AMERICAN SOCIETY OF TRANSPLANTATION

CEOT

CUTTING EDGE of TRANSPLANTATION

TRANSPLANT SUMMIT 2019

NO SIZE FITS ALL: UNCOVERING THE POTENTIAL OF PERSONALIZED TRANSPLANTATION

February 21–23, 2019 • Arizona Biltmore • Phoenix, AZ

NAME:_____

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

Today 10:00 AM

How can Veloxis Transplant Support help my patients?

Veloxis Transplant Support can help provide access to medications for your patients, regardless of their circumstances. Available support includes a free 30-day starter pack, $0 Co-pay*, and Patient Assistance Program**.

Wow! My patients can definitely benefit from a co-pay card. How can I receive assistance?

Simply by calling Veloxis Transplant Support at 1-844-VELOXIS or by speaking with your local Veloxis Transplant Account Manager.

Eligibility Requirements

* Eligible insured patients can save up to a maximum benefit of $5,000 annually off the patient's co-pay or out-of-pocket expenses of ENVARSUS XR. Patient is responsible for any differential over $5,000. This offer can be used an unlimited number of times. Offer not valid for cash-paying patients or where drug is not covered by the primary insurance. This offer is valid in the United States. No substitutions permitted. Offer not valid for prescriptions reimbursed under Medicaid, a Medicare drug benefit plan, Tricare, or other federal or state health programs (such as medical assistance programs).

** Patient Eligibility for Free Trial Offer: This voucher is good for patients according to the following eligibility criteria and Terms of Use below. No claim for reimbursement for product dispensed pursuant to this voucher may be submitted to ANY third-party payer, whether a commercial, private, or a government payer. This offer is not insurance and is not valid for mail order. Quantity limits may apply. Terms of Use: This voucher may be redeemed with an accompanying prescription for a 30-day free trial of a Veloxis medication. No substitutions permitted. This voucher is good for the purchase of a Veloxis medication and lawfully purchased from an authorized retailer or distributor in the United States. Offer not valid where prohibited by law, taxed, or restricted. Offer is not transferable, is limited to one per person, and may not be combined with any other offer. Voucher must be presented along with a valid prescription at the time of purchase. This offer may be changed or discontinued at any time without notice by Veloxis. Offer expires 12/31/2017. For questions, please call 1-844-728-3479. This is not a discount or rebate, and is not conditioned upon any past, present, or future purchase.

Veloxis | Transplant Support
1-844 VELOXIS (835-6947)

ENV-17-101.1

GENERAL INFORMATION

REGISTRATION BOOTH:

Wednesday . . . . . 5:00 pm – 7:00 pm
Thursday . . . . . 7:00 am – 6:00 pm
Friday . . . . . 7:00 am – 5:30 pm
Saturday . . . . . 7:00 am – 4:00 pm

EXHIBIT HALL
(POSTERS AND INDUSTRY DISPLAYS)

Thursday . . . . . 3:30 pm – 4:00 pm
Thursday . . . . . 5:45 pm – 7:00 pm
Friday . . . . . 4:30 pm – 6:00 pm

EVENING EVENTS
WELCOME RECEPTION AND POSTERS

Thursday . . . . . 5:45 pm – 7:00 pm

Join your colleagues for a warm welcome to the Cutting Edge of Transplantation meeting. View abstract posters, visit the exhibit booths, and enjoy food and drinks.

CLOSING RECEPTION

Saturday . . . . . 5:00 pm – 7:00 pm

Conclude your CEoT experience by winding down with your colleagues on the Wrigley Lawn.

WI-FI

NETWORK NAME: AZB MEETINGS

PASSWORD: ast2019

MEALS

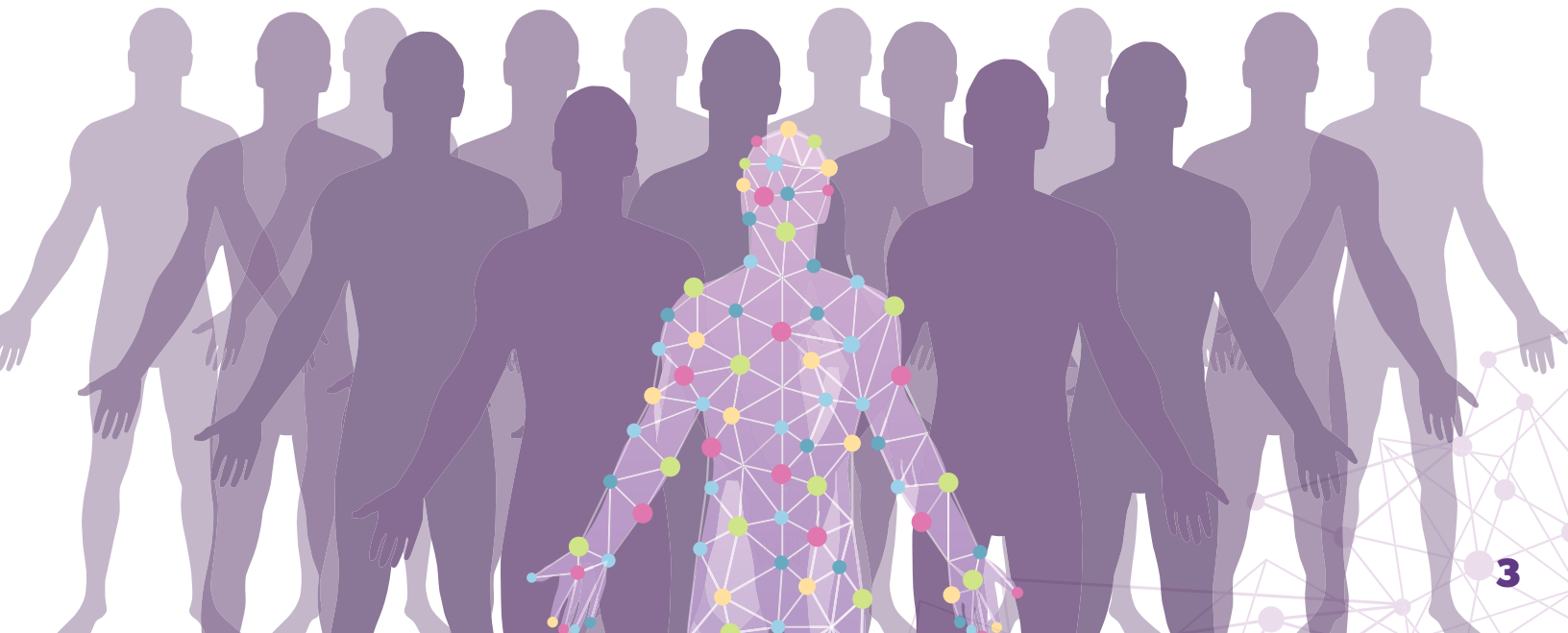
Breakfast will be provided by the AST Friday and Saturday at 7:00 AM in the FLW Foyer. Lunch will be provided by AST during the luncheon symposia. Breaks will be provided in the Exhibit Hall. Please visit the hotel concierge for dining suggestions for dinner.

NAME BADGE

All attendees must wear the AST-provided name badge to gain access to CEoT events and sessions.

GUESTS

All guests must be registered and wear the AST-provided guest name badge to gain access to the evening reception on Thursday. All other sessions and events are educational in nature and we request that guests do not attend.



MEET AND GREET

During breaks and receptions, come to the Exhibit Hall in **Salon G** to visit our CEoT 2019 Exhibitors

Angel MedFlight

CareDx®
Personalized Treatment Surveillance. Better Outcomes.

CSL Behring
Biotherapies for Life™

HANSA BIOPHARMA

OmniLife
formerly HealthTech Solutions

SANOFI GENZYME

TAI DIAGNOSTICS
Monitoring the health of transplanted organs

Veloxis PHARMACEUTICALS

PROGRAM PLANNING COMMITTEE

Anil Chandraker, MD, FASN, FAST, FRCP
Co-Chair
Brigham & Women's Hospital

Kenneth Newell, MD, PhD, FAST
Co-Chair
Emory University School of Medicine

Andrew Adams, MD, PhD
Emory University School of Medicine

Roy Bloom, MD
Hospital of the Univsersity of Pennsylvania

David Foley, MD, FACS
University of Wisconsin

Richard Formica, MD
Yale University School of Medicine

John Gill, MD, MS
Providence Health Vancouver, BC

Michelle Josephson, MD
University of Chicago

Jon Kobashigawa, MD
Cedars Sinai Smidt Heart Institute

Josh Levitsky, MD, MS
Northwestern University Feinberg School of Medicine

Dianne McKay, MD
Scripps Research Institute

Peter Nickerson, MD, FRCPC
University of Manitoba

Linda Ohler, RN, MSN, CCTC, FAAN, FAST
New York University Langone Transplant Institute

Anat Tambur, DMD, PhD
Northwestern University

Jesse Schold, PhD, M. Stat, M.Ed.
Cleveland Clinic Foundation

INVITED FACULTY AND MODERATORS

Andrew Adams, MD, PhD
Emory University School of Medicine

Matthew Albert, MD, PhD, ScB
2019 CEoT Keynote Speaker
Genetech

David Baran, MD
Sentara Heart Hospital

Ankit Bharat, MD
Northwestern University

Geetha Bhat, MD, PhD, FACC, FAST, FHFSA
University of Illinois College of Medicine, Chicago

Sangeeta Bhorade, MD
Northwestern Memorial Hospital

Roy Bloom, MD
Hospital of the University of Pennsylvania

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

Robert Bray, PhD
Emory University

Kim Brown, MD
Henry Ford Hospital

Marie Budev, DO, MPH
Cleveland Clinic

Juan Caicedo, MD
Northwestern Medicine

Daniel Dilling, MD
Loyola University Chicago, Stritch School of Medicine

Jeffrey Edelman, MD
University of Washington

MaryJane Farr, MD
Columbia University

Barry Fine, MD, PhD
Columbia University

David Foley, MD, FACS
University of Wisconsin School of Medicine and Public Health

Mandy Ford, PhD, FAST
Emory University

Richard Formica, MD
Yale University School of Medicine

John Friedewald, MD, FAST
Northwestern University

Jon Friedman, MD, FAST
Optum Health Complex Medical Conditions

Howard Gebel, PhD, D(ABHI)
Emory University Hospital

John Gill, MD, MS
Providence Health

Elisa Gordon, PhD, MPH
Northwestern University

Cynthia Gries, MD, MSc
Florida Hospital

Ramsey Hachem, MD
Washington University School of Medicine

Shelley Hall, MD
Baylor University Medical Center

Philip Halloran, MD, PhD
University of Alberta

Peter Heeger, MD
Icahn School of Medicine at Mount Sinai

Julie Heimbach, MD
Mayo Clinic

Stanley Jordan, MD, FASN, FAST
Cedars Sinai Medical Center

Michelle Josephson, MD
University of Chicago

Dixon Kaufman, MD, PhD
University of Wisconsin

Kiran Khush, MD
Stanford University

Allan Kirk, MD, PhD, FACS
Duke University Medical Center

INVITED FACULTY AND MODERATORS (CONTINUED)

Jon Kobashigawa, MD
Cedars Sinai Smidt Heart Institute

Deborah Jo Levine, MD
University of Texas Health Science Center

Josh Levitsky, MD, MS
Northwestern University Feinberg School of Medicine

Alexandre Loupy, MD, PhD
Necker Hospital, Paris

Roslyn Mannon, MD, FASN, FAST
University of Alabama

Elizabeth McNally, MD, PhD
Northwestern University's Feinberg School of Medicine

Ulf Meier-Kriesche, MD, FAST
Veloxis Pharmaceuticals

J. Keith Melancon, MD
Georgetown University Hospital

Michael Mengel, MD
University of Alberta

Thalachallour Mohanakumar, PhD
Norton Thoracic Institute, St. Joseph's Hospital 7 Medical Center

Julio Montaner, MD
British Columbia Centre for Excellence in HIV/AIDS

David Nelson, MD
Integris Baptist Medical Center

Kenneth Newell, MD, PhD, FAST
Emory University School of MedicineEmory University

Peter Nickerson, MD, FRCPC
University of Manitoba

Mark Nicolls, MD
Stanford University School of Medicine

Jonah Odim, MBA, MD, PhD
National Institute of Health

Jignesh Patel, MD, PhD
Smidt Heart Institute of Cedars Sinai

Neil Powe, MD, MPH, MBA
University of California, San Francisco

Minnie Sarwal, MD, MRCP, FRCP, DCH, PhD
University of California, San Francisco

Deirdre Sawinski, MD, FAST
University of Pennsylvania

Jesse Schold, PhD, M. Stat, M. Ed
Cleveland Clinic

Marina Serper, MD, MS
University of Pennsylvania

Kevin Shah, MD
Cedars Sinai Heart Institute

Palak Shah, MD, MS
Inova Heart & Vascular Institute

Titte Srinivas, MD, FAST
Intermountain Medical Center Transplant Services

Anat Tambur, DMD, PhD
Northwestern University

Giuliano Testa, MD, MBA, FACS
Baylor University Medical Center

Nicole Turgeon, MD
Emory University

Nicole Valenzuela, PhD, D(ABHI)
University of California, Los Angeles

Marcel van den Brink, MD, PhD
Memorial Sloan Kettering

Flavio Vincenti, MD
University of California, Los Angeles

Martin Zamora, MD
University of Colorado

Molecular Microscope®
Diagnostic System

FEB
21
-THU-

The Journey from DSA to Molecular Microscope® in Heart & Lung Transplant Recipients

12:45 - 2:00 PM

CEOT 2019 Satellite Symposium
Frank Lloyd Ballroom

MODERATOR

Deborah Jo Levine, MD, FCCP
University of Texas Health | San Antonio, TX

PRESENTERS

Josef Stehlik, MD, MPH
University of Utah | Salt Lake City, UT

Alloantibody before and after Heart Transplant – Diagnostic and Treatment Decisions

Ramsey Hachem, MD
Washington University | St. Louis, MO

DSA after Lung Transplantation – Who Should We Treat?

(This is not an official function of the CEOT Meeting and is not endorsed by AST.) Lunch provided by AST.

THURSDAY, FEBRUARY 21

12:30 PM — **Welcome Remarks**
Frank Lloyd Wright Salon EF
Anil Chandraker, MD, FASN, FAST, FRCP and Kenneth Newell, MD, PhD, FAST

12:45 – 2:00 PM — **Satellite Lunch Symposium Presented by One Lambda Inc., A Thermo Fischer Scientific Brand†**
Frank Lloyd Wright Salon EF

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

2:00 PM – 3:30 PM — **Session 1: Personalized Medicine – How Do We Catch Up? ***
Frank Lloyd Wright Salon EF

Moderators: *Michelle Josephson, MD and Kenneth Newell, MD, PhD, FAST*

2:00 PM — The Role of the Intestinal Microbiome in Allogenic Hematopoietic Cell Transplantation
Marcel van den Brink, MD, PhD

2:20 PM — Use of Genetic Information to Direct Personalized Care of Individuals with Cardiovascular Disease
Elizabeth McNally, MD, PhD

2:40 PM — What Are the Barriers and Opportunities to Developing Technology to Direct the Personalized Care of the Transplant Recipient?
Allan Kirk, MD, PhD, FACS

3:00 PM — Discussion

3:30 PM – 4:00 PM — **Break**

4:00 PM – 5:30 PM — **Session 2: Shark Tank: George Lucas Foresees the Future of Transplantation – All Things Omics***
Frank Lloyd Wright Salon EF

Moderators: *Kenneth Newell, MD, PhD, FAST and Roslyn Mannon, MD, FASN, FAST*

4:00 PM — The Force is in the Blood
Minnie Sarwal, MD, MRCP, FRCP, DCH, PhD

4:20 PM — The Force is in the Urine
Peter Heeger, MD

4:40 PM — The Force is in the cf DNA
Roy Bloom, MD

5:00 PM — The Force is in the Tissue
Michael Mengel, MD

5:20 PM — Discussion

5:45 PM – 7:30 PM — **Poster Walk & Reception**
Frank Lloyd Wright Salon G

FRIDAY, FEBRUARY 22

Session 3: Select One of Three Sessions

OPTION ONE

7:30 AM – 10:15 AM — **Personalized Organ Allocation – The Right Organ, For the Right Recipient, at the Right Time***
Frank Lloyd Wright Salon EF

Moderators: *Richard Formica, MD and Jon Friedman, MD, FAST*

When the Clock is Ticking

7:30 AM — Brevity Matching for Kidney Transplant
Richard Formica, MD

7:45 AM — Who Can Tolerate a Marginal Donor Graft?
David Foley, MD, FACS

8:00 AM — Expedited/Batch Allocation for Kidney
John Friedewald, MD, FAST

8:15 AM — Expedited/Batch Allocation for Liver
David Foley, MD, FACS

8:30 AM – 8:45 AM — **Coffee Break**

Only If You Have a Living Donor

8:45 AM — Who is the Optimal Recipient for a Living Donor Liver Transplant?
Giuliano Testa, MD, MBA, FACS

9:00 AM — Which Recipients Should Only Receive a Living Donor Kidney Transplant?
John Gill, MD, MS

Organ Transplantation Is Not Appropriate for You

9:15 AM — Who Will Not Benefit from a Kidney Transplant?
Dierdre Sawinski, MD, FAST

9:30 AM — Who Will Not Benefit from Liver Transplantation?
Kim Brown, MD

9:45 AM — Discussion

8:15 AM – 10:15 AM — **Heart Track: To Infinity and Beyond – Moving Past the Biopsy in Heart Transplantation***

OPTION TWO

Frank Lloyd Wright Salon AB

Moderators: *Jon Kobashigawa, MD and MaryJane Farr, MD*

8:15 AM — Donor Derived Cell Free DNA - Has the Answer Been There All Along?
Kiran Khush, MD

8:35 AM — Epigenetics - Does miRNA Ask the Right Questions?
Palak Shah, MD, MS

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

SESSION 3, OPTION 2, CONT.:

8:55 AM	Gene Expression Profiling - Advantages and Disadvantages of Monitoring Immune Activity Rather Than Injury *Geetha Bhat, MD, PhD, FACC, FAST, FHFSA*
9:15 AM	Measuring Immunoresponsiveness - What Tools Do We Have in Our Arsenal? *Shelley Hall, MD*
9:35 AM	Molecular Signals of Intragraft Rejection: Is INTERHEART true NORTH? *Phillip Halloran, MD, PhD*
9:55 AM	Discussion
8:15 AM – 10:15 AM	**Lung Track: Who's Monitoring the Monitor in Lung Transplantation Rejection Surveillance? *** Frank Lloyd Wright Salon CD
OPTION THREE	**Moderators:** *Sangeeta Bhorade, MD and Marty Zamora, MD*
8:15 AM	Donor Derived Cell Free DNA - Has the Answer Been There All Along? *Mark Nicolls, MD*
8:35 AM	Molecular Signals of Intragraft Rejection – Is INTERLUNG the Answer? *Phillip Halloran, MD, PhD*
8:55 AM	Epigenetics - Does miRNA Ask the Right Questions? *Thalachallour Mohanakumar, PhD*
9:15 AM	Gene Expression Profiling – Advantages and Disadvantages of Monitoring Risk Rather Than Injury *Sangeeta Bhorade, MD*
9:35 AM	Measuring Immunoresponsiveness - What Tools Do We Have in Our Arsenal? *Jeffrey Edelman, MD*
9:55 AM	Discussion
10:15 AM – 10:30 AM	**Break**
10:30 AM – 12:30 PM	**Session 4:** Select One of Three Sessions
OPTION ONE	**With all Our Drugs Why Can't We Develop Evidence-Based, Individualized Immunosuppression? *** Frank Lloyd Wright Salon EF
	Moderators: *John Gill, MD, MS and Andrew Adams, MD, PhD*
10:30 AM	Precision Medicine and Not Individualized Therapy is Required for Successful Novel Drug Development *Flavio Vincenti, MD*
10:50 AM	Belatacept – A Lesson in Personalized Immunosuppression *Andrew Adams, MD, PhD*
11:10 AM	Biomarkers to Assess Risk and Guide Immunosuppression in Kidney Transplantation *Peter Heeger, MD*
11:30 AM	Biomarkers of Rejection and Tolerance in Liver Transplantation *Josh Levitsky, MD, MS*
11:50 AM	Panel Discussion
10:30 AM – 12:30 PM	**Heart Track: Customized Immunosuppression – Why Didn't I Think of That? *** Frank Lloyd Wright Salon AB
OPTION TWO	**Moderators:** *Shelley Hall, MD and Geetha Bhat, MD, PhD, FACC, FAST, FHFSA*
10:30 AM	To Treat or Not to Treat - What Induction Therapy is Beneficial? *David Nelson, MD*
10:50 AM	Circulating Antibodies – What, When, Why to Use Desensitization Therapy? *Jignesh Patel, MD, PhD*
11:10 AM	Using Genomics to Guide Immunosuppression Therapy *David Baran, MD*
11:30 AM	Cardiac iBox to Assess Rejection Risk and Customized Immunosuppression *Alexandre Loupy, MD, PhD*
11:50 AM	Immune Approach to Primary Graft Dysfunction *Barry Fine, MD, PhD*
12:10 PM	Discussion
10:30 AM – 12:30 PM	**Lung Track: Individualizing Immunosuppression - Will We Get There in Lung Transplantation? *** Frank Lloyd Wright Salon CD
OPTION THREE	**Moderators**: *Marie Budev, DO, MPH and Daniel Dilling, MD*
10:30 AM	To Treat or Not to Treat - Which Patients May Benefit from Induction Therapy? *Ramsey Hachem, MD*
10:50 AM	Renal Sparing Protocols - Minimizing Risk and Maximizing Benefit in Individual Patients *Marie Budev, DO, MPH*

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

SESSION 4, OPTION 3, CONT.:

11:10 AM	Early CNI-Free Strategies and/ or Eliminating the Antimetabolite - Balancing Safety and Efficacy *Cynthia Gries, MD, MSc*
11:30 AM	Donor Specific Antibodies - Different (Immunosuppressive) Strokes for Different Folks *Deborah Jo Levine, MD*
11:50 AM	Immune Approach to Primary Graft Dysfunction *Ankit Bharat, MD*
12:10 PM	Discussion
12:30 PM – 12:45 PM	**Break**
12:45 PM – 2:00 PM	**Satellite Lunch Symposium Presented by CareDx, Inc. †** Frank Lloyd Wright Salon EF This is not an official function of the CEoT meeting and is not endorsed by the AST.
2:00 PM – 2:30 PM	**AST Innovation Award Presentation** Frank Lloyd Wright Salon EF *Dianne McKay, MD* 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.
2:30 PM – 4:00 PM	**Session 5: Personalized Aftercare – Can It Be That Hard? *** Frank Lloyd Wright Salon EF **Moderators:** *Roy Bloom, MD and Michelle Josephson, MD*
2:30 PM	From Many to One – Applying Big Data to the Individual Patient in Front of You *Titte Srinivas, MD*
2:50 PM	Is the ibox as Good as a Crystal Ball or Better? *Alexandre Loupy, MD, PhD*
3:10 PM	What Does Personalized Care Mean to Patients? *Ulf Meier-Kriesche, MD, FAST*
3:30 PM	Discussion
4:00 PM – 5:30 PM	**Session 6: Personalized Strategies to Improve Access and Outcomes in Patients of African Ancestry and Other Populations at Risk for a Poor Outcome*** Frank Lloyd Wright Salon EF **Moderator:** *Neil Powe, MD, MPH, MBA and J. Keith Melancon, MD*
4:00 PM	Social Factors and Access to Transplantation in Populations at Risk for a Poor Outcome *Jesse Schold, PhD, M. Stat, M. Ed*
4:15 PM	Biological Basis for Increased Risk of Graft Loss in AA – APOL1 and Beyond *Jonah Odim, MBA, MD, PhD*
4:30 PM	Use of Contemporary Technologies to Improve At-Risk Candidate and Recipient Engagement *Elisa Gordon, PhD, MPH*
4:45 PM	Liver Transplant Access in Underserved Populations – Opportunity for Targeted Interventions *Juan Carlos Caicedo, MD*
5:00 PM	Taking House Calls to a New Level – Applying Telemedicine in Transplantation *Marina Serper, MD, MS*
5:15 PM	Discussion

SATURDAY, FEBRUARY 23

7:00 AM – 8:15 AM	**Breakfast Symposium Presented by CSL Behring †** Frank Lloyd Wright Salon EF This is not an official function of the CEoT meeting and is not endorsed by the AST.
8:15 AM – 8:30 AM	**Break**
8:30 AM – 10:30 AM	**Session 7:** Select One of Two sessions
OPTION ONE	**Back to the Future – Beginning with HLA to Personalize Care*** Frank Lloyd Wright Salon EF **Moderator**: *Anat Tambur, DMD, PhD and Mandy Ford, PhD, FAST*
8:30 AM	HLA Antibody Complement Based Assays *Howard Gebel, PhD, D(ABHI) and Robert Bray, PhD*
8:50 AM	HLA Antibody Attributes *Nicole Valenzuela, PhD, D(ABHI)*
9:10 AM	Discussion

SESSION 7, OPTION 1, CONT.:

9:30 AM — HLA Molecular Mismatch Assessment
Peter Nickerson, MD, FRCPC

9:50 AM — Discussion

10:00 AM — Risk Assessment for Alloimmune Memory – Beyond Antibodies
Mandy Ford, PhD, FAST

10:20 AM — Discussion

8:30 AM – 10:30 AM — **Thoracic Cases**
Applying Personalized Medicine in the Real World of Thoracic Transplantation
Frank Lloyd Wright Salon AB

OPTION TWO

Moderators: *Sangeeta Bhorade, MD and Kevin Shah, MD*

8:30 AM — Treatment of the Sensitized Heart Patient Pre-Transplant - What's the Right Thing?
Jignesh Patel, MD, PhD
Kevin Shah, MD

8:50 AM — Donor Specific Antibodies after Lung Transplantation
Ramsey Hachem, MD
Amit Bery, MD

9:10 AM — CNI-Free Immunosuppression
Kiran Khush, MD
Yas Moayedi, MD

9:30 AM — Primary Graft Dysfunction and Autoantibodies in Lung Transplantation
Ankit Bharat, MD
Chitaru Krihara, MD

9:50 AM — PGD in a Heart Transplant Recipient
MaryJane Farr, MD
Kevin Clerkin, MD

10:10 AM — Discussion

10:30 AM – 10:45 AM — **Break**

10:45 AM – 11:45 AM — **Keynote†**
Frank Lloyd Wright Salon EF
Matthew Albert, MD, PhD, ScB
Principal Scientist, Cancer Immunology, Genentech

11:45 AM – 12:00 PM — **Break to Get Lunch**

12:00 PM – 1:30 PM — **Session 8: Transplant Center Practice – Is Variety the Spice of Life? ***
Frank Lloyd Wright Salon EF

Moderators: *John Gill, MD, MS and Nicole Turgeon, MD*

12:00 PM — Variability in Center Level Acceptance of Complex Patients
Jesse Schold, PhD, M. Stat, M. Ed

12:30 PM — The Centers of Excellence Model – Do They Work and How to Make Them Work
Julio Montaner, MD

1:00 PM — Discussion

1:30 PM – 3:30 PM — **Session 9: Trailblazers - Programs with Specialized Programs of Patient Care***
Frank Lloyd Wright Salon EF

Moderator: *Emily Blumberg, MD, FAST*

1:30 PM — Transplantation of Patients with Kidney Failure and Diabetes
Dixon Kaufman, MD, PhD

2:00 PM — Bariatric Surgery for Morbid and Super Obese Transplant Candidates
Julie Heimbach, MD

2:30 PM — Desensitization to Increase Access for Highly Sensitized Patients
Stanley Jordan, MD, FASN, FAST

3:00 PM — Discussion

3:30 PM — **Summary Heart/Lung Track**
Frank Lloyd Wright Salon EF
Jon Kobashigawa, MD and Sangeeta Bhorade, MD

3:45 PM — **Summary of Meeting/Closing**
Frank Lloyd Wright Salon EF
Anil Chandraker, MD, FASN, FAST, FRCP and Kenneth Newell, MD, PhD, FAST

5:00 PM — **Closing Reception**
Wrigley Lawn

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

AMERICAN SOCIETY OF TRANSPLANTATION

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

AST 2019 CORPORATE AFFILIATES

CareDx®
Your Partner in Transplant Care

NOVARTIS

CSL Behring
Biotherapies for Life®

ONE LAMBDA
A Thermo Fisher Scientific Brand

HANSA BIOPHARMA

SANOFI GENZYME

Medeor Therapeutics

Takeda
Shire is now a part of Takeda

MERCK

Veloxis PHARMACEUTICALS

AST CEoT SUPPORTERS

THIS EDUCATIONAL ACTIVITY IS MADE POSSIBLE WITH EDUCATIONAL GRANTS & SUPPORT FROM THE FOLLOWING COMPANIES:

Angel MedFlight

NOVARTIS

astellas

OmniLife
formerly HealthTech Solutions

CareDx®
Your Partner in Transplant Care

ONE LAMBDA
A Thermo Fisher Scientific Brand

CEDARS-SINAI
Heart Institute

SANOFI GENZYME

CSL Behring
Biotherapies for Life™

TAI DIAGNOSTICS
Monitoring the health of transplanted organs

HANSA BIOPHARMA

Takeda
Shire is now a part of Takeda

Veloxis
PHARMACEUTICALS

SUPPORTERS AND EXHIBITORS INFORMATION

ANGEL MEDFLIGHT

Angel MedFlight provides safe, seamless, air ambulance transfers for patients across the country and around the world, expanding patient care options by increasing accessibility to distant facilities. Healthcare professionals count on Angel MedFlight to simplify the process and expedite medical flights. We appreciate the opportunity to be an extension of the excellent work done by the healthcare professionals we are privileged to work with.

ASHI

The American Society for Histocompatibility and Immunogenetics (ASHI) is a not-for-profit association of clinical and research professionals including immunologists, geneticists, molecular biologists, transplant physicians and surgeons, pathologists and technologists. As a professional society involved in histocompatibility, immunogenetics and transplantation, ASHI is dedicated to advancing the science and application of histocompatibility and immunogenetics; providing a forum for the exchange of information; and advocating the highest standards of laboratory testing in the interest of optimal patient care.

ASTELLAS PHARMA US, INC.

Astellas Pharma US, Inc., located in Northbrook, Illinois, is a US affiliate of Tokyo-based Astellas Pharma Inc. Astellas is a pharmaceutical company dedicated to improving the health of people around the world through the provision of innovative and reliable pharmaceutical products. The organization is committed to becoming a global category leader in focused areas by combining outstanding R&D and marketing capabilities. For more information about Astellas Pharma US, Inc., please visit our website at www.Astellas.us.

CAREDX

CareDx, Inc. is dedicated to improving the lives of organ transplant patients through non-invasive diagnosis. By combining the latest advances in genomics and bioinformatics technology, with a commitment to generating high quality clinical evidence through trials and registries, CareDx is at the forefront of organ transplant surveillance and pre-transplant HLA typing solutions.

CEDARS-SINAI MEDICAL CENTER

Cedars-Sinai is a nonprofit academic healthcare organization serving the diverse Los Angeles community and beyond. With pioneering medical research achievements, education programs defining the future of healthcare, and wide-ranging community benefit activities, we're setting new standards for quality and innovation in patient care.

CSL BEHRING

CSL Behring is a global biotherapeutics leader driven by its promise to save lives. Focused on serving patients' needs by using the latest technologies, we develop and deliver innovative therapies that are used to treat coagulation disorders, primary immune deficiencies, hereditary angioedema, inherited respiratory disease, and neurological disorders. The company's products are also used in cardiac surgery, organ transplantation, burn treatment and to prevent hemolytic disease of the newborn.

CSL Behring operates one of the world's largest plasma collection networks, CSL Plasma. The parent company, CSL Limited, headquartered in Melbourne, Australia, employs more than 22,000 people, and delivers its life-saving therapies to people in more than 60 countries.

HANSA BIOPHARMA

Hansa Medical is a biopharmaceutical company based on Sweden, developing novel immunomodulatory enzymes for transplantation and acute autoimmune diseases. The lead product is currently in late-stage clinical development for kidney transplant patients, with significant potential for further development in other solid organ transplants and in acute autoimmune indications. The company also has a strong pipeline of preclinical projects that may provide a second wave of potential drugs.

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.

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.

OMNILIFE, INC. (FORMERLY HEALTHTECH SOLUTIONS, INC.)

OmniLife, Inc. (formerly HealthTech Solutions, Inc.), created a HIPAA-compliant mobile and web communication platform that is coordinating care between transplant patients and their care teams. TXP Chat™is streamlining the coordination for organ transplants when every second counts.

ONE LAMBDA

One Lambda, Inc., a Thermo Fisher Scientific brand, is a global leader in transplant diagnostics offering a full range of HLA Typing and antibody monitoring products to support clinicians and laboratories in the management of transplant patients. Visit www.onelambda.com to discover how we can help you improve patient outcomes.

SANOFI GENZYME

Sanofi Genzyme is the specialty care global business unit of Sanofi, focused on rare diseases, multiple sclerosis, immunology, and oncology. We help people with debilitating and complex conditions that are often difficult to diagnose and treat. We are dedicated to discovering and advancing new therapies, providing hope to patients and their families around the world.

TAI DIAGNOSTICS

TAI Diagnostics, Inc. is a leading biotechnology company focused on providing accurate, fast, cost-effective, non-invasive diagnostic tests to monitor the health of transplanted organs in patients who have received solid organ transplants.

The myTAI-HEART™ test measures the donor fraction of cell-free DNA as a direct measure of selective damage to a recipient's donated heart. The level of donor fraction is used to stratify the recipient as at low versus increased risk of moderate to severe acute cellular rejection. This ultra-sensitive test also detects other forms of selective donor organ injury, such as acute antibody mediated rejection and graft vasculopathy.

TAKEDA (SHIRE IS NOW PART OF TAKEDA)

Shire is the global biotechnology leader serving patients with rare diseases and specialized conditions. We continue to seek new possibilities in transplantation, including potential treatment options to help address the unmet medical needs of transplant recipients with cytomegalovirus (CMV) infection or antibody-mediated rejection. Shire is currently enrolling patients in three phase 3 trials– NCT02931539 and NCT02927067 investigating a FDA granted breakthrough therapy, for transplant recipients with refractory or resistant CMV infections and for treatment of hematopoietic stem cell transplant recipients with CMV infection, respectively; and NCT02547220 for the treatment of adult patients with acute antibody-mediated rejection after kidney transplantation. More information can be found on www.shiretrials.com and clinicaltrials.gov.

VELOXIS PHARMACEUTICALS

Veloxis is a specialty pharmaceutical company committed to improving the lives of transplant patients. Our unique, patented delivery technology, MeltDose®, is designed to enhance the absorption and bioavailability of select orally administered drugs.

AMERICAN SOCIETY OF TRANSPLANTATION

THE AMERICAN SOCIETY OF TRANSPLANTATION SINCERELY THANKS THE FOLLOWING COMPANIES AND ORGANIZATIONS FOR THEIR GENEROUS SUPPORT OF AST AND ITS ACTIVITIES:

AST 2018 SUPPORTERS

GOLD

astellas

SILVER

NOVARTIS

SANOFI GENZYME

Veloxis PHARMACEUTICALS

BRONZE

Bristol-Myers Squibb

CareDx
Personalized Treatment Surveillance. Better Outcomes.

HANSA BIOPHARMA

MERCK

ONE LAMBDA
A Thermo Fisher Scientific Brand

Shire

PATRON

CSL Behring
Biotherapies for Life™

FRIEND

ASN LEADING THE FIGHT AGAINST KIDNEY DISEASE

ASTS
American Society of Transplant Surgeons

CEDARS-SINAI
Heart Institute

CSTSCT

TTS
The Transplantation Society

Vitaeris

The Wawa Foundation

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

CEDARS-SINAI®

SMIDT HEART INSTITUTE

We are pleased to sponsor

CUTTING EDGE OF TRANSPLANTATION

in support of the important mission of the
American Society of Transplantation

AMERICAN SOCIETY FOR HISTOCOMPATIBILITY AND IMMUNOGENETICS
BANFF FOUNDATION FOR ALLOGRAFT PATHOLOGY

ASHI/BANFF

JOINT SCIENTIFIC MEETING

September 23-27, 2019
David L. Lawrence Convention Center

PITTSBURGH, PA

2019.ashi-hla.org

ASHI
American Society for Histocompatibility & Immunogenetics

Banff Foundation for Allograft Pathology

AST | AMERICAN SOCIETY OF® TRANSPLANTATION

FELLOWS

symposium

ON TRANSPLANTATION

2019

SAVE THE DATE

SEPTEMBER 27-29, 2019

Hilton DFW Lakes Executive Conference Center • Grapevine, TX

myAST.org

There's strength in connecting.

Kidney Transplant Connectors

Meet the Kidney Transplant Connectors, donors and recipients who are on a mission to educate and inspire others through their personal journeys and facts about transplant options.

Visit the Sanofi Genzyme kiosk to find out more.

SANOFI GENZYME

SAUS.THM.19.01.0348

Driven by Our Promise™

Making a difference in the lives of patients

For more than a century, CSL has discovered, developed, and delivered biotherapies that have saved and changed the lives of thousands of patients around the world. Our commitment to unlocking the full promise of this exciting frontier only grows stronger with each passing year.

"At CSL, we work each day as if someone's life depends on it—because it really does."

Paul Perreault
CEO and Managing Director, CSL Behring

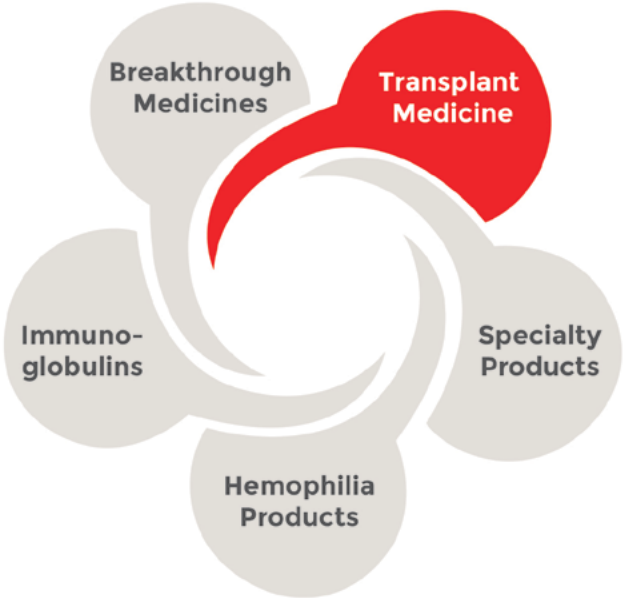
$2.9 billion
invested in R&D since 2013

1,700
R&D experts

40 countries
with CSL operations serving patients in 60+ countries

31 approvals
for new major products or indications since 2004

Innovative therapeutics platform



See what CSL Behring is doing in transplant medicine now at **cslbehring.com/r-and-d**

CSL Behring
Biotherapies for Life®

The Values That Guide Us

PATIENT FOCUS
We deliver on our promise to patients.

INNOVATION
We turn innovative thinking into solutions.

INTEGRITY
We walk the talk.

COLLABORATION
We are stronger together.

SUPERIOR PERFORMANCE
We take pride in our results.

See what CSL Behring is doing in the area of transplant medicine now at **cslbehring.com/r-and-d**

CSL Behring
Biotherapies for Life®

1020 First Avenue, PO Box 61501, King of Prussia, PA 19406-0901 USA
CSLBehring.com CRP-0055-NOV18

SAVE THE DATE

International TRANSPLANTATION SCIENCE MEETING

NOVEMBER 10–13, 2019
WYNDHAM GRAND
CLEARWATER BEACH, FL

ITS 2019

AST AMERICAN SOCIETY OF TRANSPLANTATION

ESOT The European Society for Organ Transplantation

The Transplantation Society

PAUL I. TERASAKI
ANTIBODY SYMPOSIUM

Celebrating 50 years of progress

REGISTER NOW

www.terasakisymposium.org

JULY 19 - 20, 2019

Los Angeles, CA

Questions: info@terasakisymposium.org

UCLA

MEYER & RENEE LUSKIN CONFERENCE CENTER

AMERICAN SOCIETY OF TRANSPLANTATION

CEOT CUTTING EDGE of TRANSPLANTATION

TRANSPLANT SUMMIT 2020

SAVE *THE* DATE
MARCH 5-7, 2020

ARIZONA BILTMORE | PHOENIX, AZ

AlloSure®

Better Surveillance for Better Outcomes

AVAILABLE NOW AND FULLY COVERED BY MEDICARE

A clear path forward

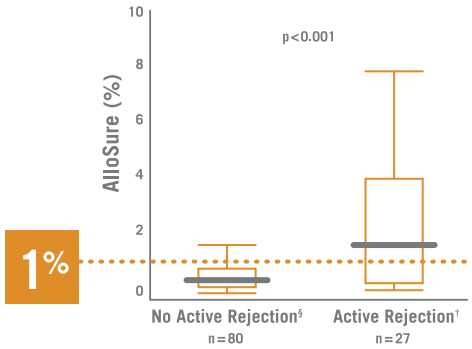
THE LATEST INNOVATION IN KIDNEY TRANSPLANT SURVEILLANCE CAN HELP TO DRIVE BETTER OUTCOMES FOR YOUR PATIENTS

AlloSure is the first clinically and analytically validated, non-invasive test that assesses kidney health by directly measuring allograft injury

Put your patients on a clear path forward with AlloSure

FEATURES

+ Measures donor-derived cfDNA, a direct indicator of kidney injury
+ Clinically and analytically validated
+ More accurate than serum creatinine in diagnosis of active rejection
+ Covered by Medicare



§ No Active Rejection, n=80 samples from 75 patients
† Active Rejection = Acute/active ABMR; Chronic, active ABMR; and TCMR IA and greater, n=27 samples from 27 patients.

Bloom RD et al. *J Am Soc Nephrol.* 2017; 28: 2221-2232.
Grskovic M et al. *J Mol Diagn.* 2016; 18: 890-902.

For more information: 1-888-255-6627 | www.allosure.com | customercare@caredx.com

YOUNG INNOVATOR AWARD WINNERS:

Basmah Abdalla
University of California, Los Angeles
Los Angeles, CA

Nicole Ali
NYU Langone Health
New York, NY

Natalie Bath
University of Wisconsin
Madison, WI

Nisreen Elfadawy
Case Western Reserve University
Cleveland, OH

Jonathan Garcia Esqueda
NYU Langone Health
New York, NY

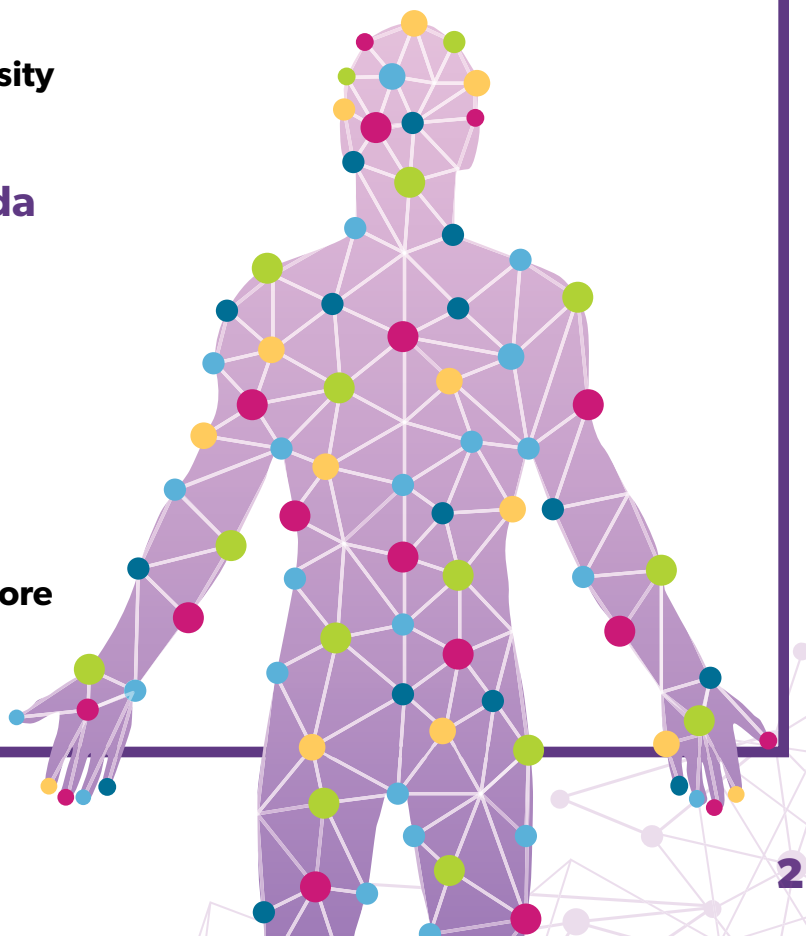
Anne Halpin
University of Alberta
Edmonton, Alberta

Theodore Kee
National University of Singapore
Singapore

Eric Pahl
University of Iowa
Coralville, IA

Erik Stites
University of Colorado
Aurora, CO

Bruce Swearingen
University of Colorado
Aurora, CO



At the time of print

ABSTRACT #: 1

TITLE: Assessment of Frailty, ADLs, and Cognitive Assessment in Older Kidney Transplant Candidates: An Implementation Study

AUTHOR(S) (FIRST NAME, LAST NAME): Basmah Abdalla, Bethany Hale-Durbin, Christine Lee, Michelle McDonald, Chasity Franco, Melissa Dunbar-Forrest, Albin Gritsch, Deena Goldwater, Gabriel, Danovitch, Joanna Schaenman

INSTITUTIONS (ALL): UCLA

BACKGROUND: With the goal of providing additional information during candidacy evaluation for older patients at risk for post-transplant complications, our objective was to standardize an assessment of physical frailty and other aging-associated syndromes during routine evaluation of kidney transplant candidates over age 55.

METHODS: After literature review, pilot studies, and consultation with an expert in geriatric assessment, we developed a tool that uses multiple standardized measures to assess geriatric syndromes, including: Fried Frailty Phenotype (FFP), the Short Physical Performance Battery (SPPB), Activities of Daily living (ADLs), cognitive function (mini-Cog), and fall-risk. To maximize time efficiency, the assessment is designed to be completed in two steps: 1) self-reported survey responses for patients to answer in the waiting room and 2) performance testing administered by a health-professional. Work flow is further optimized by dividing responsibility for performance testing between clinic LVNs (physical function) and physicians (cognitive function). Both LVNs and physicians participated in a series of in-service training sessions to ensure standardized testing.

RESULTS: Over a period of 6 months, a protocol to administer the geriatric syndrome assessment tool was developed in consultation with the surgical, nephrology, nursing and administrative teams. After a run-up period with partial implementation, the assessment protocol became part of standard practice in April 2018. Total LVN plus physician time needed for administration is approximately 10 minutes per patient, and over 500 patients have been assessed. Physical frailty, functional status, and cognitive function data are now available for discussion during Patient Selection Committee Meetings. A plan for seamless integration of the results into the electronic health record is currently in development.

CONCLUSION: Through a streamlined, team-based effort, we were able successfully evaluate aging-associated risk factors in hundreds of patients in a busy kidney transplant clinic. A Quality Assessment review is currently underway to measure health practitioner compliance, and to determine whether this new protocol has provided benefit to our program in terms of candidate evaluation and identification of older patients at risk for adverse complications of kidney transplantation.

KEYWORDS: Frailty; Transplant Candidacy; SPPB; Performance Status

ABSTRACT #: 2

TITLE: Early Acute AMR in Absence of Donor Specific HLA Antibodies

AUTHOR(S) (FIRST NAME, LAST NAME): Basmah Abdalla, Robert Shahinyan, Jonathan Zuckerman, Nicole Valenzuela

INSTITUTIONS (ALL): UCLA

BACKGROUND: Widespread use of Luminex technology to detect preformed anti-human leukocyte antigen (HLA) donor-specific antibody (DSA) and modern crossmatch techniques have reduced the risk of early acute antibody mediated rejection (AMR). However, AMR can occur in the absence of HLA DSA. Antibodies against angiotensin 1 receptor (AT1R) and donor specific antibodies against MICA have been identified as potential causes of AMR. The diagnosis of AMR requires identification of DSA for definite diagnosis. The 2017 Banff criteria allow DSA surrogates (positive C4d/molecular studies); however, this inclusion is still contentious and additional data on patients with histologic AMR in the absence of DSA are needed.

METHODS: We identified seven cases of early AMR (within the first 6 weeks of transplant) on for cause renal allograft biopsy for which solid phase single antigen Luminex assay did not reveal any HLA DSA. Sera are DTT-treated prior to testing for HLA antibodies. All transplants occurred between July 2015 and October 2018. T and B cell crossmatches were performed prior to transplant by both complement dependent cytotoxicity and flow cytometry. All patients received basiliximab induction (except pt #1 who received a 2 haplotype matched living donor transplant and received solumedrol only). Biopsies were interpreted independently by three renal pathologists according to BANFF criteria. All patients

were tested for MICA, AT1R and anti-endothelial cell antibodies at the time of biopsy. Endothelial cell crossmatch (ECXM) was performed with surrogate primary mature endothelial cells. Treatment for AMR was at the discretion of the treating transplant nephrologist.

RESULTS: All patients had histological features of acute AMR (glomerulitis and/or peritubular capillaritis) with (3/7) or without (4/7) positive C4d staining in the peritibular capillaries on for cause renal allograft biopsies (table 1). 5/7 had features of vascular rejection (arteritis) attributed to AMR. 3/5 patients with vascular rejection also had tubulitis suggestive of acute cellular rejection (ACR) in addition to features of AMR. One patient had concomitant ACR without a vascular lesion. All patients received treatment with plasmapheresis and intravenous immunoglobulin (IVIG) +/- steroids or rabbit antithymocyte globulin. One patient received rituximab and one patient with dialysis-dependent acute kidney injury received Eculizumab. All patients recovered after AMR treatment.

CONCLUSION: We identified seven cases who clinically had AMR with histological features on biopsy without any identifiable HLA or non-HLA DSA. All responded to AMR treatment which included plasmapheresis and IVIG. Nephrologists should treat early AMR with supporting biopsy features based on clinical suspicion even if no DSA is identified. Molecular diagnostics may be used to aid in diagnosis of AMR in these cases.

KEYWORDS: Antibody mediated rejection, HLA antibodies, DSA, kidney transplant

Table 1:

Pt #	Age	ESRD cause	Sens (Y/N)	Tx type	Induction	Time to rejection (days)	C4d staining (ptc)	Biopsy findings	Treatment (TPE + IVIG)
1	52	IgA	N	LR *	Steroids	35	Y	AMR + V	ATG + Ecl
2	22	?	Y	LR	Anti-IL2	2	N	AMR	ATG + Rit
3	52	AIN	N	DD	Anti-IL2	7	N	AMR + V + ACR	ATG
4	56	DM I	N	LU	Anti-IL2	5	Y	AMR + V	SM
5	68	?	Y	LU	Anti-IL2	6	N	AMR + ACR	ATG
6	58	PKD	N	DD	Anti-IL2	6	N	AMR + V	ATG
7	32	FSGS	Y	LU	Anti-IL2	43	Y	AMR + V+ ACR	ATG

Key:
Tx: Transplant
LR: Living related
LR*: 2 haplotype matched living related
LU: Living unrelated
DD: Deceased donor
AMR: Antibody mediated rejection
V: Vascular lesion
ACR: acute cellular rejection
ATG: Antithymoycte globulin
Ecl: Eculizumab
Rit: Rituximab
SM: Solumedrol

ABSTRACT #: 3

TITLE: Pre-emptive IVIG for DSA Positive Living Donor Kidney Transplant Recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Basmah Abdalla, David Kellner, Andrea Diaz, Ying Zheng, Jennifer Zhang

INSTITUTIONS (ALL): UCLA

BACKGROUND: Intravenous immunoglobulin (IVIG) is used in desensitization regimens to modulate anti-human leukocyte antigen (HLA) donor-specific antibody (DSA) to facilitate transplantation of sensitized patients, however, the risk of acute antibody mediated rejection (AMR) post IVIG therapy remains unclear. The aim of the study is to evaluate the impact of pre-transplant high dose IVIG on the incidence of acute rejection and long-term graft survival in patients transplanted with preformed HLA DSA.

METHODS: We retrospectively evaluated 676 adult living donor kidney transplant (LDKT) recipients transplanted at our institution between 2005-2013 with median follow-up of 5 years. HLA antibodies were measured using a solid phase single antigen Luminex assay with antibody strength represented as median fluorescence intensity (MFI) and T/B cell crossmatches were performed by CDC and flow cytometry. Most recipients with preformed DSA (DSA+) received high dose IVIG (2g/kg) at the time of transplant. Allograft biopsies were performed for cause only and interpreted independently by three renal pathologists. Acute cellular rejection (ACR) and AMR were diagnosed based on BANFF criteria. Statistical analysis was performed using STATA 14.2.

RESULTS: Out of 676 LDKT, 83 (12%) had preformed HLA DSA to either Class I or Class II HLA molecules (DSA+) < 6000 MFI. Of the 83 (DSA +) patients, 71 (86%) received high dose IVIG while 12 did not. ACR and/or AMR occurred in 20% (121/593) of patients without preformed DSA (DSA-), 92 % (11/12) in patients with preformed DSA but without pre-transplant IVIG (DSA+/IVIG-) and 35% (25/71) in patients with pre-formed DSA treated with IVIG (DSA+/IVIG+, $p < 0.01$). The incidence of ACR alone was not statistically different between the 3 groups. The frequency of AMR alone was 1% in DSA-group, 42% in DSA+/IVIG- group and 13% in DSA+/IVIG+ group ($p < .01$). Death-censored graft failure was 8% for (DSA-/IVIG-), 17% for (DSA+/IVIG-) and 21% for (DSA+/IVIG+) within the follow-up

time. There was a significant difference in graft failure in DSA-/IVIG- group compared to DSA+/IVIG+ group (p> 0.01). No significant differences were found between the DSA+/IVIG- with either DSA+/IVIG+ or DSA- group.

CONCLUSION: The incidence of AMR was higher in DSA+/IVIG+ group than DSA- patients. However, pre-emptive treatment of recipients with preformed DSA with IVIG at time of LDKT significantly reduced the incidence of AMR. Graft failure was significantly higher in DSA+ patients than DSA- patients. The small number of patients in (DSA+/IVIG-) group limited power to detect a difference in graft survival with pre-transplant IVIG treatment. This data supports the pre-emptive use of IVIG therapy at the time of transplant to reduce AMR in LDKT.

KEYWORDS: Antibody-mediated rejection; DSA; Donor-specific HLA Antibodies; IVI

ABSTRACT #: 4

TITLE: Determining Eligibility of Type B Candidates for Transplantation with A2 (A, non-A1) Kidneys

AUTHOR(S) (FIRST NAME, LAST NAME): Nicole Ali, Lynette Lester, Elaina Weldon, Kristine Jaye Adalla-Angeles, Jeffrey Thomas, Bonnie Lonze, Vasishta Tatapudi, Robert Montgomery

INSTITUTIONS (ALL): NYU Langone Health- Transplant Institute

BACKGROUND: Patients with blood type B are among those with the longest wait times for kidney transplantation, due to shortages of compatible donors. Through changes to the Kidney Allocation System implemented in 2014, type B patients are now able to receive A2 (A, non-A1) kidneys, opening them up to a larger donor pool. Despite this allowance, difficulty in determining patient eligibility has been cited as one reason for which transplant institutions have failed to implement this policy. Additionally, little data is available for how such efforts have affected wait times and transplantation rates. We aimed to determine the eligibility for transplantation with type A2 donated kidneys to type B candidates on the waitlist at our institution and evaluated the effect this had on wait times and transplantation rates.

METHODS: Type A2 blood antibody titers were drawn from type B candidates on the waitlist. Patients with antibody titers at or below 16 were considered eligible for transplantation with a type A2 kidneys. Those patients who met eligibility qualifications and were consented for A2 kidneys had their status changed in UNet to reflect acceptance of organs with this blood type.

RESULTS: At the onset of the study, there were 83 patients listed with blood type B at the institution. Of these 83 patients, 59 had A2 titers checked at our blood bank laboratory. Fifty-five patients were eligible to receive A2 kidneys based on our antibody cutoff. Only four patients were found to have titers too high to allow for deceased donor transplantation without pre-surgical desensitization being necessary. Our program began utilization of A2 kidneys to qualified B recipients in August 2016. Since that time, 58 patients with blood type B have been transplanted with deceased donor organs. Twenty-one of these patients received a transplant with an A2 organ. The median wait time from center listing to transplant for candidates receiving an A2 kidney was 269 days compared to 382 days for those transplanted with a blood type B kidney. The average time from dialysis/ listing to transplant for candidates receiving an A2 kidney was 1332 days compared to 2612 days for those transplanted with a blood type B kidney.

CONCLUSIONS: On average, blood type B patients in our region wait 87 months for a kidney, around 24-48 months longer than those with other blood types awaiting kidney transplants. Of the blood type B waitlisted candidates screened for A2 titer levels at our center, 93% were eligible for transplantation with A2 kidney offers. Determining eligibility required minimal resources from the institution, but had significant patient impact. Regardless of which demographic is used to calculate waiting time (center listing to transplant or dialysis time to transplant) patients who are eligible to receive an A2 kidney are able to be transplanted. In addition, this option for transplant addresses three of the five goals of the Organ Procurement and Transplantation Network strategic plan. These included decreasing wait time, increasing number of transplants and removing barriers to transplantation. With this approach, the average wait time decreased by approximately 30% and lead to approximately a 33% increase in transplantation among blood type B recipients. Given that over 70% of type B transplant patients on the kidney waiting list are members of minority groups, A2 transplantation offers one avenue for expanding access to medically underserved populations. By increasing the pool of organs available to these patients, institutions are able to promote a more equitable transplant service. The high prevalence of qualified candidates within the waitlist

pool, positive outcomes on wait time and improved transplant rates, suggests that screening of blood type B patients for A2 eligibility should be implemented across transplant institutions.

KEYWORDS: Transplant, Transplantation, Kidney, A2, non-A1

ABSTRACT #: 5

TITLE: New Reactive Oxygen Species Scavenger Prevents Injury in Ischemia-Reperfusion Injury Model

AUTHOR(S) (FIRST NAME, LAST NAME): Natalie Bath, William Fahl, Robert Redfield III

INSTITUTIONS (ALL): University of Wisconsin

INTRODUCTION: Despite the success of preservation solutions, Ischemia-Reperfusion (IR) injury remains a significant problem for all solid organ transplants. As a result, an important, unmet need in solid organ transplantation is the prevention of IR injury. At UW, our team has developed a novel, proprietary compound, PrC-210, which has demonstrated superior prevention of IR injury in preclinical studies as a free radical scavenger. Here we describe our initial findings in a murine model of kidney IR injury.

METHODS: C57/B6 mice underwent laparotomy with the left renal pedicle clamped for 30 minutes in order to induce ischemia-reperfusion injury. Right nephrectomy was performed at the time of surgery. Mice received a single systemic dose of PrC-210, PrC-211, or PrC-252 (aminothiols) 20 minutes before IR injury occurred. Animals were harvested 24 hours following IR injury. Blood and kidney tissue were collected for analysis. Kidney caspase-3 level (marker of cell death) and serum BUN were measured in animals

RESULTS: A single systemic PrC-210 dose 20 minutes before IR injury resulted in an 84% reduction in IR-induced kidney caspase level ($P<0.0001$); no significant difference in kidney caspase level was seen between PrC-210 treated kidneys and kidneys that did not undergo IR injury. PrC-210 resulted in a profound reduction of serum BUN compared to untreated ($P<0.0001$), PrC-211 ($P<0.0001$), and PrC-252 ($P<0.0001$) treated groups. PrC-211 significantly reduced caspase levels compared to untreated and PrC-252 treated groups ($P<0.003$). However, PrC-211 and PrC-252 did not significantly decrease serum BUN compared to untreated groups.

CONCLUSION: PrC-210 significantly reduced serum BUN and kidney caspase levels compared to untreated groups. PrC-210 appears to be an effective drug to prevent IR injury in transplantation. Future studies will investigate the efficacy of PrC-210 enhanced UW Solution in a rodent kidney transplant model.

KEYWORDS: Preservation solutions, ischemia, renal injury, reactive oxygen species

ABSTRACT #: 6

TITLE: Microsteatosis in Livers from Donation after Circulatory Death (DCD) Donors Is Associated with Inferior Graft and Patient Survival Following Liver Transplantation (LTx)

AUTHOR(S) (FIRST NAME, LAST NAME): Natalie Bath, Glen Leverson, David Al-Adra, Joshua Mezrich, Anthony D'Alessandro, Luis Fernandez, David Foley

INSTITUTIONS (ALL): University of Wisconsin

INTRODUCTION: The current theory is that severe macrosteatosis (MaS) (>50%) in livers recovered from donation after brain death (DBD) donors leads to increased rates of post-transplant graft failure whereas the severity of microsteatosis (MiS) does not negatively impact outcomes. Transplantation of DBD livers with mild or moderate MaS (<50%) can lead to successful outcomes in select patients. However, the maximum percentage of hepatic MaS and MiS to yield acceptable outcomes in DCD LTx remains unknown. The purpose of this analysis was to determine the impact of donor liver MaS and MiS on DCD LTx outcomes.

METHODS: Using the Organ Procurement and Transplantation Network (OPTN) database, we analyzed adult solitary liver transplants of DCD livers performed between 1/1/2006-12/31/2017 that had pre-transplant biopsy results recorded in the database. Kaplan-Meier analysis and log rank test were used to assess graft and patient survival among patients who received livers with varying levels of MaS and MiS. Multivariate analysis was performed including recipient and donor age, donor BMI, cold and warm ischemia times (CIT, WIT), MELD, and percentage of MiS and MaS. MiS was further defined as none to mild (0-10%) or moderate (>10%) and MaS was defined as none (0%), mild (1-15%), and moderate (>15%).

RESULTS: Of 7,757 recovered DCD livers, 21.5% (N=1,665) were biopsied with 53.2% (N=885) of biopsied livers ultimately being transplanted. Patients

who received DCD livers with moderate MaS (>15%) had inferior graft and patient survival rates compared to those with none to mild MaS, although this was not statistically significant. Patients who received DCD livers with moderate MiS (>10%) had significantly worse graft and patient survival ($p<0.03$) compared to those with none to mild MiS (0-10%). When analyzing MaS and MiS together, patients who received livers with mild MaS (0-15%) and moderate MiS (>10%) had significantly worse graft survival compared to those receiving livers with mild or moderate MaS and mild MiS ($p<0.04$). Moderate MaS (HR 1.9; $p=0.01$) and MELD (HR 1.02; $p<0.02$) were associated with increased risk of graft failure in a multivariate analysis; however moderate MaS was not associated with increased risk of patient death. Moderate MiS (HR 1.6; $p<0.02$), CIT (HR 1.03; $p=0.04$), and donor age (HR 1.01; $p=0.03$) were associated with increased risk of graft failure. Moderate MiS (HR 1.6; $p<0.02$) and recipient age (HR 1.04; $p=0.001$) were associated with increased risk of patient death.

CONCLUSION: Although MiS is not considered a risk factor in DBD LTx, this analysis demonstrates that MiS (>10%) in DCD livers is associated with decreased graft and patient survival. When combining MiS and MaS together, MiS >10% was associated with inferior graft survival regardless of amount of MaS. Mitochondrial dysfunction frequently seen with MiS may play a deleterious role in DCD LTx. Future studies will include the comparative impact of MiS on outcomes after DBD LTx.

KEYWORDS: Donors, non-heart-beating; high-risk; biopsy; liver transplantation

ABSTRACT #: 7

TITLE: Do Patients with Significant Peripheral Arterial Disease Undergoing Heart Transplantation Have Acceptable Outcome Post-Transplant?

AUTHOR(S) (FIRST NAME, LAST NAME): David Chang, Sadia Dimbil, Ryan Levine, Jignesh Patel, Robert Cole, Gabriel Esmailian, Nena Musto, Lawrence, Czer, Kevin Shah, Jon Kobashigawa

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

BACKGROUND: Peripheral arterial disease (PAD) is a known risk factor for patients undergoing heart transplantation (HTx). Some diabetic patients with PAD tend to have small vessel disease and hence, non-healing ulcers which would preclude their candidacy for HTx. Aside from these patients, there are many patients with advanced heart disease that tend to develop PAD. These patients may have proximal vessel disease that can be bypassed or undergo vessel angioplasty with stents. It has not been firmly established whether advanced heart disease patients with significant PAD can undergo HTx with acceptable outcome.

METHODS: Between 2010 and 2013, we assessed 26 heart transplant patients (11 with diabetes) who had established PAD prior to transplant. The criteria for PAD included: ⇢50% stenosis in a major non-cardiac vessel. Patients with non-healing ulcers were excluded from the study. Patients in this study had PAD as follows: carotid 38%, subclavian 4%, renal artery 8%, lower extremities 50% with bypass/angioplasty of non-cardiac vessel 31%. Outcomes included 5-year survival, 5-year freedom from cardiac allograft vasculopathy (CAV, as defined by stenosis ⇢ 30% by angiography), 5-year freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke). These patients were compared to a contemporaneous HTx group without PAD (n=322).

RESULTS: There was a numerical trend towards decreased survival for patients with PAD compared to the control group but this did not reach statistical significance. As important, HTx patients with PAD had similar outcomes of CAV or NF-MACE development relative to the control group. (see Table)

CONCLUSION: Advanced heart disease patients with PAD appear to undergo HTx with acceptable outcomes. However, larger number of patients are needed to confirm these findings.

KEYWORDS: peripheral arterial disease, heart transplantation

ABSTRACT #: 8

TITLE: Short and Stout Female Donors in Heart TransplantatioN: Do They Make a Difference?

AUTHOR(S) (FIRST NAME, LAST NAME): David Chang, Sadia Dimbil, Ryan Levine, Jignesh Patel, Dael Geft, Lawrence Czer, Bernice Coleman, Jon Kobashigawa

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

BACKGROUND: Certain donor characteristics after heart transplantation (HTx) may have less optimal

outcome post-HTx. One factors leading to worse outcome is female donors to male recipient possibly due to size (height and weight) mismatch relative to male donors. We try to compensate for this size mismatch by using obese female donors into male recipients. However, there have been recent concerns with obese donors, in the sense that there are commonly large fat deposits on the donor heart. It is not known whether short and obese female donors (weight oversizing) results in acceptable outcome after HTx. We sought to assess for this possibility in our large single center.

METHODS: Between 2010 and 2017 we assessed 799 HTx patients and divided them into those male recipients who received female donors (n=246) that were short (≤ 66 inches) and obese (BMI≥30) (n=61) and short and non-obese (BMI<30) recipients (n=128). In addition, we compared both groups to a male donor cohort inclusive of similar heights and weights. All patients were reviewed for 1-year outcomes including survival, freedom from CAV (as defined by stenosis ≥ 30% by angiography), freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/ pacemaker implant, stroke), and freedom from any-treated rejection, acute cellular rejection, and antibody-mediated rejection.

RESULTS: There is no significant difference in 1-year outcomes between short and obese female donors, short and non-obese female donors, and male donors of similar heights and weights (see tables).

CONCLUSION: Short and stout female donors appear to be acceptable for HTx which increases the donor pool.

KEYWORDS: female donor, short, stout, heart transplantation, donor mismatch

ABSTRACT #: 9

TITLE: Exploration of the Stanford Integrated Psychosocial Assessment for Transplant with psychosocial and medical outcomes in kidney/ kidney-pancreas transplant recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Gloria Chen[1], Cynthia Bell[1], Penelope Loughhead, Bashar Ibeche[1], J Steve Bynon[1], David Hall[1], Aleksandra De Golovine[1], Angelina Edwards[1], Wasim, Dar[1],

INSTITUTIONS (ALL): The University of Texas Health Science Center at Houston McGovern Medical School[1], Memorial Hermann Hospital

INTRODUCTION: The Stanford Integrated Psychosocial Assessment for Transplant (SIPAT) is a psychometric instrument designed to improve organ transplant patient selection. However, limited studies have been conducted on its efficacy in determining transplant outcomes. We investigated the association between SIPAT scores and demographic data with psychosocial and medical outcomes within a diverse kidney/kidney-pancreas transplant population.

METHOD: We prospectively administered the SIPAT to all pre-transplant candidates and completed a retrospective review of transplanted patients who had at least 6 months of follow-up. A total of 136 patients were identified [male, n=77 (57%)] with a mean age of 47 years-old. 38% were Black (n=51), 55% had ≤HS education (n=74), and 65% had low socioeconomic status (n=89).

RESULTS: Statistical difference was found among SIPAT scores and substance use and support system instability (P=0.035, P=0.012), while demographic factors were more associated with medical outcomes. Females (P=0.012) and patients with history of psychopathology (P=0.002) experienced psychopathology following transplant more often. Patients with more than HS education (P=0.025) and were <30 years (P=0.026) had higher rejection incidence rates. Risk factors for re-hospitalizations included Hispanic race, diabetes, and low SES (P=0.036, P=0.038, P=0.014). Black and male patients had higher incidence of infection events (P=0.032, P=0.049). Mortality and treatment non-adherence were not significantly associated with SIPAT scores or demographic variables.

CONCLUSION: The SIPAT was associated with post-transplant substance use and support system instability, while demographic variables were associated with other transplant outcomes. Revision of the SIPAT to include additional demographic components may lend to better prediction of transplant outcomes.

KEYWORDS: recipient selection, risk assessment/risk stratification, kidney(allograft) function/dysfunction

ABSTRACT #: 9 (CONTINUED)

Table 1 Demographic characteristics and Standard Integrated Psychosocial Assessment for Transplantation score for study sample

Characteristic	n (%)	SIPAT score mean (SD)	P-value*
Age			
18-29 years	21 (15%)	12 (6)	0.504
30-59 years	88 (65%)	13 (7)	
60+ years	27 (20%)	14 (6)	
Sex			
Male	77(57%)	14 (7)	0.039
Female	59(43%)	12 (6)	
Relationship Status			
Married	61(45%)	13 (6)	0.323
Non-Married	75(55%)	13 (6)	
Race			
African American/Black	51 (38%)	13 (7)	0.113
White	36 (26%)	12 (6)	
Hispanic	40(29%)	14 (5)	
Asian	9(7%)	13 (7)	
Diagnosis Leading to Transplant			
Hypertension	37(27%)	15 (6)	0.002
Diabetes	54(40%)	14 (6)	
Other	45(32%)	11 (6)	
Education			
≤ High School	74 (55%)	15 (6)	0.001
> High School	62 (46%)	11 (6)	
Socioeconomic Status			
Low**	89(65%)	14 (7)	0.143
Middle	31(23%)	13 (5)	
High	13(10%)	11 (7)	
Unknown	3(2%)	8 (4)	
SIPAT Scores			
0-6	18 (13%)		
7-20	106 (78%)		
21-39	12(9%)		
40-69	0 (0%)		
>70	0 (0%)		

*P-value by Kruskal-Wallis test
**Defined by federal poverty guidelines set by the US Department of Health and Human Services

Table 2 Outcomes by the Standard Integrated Psychosocial Assessment for Transplantation Scores

Psychosocial Outcomes	n (%)	SIPAT score mean (SD)	P-value*
Treatment Non-adherence			
Yes	27(20%)	14(7)	0.445
No	107(80%)	13(6)	
Support System Instability			
Yes	19(14%)	16(5)	0.012
No	115(86%)	13(6)	
Development/Relapse of Substance Use			
Yes	3(2%)	21(6)	0.045
No	131(98%)	13(6)	
Development/Relapse of Psychopathology			
Yes	34(25%)	13(6)	0.933
No	100(75%)	13(6)	
Medical Outcomes			
Graft Loss			
Yes	5(4%)	14(8)	0.958
No	129(96%)	13(6)	
Mortality			
Yes	3(2%)	15(5)	0.354
No	132(98%)	13(6)	
Rejection Episode			
Yes	15(11%)	13 (6)	0.871
No	119(89%)	13 (6)	
Infection Event			
Yes	22(16%)	13 (6)	0.938
No	112(84%)	13 (7)	
Medical Re-hospitalization			
Yes	80(60%)	13 (7)	0.919
No	54(40%)	13 (6)	

*P-value by Kruskal-Wallis test

Table 3 Demographic characteristics for psychosocial outcomes

	Treatment Non-adherence		Support System Instability		Development/Relapse of Psychopathology		Development/Relapse of Substance Use	
	Yes n=27	**No** n=107	**Yes** n=19	**No** n=115	**Yes** n=34	**No** n=100	**Yes** n=3	**No** n=131
Age								
18-29 years	7 (26%)	14 (13%)	4(21%)	17(15%)	5 (15%)	16(16%)	1(33%)	20(15%)
30-59 years	16 (59%)	71 (66%)	12(63%)	75(65%)	24 (71%)	63(63%)	2(67%)	85(65%)
60+ years	4 (15%)	22 (21%)	3(16%)	23(20%)	5 (15%)	21(21%)	0(0%)	26(20%)
Sex								
Male	11 (41%)	65 (61%)	11(58%)	65(57%)	13 (38%)†	63(63%)	1(33%)	75(57%)
Female	16 (59%)	42 (39%)	8(42%)	50(43%)	21 (62%)	37(37%)	2(67%)	56(43%)
Relationship Status								
Married	8 (30%)	52 (49%)	4(21%)†	56(49%)	15 (44%)	45(45%)	1(33%)	59(45%)
Non-married	19 (70%)	55 (51%)	15(79%)	59(51%)	19 (56%)	55(55%)	2(67%)	72(55%)
Race								
White	8 (30%)	27 (25%)	0(0%)‡	35(30%)	13 (38%)	22(22%)	1(33%)	34(26%)
Black	9 (33%)	41 (38%)	11(58%)	39(34%)	12 (35%)	38(38%)	1(33%)	49(37%)
Hispanic	8 (30%)	32 (30%)	8(42%)	32(28%)	8 (24%)	32(32%)	1(33%)	39(30%)
Asian	2 (7%)	7 (7%)	0(0%)	9(8%)	1 (3%)	8(8%)	0(0%)	9(7%)
Diagnosis								
Hypertension	6 (22%)	30 (28%)	6(32%)	30(26%)	8 (24%)	28(28%)	1(33%)	35(27%)
Diabetes	10 (37%)	44 (41%)	11(58%)	43(37%)	15 (44%)	39(39%)	1(33%)	53(40%)
Other	11 (41%)	33 (31%)	2(11%)	42(37%)	11 (32%)	33(33%)	1(33%)	43(33%)
Education								
≤High School	15 (56%)	57 (53%)	10(53%)	62(54%)	17 (50%)	55(55%)	2(67%)	70(53%)
>High School	12 (44%)	50 (47%)	9(47%)	53(46%)	17 (50%)	45(45%)	1(33%)	61(47%)
Socioeconomic Status								
Low	18 (67%)	70 (65%)	19(100%)‡	69(60%)	23 (68%)	65(65%)	2(67%)	86(66%)
Middle	6 (22%)	24 (22%)	0(0%)	30(26%)	7 (21%)	23(23%)	0(0%)	30(23%)
High	2 (7%)	1 (10%)	0(0%)	13(11%)	3 (9%)	10(10%)	1(33%)	12(9%)
Unknown	1 (4%)	2 (2%)	(0%)	3(3%)	1 (3%)	2(2%)	0(%)	3(2%)

† indicates two-sided p-value <0.05 from Chi-squared test
‡ indicates two-sided p-value <0.05 from Fisher's exact test

ABSTRACT #: 9 (CONTINUED)

Table 4 Demographic characteristics and psychosocial outcomes by medical outcomes

	Graft Loss		Mortality		Rejection Episode		Infection Event		Medical Re-hospitalization	
	n (%)	**IR (CI)**	**n (%)**	**IR (CI)**	**n (%)**	**IR (CI)**	**n (%)**	**IR (CI)**	**n (%)**	**IR (CI)**
Age										
18-29 years	2 (10%)	0.04 (0.01-0.18)	0(0%)	0 (0-0)	4 (19%)	0.19* (0.02-0.35)	4 (19%)	0.09 (0-0.20)	13 (62%)	0.99 (0.47-1.52)
30-59 years	3 (3%)	0.02 (0.01-0.06)	2(3%)	0.01 (0-0.05)	8 (9%)	0.05 (0.01-0.08)	14 (16%)	0.09 (0.04-0.15)	50 (58%)	0.90 (0.65-1.15)
60+ years	0 (0%)	0 (NA)	1(4%)	0.02 (0-0.16)	3 (11%)	0.07 (0-0.15)	4 (15%)	0.10 (0-0.21)	17 (63%)	1.09 (0.56-1.61)
Sex										
Male	2 (3%)	0.01 (0-0.06)	1(1%)	0.01 (0-0.05)	9 (12%)	0.06 (0.01-0.10)	16 (21%)	0.13* (0.06-0.20)	45 (58%)	0.83 (0.59-1.08)
Female	3 (5%)	0.03 (0.01-0.10)	2(3%)	0.02 (0-0.08)	6 (10%)	0.10 (0.03-0.18)	6 (10%)	0.04 (0-0.08)	35 (61%)	1.11 (0.75-1.47)
Relationship Status										
Married	0 (0%)	0 (NA)	1(2%)	0.01 (0-0.07)	6 (10%)	0.06 (0-0.11)	6 (10%)	0.06 (0.01-0.11)	33 (55%)	0.82 (0.75-1.37)
Non-married	5 (7%)	0.04^ (0.02-0.09)	2(3%)	0.01 (0-0.06)	9 (12%)	0.09 (0.03-0.15)	16 (21%)	0.12 (0.05-0.18)	47 (64%)	1.06 (0.75-1.37)
Race										
White	1 (3%)	0.01 (0-0.11)	1(3%)	0.01 (0-0.10)	3 (9%)	0.05 (0-0.10)	3 (9%)	0.03 (0-0.07)	19 (53%)	0. 68 (0.38-0.97)
African American/Black	3 (6%)	0.04 (0.01-0.11)	1(2%)	0.01 (0-0.08)	5 (10%)	0.09 (0.02-0.17)	14 (28%)	0.16* (0.07-0.26)	29 (58%)	1.03 (0.68-1.38)
Hispanic	1 (3%)	0.02 (0-0.11)	1(3%)	0.01 (0-0.10)	5 (13%)	0.07 (0-0.15)	4 (10%)	0.06 (0-0.12)	27 (69%)	1.25* (0.79-1.72)
Asian	0 (0%)	0 (NA)	0(0%)	0 (NA)	2 (22%)	0.11 (0-0.29)	1 (11%)	0.12 (0-0.31)	5 (56%)	0.36 (0.01-0.71)
Diagnosis										
Hypertension	0 (0%)	0 (NA)	2(5%)	0.03 (0.01-0.14)	3 (8%)	0.03 (0-0.08)	7 (19%)	0.11 (0.01-0.20)	18 (51%)	0.73 (0.40-1.05)

ABSTRACT #: 9 (CONTINUED)

Diabetes	3 (6%)	0.03 (0.01-0.10)	0(0%)	0 (NA)	9 (17%)	0.12 (0.04-0.21)	9 (17%)	0.12 (0.05-0.20)	39 (72%)	1.29* (0.89-1.70)
Other	2 (5%)	0.02 (0-0.09)	1(2%)	0.01 (0-0.08)	3 (7%)	0.05 (0-0.10)	6 (14%)	0.05 (0-0.10)	23 (51%)	0.70 (0.43-0.98)
Education										
≤High School	4 (7%)	0.01 (0-0.06)	2(3%)	0.02 (0-0.06)	4 (5%)	0.14 (0.05-0.22)	9 (12%)	0.07 (0.02-0.11)	43 (58%)	1.01 (0.71-1.31)
>High School	1 (1%)	0.04 (0.01-0.10)	1(2%)	0.01 (0-0.06)	11 (18%)‡	0.02* (0-0.05)	13 (21%)	0.12 (0.05-0.19)	37 (62%)	0.89 (0.60-1.18)
Socioeconomic Status										
Low	5 (6%)	0.03 (0.01-0.08)	2(2%)	0.01 (0-0.05)	11 (13%)	0.09 (0.03-0.14)	16 (18%)	0.10 (0.05-0.15)	57 (65%)	1.07 (0.80-1.34)
Middle	0 (0%)	0 (NA)	1(3%)	0.02 (0-0.14)	3 (10%)	0.06 (0-0.14)	5 (17%)	0.11 (0-0.21)	17 (57%)	0.98 (0.53-1.42)
High	0 (0%)	0 (NA)	0(0%)	0 (NA)	1 (8%)	0.04 (0-0.13)	1 (8%)	0.04 (0-0.12)	6 (46%)	0.36* (0.07-0.66)
Unknown	0 (0%)	0 (NA)	0(%)	0 (NA)	0 (0%)	0 (NA)	0 (0%)	0 (NA)	0 (0%)	0 (NA)
Treatment Non-Adherence										
No	1 (1%)	0.01 (0-0.04)	1(1%)	0.01 (0-0.04)	10 (10%)	0.05 (0.01-0.08)	18 (17%)	0.04 (0.06-0.16)	64 (61%)	0.86 (0.65-1.08)
Yes	4 (15%)‡	0.08^ (0.03-0.22)	0(0%)	0 (NA)	5 (19%)	0.17* (0.03-0.31)	2 (8%)	0.04 (0-0.10)	16 (59%)	1.28 (0.71-1.86)
Support System Instability										
No	2 (2%)	0.01 (0-0.04)	1(1%)	<0.01 (0-0.03)	12 (11%)	0.05 (0.02-0.09)	17 (15%)	0.09 (0.05-0.14)	68 (60%)	0.84 (0.64-1.04)
Yes	3 (16%)‡	0.10^ (0.03-0.30)	0(0%)	0 (NA)	3 (16%)	0.20* (0.01-0.39)	3 (16%)	0.09 (0-0.20)	12 (63%)	1.63* (0.80-2.46)
Development/Relapse of Substance Abuse										
No	5 (4%)	0.02 (0.01-0.05)	1(1%)	<0.01 (0-0.03)	15 (12%)	0.08 (0.03-0.12)	20 (16%)	0.10 (0.05-0.14)	79 (61%)	0.96 (0.75-1.17)
Yes	0 (0%)	0 (NA)	0(0%)	0 (NA)	0 (0%)	0 (NA)	0 (0%)	0 (NA)	1 (33%)	0.60 (0-1.58)
Development/Relapse of Psychopathology										
No	3 (3%)	0.02 (0-0.05)	1(1%)	0.01 (0-0.04)	10 (10%)	0.05 (0.01-0.08)	12 (12%)	0.09 (0.04-0.14)	53 (54%)	0.81 (0.60-1.02)
Yes	2 (6%)	0.03 (0-0.14)	0(0%)	0 (NA)	5 (15%)	0.15* (0.03-0.28)	8 (24%)	0. 11 (0.02-0.20)	27 (79%)†	1.38* (0.83-1.93)

IR = Incidence Rate
CI = 95% Confidence Interval
† indicates two-sided p-value <0.05 from Chi-squared test
‡ indicates two-sided p-value <0.05 from Fisher's exact test
^ indicates two-sided p-value <0.05 from Log Rank test
* indicates two-sided p-value <0.05 from negative binomial model
NA indicated confidence interval available due to no events occurring in this group

ABSTRACT #: 10

TITLE: What is the Rate of Infectious Complications Following Desensitization Therapy Prior to Heart Transplantation?

AUTHOR(S) (FIRST NAME, LAST NAME): Bernice Coleman, Sadia Dimbil, Ryan Levine, Evan Kransdorf, Jignesh Patel, David Chang, Jon Kobashigawa

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

BACKGROUND: Sensitization or the detection of circulating antibodies in heart transplant candidates appears to be increasing due to mechanical circulatory support (MCS). Many of these patients are treated with desensitization therapies to increase the donor pool and to increase the probability of receiving a donor heart 2/2 MCS. The infectious risk of desensitization therapy is not clear.

METHODS: Between 2007 and 2013, we assessed 34 heart transplant patients who were highly-sensitized and received desensitization therapy. Desensitization strategies included IVIG/rituximab (n=11), bortezomib/plasmapheresis (n=12), or a combination of these therapies (n=11). Infections that required IV antibiotics were viewed as pertinent.

RESULTS: There was no difference in 5-year freedom from infection between the groups.

CONCLUSION: Desensitization therapy does not appear to be associated with significantly higher infectious complications.

KEYWORDS: mechanical circulatory support, heart transplantation, desensitization therapy, infectious complications

ABSTRACT #: 11

TITLE: The Value of Licensed Clinical Social Worker Pre-Implant Assessment in Predicting Non-Compliance in Durable Mechanical Circulatory Support Device Patients

AUTHOR(S) (FIRST NAME, LAST NAME): Bernice Coleman, Sadia Dimbil, Ryan Levine, Heather Barone, Danny Ramzy, Jaime Moriguchi, Robert Cole, Jon Kobashigawa

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

BACKGROUND: Patient compliance is vital to the success of durable mechanical circulatory support (DMCS). During acute decompensation of heart failure, Advanced Heart Failure Centers are tasked with making timely decisions regarding candidacy for DMCS. History of non-compliance (NC) and predicting future NC can be difficult to assess during this acute phase. Licensed Clinical Social Worker (LCSW) commonly assess patients pre-implant for possible non-compliance after DMCS placement. The purpose of this study is to assess whether LCSW pre-implant assessment is effective in predicting NC after DMCS. Furthermore, is there a difference in NC outcomes when associated with a history of substance abuse.

METHODS: Between 2007 and 2018, our LCSWs evaluated 255 patients prior to DMCS and assessed them as low risk vs high risk for NC. After DMCS, NC was defined as exhibiting one of the following: Missed > 3 clinic appointments or 3 lab draws, documentation of not taking medications correctly or not following MD instructions > 3 occasions. The DMCS patients were divided into Compliant vs Non-Compliant and compared by LCSW pre-implant risk assessment. In addition, the NC patients were divided by those with a history of substance abuse vs those without.

RESULTS: Following DMCS, there were 219 compliant patients and 36 non-compliant patients. LCSWs pre-implant risk assessment (use of SIPAT tool in addition to adherence/substance abuse history) identified 41.7% of Non-Compliant patients as high risk (for NC) while only 6.7% of Compliant patients were noted to be high risk pre-implant. For those Non-Compliant patient, the additional risk of a history of substance abuse further increased the accuracy of the LCSW pre-implant risk assessment. (See Table)

CONCLUSION: Our current LCSW pre-implant risk assessment appears effective in predicting NC in our

DMCS patient population. Advanced Heart Failure Centers can use this data (high risk for NC after DMCS) for decision making when considering patients for DMCS or for more aggressive interventional techniques to prevent NC after DMCS placement.

Endpoints	Compliant (N = 219)	Non-compliant (N = 36)	P-value
Predicted High Risk by LCSW, %	6.7	41.7	<.0001

Endpoints	NC w/ Substance Abuse (N= 11)	NC w/o Substance Abuse (N= 25)	P-Value
Predicted High Risk by LCSW, %	72.7	28.0	0.012

KEYWORDS: durable mechanical circulatory support, heart failure, non-compliance, Licensed Clinical Social Worker

ABSTRACT #: 12

TITLE: Computational modelling of both T-cell and B-cell allorecognition to assess Donor HLA Immunogenicity.

AUTHOR(S) (FIRST NAME, LAST NAME): Hannah Charlotte Copley, Madhivanan Elango, Vasilis Kosmoliaptsis

INSTITUTIONS (ALL): University of Cambridge

BACKGROUND: Donor-specific alloantibody (DSA) development after solid-organ transplantation is a major cause of long term graft loss, and limits future transplant options. Current histocompatibility assessment currently focuses on counting HLA antigenic differences at the serological level, but is limited by the assumption that all mismatched HLA are of equal importance. We have previously shown that recipient B-cell allorecognition of donor HLA can be assessed by quantification of electrostatic potential differences at the tertiary level between donor and recipient HLA (electrostatic mismatch score, EMS3D). Humoral alloresponses require CD4+ T-cell help (via the indirect pathway of allorecognition) to undergo affinity maturation and result in a long lived antibody response. CD4+ T-cell help requires the presentation of donor HLA-derived peptides (CD4+ T-cell epitopes) by recipient HLA class-II molecules, and is therefore a property of both the specific donor and recipient HLA subtypes. We used in silico prediction of CD4+ T-cell epitopes to assess the risk of DSA development in a unique HLA sensitisation model.

METHODS: We examined DSA alloresponses in 179 healthy female patients (HLA-typed at two-field resolution) undergoing standardised subcutaneous lymphocyte injection, purified from their male partner, as treatment for infertility (lymphocyte immunotherapy). DSA were detected using Luminex single-antigen-beads. High binding affinity (<50nM) 15-mer peptides derived from both class I and class II donor HLA were identified by their ability to be presented by recipient HLA-DR/DQ/DP using a neural network approach (the NetMHCIIpan3.1 programme). Each donor HLA in the context of recipient HLA-type was also assessed using the EMS3D model, both models therefore assessing donor HLA immunogenicity on an allele-specific level.

RESULTS: Donor T-cell epitope numbers ranged (mean, SD) from 0-10 (1.53, 1.94) for HLA class-I and from 0-28 (3.15, 4.92) for HLA class-II mismatches. Increasing T-cell epitope number was associated with higher risk of DSA development (HLA Class-I: OR 1.08 per peptide increase, 95%CI: 1.00-1.17, p=0.05; Class-II: OR 1.21 per peptide increase, 95%CI: 1.16-1.28, p<0.01). Prediction of HLA class-II DSA (the most clinically significant alloresponse in transplantation) conformed best to the model with ROC area-under-curve (AUC) of 0.73 which was similar to the predictive ability of the EMS3D model. Notably, simple combination of the T-cell epitope score with the EMS3D score (the two scores were not correlated) improved prediction of HLA class-II DSA development (AUC 0.77).

CONCLUSIONS: Assessment of recipient T-cell help for development of humoral alloimmunity may help predict the immunogenic potential of donor HLA. Further investigation of a combined B-cell and T-cell model of humoral alloreactivity is needed to fully assess the utility of this approach, and whether it may prove to be a valuable alternative to current matching techniques.

KEYWORDS: hla immunogenicity, ems3d, computational modelling, allorecognition, alloantibody, sensitisation, kidney transplantation, indirect pathway, t-cell, b-cell, matching

ABSTRACT #: 13

TITLE: Bacteriophage-specific immune responses in a lung transplant recipient receiving bacteriophage therapy for a multidrug resistant pneumonia

AUTHOR(S) (FIRST NAME, LAST NAME): Jennifer Dan, Susan Lehman[1], Sam Boundy[1], Zsuzsanna Kovach[2], Gill Mearns[2], Rita Al-kolla[3], Shane Crotty[3]

INSTITUTIONS (ALL): University of California, San Diego, AmpliPhi Biosciences[1], AmpliPhi Australia [2], La Jolla Institute for Immunology[3]

BACKGROUND: Bacteriophages are adjunctive therapies to treat multidrug resistant bacterial infections. As non-self proteins, bacteriophages are immunogenic with the ability to elicit an immune response. T follicular helper (Tfh) cells are specialized CD4+ T cells that provide help to B cells to instruct B cell differentiation and high affinity antibody production, critical processes of acquired immunity. Here, we describe the development of phage-specific CD4+ T cells and antibodies in a bilateral lung transplant recipient with a multidrug resistant Pseudomonas aeruginosa infection not responsive to antibiotics.

METHODS: Blood was collected from the patient at weekly intervals over the course of two cycles of intravenous and inhaled bacteriophage therapy. Phage-specific circulating Tfh (cTfh) memory CD4+ T cells and phage-specific IgG and bacteriophage neutralizing antibodies were quantified.

RESULTS: Phage-specific cTfh developed towards the end of the 1st cycle of therapy, peaking during the 2nd cycle of therapy. Peak development of phage-specific cTfh coincided with rising phage-specific total IgG and neutralizing antibodies.

CONCLUSIONS: Clinically, the patient responded to 2 cycles of phage therapy despite the development of phage-specific cTfh and phage-specific antibodies. Whether phage-specific cTfh and IgG impact future bacteriophage treatment efficacy remains to be determined.

KEYWORDS: Bacteriophage, lung transplant, T follicular helper cells (Tfh)

ABSTRACT #: 14

TITLE: Contemporary Predictors and Impact on Survival of Early Readmission after Kidney Transplant: Analysis of the Nationwide Readmission Database

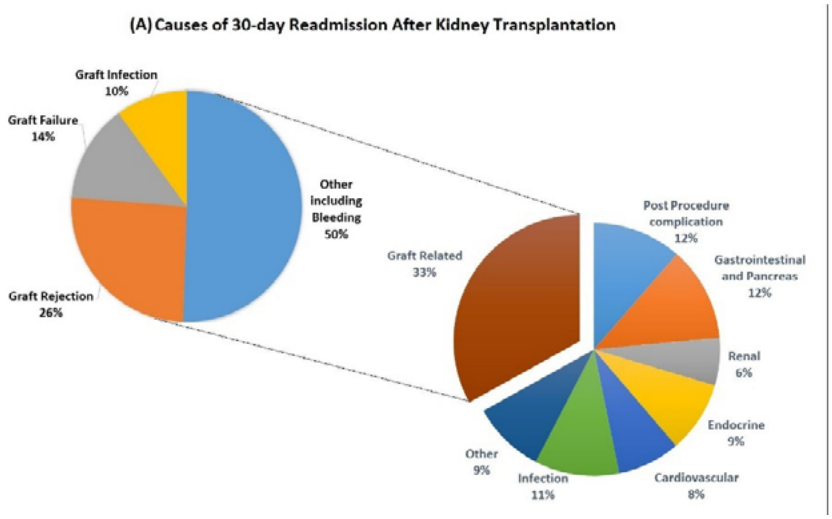
AUTHOR(S) (FIRST NAME, LAST NAME): Nissreen Elfadawy, Nour Tashtish, Sadeer Al-Kindi, Nagaraju Sarabu

INSTITUTIONS (ALL): University Hospitals - Case Medical Center- Case Wester Reserve University

BACKGROUND: Thirty-day readmissions after kidney transplantation are common and contribute to healthcare utilization and costs. We sought to describe the rates, causes, and predictors for readmission.

METHODS: Patients who underwent kidney transplantation (International Classification of Diseases-10th Revision procedure codes 0TYxxxx) between January and November 2016 who survived the index hospitalization were identified in the Nationwide Readmissions Database. Incidence, predictors, causes, and costs of 30-day readmissions were analyzed. We used logistic regression with forward selection analysis ($P<0.05$- SPSS v20).

RESULTS: Out of 9350 patients who underwent kidney transplantation, 9311 (99.5%) survived to hospital discharge and were included in this study. A total of 2417 (26%) were readmitted within 30 days. Out of those who were readmitted, 17 (0.7%) died during the readmission hospitalization. Overall, 797 (33%) of readmissions were graft-related as shown in figure 1A. Predictors of readmission are shown in figure 1B. Median length of stay for readmission was 4 days [2-6] with median hospital charges of 36,678 [19,067-72,786].



CONCLUSION: Thirty-day readmission after kidney transplantation is common and mostly secondary to graft complications. Identifying those who are at risk might help reduce readmission and costs.

KEYWORDS: Kidney Transplantation, Early hospital readmission

ABSTRACT #: 15

TITLE: The Use of Hepatitis C Positive Deceased Organ Donors for Transplantation into Hepatitis C Naïve Recipients: An Analysis of National Practice Patterns for Thoracic and Abdominal Organs

AUTHOR(S) (FIRST NAME, LAST NAME): Jonathan Garcia Esqueda, Nicole Ali, Nabil Dagher, Robert Montgomery, Bonnie Lonze

INSTITUTIONS (ALL): NYU Langone Transplant Institute

BACKGROUND: In light of the increasing prevalence of hepatitis C infection among young deceased organ donors, recent reports describing the use of hepatitis C positive donor organs for transplantation into hepatitis C negative recipients are of great interest. Nonetheless HCV positive into HCV negative transplantation is still an emerging practice, one that is being adopted on a center-by-center basis and is not governed by formal national policies. We utilized national data to describe for kidney, liver, heart and lung transplants, geographic patterns of the performance of HCV positive into HCV negative transplants.

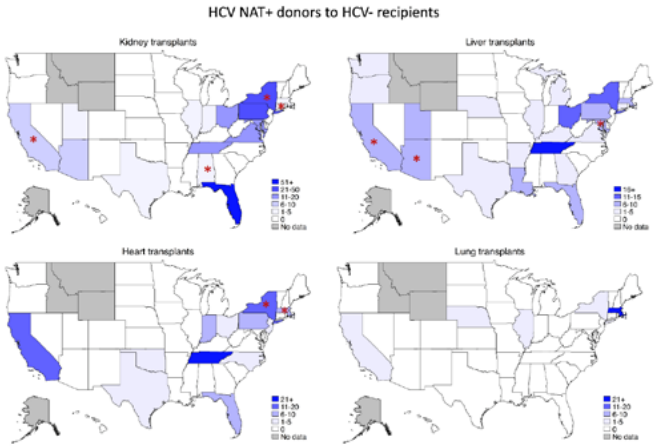
METHODS: Data were provided by the Scientific Registry of Transplant Recipients (SRTR) using deceased donors, and their respective recipients, from March 2015 to September 2018. The United Network for Organ Sharing (UNOS) considers a donor to be HCV positive if either the antibody (Ab) or the nucleic acid test (NAT) is positive. For the purposes of this study we evaluated only cases in which the donor was HCV NAT positive and therefore presumed viremic at the time of donation. Recipients were considered HCV negative if their HCV Ab test was negative, as recipient NAT testing is not routinely performed in Ab negative patients. Adult recipients only (age 18 and up) were included in this study. By transplant center, numbers of HCV NAT positive to HCV negative transplants were tabulated for each organ. Center-level data were compressed into state-level data for graphical representation. Estimates of organ-specific waiting times were calculated using the 2016 SRTR Annual Report, and states were ranked based on the proportion of recipients who waited at least 5 years for kidney or liver transplant, and at least 3 years for heart or lung transplants.

RESULTS: Heat maps in Figure 1 illustrate the sum total HCV NAT positive into HCV negative recipient transplants performed in each state for each organ. There is significant geographic variation in volume among performing centers, as well as in center-level utilization of the different organ types. For kidneys, 17 states have performed at least one HCV NAT positive to negative transplant and the top three states performed 51, 49, and 27 cases. For livers, 22 states have performed at least one HCV NAT positive to negative transplant and the top three states have performed 16, 14, and 11 cases. For hearts, 12 states have performed at least one HCV NAT positive to negative transplant and the top

three states have performed 30, 18, and 18 cases. For lungs, only 5 centers have performed at least one HCV NAT positive to negative transplant, and only 1 state has performed more than 2 cases. That state performed 27. Table 1 lists the top performing state per organ, as well as the contribution of each state's single top performing center. In nearly all states and for all organs, a single center contributed the majority, and in some cases, all, of the state's total HCV NAT positive to negative transplants. New York and California are the only two states in which HCV NAT positive to negative transplants have been performed for all organs. Table 2 lists for each organ, the 5 states with the longest waiting times per transplant, in terms of the proportion of transplanted patients who waited >5 years for a kidney or liver, or >3 years for a heart or lung. In Figure 1, states that perform HCV positive to negative transplants and also fall into the top 5 in waiting time are indicated with red asterisks.

CONCLUSIONS: Practice patterns of HCV positive into HCV negative transplants vary with organ type and with geographic region. The development of this practice on a center-by-center basis has led to this becoming a specialized practice offered at small numbers of centers, and in many cases, primarily a single center per state. One potential explanation for the specialization may be the requisite investment in time and resources required to develop center-specific policies and protocols for performing these transplants. Our data suggest that prolonged waiting times for transplants may be a motivating factor for centers to develop and implement HCV NAT positive to negative transplant protocols. For centers with comparatively shorter waiting times to transplant this investment in protocol/policy development might not be justified by a potentially modest improvement in transplant rate or waiting times for their patients. Similarly, for low volume centers, the investment might not be justified if only a minimal increase in overall transplant volumes would be expected by adopting this practice. Nonetheless, since no national guidelines govern these transplants or how patients are monitored and treated plans post-transplant, our characterization of national practice patterns implies that most protocols have evolved in parallel, on a center-by- center basis. Moving forward there will be a need for multi-center collaboration, data collection, and analysis, in order to best evaluate the impact of this practice on waiting times, organ utilization, and, ultimately, patient outcomes.

KEYWORDS: Hepatitis C infected donors



Kidney		
State	Total cases in state	Top center's contribution
FL	51	47
PA	49	43
NY	27	12
TN	17	15
VA	11	11

Liver		
State	Total cases in state	Top center's contribution
TN	16	10
NY	14	6
OH	11	8
FL	9	4
AZ	9	7

Heart		
State	Total cases in state	Top center's contribution
TN	30	30
NY	18	6
CA	18	16
PA	10	10
MA	9	6

Lung		
State	Total cases in state	Top center's contribution
MA	27	27
NY	2	2
CA	1	1
NE	1	1
IL	1	1

Kidney	
State	% tx'd patients with waittime >5yrs
AL	49.4
CA	22.9
CT	19.6
NY	18.3
HI	17.8

Liver	
State	% tx'd patients with waittime >5yrs
MD	23.8
CO	23.2
AZ	20.9
CA	20.8
MN	18.6

Heart	
State	% tx'd patients with waittime >3yrs
MN	29.2
IL	28.3
MA	25.7
VA	23.5
NY	21.1

Lung	
State	% tx'd patients with waittime >3yrs
GA	27.3
MN	21.4
AL	15.4
CO	14.3
MI	14.3

ABSTRACT #: 16

TITLE: Next Gen ABO Antibody Assessment: Development of a Bead-Based ABO Antibody Detection Assay

AUTHOR(S) (FIRST NAME, LAST NAME): Anne Halpin, Jean Pearcey, Bruce Motyka, Stephanie Maier, Janet Zhou, Todd L. Lowary, Chris W. Cairo, Lori J. West

INSTITUTIONS (ALL): University of Alberta, Dept of Pediatrics, ATI, CDTRP, GlycoNet(ALL)

BACKGROUND:Accurate characterization of ABO antibodies (ABO-Ab) is critical to assess their impact in ABO- incompatible (ABOi) transplantation. The use of organs from ABOi donors can greatly expand the potential donor pool. ABOi pediatric heart, adult kidney, and pediatric and adult liver transplantation is performed. The current ABO-Ab detection method using erythrocyte agglutination is limited by lack of ABO-subtype specificity, difficulty in ABO-Ab isotype differentiation, and poor reproducibility. We previously developed an ABO glycan microarray method for ABO-Ab analysis to address these limitations. Our aim was to create a similar bead solid-phase assay.

METHODS:ABO A-subtype antigens (I,II,III,IV,V,VI) were coupled to Luminex beads and quantified using monoclonal ABO-Ab. Bovine serum albumin and alpha-Gal antigen were coupled as negative/positive controls, respectively. IgG and IgM isotypes with specificities for ABO A-subtypes were measured and compared (n=39 healthy adult donors) by mean fluorescence intensity (MFI). These samples were tested in parallel on the previously validated glycan array. Wilcoxon signed-rank test was used to measure differences in paired data.

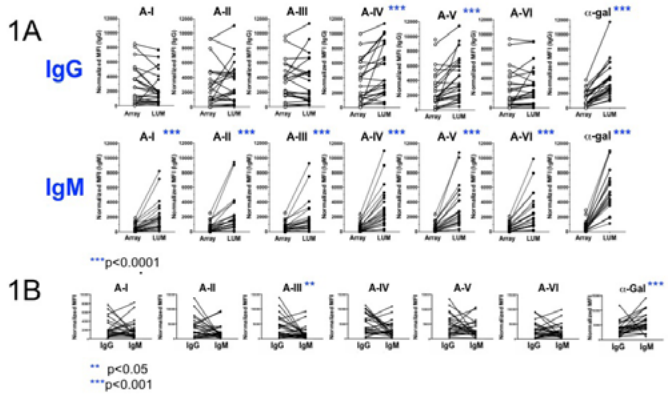


Figure 1. ***1A*** As measured by MFI value, there are varying levels of Ab detected to ABO-A subtypes in both the array (left) and Luminex (right).
1B The IgG vs IgM levels of ABO-A antibody, as detected by Luminex, is shown; the level of IgM does not appear to predict the level of IgG

RESULTS:ABO-A-subtype specific antibodies were detected; there was a high-degree of variability in the MFI values between subjects. IgG and IgM ABO-A-Ab were detectable in all non-ABO A subjects although some subjects demonstrated low MFI values by both bead and array antibody detection methods (Figure 1A). ABO-B controls had similar IgM ABO-A-Ab levels to ABO-O controls but lower levels of IgG. Also shown in Figure 1A, IgM ABO-Ab were detected at higher MFI in the bead vs array method for many subtype antigens. IgG vs IgM antibodies were compared, using the Luminex data (Figure 1B); the level of antibody of one isotype does not appear to predict the level of the other.

CONCLUSIONS: This method successfully measures ABO-A-Ab and shows promise for clinical laboratory implementation where bead-based assays are already used. A flow cytometry bead panel is under development with similar potential. The precision of this assay will facilitate assessment of ABO-Abs with specificities to antigen subtypes, which are known to be expressed differently in cardiac endothelium and in kidney allografts than erythrocytes. The availability of more sensitive and specific assays to measure ABO antibodies will assist in clinical management during desensitization pre-transplant and post-transplant, and in evaluating outcomes of ABOi organ transplantation. Additionally, this assay has great potential as a valuable tool in risk stratification and management of immunosuppression. Immune cross-reactivity to ABH subtype antigens is not well understood and may be driving some of the observed differences between the array and bead-based detection of subtype-specific ABO antibodies. Similar to work that has been done in the setting of HLA antibody investigation, individual and pooled beads coupled with ABH-subtype antigens may be utilized as a tool to explore cross-reactive epitopes. The ability to measure both IgM and IgG (and other isotype) ABO antibodies makes it possible to evaluate the role of each isotype in transplantation. Isotype ABO-Ab differentiation may be particularly relevant in the setting of plasmapheresis, which more efficiently removes IgM antibodies than IgG. There is also potential for use in ABOi stem cell transplantation. Molecular assays are becoming more readily available to define the genotype diversity of the ABO system clearly. As ABO-A and ABO-B antigens are the result of glycosyltransferase activity on the H carbohydrate chains, the interpretation of the sequences of the ABO-related alleles will be complex. It is possible that variable expression of ABH

structures on red cells as well as tissues, resulting from allele-level differences, may affect development of naturally-occurring ABO antibodies. Well-characterized information regarding ABO antibody development will likely complement ABO genotyping as this story continues to unfold.

KEYWORDS: ABO ABOincompatible

ABSTRACT #: 17

TITLE: Personalized Mobile Medication Adherence Monitoring: A Pilot Randomized Control Trial of mDOT for Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Macey Henderson, Amrita Saha, Julie Langlee, Laura Lees, David Helfer, Madeleine Waldram, Arthur Love, Francisco Rivera, Allan, Massie, Dorry Segev, Daniel Brennan

INSTITUTIONS (ALL): Johns Hopkins School of Medicine

BACKGROUND: The leading predictor of rejection, de novo DSA, graft loss, and death among adult kidney transplant (KT) recipients is immunosuppressive medication nonadherence. An estimated one-third of kidney transplant recipients reportedly experience medication nonadherence. To understand if mobile technology with asynchronous, video directly observed therapy can be leveraged in adult KT recipients to improve medication adherence habits, we adapted a mobile smartphone application (mDOT) previously shown to increase medication adherence among tuberculous patients and are testing the feasibility of this technology implementation among transplant patients in a pilot randomized control trial (RCT).

METHODS: Key features of mDOT for transplantation include a HIPAA-compliant patient-facing smartphone app and transplant provider-facing web portal, symptom and side-effect tracking and reporting, dose-by dose medication tracking capability, SMS notifications, and two-way in-app secure messaging. We are conducting an ongoing pilot RCT to evaluate mDOT on rates of post-transplant medication adherence, in preparation for a fully-powered multi-site clinical trial (NCT03427008). Participants are randomized to the intervention (mDOT) or control arm (standard of care) using block randomization (Figure 1). Immunosuppression is tracked over time through medical record abstraction and the self-reported immunosuppressant therapy adherence instrument. Qualitative feedback on the feasibility and usability of the mDOT smartphone app is collected from patients through a telephone interview and post-satisfaction survey at the end of their 12-weeks in the study.

RESULTS: We have enrolled (N =10) as of October 2018. 50% of the patients identify as white and 50% as black. 70% of these patients are male and median age is 57.5 (IQR: 45.0, 61.0) (Table 1). Feedback from patients and video reviewers have allowed us to optimize the app to foster greater patient-provider communication and user-friendliness. Clinical outcomes and qualitative feedback will be available at the time of CEoT.

CONCLUSION: Designed to facilitate immunosuppression adherence and engagement with transplant providers, mDOT may be a promising technology for adult KT recipients in the post-transplant period.

KEYWORDS: Kidney transplantation, Monitoring, Psychosocial

Table 1. Patient Demographic Characteristics

Patient Characteristic	Value
N	10
Age, median (IQR)	57.5 (45.0, 61.0)
Race - Black(%)	50
Race - White (%)	50
Female (%)	30
Male (%)	70

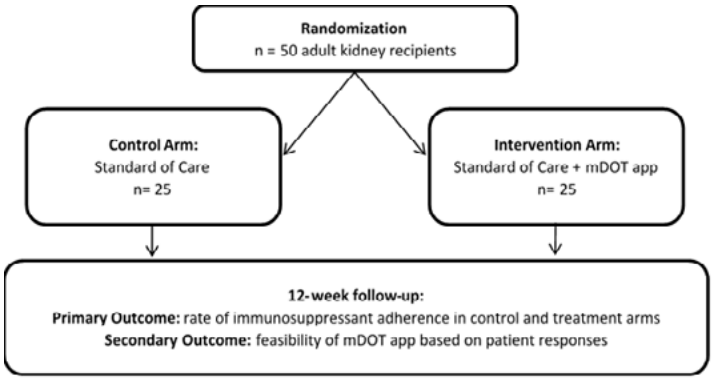


Figure 1. Schematic of Study Design for mDOT for Transplantation Study Participants

ABSTRACT #: 18

TITLE: Impact of Transplantation on Survival in Elderly Patients with End-Stage Kidney Disease

AUTHOR(S) (FIRST NAME, LAST NAME): Matthew Kadatz[1], Scott Klarenbach, John Gill[1], Jagbir Gill[1]

INSTITUTIONS (ALL): University of British Columbia[1], University of Alberta

BACKGROUND:Kidney transplantation is the treatment of choice for individuals with end stage kidney disease (ESKD). To maximize the utility of the scarce resource of donor kidneys, organs with a high kidney donor profile index (KDPI) are often allocated to elderly recipients who typically have a shorter expected survival. Prior studies demonstrating the survival benefit of kidney transplantation in the elderly did not examine the impact of KDPI on patient survival in the elderly. In this study we compared post transplant survival across various KDPI categories to survival on the wait-list in elderly patients.

METHODS: We established a cohort of elderly individuals (age ³ 65) who were waitlisted for transplantation between Jan 1, 2000 and Oct 1, 2016 using the United States Renal Database System (USRDS). Patients with a prior non-renal transplant, and those with invalid listing or transplantation dates were excluded. All individuals who were waitlisted on dialysis were included in the waitlist group. The survival of these individuals was censored at the time of transplantation or at the end of follow-up. Subjects receiving a transplant comprised the transplant group, who were censored at the end of follow-up. We used time-distribution matching to remove potential immortal time bias in the transplant group. Kaplan Meier curves and Cox-proportional hazards models where used to model survival. The time to equal survival was calculated as the number of days until the cumulative survival probability between the wait-list group and transplant group was equal. The effect modification of age, history of diabetes, MI and CHF on the survival benefit of transplantation was investigated using interaction terms.

RESULTS: Eligibility was met in 38,787 individuals; after time-dependent matching, 25,680 subjects comprised the waitlist group, while 14,611 individuals received a transplant. Recipients of a living donor transplant received an immediate survival benefit following transplantation, while recipients of a deceased donor transplant initially had decreased survival compared to the waitlist, but eventually had a long-term survival benefit from transplantation (Figure 1). The unadjusted time to equal survival in the transplant and waitlist groups was 197, 354 and 475 days in those receiving kidneys from deceased donors with KDPIs of 0-80%, 81-90% and 91-100%, respectively. A history of diabetes reduced, but did not eliminate, the survival benefit of transplantation by 8.1%, 16.9%, and 31.8% in those receiving kidneys from deceased donors with KDPIs of 0-80%, 81-90% and 91-100%, respectively. A history of MI or CHF did not significantly impact the relative survival benefit of transplantation, although these comorbidities conveyed an increased risk of mortality in both the transplantation and waitlist groups. These results were consistent in multivariable regression models.

CONCLUSIONS: In summary, elderly waitlisted patients with ESRD receive a survival benefit from transplantation regardless of donor quality, although the benefit is lower in recipients of a kidney with a high KDPI compared with recipients of a living donor kidney transplant. These findings indicate that eligible elderly patients with ESKD transplantation results in better survival, even from donors with a high KDPI.

KEYWORDS: elderly, kidney transplantation, survival

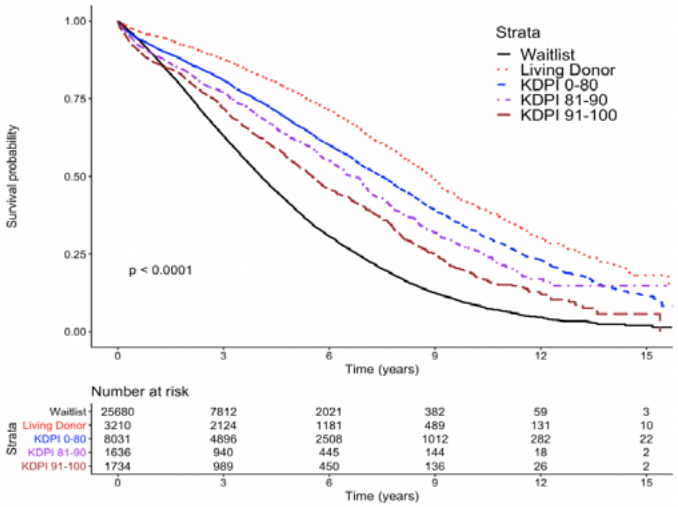


Figure 1: Kaplan-Meier curve comparing unadjusted patient survival on the waitlist to survival with a living donor transplant or a deceased donor transplant stratified by KDPI.

ABSTRACT #: 19

TITLE: The Cost of Kidney Transplantation in Elderly Patients with End-Stage Kidney Disease.

AUTHOR(S) (FIRST NAME, LAST NAME): Matthew Kadatz[1], Scott Klarenbach, John Gill[1], Jagbir Gill[1]

INSTITUTIONS (ALL): University of British Columbia[1], University of Alberta

BACKGROUND:The cost of kidney transplantation in the elderly is poorly defined. Elderly individuals with end stage kidney disease (ESKD) have an increased prevalence of comorbidities that can lead to complications after transplantation. Additionally, elderly patients often receive higher KDPI kidneys which may increase the risk of complications, including delayed graft function, and associated health care costs. Knowledge of cost can inform planning and cost-effectiveness analyses in this population. We sought to determine health care costs in elderly kidney transplant recipients, including the impact of donor quality and recipient comorbidities.

METHODS: The United States Renal Data Service (USRDS) database was used to establish a cohort of Medicare insured elderly (age ³ 65) patients waitlisted for transplantation after January 1, 2000. Payment data was available from January 1, 2010 and December 31st 2014 and was used to determine the costs of care for the initial hospitalization, remainder of 1st year post-transplant, 2nd year post-transplant and subsequent years post-transplant from the perspective of the health care payer. Any payments incurred prior to transplantation or after graft failure were excluded. Generalized linear models with a gamma distribution were used to estimate the association between donor kidney quality (stratified into living donors and KDPI categories for deceased donors) and recipient comorbidities on cost. All costs were adjusted to 2016 US dollars using the consumer price index.

Table 1: Unadjusted mean costs (2016 USD) with 95% confidence intervals of providing care for elderly kidney transplant recipients stratified time post-transplantation in the overall cohort and in patients experiencing adverse outcomes.

	Cost of Initial Hospitalization for Transplant*	Cost of Remainder of 1st Year Post-Transplant	Cost of 2nd Year Post-Transplant	Annual Cost After 2nd Year Post-Transplant
Overall Cohort	32,626 (31,791, 33,460)	66,125 (64,484, 67,766)	32,029 (30,875, 33,183)	42,891 (42,891, 44,966)
Outcome				
Death with Functioning Graft	66,304 (43,994, 88,613)	115,755 (102,820, 128,691)	72,357 (60,999, 83,715)	67,055 (64,165, 69,945)
Graft Failure	42,741 (30,357, 55,125)	144,385 (128,511, 160,259)	102,808 (83,204, 122,412)	107,471 (99,159, 115,781)
Graft Failure and Death In Same Time Period	116,961 (25,717, 208,204)	152,963 (130,745, 175,181)	161,204 (107,217, 215,192)	113,589 (100,935, 126,244)

*Hospitalization payment data is subject to bundled payments and therefore these estimates may not reflect true cost from the perspective of the hospital.

RESULTS: The mean costs of transplantation was highest in the first year following transplantation (Table 1). Cost was increased in individuals who eventually experienced outcomes of death with function, graft failure, or both, regardless of the time interval post-transplant. In multivariable models, donor type, history of congestive heart failure, history of myocardial infarction, diabetes as the cause of ESKD, and body mass index (BMI) were all associated with increased incremental costs (Table 2). The incremental cost associated with donor type, age, history of MI and BMI decreased over time post-transplant, while the incremental costs associated with history of CHF and diabetes as cause of kidney disease were relatively unchanged over time post-transplant.

CONCLUSION: In this study we determined the post transplant costs of care in elderly kidney transplant recipients and found that post transplant costs in our elderly cohort were higher than previously published estimates from the general transplant population, suggesting that post transplant costs may be greater in the elderly. Comorbidities and donor characteristics substantially impacted the cost of transplantation in our cohort and death with function and graft failure were also associated with increased costs, likely relating to the deterioration in health which precedes these events. The high costs of transplantation in the elderly, along with the greater burden of comorbid disease in this patient population warrants a contemporary cost-effectiveness analyses of kidney transplantation in the elderly.

KEYWORDS: kidney transplantation, cost, elderly

Table 2: Adjusted incremental cost (2016 USD) with 95% confidence intervals associated with donor type and comorbidities from multivariable generalized linear models stratified by time-interval post-transplant. Statistically significant results are displayed in bold font.

Outcome	Incremental Cost of Initial Hospitalization for Transplant*	Incremental Cost of Remainder of 1st Year Post-Transplant	Incremental Cost of 2nd Year Post-Transplant	Incremental Annual Cost After 2nd Year Post-Transplant
Donor KDPI (Ref: Living donor)				
KDPI 0-80	319 (-1,515 - 2,244)	1,493 (-1,540, 4,678)	734 (-1,221, 2,830)	47 (-1,124, 1,371)
KDPI 81-90	-52 (-2,658 - 2,804)	**8,729** (3,878, 14,034)	1,670 (-1,248, 5,002)	34 (-1,914, 2,001)
KDPI 91-100	385 (2,284, 3,316)	**8,473** (3,590, 13,817)	**3,175** (105, 6,673)	1,638 (-334, 3,768)
Age (Ref: 65-70)				
70-75	**4,792** (2,795, 6,921)	-313 (-3,124, 2,681)	276 (-1,592, 2,325)	-129 (-1,397, 1,209)
>75	**7,184** (3,624, 11,193)	4,523 (-612, 10,302)	2,991 (-419, 7,034)	-750 (-2,828, 1,551)
History of MI	1,377 (-2,135 , 5,410)	**8,304** (2,118, 15,380)	-903 (-4,125, 2,985)	**3,492** (1,148, 6,078)
History of CHF	**3,598** (1,405, 5,961)	**5519** (1,987, 9,323)	**4,138** (1,731, 6,814)	**4,921** (3,311, 6,630)
History of Diabetes	-744 (-2,257 – 850)	**4,278** (1,576, 7,123)	**3,385** (1,520, 5,296)	**5,897** (4,539, 7,317)
BMI (Ref: Normal)				
Low	6,581 (-1,171, 16,995)	-2,958 (-1,287, 10,258)	1,497 (-5,147, 11,436)	-1,428 (-5,596, 3,818)
High	825 (-1,066, 2,820)	1,907 (-1,195, 5,178)	1,343 (-678, 3,523)	37 (-1,211, 1,339)
Obese	721 (-1,379, 2,960)	3,088 (-448, 6,857)	**4,374** (1,812, 7,191)	1247 (-295, 2,880)
Morbidly Obese	**3916** (852, 7,302)	**9344** (4,102, 15,135)	**6,847** (3,112, 11,178)	2,224 (-106, 4,793)

*Hospitalization payment data is subject to bundled payments and therefore these estimates may not reflect true cost from the perspective of the hospital.

ABSTRACT #: 20

TITLE: Impact of CYP3A5 Genotype Testing on Tacrolimus Level Variability in Lung Transplant Recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Christine Lally, Jorge Mallea

INSTITUTIONS (ALL): Mayo Clinic, Mayo Clinic Florida

BACKGROUND: Therapeutic trough tacrolimus levels are difficult to achieve due to interpatient differences in variables including absorption, metabolism, body mass, and age. Erratic tacrolimus levels have been associated with chronic lung allograft dysfunction, acute rejection, and survival. Increasingly, therapeutic tacrolimus levels are correlating with likelihood of long-term transplant success.Cytochrome P450 3A5 (CYP3A5) is one of the enzymes through which tacrolimus is metabolized. Significant genetic variation exists in the expression of this enzyme. Clinical Pharmacogenetics Implementation Consortium (CPIC) Guidelines have already been established regarding the starting dose of tacrolimus based on CYP3A5 genotype. However, there are no studies to our knowledge that explore the adjustment of tacrolimus based on genotype in lung transplant recipients. No data exists establishing the degree of pharmacogenomic variability of our transplant population and subsequently how patients would benefit from individualized dose adjustments based on their pharmacogenomics.

METHODS: The study population consisted of lung transplant recipients at Mayo Clinic Florida from March 2018 to November 2018. A buccal scrape sample was obtained at the first encounter after listing for the purpose of pharmacogenomic testing using the RightMed gene-drug panel. RightMed is a Clinical Laboratory Improvement Amendments approved pharmacogenomics panel test. The pharmacist reviewed the test results and made recommendations on tacrolimus dosing (standard dosing or 1.5-2x the standard starting dose). This information was used to place the order for initial and subsequent tacrolimus doses for study subjects. Control subjects consisted of 174 patients transplanted from January 2013- December 2017 at Mayo Clinic Florida who were managed on tacrolimus.This study was approved by Mayo Clinic Florida IRB.Investigators collected the following information: demographic data, tacrolimus levels up to 90 days post-transplant, CYP3A5 genotype, and primary diagnosis.

RESULTS: Pharmacogenetic testing was performed for 41 patients during the study period. CYP3A5 phenotypes included 31 poor metabolizers (77.5%), 7 intermediate metabolizers (17.5%), and 2 normal metabolizers (5%). Of the 41 patients who were tested, 20 subjects were transplanted and included in the study. 50% of study patients were female, and median age at transplant was 56. 80% were White and 20% were Black or Asian. 4 patients (20%) had a CYP3A5 phenotype that directed 1.5-2x the normal starting dose of tacrolimus based on CPIC guidelines (normal or intermediate metabolizer).Of the 174 control subjects, 35.6% were female and median age at transplant was 59. 84.4% were White, 12.7% were Black or Asian, 0.6% were American Indian/Alaskan Native and 2.3% were described as "Other". The most common diagnosis in both groups was Idiopathic Pulmonary Fibrosis (IPF) comprising 40% of the study population and 49.4% of the control group. In the study population, the mean, median and standard deviation of tacrolimus trough levels were 7.9 ng/mL, 7.6 ng/mL, and 3.3 ng/mL, respectively. In the control group, the mean, median and standard deviation of tacrolimus trough levels were 8.7 ng/mL, 8.0 ng/mL, and 3.4 ng/mL, respectively.

CONCLUSIONS: Clinically, there was no difference between the median, mean, or standard deviation of tacrolimus trough levels between patients who were adjusted based on CYP3A5 genotype and control subjects without pharmacogenomic data. A larger study population may be needed to appreciate pharmacogenetic results in lung transplant patients.

KEYWORDS: Pharmacogenomics, CYP 3A5, tacrolimus, lung transplant

ABSTRACT #: 21

TITLE: Predicting Deceased Donor Kidney Transplant Outcomes: Comparing KDRI/KDPI with Machine Learning

AUTHOR(S) (FIRST NAME, LAST NAME): Eric Pahl, Chelsey Larson

INSTITUTIONS (ALL): University of Iowa, University of Minnesota

INTRODUCTION: Kidney transplantation is an effective cure for patients suffering from end-stage renal disease. Kidney transplantation is cost-effective, provides a significant survival benefit, and improves the quality of life for patients. One limitation on kidney transplantation is the appropriate assessment of donor quality, for which several indices have been created.

METHODS: Machine learning methods (MLM) were compared to kidney donor risk index (KDRI aka KDPI) for the ability to predict graft failure by 12, 24, and 36 months after deceased donor kidney transplantation (DDKT). The MLM model, an ensemble of thousands of randomly generated decision trees, was trained with the same data initially used to develop KDRI.

RESULTS: An MLM trained with the readily available recipient and donor variables performs significantly better than KDRI/KDPI when predicting graft failure by 12, 24, and 36 months after DDKT. When comparing equal prediction failure rates of 10%, MLM successfully predicted 126% more successful DDKTs (an additional 2,148) than KDRI/KDPI from 1995-2005. Over the entire ROC curve, the MLM performed statistically significantly better c-statistic than KDRI/KDPI in all predictions.

CONCLUSION: Using MLM, many high-KDRI kidney offers resulted in thousands of successful patient outcomes without increasing risk of predicted graft failure. The MLM provided a significant improvement over KDRI for the assessment of kidney offers and give clinical professionals an improved basis for making the critical decisions. This work lays the foundation for future MLM in organ transplantation and describes the steps to measure, analyze, and validate future models.

KEYWORDS: Predicting Graft Failure ; Machine Learning Artificial Intelligence ; Kidney Transplantation ; Deceased Donor

ABSTRACT #: 22

TITLE: Clinical utility of a pharmacogenomic testing tool among kidney transplant recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Spencer LeCorchick, Lance Lindberg, Titte Srinivas

INSTITUTIONS (ALL): Intermountain Medical Center

BACKGROUND: Therapeutic drug monitoring (TDM) for tacrolimus (Tac) is the cornerstone of clinical workflow in the transplant clinic. CYP3A5 polymorphism is the major basis for Tac exposure variability and could place patients at risk for rejection or toxicity. In addition to CYP3A5, many other drug metabolizing genes could affect the pharmacologic profile of individual patients. We report on the clinical implementation of, Rx Match®, a proprietary DNA testing platform that measures, analyzes, and interprets a patient's DNA to determine what medications and dosage selections are appropriate based on genetic information in a kidney transplant recipient population.

METHODS: RxMatch® provides information about CYP2C19, CYP2C9, CYP2D6, CYP3A4, and CYP3A5. In addition to providing information about a gene's activity this test also provides specific recommendations for medication dosing and expected side effect severity. It also provides information on genes affecting thrombosis risk, including Factor V Leiden and VKORC1 activity. In July 2018 we implemented a new process to screen patients in work-up for kidney transplant with this assay. RxMatch® was obtained by cheek swab in the transplant clinic at the pre-operative visit or during the transplant admission.

RESULTS: Fourteen patients received testing and were included. Seven patients were classified based on CYP3A5 polymorphism as intermediate metabolizers (one allele with normal activity and one allele with little or no activity) and seven patients were classified based poor metabolizers (two alleles showing little or no activity) (See Figure below for sample test readout). All patients with intermediate CYP3A5 activity were found to have *1D|*3A, *1A|*3C, *1A|*3A, or *1D|*3C alleles. Patients with poor CYP3A5 activity were found to have *3A|*3A, *3C|*3C, or *3A|*3C. Three intermediate metabolizers had acute cellular rejection and 1 intermediate metabolizer had mixed cellular/

Immunosuppressants			
Cyclosporine (Gengraf, Neoral)	✓	CYP3A4: Extensive metabolizer. Two alleles showing normal activity.	Typical response is expected; no additional therapeutic recommendations.
Sirolimus (Rapamune)	✓	CYP3A4: Extensive metabolizer. Two alleles showing normal activity.	Typical response is expected; no additional therapeutic recommendations.
Tacrolimus (Prograf, Hecoria)	ℹ	CYP3A5: Two alleles showing little or no activity.	Individuals with poor metabolizer status have higher dose-adjusted trough concentrations of tacrolimus; the resultant increased concentrations may increase the probability of pharmacotherapy success. Consider initiating therapy with the recommended starting dose. In liver transplant patients, donor genotype should be considered as well as the recipient's.

Thrombosis Profile

Tested Genes (Alleles)	Genotype	Predicted Phenotype	Clinical Guidance
Prothrombin (F2)	Normal	Normal risk expected based on the patient's genotype.	The absence of these variant alleles of Prothrombin (Factor II) and Factor V Leiden suggests that the patient does not have the elevated risk of thrombosis associated with these genetic markers.
Factor V Leiden	Normal		
MTHFR (A1298C)	Normal		
MTHFR (C677T)	Heterozygous		

antibody mediated rejection within the first 3 months of transplant. One poor metabolizer had acute cellular rejection in the first 3 months of transplant. Of note, in addition to immunosuppression, five of the intermediate metabolizers and 2 of the poor metabolizers were found to have decreased metabolism of tramadol to the active form with increased risk of pharmacologic failure. Test results were available to the transplant pharmacists within 72 hours of ordering.

CONCLUSION: A patient specific genomic test can be used in clinical practice to help guide medication therapy in kidney transplant recipients over and above measuring blood concentrations of immunosuppressants. Such an approach is actionable in the routine workflow of a transplant program and has potential to personalize pharmacotherapy beyond immunosuppression and minimize drug-drug interactions, reduce side effects, and therapeutic failure.

KEYWORDS: pharmacogenomics, immunosuppression, kidney transplant, precision medicine

ABSTRACT #: 23

TITLE: Undue Infection Risk from Proliferation Signal Inhibitors when initiated later after Heart Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Ryan Levine, Sadia Dimbil, Lawrence Czer, Kevin Lor, Jignesh Patel, Evan Kransdorf, Jon Kobashigawa

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

BACKGROUND: Proliferation signal inhibitors (PSIs) have been shown to decrease the incidence of cardiac allograft vasculopathy (CAV) and rejection in clinical trials when given at the time of heart transplantation. These trials have also demonstrated that patients on PSIs have a reduced risk of CMV infection post-transplant. However, the effect of PSIs on overall infection rates when given later post-transplant has not been clearly delineated. We sought to evaluate the incidence of infection post-PSI initiation at our single center.

METHODS: Between 2010 and 2015 we assessed 550 heart transplant patients, 187 of which were initiated on a PSI (sirolimus or everolimus) over a five-year period after heart transplant. Endpoints included subsequent 2-year survival and subsequent 2-year freedom from infection (including CMV). A control population with patients not initiated on a PSI (n=363) was also included.

RESULTS: 187/550 (34.0%) of heart transplant patients were initiated on a PSI over a five-year period after heart transplant. Patients were initiated on a PSI due to rejection, malignancy, CMV viremia, CAV, circulating antibodies, renal insufficiency and infection. The average time to PSI initiation was 1.3 years. Patients on a PSI compared to patients on no PSI had significantly reduced subsequent 2-year survival and reduced subsequent 2-year freedom from infection (see table). There was no difference in subsequent 2-year freedom from CMV infection.

CONCLUSION: PSI initiation later after heart transplant is associated with less than optimal outcomes. However, as PSI is used in high-risk patients, the outcomes are not unexpected but PSI use may have increased infection risk. PSI should be used with caution in these patients.

KEYWORDS: proliferation signal inhibitor, cardiac allograft vasculopathy, heart transplantation, cytomegalovirus, infection

Endpoints	PSI Initiation (n=187)	No PSI Initiation (n=363)	Log-Rank P-Value
Subsequent 2-Year Survival	88.6%	94.9%	0.013
Subsequent 2-Year Freedom from Infection	88.1%	95.3%	0.001
Subsequent 2-Year Freedom from CMV Infection	97.0%	99.3%	0.154

ABSTRACT #: 24

TITLE: Factors Predicting Risk of Antibody-Mediated Rejection in Highly Sensitized Heart Transplant Recipients

AUTHOR(S) (FIRST NAME, LAST NAME): Ryan Levine, Sadia Dimbil, Michelle Kittleson, Jon Kobashigawa

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

BACKGROUND: Highly sensitized heart failure patients awaiting transplant (HTx) confront many challenges, including a longer wait to transplant and increased waitlist mortality, as well as a higher incidence of antibody-mediated rejection (AMR), cardiac allograft vasculopathy, and mortality after HTx. The purpose of this study was to describe the donor-specific antibody characteristics of of HTx patients with first-year AMR.

METHODS: We identified 36 patients transplanted between 2012 and 2017 who developed AMR (grade 1 or 2) in the first year and compared them to 658 HTx patients who did not develop first-year AMR. We then assessed the frequency of donor-specific antibodies (DSA) present at the time of HTx in the two groups. DSAs were quantified according to MFI with a relative intensity score (MFI between 1000-5000 = 1 point, MFI between 5000-10,000 = 5 points, and MFI>10,000 = 10 points). We also compared the use of eculizumab and induction therapy between groups.

RESULTS: HTx patients with first-year AMR had significantly more DSA at transplant and were more likely to receive induction therapy and eculizumab (table). In this small sample, there was no significant difference in the proportion of Class I vs Class II DSA or the DSA relative intensity score.

CONCLUSION: Patients with first-year AMR are more likely to have DSA at the time of transplant, though the identity and intensity of DSA did not differ between groups. These findings suggest that crossing DSAs at the time of transplant is associated with a higher risk of AMR and further studies are needed to determine whether this also translates into worse longer-term outcomes..

KEYWORDS: heart transplantation, donor-specific antibody, antibody-mediated rejection

	First-Year AMR 1, 2 (n=36)	No First-Year AMR (n=658)	P-Value
Any positive DSA at transplant, n (%)	11/36 (30.6%)	43/658 (6.5%)	<0.001
Class I only	5/11 (45.5%)	11/43 (25.6%)	0.270
Class II only	4/11 (36.4%)	27/43 (62.8%)	0.173
Class I and II	2/11 (18.2%)	5/43 (11.6%)	0.621
Mean DSA relative intensity score ± SD – all HLA	7.3 ± 9.4	5.9 ± 6.6	0.227
ATG Induction Therapy (%)	83.3%	52.1%	<0.001
Eculizumab n (%)	6/36 (16.7%)	13/658 (2.0%)	<0.001

ABSTRACT #: 25

TITLE: Does the Model for End-Stage Liver Disease Predict Primary Graft Dysfunction?

AUTHOR(S) (FIRST NAME, LAST NAME): Ryan Levine, Sadia Dimbil, Evan Kransdorf, Jignesh Patel, Sean Sana, Lawrence Czer, Jon Kobashigawa

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

BACKGROUND: The Model for End-Stage Liver Disease (MELD) has been used to assess risk in patients awaiting liver transplant. More recently, MELD has been applied to patients with end-stage heart disease and has been demonstrated to reveal patients at high risk for mortality after heart transplantation (HTx). It is not known whether MELD score can predict severe PGD as per the new ISHLT scale.

METHODS: Between 2010 and 2017, we identified 25 heart transplant patients who developed severe PGD supported by ECMO. This group was compared to 670 patients who did not have PGD. The pre-transplant MELD score was calculated for each group to see if there was a correlation to PGD.

RESULTS: The MELD score was similar between patients that developed PGD and those that did not develop PGD (see table). Characteristics of the two groups demonstrated that the MELD individual criteria revealed that pre-transplant creatinine and total bilirubin were higher in the No PGD group but did not result in a difference between group MELD scores.

CONCLUSION: The MELD score may predict poor outcome after HTx; however, it does not appear to be a predictor for PGD.

KEYWORDS: model of end-stage liver disease, liver transplantation, primary graft dysfunction, heart transplantation

ABSTRACT #: 26

TITLE: Predicting Organ Yield with Donor Admission Text

AUTHOR(S) (FIRST NAME, LAST NAME): Carlos Martinez, Bob Carrico, Andrew Placona,

INSTITUTIONS (ALL): United Network for Organ Sharing

BACKGROUND: Organ yield estimates offer insight on deceased donor utilization and are routinely used for OPO performance assessments. Current yield models maintained by the Scientific Registry of Transplant Recipients (SRTR) are developed per organ and incorporate various structured clinical features such as age, BMI, etc. Here, we use natural language processing and machine learning methods to develop a single organ yield model for all organs based only on donor admission text entries authored by OPOs on DonorNet when a deceased donor is recovered for transplant. In addition to clinical information, donor text also captures descriptive characterizations regarding the donor and context of donation and thus offer detailed, donor-specific information that may not otherwise be incorporated into traditional models.

METHODS: Deceased donor admission text and organ yields were collected for all deceased donors from 2015 to 2017 (N = 29336; 100% had text entries). Donor text entries were vectorized using a term frequency times inverse document frequency (TF-IDF) weighting scheme. These TF-IDF vectors were used to train a single-input, multiple-output neural network. For each organ, the multiple-output model predicts the probability of that organ being transplanted successfully (except for kidneys where the outputs are the probabilities of transplanting zero, one, or two kidneys).The model was trained on a subset (N = 24936) of the full dataset, and performance metrics were evaluated on the remaining subset (N = 4400). For comparison, performance of the SRTR models on the evaluation subset was also assessed.Due to a limited number of annual transplants, SRTR does not model intestine yields with clinical features. Thus, we have also excluded intestine yields from this analysis.

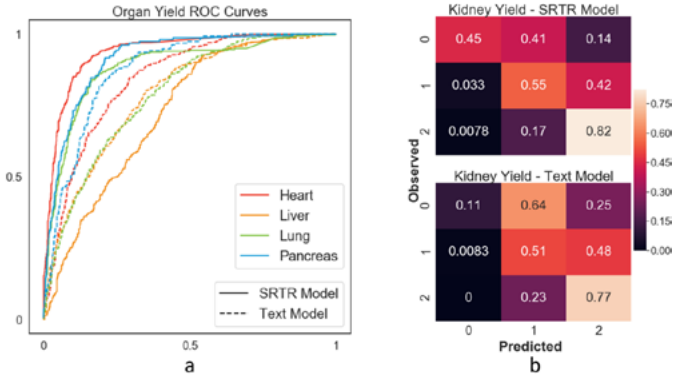
RESULTS: For both SRTR and the text models, ROC curves in Figure 1a were used to evaluate model performance on organs with binary outcomes whereas kidney yield performance was assessed with the normalized confusion matrices shown in Figure 1b. The text models were capable of discriminating between a successful transplant and discard with surprising accuracy (area under ROC scores ranged from 0.788 for liver yields to 0.876 for pancreas yields). However, the SRTR models generally outperformed the text-based model across all organs with liver yield being the notable exception.Spearman coefficients between the text and SRTR models are listed in Table 1 for each organ and ranged from 0.533 to 0.691.

CONCLUSIONS: The text-based yield estimates were underpowered to comparable in predictive performance relative to the individual SRTR models. Notably, however,

despite similar performance, the correlations between the two models were only moderate and suggestive of orthogonal information gain. Thus, donor admission text entries may be useful in augmenting yield estimates from traditional models. Future work in this domain includes exploring methods to combine features of text and clinical models and to identify key text motifs that are significant to predicting organ yield.

KEYWORDS: yield, utilization, machine learning

Heart	Kidney	Liver	Lung	Pancreas
0.671	0.691	0.558	0.533	0.656



ABSTRACT #: 27

TITLE: Highly Sensitive Multiplex PCR Assessment of cfDNA Donor Fraction in Pediatric and Adult Heart Transplant Patients: Non-Invasive Risk Stratification for Rejection in an Expanded Patient Population and Post-Transplantation Window

AUTHOR(S) (FIRST NAME, LAST NAME): Paula North[1], Aoy Mitchell[1], Michael Mitchell[1], Karl Stamm[2], Donna Mahnke[2], Mary Goetsch[1], Emily Ziegler[2], Angeles Baker[2], Adam Vepraskas[2]

INSTITUTIONS (ALL): Medical College of Wisconsin[1], TAI Diagnostics[2]

BACKGROUND: Noninvasive risk assessment for rejection in heart and other solid organ transplant recipients is a compelling clinical need. The donor-specific fraction (DF) of cell free DNA (cfDNA) in recipient plasma is a direct measure of selective injury to the donor organ and has been widely recognized as a logical analytical target to fulfill this need. Methodological differences in determination of DF are important considerations in practicality of clinical application. Using next generation sequencing (NGS), we have previously demonstrated a strong positive correlation between elevated DF and both acute cellular rejection (ACR) and acute antibody-mediated rejection (AMR) in pediatric and adult heart transplant patients (Hidestrand M et al, JACC 2014;63:1224-6). However, NGS is significantly limited by its cost, TAT, and level of sensitivity, leading us to develop and validate for clinical diagnostic use a rapid, highly sensitive, multiplexed allele-specific PCR test, termed myTAI-Heart, to address these limitations while also eliminating need for donor genotyping.

METHODS: Analytical validation of DF determination by the myTAI-Heart test was performed using a combination of single and 740 reconstructed mixtures of genomic DNA extracted from 20 individuals obtained from whole blood supplied from a commercial vendor. Results were corroborated using reconstructions of sheared DNA to more closely resemble typical cfDNA fragment lengths. The "no donor" allele-specific qPCR method targets 94 highly informative bi-allelic single nucleotide polymorphism (SNP) targets which are collectively used to evaluate donor options in staged Monte Carlo (greater than 30,000) simulations, each reporting a median DF, along with quality control metrics, generating the final DF call. The no-donor bioinformatic algorithm was developed and validated using a cohort of 1168 samples divided into two sets. The intended clinical use of the myTAI-Heart assay is to aid in identification of heart transplant recipients who have a low versus increased risk of moderate/severe ACR (ISHLT 2005 grade 2R or higher) at time of testing in conjunction with standard clinical assessments. Clinical performance characteristics for the test's intended use were established using a set of 158 matched pairs of endomyocardial biopsy-plasma samples collected from 76 heart transplant recipients, both pediatric and adult (mean 12.7 years, range 0.1 to 30.2 years). All validation samples were spun less than 7 hours after collection in Streck BCD tubes at 1400 x g x 10 min followed by a 2nd spin at 1400xg. Final supernatants were frozen and stored at -80degC prior to frozen shipment to the TAI Diagnostics CAP-accredited Lab for cfDNA extraction and quantitative genotyping. Concurrent basic recipient genotyping was performed using a separate whole blood sample, required once for each recipient.

RESULTS: Analytical validation of the myTAI-Heart assay yielded a DF Limit of Blank (LOB) of 0.110%, a Limit of

Detection (LOD) and Limit of Quantification (LOQ) of 0.165%, and linearity range of at least 0-10%. Precision ranged from a 22.92%CV for low DF (mean 0.18% DF, SD 0.04%) to 9.94%CV for high DF (mean 12.25% DF, SD 9.94%). Clinical validation studies using the set of 158 matched pairs of endomyocardial biopsy-plasma samples selected a DF cutoff of 0.32% to maximize the negative predictive value (NPV) for grade 2R or higher ACR by establishing a cutoff for grades 1R or higher (mild, moderate, and severe rejection) vs grade 0R (no rejection). Using this cutoff, performance characteristics included an NPV of 100.00% for grade 2R or higher ACR, with 100.00% sensitivity and 75.48% specificity. In addition, the assay had a 94.87% NPV and 43.90% PPV for grade 1R versus grade 0R, emphasizing the sensitivity of the DF determination. Within this validation dataset, coronary artery vasculopathy (CAV) was also detected by the no-donor myTAI-Heart DF method, with a mean DF of 0.55% in patients with CAV, p = 0.057 (Ragalie WS et al, JACC 2018 71:2982-7).

CONCLUSION: The intended use of this highly sensitive PCR-based assay, which is conservatively designed to stratify low versus increased risk of moderate to severe ACR with 100% NPV, is strongly supported by the analytical and clinical validation data here reported. This test is intended and validated for clinical diagnostic use in heart transplant recipients who are 2 months of age or older and as early as 1 week post-transplant, thereby significantly expanding the window of opportunity for noninvasive transplant rejection assessment to young children (> 2 months of age) and to all recipients as early as 1 week after transplantation.It should be recognized that cfDNA DF elevation within the reportable range of this highly sensitive assay can also be caused by other forms of selective cellular injury to the donor heart, including ACR 1R, AMR, and CAV, and therefore requires correlation with other clinical indicators to weigh these possibilities and guide patient care interventions. This test is contraindicated in patients who are pregnant, have cancer or have had cancer in the past 2 years, have post-transplant lymphoproliferative disease, have another transplanted organ (solid or allogeneic bone marrow), or are on mechanical circulatory support.

KEYWORDS: Cell free DNA, Heart transplant rejection

ABSTRACT #: 28

TITLE: Comparison of serum treatments with EDTA, DTT and dilution for single antigen test to detect HLA antibodies

AUTHOR(S) (FIRST NAME, LAST NAME): Eun-Jee Oh, Hoon Seok Kim

INSTITUTIONS (ALL): Catholic University of Korea

INTRODUCTION: Single antigen bead test (SAB) is sensitive assay to detect HLA antibodies, and shows false negative reaction on native sera with high concentrated antibodies known as prozone effect. We aim to compare the efficacy the different serum treatment methods (dilution, DTT and EDTA) to overcome the prozone effects.

METHOD: Thirty-eight sera from highly sensitized patients were tested including 21 samples for HLA class I antibodies and 17 samples for HLA class II antibodies. One negative sample was also tested as control. All sera were tested by SAB (One Lambda) without pre-treatment (native) and by adding EDTA (25mM). Five sera were further tested by incubating with 5mM DTT for 30 min at 37°C, 1:8 dilution of the sample in PBS, and C1q assay.

RESULTS: The prozone effects were detected by EDTA pretreatment in 10 sera (48%) of Class I and 7 sera (41%) of Class II assay. EDTA pretreatment sharply increased MFI values of strongly binding antibodies. Serum dilution and DTT treatment also detected prozone effect, but the efficacies were not same. Among three methods, EDTA was more potent than DTT or dilution to detect the prozone effect. However, most C1q-fixing antibodies were emerged in three methods. In one negative control sample, comparable results were achieved from native and three treatment methods.

CONCLUSION: Our study showed high prevalence of prozone phenomenon in SAB. To overcome the false negative results, the EDTA treatment was most effective, suggesting the prozone effects were mostly due to cleavage products of complement components.

KEYWORDS: prozone effect, EDTA, DTT

ABSTRACT #: 29

TITLE: Risk Factors to Define an Extended Criteria Donor Heart Do Not Appear to have Cumulative Adverse Effects after Heart Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Michael Olymbios, Sadia Dimbil, Ryan Levine, Fardad Esmailian, Jignesh Patel, Amy Jones, Jon Kobashigawa

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

BACKGROUND: There remains a disparity between the number of patients awaiting heart transplantation (HTx) and the availability of donor hearts. This is exacerbated by relatively low rates of donor heart utilization, partly because of a reluctance to accept extended criteria organs. Many of these so-called extended criteria have been shown not to impact outcomes. We sought to determine whether extended criteria have a cumulative effect on recipient outcomes.

METHODS: Between 2012 and 2017, we assessed 626 HTx extended criteria donors, defined as donor age >50 yrs, left ventricular (LV) hypertrophy >1.2cm, LV ejection fraction (LVEF) <50%, ischemic time >4 hours, donor-transmitted coronary artery disease (CAD), female-to-male gender mismatch, and donor:recipient weight <0.80. We then divided recipients into four groups according to the number of criteria present: 0 (n=350), 1 (n=220), 2 (n=76), ⇢3 (n=15). We assessed each group for 3-year actuarial survival, freedom from cardiac allograft vasculopathy (CAV), freedom from any-treated rejection and freedom from non-fatal major adverse cardiac events (NF-MACE: MI, CHF, stroke, and need for angioplasty or pacemaker/ICD).

RESULTS: There was no difference in 3-year actuarial survival, 3-year freedom from CAV and 3-year freedom from any-treated rejection between the groups. However, there was progressively worse freedom from NF-MACE as the number of extended criteria increased (82.5% vs 74.8% vs 59.3% vs 54.6%; p=0.035). The most common extended criterion in group 2 was donor age (56/220), the most common combination of 2 criteria in group 3 was age and CAD (19/76) and the most common combination of 3 criteria in group 4 was LV hypertrophy, gender mismatch and CAD (4/15).

CONCLUSION: In an attempt to expand the donor pool, numerous single-center series have demonstrated good outcomes for extended criteria organs. We show acceptable outcomes for donor organs with multiple extended criteria. However, we found that risk of NF-MACE incrementally increased with the number of criteria. These findings suggest that donors with one or even two or more extended criteria are acceptable for use, although complication rates may be higher.

KEYWORDS: heart transplantation, donor criteria, gender mismatch

Endpoints	0 Extended Criteria (n=350)	1 Extended Criterion (n=220)	2 Extended Criteria (n=76)	3 Extended Criteria (n=15)	P-Value
3-Year Survival	82.4	86.0	94.5	78.6	0.136
3-Year Freedom from NF-MACE	82.5	74.8	59.3	54.6	**0.035**
3-Year Freedom from CAV	93.8	85.1	83.5	92.9	0.081
3-Year Freedom from Any-Treated Rejection	83.0	77.0	75.1	75.7	0.583

ABSTRACT #: 30

TITLE: What Antigens to Avoid in Heart Transplant to Optimize Outcome Via the Virtual Crossmatch

AUTHOR(S) (FIRST NAME, LAST NAME): Michael Olymbios, Sadia Dimbil, Ryan Levine, Evan Kransdorf, Jignesh Patel, Adriana Shen, Lawrence Czer, Jon Kobashigawa

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

BACKGROUND: The virtual crossmatch is predicated on the threshold to avoid antigens against which the recipient has made antibodies. If the threshold is low at 5,000 MFI, then the donor pool is narrowed because antigens are viewed as being "avoids." On the other hand, if the MFI threshold is raised to 10,000, then less antigens will be viewed as avoids, thus expanding the donor pool. When you get to the highly sensitized patients, a program may decide to avoid only those antigens where the corresponding antibodies are positive at 1:8 dilution or positive in the C1q assay. In this manner, the donor pool will be theoretically expanded for that patient due to the smaller number of avoided antigens. However, these highly sensitized patients may mandate a prospective donor-specific crossmatch – which may narrow that donor pool expansion - because not all surrounding OPO's will have the ability to perform that prospective donor-specific crossmatch. The purpose of this study is to assess the MFI threshold for antigen avoidance to increase the possibility of receiving a donor heart, and to evaluate post-transplant outcomes.

METHODS: Between 2010 and 2017, we assessed 245 heart transplant patients with pre-transplant peak PRA > 10%. We divided these patients into those that had pre-transplant various categories of antigen avoids; Group 1: antigens with corresponding antibodies between 5,000 MFI and 10,000 MFI (n=19), Group 2: antigens with corresponding antibodies > 10,000 MFI (n=11), Group 3: antigens where the corresponding antibodies are positive at 1:8 dilution (>2500 MFI) (n=8) or Group 4: antigens where the corresponding antibody are positive in the C1q assay (n=6). For each category, the pre-transplant calculated PRA (cPRA) was performed to assess the differences in cPRA for each group. Post-heart transplant, one-year outcome was assessed which included 1-year survival, and 1-year freedom from cardiac allograft vasculopathy (CAV) as defined by stenosis ⇢ 30% by angiography, NF-MACE (myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/ pacemaker implant, stroke), any-treated rejection (ATR), acute cellular rejection (ACR), antibody-mediated rejection (AMR).

RESULTS: The cPRA decreased significantly as the MFI threshold increased for antibodies and corresponding antigen avoid. This included 1:8 dilution and C1q-positive assays. Post-transplant outcomes at one year were comparable among all 4 groups.

CONCLUSION: Increasing the MFI threshold and/or utilizing 1:8 dilution and C1q-positive assay may increase the donor pool. Further investigation is warranted to assess a larger group of patients to confirm these findings

KEYWORDS: virtual crossmatch, heart transplantation, mean fluorescent intensity, antigens

Endpoints	Group 1: 5000<MFI < 10000 (n=19)	Group 2: > 10000 MFI (n=11)	Group 3: Positive 1:8 dilution > 2500 MFI (n=8)	Group 4: C1q-positive (n=6)	P-Value
Mean cPRA, %	79.2%	84.5%	65.0%	54.0%	0.021
1-Year Survival	94.7%	90.9%	100.0%	100.0%	0.754
1-Year Freedom from CAV	94.7%	90.9%	100.0%	100.0%	0.754
1-Freedom from NF-MACE	78.9%	81.8%	75.0%	100.0%	0.648
1-Freedom from ATR	68.4%	63.6%	75.0%	66.7%	0.944
1-Year Freedom from ACR	89.5%	90.9%	100.0%	100.0%	0.640
1-Year Freedom from AMR	68.4%	72.7%	75.0%	66.7%	0.945

ABSTRACT #: 31

TITLE: Is Left Main Stenting Long-Term after Heart Transplantation Worthwhile?

AUTHOR(S) (FIRST NAME, LAST NAME): Michael Olymbios, Sadia Dimbil, Ryan Levine, Jignesh Patel, Lawrence Czer, Nicole Ransbottom, Jon Kobashigawa

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

BACKGROUND: Cardiac allograft vasculopathy (CAV) is one of the major factors limiting long-term survival after HTx. The use of angioplasty and drug-eluting stents is common after HTx. CAV of the left main (LM) coronary artery is known to have high mortality risk. The use of stenting for LM disease has not been well evaluated in this cohort of patients.

METHODS: Between 2010 and 2013 we assessed 37 heart transplant patients who underwent stenting of the LM coronary artery post-transplant. A non-left main (no LM disease with another coronary artery stented) population was included (n=27) for comparison. Outcomes included 5-year freedom from restenosis (⇢50% stent stenosis) subsequent 5-year survival, subsequent 5-year freedom from any myocardial infarction, and subsequent 5-year freedom from further deterioration in left ventricular function by echocardiogram.

RESULTS: 5-year freedom from restenosis and 5-year freedom from further deterioration in LV function was significantly lower in the LM stented group (see table). There was no difference in subsequent 5-year survival or freedom from myocardial infarction.

CONCLUSION: Patients with left main stenting appear to be have acceptable outcome after heart transplantation despite progression to a lower left ventricular function and a higher rate of restenosis. Larger numbers and further stratification into subgroups may define lower risk LM stenosis patients.

KEYWORDS: cardiac allograft vasculopathy, heart transplantation, left main stenting

ABSTRACT #: 32

TITLE: Feasibility Study of Telemedicine for Dialysis Patients Awaiting Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Jane Padikkala, Nicole Ali, Ashley Bagheri, Robin Layman, Mary Ann Sevick, Brigitte Sullivan, Wei-Yi Chung, Simon Jones

INSTITUTIONS (ALL): NYU Langone Health- Transplant Institute

BODY: Telemedicine enables real-time, remote monitoring of transplant recipients to facilitate more rapid and personalized interventions. Our study interventioN: telemedicine (TM) visits should have an effect in three key areas: clinic efficiency, patient adherence, and patient experience. We conducted a six-month prospective randomized-controlled clinical pilot study to evaluate the intervention for our transplant program. We targeted patients who are on hemodialysis and are listed for kidney transplant at NYU Langone Health and NYU Winthrop. Currently, at NYU, there are 406 patients on the transplant waiting list who are receiving care at dialysis centers in the New York City area. We selected 5 Atlantic Dialysis Centers which saw NYU patients and 2 NYU Winthrop dialysis centers which had the highest number of patients on our transplant list in order to yield a target sample of 45. Eligible participants were randomized to 1 of 2 groups: usual care and telemedicine intervention. Patients were followed for 4 months post randomization to determine the number of days that elapse between randomization and routine transplant waitlist clinic visit. As in office waitlist clinic appointments experience 80-day wait, a 4-month follow-up seemed more than adequate to evaluate this primary outcome. The two study arms differ in the following ways: (1) patients in usual care (UC) arm underwent basic physical exam, (2) TM patient data (such as vitals and labs) was abstracted from the patient's dialysis record and shared electronically with the transplant center and (3) both arms completed post-intervention survey, however, the TM group's survey had some questions specific to the TM component of the visit. Thus far, we randomized 18 participants into 2 groups, 8 UC and 8 TM. Primary outcomes were waiting time, missed and rescheduled visits, and cost. Secondary outcomes were feasibility, patient acceptability, and other wait-related variables such as transplant wait-list status changes during the study. Our study is powered to detect a reduction in the number

of days that elapse between randomization and the occurrence of the routine transplant waitlist clinic visit, and took into consideration loss of participants due to death, transplant, or drop-out in the next 4 months. An "intent-to-treat" (ITT) approach was used to address the specific aims. All participants were included in the data analysis in the treatment arm to which they were randomized, regardless of compliance, treatment received, or deviation from protocol. A descriptive analysis has been performed using appropriate graphical and numerical exploratory data techniques. The information obtained from this preliminary investigation of the data will be used to: (1) assess data quality and completeness; (2) describe univariate and bivariate distributions at each measurement time point; and (3) identify associations between variables. We will examine: (1) comparability of treatment arms at baseline (based on Chi-squared statistics or t-tests, as appropriate), (2) relationships between the response variables and potential covariates, and (3) predictors of missing data/ drop-out. For waiting time, there is a mean of 92.0 days (SD=42.1) in the intervention group compared to a wait time mean of 113.0 days (SD= 57.0) in the control group. The results are encouraging but not statistically significant (p=.36). When given the provider satisfaction survey, providers overwhelmingly preferred to see their patients via telemedicine as opposed to seeing in person in clinics. Providers' communication was unimpaired by using telemedicine and the inability to touch the patient did not impair the diagnosis or visit in any way. Patients in the UC arm reported they were satisfied with their in-person visit and were able to explain their health issues without any problems to their provider. We believe that TM, as a care delivery method, will improve patient access to care and transplant outcomes while reducing clinic overutilization and overall costs to both patients and providers. If the outcomes of the study are in line with our expectations then we would propose broader use of TM in all our affiliated dialysis centers.*Portions of this research were done while the author was affiliate with NYU Langone Health

KEYWORDS: Randomized-controlled Trial, Telemedicine, Telehealth, Nephrology, Hemodialysis, Kidney Transplant

ABSTRACT #: 33

TITLE: Long-Term Outcome of Heart-Kidney Transplantation in Amyloid Patients

AUTHOR(S) (FIRST NAME, LAST NAME): Jignesh Patel, Sadia Dimbil, Ryan Levine, Lawrence Czer, Bernice Coleman, Jon Kobashigawa

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

BACKGROUND: Heart transplantation in patients with amyloid light chain (AL) amyloidosis and transthyretin-related (TTR) amyloid has been controversial. In the advent of new treatments and bone marrow transplants, an increasing number of amyloid patients have received heart transplants. However, outcomes of dual-organ transplantation - namely, heart-kidney transplantation (HKTx) – in amyloid patients has not been studied. It is believed that kidney involvement with amyloid meant systemic disease and a contraindication to HKTx. Therefore, we sought to assess whether amyloid patients have good long-term outcome post-HKTx.

METHODS: Between 2011 and 2014, we assessed 4 patients (2 AL, 2 TTR) who underwent combined heart-kidney transplantation for cardiac amyloidosis at our single center. A control HKTx population without amyloidosis was included (n=26). Endpoints included 4-year outcomes including survival, freedom from CAV (as defined by stenosis ⇢ 30% by angiography), freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke), and freedom from any-treated rejection, acute cellular rejection, and antibody-mediated rejection.

RESULTS: None of the 4 amyloid patients who received a combined heart-kidney transplant died after four years. HKTx amyloid patients had a higher rate of CAV development compared to the HKTx control but this was not statistically significant. There was no significant difference between the groups for any of the endpoints (see table).

Endpoints	AL/TTR Amyloid + HKTx (n=4)	HKTx Control (n=26)	Log-Rank P-Value
4-Year Survival	100.0%	80.8%	0.345
4-Year Freedom from CAV	75.0%	92.3%	0.265
4-Freedom from NF-MACE	100.0%	96.2%	0.695
4-Freedom from Any-Treated Rejection	100.0%	88.5%	0.476
4-Year Freedom from Acute Cellular Rejection	100.0%	96.2%	0.683
4-Year Freedom from Antibody-Mediated Rejection	100.0%	92.3%	0.568

CONCLUSION: Heart-kidney transplantation in amyloid patients has good long-term outcome. Therefore the need for a kidney in amyloid patients should not be a contraindication to heart transplantation Larger numbers are needed to confirm these findings.

KEYWORDS: Amyloid, Heart Transplantation, Kidney Transplantation

ABSTRACT #: 34

TITLE: 5-Year Outcome of Photopheresis in Heart-Transplantation with Refractory/Persistent Rejection

AUTHOR(S) (FIRST NAME, LAST NAME): Jignesh Patel, Sadia Dimbil, Ryan Levine, Evan Kransdorf, Lawrence Czer, Robert Cole, Kevin Shah, Jon Kobashigawa

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

BACKGROUD: Photopheresis is a plasma exchange therapy that uses 8-methoxy-psolaren and ultraviolet light to modulate T-cell activity. Research has shown that photopheresis is an effective treatment for patients with recurrent acute cellular (ACR) and antibody-mediated rejection (AMR) post-heart transplantation (HTx). We sought to assess the long-term outcome of patients placed on photopheresis therapy at our single center.

METHODS: Between 2010 and 2012, we assessed 235 HTx patients, 10 of which were initiated on photopheresis. Photopheresis was administered for 2 days, weekly x 4 and once monthly x 5 for 6 months total therapy. Endpoints included subsequent 5-year survival, 5-year freedom from cardiac allograft vasculopathy (CAV) as defined by stenosis ⇢ 30% by angiography, 5-year freedom from non-fatal major adverse cardiac events (NF-MACE: defined as myocardial infarction, congestive heart failure, percutaneous cardiac intervention, placement of pacemaker/defibrillator, stroke), 5-year freedom from any-treated rejection (ATR), acute cellular rejection (ACR), and antibody-mediated rejection (AMR). A control group that was not treated with photopheresis (n=225) was included.

RESULTS: The average time to photopheresis initiation was 1.6 years post-transplant. The photopheresis group had an average LVEF 40% (range 23% to 63%) pre-treatment. 8/10 patients were sensitized with a PRA ⇢ 10% (range 13% to 90%). The photopheresis group compared to the control group had a significantly lower subsequent 5-year survival (40.0% vs 79.0%, p=0.001). 6 out of 10 patients on photopheresis died within 5 years. There was no difference in subsequent 5-year freedom from CAV, NF-MACE, ATR, ACR, and AMR between the groups (see table).

Endpoints	Photopheresis (n=10)	No Photopheresis (n=225)	Log-Rank P-Value
Subsequent 5-Year Survival	40.0%	79.0%	0.001
Subsequent 5-Year Freedom from CAV	90.0%	82.7%	0.914
Subsequent 5-Year Freedom from NF-MACE	80.0%	90.2%	0.251
Subsequent 5-Year Freedom from Any-Treated Rejection	90.0%	81.8%	0.623
Subsequent 5-Year Freedom from Acute Cellular Rejection	100.0%	89.8%	0.336
Subsequent 5-Year Freedom from Antibody-Mediated Rejection	90.0%	94.7%	0.498

CONCLUSION: Heart transplant patients treated with photopheresis due to high risk factors have

reduced long-term survival. It is not clear how much photopheresis benefitted these patients or whether earlier treatment may have been of more benefit. The selection of patients for photopheresis may be key to improved outcome. Further studies are needed.

KEYWORDS: photopheresis, rejection, antibody-mediated rejection, acute cellular rejection, heart transplantation

ABSTRACT #: 35

TITLE: The Sequelae Of Rare Infections In Heart Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Jignesh Patel, Sadia Dimbil, Ryan Levine, Lawrence Czer, Amy Jones, Jon Kobashigawa

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

BACKGROUND: Infection is a major cause of morbidity and mortality post-heart transplantation. Common bacterial and viral pathogens account for a large proportion of these infections, but the incidence of rare infections in immunocompromised patients continues to increase. We sought to assess the incidence of these rare pathogens and possible sequelae such as triggering rejection at our single center.

METHODS: Between 2010 and 2016, we assessed 435 heart transplant patients who developed infection post-transplant. Of these, 23 patients developed an opportunistic infection due to a rare pathogen (defined as ≤1% incidence at our single center). These patients were assessed for the type of infection, subsequent 1-year survival, subsequent 1-year freedom from any-treated rejection, acute cellular rejection, and antibody-mediated rejection. A control population with no infection post-transplant was included (n=175).

RESULTS: The pathogens with an incident rate of ≤1% are included in the table below. There was no significant difference in subsequent 1-year survival between

Type of Rare Infection (n=23)	Incidence
% Serratia marcescens	0.7% (3/435)
% Trypanosoma cruzi (Chagas)	0.5% (2/435)
% West Nile Virus	0.5% (2/435)
% Pseudallescheria boydii	0.5% (2/435)
% Candida lusitaniae	0.5% (2/435)
% Morganella morganii	0.5% (2/435)
% Leishmania	0.2% (1/435)
% Candida tropicalis	0.2% (1/435)
% Balamuthia mandrillaris	0.2% (1/435)
% Candida parapsilosis	0.2% (1/435)
% Serratia liquifaciens	0.2% (1/435)
% Serratia ureilytica	0.2% (1/435)
% Neisseria perflava	0.2% (1/435)
% Kodameae ohmeri	0.2% (1/435)
% Sphingomonas paucimobilis	0.2% (1/435)
% Pseudomonas synxantha	0.2% (1/435)

Endpoints	Rare Infections Group (n=23)	No Infections Group (n=175)	P-Value
Subsequent 1-Year Survival	91.3%	86.3%	0.424
Subsequent 1-Year Freedom from Any-Treated Rejection	73.9%	91.4%	0.018

patients with rare infections and the control population. Patients who were susceptible to these pathogens had a significantly reduced 1-year freedom from any-treated rejection (73.9% vs 91.4%, p=0.018).

CONCLUSION: Immunocompromised transplant patients with these rare infections appear to have acceptable outcome. However, these infections appear to stimulate the immune system in causing subsequent any-treated rejection. Detecting and treating emerging opportunistic infections in heart transplant patients is a critical aspect of patient care and one must be aware of subsequent rejection risk.

KEYWORDS: infection, heart transplantation, immunocompromised, pathogen, rejection

ABSTRACT #: 36

TITLE: Heart Transplant Patients with Abnormal Endomyocardial Biopsies by Histology and Normal Molecular Microscope Results: An Exploratory Analysis

AUTHOR(S) (FIRST NAME, LAST NAME): Kevin Shah[1], Sadia Dimbil[1], Ryan Levine[1], Sean Sana[1], Philip Halloran, Jignesh Patel[1], Jon Kobashigawa

INSTITUTIONS (ALL): Smidt Heart Institute at Cedars-Sinai, University of Alberta

BACKGROUND: In heart transplant (HTx) recipients who undergo endomyocardial biopsy (EMB), a molecular microscope (MMDx) system has been developed to assess both T cell-mediated (TCMR) and antibody-mediated (ABMR) rejection through the use of intragraft mRNA transcripts. Outcomes of patients who undergo surveillance EMB interpreted as abnormal by histology and normal by MMDx is unknown.

	Case 1	Case 2	Case 3	Case 4
Transplanted Organs	Heart	Heart-Liver	Heart-Kidney	Heart
EMB Histology	ACR 0 / AMR 2	ACR 0 / AMR 2	ACR 0 / AMR 1	ACR 0 / AMR 2
Therapies	IVIG, rituximab, prednisone bolus	Rituximab	Prednisone bolus, then IVIG	IVIG, plasmapheresis, rituximab
Symptoms at time of treatment	No	No	No	No
EF at time of treatment	43	62	65	67
DSA	No	Yes	No	Yes
Outcome	Remained AMR 2. LVEF improved to 56%	Persisted on EMB 10 days after. Resolved on EMB 38 days after	Increased to AMR 2 after 1 week and persisted as AMR 1	Reduced to AMR 1 on repeat EMBs and resolved 52 days

METHODS: We retrospectively reviewed cases from 2008 through 2016 of patients who underwent a surveillance EMB after transplant from one center in Los Angeles, CA. Of 41 patients who had 72 biopsies reviewed with MMDx system performed, 4 patients had pathology abnormal (ACR >1R or AMR >0) and normal MMDx (TCMR < 50% and ABMR < 50%). We describe their treatment and outcomes.

RESULTS: Four patients had EMBs which demonstrated abnormal pathology and normal MMDx. All cases had histology concerning for AMR grade 1 or greater and patients received treatment ranging from rituximab, intravenous immunoglobulin (IVIG), and steroid boluses. All patients were asymptomatic time of treatment and 3 of 4 had preserved left ventricular ejection fraction (LVEF). Two patients developed donor specific antibodies (DSA) and all patients survived 1 year after treated episode of rejection.

CONCLUSION: HTx patients who undergo surveillance EMB interpreted as AMR by histology and normal by MMDx represent a small group of patients. They are often asymptomatic with preserved LVEF at time of histologic diagnosis. Immunosuppressive therapies improve serial EMB findings and the use of MMDx may help risk stratify patients with abnormal histology as low risk. Further studies with larger cohorts and longer follow-up are warranted.

KEYWORDS: Biopsy, Rejection

ABSTRACT #: 37

TITLE: Increasing Use of Pain Medications as a Risk Factor for Outcomes After Heart Transplantation - OPIATES UPDATE

AUTHOR(S) (FIRST NAME, LAST NAME): Kevin Shah, Jignesh Patel, Ryan Levine, Sadia Dimbil, Elizabeth Passano, Jon Kobashigawa

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

BACKGROUND: Chronic pain syndromes prior to heart transplantation (HTx) are not uncommon. Patients receiving high doses of narcotics prior to kidney and liver transplant have a greater risk of adverse events after transplant, including graft rejection and death. It is not known whether there is a greater risk associated with high dose of opioids prior to HTx and adverse events.

METHODS: Between 2010 and 2017, we assessed 585 HTx recipients with a prescription for pain medications within 6 months before transplant and adjusted dosages to morphine equivalents (ME) per day. Pts were divided into the following groups: no opioids (n=357), 1-10 ME/day (n=67), 11-20 ME/day (n=65), 21-30 ME/day (n=45), 31+ ME/day (n=51). Post-heart transplant outcomes included: % non-compliance (described as first year missed clinic appointments), freedom from any-treated rejection (ATR), acute cellular rejection (ACR), and antibody-mediated rejection (AMR). Additional

Outcomes	No Opiate (n=357)	1-10 ME/day (n=67)	11-20 ME/day (n=65)	21-30 ME/day (n=45)	31+ ME/day (n=51)	P-Value
% First Year Missed Clinic Appointments	21.5%	17.9%	30.9%	28.9%	40.0%	0.05*
3-Year Survival	82.6%	83.8%	79.7%	86.0%	85.5%	0.906
3-Year Freedom from CAV	85.2%	90.8%	89.0%	79.6%	85.5%	0.732
3-Year Freedom from NF-MACE	82.1%	79.2%	68.0%	64.5%	83.2%	0.087
1-Year Freedom from ATR	83.3%	81.0%	81.5%	87.9%	85.1%	0.907
1-Year Freedom from ACR	93.1%	89.7%	91.6%	95.0%	91.0%	0.819
1-Year Freedom from AMR	93.5%	95.1%	98.4%	97.7%	92.0%	0.439

*P<0.05 compared to no opiate use and 1-10 ME/day

endpoints included survival, freedom from cardiac allograft vasculopathy (CAV - as defined by stenosis ⇢ 30% by angiography), freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke). These results were compared to a control group with no opiate use 6-months prior to HTx (n=357).

RESULTS: Patients who were on high doses of morphine equivalents had similar 1 and 3-year post-transplant outcomes when compared to patients on low doses of morphine and the control group. However, patients prescribed high doses of opioids were more likely to have more missed clinic appointments (see table).

CONCLUSION: The use and dosage of pain medications prior to HTx should be considered when evaluating potential heart transplant candidates. Patients who use high doses of opiates are of greater risk for missed clinic appointments and non-compliance post-transplant.

KEYWORDS: pain medication, heart transplantation, morphine, opitates

ABSTRACT #: 38

TITLE: Belatacept Based CNI Free Immunosuppression in Pancreas Transplantation. Results at 4 Years

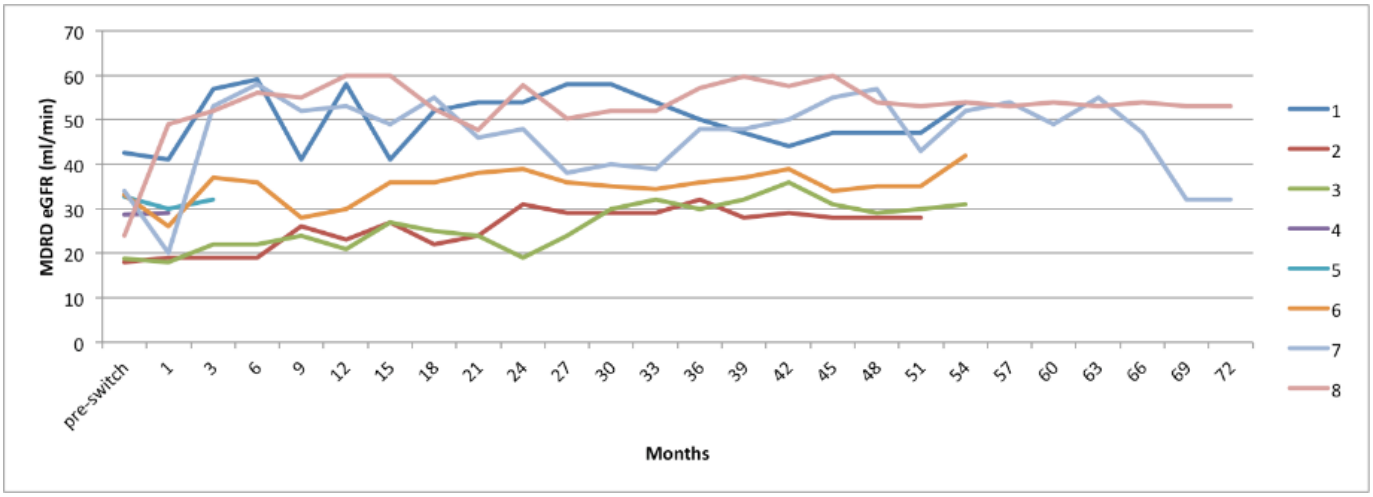
AUTHOR(S) (FIRST NAME, LAST NAME): Asif Sharfuddin[1], Jeanne Chen[1], Jonathan Fridell[1], Muhammad Yaqub[1], Tim Taber[1], Muhammad Mujtaba

INSTITUTIONS (ALL): Indiana University School of Medicine, University of Texas Medical Branch

BACKGROUND: CNI based Immunosuppression is a well known risk factor for worsening renal function. We report our experience in converting Pancreas Transplant recipients from tacrolimus to Belatacept in order to avoid further worsening of kidney function.

METHOD: Chart review was performed on all patients with a pancreas transplant who were maintained on Belatcept maintenance immunosuppression.

RESULTS: Eight EBV IGG positive (7 PTA, 1 SKP, mean age at start of Belatacept= 52.4+/-7, 7 Females 7 Caucasians) patients initially maintained on tacrolimus, sirolimus and mycophenolate with biopsy proven chronic kidney fibrosis consistent with CNI toxicity were converted from Tacrolimus to Belatacept. Median



Follow up of 53.7 months. Mean tacrolimus levels prior to switch were 6.4+/-1.4 ng/ml.Median time from transplant to conversion was 4.7 years (range0.3-9.5). Tacrolimus was weaned off over 4-6 weeks. Patients were maintained on a steroid free regimen of Belatacept, Sirolimus (level 3-6ng/ml) and Mycophenolate. Pre-conversion the mean MDRD eGFR was 29.6+/-9.9., which stabilized or improved over the follow up period to an eGFR of 35.4+/-9.8 ml/min. One patient could not tolerate the oral regimen due to GI side effects and another patient was non compliant. 1 case experienced elevation of Lipase requiring steroid therapy with subsequent successful response and continued on the same regimen with Belatacept. Subsequently at 21 months of Belatacept this subject (2) was found to have spindle cell sarcoma at the head of the transplanted pancreas and underwent a total pancreatectomy. Serum glucose (Mean pre switch 96.98+/-13.9 vs post 101+/-10) , C-peptide (Mean Pre-switch 2.4+/-1.0 vs post 2.3+/-1.2) and Hemoglobin A1c (Mean Pre-Switch levels5.7+/-0.2 vs post 5.8+/-0.2) remained unchanged over the study period. There was no incidence of BK, CMV, EBV, PTLD or Donor Specific Antibody (DSA) noted during prospective monitoring of first 12 months. No other new clinically significant event was noted with the use of this regimen for the 5 cases who have received Belatacept over the median follow up of 4.4 years with stable renal function and proteinuria.

CONCLUSION: Belatacept was able to stabilize and improve renal function in patients with CKD intolerant of tacrolimus without any impact on Pancreas outcomes up to beyond 4 years. Larger and longer term studies are needed to ensure the safety of this approach in pancreas transplant recipients in order to preserve kidney function.

KEYWORDS: Belatacept, Pancreas Transplant, CNI

ABSTRACT #: 39

TITLE: CLINICAL UTILITY OF SERIAL DONOR-DERIVED CELL-FREE DNA MONITORING IN THE KIDNEY TRANSPLANT CLINIC

AUTHOR(S) (FIRST NAME, LAST NAME): Titte Srinivas, Sanjiv Anand, Donald Morris

INSTITUTIONS (ALL): Intermountain Medical Center

BACKGROUND: Donor Derived Cell Free DNA (dd-cfDNA) is an emerging tool that can be used to monitor kidney allografts non-invasively for injury. The prospective clinical utility of this tool is not well described. We describe the clinical integration of dd-cfDNA in the clinical workflow of a kidney transplant clinic

METHODS: dd-cfDNA samples were obtained in the context of routine clinical care at months 1,2,3,4, 6, 9 and 12 months post-transplants in the 1st year post-transplant and every three months thereafter. We instituted this protocol across all 5 states in our service area through arrangements with area laboratories and our own health system's reach.

RESULTS:94 dd-CFDNA samples were ordered among 641 patients under our active management. 5 patients

had >1.0 % dd-cfDNA. 4 patients showed a > 61 % increase in dd-ccfDNA from a prior sample. Adherence to standing orders stood at 67 % at 12 months and at 68 % for 3 months. Only one patient missed > 2 tests in a row. Poulation breakup was similar to national averages being 58 % male and with a mean age of 52 years. Our population was 95 percent Caucasian. Key clinical correlates are as below. HLA mismatch and cPRA did not correlate with dd-cfDNA values. Fourteen out of 113 patients (12%) did experience biopsy proven acute rejection. A serial rise in dd-cfDNA prompted biopsy in 5 of 13 patients.

CONCLUSIONS: A routine monitoring protocol utilizing dd-cfDNA is feasible in a transplant program serving a large service area. Serial measurements of dd-cfDNA allow the institution of biopsies before significant change in graft function occurs. Long term utility of dd-cfDNA in the clinic deserves further study

KEYWORDS: cell free DNA, Immune Monitoring, Biomarker, Precision

ABSTRACT #: 40

TITLE: Clinical Utilization of Donor-derived Cell-free DNA (AlloSure) for Monitoring de novo Kidney Transplants: The Colorado Experience

AUTHOR(S) (FIRST NAME, LAST NAME): Erik Stites, Alexander Wiseman, Scott Davis, James Cooper, Monica Grafals

INSTITUTIONS (ALL): University of Colorado

BACKGROUND: Cell-free DNA is released by cellular apoptosis or damage. Donor-derived cell-free DNA (dd-cfDNA) released from kidney allografts can be differentiated from recipient cfDNA, and an increased proportion of dd-cfDNA correlates with graft injury due to rejection. We recently implemented dd-cfDNA surveillance in all eligible kidney transplant recipients at our center. Here we present our early experience.

METHODS: Beginning in January 2018, all kidney transplant recipients at our center have been monitored with serial measurements of dd-cfDNA at pre-determined time points (one, two, three, four, and six months post-transplant and then quarterly for the first three years). From January 1, 2018 through August 31, 2018, 150 kidney transplant recipients were enrolled in the screening protocol starting at the time of transplant. A dd-cfDNA proportion of >1.0% was considered positive based on published data. Management of positive results were left to clinical discretion. Patients also undergo surveillance biopsy at three months post-transplant per our institutional protocol.

RESULTS: Five-hundred and two dd-cfDNA samples were collected from 150 kidney transplant recipients with a median follow-up time of 210 days post-transplant at the time of data collection. Twenty-five dd-cfDNA results (5.0% of samples) were above the threshold of 1% in 14 different patients. The first positive test result was detected at a median of 107 days post-transplant (IQR 79 days).Thirty-four biopsies for AKI were done during the follow-up period, but 15 were excluded from analysis because they were done prior to the first surveillance dd-cfDNA. Of the remaining 19 biopsies, four were consistent with rejection (two cellular, two mixed acute rejection, and one suspicious for antibody-mediated rejection) and 15 were negative for rejection (two BK nephropathy, two acute tubular injury, one recurrent FSGS, and 10 with no acute abnormality). At a threshold of 1%, dd-cfDNA had a sensitivity of 50%, specificity of 93.3%, PPV of 66.7%, and NPV of 87.5% for detection of rejection in this setting.Ninety-four patients had a surveillance biopsy at three months post-transplant; three were excluded from analysis for insufficient tissue. Three of these patients had a positive dd-cfDNA prior to or at the time of surveillance biopsy, all of whom had normal histology. Two patients had subclinical rejection on surveillance biopsy (one borderline cellular rejection, one subclinical antibody-mediated rejection), both of whom had negative dd-cfDNA prior to biopsy. The remaining 86 patients had negative dd-cfDNA screening at time of surveillance biopsy and biopsies that were not consistent with rejection. Seven biopsies did have mild inflammatory changes that did not meet criteria for rejection, two biopsies were consistent with BK nephropathy, and one biopsy showed recurrence of dense deposit disease. In this setting, dd-cfDNA had a sensitivity of 0%, specificity of 96.6%, PPV of 0%, and NPV of 97.7% for detection of rejection.Four patients in this cohort were biopsied for a positive dd-cfDNA test and stable graft function. The positive dd-cfDNA tests prompting biopsies for these patients were detected from 115-214 days post-transplant. Two of these biopsies were consistent with rejection (one borderline cellular rejection and one antibody-mediated rejection), and two demonstrated normal pathology.

CONCLUSION: To our knowledge, this is the largest reported series to date describing the utilization of dd-cfDNA monitoring prospectively from the time of kidney

transplantation. Fourteen of 150 patients (9.3%) had at least one positive dd-cfDNA during the follow-up period with a median first detection 107 days post-transplant. Our experience with dd-cfDNA in the setting of AKI for the detection of biopsy-proven rejection (PPV of 66.7%, and NPV of 87.5%) is consistent with previous reports. Surveillance dd-cfDNA <1% is predictive of a low likelihood of rejection on three-month surveillance biopsies (NPV 97.7%), and though a small sample size, a dd-cfDNA >1% in an otherwise stable graft was associated with a 50% likelihood of subclinical rejection.

KEYWORDS: kidney transplant, dd-cfDNA

ABSTRACT #: 41

TITLE: AMD3100 (Plerixafor) As A Single-Dose Stem Cell Mobilizing Agent In Vascularized Composite Tissue Allograft (VCA) Transplantation In A Canine DLA-Mismatch Model

AUTHOR(S) (FIRST NAME, LAST NAME): Bruce Swearingen[1], Scott Graves[2], Rainer Storb[2], David Mathes[1]

INSTITUTIONS (ALL): University of Colorado School of Medicine[1], Fred Hutchinson Cancer Research Center[2]

BACKGROUND: Vascularized Composite Allograft (VCA) transplantation is a clinical reality but limited by toxicities of chronic immunosuppression and rejection. Current clinical tolerance protocols rely on recipient conditioning and donor cell mobilization that limits use to living donor transplants. We sought to design a clinically relevant protocol applicable to cadaveric organs. We previously demonstrated that using AMD3100 (Plerixafor) as a single dose agent for stem cell mobilization was successful in a DLA-haploidentical model. We wanted to increase clinical relevance by testing our existing non-myeloablative stem cell canine VCA transplant model to DLA-mismatched, unrelated canine donor-recipient pairs.

METHODS: Three DLA-mismatched, unrelated canine recipients [Group I] received conditioning with 450cGy TBI, AMD3100-mobilized donor stem cells + Bone Marrow (BM) infusion and simultaneous VCA transplantation with a short course of immunosuppression (Sirolimus: 28 days/MMF: 56 days/CSP: 70 days). Three DLA-mismatched, unrelated canine recipient [Group II] underwent a less intense conditioning regimen (350cGy TBI) but otherwise identical transplantation protocol. CD34+ hematopoietic progenitor cells were quantified via flow cytometry. Peripheral blood chimerism was evaluated by PCR techniques weekly. VCA graft survival was followed clinically and histologically.

RESULTS: All six canines tolerated the conditioning regimen. Stem cell engraftment and donor chimerism was seen in all dogs. Mean COBE apheresis count was 4.28x10^8 cells/kg and mean BM aspirate count was 0.81x10^8 cells/kg across both groups. Outcomes varied. No evidence of acute rejection was seen. Two dogs demonstrated signs of VCA rejection once off immunosuppression. GVHD (skin and/or liver) was seen in two dogs. Two dogs were lost post-operatively to the unexpected complication of intussusception while still seemingly tolerant to the VCA.

CONCLUSION: This study demonstrates proof of principle for AMD3100 as a single-dose stem cell mobilizing agent for a clinically relevant tolerance protocol in mismatched, unrelated donor-recipient pairs. Use of AMD3100 led to stem cell engraftment in all animals transplanted with no evidence of acute rejection in the VCA. AMD3100 use limited by thrombocytopenia in our previous studies continue to appear be resolved with the addition of BM Aspirate in this model. Continued experiments should allow for longer-term follow up in future canine recipients that should optimistically not experience bowel complications or GVHD.

KEYWORDS: VCA, Composite Tissue, Tolerance, Stem Cells

DLA-MISMATCHED
AMD3100 + BM SUMMARY TABLE

DOG	POD	Mobilized Cells/kg	CD34+	BM Aspirate/kg	CD34+	VCA Rejection?	Complications
450cGy TBI							
H910	92	4.66x10^8	0.02%	0.41x10^8	0.30%	No	LIVER GVHD (+CHV)
H912	167	4.43x10^8	0.09%	1.70x10^8	0.01%	No	SKIN GVHD (+CHV)
H902	35	2.82x10^8	0.23%	1.44x10^8	0.12%	No	INTUSSUSCEPTION POD 2
350cGy TBI							
H908	30	6.65x10^8	0.40%	0.73x10^8	0.40%	No	INTUSSUSCEPTION POD 26
H939	80	5.32x10^8	0.50%	0.15x10^8	1.60%	YES	INTUSSUSCEPTION POD 2
H876	104	1.77x10^8	0.16%	0.44x10^8	0.40%	YES	
MEAN:		***4.28x10^8***	***0.23%***	***0.81x10^8***	***0.47%***		

ABSTRACT #: 42

TITLE: The Road to Personalized Histocompatibility: Telling Friend from Foe

AUTHOR(S) (FIRST NAME, LAST NAME): Anat Tambur, Hannah McDowell, David F Pinelli, Reut Hod-Dvorai, Aurora Castillas

INSTITUTIONS (ALL): Northwestern University

BACKGROUND: Histocompatibility between donor and recipient of organ transplantation is key to minimize immune responses leading to graft rejection. Enumeration of molecular mismatches in large cohorts (whether by eplets, EMS-2D, or amino acid load) showed that increase molecular mismatch load is associated with development of de-novo DSA at the population level. Yet, some patients who develop de-novo DSA have low molecular mismatch load. This strongly suggests that increased molecular mismatch load is not linearly correlated with increased immunogenicity; or that lower mismatch load indicates better histocompatibility between donor and recipient. It therefore stands to reason that this approach should not be used to personalize equitable organ allocation schemes. It further suggests that new tools to assess immunogenicity should be developed.

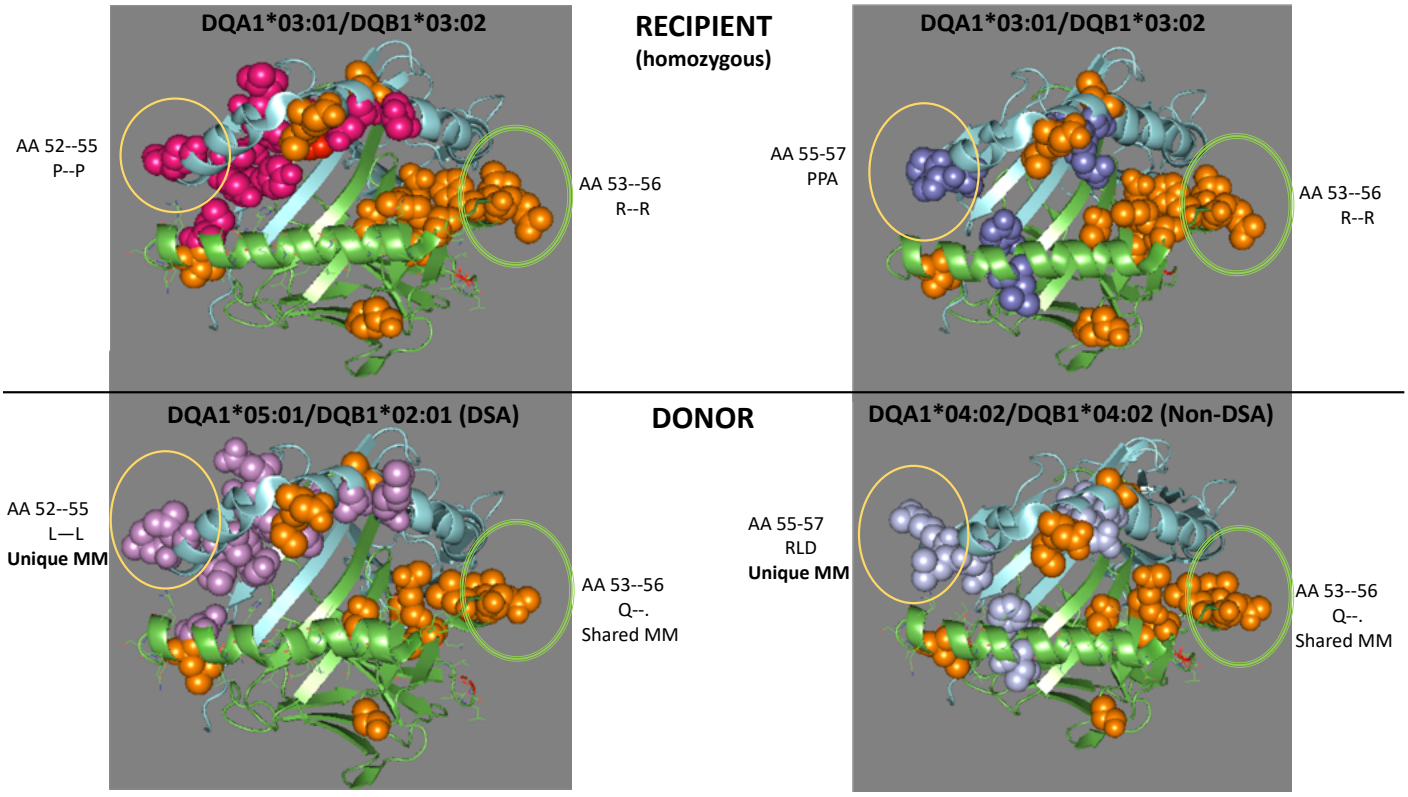
METHODS: 55 transplant recipients (34M/21F; 26CAU/11AfAm/16HIS/2Asians; Age 48+/-12; follow-up time 61+/-10 months; transplanted between 2010-12, 0% PRA prior to transplant) were enrolled. This study focused on HLA-DQ, as it has been shown to be the most common and pathogenic de novo DSA following transplant. 20/50 (40%) patients developed de-novo HLA-DQ-DSA. Molecular mismatch load was evaluated using HLA Matchmaker, EMS-2D, and amino-acid (AA) sequence comparison. 2MM1DSA cohort: to address the immunogenicity question, we evaluated a second cohort of patients (N=18; 13M/5F; 10CAU/4 AfAm/3HIS/1Asian; Age 50+/-10; transplanted between 2008-2014). Patients were selected based on having 2 HLA-DQ mismatches with their donor, who developed antibodies to one of the mismatched HLA-DQ alleles ("immunogenic") but did not develop antiboides to the other ("compatible") HLA-DQ allele. This cohort allowed us to mitigate external factors such as levels of immunosuppression and additional immune factors including inflammation, DGF, etc., as each patient serves as its own control with one donor allele stimulating the generation of de-novo antibodies while the other mismatched DQ allele was "tolerated" by that same patient's immune responses (Foe versus Friend). Structural analysis was performed using The PyMOL Molecular Graphics System, Version 2.2.1, Schrödinger, LLC.

RESULTS: For the first cohort, the mean eplet mismatch load for the DSA group was 20 vs 15 for the non-DSA group. EMS scores were 25 vs 19, respectively; and mean AA mismatch was 38 vs 26, respectively; confirming the association between increased molecular mismatch load and development of de novo DSA. However, 6/20 (30%) DSA patients had <26 AA mismatches (as low as only 11), demonstrating the need for better individualized immunogenicity metrics. The 2MM1DSA cohort allowed for direct comparison between the recipient and either of the donor alleles (DSA and non-DSA), excluding factors other than the patient's specific immune system. Given that our cohort provides an internal negative control for each de-novo DSA (the non-DSA allele seen by the same immune system), we were able to consider specific AA mismatches that are shared between the two donor alleles as "non-unique" mismatches. We hypothesize that non-unique mismatches are less likely to be critical to stimulating an immune response compared with those AA mismatches that are unique to the DSA allele. Such analysis allowed us to focus on the structural location and characteristics of the unique de-novo DSA AA mismatches, which will hopefully lead to a better understanding of the factors that drive immunogenicity. An example is presented in Figure 1: The patient is a homozygous for HLA-DQA1*03:01/DQB1*03:02. We compared this allele to both the donor immunogenic allele – DSA (DQA1*05:01/DQB1*02:01); as well as the less immunogenic allele – non-DSA (DQA1*04:02/DQB1*04:02). Some of the mismatched AAs are unique

to either the DSA allele [magenta - e.g., Recipient AA 52--55: P--P / pink – Donor AA 52--55: L--L), others are unique to the non-DSA allele (blue – e.g., Recipient AA 55-57: PPA / gray Donor AA 55-57: RLD), and yet others are shared between the DSA and non-DSA alleles but different from the recipient (orange – e.g., Recipient AA 53--56 R--R / both donor alleles AA 53--56 Q--deletion of position 56). Changes in the 3-dimensional shape of the molecule are visible (both for the unique in yellow circles; as well as the shared mismatches in green circles).

CONCLUSIONS: Molecular mismatch load analysis is currently the best tool for risk stratification post transplantation. However, in order to understand compatibility between donor and recipient, mostly to inform personalized organ allocation, the immunogenicity of a specific mismatch must be understood. Clearly, a larger cohort of patients will need to be analyzed, including patients from multiple centers and diverse ethnic backgrounds. At this point, we (1) have identified a unique patient population that can facilitate more granular analysis of immunogenicity (2MM1DSA cohort), and (2) invite collaborations to enrich the demographic background of patients and improve our understanding of histocompatibility.

KEYWORDS: HLA, Immunogenicity, Histocompatibility



ABSTRACT #: 43

TITLE: Volume-Related Post-Kidney Transplant Weight Gain And Post-Transplant Hypertension

AUTHOR(S) (FIRST NAME, LAST NAME): Ekamol Tantisattamo, Possawat Vutthikraivit, Siroj Dejhansathit

INSTITUTIONS (ALL): Mahidol University, Phramongkutklao College of Medicine

BACKGROUND: Post-kidney transplant hypertension (PTHTN) is almost universal and volume-related weight gain is one of the possible contributors especially during early post-transplant period; however, the association between post-transplant weight again (PTWG) and PTHTN is unclear.

METHODS: Weight change at the time of transplant discharge and the 1-month post-kidney transplantation (KTx) is divided into 4 groups (Group 1: loss, loss; Group 2: loss, gain; Group 3 gain, loss; Group 4 gain, gain). The association between these 4 patterns of weight changes and systolic hypertension (SHTN), defines as systolic blood pressure (SBP) ⇢130 mmHg between 1 and 24 months post-KTx are examined by multivariable Cox proportional hazard regression analysis.

RESULTS: Of all 70 kidney transplant recipients in a single center, mean age+/-SD was 52.66±11.97 years and 58.57% were male. Mean weight and body mass index (BMI) at the time of KTx were 81.22±19.06 kg and 27.64±5.64 kg/m2, respectively. Incidence of PTHTN was 0.043 person-weeks with a median time to develop PTHTN of 9.14 weeks. Compared to weight at the time of KTx, mean weight changes at the time of transplant discharge and at 1-month post-KTx are summarized in the Table 1. Group 3 had the highest proportion of PTHTN (92.11%); whereas, Group 2 had the lowest proportion (80%). Compared to Group 1, only Group 3 had a higher risk of developing PTHTN (HR 1.14, 95% CI 0.56 to 2.30, p 0.721); whereas, Group 2 and 4 had lower the risk. After adjusted for age, gender, race, type of kidney transplantation, type of induction immunosuppressive, BMI, SBP, and DBP, at the time of KTx, and eGFR at 1-month post-Tx, Group 3 and 4 had higher risk of PTHTN but remain no statistically significant.

CONCLUSION: Volume-related PTWG appears related to PTHTN; although, there is no significant association, possibly due to small number of participants. Appropriately administering peri-transplant intravenous fluid should be determined to mitigate one possible factor of PTHTN.

KEYWORDS: post-transplant hypertension, weight gain, kidney transplantation

2. -, +	5	-2.74±1.78
3. +, -	38	5.37±3.33
4. +, +	16	6.38±4.18

Table 1: Four groups of weight change at the time of post-kidney transplantation
PTHTN, post-transplant hypertension (systolic blood KTx, kidney transplantation

ABSTRACT #: 44

TITLE: Progress Toward Artificial Lung Destination Therapy

AUTHOR(S) (FIRST NAME, LAST NAME): Rei Ukita[1], Angela Lai[2], Nao Umei[2], David Skoog, Yuliya Tipograf[1], Kalliope Bouloubassis[2], Erica Comber[2], Kan Wu, Noritsugu, Naito, Alida Cooke[2], Shaoyi Jiang, Christian Heinis, Matthew Bacchetta[1], Keith Cook[2]

INSTITUTIONS (ALL): Vanderbilt University Medical Center[1], Carnegie Mellon University[2], Department of Biomedical Engineering, Advanced Respiratory Technologies LLC, University of Washington, Massachussetts General Hospital, University of Washington, Ecole polytechnique fédérale de Lausanne

BODY: Lung transplantation remains the only therapeutic option for treating end-stage lung diseases (ESLD), but access to donor organs is severely limited. Chronic lung diseases lead to over 168,000 deaths and 700,000 hospitalizations each year in the United States, far exceeding the 2,300 lung transplantations each year. Many of the surviving hospitalized patients experience significant worsening in their ADLs. Extracorporeal membrane oxygenation (ECMO) is capable of bridging patients to lung recovery or transplantation. However, its long-term (i.e. > 2 months) effectiveness is hindered by device coagulation, patient bleeding, and infection. The oxygenator fiber bundle is especially concerning due to surface-induced thrombosis from hollow fiber membrane surfaces and the potential to

increase shear-induced activation of platelets. Current anticoagulation protocols use intravenous heparin that often leads to serious bleeding complications. Different polymeric coatings, such as heparin and poly-ethylene glycol, are used for surface-targeted anticoagulation during cardiopulmonary bypass, but have only been evaluated for short-term applications, limiting their translation to long-term use. As such, current oxygenators have a limited device lifetime of 1 to 4 weeks.Recent technological advances in oxygenator design, biomaterials, and tissue engineering offer novel approaches to make ECMO safer and more durable. The newer generation artificial lungs such as compliant thoracic artificial lung (cTAL), pulmonary assist device (PAD), and integrated artificial pump-lungs can reduce pump-induced blood damage and minimize stagnation and recirculation within the device compared to the clinical oxygenators. Surface-induced coagulation may be reduced long-term with a combination of novel biomaterials and surface-focused anticoagulants. Zwitterionic poly-carboxybetaine (pCB) is a highly hydrophilic polymer coating that has reduced protein adsorption even under rigorous whole blood environment. pCB coating has been used to extend glucose sensor's sensitivity and accuracy to 42 days in whole blood in vitro and reduce in vivo clot formation in artificial lung by 59% in an acute rabbit ECMO model. Another approach is to utilize Factor XIIa inhibitors, which inhibits the intrinsic pathway of the coagulation cascade to minimize tissue bleeding. A 4-hour rabbit model demonstrated that intravenous administration of a bicyclic peptide FXIIa inhibitor preserved the normal tissue bleeding time , yet achieved a six-fold reduction in device clot formation compared to the control group that received clinical level of heparin. The combined use of pCB coating and FXIIa inhibitor offers a robust anticoagulation platform for ECMO that would synergistically reduce device clotting without adversely affecting tissue bleeding. A 1-hour rabbit study demonstrated that the combination of tip-to-tip pCB coating and intravenous administration of FXIIa inhibitor decreased clot formation by over 90% compared to the heparin control group with no change in tissue bleeding. Finally, nitric oxide is a molecule with antibacterial and platelet inhibitory effects. Its biological half-life of only a few milliseconds shows promise as a fast-acting anticoagulant and antibacterial agent. The combination of these technologies may lead to safer and more durable respiratory support that would improve the current ICU-constrained use of ECMO, and potentially enable ambulatory mechanical support outside of the ICU and ultimately home respiratory support to improve the quality of life for ESLD patients.

KEYWORDS: artificial lung, extracorporeal membrane oxygenation, destination therapy, bridge-to-transplantation, coagulation, biomaterials, Factor XIIa inhibitor, poly-carboxybetaine

ABSTRACT #: 45

TITLE: CURATE.AI: Personalized Tacrolimus Dosing in Liver Transplantation

AUTHOR(S) (FIRST NAME, LAST NAME): Theodore Kee, Ali Zarrinpar, Peter Wang, Un Bi Kim, Dean Ho, Chih-Ming Ho

INSTITUTIONS (ALL): National University of Signapore, University of Florida, UCLA, University of Florida, National University of Singapore, UCLA

BACKGROUND: Transplant immunosuppressive regimens include multiple drugs with varying pharmacokinetics, metabolic pathways and drug-drug interactions [1,2]. This study aimed to use CURATE.AI, an artificial intelligence platform, to make personalized tacrolimus dose recommendations based on tacrolimus serum trough level profiles, while accounting for multi-drug regimen changes (e.g. fluconazole dose reduction) and their corresponding interactions with trough levels using a powerful correlation termed phenotypic response surface. CURATE.AI has previously been clinically validated and has optimized combination therapy in oncology, tuberculosis, and HIV therapy [3,4].

METHODS: University of Florida IRB approval was obtained for this retrospective study of 40 liver transplant patients. CURATE.AI calibrated individualized tacrolimus dose-trough level profiles and population derived multidimensional drug-drug interaction profiles, which identified and minimized the patient-specific recalibration shifts from regimen changes.

RESULTS: CURATE.AI 3D drug-drug interaction profiles identified prednisone-fluconazole and valganciclovir-sulfamethoxazole dose changes corresponding to

recalibration shifts in the sample population (Figure 1). Integrating both individualized profiles and regimen change recalibration shifts, CURATE.AI demonstrated the robust identification of corresponding trough levels with clinically administered tacrolimus doses (Figure 2). CURATE.AI-guided and clinically-titrated doses were different, and trough level management were also compared (Figure 3).

CONCLUSION: CURATE.AI demonstrated consistent identification of measured trough levels corresponding to clinically administered tacrolimus dosing and dynamic trough level management by guiding tacrolimus dosing using only the individual's previous immunosuppression regimen doses and trough levels.

KEYWORDS: tacrolimus, artificial intelligence, personalized dosing, immunosuppression

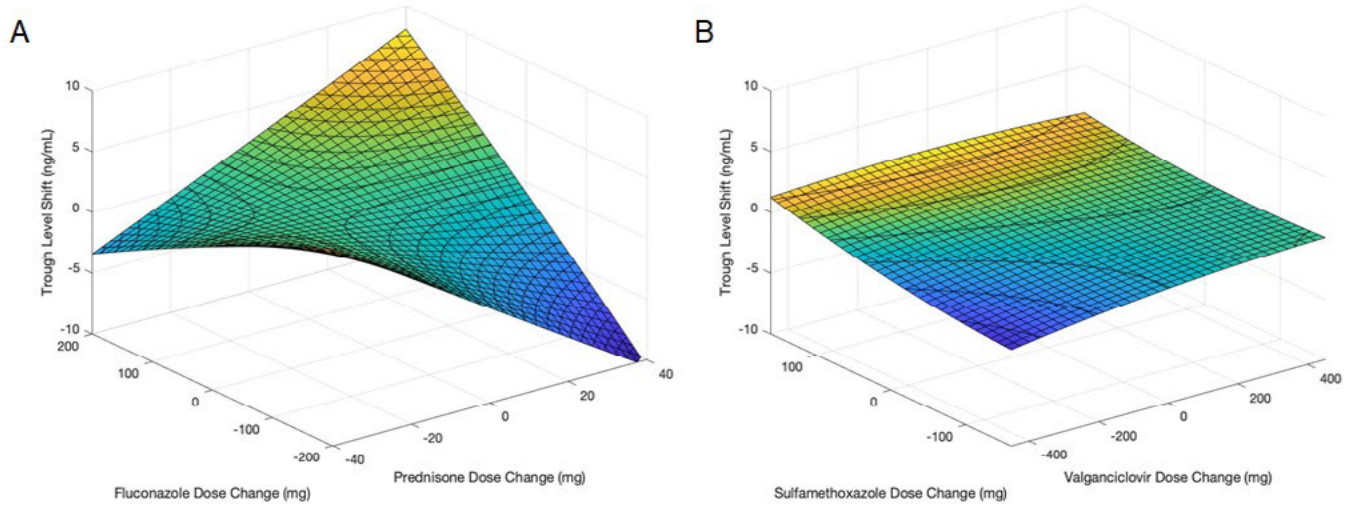


Figure 1. CURATE.AI drug-drug interaction profiles: (A) fluconazole-prednisone, (B) valganciclovir-sulfamethoxazole.

AUTHOR INDEX

TRANSPLANT SUMMIT 2019

No Size Fits All: Uncovering the Potential of Personalized Transplantation

TRANSPLANT SUMMIT 2019

No Size Fits All: Uncovering the Potential of Personalized Transplantation

Proud sponsor of CEoT 2019

ASTELLAS CARES™ TRANSPLANT

COMMITTED TO PATIENT RESOURCES AND COPAY SUPPORT

Visit the redesigned
AstellasCares.com
to learn more about how we can support patients

Astellas Cares™ offers a collection of resources for transplant patients, including:

- Health and lifestyle tips and tools
- Various downloadable educational resources
- Savings with the Astellas Copay Card[a]

[a]To see the Astellas Copay Card's eligibility requirements, terms, and conditions, visit AstellasCares.com.

astellas

AlloSure®

Better Surveillance
for Better Outcomes
www.allosure.com

AVAILABLE NOW AND FULLY COVERED BY MEDICARE

The Latest Innovation in Kidney Transplant Surveillance

AlloSure is the first donor-derived cell-free DNA test to assess kidney health by directly measuring allograft injury.

To learn more, please join us for a lunch symposium*:
Personalizing Allograft Health Surveillance with AlloSure

Friday February 22, 2019 | Frank Lloyd Wright Ballroom | 12:45pm – 2:00pm

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

Contact Us: 1-888-255-6627 | customercare@caredx.com

CareDx®
Your Partner in Transplant Care

LK-10426 Revision 2 Effective 2019-01