AMERICAN SOCIETY OF TRANSPLANTATION

CEOT

CUTTING EDGE OF TRANSPLANTATION

TRANSPLANT SUMMIT 2021

INNOVATIONS IN MODERN IMMUNOSUPPRESSION: *Ideas and Implications*

FEBRUARY 25–27, 2021

For more information visit
www.myAST.org/meetings/CEoT

VIRTUAL PROGRAM

Lifelong commitment.

To you. To your patients. To transplant.

Novartis is proud to help you improve patient outcomes and also is committed to improving transplant results by:

- Investing in innovative clinical trials
- Working with the transplant community to improve long-term graft and patient survival
- Addressing individualized patient needs with a range of immunosuppressive agents and other products in development

Novartis. In continuous pursuit of transplant success.

NOVARTIS

Novartis Pharmaceuticals Corporation
East Hanover, New Jersey 07936-1080

9/13 T-TPF-1293123

GENERAL INFORMATION

Meeting Hours (all times are Eastern Standard)

Thursday: . . . . . 10:00 AM – 5:00 PM
Friday: . . . . . 9:00 AM – 5:45 PM
Saturday: . . . . . 10:00 AM – 5:30 PM

Exhibit Hours (all times are Eastern Standard)

Thursday: . . . . . 11:15 AM - 11:30 AM
12:45 PM - 1:00 PM
2:15 PM - 2:30 PM
3:15 PM - 3:30 PM

Friday: . . . . . 9:45 AM - 10:00 AM
11:15 AM - 11:30 AM
1:00 PM - 1:15 PM
2:30 PM - 2:45 PM
4:15 PM - 4:30 PM

Saturday: . . . . . 11:30 AM - 11:45 AM
1:15 PM - 1:30 PM
2:45 PM - 3:00 PM
4:30 PM - 4:45 PM

Virtual Platform Access

Sessions for the 2021 Cutting Edge of Transplantation will take place in the Intrado Platform. All sessions being offered for Continuing Education Credit will take place in Theater 1. Sessions that are not offered for Continuing Education Credit will take place in Theater 2. To view which session are available for Credit, please refer to the CEoT 2021 Program.

The Intrado Platform recommends using Google Chrome for your web browser to optimize your viewing experience.

For Platform and Technical Issues, please visit the Help Desk in the Lobby.

During the Meeting, Be Sure to:

Complete Your Profile – Engage other attendees and earn points by completing your profile. You can earn a badge for this and completing different tasks within the platform.

New this Year: Transplant Visionaries Challenge – be ready to cast your vote live for the best pitch.

Stop by the Video Hall – Network with your colleagues face to face via video chat either one-on-one or in small groups in our Video Networking Hall.

Tune in for our Keynote Speakers – this year we have 3 keynote presentations that you won't want to miss: Atul Butte, John Beigel and Amy Abernethy. Check out the detailed program for exact times.

Participate in the Live Q&A Sessions – Based on your feedback we want to make the CEoT meeting as interactive as possible, don't miss out on the live panel Q&A discussions at the end of each session.

Visit the Exhibit Hall – The CEoT meeting is made possible by educational grants and support from our partners. Be sure to stop by the Exhibit Hall and say hi.

2021 CEOT MEETING PARTNERS & EXHIBITORS

This Educational Activity is Made Possible with Educational Grants & Support from the Following Companies:

PLATINUM

CareDx® Personalized Treatment Surveillance. Better Outcomes.

natera

NOVARTIS

SANOFI

Veloxis PHARMACEUTICALS

eurofins | Transplant Diagnostics

Mallinckrodt Pharmaceuticals

GOLD

CSL Behring Biotherapies for Life®

SILVER

ONE LAMBDA A Thermo Fisher Scientific Brand

MERCK

BRONZE

Takeda

IMMUCOR

MEETING PARTNERS AND EXHIBITORS

Bristol Myers Squibb™

Cedars Sinai

AMRA PRECISION FOR DECISION

talaris THERAPEUTICS

emocha Health®

PROGRAM PLANNING COMMITTEE

Michael Ison, MD, MS
Co-Chair
Northwestern University Feinberg School of Medicine

Michelle Josephson, MD, FASN
Co-Chair
The University of Chicago Department of Medicine

Roy D. Bloom, MD
Hospital of the University of Pennsylvania

Kimberly Ann Brown, MD
Henry Ford Hospital

David P. Foley, MD, FACS, FAST, FAASLD
University of Wisconsin

Richard N. Formica, Jr., MD, FAST
Yale University School of Medicine

John Friedewald, MD
Northwestern University

Nadeen Khoury, MD
Henry Ford Hospital

Jon Kobashigawa, MD, FAST
Cedars Sinai Heart Institute

Vineeta Kumar, MD, FAST
University of Alabama at Birmingham

Deborah Levine, MD
University of Texas Health Science Center

Josh Levitsky, MD, MS
Northwestern University

Marian Michaels, MD, MPH
Children's Hospital of Pittsburgh

Kenneth Newell, MD, PhD
Emory University School of Medicine

Peter Nickerson, MD, FRCPC, FCAHS
University of Manitoba

Linda Ohler, MSN, RN, CCTC, FAAN
Marymount University

Joanna Schaenman, MD, PhD
David Geffen School of Medicine at UCLA

Marina Serper, MD
University of Pennsylvania

Anat Roitberg-Tambur, DMB, PhD
Northwestern University

Flavio Vincenti, MD
University of California San Francisco

INVITED FACULTY AND MODERATORS

Click here to view the full speaker bios

Amy Abernethy, MD, PhD
US Food and Drug Administration

Benjamin Adam, MD, FRCPC
University of Alberta

Andrew Adams, MD, PhD
University of Minnesota Medical Center Fairview

Upton Allen, MD
The Hospital for Sick Children

Sandra Amaral, MD, MHS
Children's Hospital of Philadelphia

John Beigel, MD
National Institute of Allergy and Infectious Diseases

Roy Bloom, MD
University of Pennsylvania

Emily Blumberg, MD, FAST
Perelman School of Medicine at the University of Pennsylvania

Atul Butte, MD, PhD
University of California, San Francisco

Darshana Dadhania, MD, MS, FAST
Weill Cornell Medicine

Chris Ensor, PharmD, FAST, FCCP
AdventHealth Orlando

Christine Falk, PhD
Transplant Immunology, MHH

Maryjane Farr, MD
Columbia University Irving Medical Center

Sandy Feng, MD, PhD
University of California, San Francisco

Dave Foley, MD, FACS, FAST, FAASLD
University of Wisconsin School of Medicine and Public Health

Richard Formica, MD
Yale University School of Medicine

Ronald Gill, PhD
University of Colorado

Ramsey Hachem, MD
Barnes-Jewish Hospital

Shelley Hall, MD, FACC, FHFSA, FAST
Baylor University Medical Center

Peter Heeger, MD
Icahn School of Medicine at Mount Sinai

Michael Ison, MD, MS
Northwestern University

Annette Jackson, PhD, D(ABHI)
Duke University

Michelle Josephson, MD
University of Chicago

Kiran Khush, MD, MAS
Stanford University

Daniel Kim, MD, FRCPC
University of Alberta

Stuart Knechtle, MD, FACS
Duke University

Jon Kobashigawa, MD
Cedars-Sinai Smidt Heart Institute

Deepali Kumar, MD, MSc, FRCPC, FAST
University Health Network

Vineeta Kumar, MD, FAST
University of Alabama at Birmingham

Jennifer Lai, MD, MBA
University of California, San Francisco

Chris Leptak, MD, PhD
US Food and Drug Administration

Debbie Levine, MD
University of Texas

Megan Levings, PhD
University of British Columbia

Josh Levitsky, MD, MS
Northwestern University

Jayme Locke, MD, MPH, FACS, FAST
University of Alabama at Birmingham

Roslyn Mannon, MD, FAST, FASN
University of Nebraska Medical Center

Molly McCarthy
Patient Advisory Council

Michael Mengel, MD
University of Alberta

Marian Michaels, MD, MPH, FAST
University of Pittsburgh

Sumit Mohan, MD, MPH
Columbia University

Kenneth Newell, MD, PhD
Emory University

Peter Nickerson, MD, FRCPC, FCAHS
University of Manitoba

Inish O'Doherty, PhD
Critical Path Institute

Jacqueline O'Leary, MD, MPH
Dallas VA Medical Center

Scott Palmer, MD, MHS
Duke University Medical Center

Jignesh Patel, MD, PhD, FRCP, FAST, FACC, FAHA
Cedars-Sinai Smidt Heart Institute

Rachel Patzer, PhD, MPH
Emory University School of Medicine

Marcus Pereira, MD, MPH
Columbia University

Sean Pinney, MD
University of Chicago

Lisa Potter, PharmD, BCPS, FCCP, FAST
University of Chicago

Elaine Reed, PhD
David Geffen School of Medicine at UCLA

Christin Rogers Marks, PharmD, BCPS, FAST, FCCP
Massachusetts General Hospital

Antonie Roux, MD, PhD
Foch Hospital

Deirdre Sawinski, MD, FAST
University of Pennsylvania

Joanna Schaenman, MD, PhD
David Geffen School of Medicine at UCLA

Carrie Schinstock, MD
Mayo Clinic

Marina Serper, MD, MS
University of Pennsylvania

Palak Shah, MD, MS
Inova Heart and Vascular Institute

Mike Shullo, PharmD
West Virginia University Hospitals

Amy Silverstein, JD
Patient Advisory Council

Greg Snell, MD
Alfred Hospital, Melbourne, Australia

Laurie Snyder, MD, MHS
Duke University

Anat Tambur, DMD, PhD
Northwestern University

Helen Te, MD
University of Chicago Medicine

Betsy Verna, MD, MS, FAST
Columbia University

Flavio Vincenti, MD
University of California, San Francisco

Ashley Vo, PharmD, FAST
David Geffen School of Medicine at UCLA

Kymberly Watt, MD
Mayo Clinic, Rochester

Samuel Weigt, MD, MSCR
David Geffen School of Medicine at UCLA

THURSDAY, FEBRUARY 25

9:55 AM – 10:00 AM **Cutting Edge of Transplantation Welcome Remarks**
Theater 1
Michelle Josephson, MD and Mike Ison, MD, MS

10:00 AM – 11:15 AM **Session 1: Setting the Stage: Innovation in Areas of Unmet Needs***
Theater 1
Moderators: *Dave Foley, MD, FACS, FAST, FAASLD and Michelle Josephson, MD*

10:00 AM **Introduction**
Dave Foley, MD, FACS, FAST, FAASLD, and Michelle Josephson, MD

10:05 AM **Goldilocks Diagnostics: Too Much, Too Little, Just Right**
Roslyn Mannon, MD, FAST, FASN

10:15 AM **Access, Equity and Efficiency of Care Delivery**
Rachel Patzer, PhD, MPH

10:25 AM **Novel Paradigms in Immunosuppression**
Jon Kobashigawa, MD

10:35 AM **Redefining Meaningful Endpoints and Outcomes**
Sumit Mohan, MD, MPH

10:45 AM Panel Discussion

11:15 AM – 11:30 AM **Break**

11:30 AM – 12:45 PM **Session 2: Rebirth of the Pipeline***
Theater 1
Moderators: *Roy Bloom, MD and Peter Nickerson, MD, FRCPC, FCAHS*

11:30 AM **The Renaissance is Upon Us**
Flavio Vincenti, MD

11:35 AM **Next Gen Costimulation Blockade (anti-CD40/anti-CD40L/anti-CD28)**
Andrew Adams, MD, PhD

11:45 AM **Cell Therapies in Transplantation: CARs, BARs and Tregs**
Megan Levings, PhD

11:55 PM **Cytokine Blockade: One Target, Many Benefits**
Ashley Vo, PharmD, FAST

12:05 PM Panel Discussion: Consignment to the Graveyard or Flight of the Phoenix?

12:45 PM – 1:00 PM **Break**

1:00 PM – 2:15 PM **Satellite Symposium Presented by CareDx†**
Theater 2
This is not an official function of the CEoT Meeting and is not endorsed by the AST.

1:00 PM – 2:15 PM **Satellite Symposium Presented by Sanofi†**
Theater 2
This is not an official function of the CEoT Meeting and is not endorsed by the AST.

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

2:15 PM – 2:30 PM **Break**

2:30 PM – 3:15 PM **Keynote Speaker**
Atul Butte, MD, PhD
Theater 1

3:15 PM – 3:30 PM **Break**

3:30 PM – 4:00 PM **Innovation Award Presentation**
Theater 1
This award was created to showcase a project or program that exemplifies the spirit of innovation on which transplantation was founded. Join us to honor the recipient and hear a brief presentation on the program's successful, outside-the-box approach that earned it the Innovation Award.

4:00 PM – 5:00 PM **Abstract Session**
Click on Abstract Session on the Navigation Bar within the meeting platform.

FRIDAY, FEBRUARY 26

9:00 AM – 9:45 AM **Cutting Edge Through The Patients' Lens***
Theater 1
Moderators: *Ron Gill, PhD and Vineeta Kumar, MD, FAST*

9:00 AM **Cutting Edge Through the Patients' Lens**
Molly McCarthy and Amy Silverstein, JD

9:25 AM Panel Discussion

9:45 AM – 10:00 AM **Break**

10:00 AM – 11:15 AM **Session 3: Immune Monitoring***
Theater 1
Moderators: *Anat Tambur, DMD, PhD and Peter Nickerson, MD, FRCPC, FCAHS*

10:00 AM **Intro: Can You Handle the Truth?**
Peter Nickerson, MD, FRCPC, FCAHS

10:05 AM **Quantifying Antibodies: Is it Possible?**
Carrie Schinstock, MD

10:15 AM **Noninvasive Molecular Markers: Can You Hang Your Hat on Them?**
Peter Heeger, MD

10:25 AM **Emerging Tissue Diagnostics Under the Microscope**
Michael Mengel, MD

10:35 AM **Measuring Adequate Immunosuppression: Interplay Between Antiviral and T-Cell Alloimmunity**
Elaine Reed, PhD

10:45 AM Panel Discussion: When and How are You Going to Spend Your Money?

11:15 AM – 11:30 AM **Break**

11:30 AM – 1:00 PM **Session 4 – End Points:** Select One of Five Sessions*

OPTION 1 **Liver***
Theater 1
Moderators: *Dave Foley, MD, FACS, FAST, FAASLD and Marina Serper, MD, MS*

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

11:30 AM **Present State of Induction and Maintenance Therapy and Unmet Needs**
Christin Rogers Marks, PharmD, BCPS, FAST, FCCP

11:45 AM **Pipeline of New Agents and Potential for Use in Liver Transplantation**
Stuart Knechtle, MD, FACS

12:00 PM **Hot Topic Debate: We Should Develop and Test New Agents in Liver Transplant Recipients**
Helen Te, MD

12:15 PM **Hot Topic Debate: We Should Explore Using Our Current Therapy in a More Effective, Personalized Way**
Jacqueline O'Leary, MD, MPH

12:30 PM Panel Discussion

OPTION 2 **Kidney***
Theater 1
Moderator: *Roslyn Mannon, MD, FAST, FASN*

11:30 AM **Surrogate Endpoints: iBox and Beyond**
Inish O'Doherty, PhD

11:45 AM **Challenges of Obtaining Regulatory Endorsement of Surrogate Endpoints**
Christopher Leptak, MD, PhD

12:00 PM **Industry – Designing Clinical Trials with Next Gen Endpoints**
Peter Nickerson, MD, FRCPC, FCAHS

12:15 PM Panel Discussion

OPTION 3 **Heart: Targeting Immunosuppression in Heart Transplantation: "Do We Have the Right Arrows in our Quiver?"***
Theater 1
Moderators: *Shelley Hall, MD, FACC, FHFSA, FAST and Sean Pinney, MD*

11:30 AM **Barriers to Progress? The Use of Blockade Strategies in Immunosuppression**
Mike Shullo, PharmD

11:45 AM **Overcoming Our Inhibitions: Novel Approaches for Highly Sensitized Patients**
Jignesh Patel, MD, PhD, FRCP, FAST, FACC, FAHA

12:00 PM **Going Commando: Minimizing Immunosuppression in Heart Transplantation**
Maryjane Farr, MD

12:15 PM Panel Discussion

OPTION 4 **Lung***
Theater 1
Moderators*: Chris Ensor, PharmD, FAST, FCCP and Scott Palmer, MD, MHS*

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

11:30 AM	**To B or Not to B - the Need for Novel B Cell Immunosuppressive Strategies in Lung Transplantation** *Christine Falk, PhD*
11:45 PM	**Winds of Change: Innovation in the Management of AMR after Lung Transplantation** *Ramsey Hachem, MD*
12:00 PM	**Reimagining CLAD as an End Point in a Multi-Center Trial** *Laurie Snyder, MD, MHS and Samuel Weigt, MD, MSCR*
12:15 PM	Panel Discussion
OPTION 5	**Infectious Disease: Modern Immunosuppression's Impact on Immune Response and the Big Three: CMV, EBV, and BK*** **Theater 1** **Moderators:** *Mike Ison, MD, MS and Joanna Schaenman, MD, PhD*
11:30 AM	**New Approaches to Tame the CMV Monster: Utility of Measuring the Anti-CMV Immune Response** *Deepali Kumar, MD, MSc, FRCPC, FAST*
11:45 AM	**EBV and PTLD in SOT: Impact of an Ineffective Immune Response** *Upton Allen, MD*
12:00 PM	**The Ongoing Challenge of BK Virus Replication: Immunosuppression, BKVN and Alloimmunity** *Darshana Dadhania, MD, MS*
12:15 PM	Panel Discussion
1:00 PM – 1:15 PM	**Break**
1:15 PM – 2:30 PM	**Satellite Symposium Presented by CSL Behring*** **Theater 1** This activity is supported by an educational grant from CSL Behring.
1:15 PM – 2:30 PM	**Satellite Lunch Symposium*** **Theater 1**
2:30 PM – 2:45 PM	**Break**
2:45 PM – 4:15 PM	**Transplant Visionaries Challenge presented in partnership with Novartis** **Theater 1**
4:15 PM – 4:30 PM	**Break**
4:30 PM – 5:45 PM	**Satellite Symposium Presented by Eurofins†** **Theater 2** This is not an official function of the CEoT Meeting and is not endorsed by the AST.
4:30 PM – 5:45 PM	**Satellite Symposium Presented by OneLambda†** **Theater 2** This is not an official function of the CEoT Meeting and is not endorsed by the AST.

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

SATURDAY, FEBRUARY 27

10:00 AM – 11:30 AM **Session 5 Immunosuppression and COVID: Innovative Responses to a Challenging Pandemic***
Theater 1
Moderators: *Emily Blumberg, MD, FAST and Marian Michaels, MD, MPH, FAST*

10:00 AM **Donor and Recipient Screening for SARS-CoV-2: Safe Navigation During a Pandemic**
Emily Blumberg, MD, FAST

10:20 AM **Impact of COVID-19 Infection on SOT Recipients: Impact of Immunosuppression on Infection Risk and Operationalization of Best Practices to Minimize Risk**
Marcus Pereira, MD, MPH

10:40 AM **Treatment of COVID-19 Infection in the Immunosuppressed Patient**
Keynote Speaker: John Beigel, MD

11:00 AM Panel Discussion

11:30 AM – 11:45 AM **Break**

11:45 AM – 1:15 PM **Session 6 Care Delivery:** Select One of Four Sessions*

OPTION 1 **Liver Immunosuppression Monitoring and Endpoints***
Theater 1
Moderators: *Dave Foley, MD, FACS, FAST, FAASLD and Marina Serper, MD, MS*

11:45 AM **Can We Monitor Net Level of Immunosuppression Better and in Whom?: Biomarkers, Antibodies, Protocol Biopsies, etc**
Josh Levitsky, MD, MS

12:00 PM **Can We Monitor Immunosuppression in Patients More Effectively in the Era of Telemedicine and Remote Care?**
Marina Serper, MD, MS

12:15 PM **Hot Topic Debate: Rejection and Graft Function Should Still be the Main Endpoints of Immunosuppression Trials**
Sandy Feng, MD, PhD

12:30 PM **Hot Topic Debate: Other Endpoints (Renal, Cardiovascular, Quality of Life) Should be Primary Endpoints of Immunosuppression Trials**
Kymberly Watt, MD

12:45 PM **Panel Discussion**

OPTION 2 **Kidney***
Theater 1
Moderators: *Vineeta Kumar, MD, FAST and Roy Bloom, MD*

11:45 AM **Models of Care Delivery: Integrating the Transplant Center with the Community**
Deirdre Sawinski, MD, FAST

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

11:55 AM — **Telemedicine to Deliver Care in Transplantation: Bringing the Transplant Center to the Patient**
Marina Serper, MD, MS

12:05 PM — **Innovative Strategies for Clinical Research and Clinical Trials: Emerging Roles of Telemedicine and Remote Monitoring**
Elizabeth Verna, MD, MS, FAST

12:15 PM — **Technology-Enabled and Personalized Strategies to Promote Medication Adherence and Safe Use in Transplantation**
Sandra Amaral, MD, MHS

12:25 PM — **Translating Results of Clinical Trials into Practice and/or Policy Issues**
Lisa Potter, PharmD, BCPS, FCCP, FAST

12:35 PM — Panel Discussion

OPTION 3 — **Heart - Accepting Rejection in the Modern Era: Swipe Right***
Theater 1
Moderators: *Jon Kobashigawa, MD and Maryjane Farr, MD*

11:45 AM — **Two Truths and a Lie: Diagnosing Rejection at the Molecular Level**
Daniel Kim, MD, FRCPC

12:00 PM — **100 Proof: Where Pathology Meets Mixology**
Palak Shah, MD, MS

12:15 PM — **Going Viral in an Analog World: Potential New Tools for Detecting Rejection**
Kiran Khush, MD, MAS

12:30 PM — Panel Discussion

OPTION 4 — **Lung***
Theater 1
Moderators: *Debbie Levine, MD and Anat Tambur, DMD, PhD*

11:45 AM — **Inhale the Future, Exhale the Past: Defining Pathogenic DSA Beyond MFI**
Annette Jackson, PhD, D(ABHI)

12:00 PM — **miR on the Wall: A Glimpse into Innovative Techniques to Detect and Monitor Graft Dysfunction**
Benjamin Adam, MD, FRCPC

12:15 PM — **"Your Future is Whatever You Make it So Make it a Good One"**
Antoine Roux, MD
Greg Snell, MD

12:30 PM — Panel Discussion

1:15 PM – 1:30 PM — **Break**

1:30 PM – 2:45 PM — **Satellite Symposium Presented by Natera†**
Theater 2
This is not an official function of the CEoT Meeting and is not endorsed by the AST.

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

1:30 PM – 2:45 PM	**Satellite Symposium Presented by Veloxis**† **Theater 2** This is not an official function of the CEoT Meeting and is not endorsed by the AST.
2:45 PM – 3:00 PM	**Break**
3:00 PM – 4:30 PM	**Session 7: The Future: Most Impactful Investment, the Final Word** **Theater 1** *Moderators: Ken Newell, MD, PhD and Richard Formica, MD*
3:00 PM	**Goldilocks Diagnostics: Too Much, Too Little, Just Right** *Peter Nickerson, MD, FRCPC, FCAHS*
3:05 PM	**Access, Equity and Efficiency of Care Delivery** *Jayme Locke, MD, MPH, FACS, FAST*
3:10 PM	**Novel Paradigms in Immunosuppression** *Flavio Vincenti, MD*
3:15 PM	**Redefining Meaningful Endpoints and Outcomes** *Jennifer Lai, MD, MBA*
3:20 PM – 4:30 PM	Panel Discussion
4:30 PM – 4:45 PM	**Break**
4:45 PM – 5: 30 PM	**Keynote Speaker** **Amy Abernethy, MD, PhD** **Theater 1**
5:30 PM	**Closing Remarks** **Theater 1**

**Continuing education credit offered. See separate packet.*
†No continuing education credit offered.

CONNECT AND LEARN

NO RESERVATIONS REQUIRED

Don't miss these virtual knowledge sharing sessions. Join your colleagues for the 2021 CEoT Symposia Series!

**This is not an official function of the CEoT meeting and is not endorsed by AST.*

***This activity is funded with an educational grant and offered for credit.*

THURSDAY, FEBRUARY 25

Afternoon Symposium
Join us in Theater 2

1:00 PM - 2:15 PM
Sponsored by CareDx*

1:00 PM - 2:15 PM
Sponsored by Sanofi*

FRIDAY, FEBRUARY 26

Afternoon Symposium
Join us in Theater 1

1:15 PM - 2:30 PM
Sponsored by CSL Behring**

1:15 PM - 2:30 PM
Satellite Lunch Symposium**

Late Afternoon Symposium
Join us in Theater 2

4:30 PM – 5:45 PM
Sponsored by Eurofins*

4:30 PM – 5:45 PM
Sponsored by One Lambda*

SATURDAY, FEBRUARY 27

Afternoon Symposium
Join us in Theater 2

1:30 PM - 2:45 PM
Sponsored by Natera*

1:30 PM - 2:45 PM
Sponsored by Veloxis*

CareDx

CEoT Symposium 2021

AlloSure Surveillance and Relative Change Value

DATE: Thursday, Feb. 25th
TIME: 1:00-2:15pm EST
LOCATION: Theater 2

– The newest AlloSure clinical information from a real world data set including over four hundred patients

– Additional data and clinical cases

Nicole Ali, MD
NYU

Sanjiv Anand, MD
Intermountain Healthcare

Arjang Djamali, MD
University of Wisconsin

Hasan Fattah, MD
University of Kentucky

Gaurav Gupta, MD
VCU

Following the recorded talks, the presenters will be available for live Q&A

This is not an official function of the CEOT Meeting and is not endorsed by AST

CEoT Symposium, *Sponsored by Sanofi*

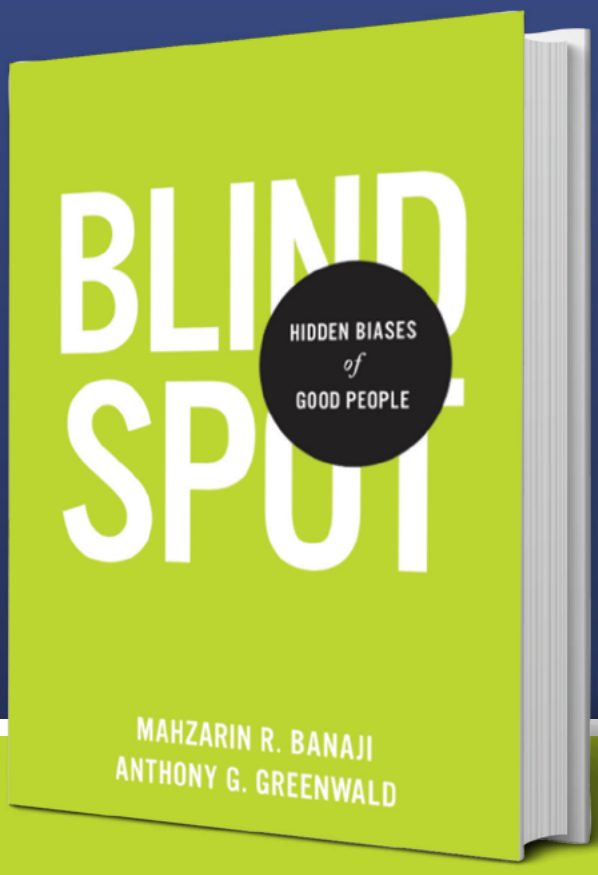
BLINDSPOT

HIDDEN BIASES *of* GOOD PEOPLE

Presented by
Professor Mahzarin R. Banaji

Mahzarin R. Banaji
Richard Clarke Cabot Professor of Social Ethics, Department of Psychology, Harvard University

Implicit bias is a behavior that occurs without conscious awareness. It can lead to errors in assessing and evaluating others when we recruit and hire, onboard and promote, lead teams, and work on behalf of our clients or the public we serve.



IN THIS SYMPOSIUM, WE WILL

- *Explore the surprising ways we make errors as a result of implicit bias*
- *Recognize our own implicit biases so that we can better serve our organizations and our patients*

Date: Thursday, February 25
Time: 1:00-2:15 PM ET
Location: Theater 2

This is not an official function of the CEoT Meeting and is not endorsed by AST.

SANOFI

MAT-US-2100562-v1.0-01/2021

"Immunosuppression Minimization: How Biomarkers Can Play a Role"

Join us for a virtual symposium at CEoT
on Friday, February 26 at 4:30 PM EST

Josh Levitsky, MD, MS

Professor of Medicine & Surgery
Division of Gastroenterology & Hepatology

Martha Pavlakis, MD

Transplant Nephrologist

Sarthak Virmani, MBBS

Transplant Nephrologist

Don't Forget to visit us at our AST CEoT Virtual Booth

TRUGRAF®

TRAC™
Transplant Rejection Allograft Check

LABS @HOME

Learn more by visiting:
EurofinsTransplant.com

ONE LAMBDA
A Thermo Fisher Scientific Brand

FEB
26
-FRI-

4:30-5:45 PM ET
Virtual Theater 2

Personalizing Post-Transplant Care: Can Precision Diagnostics Improve Patient Outcomes?

Every patient deserves individualized care supported by the most advanced diagnostic tools. In this presentation, we will discuss methods for improving diagnostic accuracy with the detection of donor specific antibodies, robust screening for COVID-19 antibodies, and quantitative biopsy assessment with the Molecular Microscope® Diagnostic System. For those looking to advance patient outcomes and overcome challenges introduced by the COVID-19 pandemic, our speakers will discuss how these tools may be used individually or in concert for the fast and objective evaluation of allograft health.

MODERATOR

Robert Montgomery, MD
NYU Langone Health | New York, NY

PRESENTERS

Philip F. Halloran, MD, PhD
Alberta Transplant Applied Genomics Centre | Edmonton, Canada
MMDx: The Next Generation of Discoveries

Michelle Hickey, PhD, D(ABHI)
UCLA Immunogenetics Center | Los Angeles, CA
Post-Transplant Immunosurveillance for Donor Specific Antibody

E. Steve Woodle, MD
UC Health | Cincinnati, OH
Multiplexed Testing for SARS-CoV-2 Antibodies: Current and Future Iterations

natera™

CEoT Lunch Symposium
Sponsored by Natera

Get the full picture with

Molecular-level Insights

Molecular-level Insights in Kidney and Pancreas Transplant Care: Prospera Deep Dive

Saturday, Feb. 27
1:30 - 2:45pm ET
Theater 2

This session explores the new applications of cell-free and genomic DNA in kidney and pancreas transplant care management. Transplant physicians will share new Natera data and their experiences incorporating Prospera into their routine care protocols. Specifically, early, promising Prospera use in kidney and pancreas patients will be highlighted. Furthermore, recent experiences in using renal genetic testing for waitlisted patients will be discussed.

Learning Objectives:

- **Hear** how your transplant colleagues are incorporating Prospera into their routine care protocols
- **Preview** early data on the use of donor-derived cell-free DNA in pancreas and kidney-pancreas recipients for rejection surveillance
- **Learn** how to refine diagnosis of kidney disease for recipients on the transplant waitlist

RSVP now at: natera.com/CEoT2021

This is not an official function of the CEoT Meeting and is not endorsed by AST.

201 Industrial Road, Suite 410 | San Carlos, CA 94070 | Main +1 650.249.9090 | Fax 1.650.730.2272 | natera.com

Caring for Renal Transplant Recipients During the COVID-19 Pandemic and Beyond

Saturday, February 27, 2021 • 1:30 PM – 2:45 PM EST • Theater 2

Daniel Brennan, MD
Medical Director, Comprehensive Transplant Center
Johns Hopkins University
Baltimore, MD

Patricia West-Thielke, PharmD, BCPS
Director, Clinical Transplant Research
University of Illinois Hospital & Health Sciences System
Chicago, IL

Rupinder Sodhi, MD
Transplant Nephrologist
Loyola University Medical Center
Maywood, IL

Daniel Felix, PharmD, BCPS
Clinical Pharmacist
UW Health
Madison, WI

Program Description

The aim of this program is to engage renal care specialists in a dynamic case-based discussion of long-term care in kidney transplantation in the age of COVID-19. Leading experts will explore evolving treatment paradigms, which may help inform care optimization, including strategies for long-term immunosuppressive therapy, and successful implementation of telemedicine.

This is a promotional event. CE/CME credit will not be available for this session.

In compliance with PhRMA and AMA guidelines, only healthcare professionals and office personnel may attend this program. Spouses or other guests are not permitted. This promotional educational activity is brought to you by Veloxis Pharmaceuticals, Inc. The speakers are presenting on behalf of Veloxis Pharmaceuticals, Inc., and must present information in compliance with FDA requirements.

If you are licensed in any state or other jurisdiction (eg, DC, ME, MN, NJ, VT) or are an employee or contractor of any organization or governmental entity that limits or prohibits meals from pharmaceutical companies, please identify yourself so that you (and we) are able to comply with such requirements. Your name, the value, and the purpose of any educational item, meal, or other items of value you receive may be reported as required by state or federal law. Once reported, this information may be publicly accessible.

This is not an official function of CEoT Meeting and not endorsed by AST.

Veloxis PHARMACEUTICALS

NOVARTIS

Transforming transplantation together

Novartis thanks you for your dedication to supporting the world's healthcare needs during these trying times. Giving patients the care they deserve has never been more important, and Novartis is committed to helping ensure access to our medications at **www.saveonmyprescription.com**.

37 Years of Commitment...and Counting

Novartis Pharmaceuticals Corporation
East Hanover, New Jersey 07936-1080

10/20 TPF-1396045


Cedars
Sinai
SMIDT HEART INSTITUTE

AMERICAN SOCIETY OF TRANSPLANTATION

The American Society of Transplantation sincerely thanks the following companies and organizations for their generous support of the AST and its activities:

2021 CORPORATE AFFILIATE PARTNERS

ATARA BIO

CareDx
Your Partner in Transplant Care

CSL Behring
Biotherapies for Life

eurofins | Transplant Diagnostics

HANSA BIOPHARMA

IMMUCOR

Mallinckrodt Pharmaceuticals

MERCK

natera

NOVARTIS

SANOFI

Takeda

Veloxis PHARMACEUTICALS

2021 Corporate Affiliate Partners confirmed at time of printing.

AMERICAN SOCIETY OF TRANSPLANTATION

The American Society of Transplantation sincerely thanks the following companies and organizations for their generous support of the AST and its activities:

AST 2020 SUPPORTERS

PLATINUM

natera

CareDx
Personalized Treatment Surveillance. Better Outcomes.

GOLD

NOVARTIS

SANOFI

CSL Behring
Biotherapies for Life

SILVER

Veloxis
PHARMACEUTICALS

ONE LAMBDA
A Thermo Fisher Scientific Brand

BRONZE

Mallinckrodt Pharmaceuticals

MERCK

HANSA BIOPHARMA

Bristol Myers Squibb

GIFT of LIFE INSTITUTE

UnitedHealth Group

PATRON

eurofins | Transplant Diagnostics

ATARA BIO

IMMUCOR

Takeda

FRIEND

Transplant Connect

eurofins | Transplant Genomics

CEDARS-SINAI Heart Institute

OmniLife
formerly HealthTech Solutions

TRINITY Air Medical

2021 AST SUPPORTER & EXHIBITOR INFORMATION

AMRA MEDICAL

AMRA Medical is a digital health company at the forefront of medical imaging analysis with unrivaled objectivity, repeatability, and precision.

The upcoming AMRA® MAsS Scan Report delivers a patient's Muscle Assessment Score based on muscle volume and muscle fat infiltration. By adding only minutes to an already prescribed MRI, clinicians gain a more personalized medicine approach to the assessment of sarcopenia for patient care decisions in transplantation.

ATARA BIOTHERAPEUTICS

Atara Biotherapeutics, Inc. (@Atarabio) is a leading allogeneic T-cell immunotherapy company pioneering the development of transformative therapies for patients with serious diseases including solid tumors, hematologic cancers, and autoimmune diseases. Using our novel allogeneic EBV T-cell platform, Atara intends to deliver treatments to patients with high unmet need. Our platform aims to leverage the unique biology of EBV T cells to channel the power of the immune system and has the potential to treat a wide range of diseases. Atara is applying this one platform to create a robust pipeline with the goal of developing treatments that improve the quality and longevity of patients' lives. Atara's pipeline includes tabelecleucel in Phase 3 development for EBV-driven post-transplant lymphoproliferative disease (PTLD) and in earlier stages of development for other EBV-associated diseases, ATA188 for multiple sclerosis, and next-generation CAR T therapies for solid tumors and hematologic cancers.

BRISTOL MEYERS SQUIBB

Bristol Myers Squibb is a leading global biopharma company focused on discovering, developing and delivering innovative medicines for patients with serious diseases in areas including oncology, hematology, immunology, cardiovascular and neuroscience. Our employees work every day to transform patients' lives through science.

CAREDX

CareDx, Inc. is a leading precision medicine company focused on clinically differentiated, high-value healthcare solutions for transplant patients and caregivers. We are committed to improving long-term transplant patient outcomes by providing innovative products and services throughout the entire patient journey. To date, our tests have helped care for over 60,000 patients.

CSL BEHRING

CSL Behring is a global biotherapeutics leader driven by its promise to save lives. For over 100 years, we have put patients first by delivering on our promise to discover, develop and deliver new and innovative life-changing therapies that address the world's most serious, complicated and rare disorders. We're now bringing that same commitment to transplantation. Our mission is to address unmet patient needs before, during, and after transplantation, to enable patients to get the very most out of the gift of life.

EMOCHA

emocha is the first comprehensive Digital Medication Adherence program for chronic and infectious diseases. Our tech-enabled service uses asynchronous video check-ins and scalable human engagement to help patients with organ transplants, asthma, tuberculosis, and diabetes radically improve medication adherence. emocha's digital platform is used by public health departments, hospitals, managed care organizations, and academic medical centers, with more than 120 customers across the globe.

EUROFINS TRANSPLANT DIAGNOSTICS

Eurofins Transplant Diagnostics, powered by Transplant Genomics *and* Viracor, can help you leverage the innovation, accuracy, expertise and speed of over 35 years of industry-leading transplant biomarker diagnostics and infectious disease management to improve patient outcomes.

2021 AST SUPPORTER & EXHIBITOR INFORMATION

HANSA BIOPHARMA

Hansa Biopharma is a pioneering biopharmaceutical company and our mission is to develop innovative, lifesaving and life-changing treatments for patients with rare immunological conditions. Hansa has developed a first-in-class Immunoglobulin-G (IgG) antibody cleaving enzyme therapy, which can enable kidney transplantation in highly sensitized patients. Hansa has a rich and expanding research and development program exploring a broad range of conditions. Our pipeline is focussed on advancing the Company's proprietary enzyme technology to develop the next generation of IgG-cleaving enzymes to enable repeat dosing in relapsing autoimmune diseases, chronic transplant rejection, oncology and gene therapy. Find out more at https://hansabiopharma.com.

IMMUCOR

Immucor is a global provider of transfusion and transplantation diagnostics. Our transplant diagnostics division provides molecular and antibody-based assays for HLA compatibility between donors and recipients. Laboratories all over the world use Immucor products as a part of determining the best path forward for a transplant recipient and lowering the probability of rejection. Developing tests to help manage patients post-transplant is our focused commitment. By providing clinicians better tools, we can help change the practice of transplant medicine. Immucor's kSORT is a non-invasive whole blood-based molecular gene expression assay that enables enhanced post-transplant surveillance of graft health, observe immune quiescence in immunosuppressed renal transplant patients and help to rule out kidney transplant rejection.

MALLINCKRODT

Mallinckrodt is a global business that develops, manufactures, markets and distributes biopharmaceutical products and therapies. To learn more visit www.mallinckrodt.com.

MERCK

For more than a century, Merck has been inventing for life, bringing forward medicines and vaccines for many of the world's most challenging diseases. Today, Merck continues to be at the forefront of research to deliver innovative health solutions and advance the prevention and treatment of diseases that threaten people and animals around the world.

NATERA

Next-Level Insights, Next-Level Care. Natera provides advanced DNA technology that enables transplant providers to deliver quality, personalized care. As a diagnostics company with proprietary bioinformatics and molecular technology, we've performed more than 2 million cfDNA tests and are dedicated to improving kidney care for good.

To help you integrate leading-edge DNA technology into kidney care, we offer solutions that are efficient, reliable, and accessible to patients and practices.

- Provide insights and personalize care with genetic testing: Renasight™ is a comprehensive gene panel that analyzes over 380 genes associated with kidney disease, with greater than 99% detection rates across genes screened.
- Make informed, confident treatment decisions for your transplant patients: Prospera™ uniquely assesses all types of kidney transplant rejection with great precision by leveraging expertise in cell-free DNA.

When you have access to the knowledge that these technologies provide, you'll be better equipped to provide optimal care for the kidneys throughout the organs' lifecycle. Discover how you can get the DNA insights you need to offer patients the treatment they need.

2021 AST SUPPORTER & EXHIBITOR INFORMATION

NOVARTIS PHARMACEUTICALS CORPORATION

Novartis Pharmaceuticals Corporation has been committed to the field of transplantation for more than 30 years. With the broadest portfolio of transplant medicines in the industry, we remain dedicated to the transplant community through our research and innovation. From the exploration of new pathways and molecules to continued clinical trial investment, patients are at the center of all we do. We are proud to collaborate with leading professional and advocacy organizations in the transplant community to raise awareness of critical unmet needs in transplantation. Through a number of novel educational and awareness-raising initiatives, we are focused on expanding patients' access to life-saving organ transplants.

ONE LAMBDA

One Lambda, Inc., a Thermo Fisher Scientific Brand is the global leader in transplant diagnostics committed to improving the lives of patients worldwide by driving innovation and delivering quality products. Our comprehensive product portfolio includes a broad range of Antibody Detection assays, post-transplant monitoring solutions including the novel Molecular Microscope® Diagnostic System, HLA Typing products, laboratory instrumentation and software, and industry-leading customer support.

SANOFI

Sanofi is dedicated to supporting people through their health challenges. We are a global biopharmaceutical company focused on human health. We prevent illness with vaccines, provide innovative treatments to fight pain and ease suffering. We stand by the few who suffer from rare diseases and the millions with long-term chronic conditions.

With more than 100,000 people in 100 countries, Sanofi is transforming scientific innovation into healthcare solutions around the globe.

Sanofi, Empowering Life

TAKEDA PHARMACEUTICAL COMPANY LIMITED

Takeda Pharmaceutical Company Limited (TSE:4502/NYSE:TAK) is a global, values-based, R&D-driven biopharmaceutical leader headquartered in Japan, committed to bringing Better Health and a Brighter Future to patients by translating science into highly-innovative medicines. Takeda focuses its R&D efforts on four therapeutic areas: Oncology, Rare Diseases, Neuroscience, and Gastroenterology (GI). We also make targeted R&D investments in Plasma-Derived Therapies and Vaccines. We are focusing on developing highly innovative medicines that contribute to making a difference in people's lives by advancing the frontier of new treatment options and leveraging our enhanced collaborative R&D engine and capabilities to create a robust, modality-diverse pipeline. Our employees are committed to improving quality of life for patients and to working with our partners in health care in approximately 80 countries.

For more information, visit https://www.takeda.com.

The AST would like to thank our partners for supporting the Cutting Edge of Transplantation Meeting, Transplant Summit 2021: Innovations in Modern Immunosuppression. The AST's activities bring together the top minds in the field. Your commitment and continued partnership ensures the advancement of transplantation and continued education for attendees. We sincerely appreciate all that you do to propel this field forward!

2021 AST SUPPORTER & EXHIBITOR INFORMATION

TALARIS

Talaris Therapeutics is developing transformative cell therapies with the potential to eliminate the burden of chronic immunosuppression for organ transplant recipients, as well as induce durable remissions in patients with autoimmune and immune-mediated disorders.

Talaris is currently enrolling de novo living donor kidney transplant patients in the FREEDOM-1 Phase 3 clinical trial. This trial is evaluating FCR001, an investigational allogeneic cell therapy with the potential to induce durable immune tolerance without the need for chronic immunosuppression across all levels of HLA mismatch.

The goal of FCR001 therapy is to create a chimeric "dual immune system" (part-donor and part-recipient) in the recipient. These two immune systems coexist, recognizing both the recipient's own body and the allograft as "self." Achieving durable chimerism potentially enables long-term immune tolerance of the graft.

VELOXIS PHARMACEUTICALS

Veloxis Pharmaceuticals A/S, an Asahi Kasei company, is a commercial-stage specialty pharmaceutical company committed to improving the lives of transplant patients. Veloxis Pharmaceuticals A/S operates in the U.S. through Veloxis Pharmaceuticals, Inc., a wholly owned subsidiary headquartered in Cary, North Carolina, USA. Veloxis is focused on the direct commercialization of immunosuppression medications in the US, expansion of partnerships for markets around the world, and acquisition of assets utilized in transplant patients and by adjacent medical specialties.

One Transplant *for* Life

Over 350,000 Americans live with functioning transplanted organs, thanks to the medical miracle of organ transplantation.

But despite this miracle, more research is required to make one transplant for life a reality.

Through AST's **Power2Save** initiative, we aim to increase public awareness around the importance of funding transplant research.

LEARN MORE at Power2Save.org

Power2Save
TRANSPLANTS SAVE LIVES

An Initiative of the American Society of Transplantation

The Immuno Bill Has Passed!

In December 2020, the Comprehensive Immunosuppressive Drug Coverage for Kidney Transplant Patients Act (Immuno Bill) finally passed!

The AST thanks its members who contacted their members of Congress about this bill. We look forward to continuing to work closely with The U.S. Department of Health and Human Services (HHS) as the Agency works to implement this important patient coverage for 2023.

AST | AMERICAN SOCIETY OF TRANSPLANTATION

AMERICAN SOCIETY OF TRANSPLANTATION

CUTTING EDGE of TRANSPLANTATION

TRANSPLANT SUMMIT 2022

SAVE *THE* DATE

FEBRUARY 17–19, 2022

THE WESTIN KIERLAND PHOENIX AZ

ATC2021

VirtualCONNECT

atcmeeting.org

JUNE 4–9, 2021

THE SCIENCE OF
TOMORROW
STARTS TODAY

Living Donor *Circle of Excellence*

THE AST IS PROUD TO INTRODUCE THE LIVING DONOR CIRCLE OF EXCELLENCE PROGRAM!

Today, many employers do not offer any kind of compensation to an employee recovering from donating an organ. The Circle aims to change that. By recognizing companies who support living donation through providing salary support post-surgery, the AST envisions more people will consider this altruistic act.

The AST strongly encourages its members to discuss this program with their internal HR departments, as well as external organizations that may be interested in this program. More information can be found by visiting the website below.

myAST.org/COE

The AST thanks its Founding Partner, UnitedHealth Group, as well as Supporting Partner, the Canadian Society of Transplantation, for supporting the Circle and for their work to advance this initiative. The AST also thanks its current Circle members.

AMERICAN SOCIETY OF TRANSPLANTATION®

COMING MARCH 2021

EXPLORE A NEW WAY to connect...

Introducing AST's newest partner initiative, AST Partner Connect. Curated with our partners' content and customized for you.

AST PARTNER CONNECT is a virtual platform that offers you the opportunity to engage with our partners on your terms.

The Platform will include:

- educational and interactive content such as videos, downloadable product information, webinars, and more
- A pathway to connect with our partners
- Up to date information on clinical trials, career postings, and more
- Offerings for savings programs for your patients

AST PARTNER connect

A wealth of partner information at your fingertips

2021 AST VIRTUAL RUN AND FITNESS CHALLENGE

GET HEALTHY WHILE SUPPORTING THE FIELD OF TRANSPLANTATION.

Thursday, February 25 – Friday, May 21

You're invited to join the first-ever AST Virtual Run and Fitness Challenge! Achieve your 2021 fitness goals as an individual – or create a team with your friends, family, or colleagues. All participants will receive a t-shirt and access to our interactive race platform.

This Run and Fitness Challenge is powered by a partnership with Veloxis.

Veloxis PHARMACEUTICALS

Learn more and register at:
myAST.org/2021Run

AST | AMERICAN SOCIETY OF® TRANSPLANTATION

AMERICAN SOCIETY OF TRANSPLANTATION

JOBS.MYAST.ORG

Find Your Perfect Fit

THE BEST WAY TO REACH JOB SEEKERS:

Place your job advertisements where highly qualified transplantation professionals search for open positions. Reach job seekers by utilizing the following multichannel approach:

1. The AST Career Center
2. Job Flash™ Email
3. Resume Bank Access

JOB SEEKER BENEFITS:

Get leads on great transplantation jobs with competitive salaries through the AST Career Center, your one-stop resource for focused online job searching.

- Best source of transplantation jobs
- Resume/CV critiques
- Career planning tools
- Networking tips
- Full-time customer service

For more information on recruitment options, contact Customer Service at clientserv@communitybrands.com or (727) 497-6565.

AST | AMERICAN SOCIETY OF TRANSPLANTATION®

READY FOR THE FUTURE?

BECOME A MEMBER OF THE AST

NEW

NON-MEDICAL DOCTORAL MEMBERSHIP

Available for transplant professionals without an accompanying medical doctoral degree. Includes PhDs, PharmDs, DNPs, and PsyDs. Offers reduced dues.

www.myAST.org

Transplant Nephrology Core Curriculum

Group Discounts Available!

The Transplant Nephrology Core Curriculum (TNCC) is an online program jointly provided by the American Society of Nephrology and the American Society of Transplantation. The TNCC focuses on key information needed to prepare for the American Board of Internal Medicine Nephrology Board Certification and Maintenance of Certification examinations. The course also provides a comprehensive update on kidney transplantation.

» www.myAST.org/TNCC

SUBSCRIBE

to the TNCC as an individual or as a group!

THE COURSE INCLUDES:

- Eleven presentations from leading experts in the field of transplant nephrology
- Convenient access to videos from your computer or mobile device
- An option to earn 9.75 Continuing Education Credits for an additional fee.
  - CME
    (AMA PRA Category 1 credits™)
  - MOC (ABIM)
  - CNE (ANCC)
  - CPE (ACPE)

Evaluation of Potential Living Kidney Donors
Didier A. Mandelbrot, MD
University of Wisconsin Hospital

Immunology and Clinical Patterns of Allograft Rejection
Alexander C. Wiseman, MD
University of Colorado at Denver and Health Sciences Center

Infectious Complications of Kidney Transplantation: Focus on CMV and BK Polyoma Infection
Daniel C. Brennan, MD
Johns Hopkins School of Medicine

Long-Term, Noninfectious Complications of Kidney Transplantation (Part 1)
Roy D. Bloom, MD
University of Pennsylvania

Long-Term, Noninfectious Complications of Kidney Transplantation (Part 2)
Heidi M. Schaefer, MD
Vanderbilt University Medical Center

Pediatric Kidney Transplantation
Vikas R. Dharnidharka, MD, MPH
Washington University and St. Louis Children's Hospital

Perioperative Management of the Kidney Transplant Recipient
Jayme E. Locke, MD
University of Alabama at Birmingham

Pharmacology of Immunosuppressive Agents
Rita R. Alloway, PharmD
University of Cincinnati

Recipient and Donor Outcomes
Daniel C. Brennan, MD
Johns Hopkins School of Medicine

Recipient Evaluation in Kidney Transplantation
Vineeta Kumar, MD
University of Alabama at Birmingham

Regulation of Transplantation in the United States
John J. Friedewald, MD
Northwestern Medicine

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American Society of Nephrology and the American Society of Tranplantation. The American Society of Nephrology is accredited by the ACCME to provide continuing medical education for physicians.

This activity is planned and implemented by the University of Minnesota, Interprofessional Continuing Education and the American Society of Nephrology. In support of improving patient care, University of Minnesota, Interprofessional Continuing Education is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team.

ASN American Society of Nephrology

AST AMERICAN SOCIETY OF TRANSPLANTATION

YOUNG INNOVATOR AWARD WINNERS

Ali Arif
Temple University Hospital Lewis Katz School of Medicine
Philadelphia, PA

Alixandra Killian
University of Alabama at Birmingham
Birmingham, AL

Guneet Kochar
Vanderbilt University Medical Center
Nashville, TN

Seong Kyu Kim
Smidt Heart Institute at Cedars-Sinai
Los Angeles, CA

Jeffrey Stern
NYU Langone Health
New York, NY

Shahul Valavoor
Indiana University
Indianapolis, IN

Amanda Vinson
Dalhousie University
Halifax, NS

At the time of print

ABSTRACTS

TITLE: Pill Burden in Belatacept versus Tacrolimus-based Immunosuppression

AUTHOR(S) (FIRST NAME, LAST NAME): Laila Lakhani, Sara Gattis, Arpita Basu

INSTITUTIONS (ALL): *Emory University Hospital, Emory University Hospital, Emory University Hospital*

ABSTRACT: 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. 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.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 betalacept groups was seen even if stratified by age group (Table 2).Belatacept should be the immunosuppression of choice amongst all eligible kidney transplant recipients to reduce pill burden and potentially improve medication adherence.

KEYWORDS: Belatacept; tacrolimus; adherence

TITLE: Covid-19 In Solid Organ Transplantation (SOT): Results Of The National Covid Cohort Collaborative (N3C)

AUTHOR(S) (FIRST NAME, LAST NAME): Amanda Vinson, Gaurav Agarwal, Ran Dai, Evan French, Stephen Lee, Amy Olex, Alfred Anzalone, Vithal Madhira, Roslyn, Mannon

INSTITUTIONS (ALL): *Dalhousie University, UAB, University of Nebraska Medical Center, Virginia Commonwealth University, University of Sasketchewan, Virginia Commonwealth University, University of Nebraska Medical Center, Palila Software, University of Nebraska Medical Cente*

ABSTRACT: 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.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.To date, 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.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 a novel opportunity for analyses of COVID in SOT recipients on a granular level, across many institutions.

KEYWORDS: Outcomes, rejection, MACE, informatics

TITLE: The Gut Microbiome in Heart Transplantation: A Prospective Pilot Study

AUTHOR(S) (FIRST NAME, LAST NAME): Mark Dela Cruz, Eric Littmann, Ravi Nayak, Christopher Lehmann, Robert Keskey, Talia Baker, Huaiying Lin, Amy Bennett, Gene, Kim, Sean Pinney, Eric Pamer, Ann B. Nguyen

INSTITUTIONS (ALL): *University of Chicago, University of Chicago, University of Chicago, University of Chicago, University of Chicago, UChicago, University of Chicago, University of Chicago, University of Chicago, University of Chicago, University of Chicago, University of Chicago*

ABSTRACT: 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.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 SCFAs concentrations were determined using targeted metabolomics. HT samples were compared to those from healthy controls (HC), liver transplant (LT), and ICU patients.193 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, measured by inverse Simpson index, was lower among HT recipients compared to HC ($p<0.002$), but higher than that of ICU and LT subjects ($p<0.003$ and $p<0.001$, respectively) (Figure 1A). HT subjects had lower frequencies of Ruminococcaceae compared to HC (11.3% vs 24%, $p<0.001$), while ICU and LT subjects had marked losses of obligate anaerobes, with a higher predominance of Enterococcus, Lactobacillus, and Proteobacteria including Klebsiella. 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, $p<0.001$) (Figure 1B). Strong Spearman correlations were found between the presence of Lachnospiraceae and the fecal SCFA concentrations of acetate ($r = 0.62$, $p<0.001$), butyrate ($r = 0.50$, $p<0.003$), and propionate ($r = 0.59$, $p<0.001$) among both HT and ICU subjects in particular. Similar correlations were seen with Ruminococcaceae. Marked changes to the relative abundance of these species and SCFA production were observed over time for individual subjects. Analysis of beta diversity, i.e. differences between samples, with Bray-Curtis and Unifrac PCoA demonstrated a trend towards clustering by cohort.The microbiota of HT recipients is less diverse than that of HC but is remarkably more diverse and contains a greater presence of commensal bacteria than that of LT or ICU subjects. SCFA concentrations, including butyrate, differed significantly between cohorts and correlated to the presence of specific bacterial groups. Intriguing differences in microbiota composition and SCFA production are measurably identifiable between patient groups. Further recruitment, collection, and correlation to clinical outcomes is in progress.

KEYWORDS: Heart Transplant, Liver Transplant, Microbiome

TITLE: A Case-match Cohort Comparison Of The Safety And Efficacy Of Basiliximab For Immunosuppression Holiday In Lung Transplant Patients

AUTHOR(S) (FIRST NAME, LAST NAME): Morgan Eiting, Jacqueline Clark, Christin Rogers Marks, Georgina Waldman

INSTITUTIONS (ALL): *Massachussetts General Hospital, Massachussetts General Hospital, Massachusetts General Hospital, Massachusetts General Hospital*

ABSTRACT: 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.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.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%).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.

KEYWORDS: Lung transplantation ; Toxicity ; Immunosuppression ; Rejection

TITLE: Kidney Transplant Outcomes Stratified by Race with a Calcineurin and Steroid Free Regimen

AUTHOR(S) (FIRST NAME, LAST NAME): Riley Scalzo, Matt Harris, Jessica Morris, Jennifer Byrns

INSTITUTIONS (ALL): *Duke University Hospital, Duke University Hospital, Duke University Hospital, Duke University Hospital*

ABSTRACT: Belatacept-based immunosuppression regimens are associated with less renal, metabolic, and cardiovascular toxicities, although early studies found that patients who received belatacept-based immunosuppression had higher rates of acute rejection, when compared to those who received calcineurin inhibitors (CNIs). Kirk et al. studied belatacept in combination with sirolimus after alemtuzumab induction and found that zero out of twenty kidney transplant recipients experienced clinical, biopsy proven, acute rejection within the first year. Furthermore, African Americans (AA) are known to have poorer outcomes after kidney transplantation and one of the proposed reasons is hyper-metabolism of CNIs. As the maintenance immunosuppression regimen of belatacept and sirolimus does not include the use of a CNI, a study is warranted analyzing the impact of race on the outcomes of patients receiving this regimen.This was a retrospective, observational, single-center study that analyzed the outcomes of kidney transplant recipients who received belatacept-sirolimus maintenance immunosuppression after alemtuzumab induction. To be included, patients must have received a kidney-only transplant between January 1st, 2016 and August 31st, 2019, be 18 years or older at time of transplant, and be EBV seropositive. The primary outcome was renal function (GFR by MDRD or CKD-EPI) at 1 year. Secondary outcomes included renal function at 3, 6, and 9 months, incidence of biopsy proven acute rejection (BPAR), patient and graft survival at 1 year, incidence of infection, incidence of malignancy, and overall tolerability of the regimen. Descriptive statistics were used for data analysis.Fifteen AA and 26 non-AA

patients were included. On average, patients were 48 years old, male, and recipients of living donors with diabetes mellitus as the etiology of end stage renal disease (ESRD). Patients in the two cohorts were well-matched, with the exception of the AA cohort having more deceased donor recipients and longer cold ischemic times (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 and graft survival in both groups was 100% at 1 year. Three patients in the AA group (20%) experienced BPAR within the first year, one attributed to non-adherence and one to intentional changes in immunosuppression due to BK viremia. No BPAR was seen in the non-AA group. Of note, de novo DSAs were present in 3 patients in the AA cohort versus 0 in the non-AA cohort (p=0.004) Adverse drug reactions (ADRs) were similar between cohorts. The most common ADRs included wound healing complications (40% versus 46.2%, respectively in AA versus non-AA cohort), mouth ulcers (20% versus 53.8%, respectively), and leukopenia (73.3% versus 65.4%, respectively). One patient was diagnosed with a new malignancy. CMV viremia occurred in 6 patients in each cohort, EBV viremia occurred in 3 patients in the AA versus 1 patient in the non-AA cohort, and BK viremia occurred in 5 patients versus 6 patients, respectively, including one case of BK nephropathy in each cohort.No significant differences between the AA and non-AA cohort were found in GFR at 1 year while receiving belatacept and sirolimus maintenance immunosuppression after alemtuzumab induction. The median GFR was similar to findings from previous studies. This regimen was associated with excellent patient and graft survival, although a 20% rate of acute rejection, which is also similar to the incidence of acute rejection reported in prior studies with belatacept use. Furthermore, there were minimal differences between the two cohorts in overall tolerability of the regimen. In conclusion, race did not seem to impact renal outcomes in patients who received belatacept and sirolimus after alemtuzumab induction.

KEYWORDS: African American, Renal Function, Belatacept, Sirolimus

TITLE: Belatacept and Sarcoidosis -a unique case of a renal transplant recipient.

AUTHOR(S) (FIRST NAME, LAST NAME): Pooja Sanghi, Sudheer Penupolu, Michael Marvin, Prince Mohan

INSTITUTIONS (ALL): *Geisinger Medical Centre, Geisinger medical Center, Geisinger Medical Center, Geisinger Medical Center*

ABSTRACT: Belatacept in de-novo kidney transplantation has been a valuable treatment option for maintenance immunosuppression. However, physicians need to be aware of adverse events (AE's) of clinical relevance in Belatacept treated recipientsA 52-year-old African American male, with stable CKD stage III since 2013

(eGFR 40ml/mt) presented with intermittent cough, dyspnoea, night sweats, and fatigue of 6-month duration with associated hypercalcemia of 12.6, PTH of 5 with a decline in eGFR to 14ml/mt in November of 2015. A CT scan showed extensive mediastinal lymphadenopathy with a reticulonodular pattern in the lungs. A tentative diagnosis of sarcoidosis was made after biopsy of mediastinal lymph nodes and the liver showed noncaseating granulomatous inflammation. His symptoms resolved within 2 weeks of starting on oral prednisone. Due to the progression of his kidney disease, he went on dialysis which he continued for 2 years before he received a living donor kidney transplant in July of 2018. His induction therapy consisted of anti-IL2R (Basiliximab), with standard maintenance doses of Mycophenolate (MMF) and tacrolimus for the first 6 months, and was switched to monthly Belatacept thereafter. His allograft function remained stable. His sarcoid remained quiescent until December 2019 when he presented again with a 6-month history of dry cough, dyspnoea, night sweats along with elevated hepatic transaminases. The patient underwent lung, liver, and mediastinal lymph node biopsies, all of which demonstrated sarcoid-like noncaseating granulomas. He received high dose oral steroids for 3 months and Belatacept was switched to Tacrolimus.

His symptoms resolved in 2 weeks and he remains well to date.Belatacept like Abatacept, antagonizes CD80-86, the ligand for CD28(essential to regulatory T cell generation) and cytotoxic T lymphocyte antigen 4(CTLA-4). The CTLA-4 pathway is a negative regulator of T-cell activation. T helper (Th17) cells are overly sensitive to CTLA-4 co-inhibition. Autoimmune-related AE's in Belatacept recipients are reported, with TH17 mediated psoriasis being common. Sarcoid granulomatosis involves dysfunction of Tregs, &expansion of CD4+ Th17 cells. Abatacept can cause granulomatous hepatitis in mice. No human studies have shown granulomatous inflammation from Belatacept. We present a unique case of multiorgan sarcoid-like granulomatous inflammation exacerbated in a patient with known Sarcoid, that resolved after stopping Belatacept thus highlighting a potential drug etiology. Pharmacovigilance in transplant settings is important. It yields new concerns about rare AE's. Physicians should be aware of Belatacept use in kidney transplantation being implicated in sarcoidosis occurrence.

KEYWORDS: Immunosuppression ,Belatacept, lymphocytes, adverse reactions

TITLE: Quantifying Hidden Sensitization: HLA-reactive Memory B Cells in the Spleens of Sensitized Women

AUTHOR(S) (FIRST NAME, LAST NAME): John Killian, Julie Houp, Anoma Nellore, Rodney King, Paige Porrett, Frances Lund

INSTITUTIONS (ALL): *Department of Surgery, University of Alabama at Birmingham School of Medicine, Department of Surgery, University of Alabama at Birmingham School of Medicine, Department of Medicine, University of Alabama at Birmingham School of Medicine, Department of Microbiology, University of Alabama at Birmingham School of Medicine, Department of Surgery, University of Alabama at Birmingham School of Medicine, Department of Microbiology, University of Alabama at Birmingham School of Medicine*

ABSTRACT: 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.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).HS was detected in 3 of 6 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.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.

KEYWORDS: B cells, anti-HLA Antibodies, Sensitization

TITLE: The use of cardiac MRI in detecting biopsy-negative rejection in heart transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Tahli Singer-Englar, Michelle Kittleson, Jignesh Patel, Jack Haslett, Seong Kyu Kim, Nikhil Patel, Babak Azarbal, Evan Kransdorf, Lawrence, Czer, Alfredo Trento, Jon Kobashigawa

INSTITUTIONS (ALL): *Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai*

ABSTRACT: Heart transplant (HTx) patients who develop cardiac dysfunction, defined as left ventricular ejection fraction (LVEF) ⟡40% without biopsy-proven rejection are relegated to a diagnosis of biopsy-negative rejection. In these cases, cardiac magnetic resonance imaging (cMRI) is performed to assess for myocardial injury identified as edema/fibrosis represented by prolonged T1 and T2 relaxation times. It has not been clinically established whether cMRI can determine rejection in this presentation. Between 2010 and 2019, we assessed 7 HTx patients who developed graft dysfunction (LVEF 33.0 ± 10.5%) without biopsy-proven rejection (referred to as biopsy-negative rejection). These patients underwent cMRI within 2 weeks of the heart biopsy to detect myocardial edema/fibrosis. HTx patients who developed biopsy-negative rejection were found to have myocardial edema in 42.9% or fibrosis in 57.1% of the cMRIs performed within 2 weeks of the initial heart biopsy. Myocardial edema/fibrosis was observed in 85.7% of rejection episodes. 1-year subsequent survival post-rejection was 71.4%.Cardiac MRI may be of value to confirm myocardial injury characterized as edema or fibrosis in patients who have biopsy-negative rejection. This may allow more focused anti-rejection treatments.

KEYWORDS: Heart transplant, Cardiac MRI, Graft dysfunction, Myocardial edema, Biopsy-negative rejection

TITLE: Timing after heart transplant on transition to CNI-free immunosuppression for optimal kidney recovery

AUTHOR(S) (FIRST NAME, LAST NAME): Nikhil Patel, Michelle Kittleson, Jignesh Patel, Tahli Singer-Englar, Seong Kyu Kim, David Chang, Babak Azarbal, Andriana Nikolova, Lawrence, Czer, Fardad Esmailian, Jon Kobashigawa

INSTITUTIONS (ALL): *Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai*

ABSTRACT: 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.Between 1994 and 2017, we assessed 61 HTx patients with elevated creatinine. RSP was started at creatinine levels of 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.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 5.26 ± 4.2 years.RSP performed at earlier rising serum creatinine appears most beneficial in terms of restoring optimal kidney function.

KEYWORDS: Heart transplant, Renal dysfunction, Renal sparing protocol, Calcineurin inhibitors, Creatinine

TITLE: The use of ACE inhibitors in diabetic heart transplant patients: Friend or foe to the kidneys?

AUTHOR(S) (FIRST NAME, LAST NAME): Seong Kyu Kim, Michelle Kittleson, Jignesh Patel, David Chang, Nikhil Patel, Tahli Singer-Englar, Rafael Skorka, Antoine Hage, Lawrence, Czer, Fardad Esmailian, Jon Kobashigawa

INSTITUTIONS (ALL): *Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai*

ABSTRACT: 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.Between 2010 and 2019, we assessed 34 heart transplant patients who had pre-transplant diabetes with normal kidney function (creatinine < 1.3 mg/dL) 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.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 difference among the study groups. 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.

KEYWORDS: Heart transplant, Diabetes, Renal dysfunction, ACE inhibitors, Calcineurin inhibitor nephrotoxicity, Creatinine

TITLE: Can prednisone be safely weaned in heart-kidney transplant patients?

AUTHOR(S) (FIRST NAME, LAST NAME): Rafael Skorka, Jignesh Patel, Michelle Kittleson, Tahli Singer-Englar, Nikhil Patel, Angela Velleca, Babak Azarbal, David Chang, Evan, Kransdorf, Lawrence Czer, Dominick Megna, Jon Kobashigawa

INSTITUTIONS (ALL): *Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai, Smidt Heart Institute at Cedars-Sinai*

ABSTRACT: 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. Between 2010 and 2018, we assessed 50 sHKTx patients. 13 of these patients were weaned off prednisone within the first year after transplant and 37 patients remained on prednisone. The endpoints included subsequent 1-year survival, freedom from cardiac allograft vasculopathy (CAV, stenosis ⇢30% by angiography), freedom from acute cellular rejection (ACR), and freedom from antibody-mediated rejection (AMR) were also included. Creatinine and glomerular filtration rate (GFR) were used to assess renal function pre- and post-prednisone wean.Patients who were weaned from prednisone exhibited similar subsequent 1-year survival, freedom from CAV, and freedom from rejection compared to those patients not weaned off prednisone. In addition, renal function was also not affected by the prednisone wean. (See table.) Steroid-free immunosuppression appears safe in sHKTx patients. Larger number of patients will be needed to confirm these findings.

KEYWORDS: Heart-kidney transplant, Prednisone, Survival, Cardiac allograft vasculopathy, Rejection, Creatinine, GFR

TITLE: Current International Intestinal Transplant Registry Data is Insufficient for Immunologic Risk Assessments

AUTHOR(S) (FIRST NAME, LAST NAME): Joseph Ladowski, Mariya Samoylova, Jeffrey Ord, Annette Jackson, Debra Sudan

INSTITUTIONS (ALL): *Duke University, Duke University, Duke University, Duke University, Duke University*

ABSTRACT: The International Intestinal Transplant Registry (IITR) is an encounter-based database developed by an international consortium performing intestinal transplantation (IT). The goal of this study was to characterize available immunological data and evaluate factors associated with rejection.Demographic, outcomes, and serologic HLA data from donor/recipient pairs was obtained from the IITR. HaploStats was used to convert serological data to high-resolution, four-digit HLA sequences. Eplet mismatch analysis was performed using HLAMatchmaker. Highest and lowest deciles were compared for reported DSA correlations using a Mann-Whitney non-parametric t-test for all class I HLA, -DRB1/3/4/5, and –DQA/B1.Data from 228 ITs with a median follow-up time of 28 months (range 0–103 months) was evaluated. 31 (13.6%) individuals lacked any HLA typing, 17(7.4%) had molecular data, and 180 patients (79.0%) had recorded serological typing. Of 197 patients with HLA typing data, 62 (31.5%) were excluded for lack of DSA follow-up, 9 (4.6%) for preformed DSA, 13 (6.6%) for survival less than 24 hours, and 6 (5.3%) due to missing HLA-DQ typing that could not be imputed with confidence. Of the remaining 107, 35 (32.7%) had DSA reported post-transplant. Time to DSA detection was available for 28 of 35 (87.5%) individuals revealing a broad timeline with a median of 0.57 months (range 4–1097 days).

With the available data, there was no difference in graft ($p = 0.89$) or patient survival ($p = 0.54$) between those who reported post-transplant DSA and those who did not. Comparing the highest and lowest 20th percentiles of HLA eplet mismatch scores, we found no difference in reported DSA development, rejection, graft survival, or patient survival for antibody-verified class I, class II (-DR1/3/4/5, -DQA1/DQB1), HLA-DR1/3/4/5, and HLA–DQA1/DQB1 (data summarized in Figure 1). Of note, the associations of the outcomes were strongest when investigating HLA class II, although they did not reach significance.

There is strong evidence that HLA eplet mismatch scores are correlated with post-transplant DSA development and rejection. Unfortunately, the study of this question in the IITR is limited by the quality and completeness of HLA and DSA data. Moreover, early DSA detection within the first post-transplant month may reflect limited pre-transplant screening and under appreciation of preformed HLA

immune memory. To develop multicenter, data-based guidance for immunological risk assessment and immune monitoring, we must first improve the completeness of the registry immunological dataset.

KEYWORDS: eplet, DSA, HLA, intestinal transplant

TITLE: Kidney Transplant Outcomes Stratified by Age with a Calcineurin and Steroid Free Regimen

AUTHOR(S) (FIRST NAME, LAST NAME): Riley Scalzo, Matt Harris, Jessica Morris, Jennifer Byrns

INSTITUTIONS (ALL): *Duke University Hospital, Duke University Hospital, Duke University Hospital, Duke University Hospital*

ABSTRACT: Belatacept is a novel immunosuppressive agent that offers several advantages over the commonly used calcineurin inhibitors (CNIs). Despite this, belatacept-based immunosuppression was associated with higher rates of acute rejection in early studies, when compared to CNIs. In an attempt to challenge this finding, Kirk et al. studied a combination of belatacept and sirolimus after alemtuzumab induction. As hypothesized, this regimen led to zero cases of biopsy proven, acute rejection within the first year in a population of 20 kidney transplant recipients. Furthermore, age is known to play a significant role in a patient's post-transplant course. Given the potential benefits of a regimen containing belatacept and sirolimus after alemtuzumab induction, a study is warranted analyzing the impact of age on the outcomes of patients receiving this therapy.This was a single center, retrospective analysis of kidney transplant patients who received alemtuzumab induction with de novo belatacept and sirolimus between January 2016 and August 2019. A cohort analysis was performed on patients who were <55 years old versus >/=55 years old and received a kidney-only transplant,18 years or older at transplant, and EBV seropositive. The primary endpoint was renal function (GFR by MDRD or CKD-EPI) at 12 months. Secondary endpoints included renal function at 3, 6, and 9 months, incidence of biopsy proven acute rejection (BPAR) and/or de novo donor specific antibodies (DSAs), patient and graft survival at 12 months, incidence of malignancy and infection, and tolerability of the regimen defined by incidence of post-transplant diabetes mellitus (PTDM), hyperlipidemia, mouth ulcers, wound healing complications, infusion-related reactions, and leukopenia. Descriptive statistics were performed.Twenty seven patients <55 years old and 14 patients >/=55 years old were included in the analysis. Baseline demographics were similar between groups (see Figure 1) with the exception of age. On average, patients were Caucasian, male living donor recipients. At 12 months, GFR was 51.5 mL/min in the <55 years old cohort versus 57.5 mL/min in the >/=55 years old cohort (p=0.32) (see Figures 2 and 3). Serum creatinine at 12 months was higher in the <55 years old group (1.5 mg/dL versus 1.1 mg/dL, respectively, p=0.02). BPAR and de novo DSAs were not different between groups. Patient and graft survival was 100%. CMV viremia occurred in 6 patients in each group (22.2% versus 42.9%, respectively) and BK viremia occurred in 8 patients in the <55 years old group versus 3 in the >/= 55 years old group. The most common infection was urinary tract infection (18.5% versus 14.3%, respectively). Malignancy occurred in 1 patient who was in the <55 years old cohort. The medication regimen was well tolerated with mouth ulcers (40.7% versus 42.9%, respectively) and leukopenia (66.7% versus 71.4%, respectively) being the most common adverse drug reactions. No patients in the cohort developed PTDM.Renal function defined by MDRD/CKD-EPI was preserved in both cohorts regardless of age in those receiving a maintenance regimen of belatacept and sirolimus after alemtuzumab induction. The median GFR is similar to findings from previous studies. This regimen was associated with excellent patient and graft survival. Furthermore, there were minimal differences between the two cohorts in overall tolerability of the regimen. In conclusion, age did not seem to impact renal outcomes in patients who received belatacept and sirolimus after alemtuzumab and the regimen was well tolerated regardless of age.

KEYWORDS: Age, Renal function, Belatacept, Sirolimus

TITLE: Cell-Free-DNA as a surrogate marker for kidney biopsy- Indiana University Transplant Nephrology Experience.

AUTHOR(S) (FIRST NAME, LAST NAME): Shahul Valavoor, Oluwafisayo Adebiyi

INSTITUTIONS (ALL): *Indiana University, Indiana University*

ABSTRACT: 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), DNA of donor origin in the blood of KT recipient arising from cells undergoing injury and death, a noninvasive test that has been used in recent times as a surrogate marker for the diagnosis of acute rejection. KT biopsy and histological assessment can be logistically challenging in some cases and carries inherent risk for complications related to procedure. Advancements in noninvasive biomarker assays such as dd-cfDNA may offer the opportunity to improve and expand the spectrum of available diagnostic tools to monitor and detect risk for rejection and positively impact outcomes for KT recipients. As the interest in telehealth and remote monitoring increases, many transplant practitioners have turned to donor-derived cell-free DNA (dd-cfDNA) to noninvasively monitor the immunologic status of allografts. We are reporting our experience with dd-cfDNA in our academic center for the period of January 2017 to August 2020.

Methods: 29 Patients with suspected rejection who underwent both donor-derived cell-free DNA (dd-cfDNA) test and Allograft Biopsy within a time frame of 2 weeks, between January 2017 till August 2020, were included in the study. 23 out of 29 patients underwent dd-cfDNA and Allograft biopsy within a time frame of 1 week. Patients who underwent dd-cfDNA and Allogaft biopsy with a time a frame of 2 weeks or more between tests were excluded.

Results at our academic center showed that 17 out of 29 patients (58%) who had negative dd-cfDNA test had signs of rejection on histology.

5 out of 29 patients (17%) who had positive dd-cfDNA test had no signs of rejection on histology.

Histology and dd-cfDNA test correlated in only 6 out of 29 patients (20%).

Our study has limitations. First, it is a single point dd-cfDNA. Second, the type of rejection in our study was mostly found to be Acute Cellular Rejection (ACR), whereas, some studies have shown greater correlation of dd-cfDNA with Acute Antibody Mediated rejection (AMR).

We suggest that since dd-cfDNA is noninvasive, testing patients for dd-cfDNA more frequently at set intervals after KT may be more useful than a single point testing, which may indicate rise in titres over time which in-turn could provide clues for early detection of possible allograft rejection. Clinicians must recognize that many patients with rejection will have reassuring dd-cfDNA results, so negative or positive tests must be received with caution. On the basis of currently available data, negative dd-cfDNA alone should not be considered to "rule out" rejection in cases where the pretest probability of rejection is not already low.

KEYWORDS: Cell-Free-DNA Surrogate Marker Kidney Transplant Rejection

TITLE: Better dialysis facility quality ratings are associated with increased listing for kidney transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Joel Adler, Lingwei Xiang, Joel Weissman, James Rodrigue, Rachel Patzer, Sushrut Waikar, Thomas Tsai

INSTITUTIONS (ALL): *Brigham and Women's Hospital, Brigham and Women's Hospital, Brigham and Women's Hospital, Beth Israel Deaconess Medical Center, Emory University, Boston Medical Center, Brigham and Women's Hospital*

ABSTRACT: 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) has two public reporting programs intended to improve dialysis facility quality: (1) the Five-Star Quality Rating to help patients evaluate the quality of their dialysis center and (2) the Quality Incentive Program (QIP), a pay-for-performance program which penalizes dialysis center payments up to 2%. Empirical data would be helpful to assess whether improving patient choice by increasing access to higher quality dialysis centers would lead to higher transplant listing rates, aiding the goals of AAKH.

Using the incident cohort of adult patients beginning dialysis in 2013-2018 from the United States Renal Data System, rates of listing for transplant within one year were assessed. Dialysis facility Five-Star Quality and QIP scores were obtained from Medicare Dialysis Facility Compare. We analyzed crude one year listing rates by Five-Star Quality and QIP ratings, and then estimated the probability of listing for transplant within one year using a logistic regression model that controlled for patient- and facility-level factors.Of the 507,581 incident dialysis patients, 33,048 (6.5%) were listed for transplantation within 1 year. Median dialysis facility one year listing rate was 5.4% (IQR 2.5-9.1%). Adjusting for both patient- and facility-level covariates, patients at 5 star facilities were 1.3 times more likely to be listed for transplant compared to 1 star facilities (P<0.001). A similar observation was found for QIP score, where the odds of listing were higher at QIP score ⋯→75 vs <40 facilities (OR 1.4, P<0.001, Figure). Patients from rural (OR 0.7, P<0.001), for-profit (OR 0.8, P<0.001), and large (OR 0.8, P<0.001) dialysis facilities were less likely to be listed.There was a significant association between a higher likelihood of listing for transplant and better dialysis facility quality as measured by the CMS Five-Star Quality Ratings and QIP scores. Increasing patient access to higher quality dialysis facilities may increase access to transplantation and achieve the goals of AAKH. Moreover, these ratings could be integrated into the current CMS quality metrics to incentivize dialysis center referral to transplant centers, inform patient choice, and drive quality improvement.

KEYWORDS: dialysis, policy, advancing american kidney health, quality

TITLE: Clinical Effect of Post-Transplant AV-Fistula Ligation on Hemodynamic Status and Kidney Allograft function

AUTHOR(S) (FIRST NAME, LAST NAME): Shahul Valavoor, Oluwafisayo Adebiyi

INSTITUTIONS (ALL): *Indiana University, Indiana University*

ABSTRACT: Ligation of AVF post kidney transplant often done mostly for esthetic reasons 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 center to see the effects of AVF ligation on Hypertension and kidney function parameters at one-year post procedure.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.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).Post-kidney transplant AV fistula Ligation appears to have no significant effect on kidney allograft function one-year post procedure though may be associated with higher blood pressure.

KEYWORDS: Clinical Effects Post-Transplant AV-Fistula Ligation Hemodynamic Status Kidney Allograft function

TITLE: The Detection of ABMR In Patients with AT1R Antibodies using Donor-derived Cell Free DNA

AUTHOR(S) (FIRST NAME, LAST NAME): Sam Kant, Dhiren Kumar, Irfan Moinuddin, Tarek Alhamad, Murad Haris, Jennifer Gray, Bethany Dale, Maria Bettinotti, Daniel C., Brennan

INSTITUTIONS (ALL): *Johns Hopkins University School of Medicine, Virgina Commonwealth University, Virgina Commonwealth University, Washington University School of Medicine at St. Louis, Washington University School of Medicine at St. Louis, CareDx, CareDx, Johns Hopkins University School of Medicine, Johns Hopkins University School of Medicine*

ABSTRACT: 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.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 testsWe 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 (Figure 1). Levels of dd-cfDNA were lower in patients with FSGS as primary disease (p=0.04), in comparison other etiologies of kidney disease (Figure 2). 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 (Figure 3).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.

KEYWORDS: AMBR, AT1R, donor-derived cell free DNA

TITLE: Black Transplant Recipients Reside in the Most Socially Vulnerable Communities

AUTHOR(S) (FIRST NAME, LAST NAME): Alixandra Killian, Chandler McLeod, Brittany Shelton, Rhiannon Reed, Paul MacLennan, Haiyan Qu, Babak Orandi, Deirdre Sawinski, Jayme, Locke

INSTITUTIONS (ALL): *University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Pennsylvania, University of Alabama at Birmingham*

ABSTRACT: Racial and socioeconomic disparities in posttransplant 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.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.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).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.

KEYWORDS: Social vulnerability, racial disparities, solid organ transplantation

TITLE: Living Donor Kidney Transplantation Racial Disparities Persist Independent of Social Vulnerability

AUTHOR(S) (FIRST NAME, LAST NAME): Alixandra Killian, Chandler McLeod, Brittany Shelton, Rhiannon Reed, Paul MacLennan, Haiyan Qu, Babak Orandi, Vineeta Kumar, Deirdre, Sawinski, Robert Cannon, Douglas Anderson, Michael Hanaway, Jayme Locke

INSTITUTIONS (ALL): *University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Pennsylvania, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham, University of Alabama at Birmingham*

ABSTRACT: 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.This retrospective study utilized the Scientific Registry of Transplant Recipients to identify

adult, kidney 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.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).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.

KEYWORDS: LDKT, racial disparities, social vulnerability

TITLE: Role of cell free DNA in simultaneous liver and kidney transplant-a case report

AUTHOR(S) (FIRST NAME, LAST NAME): Pooja Sanghi, Prince Mohan, Michael Marvin, Anil Kotru

INSTITUTIONS (ALL): *Geisinger Medical Centre, Geisinger Medical Center, Geisinger Medical Center, Geisinger Medical Center*

ABSTRACT: Since its discovery in 1948, growing evidence and clinical use have demonstrated that donor-derived cell-free DNA (dd-cfDNA), allows early detection of allograft injury, making it a valuable non-invasive quantitative marker of inflammation used for monitoring post-transplant(1). A rise in dd-cfDNA levels precedes changes in serum creatinine, thus allowing early detections and providing a screening tool for allograft rejection(2). However, the utility of elevated values in presence of dual organ transplants has not been validated in studies and remains an unknown territory.Case

A 30-year-old Caucasian lady underwent a simultaneous liver and kidney (SLK) transplantation in January of 2020 for congenital biliary atresia and renal failure due to calcineurin toxicity, respectively. Post-transplant her baseline renal allograft function remained at 1.4mg/dl with stable liver functions. She was maintained on Tacrolimus(FK) 5mg twice daily (goal of 8-10ng/ml), Cellcept 500mg twice daily, and 5mg daily dose of Prednisone. A decision was made to switch to Everolimus and FK, to reduce exposure to calcineurin inhibitors (3). She underwent a routine cfDNA test in May which came back at 5.6% following which she underwent a kidney biopsy that showed borderline acute T cell-mediated rejection prompting treatment with a short course of steroids. The repeat cfDNA in June was 1.5% and creatinine improved to 1.3mg/dl. Later in the month, she ended up yet another kidney biopsy due to rising creatinine which was negative for rejection this time but unfortunately led to the development of a page kidney along with an acute kidney injury with creatinine rise to 5.5mg/dl due to compression from hematoma necessitating hospital admission.

She was discharged in early July with improved creatinine to 1.8mg/dl but the cf DNA remained elevated at 1.8% the significance of which in presence of liver transplant was not clear. She was admitted again in August with Klebsiella urinary tract infection(UTI), creatinine of 2.9mg/dl, and a cfDNA of 4.5% in the setting of UTI. She was treated with IV antibiotics and discharged by end of August with improved creatinine of 1.7mg/dl and improved cfDNA of 1%. She remains well to date out of the hospital.

Discussion

It is proposed in multiple studies that molecular characterization of the renal allograft through biomarkers like dd-cfDNA should complement targeted tissue biopsy due to the association of clinically adverse outcomes with elevated cfDNA levels(5). Elevation in cfDNA levels varies with higher values seen in presence of liver transplants due to the large volume of the organ and is also dictated by the type of injury (vascular injury vs inflammation from infection) (4). Clinicians should consider cfDNA as a continuous variable and need to follow a standard reference range in order to have a better interpretation of results(5). Elevation of cfDNA especially in presence of dual organ transplants needs to be better interpreted in combination with other non-invasive genomic biomarkers (both in urine and blood) for monitoring injury status of renal allograft as every elevated cell-free DNA does not represent a rejection of the allograft.

Physicians should consider the use of companion diagnostic biomarkers as tools to supplement the utility of biopsy. Elevated levels in presence of liver transplants have not been validated in studies. We highlight a case of SLK with high levels of cfDNA even in absence of rejection. Etiology of allograft injury based on genome sequencing in urine and blood is the need for future studies.

KEYWORDS: Biomarker, kidney allograft dysfunction, immune function monitoring, dual organ transplants

TITLE: Association Of Kidney Function With Patient Reported Outcomes After Kidney Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Guneet Kochar, Scott Rega, Irene Feurer, Anthony Dreher, Heidi Schaefer, Rachel Forbes, David Shaffer, C. Wright Pinson, Beatrice, Concepcion

INSTITUTIONS (ALL): *Vanderbilt University Medical Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center*

ABSTRACT: Kidney transplantation offers superior patient survival over chronic dialysis and can improve patient reported outcomes (PROs) including health-related quality of life (HRQoL) and symptoms of depression and anxiety. However, poor kidney function can negatively impact PROs. Our study aimed to determine the association of posttransplant eGFR with PROs and, specifically, the risk of reduced HRQoL and increased symptoms of depression and anxiety with reduced eGFR.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.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.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.

KEYWORDS: Patient Reported Outcomes, Health Related Quality of Life, Depression, Anxiety, eGFR

TITLE: Association of Delayed Graft Function with Mortality Post-Kidney Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Natsuki Eguchi, Hirohito Ichii, Antoney Ferrey, Uttam Reddy, Donald Dafoe, Hwakyung Seo, Kamyar Kalantar-Zadeh, Ekamol Tantisattamo

INSTITUTIONS (ALL): *University of California, Irvine, University of California, Irvine, University of California, Irvine, University of California, Irvine, University of California, Irvine, University of California, Irvine, University of California, Irvine, University of California, Irvine, University of California, Irvine*

ABSTRACT: 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.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.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 (HRunadjusted 1.05, p 0.910, 95% CI 0.44, 2.55 and sub-HRadjusted 1.35, p 0.515, 95% CI 0.55, 3.30). 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.

KEYWORDS: Delayed Graft Function, mortality, Kidney Transplantation, Rejection

TITLE: Vasopressin Use After Deceased Donor Kidney Transplant (DDKT): Who Needs It And How Much Does It Help?

AUTHOR(S) (FIRST NAME, LAST NAME): Muhammad Jan, Asif Sharfuddin, Muhammad Yaqub

INSTITUTIONS (ALL): *Indiana University School of Medicine, Indiana University School of Medicine, Indiana University School of Medicine*

ABSTRACT: Vasopressin (AVP) is used for maintenance of volume status and hemodynamics due to its vasopressor activity with less arrhythmogenic and ischemic potential. It has catecholamine sparing effect. AVP has been shown

to improve rates of deceased organ donation. We studied AVP use post DDKT for improving hemodynamics with resultant effect on graft function and clinical course.A retrospective chart review was done on patients >18 years of age who required AVP post operatively after a DDKT over 5 years (2012-2017). Recipient, donor characteristics, intraoperative parameters, hospital/ICU stay, graft failure, patient survival, and hyponatremia during first 48 hours were reviewed.A total of 43 patients fulfilled inclusion criteria. Refer to Table for summary. Total of 5 patients (11.6%) required dialysis, 3 of whom received donation of kidney after cardiac death. There were 3 deaths during the first 12 months (6.9%). Mean cold and warm ischemia time were 32.5±12.9 hours and 39.2 ±10.2 minutes, respectively. Mean time to start AVP was 6.8 hours post operatively and mean duration of AVP use was 43.2 with a median of 30 hours. 72.1% of patient also required dopamine. Mean hospital stay was 14.5 days and length of ICU stay was 5.4 days. Mean creatinine at day 7 was 4.0 ± 4.2 mg/dl. There was no incidence of hyponatremia during the first 48 hours. Graft survival was 72% at median follow up time of 7.2 years.Patient requiring AVP post DDKT have unique characteristics - fewer anti-HTN medications and longer time on dialysis prior to transplant. A longer than median hospital length of stay was noted. To our knowledge this is the first study reviewing AVP use post DDKT. Future studies are needed to compare characteristics and outcomes with patients' who did not require AVP post DDKT.

KEYWORDS: Vasopressin, Post Transplant Hypotension, Graft survival

TITLE: Personalized Tacrolimus Dosing in Liver Transplant Immunosuppression using CURATE.AI Dosing Optimization Platform

AUTHOR(S) (FIRST NAME, LAST NAME): Anh Truong, Jeffrey Khong, Agata Blasiak, Theodore Kee, Viki Kim, Peter Wang, Pawel Raif, Nguyen Le, Ali, Zarrinpar, Dean Ho

INSTITUTIONS (ALL): *The N.1 Institute for Health, Department of Biomedical Engineering, NUS, UCLA, The N.1 Institute for Health, WisDM, Department of Biomedical Engineering, NUS, The N.1 Institute for Health, WisDM, Department of Biomedical Engineering, NUS, University of Florida, The N.1 Institute for Health, Department of Biomedical Engineering, NUS, The N.1 Institute for Health, Department of Biomedical Engineering, NUS, The N.1 Institute for Health, Department of Biomedical Engineering, NUS, University of Florida, The N.1 Institute for Health, WisDM, Department of Biomedical Engineering and Pharmacology, NUS*

ABSTRACT: Therapeutic drug monitoring (TDM) of tacrolimus is routinely performed for liver transplant recipients to maintain drug efficacy while minimizing its toxicity. However, managing a therapeutic drug level is challenging, particularly considering the use of multiple drugs during the post-operative period, each with its own pharmacokinetics, metabolic pathways and drug-drug interactions. The dosing decision is further complicated by the large inter- and intra-individual variability in dosing requirements. Additionally, an individual's treatment responses vary depending on the time after transplantation, changes in his or her condition and co-administered therapies. As a result, individuals infrequently demonstrate the expected response, and drug level in the blood often deviates from the target therapeutic range. Alternatively, we developed CURATE.AI, a powerful artificial intelligence platform that utilises a small data approach and a quadratic fit termed phenotypic response surface, to personalize tacrolimus dose based on each individual's tacrolimus serum trough levels. CURATE.AI has been successfully validated as a clinical decision support system in dosing optimizations for various disease indications, including oncology (solid tumor, hematologic cancers) and post-transplant immunosuppression (liver, kidney). This retrospective study aimed to improve the robustness of CURATE.AI by developing a dosing optimization approach that dynamically identifies the dose-trough level relationship over time. We incorporated a lifetime constant τ, which characterizes the exponential

decay profile of blood tacrolimus level post-administration, to account for blood tacrolimus level changing over time when calibrating personalised response surfaces for each individual patient. By accurately determining trough levels that are close to the clinically measured trough levels, CURATE.AI can prospectively guide dosing to achieve the target therapeutic range and enable personalized dosing to optimize patient outcomes.This retrospective study of 159 liver transplant patients was conducted under the Institutional Review Board (IRB) approval (NUS-IRB N-19-072E; UF IRB201800823), of which 60 patients met the data screening criteria for further analysis in this study. Data were processed using custom written Python 3.6.8 script (Python Software Foundation). CURATE. AI optimized a population lifetime constant τ in the established range of tacrolimus half-life (3.5 – 40.5h; τ = (half-life) / ln 2) using five-fold cross-validation techniques for this 60-patient cohort. By incorporating this population-based τ and the patient-specific time t of dose-trough level data pair from the most recent tacrolimus trough level measurement in a weighted second-order polynomial regression, CURATE.AI dynamically calibrated a personalized tacrolimus dose-trough level profile that takes into account the exponential decay behavior of blood tacrolimus level post-administration. Additionally, CURATE.AI applied a dynamic projection to the initial calibrated profile by vertically shifting the weighted quadratic surface to the most recent data point, yielding the final personalized profile for a robust tacrolimus trough level determination for the administered tacrolimus doses. Two other second-order models were used as controls: without incorporating τ and dynamic projection (non-τ model), with τ and without dynamic projection (τ model). Tacrolimus trough levels determined by CURATE. AI were compared with the clinically measured trough levels and trough levels determined by the control models using five-fold cross-validation to assess CURATE. AI performance.CURATE.AI demonstrated accurate determination of trough levels for the administered doses for an individual patient (Figure 1A, green vs red) while dynamically accounting for tacrolimus blood level changes over time. By incorporating and dynamic projection into the weighted quadratic fit, CURATE.AI was capable of dynamically recalibrating personalized dose-trough level response profile with new dose-trough level information retrospectively added over the course of treatment. As compared to the non-τ and τ models (Figure 1B-C, grey), CURATE.AI retrospective performance (Figure 1B-C, green) was free from bias and achieved a clinically acceptable precision within 3 ng/mL difference from the clinically measured trough levels. CURATE. AI also achieved a higher rate of successful trough level determination (Figure 1C), such that the determined trough levels were within 3ng/mL difference from the clinically measured trough levels. Further, five-fold cross-validation proved consistent CURATE.AI performance across training set (1.92 ± 0.06 ng/mL) and test set (1.95 ± 0.15 ng/mL).Target therapeutic trough level is difficult to achieve with the current TDM approach largely due to the intra- and inter-individual variability in dosing requirements for transplant patients. CURATE.AI overcame this major challenge in the traditional approach by using only the individual's tacrolimus dose-trough levels and time of treatments while demonstrating robust tacrolimus trough level determination for the administered tacrolimus doses. As such, this small-data approach enabled a rapid and dynamic personalized tacrolimus dosing management to achieve favourable clinical outcomes for individual transplant patients. This study proved CURATE.AI retrospective performance in identifying the dose-trough level relationship and laid the foundation for its potential applicability as a clinical decision support system to prospectively guide dosing for transplant patients, similar to other CURATE.AI clinical trials for multiple myeloma (NCT03759093), solid tumor (NCT02711956) and post-transplant immunosuppression (NCT03527238).

KEYWORDS: tacrolimus, artificial intelligence, personalized dosing, post-transplant immunosuppression

TITLE: Impact of COVID-19 Infection on Tacrolimus Levels in Solid Organ Transplant Recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Kristin Heagler, Sabrina Sanchez, Khushbu Tejani

INSTITUTIONS (ALL): *Loyola University Medical Center, Loyola University Medical Center, Loyola University Medical Center*

ABSTRACT: Immunocompromised patients are at an increased risk of infection, thus are considered to be a high-risk group for infection with SARS-CoV-2 (COVID-19). There have been observations within the transplant community that many patients infected with COVID-19 were found to have increased tacrolimus trough levels. A common presenting symptom associated with COVID-19 is diarrhea, which is a known risk factor for increased tacrolimus levels. Recent COVID-19 treatment often includes remdesivir, which is a weak CYP3A4 inhibitor that may lead to increased tacrolimus trough levels as well. The purpose of this study was to determine the effect of COVID-19 infection and associated treatments on tacrolimus levels.This retrospective chart review evaluated all solid organ transplant recipients with inpatient admission 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 level on admission was greater than or equal to 20% of their baseline level. Baseline levels were defined as the most recent trough level on a consistent dose in an outpatient setting per pharmacist clinical judgement. A logistic regression was performed to evaluate potential associated risk factors for elevated levels including transplant type, tacrolimus formulation (immediate release vs extended release), presence of diarrhea, or treatment with remdesivir.A total of 167 patients were screened and 55 met criteria for inclusion between March 1, 2020 and December 26, 2020. Baseline characteristics are outlined 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 found to be associated with an increase in tacrolimus trough levels. In transplant patients admitted with COVID-19 infection, 43.7% of patients and 72.7% had increased trough levels on admission and peak 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.

KEYWORDS: COVID-19, immunosuppression, therapeutic drug monitoring

TITLE: Renal Outcomes and Incidence of Kidney Injury after Cardiac Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Ali Arif, Suraj Mishra, Cindy Collier, Rania Kaoukis, Jamael Hoosain, Mingyue He, Iris Lee, Val Rakita, Dina, Abdelwahab

INSTITUTIONS (ALL): *Temple University Hospital Lewis Katz School of Medicine, Temple University Hospital Lewis Katz School of Medicine, University of Texas Rio Grande Valley, Temple University Hospital Lewis Katz School of Medicine, Temple University Hospital Lewis Katz School of Medicine, Temple University Hospital Lewis Katz School of Medicine, Temple University Hospital Lewis Katz School of Medicine, Temple University Hospital Lewis Katz School of*

Medicine, Temple University Hospital Lewis Katz School of Medicine

ABSTRACT: Acute kidney injury (AKI) and chronic kidney disease (CKD) are frequent complications after cardiac transplantation. Limited data exists describing poor renal outcomes in cardiac transplant patients. Previous research attributes chronic kidney disease (CKD) development from long-term use of calcineurin inhibitors while major identified risk factors for AKI include preexisting CKD, age at transplant, diabetes mellitus (DM), and hypertension (HTN). Our study reports the incidence of AKI and CKD among patients undergoing heart transplantation as well as risk factors related to poor renal outcomes.This is a single-center retrospective study of 118 patients undergoing cardiac transplantation over a 5-year period (1/2014-6/2019). Incidence of AKI in the first month was defined by Risk, Injury, Failure & Loss (RIFLE) criteria and cumulative incidence of CKD as defined by Kidney Disease Improving Global Outcomes (KDIGO). The relationship between CKD, AKI, pre-transplant GFR and creatinine, operative conditions, and patient demographics were assessed by Spearman correlations. A logistic regression model assessed the effect of tacrolimus regimen on the development of CKD post-transplant.The incidence of AKI during the first-month post-transplant is 16.1% (19/118) with only 5/19 patients recovering. Of these patients, 14 (73.7%) progressed to CKD. The cumulative incidence of AKI over the three years was 37.3 % (44/118). Cumulative Incidence of CKD over a 4-year period was 63.6% (75/118) of which 43 (58.9%) did not have AKI. Over half of the patients (56.3%) developing CKD did so within the first year of transplant. Having an LVAD bridge to transplant was associated with a statistically significant increase in AKI within one-day post-transplant (p=.002).

By multivariate analysis age at the time of transplant (p= 0.12) was found to be a statistically significant predictor of CKD post-transplant. Tacrolimus administered at high levels (>10 ng/mL) at one month, >8 ng/mL at 6 months, and >6 ng/mL at 1-year post-transplant) approached significance (p=.055) while ethnicity, gender, and LVAD as a bridge were not significant. Average tacrolimus levels were 9.5 ng/mL (SD=5.2) at one month, 9.2 ng/mL (SD=3.2) at six months, 8.4 ng/mL (SD=4.1) at one year, and 7.8 ng/mL (SD=4.6) two years post-transplant.

The mean eGFR prior to transplant for those developing CKD was 46.6 ml/min/1.73 m2 (SD=21.4), which was significantly lower (P=.001) than those not developing CKD 66.3 ml/min/1.73 m2 (SD=33.1). The average creatinine prior to transplant was 1.8 mg/dl (SD=0.1) for those developing CKD but was not significantly higher (p=.39) than those who did not develop CKD (1.63 mg/dl (SD=0.2). Across the entire sample, mean GFR prior to transplant was 53.6 ml/min/1.73m2 (SD=27.7) while mean GFR at one year and two years post-transplant were 53.1 ml/min/1.73 m2(SD=21.7) and 52.0 ml/min/1.73 m2(SD=20.8),respectively. 11 patients (9.3%) died during follow-up, with 45.5% of those deaths occurring within 1 year of transplant. The average time to death post-transplant was 417 days (SD=463.21).

AKI was a common complication post-transplant (16.1%) was associated with progression to CKD in our cohort (63.6%), with age at transplant being a significant predictor. Although the use of tacrolimus was not predictive of CKD development, high levels of tacrolimus neared significance when controlling for age at the time of transplant. Our research provides a novel finding in regard to immunosuppressant administration and the risk of CKD among heart transplant recipients. Further research in a large cohort is needed to further examine this association.

KEYWORDS: Acute Kidney Injury, AKI, Chronic Kidney Injury, CKD, Tacrolimus, Cardiac, Transplant, LVAD

TITLE: COVID-19 In Kidney Transplant Recipients in the Southeastern United States: A Single Center Experience

AUTHOR(S) (FIRST NAME, LAST NAME): Kayla Kumm, Saed Shawar, Rachel Forbes, Beatrice Concepcion

INSTITUTIONS (ALL): *Vanderbilt University Medical*

Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center, Vanderbilt University Medical Center

ABSTRACT: The novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), 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 SARS-CoV-2 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.A retrospective review of KTRs who tested positive for COVID-19 From March 15, 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.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, serum creatinine 2.3±1.7, CRP 96±84, ferritin 1093±1052, procalcitonin 0.62±1.0, lactate 1.2±0.4. 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. 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).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.

KEYWORDS: COVID-19, solid organ transplant, remdesivir

TITLE: Genotyping of Donor Blood Expedites Direct-Acting Antiviral Initiation and Minimizes Duration of Viremia in Recipients of Hepatitis C Positive Donor Solid Organ Transplants

AUTHOR(S) (FIRST NAME, LAST NAME): Jeffrey Stern, Karen Khalil, Nicole Ali, Elaina Weldon, Rebecca Dieter, Tyler Lewis, Nader Moazami, Alex Reyentovich, Luis, Angel, Nabil Dagher, Harmit Kalia, Bruce Gelb, Jonathan Berger

INSTITUTIONS (ALL): *NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health, NYU Langone Health*

ABSTRACT: There is increasing acceptance of hepatitis C (HCV+) antibody (Ab) and/or nucleic acid (NAT) positive organs for transplant, including among recipients who are HCV naïve (HCV-). Broader implementation of this practice may remain impeded by concerns for risks including fibrosing cholestatic hepatitis, cellular rejection, and other less well characterized effects of transient viremia such as the risk of exposing family members or caregivers. In several reported series, treatment of hepatitis C was initiated months after transplant, during which time recipients maintained high-level HCV viremia. Minimizing post-transplant viremic time could both increase patient acceptance, and decrease overall risk of these transplants. For all HCV- recipients of HCV+ donor organ transplants performed at NYU Langone Health from January 2018 to December 2020, we implemented a procedure to facilitate early initiation of direct acting antiviral (DAA) therapy. This was achieved by utilizing donor blood accompanying the organ to determine HCV genotype, obviating the need to wait for high-level recipient viremia

post-transplant. Recipient surveillance for HCV viremia was initiated between days 1-5 post-transplant. For recipients of thoracic organs, a hospital-compensated supply of DAA was utilized to initiate therapy whilst insurance authorization was awaited. For abdominal organs, DAA was initiated only after insurance approval, which followed shortly after genotyping and recipient viral load results. Surveillance for HCV viremia was performed weekly for at least 12 weeks, and at 6 and 12 months post-transplant. We analyzed time to initiation of DAA, peak measured viral load, time to first undetectable viremia, rates of sustained viremic response (SVR12), and incidence of HCV-related adverse events. IRB approval for this study was obtained, and all analyses were performed using Stata SE 16.0.186 transplants across all solid organ types were performed from 33 Ab+/NAT- and 153 NAT+ donors. The most common HCV genotypes isolated were 1a and 3 (52.7%, 20.4%). 97% of patients who received organs from HCV Ab+/NAT- donors never developed detectable HCV viremia and were not treated with DAA. Six recipients of NAT+ organs never developed detectable viremia; five were lung transplants in whom DAA was initiated immediately post-transplant, and one was a renal transplant recipient in whom DAA was never initiated. Liver transplants had the highest detectable viral loads post-transplant with a mean of 6.3 log copies (range, 2.8-8.1). Kidneys had the shortest average time to viremia (3.2±2.7 days) and hearts had the longest (4.7±2.7 days), though this was largely driven by the timing of testing. Glecaprivir/pibrentasvir (n=117) was the most common DAA used followed by sofosbuvir/velpatasvir (n=34), and sofosbuvir/velpatasvir/voxilaprevir (n=1). Insurance payment for DAA was obtained in 100% of cases. DAA therapy was initiated at a median of 8 days (IQR 5-12) post-transplant and viremia clearance was observed at a median of 31 days (IQR 19-44) across all organs (Figure 1, inset). Increasing time to DAA initiation correlated with increased time to clearance (Figure 1; linear regression adjusted for organ type, R^2=0.41). SVR12 was achieved in 100% of patients who have reached this time point in follow-up (n=130). No cases of fibrosing cholestatic hepatitis occurred. Two adverse events were reported in which recipient family members were exposed to patient blood by needle stick (insulin needle) during the time of active viremia. HCV surveillance for the exposed individuals was performed, and neither contracted the disease.Transplantation of HCV+ organs into HCV- recipients has expanded since the development of DAAs, but no standard practices for recipient HCV surveillance and treatment exist. Early initiation of antiviral therapy after documented viremia and genotyping results in faster viral clearance, but outside of sponsored clinical trials, treatment initiation requires insurer approval, which in turn often requires documentation of recipient HCV viremia and genotype. We developed a procedure in which genotyping of donor blood facilitates rapid insurance authorization of DAA treatment. In a recent large published series, the median time to DAA initiation was 76 days; in this time frame over 99% of our patients had already cleared their viremia. Reducing the duration of recipient viremia likely improves the safety as well as the overall appeal of receiving a HCV+ organ.

KEYWORDS: Hepatitis C virus, Organ Transplantation

TITLE: Evaluation Of Low Dose Famciclovir As Herpes Simplex Virus And Varicella Zoster Virus Prophylaxis In Cytomegalovirus Low Risk Solid Organ Transplant Recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Mariesa Le, Ashley Cubley, Christin Rogers, Sarah Shao, Camille Kotton

INSTITUTIONS (ALL): *Massachusetts General Hospital, Massachusetts General Hospital, Massachusetts General Hospital, Massachusetts General Hospital, Massachusetts General Hospital*

ABSTRACT: 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. 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.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).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.

KEYWORDS: Viral therapy; Cytomegalovirus; Kidney transplantation; Dosage

TITLE: Serial Donor-derived cell-free DNA Monitoring throughout Biopsy-Proven Acute Rejection Treatment in Pediatric Renal Transplant Recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Elisabeth Kincaide, Randall Hinojosa, Kelsey Klein, Kelley Hitchman, Mazen Arar, Daniel Ranch, Ikuyo Yamaguchi

INSTITUTIONS (ALL): *University Health System, University Health System, University Health System, University Health System, University Health System, University Health System, University of Oaklahoma*

ABSTRACT: Donor-derived cell-free DNA (dd-cfDNA) is a validated plasma analyte (t½ ~30 min) for non-invasive surveillance of renal allograft injury. Limited reports have characterized dd-cfDNA kinetics in pediatric patients. Reference ranges of dd-cfDNA > 1% were first suggestive of pathologic injury while low levels (< 0.5%) highly suggest stable allograft health without active injury. In the present study, we observed serial dd-cfDNA levels prior to biopsy (Bx), during anti-rejection therapy, and after completion of immunomodulatory treatment of biopsy-proven acute rejection (BPAR) in pediatric renal transplant recipients.Need for biopsy was determined by serum creatinine (SCr) change, proteinuria (UPCR), and/or HLA donor-specific antibody (DSA) presence. The study protocol was granted Institutional Review Board approval and patient consent was obtained. Serial dd-cfDNA samples (AlloSure®, CareDx, Inc.) were prospectively collected concomitantly with post-transplant labs at the time of renal biopsy, prior to each treatment during courses of anti-rejection therapy, and at follow-up to assess treatment response. Patients received

one, or a combination of conventional therapies including intravenous methylprednisolone (MP), rabbit anti-thymocyte globulin (rATG), therapeutic plasma exchange (TPE) with intravenous immunoglobulin (IVIg), and eculizumab. Patient demographics, native end-stage renal disease (ESRD), and Banff (2019) allograft histopathologic classifications were obtained.Four total patients with median age 9 [range 3-16 years] received for-cause renal allograft biopsies with BPAR findings. All patients were treated according to institutional protocols.

[Figure 1] 3-year-old African-American male with ESRD secondary to posterior urethral valves received a deceased donor kidney transplant (DDKT) with basiliximab and achieved a baseline SCr 0.3 – 0.5 mg/dL. Eighteen months post-transplant, biopsy findings revealed TCMR IIA (i3 t3 v1); pre-Bx dd-cfDNA was 12.9% and the patient received MP 20 mg/kg/day x 3 resulting in SCr decline. Despite SCr stabilization 0.4 - 0.7 mg/dL, persistently elevated dd-cfDNA levels [2.0 – 3.9%] prompted a repeat biopsy revealing TCMR IA (ti3 t2 i-IFTA3 v0). Subsequent treatment with rATG 1 mg/kg/day x 4 resulted in a sustained decrease in dd-cfDNA (from 1.2 to 0.17%), despite no changes in SCr over the following four months.

[Figure 2] 5-year-old white female with ESRD secondary to congenital nephrotic syndrome underwent a living unrelated donor kidney transplant (LUDKT) with rATG induction and achieved a baseline SCr 0.4 – 0.7 mg/dL. Twenty-six months post-transplant, biopsy findings revealed mixed rejection with borderline changes (i2 t1 v0) plus AbMR (g3 ptc2 C4d3; cg0) for which the patient received MP 10 mg/kg/day x 3 and completed TPE with IVIg for 5 sessions. Pre-Bx dd-cfDNA 3.11 – 3.7% and scores throughout therapy declined to 0.26%, but increased towards the end of therapy to 2.19%. SCr has remained essentially unchanged (0.5 – 0.8 mg/dL), and further observation of this patient is pending.

[Figure 3] 13-year-old Hispanic male with ESRD secondary to biopsy-proven FSGS for which he received a DDKT with basiliximab and achieved a baseline SCr 0.4 – 0.7 mg/dL. Sixteen days post-transplant, increased SCr (0.7 – 1.0 mg/dL) and UPCR (0.89 – 2.3 mg/mg) indicated the need for biopsy that presented borderline changes (i1 t1 v0) without any evidence of podocyte foot process effacement. The sample did identify thrombus in one artery with intimal thickening in the setting of anti-angiotensin II type 1 receptor antibody positivity (> 40 units/mL), and pre-bx dd-cfDNA was 7.1 – 8.4%. Treatment included MP 10 mg/kg/day x 3, TPE x 7 sessions without IVIg, and the patient was started on losartan 12.5 mg (later titrated to 25 mg) daily. Dd-cfDNA declined over the course of therapy from 4.73 to 0.3 – 0.95%, despite unchanged SCr (0.6 – 1.0 mg/dL) and UPCR (0.86 - 1.21 mg/mg) upon completion. The following weeks, post-therapy SCr (0.9 – 1.2 mg/dL) and UPCR (0.73 – 1.1 mg/mg) have stabilized, and dd-cfDNA had a single increase to 2.63% followed by subsequent decline to 0.56%.

[Figure 4] 16-year-old white female with ESRD secondary to unknown etiology for which she received a LUDKT with basiliximab and achieved a baseline SCr 0.7 – 1.0 mg/dL. Fourteen days post-transplant, SCr increased to 1.2 – 1.3 mg/dL prompting a biopsy that revealed TCMR IB (i2 t3 v0) with cortical necrosis and thrombosis suggestive of thrombotic microangiopathy (TMA) in the setting of an elevated lactate dehydrogenase (LDH), normal complement factors, and few schistocytes observed upon peripheral blood smear. Pre-Bx dd-cfDNA was 0.74%. Treatment included MP 15 mg/kg/day x 3, rATG 1.5 mg/kg/day x 4, and eculizumab initiation [900 mg/week x 4, followed by 1200 mg every 2 weeks] for newly diagnosed atypical hemolytic uremic syndrome of unclear origin. Both SCr (1.4 – 2.3 mg/dL) and dd-cfDNA (17.0 – 26.23%) increased, and a repeat biopsy presented borderline changes (i1 t2 v0) with persistent findings of TMA. Tacrolimus was converted to sirolimus, eculizumab therapy was continued, and dd-cfDNA ultimately declined from 8.15 to 0.12 – 0.31%, despite persistently elevated SCr 1.3 – 1.6 mg/dL. Additional markers of graft function and disease activity including UPCR and LDH have also declined to stable levels.This novel exhibition of dd-cfDNA kinetics in a pediatric population represents a

comprehensive view of immune-mediated "molecular injury" throughout immunomodulatory treatment courses of BPAR episodes. Following successful treatment, we observed patients' dd-cfDNA scores decline to levels less than previously validated thresholds indicating stable graft health. dd-cfDNA levels demonstrated interpatient variability, therefore patient-specific baseline values should be considered. Repeat biopsies were avoided in patients whose dd-cfDNA stabilized despite a lack of substantial changes in SCr or UPCR. Both patients with repeat BPAR had persistently elevated pre-Bx dd-cfDNA levels. None of the non-AbMR patients developed de novo DSA suggesting that early dd-cfDNA guided intervention could be meaningful in preventing alloimmune maturation. This may provide opportunity for personalized medicine approaches to rejection treatment, and continued investigation will determine whether close dd-cfDNA monitoring can predict clinical outcomes and/or chronic allograft loss.

KEYWORDS: pediatric; renal transplant; BPAR; immune monitoring; dd-cfDNA; molecular injury

TITLE: Timing of rejection, presence of T cell mediated rejection (TCMR) and change in Donor specific antibodies all play role in graft survival after the treatment of antibody mediated rejection of kidney transplantation.

AUTHOR(S) (FIRST NAME, LAST NAME): Anjushree Kumar

INSTITUTIONS (ALL): *University of Virginia*

ABSTRACT: Antibody-mediated rejection (AMR) is recognized as a major cause of graft loss in renal transplant patients. While the optimal treatment regimen for AMR is still debated, it is widely accepted that reduction in donor specific anti-HLA antibodies (DSA) is associated with improved graft survival. But timing of rejection and presence of TCMR are also major determinant of graft survival.We aim to evaluate factors which influence the allograft survival during management of antibody mediated rejection of kidney transplantation.The cohort consisted of 16 kidney transplant recipients who received their rejection treatment from 10/2016 to 5/2019. Out of these 16, only 12 were included as DSA post rejection treatment were found only in 12/16patients. The mean age at transplant was 44 (range 21-61 years), 42% were males, 67% Caucasian and 84% were deceased donor transplant recipients. Majority were first transplant recipients (n= 9, 75%), one patient had a prior transplant, and two patient had two prior transplants. Mean panel reactive antibody (PRA) was 42% ranging (0-100%) with 33% with PRA >85% at transplant but the pre-transplant DSA burden was minimal in all. All recipients received Thymoglobulin for induction. All were on mycophenolate mofetil, tacrolimus and prednisone (MMF/tac/pred).

At time of rejection, all had DSA MFI >5000. 10/12 had class 2 and 2/12 had class 1 immunodominant DSA. Mean creatinine prior to rejection episode was 3.9 mg/dl. The rejection was biopsy proved in 10/12 and 7/10 had mixed while remaining had AMR only. All patients were treated with Plasmapheresis(PLEX) and Intravenous immunoglobulin(IVIG) and baseline immunosuppression was strengthened. 1/12 did not receive additional treatment. The rest received a combination of medications: thymoglobulin(thymo) (n=9, 75%), Bortezomib (n= 1, 8%), and both (n=1, 8%). DSA and creatinine was followed at interval of 1 week, 1 month, 3 months, 6 months, 1 year.

The donor specific antibodies have been associated with deterioration of allograft. But there are other factors like presence and extent of TCMR, rejection happening after 6 months from transplantation and change in DSA after treatment play major roles in the allograft survival. Our analysis indicates late mixed rejection with persistence of DSA after treatment have the worst prognosis.

KEYWORDS: Antibody mediated Rejection, Donor specific antibodies, T cell mediated rejection, allograft survival

Lifelong commitment.

To you. To your patients. To transplant.

Novartis is proud to help you improve patient outcomes and also is committed to improving transplant results by:

- Investing in innovative clinical trials
- Working with the transplant community to improve long-term graft and patient survival
- Addressing individualized patient needs with a range of immunosuppressive agents and other products in development

Novartis. In continuous pursuit of transplant success.

NOVARTIS

Novartis Pharmaceuticals Corporation
East Hanover, New Jersey 07936-1080

9/13

T-TPF-1293127