertension, 272 (45.3%) pretransplant diabetes mellitus, average age 51.9 ± 11.8 years. One hundred and forty-six patients (48.7%) in the pharmacist cohort experienced a hospital encounter in comparison to 154 patients (51.3%) in the control group (p=0.513). Appropriate renal dosing of prophylactic medications was significantly higher in the pharmacist cohort at 30, 60 and 90 days (p=0.032, p=0.009, p=0.002). Selected additional secondary outcomes are listed in table 1.
Conclusions: All-cause hospital encounters 90 days post-transplant did not differ between groups. Clinical pharmacist involvement in the outpatient transplant setting is associated with a significantly higher rate of appropriate renal dosing of standard prophylactic medications. Additional analysis of hospital encounters is warranted to further elucidate differences between groups. Prospective cohort studies of transplant clinical pharmacist interventions are needed.

Table 1. Selected Secondary Outcome Results			
	Pharmacist (n=300)	Control (n=300)	p-value
Hospital admission	40.3% (n=121)	44% (n=132)	p=0.363
Emergency department visit not resulting in admission	15.7% (n=47)	15.3% (n=46)	p=0.91
Biopsy confirmed rejection	14% (n=42)	15.7% (n=47)	p=0.566
Death	0.3% (n=1)	0.7% (n=2)	p=1

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Abstract# 820

Evaluation of Safety and Efficacy of PCSK9 Inhibitors in Solid Organ Transplant Recipients: Experience at a Large Multi-organ Transplant Center

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Purpose: The aim of the study was to characterize the efficacy and safety of proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors in solid organ transplant recipients (SOTR).
Methods: This retrospective study included SOTR age ≥18 yrs who used a PCSK9 inhibitor for at least 4-wks post-transplant with at least 1 lipid panel available. Heart, lung, kidney, and liver transplant recipients who were transplanted between Jul 1,1990-2020 were included. Data collection ended on Oct 31, 2020, and included SOTR demographics, atherosclerotic cardiovascular disease (ASCVD) history, rejection, graft loss, and death in the 6 months following PCSK9 initiation. The primary efficacy outcome was change in LDL and total cholesterol (TC) from baseline to 6 months. The primary safety outcome was incidence of presumed or proven rejection. Secondary endpoints included change in calcineurin inhibitor (CNI) or mammalian target of rapamycin (mTOR) troughs or doses and incidence of ASCVD in the 6 months after PCSK9 initiation.
Results: Nineteen SOTRs were included. Mean age was 56 yrs (±11.8) and SOTRs were primarily males (63.2%) and white (84.2%). 52.6% of SOTRs were followed for 6 months. Transplanted organs included kidney (42.1%), heart (31.6%), liver (21.1%), and lung (5.3%). Median time from transplant to PCSK9 initiation was 4.6 yrs (IQR 0.84-16.4). Twelve were initiated on evolocumab and 7 on alirocumab. Over half (52.6%) were on concomitant statin therapy. Significant reductions in TC and LDL were observed upon initiation of PCSK9 therapy (Table 1). Immunosuppression regimens consisted of tacrolimus (89.5%), cyclosporine (5.3%), and sirolimus (5.3%). No significant changes in CNI or mTOR troughs or dosing were observed. New ASCVD events occurred in 15.7% of SOTRs. All had a prior history of ASCVD, 2 had an myocardial infarction and a 3rd required stent placement for occluded coronaries. No episodes of rejection, graft loss, or death occurred during the study period.
Conclusions: PCSK9 inhibitor use in SOTR appears to be efficacious and safe. No episodes of rejection or changes in immunosuppression dosing or CNI or mTOR troughs were observed during the study. Further research on the longitudinal effects of PCSK9 therapy in SOTR is warranted.

Table 1				
Parameter Evaluated	Baseline (Mean ± SD)	6 months (Mean ± SD)	Mean Change (Mean ± SD)	p-value
LDL (mg/dL)	106.9 ± 55.6	39.8 ± 19.7	80 ± 50.2	**0.033**
Total Cholesterol (mg/dL)	195.3 ± 64.4	128.2 ± 34.0	76.2 ± 67.1	**0.012**
Tacrolimus trough (mcg/L)	7.1 ± 1.9	9.5 ± 5.0	2.0 ± 4.0	0.126
Tacrolimus dose (mg/day)	5.3 ± 4.1	5.2 ± 4.0	0.0 ± 1.7	1.000

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Abstract# 821

Letermovir Prophylaxis in Solid Organ Transplant - CMV Breakthrough and Tacrolimus Drug Interaction

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Purpose: Valganciclovir is the preferred drug for cytomegalovirus (CMV) prophylaxis in solid organ transplantation. A limitation to its use is profound myelosuppression. Letermovir is a new agent approved for CMV prophylaxis in hematopoietic stem cell transplantation and is associated with less toxicity. This study aims to assess the effectiveness and safety of letermovir in solid organ transplantation.

Methods: A single-center, matched cohort study was performed on 31 transplant recipients who were converted from valganciclovir to letermovir from November 2017 to June 2020. The primary outcome was the rate of CMV breakthrough infections while on prophylaxis. Secondary outcomes included rate of leukopenia, doses of immunosuppression, rejection, non-CMV infection, and renal function. Statistical analyses of continuous variables included the student's t-test, ANOVA test, and Wilcoxon Signed Rank test. Categorical data were analyzed with chi-square test and Fisher's Exact test.

Results: There was no difference in the rate of CMV breakthrough between patients on letermovir (8.7%) and valganciclovir (13.5%), (p = 0.7097). After conversion to letermovir, patients required lower tacrolimus doses at -3.34 mg (Std Dev-1.3, p=0.0273), between conversion and day 7. The median difference in tacrolimus trough concentrations from conversion to day seven was 9.1 ng/mL [4.9, 16.95] (P=0.0002). Leukopenia improved by 1.8 10^9/L [1.08, 4.85] (p<0.0001).

Conclusions: Patients converted from valganciclovir to letermovir did not show an increased rate of CMV breakthrough compared to a historical, matched cohort of patients remaining on valganciclovir. A significant drug interaction was noted with tacrolimus, leading to a recommendation to reduce the dose by 40-50% upon initiation of letermovir.

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Abstract# 822

The Impact of Tacrolimus IPV and TTR on the Development of De Novo Donor-specific Antibodies in Kidney Transplant Recipients

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Purpose: High intrapatient variability (IPV) and low time in therapeutic range (TTR) of tacrolimus (TAC) may increase the risk of developing de novo donor-specific antibodies (dnDSA) among transplant recipients. The purpose of the study was to assess: (1) mean IPV and TTR between patients who developed dnDSA versus patients who did not (control), 2) rates of biopsy proven rejection, and 3) death-censored graft loss.

Methods: This is a retrospective, single center chart review of 51 adults who underwent renal transplantation between January 2014-December 2018. All patients had 2 years of post-transplant follow-up data available. Induction and maintenance immunosuppression is described in Table 1. Patients were excluded if they failed to undergo DSA screening post-transplant or received a multi-organ transplant. Methods for calculations of IPV and TTR are summarized in Figure 1.

Results: Patients who did not develop dnDSA "Control" (n=38) and those who developed dnDSA (n=13) were compared. Baseline characteristics are described in Table 2. Based on institutional protocol, the majority of patients received rATG and approximately half underwent steroid withdrawal. The mean IPVs and TTRs were not statistically significant when comparing the 2 groups, but there was a trend towards significance for TTRs at 12 months (55.6±19.6 vs 45±21.7, p=0.08) (Table 3 and 4). Rates of biopsy proven rejection were significantly higher in the dnDSA group (38.5% vs 5.2%, p=0.008). 1 patient in dnDSA group experienced death-censored graft loss due to antibody mediated rejection. When evaluating IPV and TTR of patients who developed dnDSA and rejection, the results were concurrent with current literature (Table 5).

Conclusions: Mean IPVs between control and dnDSA groups were not significantly different at all time points. Although the differences in TTR did not reach statistical significance, patients in the dnDSA group had a trend towards lower TTR. This suggests that TTR may have more impact than IPV in predicting dnDSA development following renal transplantation.

Table 1. **Immunosuppression**

	Control [n=38]	dnDSA [n=13]
Induction		
rATG, n [%]	32 [88.9]	12 [92.3]
Basiliximab, n [%]	4 [11.1]	1 [7.7]
rATG and Basiliximab, n [%]	2 [15.4]	-
Maintenance		
Tacrolimus, n [%]	38 [100]	13 [100]
Mycophenolate, n [%]	38 [100]	13 [100]
Steroid Withdrawal, n [%]	23 [60]	2 [15.4]
Re-initiation of Steroids, n [%]	8 [21]	8 [61.5]

Figure 1. **Calculation**

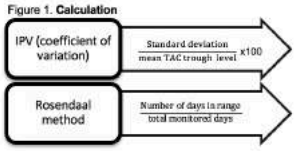


Table 2. **Demographics**

	Control [n=38]	dnDSA group [n=13]	p-value
Age at Transplant (years) median,[IQR]	52 [40 – 62]	52 [36 – 55]	NS
Male, n [%]	20 [52.6]	7 [53.8]	NS
African American, n [%]	6 [15.8]	7 [53.8]	0.01
Caucasian, n [%]	21 [55.3]	4 [30.8]	NS
ESRD, n [%]			NS
HTN	8 [21.0]	4 [30.8]	
DM	8 [21.0]	3 [23.1]	
IgA	5 [13.1]	1 [7.7]	
FSGS	4 [10.5]	3 [23.1]	
Other	7 [18.4]	5 [38.5]	
Donor Type, n [%]			NS
Deceased	25 [65.7]	11 [84.6]	
Living related	13 [34.2]	2 [15.4]	
Number of HLA mismatch, n [%]			NS
0	4 [10.5]	0	
1-3	8 [21]	3 [23.0]	
4-6	26 [68.4]	10 [76.9]	
Prior Transplant, n [%]	1 [2.6]	1 [7.7]	NS
cPRA, mean [SD]	9.4 [25.1]	27.2 [39.9]	NS
HLA risk Intermediate & High vs Low, n [%]	3 [7.9]	5 [38.5]	0.02
Cold ischemia time, mean [SD]	8.28 [7.17]	13.7 [6.5]	0.02
DGF, n [%]	8 [21.1]	5 [38.5]	NS

Table 3. **Mean TTR**

	Control [n=38]	dnDSA group [n=13]	p-value
TTR, mean [SD]			
TTR 3 months	35.1 [16.5]	28.8 [11.7]	NS
TTR 6 months	55.4 [21.5]	45.0 [24.3]	NS
TTR 12 months	55.6 [19.6]	44.4 [21.7]	0.08
TTR 24 months	61.6 [19.7]	52.7 [19.4]	NS

Table 4. **Mean IPV**

	Control [n=38]	dnDSA group [n=13]	p-value
IPV, mean [SD]			
IPV 3 months	38.6 [7.4]	39.0 [9.5]	NS
IPV 6 months	38.9 [5.6]	37.1 [7.6]	NS
IPV 12 months	38.1 [4.5]	38.7 [8.1]	NS
IPV 24 months	37.4 [4.1]	38.7 [8.7]	NS

Table 5. **Mean IPV and TTR Prior to Event**

	dnDSA	Rejection
IPV mean [SD]	44.2 [21.0]	50.3 [24.9]
TTR mean [SD]	35.1 [14.82]	29.9 15.6]

CITATION INFORMATION: Xu D., Richards K., Zheng K., Patel H., Cardarelli F., Pena J., Aala A. The Impact of Tacrolimus IPV and TTR on the Development of De Novo Donor-specific Antibodies in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: D. Xu: None. K. Richards: None. **K. Zheng:** None. **H. Patel:** None. **F. Cardarelli:** None. **J.A. Pena:** None. **A. Aala:** None.

Public Policy

Non-Organ Specific: Public Policy & Allocation

Abstract# 686

Better Dialysis Facility Five-Star Rating is Associated with Increased Listing for Kidney Transplantation

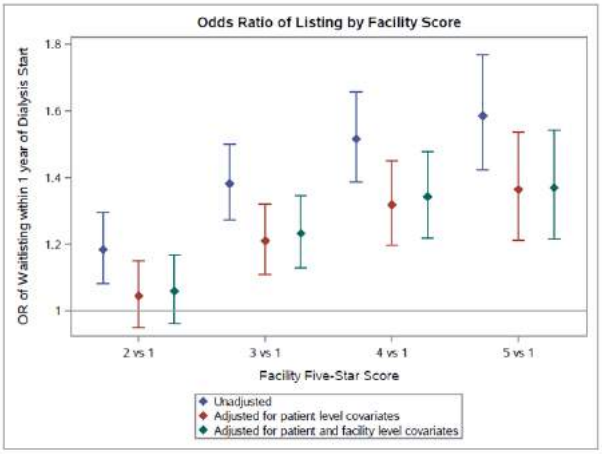
J. T. Adler[1], L. Xiang[1], J. S. Weissman[1], J. R. Rodrigue[2], R. E. Patzer[3], S. S. Waikar[4], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [3]Surgery, Emory University, Atlanta, GA, [4]Medicine, Boston Medical Center, Boston, MA*

Purpose: Improving the quality of dialysis care for patients with end stage kidney disease (ESKD) is a national clinical and policy priority: the Advancing American Kidney Health (AAKH) executive order established a target of 80% of new patients with ESKD receiving home dialysis or a kidney transplant by 2025. The Centers for Medicare & Medicaid Services (CMS) Five-Star Quality Rating is a public reporting program developed to help patients evaluate the quality of their dialysis center; it remains unknown if access to higher quality dialysis centers is related to higher likelihood of listing for transplant, which would help achieve the goals of AAKH. Therefore, empirical data would be helpful to assess whether increasing access to higher quality dialysis centers would potentially improve transplant listing rates.

Methods: Using the incident cohort of patients beginning dialysis in 2013 from the United States Renal Data System, rates of listing for transplant within one year were

assessed. Dialysis facility Five-Star Quality scores were obtained from Medicare Dialysis Facility Compare. We analyzed crude listing rates by Five-Star Quality ratings, and then estimated the probability of listing for transplant using a logistic regression model that controlled for patient- and facility-level factors.

Results: Of the 100,740 incident dialysis patients, 7,851 (7.8%) were listed for transplantation within 1 year. Patients undergoing dialysis at 5-star dialysis centers were more likely to be listed than patients at the 1-star dialysis centers (9.2% vs 6.0%, P<0.001). Adjusting for both patient- and facility-level covariates, the odds of patient listing within 1 year were higher at 5 vs 1 star facilities (OR 1.40, P<0.001, Figure). Patients from rural (OR 0.81, P<0.001), for-profit (OR 0.69, P<0.011), and large (OR 0.81, P<0.001) dialysis facilities were less likely to be listed.



Conclusions: There was a significant association between better dialysis facility quality, as measured by the CMS Five-Star Quality Ratings, and higher likelihood of listing for transplantation. Increasing patient access to higher quality dialysis facilities may increase access to transplantation and achieve the goals of AAKH.

CITATION INFORMATION: Adler J., Xiang L., Weissman J., Rodrigue J., Patzer R., Waikar S. Better Dialysis Facility Five-Star Rating is Associated with Increased Listing for Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.T. Adler: None. **L. Xiang:** None. **J.S. Weissman:** None. **J.R. Rodrigue:** None. **R.E. Patzer:** None. **S.S. Waikar:** None.

Abstract# 687

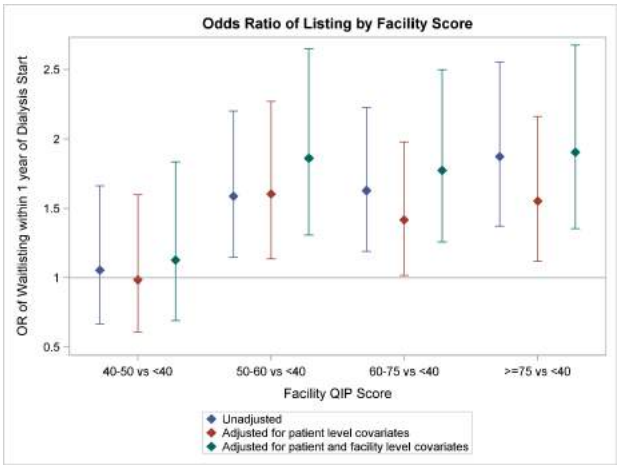
The Quality Incentive Program (QIP) is Associated with Increased Waitlisting for Transplantation

J. T. Adler[1], L. Xiang[1], J. S. Weissman[1], J. R. Rodrigue[2], R. E. Patzer[3], S. S. Waikar[4], T. C. Tsai[1], *[1]Surgery, Brigham and Women's Hospital, Boston, MA, [2]Surgery, Beth Israel Deaconess Medical Center, Boston, MA, [3]Surgery, Emory University, Atlanta, GA, [4]Surgery, Boston Medical Center, Boston, MA*

Purpose: The Centers for Medicare & Medicaid Services (CMS) introduced the Quality Incentive Program (QIP) in 2012, a pay-for-performance program which penalizes dialysis centers payments up to 2% based on performance on publicly reported quality measures of clinical outcomes, safety reporting, and care coordination. It is unknown if these ratings translate to improved access to transplantation, defined as listing within 1 year of dialysis start.

Methods: Using the incident cohort of patients beginning dialysis in 2013 from the United States Renal Data System, patients were followed for one year to assess 1-year transplant listing rates. Dialysis facility QIP scores were obtained from Medicare Dialysis Facility Compare. We analyzed unadjusted 1-year listing rates by levels of QIP score. Using a multivariable logistic regression model that controlled for patient and facility-level factors, we then assessed the relationship between quality as measured by QIP performance and 1-year listing rates. QIP scores < 40 lead to a payment reduction of at least 1.5%.

Results: There was a significantly higher unadjusted rate of listing for transplantation at higher performing centers (8.1 vs 4.5%, ≥75 vs <40, P<0.001). In analyses adjusted for patient- and facility-level covariates, the odds of listing were higher at QIP score ≥75 vs <40 facilities (OR 1.90, P<0.001). Patients from urban (OR 1.23, P<0.001), non-profit (OR 1.37, P<0.001), and small (OR 1.25, P<0.001) dialysis facilities were more likely to be listed within 1 year.



Conclusions: There was a significant association between better dialysis facility quality, as measured by the QIP score, and higher likelihood of listing for transplantation. Given the national policy goal of increasing listing transplantation, 1 year listing rates could be considered as part of the QIP metric to incentivize dialysis center referral to transplant centers.

CITATION INFORMATION: Adler J., Xiang L., Weissman J., Rodrigue J., Patzer R., Waikar S., Tsai T. The Quality Incentive Program (QIP) is Associated with Increased Waitlisting for Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.T. Adler: None. **L. Xiang:** None. **J.S. Weissman:** None. **J.R. Rodrigue:** None. **R.E. Patzer:** None. **S.S. Waikar:** None. **T.C. Tsai:** None.

Abstract# 688

Dual Liver and Kidney Donors, What Makes Them Decide to Do It?

H. Al Harakeh, B. Emmanuel, C. Hughes, A. Tevar, J. Steel, A. F. DiMartini, S. Ganesh, A. Humar, *Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA*

Purpose: There is incongruity between the transplant waiting list and the number of deceased donors available, therefore there is an enduring challenge to increase the number of living donors. On the other hand, there are nearly 60 intriguing living donors who donated more than one solid organ so far in the US. 17 of these donors donated at our center. We looked at those patients' charts and tried to learn how they made that decision.

Methods: Using our divisional database a retrospective chart review was done on all donors who donated a liver and a kidney. Data regarding reasons for donation, altruism, and complications were abstracted.

Results: 17 patients donated two organs, a liver and a kidney, at different times. Nine of the patients (53%) were males. Six (35%) were residents of Pennsylvania and the others came from different states. Eleven (65%) patients identified themselves as believers and six (35%) did not associate themselves with any religion. Nine of the patients (52%) were either married or had a long term relationship. Nine (53%) had children, and 15 (88%) had at least one parent alive. 13 (76%) had a Bachelor degree or higher. 14 (83%) consumed alcohol either socially or moderately and three did not. Four of our patients (24%) had depression, one of whom with suicidal ideation. The four were diagnosed, received pharmacologic treatment and cleared by our psychiatrists for the surgeries prior to donation. Eleven of the patients (65%) donated the kidney before the liver. The average age at the first donation was 39 years and the average time between both surgeries was 3.8 years. Twelve patients (71%) were altruistic donors at the first donation, and three of the five non-altruistic donors in the first donation became altruistic in the second. Some of the reasons for donating were "after losing his son to brain cancer", "good experience with his previous kidney donation", "after knowing that one can do it again". Major complications happened in three patients. One of them was an intraabdominal abscess that happened after the second donation which was a kidney. The second underwent incisional hernia repair after the first donation which was a liver and after the second which was a kidney. The third patient had an exploratory laparotomy for obstruction four days after his second donation which was a liver. Adhesion bands from the previous kidney trocar sites were the culprit. All 17 donors are still alive and had an otherwise uncomplicated postoperative course.

Conclusions: Factors like previous good experience in donation and the knowledge that it can be done helped in the decision making for some donors to donate for the second time. More research is needed on this topic to help assess the safety of dual donation and to help advocate additional donating.

CITATION INFORMATION: Al Harakeh H., Emmanuel B., Hughes C., Tevar A., Steel J., DiMartini A., Ganesh S., Humar A. Dual Liver and Kidney Donors, What Makes Them Decide to Do It? *AJT, Volume 21 Supplement 3*

PUBLIC POLICY

DISCLOSURES: H. Al Harakeh: None. **B. Emmanuel:** None. **C. Hughes:** None. **A. Tevar:** None. **J. Steel:** None. **A.F. DiMartini:** None. **S. Ganesh:** None. **A. Humar:** None.

Abstract# 689

Impact of Electronic Donor Referral Technology on Deceased Donor Referrals

B. Boyarsky[1], J. R. DiRito[2], K. Vanterpool[1], J. Piano[3], W. Liu[3], J. Hewlett[4], C. Trahan[4], D. Segev[1], M. Levan[1], A. Massie[1], P. Niles[4], *[1]Johns Hopkins, Baltimore, MD, [2]Yale, New Haven, CT, [3]Transplant Connect, Santa Monica, CA, [4]Southwest Transplant Alliance, Dallas, TX*

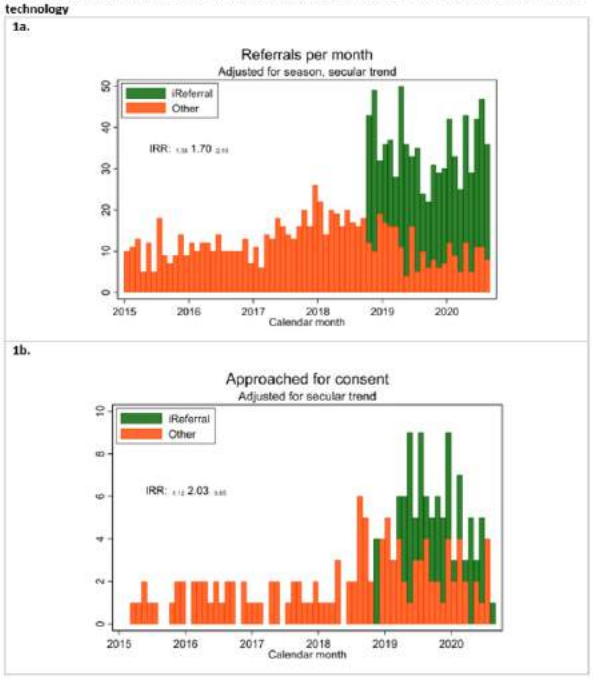
Purpose: Hospitals likely fail to refer many medically eligible potential deceased donors to OPOs. As such, increasing eligible referrals may increase the donor pool. We hypothesized that implementation of iReferral[SM], an automated and electronic referral platform, would be an effective method of circumventing the challenges faced with the current phone-based referral system.

Methods: To better understand the impact of the iReferral[SM] system on referrals, we conducted a retrospective study of all deceased donor referrals (n=1409) to three Texas hospitals January 2016 - August 2020. We used Poisson regression to analyze changes in the number of referrals following deployment of the iReferral[SM] system in October 2018, overall and for various subgroups, adjusting for seasonality and secular trends.

Results: After implementation of iReferral[SM], the number of patient referrals increased from median (IQR) 14 (12-18) to 36 (31-43) (p<0.001), representing a 70% total increase per month (IRR $_{1.38}$ 1.70 $_{2.10}$ p<0.001) (Figure 1). This increase was seen across various subgroups including patients <50 (IRR $_{1.07}$ 1.73 $_{2.81}$ p=0.02) and >50 years old (IRR $_{1.36}$ 1.72 $_{2.16}$ p<0.001), and brain dead patients (IRR $_{1.43}$ 1.76 $_{2.16}$ p<0.001). Median (IQR) hours from admission to referral decreased from 60 (13-157) to 30 (7-152) (p<0.001). The number of patients whose families were approached for consent doubled (IRR $_{1.12}$ 2.03 $_{3.65}$ p=0.02). The number of donors per month was 26% higher than pre-iReferral[SM], though the difference was not statistically significant (p=0.3).

Conclusions: After the implementation of an automated and electronic donor referral, the rate of deceased donor referrals increased substantially, and the number of patients whose families were approached for consent doubled. Automating the process at these key upstream steps in the deceased donor process may increase hospital and OPO efficiency and donor referrals.

Figure 1. Number of deceased donor referrals per month (1a) and number of families approached for consent per month (1b) before and after the implementation of iReferral[SM] automated donor referral technology



CITATION INFORMATION: Boyarsky B., DiRito J., Vanterpool K., Piano J., Liu W., Hewlett J., Trahan C., Segev D., Levan M., Massie A., Niles P. Impact of Electronic Donor Referral Technology on Deceased Donor Referrals *AJT, Volume 21 Supplement 3*

DISCLOSURES: B. Boyarsky: None. **J.R. DiRito:** None. **K. Vanterpool:** None. **J. Piano:** Ownership Interest; Name of Commercial Interest; iReferral. Ownership Interest; Nature of Relationship; Founder. **W. Liu:** Ownership Interest; Name of Commercial Interest; Transplant Connect. Ownership Interest; Nature of Relationship; VP. **J. Hewlett:** Other; Name of Commercial Interest; Client/Vendor relationship with Transplant Connect. **C. Trahan:** Other; Name of Commercial Interest; Client/Vendor relationship with Transplant Connect. **D. Segev:** None. **M. Levan:** None. **A. Massie:** None. **P. Niles:** Other; Name of Commercial Interest; Client/Vendor relationship with Transplant Connect.

Abstract# 690

Realistic Targets for Transplantation Among Incident Kidney Failure Patients in the United States

S. Brar, M. Kadatz, J. Lan, D. Chang, J. Gill, S. Vaishnav, J. Gill, *University of British Columbia, Vancouver, BC, Canada*

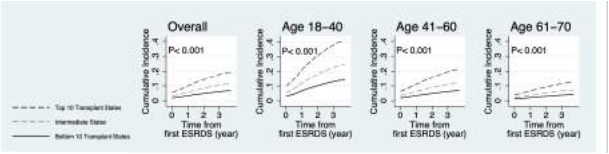
Purpose: The Executive Order on Advancing American Kidney Health aims to treat 80% of all kidney failure patients with transplantation or home dialysis but no targets for transplantation were advanced.

Methods: We studied incident kidney failure patients 18-70 years of age in the United States between 2015 and 2016 to determine the proportion treated by transplantation by state of residence. Patients were followed from the date of first chronic kidney failure treatment for 3.5 years for the outcome of transplantation from any donor source with death treated as a competing risk.

Results: The figure shows the incidence of transplantation overall and stratified by patient age. In each age group, the incidence of transplantation in the 10 states with the highest use of transplantation is shown to indicate a feasible target for transplantation. The incidence in states with intermediate use and and lowest use of transplantation is shown to demonstrate the opportunity to increase transplantation. Only 11% of patients aged 18-70 years were treated with transplantation within the first 3.5 years of developing kidney failure with 19% of patients in the top ten performing states and 7% in the bottom ten performing states treated with transplantation. Treatement with transplantation was inversely related to patient age: 18-40 years (overall 23%, top 10 states 39%, bottom ten states 14%); 41-60 years (overall 12%, top 10 states 21%, bottom 10 states 7%); 61-70 years (overall 7%, top 10 states 12%, bottom 10 states 4%).

Conclusions: We conclude that a realistic target for treatment with transplantation among patients aged 18-70 years is 20% after 3.5 years of a kidney failure diagnosis.

	Top 10 (N=11,338)	Int (N=126,825)	Bottom 10 (N=25,695)
Pre-emptive (%)	7	3	2
Living donor (%)	5	3	2
KDPI <85 (%)	4	3	2
KDPI 85+ (%)	0.3	0.2	0.1



CITATION INFORMATION: Brar S., Kadatz M., Lan J., Chang D., Gill J., Vaishnav S., Gill J. Realistic Targets for Transplantation Among Incident Kidney Failure Patients in the United States *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Brar: None. M. Kadatz: None. **J. Lan:** None. **D. Chang:** None. **J. Gill:** None. **S. Vaishnav:** None. **J. Gill:** None.

Abstract# 691

Racial/ethnic Disparities Among Renal Transplant Recipients with Diabetes, Hypertension, and/or Dyslipidemia Due to Medicare Part D Star Ratings Criteria

M. Chisholm-Burns[1], C. Spivey[1], C. Tsang[1], L. E. Hines[2], J. Wang[1], *[1]University of Tennessee Health Science Center College of Pharmacy, Memphis, TN, [2]Pharmacy Quality Alliance, Alexandria, VA*

Purpose: Medication adherence is critical to positive outcomes in renal transplant recipients (RTRs), and policies have been designed encouraging adherence. For example, Medicare Part D Star Ratings of quality of health and drug services received by individuals enrolled in Medicare Advantage (MAPD) and Prescription Drug plans promote positive outcomes and are associated with incentives including federal bonus payments made to MAPDs and possible increases in plan enrollment. Medication adherence measures for diabetes (DM), hypertension (HTN; renin-angiotensin system antagonists), and cholesterol (statins) are the only 3 medication utilization measures considered for plan ratings in the Part D Star Ratings system in 2018. Methods to calculate Star Ratings may contribute to racial/ethnic disparities, causing MAPDs to focus on certain patients meeting Star Ratings inclusion criteria, and possibly disincentivizing needed services/programs to those who do not meet criteria. The study objective is to determine if measurement of Star Ratings adherence metrics among RTRs with DM, HTN, and dyslipidemia (DLD) lead to racial/ethnic disparities.

Methods: This was a cross-sectional analysis of 305,077 adult RTRs with Medicare claims between 2010 and 2016, and receiving continuous coverage of Medicare Parts A/B/D and alive in 2017. Utilizing 2017 Medicare claims linked to Area Health Resources Files, inclusion in measure calculation was determined based on inclusion/exclusion criteria in metrics for adherence to DM, HTN, and cholesterol medications in Star Ratings. Logistic regression and multinomial logistic regression were used to calculate odds ratios (ORs), relative risk ratios (RRRs) and adjust for patient/community characteristics.
Results: Compared to non-Hispanic White RTRs, minorities were less likely to meet criteria to be included in calculations for Star Ratings adherence measures. Among RTRs with DM, adjusted ORs for inclusion of Black, Hispanic, and Asian/Pacific Islander RTRs were 0.56 (95% Confidence Interval [CI] 0.53 - 0.60), 0.53 (95% CI 0.50 - 0.57), and 0.69 (95% CI 0.63 - 0.76), respectively. Findings were similar among RTRs with HTN and DLD. Among individuals with 2 or 3 chronic conditions, minorities were likely to be included in the calculation of fewer measures than their White counterparts. For example, among individuals with all 3 conditions, adjusted RRRs for Black compared to White RTRs for being included in calculation of 3, 2, or 1 measure were 0.31 (95% CI 0.27 - 0.36), 0.41 (95% CI 0.36 - 0.46), and 0.46 (95% CI 0.37 - 0.56), respectively.
Conclusions: Disparities exist among RTRs with DM, HTN, and/or DLD qualifying for inclusion in Star Ratings measures. Racial/ethnic minorities are less likely to be included compared to White patients, potentially creating health disparities and adverse outcomes.
CITATION INFORMATION: Chisholm-Burns M., Spivey C., Tsang C., Hines L., Wang J. Racial/ethnic Disparities Among Renal Transplant Recipients with Diabetes, Hypertension, and/or Dyslipidemia Due to Medicare Part D Star Ratings Criteria *AJT, Volume 21 Supplement 3*
DISCLOSURES: M. Chisholm-Burns: None. **C. Spivey:** None. **C. Tsang:** None. **L.E. Hines:** None. **J. Wang:** None.

Abstract# 692

The Use of Organs from Donors That Do Not Meet Eligibility Criteria in the United States

L. Deroos, M. Lavieri, D. Hutton, W. Marrero, N. Parikh, *University of Michigan, Ann Arbor, MI*

Purpose: Increasing the number of organs available for transplantation could reduce waitlist morbidity and mortality for patients with end organ failure. Most transplanted organs come from donors meeting an organ-specific eligibility definition prescribed by the OPTN. However, many successful transplants involve donors who do not meet all criteria (i.e."ineligible" donors). We aimed to analyze survival differences between recipients of eligible and ineligible organ donations and model the impact of increased ineligible donor use.
Methods: We combined OPTN STAR file data with OPTN-provided data of all eligible deaths from 2008-2017. We fit Kaplan-Meier survival curves for eligible and ineligible solid-organ donation recipients and compared survival outcomes via log rank tests. We used Cox regression to study the association of eligibility with survival when controlling for patient characteristics (e.g. sex, age, BMI, etc.). Finally, we estimated life-years gained had OPOs increased ineligible donor utilization rates to the 75th percentile.
Results: 77,576 adult donors met inclusion criteria. Figure 1 shows patient survival by organ and donor eligibility. Recipients of ineligible kidney, lung, and pancreas donations had no significant difference in survival compared to eligible donations (p=0.24, 0.49, 0.86, respectively). Heart and liver transplants using ineligible donors saw an 8.5% (p=0.03) and 3.6% (p<0.01) reduction in 5-year survival, respectively. When accounting for patient characteristics, donor eligibility had a significant positive association with survival (hazard ratio: 1.14; 95% CI: (1.10, 1.18); p<0.01). Across OPOs, ineligible donor use ranged from 5%-39% of donors. Had OPOs increased ineligible donor use to meet the 75th percentile, 9,450 additional organs would have been available for transplant over the 10-year period, enabling an estimated 51,786 additional life-years saved.
Conclusions: Using organs from ineligible donors offers a survival benefit for waitlisted candidates who may otherwise never receive a transplant. Heart and liver recipients have decreased relative survival with ineligible compared to eligible donor use, however improving utilization can improve the number of organs available for transplantation. Further analyses defining ineligible donors that yield optimal recipient outcomes are warranted.

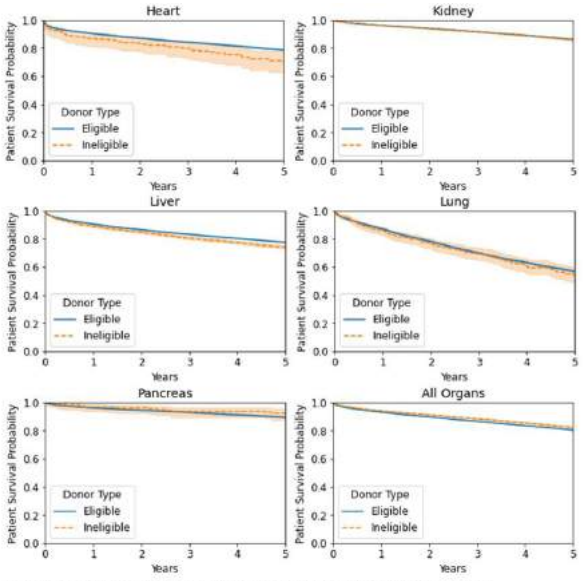


Figure 1: Kaplan-Meier curves of transplant recipient survival by organ and donor eligibility.

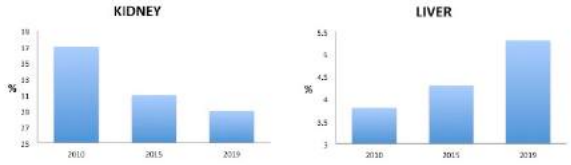
CITATION INFORMATION: Deroos L., Lavieri M., Hutton D., Marrero W., Parikh N. The Use of Organs from Donors That Do Not Meet Eligibility Criteria in the United States *AJT, Volume 21 Supplement 3*
DISCLOSURES: L. Deroos: None. **M. Lavieri:** None. **D. Hutton:** None. **W. Marrero:** None. **N. Parikh:** Consulting Fee; Name of Commercial Interest; Bristol Myers-Squibb, Eli Lilly, Genentech, Exact Sciences. Consulting Fee; Nature of Relationship; Consulting. Grant/Research Support; Name of Commercial Interest; TARGET, Bayer, Exact Sciences, Glycotest. Grant/Research Support; Nature of Relationship; Institutional research support.

Abstract# 693

Trends in Living Donor Transplantation in USA

N. Kemmer, C. Albers, S. Agrawal, R. Syed, M. Malespin, J. Buggs, *Tampa General Hospital, Tampa, FL*

Purpose: Globally, living donation has improved access to organ transplantation and saved the lives of individuals with end-stage kidney disease and end-stage liver disease. In the USA, the increasing prevalence of end-stage disease has resulted in widening gap in organ supply and demand. In the last decade, several allocation policies have been implemented by UNOS (United Network for Organ sharing), with the goal of maximizing donor availability, improving access and expanding the donor pool. However, the contribution of living donation on the donor pool is uncertain. Therefore, the Aim of this study is to evaluate the trend of living donation in the changing landscape of Abdominal Transplantation.
Methods: Using the UNOS database, we identified all adult candidates (≥ 18 years) who underwent solid organ transplant (Liver, Kidney) in the last decade (2010 - 2019). Data extracted included Type of Transplant (Living vs. Deceased), Recipient demographics including age, gender, ethnicity and race. Chi-square tests and ANOVA tests were used for comparative analysis.
Results: During the study period, 244,844 underwent transplant (178,125 Kidney and 66,719 Liver). Among the Kidney recipients 31.8% were living donor with 62% male and among Liver recipients 4.0 % were living donor with 55% male. Although overall there was an increase in total annual transplant (living and deceased) for both kidney (16,152 to 23,641) and liver (5731 to 8,345), there was a significant variation in proportion of living donor transplantation. We found a decline in living donor kidney transplant (LDKT) but a paradoxical increase in living donor liver transplant (LDLT). See Figure 1. With the exception of Asian group, a significant decline in LDKT was found among non-Asian (Black, Caucasian and Hispanic) in comparison to an increase in LDLT recipients. Among Asian recipients we found an increase in LDKT (27% to 33%, p=0.005) but a trend towards a decline in LDLT though this was not significant (4.1 % to 3.6%, p= 0.62).
Conclusions: The current study showed that in the last decade (2010 - 2019), there has been a significant decline in adult LDKT with a corresponding relative increase in LDLT. With the ongoing shortage of available deceased donors and the proven comparable outcomes with living donor transplantation (liver, kidney); future studies focused on identifying barriers to living donation are warranted. Furthermore, public health policies aimed at increasing awareness and education about living donation will be invaluable



CITATION INFORMATION: Kemmer N., Albers C., Agrawal S., Syed R., Malespin M., Buggs J. Trends in Living Donor Transplantation in USA *AJT, Volume 21 Supplement 3*
DISCLOSURES: N. Kemmer: None. **C. Albers:** None. **S. Agrawal:** None. **R. Syed:** None. **M. Malespin:** None. **J. Buggs:** None.

Abstract# 694

Attitudes Regarding Transplantation During the Pandemic: Give Me My Kidney Now!

T. Menser[1], M. Hobeika[2], A. Gaber[2], H. Ibrahim[2], *[1]Houston Methodist Research Institute, Houston, TX, [2]Houston Methodist Hospital, Houston, TX*

Purpose: The transplant community faces ongoing challenges regarding the conduct of organ transplantation during the COVID-19 pandemic, and patient treatment preferences during the pandemic require consideration.
Methods: To determine waitlisted end-stage kidney disease patients willingness to accept an organ during the pandemic, we conducted an online survey of patients with available email addresses (n=1068); responses were received between May 29 and July 2, 2020.Patients were asked 12 questions, including two open-ended question to understand any concerns related to 1) quality and source of donor kidney and 2) impact of COVID-19 on kidney transplantation in general.
Results: The majority of respondents indicated they would accept an organ during the pandemic and respondents almost universally indicated their comfort with transplant if their physician thought they should. Table 1 shows the questions and the aggregated responses; the response rate was 22% (n=232, with an average response per question of 76% (n=176). There were 113 responses to the open-ended questions that were classified into following emergent themes: "clinical concerns", "COVID concerns", "trust", and "no concern" if the latter was explicitly stated, with a fifth category for "other" responses. The open response comments highlighted candidates' concerns about the pandemic lengthening their wait time, contracting COVID-19 after transplantation, and balancing risk of infection versus remaining on the list (Table 2).
Conclusions: These results indicate that kidney transplant candidates heavily support continued transplantation during the pandemic, suggesting that patients may perceive the need for transplantation to outweigh the risks associated with COVID-19. Balancing patient treatment preferences with clinical capacity (e.g., testing availability, personal protective equipment, and overall hospital beds) requires ongoing reassessment in the face of fluctuating incidence of COVID-19.

Table 2 – Representative Quotes from Waitlisted Kidney Patients
Clinical Concerns
"Worried about not getting to go to the doctor during COVID-19. Worried that the wait for a donor kidney will be even longer now. Worried about catching COVID-19 in the hospital and/or clinic."
"I am concerned about the challenges post transplant. The immune system is medically suppressed to reduce rejection risk."
COVID Concerns
"Right now the risk of dying from COVID in Texas is .00005%. What is the risk of me dying if I don't get a kidney soon."
"As long as it's a good working kidney I'm willing to take my chances."
Trust
"I will leave it to Drs. And God amen."
"I would rely on my transplant team decision for me."
No Concerns
"As long as they are disease free, I don't have any."
"No concerns just want a Kidney already 5 years and counting."

Table 1 – COVID-19 Kidney Transplant Treatment Preferences Responses	Yes %
1. I am willing to receive a deceased donor transplant during the COVID pandemic.	80%
2. I am willing to receive a living donor transplant during the COVID pandemic.	92%
3. If a deceased donor kidney becomes available for me during this time I would choose to wait until after the COVID pandemic.	27%
4. If a living donor volunteers to donate a kidney to me during this time I would choose to wait until after the COVID pandemic.	17%
5. I am willing to receive a transplant at this time but only from a donor who has tested negative for the COVID virus.	81%
6. I am willing to receive a transplant at this time, but only with a highest-quality kidney (from a young and healthy donor).	57%
7. I am willing to receive a transplant at this time from any donor as long as my doctor thinks it would be a good kidney for me.	95%
8. I would accept a donor kidney if the risk of dying from potential COVID infection was the same as my risk of death by remaining on dialysis.	61%
9. I would accept a donor kidney regardless of the risk of COVID infection.	36%
10. I trust my transplant team to make the decision about the safety of accepting a kidney at this time.	97%

CITATION INFORMATION: Menser T., Hobeika M., Gaber A., Ibrahim H. Attitudes Regarding Transplantation During the Pandemic: Give Me My Kidney Now! *AJT, Volume 21 Supplement 3*
DISCLOSURES: T. Menser: None. **M. Hobeika:** Consulting Fee; Name of Commercial Interest; Veloxis Pharmaceuticals. Consulting Fee; Nature of Relationship; Speaker's Bureau. **A. Gaber:** None. **H. Ibrahim:** None.

Abstract# 695

Seasonality of Mortality for Solid Organ Waitlist Candidates

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Purpose: Analysis of the impact of policies or natural occurrences on transplant system outcomes requires comparison of a treatment (post-policy) period to a control (pre-policy) period. Choosing a proper control period requires an understanding of seasonality of outcomes of interest. This study describes seasonality of death on the solid organ transplant waiting lists and compares it to that of the US adult population.
Methods: Using SRTR standard analysis files, mortality rates were calculated for each month from January 1999 to December 2018 for candidates prevalent on each solid organ transplant waitlist at any point in the month. Monthly rates were then standardized as a ratio to the 13-month simple moving average centered on the month to give an interpretation of more deaths (ratio > 1) than the yearly average or fewer deaths (ratio < 1). Linear regression with month as a categorical predictor modeled seasonality of standardized mortality for each organ.
Results: Mortality rates on the kidney, liver, lung, and pancreas waitlists showed statistically significant variation by month. For kidney, liver, and lung, mortality rates were higher in the winter, particularly January and February, and lower in the summer. Pancreas waitlist mortality rates showed broader confidence intervals and a less clear seasonal trend. In comparison, heart waitlist mortality rates were fairly consistent through the year. Seasonal trends in mortality rates for kidney, pancreas, liver, and heart differed significantly from seasonal trends in the US population. In the case of kidney, liver, and heart, seasonal trends were less pronounced than in the general population (Figure 1).
Conclusions: Mortality rates on many solid organ transplant waitlists followed seasonal trends. Analysis of mortality outcomes before and after policy changes or natural experiments should use cohorts matched on time of year. For example, if data after a policy change are available only for January to April of a given year, an appropriate control cohort would most likely be January to April of the previous year.

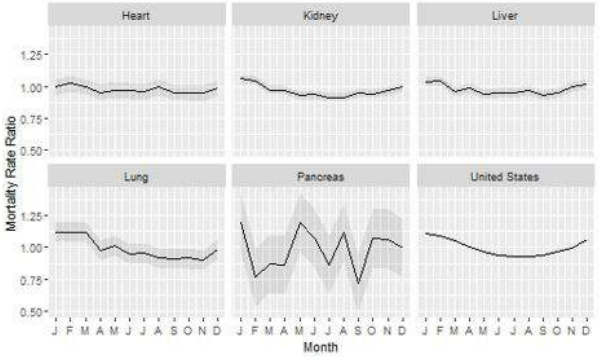


Figure 1. Average solid organ candidate waitlist mortality by month compared with that of the US general population. Curves are averages of monthly mortality rates from 1999 to 2018 standardized to 13-month simple moving averages (95% confidence interval shown in the shaded region).

CITATION INFORMATION: Miller J., Musgrove D. Seasonality of Mortality for Solid Organ Waitlist Candidates *AJT, Volume 21 Supplement 3*
DISCLOSURES: J. Miller: None. **D. Musgrove:** None.

Abstract# 696

Early Review of Liver Acuity Circles Allocation

S. Noreen[1], J. Heimbach[2], J. Pomposelli[3], M. Cafarella[1], J. Trotter[4], *[1]UNOS, Richmond, VA, [2]Mayo Clinic, Rochester, MN, [3]UCHealth, Aurora, CO, [4]BSWHealth, Dallas, TX*

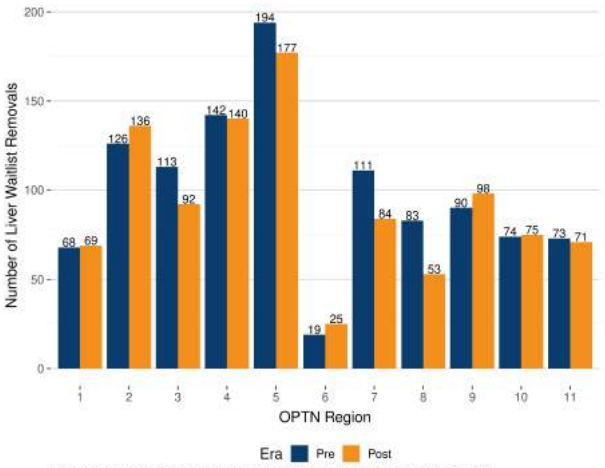
Purpose: Acuity circles (AC) allocation was implemented on February 4, 2020, followed shortly by the declaration of national emergency for COVID-19. The goal of this policy was to broaden distribution of livers, particularly for highly medically urgent candidates.

Methods: OPTN liver waitlist, transplant, and donor data were used. Cohorts of deceased donor liver-alone transplants for the pre- (2/5 - 7/2/2019) and post-eras (2/4 - 6/30/2020), as well as cohorts of liver waitlist registrations added, liver-alone waitlist registrations removed due to death or too sick to transplant, and deceased liver donors during 2/5 - 8/6/2019 (pre-policy) and 2/4 - 8/4/2020 (post-policy) were assessed.

Results: Similar volumes of deceased liver donors were recovered pre- and post-policy (4545 vs. 4564). While 375 fewer new registrations were added to the liver waitlist post-policy largely due to COVID-19, similar numbers of registration removals occurred (1093 pre- vs. 1020 post-policy) (Figure 1). There were fewer transplants overall post-policy (2997 vs. 3140 pre), with similar proportions of recipients with MELD or PELD scores of 29 and higher (51.7% pre- vs. 51.2% post-policy). However, these most medically urgent recipients received livers from farther away post-policy (Figure 2). The variation in median allocation score at transplant, as a measure of disparity across areas, has also decreased by most geographic units (Figure 3).

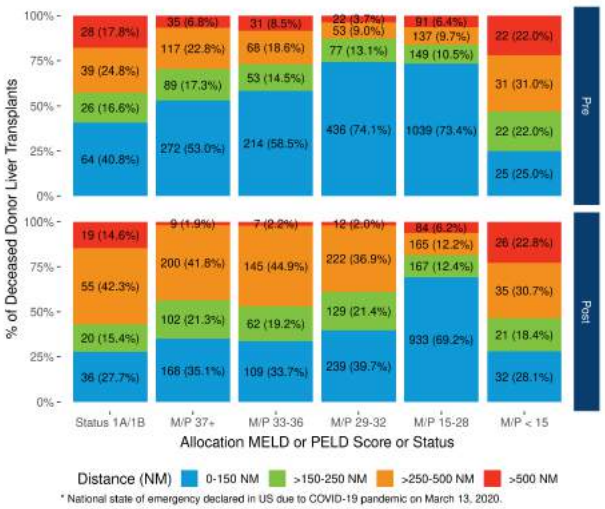
Conclusions: It can already be seen that livers are being more broadly distributed for those with greater medical urgency, and geographic disparities are decreasing. However, the confounding effects of COVID-19 cannot be parsed out from potential policy effects, and continued data accumulation and monitoring of the system by the OPTN Liver Committee will be needed to determine the true effects of this policy change.

Figure 1. Liver-alone waiting list registration removals due to death or too sick to transplant by OPTN Region and policy era



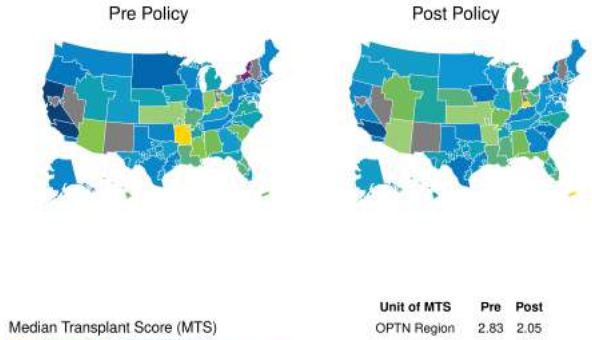
* National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.
** Candidates may be listed at multiple transplant programs, contributing multiple registrations and thus represent multiple deaths in these counts.

Figure 2. Deceased donor liver-alone transplants by allocation MELD or PELD score at transplant, classification distance, and policy era



* National state of emergency declared in US due to COVID-19 pandemic on March 13, 2020.

Figure 3. Median allocation MELD or PELD score at transplant by donation service area DSA and policy era, with table of standard deviation of median transplant scores by varying geographic units and policy era



Unit of MTS	Pre	Post
OPTN Region	2.83	2.05
DSA	3.71	3.40
State	4.00	3.70
Transplant Center	4.81	4.87

CITATION INFORMATION: Noreen S., Heimbach J., Pomposelli J., Cafarella M., Trotter J. Early Review of Liver Acuity Circles Allocation *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Noreen: None. **J. Heimbach:** None. **J. Pomposelli:** None. **M. Cafarella:** None. **J. Trotter:** None.

Abstract# 697

Black Disparity in Access to Kidney Transplant Waitlist Worsens in Illinois After New Kidney Allocation System (kas)

S. Park[1], D. Simpson[1], N. Katariya[2], J. Friedewald[3], B. Ho[3], D. P. Ladner[1], *[1]Transplant Outcomes Research Collaborative, Comprehensive Transplant Center, Northwestern University, Chicago, IL, [2]Division of Transplant Surgery, Northwestern University, Chicago, IL, [3]Transplant Nephrology, Northwestern University, Chicago, IL*

Purpose: We hypothesized racial/ethnic disparities to access the kidney transplant (KT) waitlist (WL) remain after the implementation of the new kidney allocation system (KAS) at a state level.

Methods: We used the US Renal Data System (URSRDS) data from 1/1/2004 - 12/31/2018 for ESRD patients who resided in Illinois at the time of dialysis initiation. Inclusion criteria were; 1) 18 -70 years at dialysis initiation, and 2) first KT only. Multi-organ transplant was excluded. A competing risk analysis was conducted with a sub-distribution hazard model stratified by race/ethnicity. Death on dialysis was considered as a competing risk for waitlisting. Sub-distribution hazard ratio (SHR) between the pre-KAS (11/1/2004 - 12/4/2015) and post-KAS (12/5/2015 - 12/31/2018) compared Black and Hispanics to Whites.

Results: A total of 47,484 patients were included with 39,646 in the pre-KAS and 7,838 patients in the post-KAS era based on initiation date of dialysis. In the pre-KAS group, 10,472 (26.4%) patients were added to the WL. 764 (10.8%) patients enrolled on the WL during the post-KAS era. Before KAS, Black patients had the lowest SHR (0.945, p=0.01) for WL enrollment, with Hispanics (1.331, p<0.001) and others (1.693, p<0.001) above Whites. Post-KAS SHR of WL addition in Blacks fell even lower (0.639, p<0.001), relative to Whites. The SHR dropped somewhat for Hispanics (1.208, p=0.01) and Others (1.551, p<0.001) (Table 1).

Conclusions: In Illinois, the disparity in access to the WL became worse for Blacks in the post-KAS era. Causes for the widening gap need to be explored, to find mitigation solutions.

Table1) Sub-distribution hazard ratio for getting on WL in preKAS and postKAS era by race/ethnicity

PreKAS (Since 2004-12/4/2015)

	SHR	P-value
Black	0.945	0.01
Hispanic	1.331	<0.001
Others	1.693	<0.001

PostKAS (12/5/2015-12/31/2018)

	SHR	P-value
Black	0.639	<0.001
Hispanic	1.208	0.01
Others	1.551	<0.001

CITATION INFORMATION: Park S., Simpson D., Katariya N., Friedewald J., Ho B., Ladner D. Black Disparity in Access to Kidney Transplant Waitlist Worsens in Illinois After New Kidney Allocation System (kas) *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Park: None. **D. Simpson:** None. **N. Katariya:** None. **J. Friedewald:** Consulting Fee; Name of Commercial Interest; Eurofins-Transplant Genomics, INC. Consulting Fee; Nature of Relationship; paid consultant. **B. Ho:** None. **D.P. Ladner:** None.

Abstract# 698

The Impact of Lack of Access to Simultaneous Kidney and Pancreas Transplantation Due to Insurance Ineligibility - A Single Center Analysis

Y. A. Qazi, E. Villalon, D. Samson, W. Mon, M. Smogorzewski, *Keck Medical Center at USC, Los Angeles, CA*

Purpose: Simultaneous kidney and pancreas transplantation(SPK) provides a survival and quality of life advantage in young, low BMI insulin dependent diabetics with End Stage Renal Disease (IDDMesrd). Because of secondary complications such as retinopathy, many are disabled and unable meet eligibility for Medicare coverage. The greater Los Angeles metropolitan area has had no active pancreas transplant program for Medi-cal patients (CA's Medicaid) with the nearest one contracted in San Francisco. The purpose of our study was to compare the transplant rate and waitlist mortality in diabetics under 50 years of age based on their insurance status.

Methods: IDDMesrd patients referred to our center and medically eligible for SPK were analyzed in this study. Following were the inclusion criteria ; Age < 50 years, Insurance status : Medi- cal or Medi-care. Other form of insurances were not included in this study. The following data was collected: waitlist mortality (both active and active on the list) , transplant rate and type of transplant.

Results: There were 129 patients that met the eligibility criteria- 47 Medi-Cal and 82 MedicareWaitlist mortality for Medi-cal was 10/47 (21%) , 0 patients received a SPK and 5/47 (10%) received a kidney transplant alone. Waitlist mortality for the Medicare group 11/82(13%) ,16/82 (20%) received a SPK.

Conclusions: In our single center analysis of young IDDMesrd ineligible for a SPK due to insurance, the waitlist mortality was almost double and transplant rate half when compared to individuals that were insurance eligible. The higher transplant rate in the Medicare group is likely the result of shorter wait times for SPK compared to kidney alone in the Los Angeles area. Young Medi-Cal IDDMesrd patients in the greater Los Angeles area that are unable to be to be listed for SPK locally due to insurance, are significantly disadvantaged and suffer higher mortality and lower transplant rates. There is an urgent need for Med-ical to provide more local access for SPK in the greater Los Angeles area.

CITATION INFORMATION: Qazi Y., Villalon E., Samson D., Mon W., Smogorzewski M. The Impact of Lack of Access to Simultaneous Kidney and Pancreas Transplantation Due to Insurance Ineligibility - A Single Center Analysis *AJT, Volume 21 Supplement 3*

DISCLOSURES: Y.A. Qazi: None. **E. Villalon:** None. **D. Samson:** None. **W. Mon:** None. **M. Smogorzewski:** None.

Abstract# 699

Trends of Kidney Transplant Volume During Covid-19 Era

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Purpose: The emergence of SARS-CoV-2 and the clinical syndrome of COVID-19 have significantly disrupted routine healthcare and life-saving procedures, including solid organ transplantation. This resulted in holding living donor program activity and limiting solid organ transplant at many transplant centers. We examined the trend of kidney transplant volume before and after the first peak of COVID-19 to quantity the impact of the pandemic on kidney transplant practices.

Methods: Data on kidney transplant procedures from the national organ registries, Organ Procurement and Transplantation Network, 1/1/2019-5/31/2020) and Scientific Registry of Transplant Recipients (6/1/2020-9/30/2020) were examined. We excluded multiple organ transplantation.

Results: There were 12,757 deceased donor and 1,889 living donor kidney transplants between Jan 2020 and Sep 2020. The volume plummeted in March, reached a nadir in April, and gradually increased starting from May. There were only 72 living donor kidney transplants performed in April 2020, compared to 530 in the April 2019. However, by September 2020, the volume appeared to return to a level similar to the same month in 2019. In a similar pattern, numbers of kidneys recovered for transplantation decreased in March and April, before recovering in May 2020. **Figure 1**

Conclusions: As testing and PPE supply improve along with more experience with conducting safe transplant procedures during the pandemic, recommendations regarding transplant practice during COVID-19 continue to evolve. The availability of COVID-19 testing with rapid PCR results before transplant has led to an uptake of solid organ transplants and a recovery of suspended practice. Ongoing monitoring of both practices and outcomes is necessary to guide decisions of proceeding with transplantation as the country faces additional surges of COVID-19 during the winter months.

CITATION INFORMATION: Rajashekar G., Chang S., Lentine K., Wellen J., Alhamad T., Merzkani M., Murad H. Trends of Kidney Transplant Volume During Covid-19 Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: G. Rajashekar: None. **S. Chang:** None. **K. Lentine:** None. **J. Wellen:** None. **T. Alhamad:** None. **M. Merzkani:** None. **H. Murad:** None.

Abstract# 700

Investigating Physician Outlook Regarding Living Donation Prior to Planned Withdrawal of Care

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Purpose: The aim of this study is to assess the attitudes of physicians, physician assistants, and nurse practitioners in transplant and critical care regarding Living Donation Prior to Planned Withdrawal of Care (LD-PPW), which is the recovery of a living donor organ prior to withdrawal of life sustaining measures in a patient who is not brain dead, but for whom medical care towards meaningful recovery has been deemed futile.

Methods: A case scenario was administered via email through Medical Marketing Services to healthcare practitioners involved in transplant and critical care. This scenario included a survey about a potential LD-PPW donor ("Jason"), and participants rated their agreement with hypothetical statements on a 5-point Likert scale as it pertains to his eligibility to donate (Figure 1). 17519 surveys were distributed, 3611 were viewed, and 148 completed responses were received.

Results: Compared to previously published data surveying public perception of LD-PPW, this pilot data suggests that LD-PPW would be met with similar or even greater support from the professional community, with over 70% of responding practitioners indicating support for LD-PPW (Figure 2). 82% of respondents were confident in their ability to declare futility of care and 94% of respondents felt the care they provide would not vary with a patient's organ donor status (Figure 2).

Conclusions: This study was initiated because donation after cardiac declaration of death (DCDD) does not satisfy the current need for organ donation and transplantation, as nearly half of all DCDD does not proceed to organ donation. LD-PPW has been proposed as an alternative procedure targeted at increasing the quality and quantity of transplantable organs while respecting the donor's right to donate. This pilot study revealed strong support for LD-PPW among healthcare practitioners, reaffirming previously published data of strong support within the public at large. Further research will assist execution of a formalized process for LD-PPW by allaying common concerns and identifying further barriers to implementation.

Figure 1. Case scenario of a potential LD-PPW donor, "Jason", and comprehension questions. At the time of survey distribution, LD-PPW was referred to as Imminent Death Donation (IDD).

Jason has been admitted to the ICU after a serious car accident where the passenger has already died on the scene. He has suffered a devastating brain injury leaving him completely unresponsive but does not fulfill the criteria for brain death. Your team informs his family that although Jason's heart continues to beat, he is unlikely to have any meaningful neurologic recovery and is completely dependent on ventilation. Any other measures would amount to medical futility.

Jason is a registered organ donor. The ICU charge nurse notified the organ procurement organization (OPO) to assess his eligibility to donate. After reviewing his case, the organ procurement organization decides that Jason's organs are healthy but **do not meet the criteria for donation after brain death (DBD)** because he is **not legally brain dead**. He could be eligible for **donation after cardiac death (DCD)** (organ procurement which takes place quickly after removal of life sustaining measures and pronouncement of death). However, approximately 40-45% of DCD donors fail to progress to asystole in the amount of time allotted for successful procurement, and of those organs that are donated, transplant outcomes are not as good as donations from living donors or brain dead donors. Based on DCD tools available, Jason would likely not pass in the 2 hours allotted. Jason's family is disappointed that he cannot donate because they want to honor his wishes and for "something good to come out of this tragedy."

The family then asks if organ donation is possible before withdrawal of life sustaining care. **Like a living donor, Jason could donate one kidney - an organ he could technically live without and would not, in itself, cause death.** After the organ donation procedure, Jason would still have a heartbeat and need a ventilator to breathe. Jason's family would then remove life sustaining care and be present when he passes.

This process would be called **Imminent Death Donation (IDD)**. This donation could **only occur with the consent of Jason's family.**

1. In the above case scenario, was Jason responsive?
2. According to your healthcare team, would Jason recover from his condition?
3. Was Jason able to breathe without the ventilator machine?
4. Was Jason legally brain dead?
5. Could Jason live without one kidney?
6. Could the Imminent Death Donation of organs occur without the consent of Jason's family?

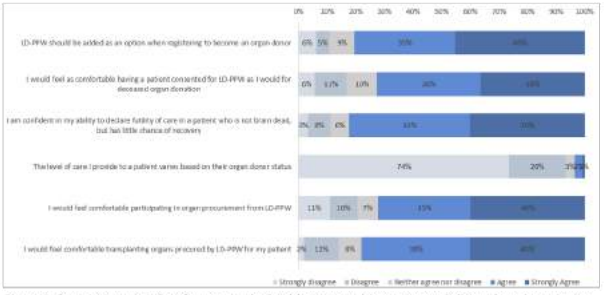

Figure 2. Descriptive statistics of responses by healthcare practitioners towards living donation prior to planned withdrawal of care (LD-PPW), called Imminent Death Donation (IDD) at the time of survey administration. Participants (n = 148) rated their agreement on a 5-point Likert scale with statements about a hypothetical patient and potential living donor prior to planned withdrawal of care, "Jason", in a case scenario.

CITATION INFORMATION: Rath S., Washburn L., Creden S., Goss M., Rana A., Goss J., Galvan N. Investigating Physician Outlook Regarding Living Donation Prior to Planned Withdrawal of Care *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Rath: None. **L. Washburn:** None. **S. Creden:** None. **M. Goss:** None. **A. Rana:** None. **J. Goss:** None. **N.T. Galvan:** None.

Abstract# 701

Impact of Traveling for Transplant on Access to and Outcomes from Kidney and Liver Transplantation

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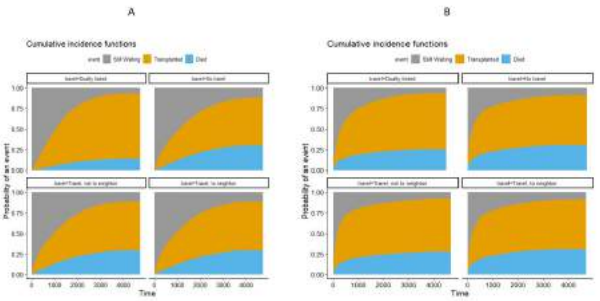
Purpose: Newly developed transplant referral regions (TRRs) can be used to understand how and why patients travel outside of their home transplant center to receive care. We used TRRs to estimate the association between travel for transplant and transplant access and outcomes for kidney and liver candidates.
Methods: We obtained data on adult kidney and liver transplant candidates listed from 2006 to 2016 from SRTR. Traveling for transplant was defined using TRRs, and categorized as (1) no travel, (2) travel to a neighboring TRR, (3) travel to an outside TRR, or (4) dually listed in home TRR and outside TRR. We estimated cause-specific hazard ratios for the association between transplant travel, time to transplant, and waitlist mortality, adjusting for clinical and demographic factors. We used Cox proportional hazards models to estimate the association between transplant travel and post-transplant survival.
Results: Between 2006 and 2016, 108,864 kidney and 32,314 liver candidates were listed outside their home TRR. Kidney candidates who traveled had higher transplant rates (Figure 1A). After adjustment, transplant rates were 7% higher for those who traveled to a neighbor, 12% higher for those who traveled to a non-neighbor, and 23.5% higher for dually listed patients compared to non-travelers. Those who traveled to a neighbor had 7% higher waitlist mortality (csHR: 1.07, 95% CI: 1.05, 1.10) than those who did not travel, while dually listed patients had nearly 50% lower waitlist mortality (csHR: 0.55, 95% CI: 0.53, 0.57). However, dually listed patients had higher post-transplant mortality than non-travelers (HR: 1.45, 95% CI: 1.38, 1.52). Among liver candidates, only those who traveled to a non-neighboring TRR had higher transplant rates relative to those who did not travel (Figure 1B, csHR 1.15, 95% CI: 1.13, 1.19). Dually listed candidates had lower waitlist mortality (csHR 0.80, 95% CI: 0.75, 0.85). Those who traveled to a non-neighboring TRR (HR: 1.06, 95% CI: 1.01, 1.12) and dually listed candidates (HR: 1.60, 95% CI: 1.10, 2.33) had higher post-transplant mortality than those who did not travel.
Conclusions: Traveling for transplant was associated with higher rates of transplant and shorter waiting time, but dually listed candidates appeared to have higher post-transplant mortality. Further research is needed to understand how transplant travel affects patients, transplant centers, and the communities they serve.

Figure 1. Cumulative incidence functions for kidney (A) and liver (B) waitlist outcomes, by travel group.



CITATION INFORMATION: Ross-Driscoll K., Lynch R., Axelrod D., Patzer R. Impact of Traveling for Transplant on Access to and Outcomes from Kidney and Liver Transplantation *AJT, Volume 21 Supplement 3*
DISCLOSURES: K. Ross-Driscoll: None. **R. Lynch:** None. **D. Axelrod:** Consulting Fee; Name of Commercial Interest; Sanofi, CareDx. **R. Patzer:** None.

Abstract# 702

Accounting for Survivor Bias in Transplant Benefit Models

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Purpose: The lung allocation system in the U.S. prioritizes lung transplant candidates based on estimated pre- and post-transplant survival. However, these models do not account for all waitlist candidates; rather, they only account for those who survive on the waitlist long enough to receive transplant. Transplanted candidates may differ from un-transplanted candidates, resulting in survivor bias and inaccurate predictions.
Methods: We propose a weighted estimation strategy to account for survivor bias in the pre- and post-transplant models used to calculate Lung Allocation Scores (LAS), the current basis for prioritizing lung transplant candidates in the U.S. We then created a modified LAS using these weights, and compared its performance to that of the existing LAS via time-dependent receiver operating characteristic (ROC) curves, calibration curves, and Bland-Altman plots.
Results: Overall, accounting for survivor bias improved discrimination and calibration over the existing LAS, and led to changes in patient prioritization. Individuals who received lower (worse) priority under the modified LAS tended to experience increases in their estimated waitlist urgency, whereas those who received higher (better) priority under the modified LAS tended to experience increases in their estimated transplant benefit.
Conclusions: Our approach to addressing survivor bias is intuitive and can be applied to any organ allocation system that prioritizes patients based on estimated post-transplant survival. This work is especially relevant to current debate about methods to ensure more equitable distribution of organs.
CITATION INFORMATION: Schnellinger E., Cantu E., Harhay M., Schaubel D., Kimmel S., Stephens-Shields A. Accounting for Survivor Bias in Transplant Benefit Models *AJT, Volume 21 Supplement 3*
DISCLOSURES: E.M. Schnellinger: None. **E. Cantu:** None. **M.O. Harhay:** None. **D.E. Schaubel:** None. **S.E. Kimmel:** None. **A.J. Stephens-Shields:** None.

PUBLIC POLICY

Abstract# 703

Has the Proportional Rise in Deceased Organ Donation Rate Over Last 5 Years Been Optimal? Data-based, Forecasting Model Analysis of UNOS/NHSBT UK Donor Data

H. Sharma[1], A. Sharma[2], *[1]Transplant and Vascular Access Surgery, Royal Liverpool University Hospital, Liverpool, United Kingdom, [2]Data Analytics, Loyola University, Chicago, IL*

Purpose: The increase in deceased donor numbers since last decade has been widely reported. We aim to analyse if the trend in rise of numbers has been optimum as per the forecasting casting model based on historical organ procurement data from UNOS/NHSBT UK from 2005-2014.

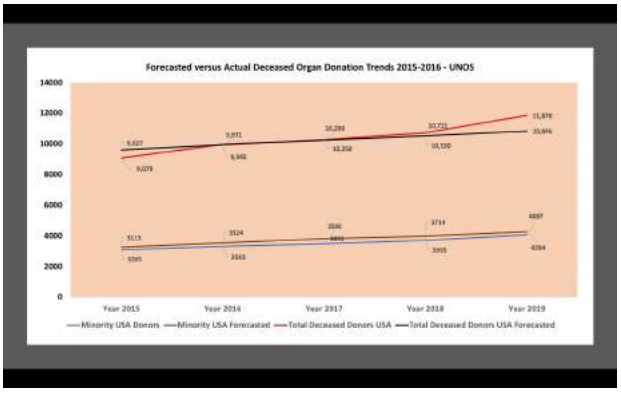
Methods: We created a Forecasting model using exponential moving average method for time-series forecasting . We compared the forecasted figures to the actual deceased donor numbers for last 5 years (2015-2019) . We also compared the forecasted versus actual donation rates in the minority population group.

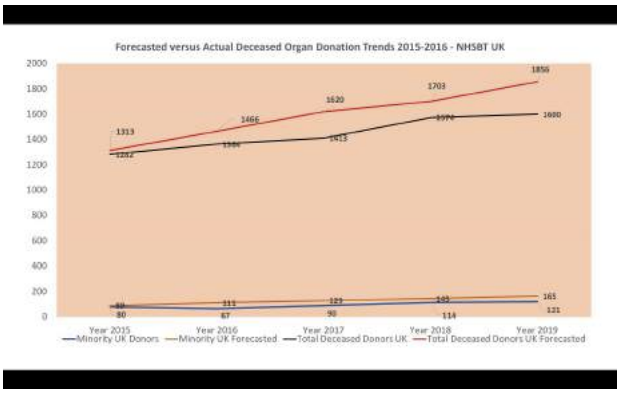
Results: The total actual versus forecasted deceased donation rates in US have kept pace p=0.46. In 2019, the actual donation numbers were in excess of forecasted digits but the actual donation rates in minority population in US have shown a negative trend compared to the forecasted figures p=0.002. In the UK, the actual donation rates were inferior compared to the forecasted numbers p=0.02. The actual organ donation rates were sub optimal in minority population too p=0.007.

Conclusions: The actual total deceased organ donation rates in US exceed the forecast but fall in actual donation from minority population compared to forecasted figures indicates failure of social initiatives. The UK actual total and minority population deceased organ donation trends have fallen behind the forecasted figures. More creative initiatives are needed to involve the minority population to improve the numbers

	Total Deceased Donors USA	Total Deceased Donors USA Forecasted	Minority USA Donors	Minority USA Forecasted	Total Deceased Donors UK	Total Deceased Donors UK Forecasted	Minority UK Donors	Minority UK Forecasted
Year 2015	9,079	9,627	3113	3265	1282	1313	80	89
Year 2016	9,971	9,945	3324	3543	1364	1466	67	111
Year 2017	10,286	10,258	3506	3834	1413	1620	90	129
Year 2018	10,721	10,530	3714	3995	1574	1703	114	145
Year 2019	11,870	10,846	4087	4284	1600	1856	121	165

Table 1 : Actual versus Forecasted Decease Donation 2015-2019 (UNOS/NHSBT UK)





CITATION INFORMATION: Sharma H., Sharma A. Has the Proportional Rise in Deceased Organ Donation Rate Over Last 5 Years Been Optimal? Data-based, Forecasting Model Analysis of UNOS/NHSBT UK Donor Data *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Sharma: None. **A. Sharma:** None.

Abstract# 704

Panic in the Pandemic: A Medical Decision Analysis Examining When Kidney Transplant Programs Should Close

A. J. Vinson[1], B. Kiberd[2], K. Tennankore[1], *[1]Nova Scotia Health Authority Division of Nephrology, Departm, Halifax, NS, Canada, [2]Dalhousie University, Halifax, NS, Canada*

Purpose: Pandemics greatly interfere with overall health care delivery as resources are diverted to combat the crisis. Kidney transplantation programs were closed temporarily during the COVID-19 pandemic. Given the critical shortage of organs and the overall importance of transplantation in improving length and quality of life for those with kidney disease, this analysis examines the impact of discarding deceased donor organs or in the case of live donation, deferral during a pandemic.

Methods: The net benefit (or harm) of discarding deceased donor organs or deferring live donor kidney transplant was measured in projected life years from a societal and individual perspective using a Markov model. A wide range of infection rates, pandemic durations, and case fatality rates associated with infection in waitlisted and transplant recipients was examined.

Results: Overall, patient life expectancy fell for both waitlisted and transplant recipients as the pandemic conditions became more unfavourable. However, the overall net benefit of a transplant during the pandemic was preserved. Even assuming plausible but higher relative case fatality rates in transplant recipients compared to waitlisted patients and risks of nosocomial and donor transmission, there remained a benefit with proceeding with deceased donor kidney transplant; net benefit >4 years up until age 60, Table 1. The net benefit of proceeding with live donor transplant during a pandemic was >7 years for all ages. Deferring transplantation, even accounting for additional pandemic-associated risk, negatively impacted most recipients.

Conclusions: As long as hospitals have adequate resources to deal with the pandemic and can limit nosocomial infection, kidney transplantation should not be curtailed.

Table 1. Life Years by Options: Baseline Variables

Age	Transplant COVID-19	Transplant No COVID-19	Wait List (WL) COVID-19	Wait List No COVID-19	Difference COVID-19 (Transplant-WL) No COVID-19 (Transplant-WL) Transplant (No COVID-COVID)
20	25.23 years	25.45 years	20.68 years	20.82 years	4.55 years 4.63 0.22
30	23.40	23.61	17.00	17.11	6.40 6.50 0.21
40	19.84	20.05	13.69	13.80	6.15 6.25 0.21
50	15.11	15.54	10.41	10.67	4.70 4.87 0.43
60	10.50	11.14	7.72	8.15	2.78 2.99 0.64
70	6.95	7.53	5.91	6.36	0.90 1.17 0.58

CITATION INFORMATION: Vinson A., Kiberd B., Tennankore K. Panic in the Pandemic: A Medical Decision Analysis Examining When Kidney Transplant Programs Should Close *AJT, Volume 21 Supplement 3*

DISCLOSURES: A.J. Vinson: Consulting Fee; Name of Commercial Interest; Paladin Labs Inc. **B. Kiberd:** None. **K. Tennankore:** Consulting Fee; Name of Commercial Interest; Otsuka, Janssen, AstraZeneca. Grant/Research Support; Name of Commercial Interest; Otsuka, Astellas.

Abstract# 705

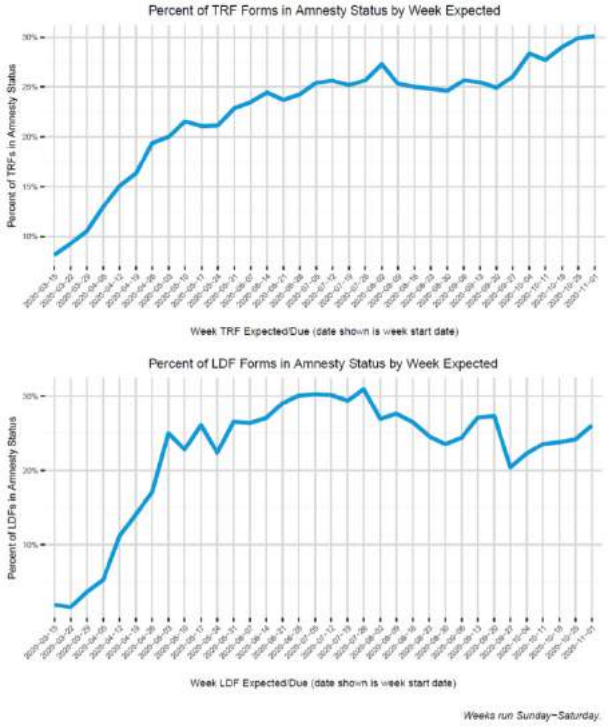
Summary of the OPTN's Policy and System Modifications in Response to the COVID-19 Pandemic

A. Wilk, S. Taranto, C. Jett, L. Cartwright, *UNOS, Richmond, VA*

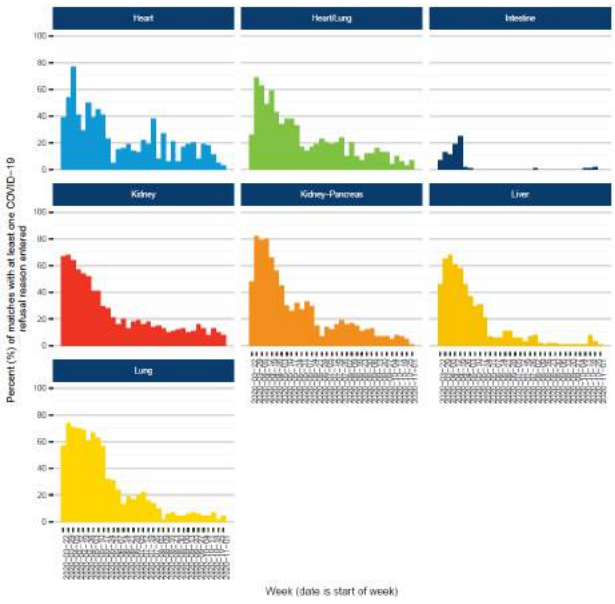
Purpose: In April 2020, the OPTN made several policy and system modifications in response to the growing COVID-19 pandemic including updates to candidate lab data, relaxing data submission requirements, incorporation of donor COVID-19 infectious disease testing, and the addition of new COVID-19 specific offer refusal and candidate cause of death codes. The changes were intended to reduce institutional burden in a time of unprecedented challenge to the US healthcare system and to protect transplant candidates/recipients from unnecessary potential COVID-19 exposure.

Methods: OPTN candidate, donor, and recipient data was analyzed by week from March-November 8, 2020.

Results: The percent of candidates that appeared to carry labs forward to maintain waiting list status has been low and varied by organ and candidate age group (0-17% in any given week). The number and percent of TRF and LDF forms in amnesty status at form due date has grown since policy implementation, remaining at ~25-30%, and varied by OPTN Region and organ.



There continues to be a decline in the percent of matches with at least one COVID-19 refusal reason for all organs from a peak of over 60% in March to <20% in November.



The proportion of COVID-19 related waiting list deaths among all reported deaths was highest for kidney, and decreased from a high of 26% in mid-April to an average of 6% per week in October. All OPOs that recovered deceased donors reported COVID-19 donor testing results through the optional donor infectious disease fields in DonorNet or via free response donor text fields or attachments. At the time of this analysis, no donors with a known active COVID-19 infection were transplanted.

Conclusions: As the COVID-19 pandemic continues to evolve, the OPTN Executive Committee has been committed to monitoring the usage and impact of these modifications and is weighing committee feedback and public comment responses in determining a path forward. There was broad support from the community during public comment to maintain these changes until the healthcare system is able to resume normal operations despite concerns regarding missing data from follow-up forms in amnesty status. There continues to be remarkable transplant community involvement in responding to the evolving challenges faced by the nation's healthcare system.

CITATION INFORMATION: Wilk A., Taranto S., Jett C., Cartwright L. Summary of the OPTN's Policy and System Modifications in Response to the COVID-19 Pandemic *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Wilk: None. **S. Taranto:** None. **C. Jett:** None. **L. Cartwright:** None.

Abstract# LB 71

The Calculated Panel of Incompatible Epitopes (cPIE) in the Service of Equitable Access to Transplantation

J. Lamsatfi[1], B. Bingfan Liu[1], S. Parto[2], A. Lewin[3], K. Oualkacha[1], F. Claas[4], P. Keown[5], R. Sapir-Pichhadze[6], *[1]McGill University, Montreal, QC, Canada, [2]McGill University Health Centre, Montreal, QC, Canada, [3]Hema-Quebec, Montreal, QC, Canada, [4]Leiden University Medical Centre, Albinusdreef, Netherlands, [5]University of British Columbia, Vancouver, BC, Canada, [6]Medicine, McGill University Health Centre, Montreal, QC, Canada*

Purpose: To inform on feasibility of eplet matching, we developed the calculated Panel of Incompatible Epitopes (cPIE), an algorithm informing on the likelihood of identifying blood group and eplet-compatible donors. We applied cPIE to study how self-identified ethnicity may affect access to transplantation.

Methods: Analyses were conducted in a subcohort of 1568 participants from the Hema-Quebec Stem Cell Registry (HQ) who underwent genotyping for 11 HLA loci by NGS (Jan 2018-Jan 2020). Genotypes were transformed to epitypes and blood groups were assigned randomly using distributions in self-reported ethnic groups of Quebec blood donors. Participants from the HQ subcohort with similar self-reported ethnicity represented candidate groups. The likelihood of finding blood group matched and eplet compatible donors was assessed by the cPIE algorithm considering eplet compatibility thresholds limited to antibody-verified (AbVer), HLA class II, and a subset of 15 eplet mismatches highly predictive of death-censored graft failure. For each threshold, donors from the entire HQ subcohort were deemed compatible, if all their eplets were included in the candidates' epitypes. Distributions of cPIE were also assessed when considering blood group compatible donors.

Results: The distribution of cPIE (Median and Interquartile Range (IQR)) by 16 self-identified ethnic groups represented in HQ (Arab (N=25), South Asian (N=9), South East Asian (N=5), Black African (N=9), Black American (N=15), Black Other (N=6), Caucasian (N=966), Chinese (N=13), Philippine (N=7), First Nation (N=8),

SMALL BOWEL

Hispanic (N=126), Jewish Ashkenazi (N=82), Jewish Sephardi (N=42), Metis (N=5), Other (N=240), and Unknown (N=10)) for each eplet compatibility threshold are presented in Table 1. Likelihood of finding donors was greater when allowing blood group compatibility with candidates.

Conclusions: Across self-identified ethnicities there is extensive heterogeneity at the individual level in the likelihood of identifying blood group and eplet-compatible donors. Verification of individual candidates' allele-level HLA genotypes is needed to inform on access to transplantation. For harder to match candidates, blood group compatibility may help expand the donor pool.

	BLOOD GROUP MATCHED	BLOOD GROUP COMPATIBLE	BLOOD GROUP MATCHED	BLOOD GROUP COMPATIBLE	BLOOD GROUP MATCHED	BLOOD GROUP COMPATIBLE
	Class I and II AbVer Eplets		Class II AbVer Eplets		High Risk Eplets	
SELF-IDENTIFIED ETHNICITY	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
ARAB (25)	0.0002 (0.0002-0.0003)	0.0005 (0.0003-0.0005)	0.002 (0.00049-0.008)	0.003 (0.001-0.01)	0.07 (0.015-0.13)	0.12 (0.03-0.2)
SOUTH ASIAN (5)	0.0002 (0.0002-0.0003)	0.0004 (0.0002-0.0005)	0.002 (0.0009-0.002)	0.005 (0.002-0.006)	0.004 (0.002-0.07)	0.009 (0.006-0.2)
SOUTH EAST ASIAN (5)	0.0003 (0.0003-0.0005)	0.0003 (0.0003-0.0003)	0.005 (0.0009-0.005)	0.005 (0.0009-0.006)	0.03 (0.03-0.09)	0.032 (0.031-0.2)
BLACK AFRICAN (9)	0.0002 (0.0002-0.0003)	0.0005 (0.0003-0.0005)	0.001 (0.0004-0.003)	0.002 (0.001-0.01)	0.01 (0.003-0.04)	0.03 (0.01-0.04)
BLACK AMERICAN (15)	0.0003 (0.00009-0.0003)	0.0004 (0.0003-0.0004)	0.001 (0.0002-0.004)	0.001 (0.0007-0.006)	0.02 (0.008-0.11)	0.1 (0.02-0.1)
BLACK OTHER (6)	0.0003 (0.0003-0.0004)	0.0005 (0.0003-0.0006)	0.002 (0.0003-0.005)	0.003 (0.0004-0.007)	0.1 (0.03-0.1)	0.1 (0.04-0.2)
CAUCASIAN (566)	0.0003 (0.0002-0.0003)	0.0005 (0.0003-0.0005)	0.002 (0.0009-0.006)	0.004 (0.002-0.009)	0.08 (0.02-0.1)	0.1 (0.03-0.2)
CHINESE (13)	0.0002 (0.0002-0.0003)	0.0004 (0.0003-0.0005)	0.0005 (0.0002-0.002)	0.001 (0.0005-0.007)	0.07 (0.03-0.1)	0.1 (0.04-0.2)
PHILIPPINE (7)	0.0002 (0.0002-0.0003)	0.0005 (0.0003-0.0005)	0.0006 (0.0003-0.003)	0.0006 (0.0005-0.007)	0.04 (0.03-0.1)	0.09 (0.05-0.2)
FIRST NATION (8)	0.0003 (0.0002-0.0003)	0.0005 (0.0003-0.0005)	0.005 (0.002-0.006)	0.007 (0.004-0.01)	0.1 (0.1-0.3)	0.2 (0.1-0.3)
HISPANIC (126)	0.0003 (0.0003-0.0003)	0.0004 (0.0003-0.0005)	0.002 (0.0007-0.005)	0.003 (0.001-0.008)	0.1 (0.02-0.1)	0.1 (0.04-0.2)
JEWISH ASHKENAZI (82)	0.0003 (0.0002-0.0003)	0.0005 (0.0003-0.0006)	0.003 (0.001-0.006)	0.004 (0.002-0.008)	0.08 (0.02-0.1)	0.1 (0.03-0.2)
JEWISH SEPHARDI (42)	0.0003 (0.0002-0.0003)	0.0005 (0.0003-0.0005)	0.001 (0.0006-0.007)	0.004 (0.001-0.009)	0.04 (0.01-0.1)	0.1 (0.02-0.2)
METIS (5)	0.0003 (0.0002-0.0003)	0.0004 (0.0003-0.0005)	0.003 (0.0018-0.003)	0.0033 (0.0032-0.004)	0.1 (0.02-0.1)	0.14 (0.1-0.2)
OTHER (240)	0.0003 (0.0002-0.0003)	0.0004 (0.0003-0.0005)	0.002 (0.0006-0.005)	0.004 (0.001-0.01)	0.04 (0.01-0.1)	0.1 (0.03-0.2)
UNKNOWN (10)	0.0002 (0.0002-0.0003)	0.0004 (0.0003-0.0005)	0.005 (0.001-0.009)	0.0034 (0.003-0.004)	0.2 (0.04-0.3)	0.14 (0.1-0.2)

Table 1. Likelihood of Finding Compatible Donor by Self-Reported Ethnic Group

CITATION INFORMATION: Lamsatfi J., Bingfan Liu B., Parto S., Lewin A., Oualkacha K., Claas F., Keown P., Sapir-Pichhadze R. The Calculated Panel of Incompatible Epitopes (cPIE) in the Service of Equitable Access to Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Lamsatfi: None. **B. Bingfan Liu:** None. **S. Parto:** None. **A. Lewin:** None. **K. Oualkacha:** None. **F. Claas:** None. **P. Keown:** None. **R. Sapir-Pichhadze:** None.

Small Bowel

Intestinal Transplantation and Rehabilitation

Abstract# 1245

Dynamic Reconstitution of Recipient Resident Memory T Cell Repertoire After Human Intestinal Transplantation

W. Jiao, M. Martinez, J. Zuber, A. Obradovic, R. Jones, E. Waffarn, Z. Wang, A. Gorur, K. Rogers, T. Kato, Y. Shen, J. Fu, M. Sykes, *Columbia University, New York, NY*

Purpose: Our studies in intestinal transplant (ITx) recipients demonstrated that donor T cell blood macrochimerism(peak level ≥4%) is associated with slower graft T cell replacement by the recipient and less rejection. Graft-infiltrating recipient T cells gradually take on the resident memory (TRM) phenotype during quiescence. However, TRM repertoire formation under quiescent and rejection conditions is largely unexplored.

Methods: We have investigated the dynamics of T cell receptor (TCR) repertoire reconstitution by recipient T cells in intestinal allografts across time and space by applying TCR sequencing and flow cytometry from pre-Tx recipient lymphoid tissue and post-Tx gut and blood over years.

Results: In ileal allografts, cumulative percentages of TCRs identified in earlier graft biopsies increased over time, demonstrating the establishment of a stable recipient repertoire (Fig. 1). Establishment of a stable repertoire appeared more rapid in patients without blood macrochimerism, as 4 out 4 showed an overall decline in jensen-shannon divergence (JSD) values between adjacent times in ileum within 400 days. In contrast, 5 out 6 patients with blood macrochimerism and long-term follow up showed delayed establishment of a stable repertoire, as reflected by either an increased or a stable trend of JSD values. Low JSD values in Pts 15 and 13 early post-Tx reflected persistent donor TRM repertoires and JSDs increased as recipient cells eventually replaced those of the donor. The delay in recipient replacement of donor TRM resulted in a delay in the establishment of a stable recipient repertoire. Recipient sequences were shared across different gut tissues and these demonstrated higher clonal dominance and lower diversity compared to those appearing in only one gut region, indicating that dominant recipient-derived TRM T cell clones seeded the entire gut, including the native colon (Fig. 2).

Conclusions: Our data reveal the dynamic establishment of a stable TRM repertoire over time after ITx by recipient T cells across different regions of the gut. This process is more rapid in patients without blood macrochimerism, who are also more prone to rejection.

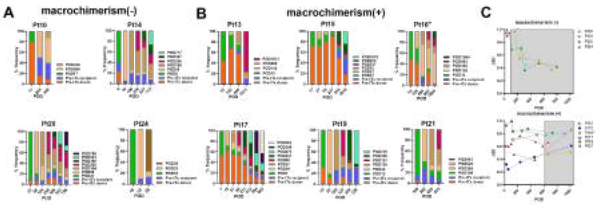


Figure 1. Graft-infiltrating recipient T cells gradually established a stable repertoire after ITx. (A) and (B) Dynamic establishment of the recipient TCR repertoire in intestinal allograft in patients without ("-") and with ("+") macrochimerism. In bar plots, the top 1000 sequences defined by frequency in each ileal sample collected on different post-operative days (POD) are presented and their constitution from pre-Tx donor or recipient mappable clones and clones first identified in the indicated PODs are shown. "Putative de novo sequences" are defined as sequences first identified at the designated time point but not previous time points and are located on the top section of each bar. (C) Dynamic establishment of the recipient repertoire in patients with ("+") and without ("-") macrochimerism is shown. Repertoire stability was reflected by changes of JSD values between adjacent time points among the top 1000 sequences identified at each time point post-Tx. JSD values range between 0 and 1, where 0 indicates identical repertoires and 1 indicates complete divergence. Grey shaded areas indicate the overall time frame when >50% of donor T cells in an ileum allograft had been replaced by the recipient.

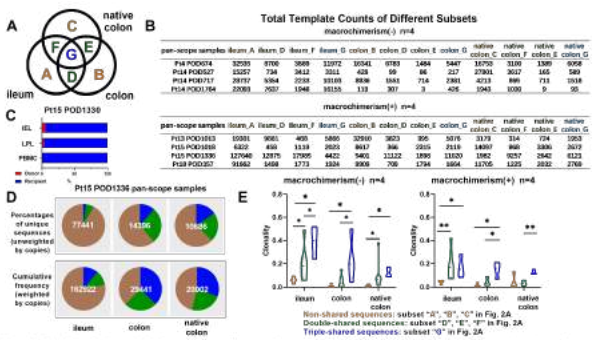


Figure 2. Clonal distribution and dominance across different regions of the gut late post-Tx. (A) Venn diagrams illustrate the subsets of sequences ("A" to "G") appearing in different regions of the intestine in one patient at a given time point when transplanted ileum, transplanted colon and native colon were simultaneously biopsied through a pan endoscopic procedure. (B) Total template counts of different subsets for each pan-scope sample are shown. Non-shared sequences (in subset "A", "B", "C") are in brown. Double-shared sequences (in subset "D", "E", "F") are in green. Triple-shared sequences (in subset "G") are in blue. Samples were included if recipient T cell chimerism in gut >90% and total template counts >500. (C) Chimerism status in PBMC, ileal intraepithelial lymphocytes (IEL) and lamina propria lymphocytes (LPL) in Pt15 POD1330 is shown, one week earlier than the pan-scope performed on POD1336. (D) Representative pan-scope samples collected from Pt15 on POD1336 showed higher fractions for those sequences shared across 3 different gut tissues when measured by cumulative frequency compared to unique sequence numbers. Pie chart color codes match each subset defined in Fig. 2A, 2B and 2E. Total number of unique sequences or templates within samples are shown in the center of each pie. (E) Triple-shared sequences had higher clonalities compared to double-shared sequences or non-shared sequences, regardless of the status of blood macrochimerism. Mann-Whitney test was performed to determine statistical significance: * p<0.05, **p<0.01.

CITATION INFORMATION: Jiao W., Martinez M., Zuber J., Obradovic A., Jones R., Waffarn E., Wang Z., Gorur A., Rogers K., Kato T., Shen Y., Fu J., Sykes M. Dynamic Reconstitution of Recipient Resident Memory T Cell Repertoire After Human Intestinal Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Jiao: None. M. Martinez: None. **J. Zuber:** None. **A. Obradovic:** None. **R. Jones:** None. **E. Waffarn:** None. **Z. Wang:** None. **A. Gorur:** None. **K. Rogers:** None. **T. Kato:** None. **Y. Shen:** None. **J. Fu:** None. **M. Sykes:** None.

COVID-19

COVID-19

Abstract# LB 43

SARS-CoV-2 Infection in Solid Organ Transplant Recipients: A Retrospective Cohort Study

A. Adeel, *Infectious Diseases, University of Massachusetts, Worcester, MA*

Purpose: Initial studies of COVID-19 in solid organ transplant (SOT) recipients demonstrated high mortality rates, but more recent comparative data shows contradictory results.

Methods: We evaluated differences in demographic characteristics, comorbidities, clinical presentation, and outcomes among three patient groups based on their solid organ transplant status and COVID-19 status between 3/1/2020 and 6/30/2020: SOT recipients with COVID-19 (T+|C+), SOT recipients who tested negative for COVID-19 (T+|C-), patients with cirrhosis or end-stage renal disease (ESRD) who were positive for COVID-19 (T-|C+). Controls (T-|C+) were chosen in a 2:1 match with cases (T+|C+) based on age range, gender and testing date. Bivariate analyses were done using chi-square and Fisher's exact test for categorical data and ANOVA for continuous data using STATA 15. Bonferroni correction was applied for multiple comparison.

Results: A total of 222 patients were included in this analysis, 22 (10%) T+|C+, 153 (69%) T+|C-, 47 (21%) T-|C+ (Table 1). Among transplant recipients, patients with COVID-19 were more likely non-Hispanic Black or Hispanic and younger. T+|C+ patients were more likely to present with symptoms than other groups; however, they were less likely to be hospitalized and die ($p < 0.01$). Among patients with COVID-19, patients with transplant were less likely to require supplemental oxygen support ($p = 0.01$) and ICU admission ($p = 0.05$). SARS-CoV-2 PCR cycle thresholds are shown in Figure 1.

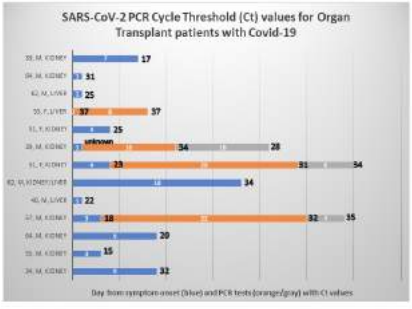
Table 1: Characteristics, comorbidities and presenting symptoms of transplant patients with and without COVID-19 and non-transplant patients with COVID-19

	Transplant COVID + T+ | C+ (N=22)	Transplant COVID - T+ | C- (N=153)	Controls COVID - T- | C+ (N=47)	P-value
Age, mean (SD)	54.6 (11.4)	58.5 (11.6)	63.6 (13.6)	0.01[a]
Male Gender	16 (72.3%)	914 (61.4%)	31 (65.9%)	0.57
Race- ethnicity				
Non-Hispanic White	11 (50.0%)	84 (55.2%)	27 (57.4%)	0.01[b]
Non-Hispanic Black	3 (13.6%)	10 (6.5%)	11 (23.4%)	
Hispanic or Latino	6 (27.2%)	31 (20.3%)	8 (17.0%)	
Non-Hispanic other	2 (9.1%)	27 (17.7%)	1 (2.1%)	
Organ transplanted				
Kidney Transplant	13 (59.1%)	68 (44.5%)	-	0.78
Liver Transplant	9 (40.9%)	81 (52.9%)	-	
Multi-organ Transplant	0	4 (2.6%)	-	
Comorbidities				
Hypertension	17 (77.2%)	114 (74.5%)	35 (74.4%)	1.00
Diabetes	11 (50.0%)	88 (57.5%)	30 (63.8%)	0.54
COPD	2 (9.1%)	10 (6.5%)	17 (36.1%)	<0.01
CKD	16 (72.7%)	90 (58.8%)	32 (68.1%)	0.29
Asthma	3 (13.6%)	14 (9.1%)	1 (2.1%)	0.13
Cancer history	1 (4.5%)	35 (22.8%)	6 (12.7%)	0.05
Cirrhosis	-	-	21 (44.6%)	
Dialysis dependent	-	-	27 (57.4%)	
Symptoms				
Fever	17 (94.4%)	53 (60.9%)	23 (69.7%)	0.01
Cough	13 (72.2%)	39 (44.8%)	17 (51.5%)	0.08
Dyspnea	8 (44.4%)	48 (55.1%)	22 (66.6%)	0.15
Fatigue	10 (55.5%)	53 (60.9%)	13 (39.3%)	0.10
Myalgias	9 (50.0%)	25 (28.7%)	1 (3.0%)	< 0.01
Pharyngitis	5 (27.7%)	11 (12.6%)	3 (9.1%)	0.13
Nausea	6 (33.3%)	27 (31.0%)	4 (12.1%)	0.07
Diarrhea	7 (38.8%)	31 (35.6%)	3 (9.1%)	0.01
Headache	9 (50.0%)	22 (25.2%)	2 (6.0%)	< 0.01
Symptomatic at Testing?	17 (77%)	-	21 (45%)	
Hospitalized	5 (26.3%)	-	24 (72.3%)	< 0.01
Deceased	1 (4.5%)	13 (8.5%)	15 (31.9%)	< 0.01

p-values based on chi-square test with Bonferroni correction for multiple comparison unless noted a: ANOVA with Bonferroni correction; b: Fisher's exact with Bonferroni correction

Conclusions: Patients who are transplant recipients with COVID-19 may not have a higher risk of severe disease or mortality in comparison to transplant patients without COVID-19 and patients with cirrhosis or ESRD.

Figure 1: SARS-CoV-2 PCR cycle threshold (Ct) value for transplant patients at different intervals with Covid-19



CITATION INFORMATION: Adeel A. SARS-CoV-2 Infection in Solid Organ Transplant Recipients: A Retrospective Cohort Study *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Adeel: None.

Abstract# LB 44

Kidney Transplantation in Patients with Prior Coronavirus Disease 2019 (COVID-19)

A. Santeusanio, A. Bhansali, M. Rana, S. Lerner, D. Von Ahrens, O. Sulimani, S. Farouk, F. Tedla, R. Shapiro, *Mount Sinai Hospital, New York, NY*

Purpose: We describe short-term outcomes as well as peri- and post-transplant complications in patients with prior coronavirus disease 2019 (COVID-19) who subsequently underwent kidney transplantation.
Methods: This was a single-center, retrospective cohort study of all recipients of isolated living- or deceased-donor kidney transplants between 4/1/2020-10/1/2020. Patients with prior PCR confirmed COVID-19 were considered candidates for kidney transplantation if they were at least 4 weeks post-infection, had resolution of symptoms, and had one negative nasopharyngeal PCR swab specimen. Standard doses of induction and maintenance immunosuppression were administered at the time of transplant and included anti-thymocyte globulin, tacrolimus, mycophenolate, and tapering corticosteroids. Patients were followed from the date of transplantation until study conclusion (11/1/2020), to compare short-term patient and allograft outcomes between those with prior COVID-19 and COVID-19 naïve controls transplanted during the same time-period.
Results: 81 patients received isolated kidney transplants during the review period, 13 (16.0%) of whom had recovered from prior COVID-19 infection. The median time between COVID-19 diagnosis and transplantation was 71 (IQR=56.5-135) days, and all 10 patients who were tested had evidence of significant antibody titers to the SARS-CoV-2 spike protein. The majority of patients had mild disease (69.2%), while 3 patients required hospital admission and supplemental oxygen, and 1 patient required mechanical ventilation. Baseline characteristics were similar between COVID-19 positive and negative patients, with the exception of more Hispanic/Latino patients in the prior COVID-19 group (53.8% vs 17.6%; p<0.01). At study conclusion, after a median follow-up of 3.6 months, patient and allograft survival were similar between COVID-19 positive and negative patients (92.3%/92.3% vs 100.0%/98.5%), and mean baseline serum creatinine was 1.5 mg/dL in both groups. One patient with prior mild COVID-19 died due to a pulmonary embolism within 1-month of transplant; however, no differences were observed in the overall rate of thromboembolism (7.7% vs 4.4%; p=0.61). Index hospital length of stay and readmission rate within 30-days of transplant were also similar between groups, but patients with prior COVID-19 did have a higher incidence of delayed extubation post-transplant (15.4% vs 1.5%; p=0.02). No cases of COVID-19 re-infection or biopsy proven allograft rejection were observed among patients with prior COVID-19.
Conclusions: In our preliminary experience, patients with prior COVID-19 infection appeared to have similar short-term outcomes when compared with COVID-19 naive patients. We did observe a potential signal for increased peri-operative respiratory complications in patients with prior COVID-19, which may warrant additional monitoring and further study in multi-center cohorts.

CITATION INFORMATION: Santeusanio A., Bhansali A., Rana M., Lerner S., Von Ahrens D., Sulimani O., Farouk S., Tedla F., Shapiro R. Kidney Transplantation in Patients with Prior Coronavirus Disease 2019 (COVID-19) *AJT, Volume 21 Supplement 3*
DISCLOSURES: A. Santeusanio: None. **A. Bhansali:** None. **M. Rana:** None. **S. Lerner:** None. **D. Von Ahrens:** None. **O. Sulimani:** None. **S. Farouk:** None. **F. Tedla:** None. **R. Shapiro:** None.

Abstract# LB 45

Kidney Transplant Biopsy Findings After Covid-19

E. Daniel[1], S. Kudose[2], D. J. Cohen[1], L. Ratner[3], V. D'Agati[2], I. Batal[2], *[1]Division of Nephrology, Columbia University Medical Center, NY, NY, [2]Department of Pathology, Columbia University Medical Center, NY, NY, [3]Department of Surgery, Columbia University Medical Center, NY, NY*

Purpose: COVID-19 has been reported as a cause of kidney injury and data from published native kidney biopsy results demonstrate a variety of causes. To our knowledge, there are no published series looking specifically at kidney allograft biopsy findings in patients with COVID-19.
Methods: We identified 10 kidney transplant recipients who underwent allograft biopsy within one month after infection with SARS-CoV-2 virus. We collected data regarding patients' clinical characteristics, transplant history, COVID-19 illness, and histology and immunohistochemistry findings of the kidney allograft biopsies.
Results: Patients had a median age of 50.3 years, and four of the patients were female. Demographics included four Hispanics, three Whites, two Blacks, and one unidentified. All patients had co-morbidities, including hypertension in eight and diabetes in three. Cause of allograft biopsy was acute kidney injury (n=9), proteinuria (n=2), and nephrectomy after allograft failure (n=1). 6/10 had developed COVID pneumonia, and two of those required mechanical ventilation.On analysis of histology results, three had severe acute rejection (two with acute T cell rejection - grades 2A and 2B, and one with a mixed rejection), two revealed podocytopathy (one with collapsing

glomerulopathy and one with recurrent lupus podocytopathy), one showed cortical necrosis, one had chronic thrombotic microangiopathy/transplant glomerulopathy, one had acute tubular injury, and two showed no specific histologic abnormalities. Immunohistochemical staining for SARS-N-Capsid was negative in 5/5 biopsies where performed.Follow up data including serum creatinine levels was available for 8/10 patients. Of these, only two demonstrated an improvement in kidney function back to baseline. No deaths were reported in the studied population.

Conclusions: This series of kidney transplant recipients who underwent allograft biopsy after COVID-19 illness demonstrates a wide variety of causes of kidney allograft dysfunction, the most common of which was rejection. Similar to the cases of native kidney dysfunction, we found no evidence of direct viral invasion.

CITATION INFORMATION: Daniel E., Kudose S., Cohen D., Ratner L., D'Agati V., Batal I. Kidney Transplant Biopsy Findings After Covid-19 *AJT, Volume 21 Supplement 3*

DISCLOSURES: E. Daniel: None. **S. Kudose:** None. **D.J. Cohen:** None. **L. Ratner:** None. **V. D'Agati:** None. **I. Batal:** None.

Abstract# LB 46

Liver and Kidney Transplantation During the Covid-19 Pandemic Period: A Single Center Experience

M. Haberal[1], E. Karakaya[1], A. Akdur[1], E. Ayvazoglu Soy[1], F. Ozcay[2], E. Baskin[3], S. Boyacioglu[4], A. Torgay[5], S. Yildirim[1], G. Moray[1], F. Yarbug Karakayali[1], *[1]Division of Transplantation, Department of General Surgery, Baskent University, Ankara, Turkey, [2]Department of Pediatric Gastroenterology, Baskent University, Ankara, Turkey, [3]Department of Pediatric Nephrology, Baskent University, Ankara, Turkey, [4]Department of Gastroenterology, Baskent University, Ankara, Turkey, [5]Department of Anaesthesiology, Baskent University, Ankara, Turkey*

Purpose: Introduction: Beginning of this year, when the Covid-19 pandemic has first started, it had the immediate effect of severely reducing living and deceased organ donation and transplantation activity worldwide. Our early experience showed that neither hemodialysis nor transplant patients have got infected with Covid-19 higher than the normal population. While it seems obvious that life-saving transplant activity should not be stopped, it should be tailored with careful selection of both donors and recipients within **transparency** and considering **ethical and legal aspects.**

Methods: Materials and Methods: With the declaration of COVID-19 as a pandemic, many studies have indicated that elective surgeries including transplantation should be postponed. However, according to our study results, we decided to continue our transplant activities in a controlled manner at our centers located in 3 different cities. From March 1 2020 to December 30, 2020, we performed 69 kidney transplants (58 adults, 11 pediatrics) and 21 liver transplants (8 adults, 13 pediatrics). All recipients were given a routine immunosuppressive protocol. We reviewed the medical records of both recipients and donors, PCR tests have been carried out twice before transplantation, and they were screened with thoracic CT.

Results: Results: Kidney transplants were performed from 67 living related and 2 deceased donors and liver transplants were performed from 20 living related and 1 deceased donors. Out of 69 kidney transplants, 68 patients are alive with normal kidney function and 1 patient died to due to cardiac problem. Out of 21 liver transplants, 20 patients are alive with normal liver function and 1 patient died due to cardiac oxalosis. During this period, no patients died due to Covid-19 pandemic, both recipients and donors were discharged successfully. Only one patient has got infected with Covid-19 and has recovered.

Conclusions: Conclusions: Our results show that when precautions are taken, transplant does not pose a risk to patients during the pandemic period. The safety and success of our transplantation activities lies in our newly developed protocol in response to the COVID-19 pandemic.

CITATION INFORMATION: Haberal M., Karakaya E., Akdur A., Ayvazoglu Soy E., Ozcay F., Baskin E., Boyacioglu S., Torgay A., Yildirim S., Moray G., Yarbug Karakayali F. Liver and Kidney Transplantation During the Covid-19 Pandemic Period: A Single Center Experience *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Haberal: None. **E. Karakaya:** None. **A. Akdur:** None. **E. Ayvazoglu Soy:** None. **F. Ozcay:** None. **E. Baskin:** None. **S. Boyacioglu:** None. **A. Torgay:** None. **S. Yildirim:** None. **G. Moray:** None. **F. Yarbug Karakayali:** None.

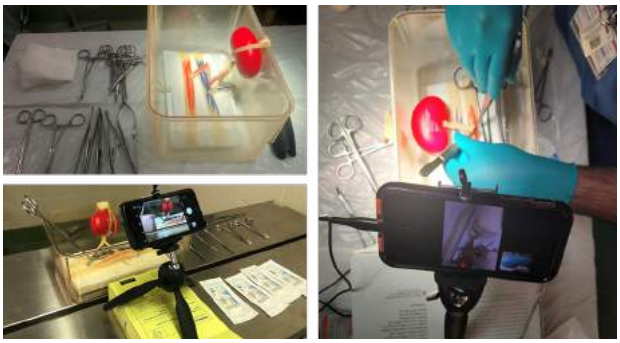
Abstract# LB 47

Feasibility of a Virtual Renal Transplant Simulation Model for Surgical Trainees in the Covid Era

O. Eletta[1], S. Iacono[1], D. Walls[1], S. Puri[2], B. Perry[1], C. Anderson[1], M. J. Nguyen[3], A. Bongu[2], *[1]General Surgery, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, [2]Transplant, Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, [3]Transplant Institute, Loma Linda University Medical Center, Loma Linda, CA*

Purpose: The COVID-19 pandemic and social distancing requirements has affected our resident education curriculum. We developed a virtual renal transplant simulation session to simulate renal vascular anastomoses (RVA). We hypothesize that this tool can be used to continue surgical skills education and enhance resident comfort with RVA in the COVID era.

Methods: We employed a well described model to mimic RVA to the iliac vessels using a mock kidney and penrose drains in a 5x8x11inch transparent container to simulate operating in the iliac fossa. Additionally, each kit included camera stands for mobile phones. General surgery residents with varying levels of experience participated. Our virtual workshop started with a demonstration and took place via a live video interface from several remote locations. An attending surgeon observed each resident and provided real time feedback. Pre and post simulation surveys were sent out to elicit comfort levels with procedure on a scale from 0 (not comfortable) to 100(very comfortable) and fidelity as a tool to improve general surgery residency training in renal transplantation.



Results: 16 surgical residents participated in the simulation. 12 (75%) had previously rotated on transplant surgery service. 75% of residents reported performing <10 vascular anastomoses. There was a statistically significant increase in mean comfort level score with performing a vascular anastomosis after the simulation compared to before (52 vs 23, P <0.01). There was also a statistically significant increase in mean comfort level score for assisting with a vascular anastomosis after compared to before (70 vs 38, p<0.01). 100% of residents reported that the model was useful for practicing needle control and precision, practicing knot tying, and learning the steps for completing renal vascular anastomoses. All residents recommended that this training model be used prior to rotating on the transplant service.

Conclusions: We demonstrated the feasibility of virtual sessions that surgical residents found to be effective in improving their technical skills. This method can be modified for other elements of surgical simulation while maintaining social distancing measures.

CITATION INFORMATION: Eletta O., Iacono S., Walls D., Puri S., Perry B., Anderson C., Nguyen M., Bongu A. Feasibility of a Virtual Renal Transplant Simulation Model for Surgical Trainees in the Covid Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: O. Eletta: None. **S. Iacono:** None. **D. Walls:** None. **S. Puri:** None. **B. Perry:** None. **C. Anderson:** None. **M.J. Nguyen:** None. **A. Bongu:** None.

Abstract# LB 48

Living Organ Donor Perspectives on Covid-19 Vaccines

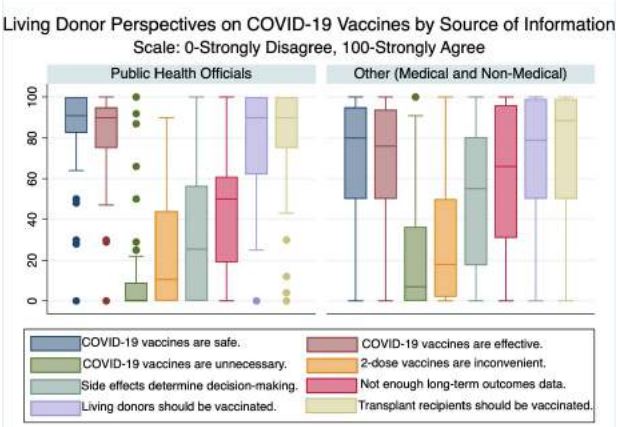
M. N. Harhay[1], A. Klassen[2], H. Zaidi[1], M. Mittelman[3], R. Bertha[3], R. Mannon[4], K. Lentine[5], *[1]Medicine, Drexel University, Philadelphia, PA, [2]Drexel University, Philadelphia, PA, [3]American Living Organ Donor Fund, Philadelphia, PA, [4]University of Nebraska Medical Center, Omaha, NE, [5]Saint Louis University, Saint Louis, MO*

Purpose: Promoting widespread COVID-19 vaccinations is a crucial strategy to protect living organ donors and transplant recipients during the pandemic. We examined perspectives and sources of hesitancy about COVID-19 vaccines among former and prospective living organ donors.

Methods: We conducted an IRB-approved study of US living organ donors and prospective donors. An online survey was disseminated on multiple social media platforms between 12/28/20-2/9/21. Survey items included multiple choice, ranking, and ratings of agreement to statements about COVID-19 vaccine effectiveness, convenience, and importance. We used descriptive statistics and a multivariable logistic regression model to examine associations between respondent characteristics and preferences and COVID-19 vaccine acceptance.

Results: Among 323 respondents from 40 US states and DC, 53% were 31-50 years old, 91% were non-Hispanic white, and 88% were female. Respondents included 267 living donors (94% kidney) and 56 in evaluation to donate (75% kidney). When asked if they would accept a COVID-19 vaccine, 76% answered yes, 11% no, and 13% unsure. Compared to those who would decline a vaccine or are unsure, respondents who would accept a vaccine were more likely to receive yearly influenza vaccines (48% vs 83%, p<0.001) and rely on public health officials for information (4% vs 35%, p<0.001). Respondents who relied on information sources other than public health officials were less likely to agree that COVID-19 vaccines are safe, effective, adequately studied or that donors and recipients should receive COVID-19 vaccines (**Figure**). Adjusting for demographics, education, and donor type, prioritization of public health officials for information and acceptance of yearly influenza vaccines were independently associated with higher COVID-19 vaccine acceptance (p<0.001 for both). The association between public health official guidance and higher

COVID-19 acceptance was similar among respondents who do and do not receive yearly influenza vaccines (adjusted marginal probabilities of vaccine acceptance of 97% and 94%, respectively).
Conclusions: Living organ donors who prioritize information from public health officials are more likely to accept a COVID-19 vaccine than those who rely on other information sources. Transplant programs could incorporate public health messaging and education when discussing the risks and benefits of COVID-19 vaccination.

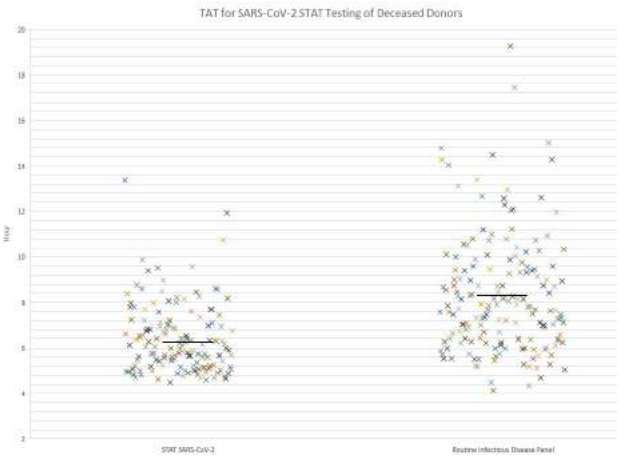


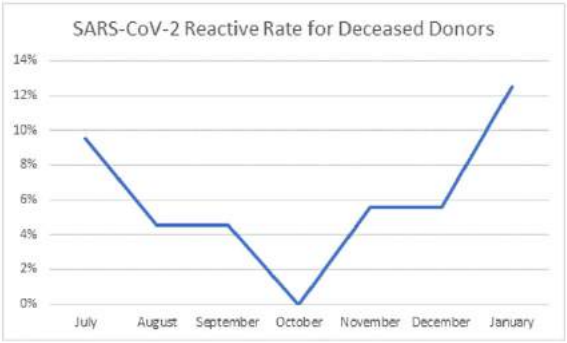
CITATION INFORMATION: Harhay M., Klassen A., Zaidi H., Mittelman M., Bertha R., Mannon R., Lentine K. Living Organ Donor Perspectives on Covid-19 Vaccines *AJT, Volume 21 Supplement 3*
DISCLOSURES: M.N. Harhay: Honoraria; Name of Commercial Interest; Relypsa. **A. Klassen:** Consulting Fee; Name of Commercial Interest; Merck. **H. Zaidi:** None. **M. Mittelman:** Consulting Fee; Name of Commercial Interest; Pfizer, Takeda. **R. Bertha:** None. **R. Mannon:** None. **K. Lentine:** Consulting Fee; Name of Commercial Interest; CareDx. Other; Name of Commercial Interest; Sanofi Speakers Board.

Abstract# LB 49

Sars-cov-2 Stat Testing for Organ Donation; One Laboratory's Experience

S. Dionne, B. O'Neale, *VRL-Eurofins, Centennial, CO*
Purpose: The COVID-19 pandemic took the U.S. by storm. The Transplant Community had to navigate through unprecedented scenarios in order to continue the life-saving mission of donation. Testing for SARS-CoV-2 initially was not readily available to all OPOs. This abstract reviews the early data of STAT testing for a single OPO in Region 8.
Methods: Retrospective data analysis was performed spanning a seven-month time period (July 2020-Jan 2021). SARS-CoV-2 testing was performed using Transcription Mediated Amplification on the Panther platform. 148 donors were evaluated.
Results: We needed to factor the feasibility of adding an additional STAT test to the lab work assignments. When choosing an assay/instrumentation, outside of sensitivity and specificity, we took into consideration the ability to streamline testing in our lab operations. The results of 148 deceased donor SARS-CoV-2 results were retrospectively reviewed. TAT averaged 6.4 hours for testing; there was no negative impact to the standard infectious disease panel TAT. TAT was efficient for two reasons (i) Lab Management assessed staffing needs and made adjustments to accommodate the additional STAT test (ii) the Panther allows for random access for STAT sample loading/testing. AST recommendations are that donors should be screened epidemiologically and a clinical history for suspected infection should be performed. The prevalence for asymptomatic disease is high. Our SARS-CoV-2 reactive rate for deceased donors averaged 5.8%. We observed trends in the reactive rates which mirrored the restrictions and relaxed restrictions that were imposed by the State. The rates increased during the holiday season when COVID-19 was prevalent in our DSA.
Conclusions: While the risk of transmitting SARS-CoV-2 through organ transplantation is not known, this data demonstrates the importance of continued screening for donors to prevent the potential for donor-derived recipient infection. With proper laboratory planning and choosing an assay/platform that can be streamlined into operations, STAT testing options for new diseases is achievable without majorly delaying organ allocation practices.





CITATION INFORMATION: Dionne S., O'Neale B. Sars-cov-2 Stat Testing for Organ Donation; One Laboratory's Experience *AJT, Volume 21 Supplement 3*
DISCLOSURES: S. Dionne: None. **B. O'Neale:** None.

Abstract# LB 50

Covid-19 Severity within One Year of Liver, Pancreas and Kidney Transplantation

H. Sarumi, J. Fisher, B. Johnson, T. Pruett, *Solid Organ Transplant Surgery, University of Minnesota, Minneapolis, MN*
Purpose: The current pandemic has created uncertainty in the severity of COVID-19 in transplant recipients, especially those given lymphocyte depleting therapy within a year prior to acquisition. Our experience was reviewed to stratify outcomes of COVID-19 infection occurring before or after one year from transplant.
Methods: All COVID-19 PCR positive liver, pancreas and/or kidney transplant recipients with a minimum of 28 days follow up were reviewed for demographics and outcomes.
Results: 216 recipients were identified: 20 <1 year and 196 >1 year post-transplant. Almost 80% were kidney alone or with pancreas or liver, ~ 2% pancreas alone and ~19% liver recipients. In the <1 year group 17 (85%) received thymoglobulin induction, 1 (5%) received thymoglobulin rejection treatment 8 days post-transplant and 3 (15%) received steroid rejection treatment 2, 2.5 and 10 months prior to COVID-19 diagnosis. Of recipients > 1 year from transplant there was 1 (0.5%) rejection treated with steroids 8 months prior to diagnosis. In the <1 year group 15% were asymptomatic at time of diagnosis. Both groups had a similar mortality rate. Infections diagnosed >1 year after transplantation had a higher hospitalization rate due to COVID-19, statistical significance was not feasible due to small sample size. There were patients in both groups hospitalized for other reasons. Of those hospitalized for COVID-19, 1 (20%) in the <1 year group was readmitted. This patient was diagnosed with COVID-19 due to fever and dyspnea 2 weeks following SPK, induction included thymoglobulin 2 mg/kg. Immunosuppression was decreased, patient was treated with dexamethasone and remdesivir, but ultimately was intubated and died 29 days following diagnosis. In the <1 year group an additional 4 patients were hospitalized, none of whom required intubation. It is likely that not all COVID-19 positive recipients were captured in this data for the >1 year post transplant group due to loss of follow up.
Conclusions: With a limited experience, COVID-19 infection within the first year after transplantation does not appear to have a greater mortality or hospitalization rate after lymphocyte depletion induction contrasted to recipients acquiring COVID-19 greater than a year after transplantation.

Figure 1: Demographics		
	<1 Year	>1 Year
Age	51.2 (25-73)	54.6 (14-85)
Sex: Male	55.0%	63.3%
Race: Caucasian	50.0%	70.4%
BMI	27 (20.2-33.3)	29.1 (15.5-46.3)
Previous transplant	15.0%	19.4%

Figure 2: Outcomes		
	<1 Year	>1 Year
Symptomatic at Diagnosis	85.0%	80.6%
COVID-19 Hospitalization	25.0%	36.2%
COVID-19 Mortality	5.0%	7.1%
Hospital Readmission	20% (1/5)	13% (9/69)

CITATION INFORMATION: Sarumi H., Fisher J., Johnson B., Pruett T. Covid-19 Severity within One Year of Liver, Pancreas and Kidney Transplantation *AJT, Volume 21 Supplement 3*

DISCLOSURES: H. Sarumi: None. **J. Fisher:** None. **B. Johnson:** None. **T. Pruett:** None.

Abstract# LB 51

Short Term Outcomes in Previously Covid Positive Kidney Transplant Recipients in Pre-vaccine Era

R. Prashar, N. J. Khoury, M. Ramesh, A. K. Patel, *Henry Ford Transplant Institute, Detroit, MI*

Purpose: To study clinical characteristics and short-term outcomes in kidney transplant recipients who were previously infected with SARS-CoV-2

Methods: In this retrospective, single-center case-series, we identified 5 consecutive kidney transplant recipients (KTRs), who were diagnosed with COVID-19 prior to transplant. Data from electronic medical records were retrieved for demographic, epidemiologic and clinical characteristics. All patients were transplanted after meeting institutional requirements of resolution of COVID-19 infection. Patients were required to have a negative Nasopharyngeal testing by NAT for SARS-CoV-2, 28 days post symptom resolution. For living donor KTRs repeat testing was done at 48 hours prior to transplant date. For deceased donor KTRs, Rapid Nasopharyngeal testing by NAT for SARS-CoV-2 was done at the time of organ offer. Severity of disease was determined by WHO COVID-19 severity classification.

Results: The demographics, severity of COVID-19 disease, timing of transplant and post-transplant course of the 5 KTRs with recovered COVID-19 are shown in .

Patient No	Age at transplant (years)	Gender	Race	Severity of COVID	Days post COVID diagnosis, when patient received transplant	Type of transplant LDKT-Living Donor DDKT-Deceased Donor	cPRA (%)	Induction	Post-transplant SARS-CoV-2 PCR positive	Most recent creatinine (mg/dL) (days post-transplant)
#1	30	Female	White	Mild	78	LDKT	0	Basiliximab	Yes (asymptomatic)	0.95 (166 days)
#2	48	Male	Black	Moderate	192	DDKT	0	ATG	No	1.9 (121 days)
#3	56	Female	Middle Eastern	Moderate	89	LDKT	0	Steroids	No	0.7 (66 days)
#4	28	Female	Black	Mild	255	DDKT	20	ATG	No	1.3 (44 days)
#5	38	Male	White	Moderate	273	LDKT	0	Basiliximab	No	1.3 (41 days)

Three patients received living donor kidney transplant. Patients were transplanted at a median of 192 days after COVID-19 diagnosis, after complete recovery and documentation of 2 negative SARS-CoV-2 PCRs. Three patients had moderate disease requiring hospitalization. Two patients received ATG for induction, 2 received basiliximab and one living related transplant recipient received steroids for induction. Post-transplant course was uncomplicated, except in one patient (#1), who had bleeding and had to be taken back to surgery on post-operative day 4. SARS-CoV-2 PCR was checked as a part of Per protocol with a positive result. However, patient remained asymptomatic, and tested negative 3 weeks posttransplant. The other four patients developed no symptoms of COVID 19 in their post-transplant course and continue to have excellent graft function at a median of 66 days post-transplant.

Conclusions: Potential KTRs with previously resolved COVID 19 disease can be safely transplanted and have favorable short-term post-transplant outcomes. While there could be persistent shedding, re-infection or re-activation of disease, disease course appears to be mild

CITATION INFORMATION: Prashar R., Khoury N., Ramesh M., Patel A. Short Term Outcomes in Previously Covid Positive Kidney Transplant Recipients in Pre-vaccine Era *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Prashar: None. **N.J. Khoury:** None. **M. Ramesh:** None. **A.K. Patel:** None.

Abstract# LB 52

Kidney Transplantation in Times of Covid-19 - Decision Analysis in the Canadian Context

I. Yanev[1], M. Gagnon[1], M. Cheng[2], S. Paraskevas[2], D. Kumar[3], A. Dragomir[4], R. Sapir-Pichhadze[4], *[1]McGill University, Montreal, QC, Canada, [2]McGill University Health Centre, Montreal, QC, Canada, [3]University Health Network, Toronto, ON, Canada, [4]Research Institute of McGill University Health Centre, Montreal, QC, Canada*

Purpose: The coronavirus disease 2019 (COVID-19) pandemic significantly impacted the field of transplantation across Canada. In this study, we outline the implications of COVID-19 related interruptions in kidney transplant activities to Canadian end-stage renal disease (ESRD) patients.

Methods: We used an adapted Markov microsimulation model with a 10-year horizon and an ESRD patient perspective to study the effectiveness (patient survival in months) of living (LD) or deceased donor (DD) transplantation vs. halting transplantation for the course of the pandemic. We conducted base case, scenario, and sensitivity analyses to illustrate the impact of patient and donor characteristics as well as SARS-CoV-2 infection rates and pandemic length on the preferred strategy.

Results: The base case analysis suggested that LD offered greater effectiveness (99.18 months, 95% CI 98.32-100.04) in comparison to delaying LD and remaining on dialysis for the duration of the pandemic (95.7 months (95% CI 94.80-96.6)). In contrast, DD offered effectiveness of 95.4 months (95% CI 94.50-96.30) in comparison to 94.3 months (95% CI 93.38-95.22) when experiencing interruptions in DD transplant activities for the duration of the pandemic. Infection incidence greater than 1.4% over 5-months, shorter periods of interruptions in transplant activities, younger candidates, delayed pre-emptive transplants and transplantation of donors with higher Kidney Donor Risk Index scores made the DD strategy comparable to delaying transplant activities.

Conclusions: Cessation of transplant activity during the COVID-19 pandemic appears to be detrimental to long-term survival of ESRD patients, contributes to organ discard, and worsens the everlasting gap between organ supply and demand.

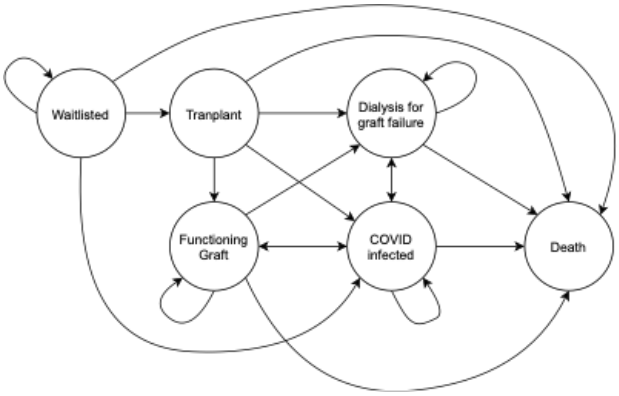
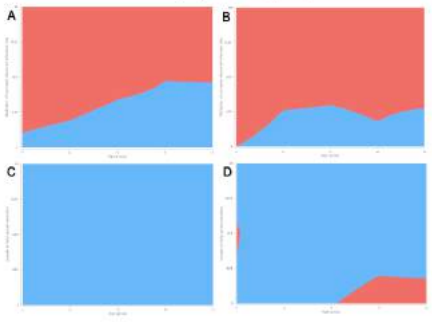


Figure 2. Two-way sensitivity analysis, Preferred Strategy as a function of SARS-CoV-2 Infection Rate and COVID-19 Pandemic Length by Candidate Age Groups



A: Multiplier of currently observed infection rates vs age group in LD (red) vs. "Hold LD" (blue) strategy; B: Multiplier of currently observed infection rates vs age group in DD (red) vs. "Hold DD" (blue) strategy; C: Length of hold period in months vs candidate's age group in LD (red) vs "Hold LD" (blue); D: Length of hold period in months vs candidate's age group in DD (red) vs "Hold DD" (blue) Abbreviations: DD: deceased donor; LD: living donor.

CITATION INFORMATION: Yanev I., Gagnon M., Cheng M., Paraskevas S., Kumar D., Dragomir A., Sapir-Pichhadze R. Kidney Transplantation in Times of Covid-19 - Decision Analysis in the Canadian Context *AJT, Volume 21 Supplement 3*

DISCLOSURES: I. Yanev: None. **M. Gagnon:** None. **M. Cheng:** None. **S. Paraskevas:** None. **D. Kumar:** None. **A. Dragomir:** None. **R. Sapir-Pichhadze:** None.

Abstract# LB 53

Influence of Vitamin D Status on the Prognosis of Covid 19 in Patients with Kidney Transplant

J. Ugalde-Altamirano, I. Revuelta, A. Carrillo, M. Xipell, F. Cofan, N. Esforzado, E. Montagud, G. Piñeiro, A. Molina, P. Ventura, D. Cucchiari, F. Oppenheimer, F. Diekmann, J. Campistol, B. Bayes, J. Torregrosa, *Nephrology, Hospital Clinic de Barcelona, Barcelona, Spain*

Purpose: The protective role of Vitamin D as an immunomodulator has been demonstrated in different pathologies included the viral etiology. This effect has been described by different mechanisms among these acting as an immunoprotein inducer, participates in growth and cell differentiation and acts as a mediator of apoptosis. Some evidence suggests that it could influence the SARS-COV 2 infection and its prognosis. Kidney transplant (KT) patients are more susceptible to 25 (OH) VitD (Calcidiol) deficiencies. The purpose of this study is to evaluate the Vitamin D status in transplant patients who have been diagnosed with COVID-19 and its possible correlation with prognosis.

Methods: It is an observational, retrospective, cross-sectional and descriptive study that includes kidney transplant patients diagnosed with COVID-19 and with serum 25 (OH) Vit D

Results: 79 patients were evaluated. The mean age was 58 years, 60.8% were men. 86% were KT, 11% were simultaneous pancreas and kidney transplant (SPK). 39 (48%) presented neumonia, 22 (28%)flu-like syndrom. 14 (17%) asymtomatic and 2(2,5%) fever. From this patients 39,2% had not changes in the antiinflamatorie therapy, 20.3%, required increased dose of corticosteroids, and 30.4% required methylprednisolone bolus or initiation of anti-interleukin therapy. The mean of Vit D was 21.41+/- 11% we found that 52% has Vit D <20 ng/ dl. 25% between 20 -30 ng / dl and 21,51% > 30 ng / dl

In 32 patientes who required intensification of treatment we found that 73% had Vit D levels <20 ng. 11 patients need an citical care unit, of these 62.5% had levels below <20 ng / dl. There were 12 deaths. 66% of deaths had vitamin D values <20 ng / dl.

Conclusions: We were able to observe that vitamin D levels could influence in the prognosis of SARS-COV 2 infection.

Vitamin D deficiency was found in a high percentage of transplant patients with COVID 19. Low levels of 25 OH Vit D were evidenced in patients who required greater intensification of antiinflamatory treatment and in deaths.

CITATION INFORMATION: Ugalde-Altamirano J., Revuelta I., Carrillo A., Xipell M., Cofan F., Esforzado N., Montagud E., Piñeiro G., Molina A., Ventura P., Cucchiari D., Oppenheimer F., Diekmann F., Campistol J., Bayes B., Torregrosa J. Influence of Vitamin D Status on the Prognosis of Covid 19 in Patients with Kidney Transplant *AJT, Volume 21 Supplement 3*

DISCLOSURES: J. Ugalde-Altamirano: None. **I. Revuelta:** None. **A. Carrillo:** None. **M. Xipell:** None. **F. Cofan:** None. **N. Esforzado:** None. **E. Montagud:** None. **G. Piñeiro:** None. **A. Molina:** None. **P. Ventura:** None. **D. Cucchiari:** None. **F. Oppenheimer:** None. **F. Diekmann:** None. **J. Campistol:** None. **B. Bayes:** None. **J. Torregrosa:** None.

Abstract# LB 54

Short Term Outcomes in Previously Covid Positive Living Kidney Donors and Their Recipients

R. Prashar, N. J. Khoury, M. Ramesh, A. K. Patel, *Henry Ford Transplant Institute, Detroit, MI*

Purpose: Study short term outcomes of living kidney donors (LKD) who were previously infected with COVID 19, and in their recipients.

Methods: After a brief hiatus due to COVID March-May 2020, 33 living donor transplants have been performed at our center so far. Of these, we identified 3 consecutive LKD who were diagnosed with COVID prior to transplant. We collected retrospective data on clinical characteristics for these donors, and recipients of these previously infected donors. They were approved after meeting institutional requirements of resolution of COVID. Donors and recipients were required to have a negative Nasopharyngeal testing by NAT for SARS-CoV-2, 28 days post symptom resolution, and a repeat negative test 48 hours prior to transplant.

Results: Table 1 shows demographics, severity of COVID, timing of donation and post-donation course of the 3 LKD .

Patient No	Age at donation (years)	Gender	Race	Severity of COVID	Days post COVID diagnosis , when patient donated	Pre-donation eGFR (CKD-EPI using creatinine) (ml/min/1.73m^2)	Post-donation complications	Post-donation eGFR at 2 weeks (CKD-EPI using creatinine) (ml/min/1.73m^2)
D#1	22	Male	Middle Eastern	Mild	72	134	None	91
D#2	52	Female	Middle Eastern	Mild	50	105	Incidental finding of IgAN on post perfusion biopsy	58
D#3	22	Female	White	Mild	47	123	None	80

Mean time to donation from COVID diagnosis was 56 days. All had mild disease with no hospitalization. None had hematuria or proteinuria prior to donation. Post donation course was uncomplicated in all, with expected initial decline in GFR. In one (D#2), post-perfusion biopsy showed an incidental finding of IgA nephropathy (Oxford Classification 0). There were no viral particles on electron microscopy. There was patchy podocyte foot process effacement, believed to be from recurrence of FSGS in recipient(R#2). Clinical characteristics and post-transplant course of recipients of these LKD are shown in

Patient No	Age at donation (years)	Gender	Race	Severity of COVID	Days post COVID diagnosis , when patient donated	Pre-donation eGFR (CKD-EPI using creatinine) (ml/min/1.73m^2)	Post-donation complications	Post-donation eGFR at 2 weeks (CKD-EPI using creatinine) (ml/min/1.73m^2)
D#1	22	Male	Middle Eastern	Mild	72	134	None	91
D#2	52	Female	Middle Eastern	Mild	50	105	Incidental finding of IgAN on post perfusion biopsy	58
D#3	22	Female	White	Mild	47	123	None	80

One patient (R#1), previously had COVID. Post-transplant course was uneventful in 2 recipients. One (R#2) developed recurrence of FSGS immediately post-transplant. Her course was further complicated by COVID on post-op day 7, moderate in severity, managed by reduction in immunosuppression, bamlanivimab, steroids & remdesivir. While the exact exposure for this patient is yet to be determined, she appears to have contracted it from the community.

Conclusions: LKD with previously resolved COVID appear to have an uncomplicated immediate post-donation course. Recipients of LKD with resolved COVID tend to do well. Questions remain regarding optimal timing of donation and transplant after COVID resolution, to minimize risk of SARS-CoV2 transmission through tissue, even with negative nasopharyngeal PCR

CITATION INFORMATION: Prashar R., Khoury N., Ramesh M., Patel A. Short Term Outcomes in Previously Covid Positive Living Kidney Donors and Their Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: R. Prashar: None. **N.J. Khoury:** None. **M. Ramesh:** None. **A.K. Patel:** None.

Abstract# LB 55

Elevated Tacrolimus Levels in Hospitalized Organ Transplant Recipients with COVID-19

K. Mecadon[1], A. Hardesty[2], K. Vieira[3], R. Rogers[3], B. Merhi[4], A. J. Osband[5], G. Bayliss[4], R. Gohh[4], P. Morrissey[5], D. Farmakiotis[3], *[1]Department of Pharmacy, Rhode Island Hospital, Providence, RI, [2]Department of Internal Medicine, Residency, Warren Alpert Medical School of Brown University, Providence, RI, [3]Division of Infectious Diseases, Warren Alpert Medical School of Brown University, Providence, RI, [4]Division of Nephrology, Warren Alpert Medical School of Brown University, Providence, RI, [5]Department of Surgery (Transplantation), Warren Alpert Medical School of Brown University, Providence, RI*

Purpose: The effect of COVID-19 on immunosuppressant drug levels in organ transplant recipients (OTRs) has not been adequately studied.

Methods: We retrospectively studied hospitalized adult (>18-year-old) OTRs with COVID-19, who were receiving tacrolimus and were hospitalized between 3/1 and 12/16/2020. Categorical data were compared by Fisher's exact test, and continuous by the Mann-Whitney and Wilcoxon rank sum tests for unrelated or paired samples, respectively.

Results: We studied 30 OTRs. 67% were men, 90% had a kidney transplant. Two were heart transplant and one small intestine transplant recipients. Median age was 60.5 (range 21-84) years, median time from transplant 36 (range: 1-224) months. Tacrolimus troughs were significantly higher on admission for COVID-19 than baseline (average trough in the 6 months prior): median 11.5 vs. 7.4 ng/mL, P=0.001; Fig. 1. Patients with diarrhea had higher tacrolimus trough levels, compared to those without diarrhea (P=0.09). We found no significant association between tacrolimus trough and acute kidney injury or bacterial infections. Compared to OTRs with tacrolimus trough <10 ng/mL, those with trough >10 ng/mL were more likely to have elevated aspartate aminotransferase (AST) on admission (P=0.01, Fig. 2) and require supplemental oxygen during hospital admission (P=0.026, Fig. 1: black lines represent OTR requiring supplemental oxygen).

Conclusions: Tacrolimus trough levels were substantially elevated in most OTRs with COVID-19 at the time of hospital admission, compared to baseline. In OTRs with COVID-19, including outpatients, immunosuppressant drug levels should be closely followed; management of immunosuppression should be individualized.

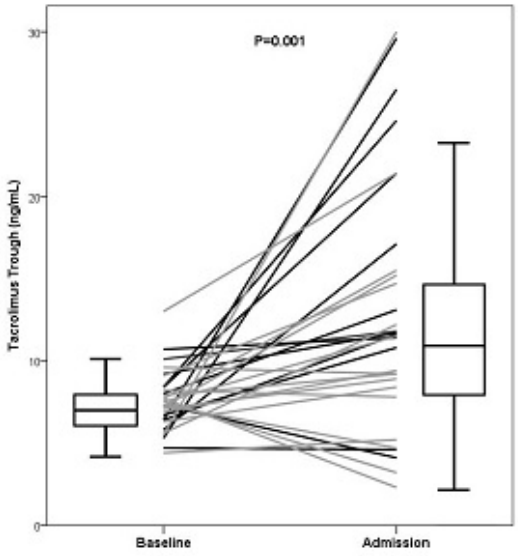


Figure 1.

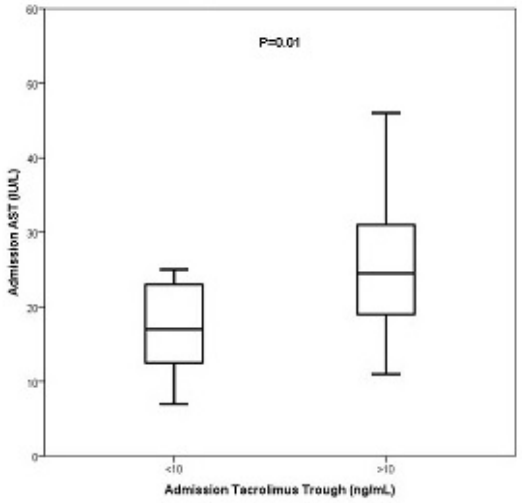


Figure 2.

CITATION INFORMATION: Mecadon K., Hardesty A., Vieira K., Rogers R., Merhi B., Osband A., Bayliss G., Gohh R., Morrissey P., Farmakiotis D. Elevated Tacrolimus Levels in Hospitalized Organ Transplant Recipients with COVID-19 *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Mecadon: None. **A. Hardesty:** None. **K. Vieira:** None. **R. Rogers:** None. **B. Merhi:** None. **A.J. Osband:** None. **G. Bayliss:** None. **R. Gohh:** None. **P. Morrissey:** None. **D. Farmakiotis:** Consulting Fee; Name of Commercial Interest; Viracor. Grant/Research Support; Name of Commercial Interest; Merck. Grant/Research Support; Nature of Relationship; Astellas. Grant/Research Support; If "Other" Please Explain; Viracor.

Abstract# LB 56

Monoclonal Antibodies for Covid-19 in Patients with Solid Organ Transplant Recipients

L. Hasan[1], H. Hardgrave[2], T. Osborn[3], R. Dare[1], L. Burdine[4], E. Giorgakis[4], J. Rico[1], *[1]Internal Medicine, University of Arkansas for Medical Sciences, Little Rock, AR, [2]University of Arkansas for Medical Sciences, Little Rock, AR, [3]Surgery, University of Arkansas for Medical Sciences, Little Rock, AR, [4]Transplant surgery, University of Arkansas for Medical Sciences, Little Rock, AR*

Purpose: The FDA has issued Emergency Use Authorization (EUA) for monoclonal antibodies for the treatment of mild to moderate COVID-19 in patients at risk for progressing to severe disease. The authorized use includes treatment for patients with suppressed immune system (1,2). To our knowledge, there are no reports in the literature of Solid Organ Transplant Recipients receiving outpatient monoclonal antibodies for the treatment of mild to moderate COVID-19. We predict that SARS-CoV2 neutralizing antibodies infusion would help reduce hospital admissions and complications from SARS-CoV2 infection in this population.

Methods: In this retrospective descriptive study, we identified patients with kidney and/or liver transplant who were diagnosed with SARS-CoV2 infection in the outpatient setting with mild symptoms at the time of diagnosis and agreed to receive one of the two products available. 17 total patients were identified and followed by clinic visits or phone calls. Follow-up assessment included complications from Bamlanivimab infusion, resolution or progression of symptoms, hospitalizations, and outcome. The assessment was conducted at time of presentation and at least three weeks later.

Results: Out of the 17 patients, 14 had kidney transplant, 2 had liver and only one had both. Eleven patients received monoclonal antibodies within 10 days of symptom onset, 3 received it beyond 10 days of symptom onset and 3 patients had an unknown duration of symptoms before infusion. Three out of 17 patients (17%) experienced side effects after infusion including fever, myalgia, generalized weakness and pruritus. There were no serious adverse events. Four patients were hospitalized with a mean length of stay of 3.75 days (1-7 days). There were no ICU admissions. All 17 patients were alive at 3-week follow up.

Conclusions: Infusion of monoclonal antibodies for the treatment of mild to moderate Covid-19 was a safe strategy for Solid Organ Transplant Recipients, reducing hospitalizations and mortality from SARS-CoV2 infections in such high-risk population.

CITATION INFORMATION: Hasan L., Hardgrave H., Osborn T., Dare R., Burdine L., Giorgakis E., Rico J. Monoclonal Antibodies for Covid-19 in Patients with Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: L. Hasan: None. **H. Hardgrave:** None. **T. Osborn:** None. **R. Dare:** None. **L. Burdine:** None. **E. Giorgakis:** None. **J. Rico:** None.

Abstract# LB 57

Covid-19 in Renal Transplant Recipients: Experience of Lithuania

M. Miglinas[1], M. M. Janušaitė[2], E. Ašakienė[2], L. Vareikienė[2], *[1]Nephrology, Vilnius University Santaros Klinikos, Vilnius, Lithuania, [2]Nephrology, Vilnius University Santaros clinics, Vilnius, Lithuania*

Purpose: Renal transplant recipients are at increased susceptibility to many viral infections, including coronavirus disease 2019 (COVID-19). The purpose of this review is to define the effect of COVID-19 infection on Lithuanian patients after kidney transplantation.

Methods: We enrolled patients who underwent kidney transplantation and were diagnosed with COVID-19 infection before January 24th, 2021. Patients were prospectively monitored. Clinical features, management and outcomes were recorded.

Results: We report on 53 cases of COVID-19 infection in kidney transplant recipients (median age 51 (range 29-75), 53 % females, from a 661 follow-up patients after renal transplantation) in 4 Lithuanian hospitals. Most common symptoms included febrile fever, cough and dyspnea. 55 % patients required hospitalization. Chest x-ray showed both sided infiltration in 63 % of patients, 55 % required supplemental oxygen, 6.8 % needed mechanical ventilation or extracorporeal membrane oxygenation (ECMO). Immunosuppression was changed to Hydrocortisone in 35 %. Remdesivir was administered to 23 % of hospitalized patients, 30.7 % were treated with Dexamethasone. 31 % were admitted to an intensive care unit (ICU) after an average of 3 days after hospitalization. Even though 27 % of the hospitalized patients required kidney replacement therapy, no patients lost their allografts. Overall mortality was 27 %. At an average of 3.6 months post-diagnosis - 76 % of patients tested positive for anti-spike IgG SARS-CoV-2 antibodies.

Conclusions: The data of COVID-19 infection in Lithuania was similar to that reported in the general population. A standard treatment and strategy of immunosuppression adjustment was applied, with 27% mortality among kidney transplant recipients hospitalized with COVID-19 infection. 76 % of patients tested positive for anti-spike IgG SARS-CoV-2 antibodies after 3.6 months post-diagnosis.

CITATION INFORMATION: Miglinas M., Janušaitė M., Ašakienė E., Vareikienė L. Covid-19 in Renal Transplant Recipients: Experience of Lithuania *AJT, Volume 21 Supplement 3*

DISCLOSURES: M. Miglinas: None. **M.M. Janušaitė:** None. **E. Ašakienė:** None. **L. Vareikienė:** None.

Abstract# LB 58

Nurse and Nurse Practitioner-lead Monoclonal Antibody Initiative for Solid Organ Transplant (sot) Recipients with Covid-19

W. Cochran[1], R. Avery[2], D. Brennan[2], N. Lawrence[2], A. Brown[2], S. Sullivan[2], B. Adams[2], M. McCarthy[2], S. Ellis[2], F. Naqvi[2], E. Kraus[2], N. Alachkar[2], S. Alasfar[2], F. Al Ammary[2], J. Horn[2], L. Hartman[2], L. Fessler[2], S. Purekal[2], Z. Siddiqui[2], D. Carter[2], J. Ficke[2], M. Kantsiper[2], L. Boyer[2], I. Gupta[2], A. Gurakar[2], D. Ostrander[2], J. Langlee[2], S. Shoham[2], K. Marr[2], P. Shah[2], *[1]Johns Hopkins Comprehensive Transplant Center, Baltimore, MD, [2]Johns Hopkins, Baltimore, MD*

Purpose: Monoclonal antibody (mAB) infusion (bamlanivimab or casirivimab/imdevimab) for symptomatic, non-hypoxemic, high-risk outpatients with COVID-19 infection, is an available early intervention for COVID-19+ SOT recipients. We aimed to assess efficiency in time from diagnosis to treatment, and outcomes in a retrospective cohort of SOT recipients with COVID-19 who received mAB.

Methods: We developed a Nurse Coordinator-led initiative to screen, refer, and facilitate mAB infusion for COVID-19+ SOT recipients within 10 days of symptom onset. SOT recipients received electronic messaging to promptly report potential COVID-19 symptoms to the transplant team. Data were collected on time from symptom onset to diagnosis, mAB infusion, and follow-up > 21 days, and hospital admissions, disease severity, mortality, and rejection.

Results: 34 out of 36 referred SOT recipients with symptomatic COVID-19 disease without hypoxia received mAB therapy (3 heart, 8 lung, 16 kidney, 2 Liver-Kidney, 2 Pancreas-Kidney, 3 Kidney-Heart). Median time from symptom onset to diagnosis was 2 days and from date of diagnosis to mAB infusion was 4 days. Of those 34, 88% did not require hospitalization and recovered uneventfully. 12% required hospitalization for COVID disease progression, two on the same day as mAB infusion, and the other 2, more than 26 days post infusion. Of these, 2 patients had mild-moderate hypoxia, and 2 had critical disease. Only 1 patient died from COVID-19 complications and no episodes of rejection or graft loss were observed.

Conclusions: The Nurse Coordinator-led initiative efficiently facilitated mAB therapy for COVID-19+ SOT recipients and was associated with excellent outcomes. Compared to prior published COVID-19 outcomes in SOT recipients, patients who received mAB may have reduce hospitalization and low mortality. As mAB therapy may be underutilized in the general population, these results support efforts to educate transplant centers to implement efficient interventions for the screening and referral of COVID+ SOT recipients for mAB therapy.

CITATION INFORMATION: Cochran W., Avery R., Brennan D., Lawrence N., Brown A., Sullivan S., Adams B., McCarthy M., Ellis S., Naqvi F., Kraus E., Alachkar N., Alasfar S., Al Ammary F., Horn J., Hartman L., Fessler L., Purekal S., Siddiqui Z., Carter D., Ficke J., Kantsiper M., Boyer L., Gupta I., Gurakar A., Ostrander D., Langlee J., Shoham S., Marr K., Shah P. Nurse and Nurse Practitioner-lead Monoclonal Antibody Initiative for Solid Organ Transplant (sot) Recipients with Covid-19 *AJT, Volume 21 Supplement 3*

DISCLOSURES: W. Cochran: None. **R. Avery:** None. **D. Brennan:** None. **N. Lawrence:** None. **A. Brown:** None. **S. Sullivan:** None. **B. Adams:** None. **M. McCarthy:** None. **S. Ellis:** None. **F. Naqvi:** None. **E. Kraus:** None. **N. Alachkar:** None. **S. Alasfar:** None. **F. Al Ammary:** None. **J. Horn:** None. **L. Hartman:** None. **L. Fessler:** None. **S. Purekal:** None. **Z. Siddiqui:** None. **D. Carter:** None. **J. Ficke:** None. **M. Kantsiper:** None. **L. Boyer:** None. **I. Gupta:** None. **A. Gurakar:** None. **D. Ostrander:** None. **J. Langlee:** None. **S. Shoham:** Consulting Fee; Name of Commercial Interest; Acidophil, Amplyx, Jannssen, Reviral. Grant/Research Support; Name of Commercial Interest; Ansun, Astellas, Cidara, F2G, Merck, T2, Shire, Shionogi, Gilead. Honoraria; Name of Commercial Interest; Intermountain Health, Karyopharm, Immunome, Celtrion, Adagio. **K. Marr:** None. **P. Shah:** None.

Abstract# LB 59

Impact of Covid-19 Infection on Tacrolimus Levels in Solid Organ Transplant Recipients

K. Heagler, K. Tejani, S. Sanchez, *Loyola University Medical Center, Maywood, IL*

Purpose: Immunocompromised patients are considered to be at high-risk for infection with SARS-CoV-2 (COVID-19). There have been observations within the transplant community that patients infected with COVID-19 have increased tacrolimus trough levels. A common presenting symptom of COVID-19 is diarrhea, which is a risk factor for increased tacrolimus levels. COVID-19 treatment often includes remdesivir, a weak CYP3A4 inhibitor that may also lead to increased tacrolimus levels. The study purpose was to determine the effect of COVID-19 infection and associated treatments on tacrolimus levels.

Methods: This retrospective chart review evaluated all solid organ transplant recipients admitted inpatient to the study institution within 14 days of a positive COVID-19 PCR test. Patients were excluded if they were treated outpatient, were not on tacrolimus, or were initially treated at an outside hospital. Patients were considered to have a clinically significant increased tacrolimus trough level if their admission level was 20% or greater than their baseline. Baseline levels were defined as the most recent trough level on a consistent dose per pharmacist clinical judgement. A logistic regression was performed to evaluate potential risk factors for elevated levels.

Results: A total of 55 patients met inclusion criteria from March 1, 2020 to December 26, 2020. Baseline characteristics are listed in Table 1. The majority of patients were male (67.3%), kidney transplant recipients (63.6%), and Hispanic ethnicity (41.8%). A clinically significant increase from baseline was observed in 47.3% of patients on admission. When comparing baseline level to peak trough level, 72.7% of patients had a clinically significant increase (Table 2). Transplant type, tacrolimus formulation, presence of diarrhea, and treatment with remdesivir were not associated with increased tacrolimus trough levels.

Conclusions: In transplant patients admitted with COVID-19, 43.7% of patients and 72.7% had increased trough levels on admission and peak trough levels greater than 20% of baseline, respectively. Potential risk factors for elevated levels, including presence of diarrhea and treatment with remdesivir, did not significantly increase the risk of elevated tacrolimus levels. These findings suggest that infection with COVID-19 may be an independent risk factor for increased tacrolimus levels, but will require further investigation to determine the full effect. Increased tacrolimus trough level monitoring should be considered in solid organ transplant recipients infected with COVID-19 to avoid toxicities associated with supratherapeutic levels.

Table 1

Baseline Characteristics (N = 55)	
Male gender – n (%)	37 (67.3)
Kidney transplant recipient – n (%)	34 (63.6)
Hispanic ethnicity – n (%)	23 (41.8)
Tacrolimus IR formulation – n (%)	41 (76.4)
Age at time of infection, year [median (IQR)]	63.7 (49.9 – 68.9)
Time from transplant, year [median (IQR)]	3.3 (0.8 – 6.0)
Presence of diarrhea – n (%)	16 (29)
Treatment with remdesivir – n (%)	23 (41.8)
Treatment in ICU – n (%)	15 (27.3)

Table 2

Results (N = 55)	
BL TAC level (ng/dL), mean (± SD)	6.5 (± 5.9)
AD TAC level (ng/dL), median (IQR)	6.9 (4.8 – 10.5)
PK TAC level (ng/dL), median (IQR)	10.5 (8 – 14)
Increase in level from BL to AD, % [median (IQR)]	9.6 (-32 – 79.8)
Increase in level from BL to PK, % [median (IQR)]	61.8 (16.7 – 165.1)
Clinically significant increased level on AD – n (%)	26 (47.3)
Clinically significant increased PK level – n (%)	40 (72.7)

Abbreviations: BL, baseline; TAC, tacrolimus; AD, admission; PK, peak

CITATION INFORMATION: Heagler K., Tejani K., Sanchez S. Impact of Covid-19 Infection on Tacrolimus Levels in Solid Organ Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: K. Heagler: None. **K. Tejani:** None. **S. Sanchez:** None.

Abstract# LB 60

Bamlanivimab for Covid-19 in Kidney Transplant Patients

M. Y. Jan, S. El-Sayegh, M. S. Yaqub, D. P. Mishler, O. Adebiyi, M. D. Anderson, T. E. Taber, A. Sharfuddin, *Nephrology, Indiana University School of Medicine, Indianapolis, IN*

Purpose: Treatment options for patients with COVID 19 have limited efficacy in reducing severity and duration of viral symptoms as well as progression to severe disease. Bamlanivimab(LY-CoV555) received Emergency Use authorization (EUA) by the FDA on November 9,2020 for non-hospitalized COVID 19 patients with mild to moderate illness who are considered high risk for progression to severe COVID 19 or to require hospitalization such as those on chronic immunosuppression therapy post-transplant. In this study we review its use among patients with kidney transplant.

Methods: 24 patients who tested positive for COVID 19 with nasopharyngeal PCR between November 9, 2020 and February 7, 2021 were retrospectively reviewed and analyzed. Labs, clinical course and communication with transplant team was reviewed. FDA approved standardized infusion dose was used.

Results: Average age of recipients was 57.5 +/- 11.8 years. Hypertension was most common co-morbidity in 17/24 patients followed by Diabetes Mellitus in 10/24. 3 patients had combined Pancreas Transplant, 1 combined-heart and 1combined- Liver. 3/24(12.5%) patients required hospitalization, and supplemental oxygen, while 1 patient required mechanical ventilation and died. Dialysis therapy for acute kidney injury was required in 1 patient. Majority of patients 14/24 were on Tacrolimus and Mycophenolic acid. 13/24 had no change to their immunosuppression after COVID diagnosis while 7/24 had mycophenolic acid decreased to half or lower and in 4 cases it was held temporarily. 1 patient each reported headache, elevated blood pressure after infusion. Among the 3 patients who were hospitalized 1 patient each was diagnosed with Aspergillosis and Histoplasmosis. Results summarized in Table 1.Table 1. Characteristics and outcomes among patients receiving Bamlanivimab, n=24

Age	57.5 +/- 11.8 Years						
Gender	Male 58.3% Female 41.7%						
Race:	Caucasian 83.3%, African American 12.5%, Hispanic 4.2%						
Type of Transplant:	LDKT 41.7%, DDKT 58.3%						
Co-Morbidities:	Hypertension 75%, Diabetes Mellitus (I and II) 41.7%%, Coronary Artery Disease 16.7%						
Time from kidney transplant to COVID 19	2828 +/- 2893 (mean) days, Median 1790 (19-11885) days						
IS Regimen Pre COVID	tac/mpa 58.3% (n=14)	tac/mpa/prednisone 16.7% (n=4)	tac/sirolimus 8.3% (n=2)	cyc/mpa/Prednisone 8.3% (n=2)			
IS Regimen Post COVID	No change in IS 54.2% (n=13)	Decrease mpa by ½ or lower 29.2% (n=7)	Hold mpa 16.7% (n=4)				
Time from COVID diagnosis to mab	2.25 (mean)+/- 2.1 days	1 (median) (1-9) days					
Hospitalizations	3	Supplemental Oxygen 3/3	ICU Admissions 2/3	Ventilator 1	Mortality 1		
AKI	3	AKI requiring RRT	1				
Dexamethasone	16.7% (n=4)	Remdesivir 8.3% (n=2)	Convalescent Plasma 1/24 4.2% (n=1)				
Common Symptoms	Cough 29.2%	Fatigue 29.2%	Fever 20.8%	SOB 20.8%	Headache 16.7%	Loss of taste/smell 12.5%	Asymptomatic 16.7%

Living Donor Kidney Transplant, DDKT Deceased Donor Kidney Transplant, MPA mycophenolic acid, IS Immunosuppression, Tac. Tacrolimus, Cyc. Cyclosporin, RRT Renal Replacement Therapy, mab. monoclonal antibody

Conclusions: To our knowledge this is the first report describing the use of Bamlanivimab in patients with Kidney Transplants. It showed a beneficial effect in immunosuppressed patients with mild to moderate COVID 19 symptoms with majority avoiding hospitalization. It appears to be well tolerated with no significant major adverse effects or allergic reactions in our cohort. Further large scale studies are needed to evaluate its impact on symptom duration and decrease in severity of COVID 19 among patients on immunosuppression for kidney transplant.

CITATION INFORMATION: Jan M., El-Sayegh S., Yaqub M., Mishler D., Adebiyi O., Anderson M., Taber T., Sharfuddin A. Bamlanivimab for Covid-19 in Kidney Transplant Patients *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.Y. Jan: None. **S. El-Sayegh:** None. **M.S. Yaqub:** None. **D.P. Mishler:** None. **O. Adebiyi:** None. **M.D. Anderson:** None. **T.E. Taber:** None. **A. Sharfuddin:** None.

Abstract# LB 61

Impact of a "COVID-free" Pathway on Living Donor Transplantation During a Pandemic

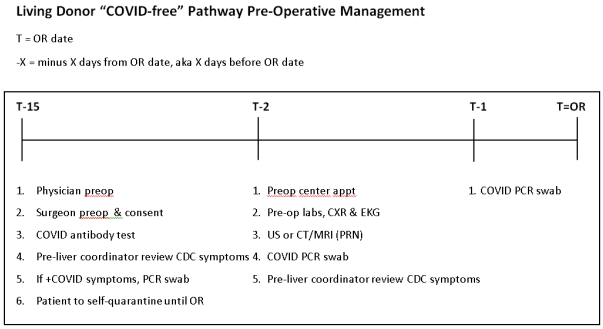
S. Koganti, Y. Cheah, C. J. Simon, M. Tobon Lascano, J. Kim, M. E. Akoad, *Lahey Hospital & Medical Center, Burlington, MA*

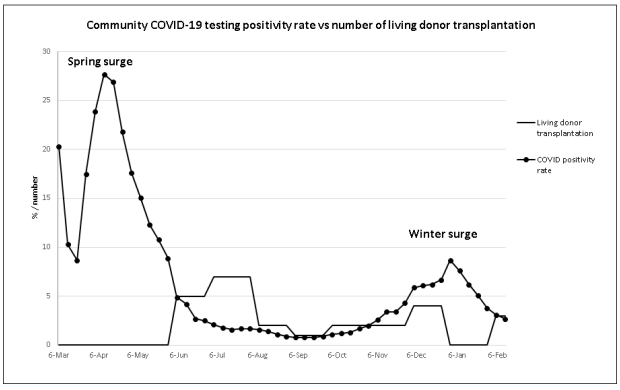
Purpose: COVID-19 pandemic has significantly decreased rates of organ transplantation, with most programs curtailing living donor transplantations. This has led to an increase in waitlist deaths. We implemented a "COVID-free" pathway to minimize the risk of COVID infection in living donors and recipients to enable resumption of living donor transplantation.

Methods: The pathway consisted of a three-tier testing, quarantine and screening strategy (fig1). Most outpatient appointments were changed to televisits. Inpatients were roomed in units that do not have COVID patients. Rationale for the pathway was based on available data on the transmissibility dynamics of SARS-CoV-2 virus. We prospectively analyzed the impact of the pathway implementation on the number of living donor liver and kidney transplantation and its relationship to community 7-day COVID testing positivity rate, and COVID-related outcomes.

Results: A total of 54 patients (28 living donors and 26 living donor recipients) entered the COVID-free pathway from April 2020 until February 2021. Unsuspected asymptomatic COVID infection was detected in a living donor and kidney recipient pair (spouses) using our testing protocol which led to a postponement of their procedures. The rest of the living donor and recipient procedures proceeded as scheduled. None of the donors or recipients became infected with COVID during their hospitalization. One of the living donor liver recipients contracted COVID after discharge. The postponed pair who tested positive tested negative 2 months later with appropriate seroconversion and underwent uneventful donor nephrectomy and kidney transplantation. The rate of living donor transplantation was inversely related to the local COVID-19 positivity rate (fig2).

Conclusions: Our "COVID-free" pathway was useful in avoiding surgery in unsuspected infected living donor and their recipients. The comprehensive pathway allowed us to resume living donor transplant activity during the pandemic, though does not completely protect our patients after discharge.





CITATION INFORMATION: Koganti S., Cheah Y., Simon C., Tobon Lascano M., Kim J., Akoad M. Impact of a "COVID-free" Pathway on Living Donor Transplantation During a Pandemic *AJT, Volume 21 Supplement 3*

DISCLOSURES: S. Koganti: None. **Y. Cheah:** Consulting Fee; Name of Commercial Interest; Integra Lifesciences Cooperation. Consulting Fee; Nature of Relationship; Animal Lab consultant. **C.J. Simon:** None. **M. Tobon Lascano:** None. **J. Kim:** None. **M.E. Akoad:** None.

Abstract# LB 62

Quantification of Multiple Isotypes of Anti-SARS-CoV-2 Antibodies in Kidney Transplant Recipients

J. S. Maltzman[1], L. Wang[1], P. Ahearn[1], T. Yalamarti[1], M. Menon[2], Y. Azzi[3], M. Melcher[1], M. Fernandez-Vina[1], R. Bray[4], H. Gebel[4], E. Woodle[5], E. Akalin[3], A. Girnita[1], P. Cravedi[2], *[1]Stanford University, Palo Alto, CA, [2]Icahn School of Medicine, NYC, NY, [3]Einstein School of Medicine, NYC, NY, [4]Emory University, Atlanta, GA, [5]University of Cincinnati, Cincinnati, OH*

Purpose: Solid organ transplant recipients are at increased risk of severe outcomes with infection by SARS-CoV-2, the etiologic agent of COVID-19. Antibodies directed against the virus are thought to offer protection and monoclonal antibodies directed against the virus have been used therapeutically. However, a thorough characterization of anti-SARS-CoV2 immune globulin isotypes in organ transplant recipients has not been reported.

Methods: Using a semi-quantitative Luminex-based multiplex assay, we determined antibody levels from 48 SARS-CoV-2 PCR+ hospitalized kidney transplant recipients. We measured total IgG, IgM, IgA and IgG subtypes of antibodies directed against 5 distinct viral epitopes including the nucleocapsid protein as well as multiple regions of the spike protein including the receptor binding domain.

Results: We identified multiple patterns of antibody responses. Specifically, 5 subjects were seronegative and 29 subjects had IgM, IgG and IgA antibodies specific for multiple epitopes of SARS-CoV-2. The 14 remaining subjects displayed a mixture of immunoglobulin isotypes. Of three subjects indeterminant for IgG antibodies, two had developed IgM, suggesting that they were early in the course of their immune response. Longitudinal samples from one subject demonstrated dynamic changes from IgM^+IgG^+ --> IgM^-IgG^+. Utilizing the semi-quantitative aspect of the assay, we found that IgG antibodies to the full Spike and Spike S1 domains were present at a statistically reduced level compared to immunocompetent controls while those directed against the Spike S2 domain were statistically higher. Interestingly, 77% of these subjects had detectable IgA directed against combinations of spike and/or nucleocapsid specificity. IgG subtype analysis and correlation between antibody expression patterns with clinical severity is under investigation.

Conclusions: Overall, these studies indicate that solid organ transplant recipients have the capacity to mount a dynamic antibody response to SARS-CoV-2 infection and that this response differs from immunocompetent individuals.

CITATION INFORMATION: Maltzman J., Wang L., Ahearn P., Yalamarti T., Menon M., Azzi Y., Melcher M., Fernandez-Vina M., Bray R., Gebel H., Woodle E., Akalin E., Girnita A., Cravedi P. Quantification of Multiple Isotypes of Anti-SARS-CoV-2 Antibodies in Kidney Transplant Recipients *AJT, Volume 21 Supplement 3*

DISCLOSURES: J.S. Maltzman: None. **L. Wang:** None. **P. Ahearn:** None. **T. Yalamarti:** None. **M. Menon:** None. **Y. Azzi:** None. **M. Melcher:** None. **M. Fernandez-Vina:** None. **R. Bray:** None. **H. Gebel:** None. **E. Woodle:** None. **E. Akalin:** None. **A. Girnita:** None. **P. Cravedi:** None.

Abstract# LB 63

Donor-specific Anti-HLA Alloantibody in Kidney Transplant Recipients with COVID-19 Exhibit a Different Immunoglobulin Class and Subclass Profile When Compared to Anti-SARS-CoV-2 Antibodies

A. Girnita[1], L. Wang[1], M. Fernandez-Vina[1], E. Woodle[2], P. Ahearn[1], T. Yalamarti[1], M. Menon[3], Y. Azzi[4], M. Melcher[1], R. Bray[5], H. Gebel[5], E. Akalin[4], P. Cravedi[3], J. S. Maltzman[1], *[1]Stanford University, Palo Alto, CA, [2]University of Cincinnati, Cincinnati, OH, [3]Icahn School of Medicine, NYC, NY, [4]Einstein School of Medicine, NYC, NY, [5]Emory University, Atlanta, GA*

Purpose: Both anti-HLA and anti-SARS-CoV-2 antibodies target protein antigens. The aim of the present study was to compare the class and subclass profile of such antibodies in a cohort of kidney transplant patients.

Methods: We detected and identified anti-HLA and anti-SARS-CoV-2 antibody in 48 kidney transplant recipients who were hospitalized for SARS-CoV-2 PCR+ infection. Anti-HLA antibodies were detected by single-antigen bead Luminex assay, with IgG class, and IgG1-2-3-4 subclass secondary antibody. Anti-SARS-CoV-2 antibodies were also detected by Luminex assay directed against 5 distinct viral epitopes including the nucleocapsid protein as well as multiple regions of the spike protein. The secondary antibodies addressed total IgG, IgG1-2-3-4, IgM and IgA class/subclasses.

Results: The antibody profile (Table 1) included 12/48 cases of donor-specific anti-HLA antibodies, and 43/48 cases with anti-SARS-CoV2 antibodies. The majority of HLA-specific antibodies targeted HLA-DQ, with a dominant IgG class and an IgG1+IgG2+IgG3 subclass prevalence. However, anti-SARS-CoV2 antibody profile was characterized by increased prevalence of IgM (38/43, 79%) and IgA (41/42, 85%), and a lower prevalence of IgG2.

Conclusions: Overall, these data suggests that kidney transplant recipients with Covid-19 exhibit a humoral immune response both to donor-HLA and SARS-CoV-2. Although both are protein antigens, the allo-immune response has a high-IgG/low IgA pattern, while the Covid-19 antibody profile includes high IgA. Additional follow-up is needed to determine if the increased IgA is a consistent marker of anti-SARS-CoV-2 antibody response.

Patients	N = 48	%
Anti-HLA Antibody	43	90%
DSAs	12	25%
Class II DSA	12	100%
Class I DSA	1	8%
HLA-DR DSA	3	25%
HLA-DQ DSA	9	75%
HLA-DP DSA	2	17%
Total IgG DSA	12	100%
IgG1 DSA	11	92%
IgG2 DSA	6	50%
IgG3 DSA	9	75%
IgG4 DSA	0	0%
Anti-SARS-CoV2 Antibody	43	90%
IgG	42	88%
IgM	38	79%
IgA	41	85%
IgG1	41	85%
IgG2	10	21%
IgG3	33	69%
IgG4	3	6%

CITATION INFORMATION: Girnita A., Wang L., Fernandez-Vina M., Woodle E., Ahearn P., Yalamarti T., Menon M., Azzi Y., Melcher M., Bray R., Gebel H., Akalin E., Cravedi P., Maltzman J. Donor-specific Anti-HLA Alloantibody in Kidney Transplant Recipients with COVID-19 Exhibit a Different Immunoglobulin Class and Subclass Profile When Compared to Anti-SARS-CoV-2 Antibodies *AJT, Volume 21 Supplement 3*

DISCLOSURES: A. Girnita: None. **L. Wang:** None. **M. Fernandez-Vina:** None. **E. Woodle:** None. **P. Ahearn:** None. **T. Yalamarti:** None. **M. Menon:** None. **Y. Azzi:** None. **M. Melcher:** None. **R. Bray:** None. **H. Gebel:** None. **E. Akalin:** None. **P. Cravedi:** None. **J.S. Maltzman:** Grant/Research Support; Name of Commercial Interest; One Lambda/Thermo Fisher. Grant/Research Support; Nature of Relationship; Research Support. Ownership Interest; Name of Commercial Interest; Genentech/Roche. Ownership Interest; Nature of Relationship; equity interest (spouse). Salary; Name of Commercial Interest; Genentech/Roche. Salary; Nature of Relationship; employment (spouse). Other; Name of Commercial Interest; Qihan Biotech. Other; Nature of Relationship; Scientific Advisory Board.

Abstract# LB 64

High Levels of Sars-cov-2 Detected in Immunosuppressed Covid-19 Patient Environments Weeks Following Initial Positive Test

C. E. Kuschner[1], Z. Brune[2], L. B. Becker[1], L. Teperman[1], *[1]North Shore University Hospital, Manhasset, NY, [2]Feinstein Institutes for Medical Research, Manhasset, NY*

Purpose: COVID-19 is a novel viral illness associated with significantly worse mortality, prolonged disease course, and extended periods of viral shedding in transplant patients on long-term immunosuppression. While prior case series have demonstrated extended disease duration in immunosuppressed kidney transplant patients, few have quantified the differences in viral shedding between immunosuppressed and immunocompetent patients. We provide the first case series demonstrating that immunosuppressed transplant patients have significantly higher viral loads, as measured through non-invasive environmental sampling.

Methods: We quantified viral particles on representative surfaces from the rooms of two patients on tacrolimus therapy with a history of renal transplant and compared against non-immunosuppressed patient. All patients had a SARS-CoV-2 positive nasopharyngeal swab within 48 hours of sampling and were symptomatic. Matched non-transplant patients were 3-4 days from initial symptoms while transplant patients were 3-4 weeks. Samples were collected using polyester-tipped swabs pre-soaked in DNA/RNA Shield (Zymo Research) for 1 minute. One-step quantitative real time-polymerase chain reaction performed using TaqPath 1-Step qRT-PCR Master Mix on the LightCycler® 480 System. Samples were run in triplicate for N1 and N2 primers and probes (IDT) recommended by the CDC. The viral copy count from each raw sample was divided by its respective surface area to calculate viral copies/cm^2.

Results: Despite the increased time between initial positive test result and sample collection, kidney-transplant patients on tacrolimus therapy demonstrated higher viral loads on associated bedrails, flooring, and bathroom flushes compared to the matched, non-immunosuppressed patients.

Patients	Bedrail (copies/cm²)	Floor beneath patient (copies/cm²)	Medication Dispenser (copies/cm²)	Bathroom Flush (copies/cm²)
Transplant A	549.1	78,292.2	19.2	1,528.7
Transplant B	105.8	674.9	437.9	74,864.8
Non-Transplant A	123.4	0.8	12.0	0
Non-Transplant B	0.4	0	0	0

Conclusions: This data raises a warning that immunocompromised individuals may shed higher levels of virus into their environment, likely through both aerosol and fecal mechanisms. Previous research has shown non-immunosuppressed individuals carry diminished environmental shedding by 21 days and may be safe to return to public service and general hospital floors, yet no similar analysis has been performed on immunosuppressed transplant patients. Our findings suggest that hospitals must take extensive isolation precautions when treating immunocompromised patients who have tested positive for SARS-CoV-2 due to the potential increase in the quantity of infectious virus particles.

CITATION INFORMATION: Kuschner C., Brune Z., Becker L., Teperman L. High Levels of Sars-cov-2 Detected in Immunosuppressed Covid-19 Patient Environments Weeks Following Initial Positive Test *AJT, Volume 21 Supplement 3*

DISCLOSURES: C.E. Kuschner: Consulting Fee; Name of Commercial Interest; RXR Realty. Consulting Fee; Nature of Relationship; Consultant. **Z. Brune:** Consulting Fee; Name of Commercial Interest; RXR Realty. Consulting Fee; Nature of Relationship; Consultant. **L.B. Becker:** None. **L. Teperman:** None.

Abstract# LB 65

Covid-19 Infections Post-liver and Kidney Transplantation in a Southern Ca Program

M. E. de Vera[1], J. Woloszyn[2], S. Regmi[2], R. Rattanavich[2], M. Rakoski[2], M. Lin[2], P. Mehta[2], A. Kore[2], J. Weissman[2], C. Martens[2], T. Phan[2], B. Jerez-Aguilar[2], M. Robinson[2], E. Wells[2], R. Villicana[2], M. Nguyen[2], *[1]Loma Linda University Health, San Bernardino, CA, [2]Transplant Institute, Loma Linda University Health, San Bernardino, CA*

Purpose: Southern CA is at the epicenter of the Covid-19 pandemic. We reviewed outcomes of our center's liver, kidney, and pancreas transplant patients stricken with Covid-19 infection.

Methods: Retrospective review of 161 post-transplant patients with Covid-19 infection.

Results: From March 2020 to January 2021, 43 liver, 107 kidney, 6 liver/kidney, and 4 kidney/pancreas patients came down with Covid-19 (TABLE). Transplants were performed from August 2000 to December 2020. Mean age was 54±1 yrs. Median time of infection was 27 months post-transplant (range 15 days to 21 years). Frequency of symptoms were: shortness of breath (55%), fever (52%), muscle aches (48%), diarrhea (36%), headaches (34%), loss of taste or smell (27%). Only 10 (6%) pts were asymptomatic. Overall mortality rate was 20% (33/161) and severe Covid-19 (hospitalization and death) occurred in 90/161 (56%) patients. Mortality risk factors included older age (62±2 vs 52±1 yrs, p<0.01), hospitalization (32/33, 97% vs 59/128, 46% p<0.01), mechanical ventilation (30/33, 91% vs 4/128, 3% p<0.01); there was no difference in gender (p=0.5), race (p=0.88), presence of diabetes (p=0.26), hypertension (p=0.06), or obesity (p=0.83). Liver/kidney recipients had the highest mortality rate (Table). Risk factors for severe Covid-19 included age (56±1 vs 51±2 yrs, P=0.01) and presence of diabetes (54/90, 60% vs 29/71, 41% p=0.02); there was no difference in gender (p=0.97), race (p=0.39), presence of hypertension (p=0.09), or obesity (p=0.82). Kidney patients had more severe Covid-19 than the other organ recipients. Kidney/pancreas patients were younger and tended to have mild infection and had no mortality. 156 (97%) patients were on tacrolimus (2 were on CyA, 2 on belatacept), 113 (70%) on MMF, and 127 (79%) on prednisone. 101 (63%) of patients were on triple immunosuppression. MMF was the most common agent to be adjusted (48/113, 42%) followed by tacrolimus (9/156, 6%). Of the 90 pts hospitalized, 70 (78%) received steroids, 30 (33%) received Remdesivir, and 53 (59%) were anticoagulated. 5 patients received convalescent plasma. Peak C-reactive protein levels when measured were significantly higher in patients who died (53.7±15.8 vs 19.8±5.3 mg/L, p=0.02).

Conclusions: Covid-19 infection inflicts a high mortality rate in liver, kidney, and pancreas transplant recipients.

Data and Demographics				
	Liver (n=43)	Liver/kidney (n=6)	Kidney (n=107)	Kidney/pancreas (n=4)
Age	58±13	54±16	54±18	42±8 (p<0.01)
Gender (M:F)	26:17	5:1	58:49	1:3
Severe Covid-19	19/43 (45%)	3/6 (50%)	67/107 (63%)	1/4 (25%)
Mortality	6/43 (14%)	3/8 (37%)	24/107 (22%)	0/4

CITATION INFORMATION: de Vera M., Woloszyn J., Regmi S., Rattanavich R., Rakoski M., Lin M., Mehta P., Kore A., Weissman J., Martens C., Phan T., Jerez-Aguilar B., Robinson M., Wells E., Villicana R., Nguyen M. Covid-19 Infections Post-liver and Kidney Transplantation in a Southern Ca Program *AJT, Volume 21 Supplement 3*

DISCLOSURES: M.E. de Vera: None. **J. Woloszyn:** None. **S. Regmi:** None. **R. Rattanavich:** None. **M. Rakoski:** None. **M. Lin:** None. **P. Mehta:** None. **A. Kore:** None. **J. Weissman:** None. **C. Martens:** None. **T. Phan:** None. **B. Jerez-Aguilar:** None. **M. Robinson:** None. **E. Wells:** None. **R. Villicana:** None. **M. Nguyen:** None.

Abstract# LB 66

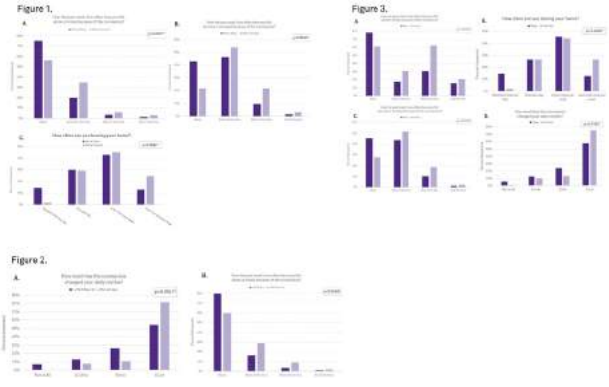
White, Older Men Are Less Affected by the Changes of the Covid-19 Pandemic

R. J. Berkowitz, A. Daud, S. Brietigam, T. S. Taylor, J. Carter, M. A. Callegari, B. Borja-Cacho, J. C. Caicedo, D. Simpson, D. P. Ladner, *Surgery, Northwestern Medicine, Chicago, IL*

Purpose: This study explores quality of life and lifestyle changes due to the COVID-19 pandemic among pre- and post- liver (LT) and kidney (KT) transplant patients across race, age, and gender.

Methods: Patients listed (pre) for liver transplant (LT) or kidney transplant (KT) and recipients (post) of LT and KT were prospectively enrolled at a large single center from 5/2020 - 1/2021. Demographics were collected from the EHR. The Chicago COVID-19 Comorbidities (C3) survey was administered via phone by trained research assistants to ascertain patient knowledge about COVID-19. Chi-Square or Fisher's Exact tests were used (p<0.05).

Results: A total of 310 pre- and post-LT and KT patients were enrolled (Table 1), with 187 (60%) KT patients and 122 (40%) LT patients. The mean age group for the cohort was 55-64, 104 (34%) were female, 228 (74%) were White, 45 (15%) were Black, 43 (14%) were Hispanic, and 251 (87%) had some college education. 26 (8%) patients had known COVID-19, 22 (85%) were post- LT or KT. There were no significant differences in COVID-19 diagnoses between genders or organ category (Table 2).



Compared to men, women felt lonelier (Fig 1A, p=0.0159), more nervous or stressed (Fig 1C, p= 0.0138), and left their home less frequently (Fig 1B, p= 0.0006) due to the pandemic. Specifically, white men left their homes more (Fig 3C, p= 0.0092) than white women, and a higher percentage of white men "never" felt nervous or stressed (Fig 3B, p= 0.004) or were "never" lonely because of the coronavirus (Fig 3A, p=0.0321) compared to white women. Further, women ≥55 reported that their routines changed more (Fig 2A, p= 0.0041 and felt lonelier (Fig 2B, p= 0.0249) than men ≥55 because of the coronavirus.

Figure 1.

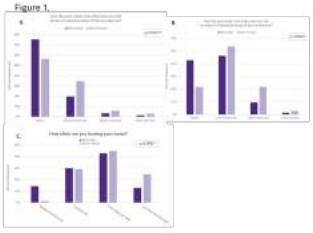


Figure 3.

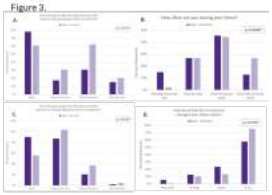
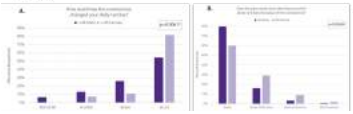


Figure 2.



Conclusions: It has been previously demonstrated that women have shouldered a bigger mental health burden during the pandemic. Our findings show that this holds within the transplant population across age and race. Though our population is primarily male and chronically ill, that did not seem to affect behaviors and attitudes towards COVID-19. Thus, targeted social support for this particularly vulnerable population may be beneficial in closing this mental health gap.

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