הכנס ה-

29

החברה הישראלית להשתלות

Conference Program, Abstracts and E-Posters

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משתתפות ומשתתפי הכנס היקרים,
ברוכים הבאים לכנס ה-29 של החברה הישראלית להשתלות

לאחר שמטעמי הגבלות מגיפת הקורונה נמנע מאיתנו מלקיים את הכנס המסורתי של החברה הישראלית להשתלות בשנה שעברה, אנחנו מתכנסים שוב, גם אם עדיין במתכונת היברידית, כמשפחה אחת גדולה, במפגש השנתי של כל העוסקים במקצועות הרבים והשונים המרכיבים את תחום ההשתלות.

המגיפה השפיעה עמוקות על כל תחומי החיים ובעיקר על מקצועות הרפואה. תחום ההשתלות נדרש להתאמות מורכבות בין המרכזים המגייסים את תרומות האיברים למרכזים המשתילים, אשר הקשו מאד על המשך פעילותו. למרות זאת, בעזרת המחויבות הלא מובנת מאליה והתגייסותם המלאה של כל העוסקים במלאכה הצלחנו לשמור על המשך פעילות ההשתלות בארץ.
מטרת הכנס להרחיב את הידע המקצועי, להכיר את החידושים, ללמוד וללמד, וגם להכיר טוב יותר אחד את השני באופן אישי כדי לטפח את שיתוף הפעולה ולשפר את הרפואה שאנו נותנים למטופלינו.

כבשנים הקודמות, נפתח את הכנס בפרה-סימפוזיונים בתחום הכירורגיה ההפטוביליארית והשתלות הכבד, השתלת הכליות והשתלות הלב והריאות.

בכנס עצמו נשמע הרצאות על הסוגיות החשובות ביותר בתחום ההשתלות ממרצים ישראלים וכן מארבעת האורחים המכובדים שלנו: **פרופ' סטפן שאוב** מבאזל שוויץ, שיעדכן בחידושים בתכשירים למניעת דחייה, **פרופ' ברונו ריכארט** ממינכן גרמניה, על ההתקדמות בהשתלות מתרומות איברים מחיה: Xenotransplantation , **פרופ' ריינר אוברבוואר** מווינה אוסטריה, על טיפול ב-Regulatory cells בהשתלות ויקנח **פרופ' עימנואל מורלון** מליון שבצרפת על השתלות פנים וגפיים עליונות.

בנסיבות התקופה, נתמקד בהערכה של השפעת מגיפת הקורונה והחיסונים כנגדה על מושתלי האיברים.

כמו תמיד, תשומת לב עמוקה תוקדש לתקצירי המחקר שהוגשו מכל המחלקות בארץ המייצגים את הפעילות המחקרית והקלינית הנעשית בתחום בישראל.

השנה נתכבד להעניק את פרס מפעל החיים ל**ד"ר אלכסנדר יוסים** שהיה ממייסדי תחום ההשתלות בישראל ושתרומתו להשתלות האיברים בארץ ניכרת בכל אחד מהתחומים בהם אנו עוסקים. אלכס חנך בדרכו הנעימה והמופלאה דורות רבים של רופאים ורופאות צעירים ויהיה תמיד מעמודי התווך של ההשתלות בישראל.

אנחנו רוצים להודות מאוד לכל מי שעמל עזר ותמך בהכנת הכנס: **פרופ' ריפאת ספדי, ד"ר עבד חלאילה, פרופ ג'יי לביא, פרופ איתן מור, ד"ר מריוס בראון.**

תודה מיוחדת לחברות התרופות והציוד הרפואי שתמכו בכנס שכן ללא תמיכתן לא ניתן היה לקיימו.

אנחנו מאחלים לכולנו כנס פורה ומעניין!

ד"ר טוביה בן גל
יו"ר החברה הישראלית להשתלות

ד"ר רותי רחמימוב
מזכירת החברה הישראלית להשתלות

יו"ר	**ד"ר טוביה בן גל**
מזכירה	**ד"ר רותי רחמימוב**
גזבר	**ד"ר מריוס בראון**

וחברי הוועד

פרופ' איתן מור
פרופ' ג'יי לביא
פרופ' ריפאת ספדי
ד"ר עבד חלאילה

CONFERENCE PROGRAM

Thursday, November 18, 2021

09:30 – 10:30 Registration & Refreshments

10:30 – 12:20 Hall A

Pre-Conference Symposium
Heart Transplantation

Chairs:
Dr. Avishay Grupper & Dr. Asleh Rabea

10:45 – 11:00 Reduction in the recommendation for morphine treatment in acute HF in the 2021: ESC guidelines
Prof. Tal Hasin, *Shaare Zedek Medical Center*

11:00 – 11:15 Ecmo as bridge to LVAD or HTx Pros & Cons
Dr. Yigal Kassif, *Sheba Medical Center*

11:15 – 11:30 Assessment for advanced HF therapies by the new ESC guidelines
Dr. Avishay Grupper, *Sheba Medical Center*

11:30 – 11:50 Exchanging HW with HM3
zoom
Prof. Jan Schmitto, *Hannover Medical School, Germany*
sponsored by: amida

11:50 – 12:05 Effects of LVAD's on HTx outcomes
Dr. Asleh Rabea, *Hadassah Medical Center*

12:05 – 12:20 Updates on HTx
Dr. Benjamin Ben Avraham,
Rabin Medical Center

10:30 – 12:20	Hall B
	Pre-Conference Symposium **Liver Transplantation**
	Chairs: **Dr. Marius Braun & Prof. Rifaat Safadi**
10:45 – 11:00	Lost-Lost situation **Dr. Ella Veitsman,** *Rambam Medical Center*
11:00 – 11:15	The practical approach to Covid19 liver transplant patients before and after vaccination **Dr. Yana Davidov,** *Sheba Medical Center*
11:15 – 11:30	The therapeutic challenge of hepatic artery occlusion following liver transplantation **Dr. Abed Khalaileh,** *Hadassah Medical Center*
11:30 – 11:50	Cholestatic diseases post liver transplantation – can we prevent them? **Dr. Helena Katchman,** *Tel Aviv Medical Center*
11:50 – 12:05	Down-staging hepatocellular carcinoma with high alpha fetoprotein **Dr. Assaf Issaschar,** *Rabin Medical Center*
12:05 – 12:20	Discussion

10:30 – 12:20	Hall C
	Pre-Conference Symposium **Kidney Transplantation**
	Chairs: **Dr. Keren Tzukert & Dr. Ruth Rahamimov**
10:45 – 11:00	Long term prognosis of the living kidney donor **Dr. Keren Tzukert,** *Hadassah Medical Center*
11:00 – 11:15	High Uric Acid – Is it a risk factor for the living kidney donor? **Dr. Ayelet Grupper,** *Tel Aviv Medical Center*
11:15 – 11:30	Post transplantation HUS and C3 nephropathy **Dr. Ruth Rahamimov,** *Rabin Medical Center* sponsored by: NEOPHARM ISRAEL
11:30 – 11:50	Case presentation: Bone Mineral Disorders and Renal Transplantation **Dr. Tamar Hod,** *Sheba Medical Center*
11:50 – 12:05	Case presentation: Kidney transplantation in children with severe intellectual disability– ethical questions **Dr. Orly Haskin,** *Schneider's Children's Medical Center of Israel*
12:05 – 12:20	Discussion

12:20 – 12:40 Coffee Break, Welcome Reception and Exhibition

12:40 – 14:10 Hall A

Improving Long-Term Survival in Organ Transplants Recipients

Chairs:

Prof. Benaya Rozen-Zvi & Dr. Liran Levi

12:40 – 13:00 Cardiovascular risk in abdominal organ transplantation
Dr. Keren Skalsky, *Rabin Medical Center*

13:00 – 13:20 Major cardiovascular events in lung transplant recipients without prior CVD
Dr. Yael Shostak, *Rabin Medical Center*

13:20 – 13:40 SGLT2 in organ transplant recipients
Dr. Ofri Mosenzon, *Hadassah Medical Center*
sponsored by: AstraZeneca

13:40 – 14:00 New frontiers in tissue typing
Dr. Moshe Israeli, *Rabin Medical Center*

14:00 – 14:10 A -20 Year Retrospective Analysis Shows Differential Predictors in Lung Procurement between DCD and DBD Donors
Dr. J. Sam Meyer, *Rabin Medical Center*

14:10 – 15:00 Lunch and Exhibition

15:00 – 16:25 Hall A

Conference Opening – Plenary Session

Chairs:

Dr. Ruth Rahamimov & Dr. Tuvia Ben Gal

15:00 – 15:05 Opening Words
Dr. Tuvia Ben Gal, *President, Israel Transplantation Society*

15:05 – 15:15 Welcome Remarks
Prof. Rafi Beyar, *Chairman, Steering Committee, Israel National Transplantation Center*

15:15 – 15:45 Transplantation in Israel 2021-2020
Dr. Tamar Ashkenazi, *Director, Israel National Transplantation Center, Transplantation in Israel 2020-2021*

15:45 – 16:05 Life achievement award to
Dr. Alexander Yussim, Presented by **Dr. Ruth Rahamimov**

16:05 – 16:25 The story of organ transplantations in Israel
Prof. Eytan Mor, *Sheba Medical Center*

16:25 – 16:45 Coffee Break and Exhibition

16:45 – 18:05 Hall A

Transplantation in the COVID Era

Chairs:
Dr. Eviatar Nesher & Prof. Jacob Lavee

16:45 – 17:05 COVID 19 in SOT patients
Prof. Jihad Bishara, *Rabin Medical Center*

17:05 – 17:25 The COVID 19 vaccine – lessons learned and to be learned
Dr. Gabriel Mircus PhD, *Vaccines Medical Lead, Pfizer Israel*

17:25 – 17:45 Anti-COVID vaccine in SOT patients
Dr. Ayelet Grupper, *Tel Aviv Medical Center*

17:45 – 18:05 The role of mTOR inhibitors in the SOT population during the COVID-19 pandemic: Effects of the disease and vaccination
Prof. Rifaat Safadi, *Hadassah Medical Center*
sponsored by: NOVARTIS

18:05 – 18:25 Hall A

Panel Discussion: Improving compliance to medications in organ transplant recipients

Moderators:
Dr. Tuvia Ben Gal & Dr. Ruth Rahamimov
independent sponsorship: astellas

Panelists: Mrs. Tiki Mashraki, Mrs. Paulina Catz, Mrs. Michal Aharon, Mrs. Vicky Yaari, Mrs. Irena Yakshin

18:25 – 18:50 Board meeting part 1

19:00 – 21:00 Dinner

Friday, November 19, 2021

08:30 – 09:50 Hall A

Plenary Session – Clinical Aspects of SOT

Chairs:

Dr. Abed Khalaileh & Dr. Yaacov Goichman

08:30 – 08:50 Cell free DNA in organ transplantation
Dr. Ruth Rahamimov
sponsored by: ZER LABORATORIES

08:50 – 09:10 CMV Prevention and treatment
Dr. Osnat Shtraichman, *Rabin Medical Center*
sponsored by: KAMADA

09:10 – 09:30 Resistant CMV: Management of the SOT patient
Prof. Dana Wolf, *Hadassah Medical Center*
sponsored by: Takeda

09:30 – 09:50 Vaccinations in SOT candidates, transplanted patients and family members: An update
Prof. Shalom Ben Shimol, *Soroka Medical Center*
sponsored by: Pfizer

09:50 – 10:20 Coffee Break and Exhibition

10:20 – 12:20 Hall A

Plenary Session – Future Perspectives in Organ Transplantation

Chairs:
Prof. Eytan Mor & Prof. Oren Shibolet

10:20 – 10:50 zoom
Immunosuppression: What's new?
Prof. Stefan Schaub, *University Hospital Basel, Switzerland*

10:50 – 11:20 zoom
Xenotransplantation
Prof. Bruno Reichart, *LMU Munich, Germany*

11:20 – 11:50 zoom
Regulatory cells therapy in transplantation
Prof. Rainer Oberbauer,
Medical University Vienna, Austria

11:50 – 12:20 zoom
Face and upper extremity transplantation: Where are we now?
Prof. Emmanuel Morelon,
Hospices Civils de Lyon, France

12:20 – 13:00 Lunch and Exhibition

13:00 – 15:00 Hall A

Abstracts Session 1
Liver and National Transplantation Center

Chairs:
Prof. Jonathan Cohen &
Dr. Helena Katchman

13:00 – 13:10 SAR-CoV-2 vaccine alleviates disease burden and severity in liver transplant recipients even with weaker serological immunogenicity
Dr. Abed Khalaileh, *Hadassah Medical Center*

13:10 – 13:20 A third vaccine boost of the BNT162b2 mRNA improved significantly immune response among liver transplant recipients
Dr. Yana Davidov, *Sheba Medical Center*

13:20 – 13:30 Sustainability of humoral immunity induced by COVID-19 vaccination and response to booster dose among Liver Transplant recipients
Dr. Liane Rabinowich, *Sourasky Medical Center*

13:30 – 13:40 מידת ניצול/פסילת האיברים המוצעים להשתלה
Utilization and rejection rates of organs offered for transplantation
רונה סימון, ***המרכז הלאומי להשתלות***

13:40 – 13:50 Clinical outcomes and antibody response in COVID-19-positive pediatric solid-organ transplant recipients
Dr. Efrat Talgam-Horshi, *Assuta Ashdod University Hospital*

13:50 – 14:00 ההסתגלות לאובדן אצל בני משפחות שכולות לאחר תרומת איברים ורקמות: השוואה בין משתתפים ללא משתתפים בקבוצות תמיכה של המרכז הלאומי להשתלות
ד"ר תמר אשכנזי, ***המרכז הלאומי להשתלות***

14:00 – 14:10 The outcome of liver transplantation in elderly israeli patients
Ronli Ovadya, *The Hebrew University*

14:10 – 14:20 האם חיסון עדר מגן מפני תחלואה במושתלי כבד מפני COVID-19, סיכום נתונים ממרכז רפואי בלינסון
ד"ר מיכל כהן - נפתלי, ***מרכז רפואי רבין***

14:20 – 14:30 Perinatal outcomes after liver transplantation – Is there a role for aspirin treatment?
Dr. Marius Braun, *Rabin Medical Center*

14:30 – 14:40 Organ donation in the time of COVID-19: The Israeli experience
Prof. Jonathan Cohen, *Israel National Transplantation Center*

14:40 – 14:50 פגיעה בלתי צפויה במושתלי כבד לאחר חיסון ל-COVID 19, האם DILI או תופעה מקרית
ד"ר מיכל כהן נפתלי, ***מרכז רפואי רבין***

14:50 – 15:00 Implementation of the Fried Frailty Scale in the evaluation of kidney transplant candidates in Beilinson
Yonit Rosen-Krauss, *Rabin Medical Center*

13:00 – 15:00 Hall B

Abstracts Session 2
Heart Lungs and Pre Transplant Evaluation

Chairs:
Prof. Tal Hasin & Prof. Israel Gotsman

13:00 – 13:10 Reversed Systolic Heart Failure Post Kidney Transplant
Dr. Keren Skalsky, *Rabin Medical Center*

13:10 – 13:20 Patient evaluation in the elderly population for renal transplant using Charlson Comorbidity Score (CCS) and the Clinical Frailty Scale (CFS) in Sheba Medical Center
Dr. Hila Meiri, *Sheba Medical Centre*

13:20 – 13:30 Preoperative coronary evaluation in kidney transplanted patients: a retrospective cohort study
Dr. Keren Skalsky, *Rabin Medical Center*

13:30 – 13:40 Pulmonary markers of epithelial cell activity and injury in chronic lung allograft dysfunction
Dr. Liran Levy, *Sheba Medical Center*

13:40 – 13:50 Lung Transplantation after Hematopoietic Stem Cell Transplantation
Dr. Dorit Shitenberg, *Sheba Medical Center*

13:50 – 14:00 Referral rate of patients with interstitial lung disease to lung transplantation based on pulmonary function deterioration
Dr. Ofir Deri, *Sheba Medical Center*

14:00 – 14:10 Comparing predictors of abdominal organ and lung procurement in DCD donors: A retrospective analysis
Dr. J. Sam Meyer, *Rabin Medical Center*

14:10 – 14:20 Bronchoalveolar Lavage Markers of Inflammation Early Post Lung-Transplant are Associated with CLAD and Death
Dr. Liran Levy, *Sheba Medical Center*

14:20 – 14:30 Lung transplantation for artificial stone silicosis, report of 35 patients
Dr. Dror Rosengarten, *Rabin Medical Center*

14:30 – 14:40 Outcomes in patients bridged to HeartMate 3 LVAD using VAECMO
Dr. Elchanan Zuroff, *Sheba Medical Center*

14:40 – 14:50 Sarcopenia as an indicator of negative outcomes in kidney transplant patients
Dr. Ayelet Grupper, *Tel-Aviv Medical Center*

14:50 – 15:00 The role of angiography in the management of vascular complication following kidney transplantation
Dr. Abraham Castro Navarro,
Hadassah Medical Center

13:00 – 15:00 Hall C

Abstracts Session 3
Kidneys

Chairs:
Prof. Hadar Merhav & Dr. Tamar Hod

13:00 – 13:10 Post-Transplant HUS is associated with other risk factors besides exposure to Calcineurin inhibitors
Dr. Ittai Fattal, *Rabin Medical Center*

13:10 – 13:20 Autoimmunity to factor H and factor I in post-transplant hemolytic uremic syndrome
Dr. Ittai Fattal, *Rabin Medical Center*

13:20 – 13:30 Robotic-assisted kidney transplantation – Implementation and initial experience at Beilinson Transplant Center
Dr. Eviatar Nesher, *Rabin Medical Center*

13:30 – 13:40 The reasons why potential kidney donors do not complete the procedure, a comparison between related and non-related potential donors
Dr. Ronen Ghinea, *Sheba Medical Center*

13:40 – 13:50 C3 Glomerulopathy recurrence after kidney transplantation
Dr. Yael Borovitz, *Schneider children's medical Center*

13:50 – 14:00 Serological response to the BNT162b2 COVID-19 mRNA vaccine in adolescent and young adult kidney transplant recipients
Dr. Orly Haskin, *Schneider Children's Medical Center*

14:00 – 14:10 Bortezomib as first line treatment of early antibody mediated rejection – The Jerusalem experience
Dr. Keren Tzukert, *Hadassah Medical Center*

14:10 – 14:20 Is MAG3 kidney scan as efficient and specific as kidney biopsy in kidney transplant patients?
Dr. Oded Cohen-Arazi, *Hadassah Medical Center*

14:20 – 14:30 Reconstruction of multiple arteries in kidney transplantation
Dr. Abraham Castro Navarro, *Hadassah Medical Center*

14:30 – 14:40 Clinical outcomes associated with induction regimens for kidney transplantation among children in North America
Dr. Daniella Levy Erez, *Schneider Children's Medical Center*

14:40 – 14:50 Nephrotic syndrome recurrence post-renal transplantation: 10 years' experience at Schneider Children's Medical Center of Israel
Dr. Dor Fisher, *Schneider Children's Medical Center*

14:50 – 15:00 Combined kidney and hematopoietic cell transplantation for tolerance induction between HLA matched sibling donor-recipient pairs
Dr. Moshe Yeshurun, *Rabin Medical Center*

19:00 – 20:00 Dinner

Saturday, November 20, 2021

08:00 – 10:00 Board Meeting Part 2

INVITED SPEAKERS

Prof. Stefan Schaub

Stefan Schaub is associate professor of the clinic transplantation immunology and nephrology at the University Hospital Basel, Switzerland. In addition, he is the head of the HLA laboratory. His research interests are pre-transplant immunological risk stratification and non-invasive post-transplant monitoring of renal allografts.

Prof. Rainer Oberbauer

Rainer Oberbauer, MD, PhD
Professor of Medicine
Director, Department of Nephrology & Dialysis and Transplant Medicine
Medical University of Vienna, Vienna, AUSTRIA

Dr. Oberbauer received his MD from the University of Vienna, Austria in 1990 and his MSc in Epidemiology from the Harvard School of Public Health, USA in 2005 and PhD from Semmelweis University in Budapest 2017. He completed his fellowship in nephrology at the Universities of Vienna and Stanford. In 2006 he was nominated as Director of the Renal Department of the Elisabethinen Hospital and in 2014 to Director of the Department for Nephrology and Dialysis, Internal Medicine III, Medical University of Vienna.

Dr. Oberbauer has a longstanding clinical and scientific interest in renal transplantation and he has published numerous experimental as well as clinical papers in this field. He is a member of many international transplant societies, past chair of EKITA and is EIC of Transplant Int and on the editorial board of a number of other major international transplant journals. He has also received several academic awards for his scientific papers, which mainly focus on genetic and clinical epidemiology and new immunosuppressive strategies following renal transplantation.

Further information: https://innere-med-3.meduniwien.ac.at/en/nephrology/

Prof. Jan Schmitto

Prof. Dr. med. Jan D. Schmitto, MBA, FCCP, FRCS (Glasg.), FACS
Department: Department of Cardiothoracic, Transplantation and Vascular Surgery (HTTG) at the Hannover Medical School (MHH)

Function: Director of the Mechanical Circulatory Support (MCS) Program, Director of the Program of Active Cardiac Implant Technologies, Surgical Director of the Interdisciplinary Heart Failure Unit

Education:

YEAR	Academic Qualification
1996–2002	Medical Studies; University of Münster
2002	Final German Medical Licensing Examination certificate
2003	Doctoral thesis (magna cum laude); Westfälische Wilhelms-Universität, Münster
2004	Qualification as doctor on emergency medicine
2006	Qualification as doctor on sports medicine
2008	Qualification as doctor on medical quality management
2009	Board Certification for Cardiac Surgery
2011–2012	Additional qualification as Medical Hospital Manager
2011–2013	Master of Business Administration, University of Applied Science and Arts Neu-Ulm
2012	Habilitation; Hannover Medical School
2016	Apl. Professor; Hannover Medical School
2019	Board Certification for Thoracic Surgery

Academic appointments and research posts:

YEAR -YEAR	Appointment
2004-2005	Resident; Department of General Surgery, Division of Visceral and Abdomial Surgery, University of Göttingen
2002-2009	Doctor and Academic Assistant; Department of Thoracic-, Cardiac- and Vascular Surgery, University of Göttingen
2009-2010	Fellowship; Harvard Medical School, Boston, USA
2011-present	Consultant; Department of Cardiac, Thoracic, Transplantation and Vascular Surgery, Hannover Medical School
2016-present	Apl. Professor; Hannover Medical School
2017-present	Director of the Mechanical Circulatory Support (MCS) Program, Director of the Program of Active Cardiac Implant Technologies, Surgical Director of the Interdisciplinary Heart Failure Unit; Hannover Medical School

Other professional activities: Reviewer, Board membership, Chairperson, Committee member etc.

YEAR	Organisation
2003-present	Member; German Association for Cardio-Thoracic Surgery (DGTHG)
2004-present	Member; European Association for Cardio-Thoracic Surgery (EACTS)
2009-present	Member; American Society for Artificial Internal Organs (ASAIO)
2013-present	Chairman; Pulslos Leben e.V.
2014-present	Member; International Society for Heart and Lung Transplantation (ISHLT)
2014-present	Member; International Society of Rotary Blood pumps (ISRBP)
2014-present	Fellowship; American College of Chest Physicians (FCCP) (CHEST)
2015-present	Fellowship; Royal of College of Physicians and Surgeons (FRCS) Glasgow
2016-present	Leader; Clinical research group KFO 311
2017-present	Fellowship; American College of Surgeons (FACS)
2017-present	Editorial board member; Journal of Thoracic Disease (JTD)
2017-present	Leader: International Heart Failure Unit (DGK), Hannover medical school
2018-present	Member; Working group Heart Failure (DGK)

Major research interests:

- Left ventricular assist device (LVAD) implantation, upgrade and exchange, especially with minimally-invasive surgery.
- Developing and testing (in vitro, in vivo, ex vivo) experimental mechanical circulatory support devices in acute and chronic animal heart failure models.

Prof. Emmanuel Morelon

Prof. Emmanuel Morelon, MD, PhD
Director of the Renal and Pancreas Transplantation Program, Transplantation Department, Edouard Herriot Hospital, Lyon, France

Professor Emmanuel Morelon received his medical degree from the Necker School of Medicine in Paris in 1988. During his internship in Paris, he began pursuing a career as a nephrologist in transplantation. He worked as Assistant Professor in the Transplantation Department at the Necker Hospital from 1997 to 2004. Simultaneously, Prof. Morelon received training in basic immunology in the laboratory of Prof. Alice Dautry-Varsat at the Pasteur Institute.

Since 2005, Prof. Morelon is the medical director of the Renal and Pancreas Transplantation Program in the Transplantation Department at the Edouard Herriot Hospital in Lyon. He has also been involved with the composite tissue graft program including face and upper extremity transplantation. He has become an international expert in the immunology of vascularized composite allotransplantation.

He was the president of the International Society of Vascularized Composite Allotransplantation from 2017 to 2019.

Prof. Bruno Reichart

Reichart, Bruno, Prof. Dr. med. Dr. h. c., * 18.01.1943, Vienna
Current position: Professor of Cardiac Surgery, Emeritus
Co-Speaker of the Transregio Research Group "Xenotransplantation", German Research Foundation, Co-Speaker "Renal Xenotransplantation", Else-Kröhner-Fresenius Foundation

Professional Career

2004 – 2024	supported by the German Research Foundation, Transregio TRR127 "Xenotransplantation, XTX", Speaker; since 2016 Co-Speaker; consistent xenogeneic (genetically modified, gm, pig-to-baboon) heart transplantations, XHTX, (Nature, 2019)
1998 – 2004	pre-clinical XHTX, supported by the Bavarian Research foundation
1990 – 2011	Chairman and Professor, Department of Cardiovascular Surgery, LMU
1989 –1991	President of the ISHLT
1984 – 1990	Chairman, Department of Cardiothoracic Surgery, University of Cape Town, Groote Schuur and Red Cross Children's Hospitals, Professor of Cardiothoracic Surgery; interested in heart and lung preservation, concordant (green vervet monkey-to-baboon) heart transplantations
1983 – 1984	Professor of Cardiovascular Surgery (C3)
1983	first German heart and lung transplantation
1981 – 1984	first German heart transplantation series
1977 – 1983	Senior Consultant, Department of Cardiac Surgery, LMU; scientific interests: radionuclide first pass ejection fraction studies after aorta-coronary by-passes, HTX, non-invasive immunologic monitoring after experimental and clinical HTX (Caves Award of the ISHLT)

ABSTRACTS

Abstracts Session 1
Liver and National Transplantation Center

SAR-CoV-2 vaccine alleviates disease burden and severity in liver transplant recipients even with weaker serological immunogenicity

Abed Khalaileh[1,2], Ashraf Imam[1,2], Alaa Jammal[1,3], David Hakimian[1,3], Johnny Amer[1,2,3], Asher Shafrir[1,3], Yael Milgrom[1,3], Mohammad Masarowah[1,3], Wadi Hazou[1,3], Rifaat Safadi[1,3]

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Background: Pfizer's mRNA SARS-CoV-2 vaccine show a high efficacy in several clinical data. The immunosuppression used in liver transplant recipients suggested reducing the efficacy of SARS-CoV-2 vaccination in liver transplant (LT) recipients.
Aims: To assess retrospectively the clinical and serologic impact of the Pfizer's SARS-CoV-2 vaccine within LT recipients in Hadassah Medical Organization.
Methods: Clinical and laboratory characteristics of LT recipients experienced SARS-CoV-2 infection and/or vaccinated recipients; were correlated with clinical and serologic vaccine responses of BNT162b2 vaccine. Serum SARS-CoV-2 spike immunoglobulins (anti-S) assessed at least 7 days following vaccine (Liaison assay).
Results: Between 1 March 2020 to 25 September 2021, we included 167 fulfil cases to major 2 groups.
SARS-CoV-2 positive group: 45 recipients experienced SARS-CoV-2 infection included to assess dynamic impact of vaccination. Pre-vaccination 34 symptomatic and 3 asymptomatic cases from first 3 waves compared to 8 post vaccination symptomatic SARS-CoV-2 infection (5 from the 3rd and 3 from the 4th waves). Post Vaccination subgroup lack NAFLD with lower rates of diabetes, but worse lipid profile with higher rates of smoking and Mycophenolate mofetil (MMF) treatment. All 3/45 (6.7%) died cases were Pre-Vaccinated. In spite this worsen background comorbidity of the Post Vaccination group and despite a greater SARS-CoV-2 infection within the general Israeli population at the 4th wave, both number of SARS-CoV-2 positive recipients and death outcome were better in Post- compared to Pre-Vaccination

subgroups, reflecting vaccination impact.

Vaccinated group: total 130 LT recipients received both doses of SARS-CoV-2 vaccine and had a serologic and clinical follow-up were included. Of them, 129 completed both vaccine doses and one case received only the first vaccine dose, then infected with SARS-CoV-2 after 3 weeks. Eight out of the 130 (6.2%) experienced post vaccine SARS-CoV-2 infection (they are overlapping in both groups), defined as clinical vaccine failure. Another 38 case (29.2%) were serological vaccine failure, keeping total vaccine failure rate 46/130 (35.4%). The rest 84 (64.6%) cases were serological vaccine responders (anti-S≥19 AU/ml). Older post-LT interval and lower consumption of immunosuppression (Steroids, FK506 and MMF) associated with favorable SARS-CoV-2 vaccine response. However, mTOR inhibitors did not affect or improved outcome, probably contributed to reduce FK506 dosages and serum levels. Immunogenicity with anti-S levels <100 AU/ml are at risk to lose serologic response or be infected with SARS-CoV-2. A booster dose achieved an effective serologic response within third of failures and within most of responders. It is promising to secure a better and maybe longer protection.

Conclusion: Pfizer's BNT162b2 vaccine seams improving SARS-CoV-2 morbidity and mortality within LT recipients even with weaker serological immunogenicity. Immunosuppression impairment of immunogenicity might improve by switching MMF to mTOR inhibitors. Booster vaccine should be considered at least to non- and low-responders after the 2nd dose.

A third vaccine boost of the BNT162b2 mRNA improved significantly immune response among liver transplant recipients

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Background: Among solid organ transplant recipients, the immune response after two doses of BNT162b2 mRNA vaccine is impaired. The immunogenicity and safety of a third boost among liver transplant (LT) recipients is unknown. Aim: to evaluate the immune response after the third boost of BNT162b2 mRNA vaccine among LT recipients

Methods: Consecutive 64 LT recipients followed in Sheba medical Center were included. Level of IGG against receptor-binding domain (RBD), neutralizing antibodies (NA) and T-cells before (test 2) and 21-28 days after third vaccine (test 3) were determined and compared to levels of immune response after the second vaccine dose with a median time after second vaccine of 38 days (test 1). Adverse effects (AE) were monitored.

Results: 64 consecutive LT recipients with a median age of 64 years; 59.4% males were included. The immune response that was noted after the second vaccine dose (test 1) 69.4%, decrease further after a median time of 174 days (54%) and improved significantly after the third vaccine to 97%. The geometric mean of anti-RBD IGG, NA and T-cells levels after third dose increased significantly and were 1.5 (95%CI,0.9-1.5) vs. 4.1 (95%CI,3.5-4.7) IU/ml, $p<0.0001$, 26 (95%CI,8-87) vs. 4288 (95%CI,2187-8406), $p<0.005$ and 6.5 (95%CI,2-22) vs. 204 (95%CI,120-348) 106 cells, $p=0.008$, in the second and the third tests respectively. The level of anti-RBD IGG after the third vaccine correlated negatively with age ($p>0.0001$), renal failure ($p>0.0001$), and MMF treatment ($p=0.004$), combined immunosuppression (double and triple therapy) vs. CNI monotherapy ($p=0.001$). After the third dose, adverse events were reported by 37% of recipients and were mostly mild (local pain and fatigue).

Conclusion: The immune response after third BNT162b2 mRNA vaccine is dose depended and improved significantly without serious adverse effect. Further studies need to evaluate durability achieved immune response and right number and schedule of boost vaccines.

Sustainability of humoral immunity induced by COVID-19 vaccination and response to booster dose among Liver Transplant recipients

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Background and Aims: The BioNTech-BNT162b2 SARS-CoV-2 mRNA vaccine efficacy reached 95% in the general population following administration of 2 doses. Liver transplant (LT) recipients are immunosuppressed and thus at risk for lower vaccine immunogenicity. Our aim was to assess vaccine immunogenicity and safety in this population.

Methods: LT recipients followed at the Tel-Aviv Sourasky Medical Center and healthy volunteers were tested for SARS-CoV-2 IgG antibodies against the Spike-protein (S) and Nucleocapsid-protein (N) at four time points: 10-20 days after the second Pfizer-BioNTech BNT162b2 SARS-CoV-2 vaccine dose, after 3 months follow-up perios, prior to and 10-20 days after a third booster dose. Information regarding vaccine side effects and clinical data was collected from patients and medical records.

Results: Following the second vaccine dose, immunogenicity among 75 LT recipients was significantly lower compared to the control group, with positive serology in 53.3% compared to 100% among controls ($p<0.001$). Antibody titer was also significantly lower among LT recipients (median 368.3AU/mL vs. 12,538AU/mL in controls, $p<0.001$). After 3 months follow-up, the proportion of seropositive LT patients decreased to 51.6%, with a decline in antibody titer both in the study (median 157AU/mL) and the control group (median 1,995.2AU/mL). During July-August 2021, 61 LT recipients received a third booster dose. Positive response rate increased from 49.1% to 83.6%. The median antibody titer significantly increased in both groups, but remained lower in LT recipients (3,542AU/mL vs. 28,358AU/mL among controls). Predictors for negative response among LT recipients were older

age, lower eGFR, and treatment with high dose steroids and MMF.

Conclusion: LT recipients are at risk for lower humoral response to Pfizer-BioNTech SARS-CoV-2 mRNA based vaccine. Factors influencing serological antibodies response include age, renal function and immunosuppressive medications. A booster dose was able to increase the response rate significantly, although antibody titers remained lower in comparison to control.

מידת ניצול/פסילת האיברים המוצעים להשתלה

Utilization and rejection rates of organs offered for transplantation

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רקע: במציאות בה פוטנציאל התורמים הנפטרים השנתי באבחנת מוות מוחי/DCD, בהם לפחות איבר אחד מתאים להשתלה, עומד על 180-220, שעורי ההסכמה עומדים על כ-60%, ורשימת הממתינים להשתלה אינה מוגבלת בגיל, ישנו הכרח להבטיח שימוש אופטימלי במירב האיברים המוצעים להשתלה.

מטרה: לבחון את מידת ניצול האיברים אל מול שיעור הפסילות, לפני במהלך ולאחר ההנצלה. לנתח את הגורמים לפסילה ולקחת בחשבון שינויי מדיניות ונהלים כמו שימוש בתורמים מבוגרים, הדמיה כלל גופית, ולבחון דרכים לצמצום הפער בין מספר האיברים המוצעים להשתלה לבין אלו המושתלים.

שיטה: בחינת היצע ושימוש באיברים בשנים 2020- 2018 וניתוח גורמי הפסילה לפני בעת ולאחר ההנצלה, לכל איבר בנפרד, על סמך התיעוד שנעשה במרכז הלאומי להשתלות.

ממצאים:

ניצול איברים

Organ	2018	2019	2020
Kidneys	79.1%	82%	71.8%
Liver	89%	88%	87.9%
Lung	45.8%	45%	38.5%
Heart	24%	23%	21.6%
Pancreas	6.5%	10.5%	4.8%

סיבות לפסילה

Organ	הוצעו	הושתלו	סך פסילות	נפסלו לפני הנצלה	נפסלו בעת הנצלה	נפסלו אחרי הנצלה	**גורמים בולטים לפסילה**
Kidneys	632	470	162	107	13	42	28% מתוך "אחרי הנצלה" היו הנצלות DCD
Liver	302	259	43	16	24	3	75% "בעת הנצלה" על סמך ביופסיה
Lung	584	255	329	276	50	3	74% "לפני הנצלה" בעקבות הדמיה / ברונכו/חמצון ירוד
Heart	186	68	118	117	1		50% אקו וצנתור
Pancreas	113	19	94	69	25		בהנצלה - בשל מראה בצקתי/שומני

בהרצאה יפורטו הסיבות לפסילה ויוצגו ממצאים השוואתיים מן העולם.

Clinical outcomes and antibody response in COVID-19-positive pediatric solid-organ transplant recipients

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Background: The COVID-19 pandemic has profoundly impacted transplantation activity worldwide. Nevertheless, data on the clinical and laboratory features of SARS-CoV-2 infection in pediatric recipients of solid organ transplant (SOT) recipients are scarce.

Methods: We describe the clinical and laboratory manifestations, and outcomes of 25 pediatric solid-organ transplant recipients who tested positive for SARS-CoV-2.

Results: The mean age was 15.2±4 years; 14 (56%) were kidney and 11 (44%) liver transplant recipients. Twenty-three (92%) of the patients were symptomatic. Most (84%) had a mild disease. Two patients (8%), both kidney transplant recipients with additional comorbidities, had severe respiratory disease and required adjustments in their immunosuppression therapy. Significantly longer virus shedding time was found among kidney and pancreas transplanted recipients than among liver transplant recipients (35.1±9.8 vs.19.6±4.7 days, $p<0.001$). 22/23 (96%) had positive antibody responses.

Conclusion: Our study demonstrated that while the majority of pediatric recipients of SOT developed a mild disease with a positive serologic response, a relatively high percentage (8%) developed a severe disease. This emphasizes the need for close monitoring of this particular population, especially those with comorbidities.

ההסתגלות לאובדן אצל בני משפחות שכולות לאחר תרומת איברים ורקמות: השוואה בין משתתפים ללא משתתפים בקבוצות תמיכה של המרכז הלאומי להשתלות

Adjusting to loss after organ and tissue donation. Comparison of participants and non-participants in the National Transplant Center's grief support groups

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רקע: המרכז להשתלות מקיים קבוצות תמיכה למשפחות שכולות שתרמו איברים או רקמות במשך 32 שנים. לאחר התרומה משפחות תורמות מקבלות מכתב לגבי הקבוצות, ללא מחויבות וללא תשלום.
המיוחד בקבוצות אלו, א. משלבות בני משפחה שונים. ב. נסיבות המוות שונות. ג. אינן מוגבלות לתקופה/לסידרה.
מטרה: לבדוק את ההסתגלות לאובדן הן שהשתתפו והן שלא השתתפו בקבוצות התמיכה.
שיטה: המשפחות שמקיימות קשר עם המרכז קיבלו מכתב, והמסכימים מילאו שאלונים. השאלונים כללו מדדי התאבלות, צמיחה פוסט טראומתית, התפתחות החיים, ולמשתתפים בלבד על מאפייני הקבוצה.
משתתפים: מתוך 199 (59.3%) 118 משתתפי הקבוצות ו- 81(40.7%) לא משתתפים. דמיון בין הקבוצות בגיל ממוצע 56, כ-9.82 שנים לאחר האובדן וכ-15.77 שנות השכלה, הבדל משמעותי במגדר, 68% נשים. רמת דתיות נמוכה, 77.4% ילידי ישראל, 95% יהודים.
ממצאים חלקיים:

Group differences (N = 199)

	Total	Group participants (n = 85)	Non-participants (n = 114)	Difference
PTG total (Post Traumatic Growth)	3.27 (0.77)	**3.42** (0.76)	**3.14** (0.74)	t(184) = 2.51 (**p = .013**)
PTG relating to others	3.29 (0.86)	**3.45** (0.83)	**3.17** (0.86)	t(190) = 2.24 (**p = .026**)
PTG spiritual change	2.18 (1.03)	**2.39** (1.15)	**2.02** (0.91)	t(179) = 2.32 (**p = .022**)
PTG appreciation of life	3.64 (0.95)	**3.86** (0.91)	**3.48** (0.95)	t(186) = 2.77 (**p = .006**)

משתפי הקבוצות העניקו ציונים גבוהים: למפגש עם אנשים שמבינים אותי, הזדמנות להזכיר את היקיר/ה שאבדתי, הבנות ותובנות על המצב שלי/של משפחתי, כלים להבין את המצב שלי יותר טוב - ממוצעים < 5/58.3.

ציונים נמוכים: רעיונות להתנהלות שלא חשבתי עליהם, משפרת את מצב הרוח שלי, תשובות לשאלות שהטרידו/מטרידות אותי, מרגיעה אותי, נותנת לי כוחות להמשיך - ממוצעים > 5/4.3

בעיקר חשוב: תמהיל המשתתפים, מגוון הנושאים וסגנון הנחייה.

הסיבות לאי השתתפות: אין צורך בקבוצה, מיקום גאוגרפי, היום/שעה לא מתאימים.

The Outcome of Liver Transplantation in Elderly Israeli Patients

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Background: Liver transplantation (LT) is an important treatment option for patients suffering from acute liver failure, end-stage liver disease and hepatocellular carcinoma. LT at an older age is connected to a lower survival rate and a higher incidence of complications. In 2014, the upper age limit (65) of registration to the LT waiting list in Israel was cancelled. In this paper, we aimed to examine the outcomes of LT in elderly Israeli patients, considering survival and complications, in comparison to younger patients.

Methods: Retrospective review of patient records who underwent LT between the years 2014-2019 in two transplant centers in Israel - Rabin Medical Center and Hadassah Medical Center (N = 269). Association between the patient's age group, one-year-survival and complications was assessed using the Chi-Square Test or the Fisher's Exact Test. The Kaplan-Meier model was used for describing overall survival, with the log-rank test as a comparison of different age groups' survival curves.

Results: 261 patients underwent 269 LTs. The mean age was 53, median 57 (SD 12.62) and the oldest age was 76. We compared one-year survival between four age groups: 1. Age59 (82.9%), 2. 60Age64 (73.2%), 3. 65Age69 (71.4%), 4. Age70 (93.8%); there was no significant difference between the groups (p=0.11, Fisher's exact test). The only complication significantly associated with age was cardiovascular (including MI, CVA) in the early period after LT (up to 3 months): 3.3% of group 1, 13.0% of group 2, 2.5% of group 3, 18.8% of group 4 (p=0.009, Fisher's exact test). Survival analysis using the Kaplan-Meier model did not yield a significant difference between the age groups' survival curves [p=0.1, Log Rank (Mantel-Cox) test].

Conclusion: Increasing age does not affect one-year-survival, although there is a higher risk of cardiovascular complications among elderly patients (70). Regarding overall survival, statistical analysis implies there is no significant difference between the age groups; further follow-up should certainly be obtained.

האם חיסון עדר מגן מפני תחלואה במושתלי כבד מפני COVID-19, סיכום נתונים ממרכז רפואי בלינסון

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הקדמה: אימונוסופרסיה ותחלואה נלווית מעלים סיכון לסבול מ-COVID 19, בפרט במושתלי אברים. עבודות קודמות הצביעו על תחלואה ותמותה גבוהים בקרב מושתלי איברים אך מטאנליזה שפורסמה לאחרונה הראתה שבקרב מושתלי הכבד השיעור לא שונה מהאוכלוסייה הכללית. מדינת ישראל הייתה הראשונה בעולם להתחיל בפרויקט החיסונים למדוכאי חיסון ולאוכלוסייה הכללית. מכיוון שיתכן וקיים הבדל במידת יעילות החיסון לאורך זמן אצל מדוכאי חיסון , החלטנו לבדוק האם קיים הבדל בשיעור ההדבקה, בתחלואה ובתמותה של מושתלי כבד לעומת האוכלוסייה הכללית בהתאם לגלי הקורונה שהוגדרו עי משרד הבריאות.

שיטות: עבודה רטרוספקטיבית ממרכז רפואי בילינסון בו נאספו נתונים על מושתלי כבד לפי דיווחי המטופלים וגיליונות אלקטרונים. נאספו נתונים דמוגרפים, אבחנה, מחלה, חיסון, טיפולים ותוצאים. הנתונים נותחו והושוו לנתונים שמדווחים באתר של משרד הבריאות.

תוצאות: 214 מושתלי כבד נמצאים במעקב בבית חולים בלינסון. מתוכם 73 חלו בקורונה במהלך שנת 2020-2021. 17 חולים (4.1%) נדבקו בגל השלישי 11/2020-4/2021, (ממוצע הדבקה יומי באוכלוסייה אז היה 9714 כאשר קרוב ל-0.2% מהאוכלוסייה חוסנה).

בגל הרביעי נדבקו 11 מושתלים, מהם 9 לאחר חיסון (ממוצע ההדבקה היומי באוכלוסייה היה 7756 כאשר 58.8% מהאוכלוסייה חוסנה).

בגל השלישי 2 מושתלים נפטרו, שאר החולים חלו במחלה קלה ולא נזקקו לטיפול.

בגל הרביעי נפטר מושתל אחד, ומשותלת אחת נזקקה לאישפוז ללא הנשמה.

לא היה הבדל בין שיעורי ההדבקה בגלים השונים p=21.0. כצפוי, גם באוכלוסייה שלנו נמצא כי שיעור התפתחות הנוגדנים עלה מ-62% לאחר חיסון שני ל-93% לאחר חיסון שלישי. בתקופת המחקר 3 חולים נפטרו מקורונה לעומת 4 חולים ממחלות אחרות כלומר לא הייתה עלייה בתמותת מושתלים בעקבות מגפת ה-COVID.

מסקנות: מנתונים אלה עולה כי למרות חיסון העדר והעלייה בכייל הנוגדנים לאחר החיסון השלישי ישנו עדיין סיכון מוגבר למושתלי כבד לחלות ב-COVID 19 שמושפע מהעלייה בשיעור ההדבקה באוכלוסייה הכללית ולא משיעור החיסוניות. המהלך הקליני היה טוב מהמדווח בספרות הן מבחינת תחלואה והן מבחינת תמותה.

Perinatal Outcomes After Liver Transplantation – Is There a Role for Aspirin Treatment?

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Purpose: To describe perinatal outcomes in liver transplanted women and evaluate the effect of low-dose aspirin treatment in these women. **Methods:** An observational retrospective study examining perinatal outcomes among liver transplant recipients, at a single university-affiliated medical center. Demographic, obstetric and clinical data were obtained from Maternal-Fetal Medicine and Hepatology clinic electronic health records. Low-dose aspirin use in these women during pregnancy began in 2018 and was evaluated with regards to its effect on the risk of developing preeclampsia and hypertensive disease.

Results: Overall, 18 women had 25 successful deliveries. Between 2016 and 2020, 13 deliveries by 10 pregnant liver transplant recipients were identified. Primary liver disease was Wilson's disease in 7 pregnancies (53%), acute liver failure due to an unknown cause in 3 (23%) and a single woman with each of the following: Viral hepatitis A, Hyperoxaluria type 1 and primary sclerosing cholangitis. Mean age was 23 years at transplant and 30 at conception. All recipients received tacrolimus, and steroids were administered to 9 (69%) recipients. Low-dose aspirin (100 mg daily) was administered to liver-transplanted pregnant women beginning 2018 and was given in 5 (38%) of the pregnancies. Regarding maternal outcomes, 2 women (16%) developed preeclampsia, two (16%) gestational diabetes, and 3 (24%) had postpartum infection. None of the women receiving low-dose aspirin developed hypertensive disease or excessive bleeding during pregnancy. Median gestational age at delivery was 37 weeks (31-39 weeks), with 6 preterm births (31-36 weeks) and a median birthweight of 3072g (1450-4100g).

Conclusions: Based on our single-center experience and, low-dose aspirin may by a possible preventive measure for preeclampsia in liver transplant patients

Organ donation in the time of COVID-19: The Israeli experience

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Background: Coronavirus disease 2019 (COVID-19) resulted in a worldwide pandemic with medical consequences. We present the response of the Israel Transplant to the evolving challenge and the impact on deceased and living organ donation during 2020 which is compared with 2019.

Methods: Guidelines were introduced for the utilization of organs and protection of health care personnel. Data collected included i) for deceased donors, the total number of potential organ donors, where hospitalized, cause of death, number of family authorizations and refusals, number of actual donors, number of organs transplanted/donor and total number of transplants performed; ii) for living kidney donors, whether related or altruistic, and the number of procedures performed; and iii) the number of patients registered on the national organ waiting list.

Results: Following the first case in February 2020, deceased organ donation continued uninterrupted, and the total number of potential donors was similar to 2019 (181 vs. 189). However, the number of families approached for donation decreased significantly ($P = 0.02$). This may be attributed to COVID-19-imposed limitations including fewer brain death determinations due to a limited possibility for face-to-face donor coordinator-donor family interactions providing emotional support and visual explanations of the medical situation. In addition, fewer donors were admitted to ICU ($P = 0.1$) and the number of organs retrieved/donor decreased (3.8/donor to 3.4/donor). The overall result was a decrease of 24.2% in the number of transplant procedures (306 vs. 232). Living donation, initially suspended, was resumed in May and the total number of procedures increased, due to a significant increase in altruistic donations ($P < 0.0001$).

Conclusion: While organ donation continued throughout 2020, the transplantation rate declined as a result of limitations imposed by the COVID-19 pandemic and continuously changing hospital bed priorities. Appropriate responses for future similar scenarios need to be sought and implemented.

פגיעה בלתי צפויה במושתלי כבד לאחר חיסון ל-COVID 19, האם DILI או תופעה מקרית

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הקדמה: COVID-19 פנדמיה גורם למחלה קשה עם שיעורי תמותה גבוהים ולכן ניתן אישור מהיר למתן חיסון לכלל האוכלוסייה החל מגיל 12. הן תופעות אוטואימונית סיסטמיות והן פגיעה בכבד במנגנון אוטואימוני או Drug-induced hepatotoxicity כתוצאה מחיסון נגד COVID-19 דווחו. ברב המקרים הפגיעה נשלטת וחולפת אך תואר גם מקרה שהוביל לאי ספיקת כבד ומוות. מושתלי אברים נמצאים בסיכון גבוה לסבול מ COVID-19 קשה עם שיעור תמותה גבוה, לכן הוחלט לחסן מושתלי אברים באופן גורף. ההמלצה התקבלה על סמך נתוני הבטיחות והיעילות מהאוכלוסיה הכללית, בטרם הופקו נתוני בטיחות ויעילות בקרב מושתלי איברים . אנו מציגים 2 מושתלי כבד שפיתחו פגיעה בלתי צפויה בכבד לאחר החיסון השני.

תאור מקרה:

בת 85, מושתלת כבד מ-2012 על רקע הפטיטיס C, ב-2016 טופלה והשיגה SVR, לאורך השנים אנזימי כבד תקינים לחלוטין, תחת טיפול בפרוגרף בלבד. קיבלה ב-16.3.2021 חיסון שני לקורונה כשבועיים לאחר מכן הופיעו תלונות על גרד ובבדיקות דם עלייה משמעותית באנזימי כבד עם ALP 400, GGT שמגיע בשיא ל-1158, ALT 628, AST 491, בילירובין 1.5, עברה ברור נרחב - ללא ממצא מכוון. בביופסיה - תסנינים כבדים פורטלים מורכבים מלימפוציטים, מעורבים עם תאי פלסמה, ופריצה מעבר לlimiting plate. בנוסף, חדירה לצינוריות מרה ולאנדותל מתאים לדחיה. טופלה בסטרואידים, סלספט ואורסוליט עם ירידה הדרגתית.

בן 62, מושתל כבד+כליה על רקע היפראוקסלאוריה מ-2001, משנת 2017 החלה התדרדרות כלייתית הדרגתית עם ערכי קראטינין שהתייצבו על סביבות 4. תחת טיפול בפרדניזון 5 מג ופרוגרף תפקוד כבד תקין . ב-4.3.2021 קיבל חיסון שני לקורונה. בתחילת אפריל הופיעה החמרה בקראטינין עד 8, גרד ובבדיקות דם LDH 350 AST 750 ALT 465 ALP, GGT 1347, בילירובין 2. החל דיאליזה וביופסיית כבד דלקת פורטלית ופריפורטלית ללא נקרוזיס וללא ונוליטיס. הועלה מינון פרדניזון ל-10 מג עם שיפור הדרגתי.

מסקנה: סמיכות האירועים והעדר סיבות אחרות לפגיעה בכבד מעלים את החשד שמדובר בתגובה לאחר מתן החיסון. כאשר מדברים על פגיעה טוקסית קשה בכבד שנגרמת מתרופות ישנה הנחייה ברורה להמנע ממתן תרופה זו. מקרים אלה מעוררים את השאלה האם דין החיסון כדין פגיעה משנית לתרופה ובמקרה כזה - מהם האפשרויות בעתיד - האם לא לחסן חיסון שלישי, רביעי, האם לתת הרכב חיסון אחר?

Implementation of the Fried Frailty Scale in the evaluation of kidney transplant candidates in Beilinson

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Introduction: Frailty is a syndrome characterized by diminished strength, endurance and physiologic function; it is associated with increased vulnerability to stressors and poor medical and surgical outcomes. The physical frailty phenotype (PFP) described by Fried is the most commonly used frailty metric score in patients with end-stage renal disease and kidney transplant recipients.

Herein we describe the implementation of the PFP in our kidney transplant candidates in order to evaluate frailty prevalence within this population and identify patients who are at high risk for unfavorable outcomes and complications following transplantation.

Materials and Methods: In this prospective study all 60 years old and older kidney transplant candidates were evaluated at our pre-transplant clinic between December 2020 - May 2021 with PFP scale; demographics, time on dialysis and comorbidities were documented. Frailty was defined with a score of 3-5, whereas patients with a score between 0-2 were defined as non-frail. Waiting list drop-out was documented as well as post-transplant outcomes including length of hospital stay, complications and readmissions.

Results: during the study period 30 patients were evaluated; mean age was 69 (60-75), 22(73%) were male and 8 (27%) were women; mean time of dialysis was 5.7 years. The average risk factors were 2. The prevalence of frailty in this group was 37% (11) and 63% (19) were defined as non-frail. 40% (12) of all the patients underwent kidney transplant. Among these patients only 2 were defined as frail before the transplant. Mean length of post-transplant hospital stay was 9.8 days for the non-frail patients and 15 days for the frail. Number of re-hospitalizations within the 3 first months after transplant was 0.9 for the non-frail and 2 for the frail patients. 6 candidates were defined as very frail, with a score more than 4 and were removed from the list pre transplant

Conclusion: Our initial experience with frailty evaluation of kidney transplant

candidates indicates its importance as a predictor of poor outcomes following transplantation. The majority of the patients who underwent successful kidney transplant were defined as non-frail whereas the frail patients experienced increased hospitalization days post transplant. We are currently formulating our Beilinson Frailty Index which combines Frieds' tool with patients' risk factors, laboratory tests results and sarcopenia level,for more effective patient selection with the aim to increase the quality of outcome for the selected patient.

Abstracts Session 2
Heart Lungs and Pre Transplant Evaluation

Reversed Systolic Heart Failure Post Kidney Transplant

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Background: End stage renal disease (ESRD) is a major risk factor cardiovascular morbidity and mortality, which can be partially eliminated by kidney transplant. Systolic heart failure might be considered as contraindication for kidney transplant although some patients myocardial recovery post-transplant. We aim to identify and characterize the phenomenon of reverse myocardial remodelling in kidney transplanted patients.

Methods: From a large registry of patients undergoing kidney transplant between 2016-2019 (n=604) at Rabin Medical Center, patients were assessed for the presence of systolic heart failure in the pretransplant period and post-transplant. We calculated the mean change in ejection fraction (EF) post-transplant and assessed the predictors of myocardial recovery.

Results: Data of 225 patients was available for the final analysis. Mean EF pre-transplant was 56.44+-8.88 with minor although significant increase post-transplant to 57.88+-8.97% (p<0.001). When eliminating patients with known ischemic heart disease, results were similar with EF improvement from 57.01+-8.74% to 58.60+-8.71% (P<0.001; n=186). A more prominent improvement was demonstrated among younger patients, under the age 51 years, from 56.99+-9.31% to 60.32+-6.27% (P<0.001; n=72) and among women (EF 57.80+-7.90% to 60.01+-7.32; P<0.001; n=69). There was no statistically significant improvement in ejection fraction among males and among patients older than 51 years old.

Conclusion: Systolic heart failure pre-kidney transplant may be improved post-transplant. The phenomenon is expected to be more prominent among young patients and female gender.

Patient Evaluation in The Elderly Population For Renal Transplant Using Charlson Comorbidity Score (CCS) And The Clinical Frailty Scale (CFS) in Sheba Medical Center

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Background: The demography in most part of the world is changing with increasing percentage of elderly population. Renal transplant (RT) as a treatment for end-stage renal disease (ESRD) in elderly patient has been proven to offer better quality of life and longer life expectancy. Both the American and the European guidelines state that old age does not represent a contraindication for RT with patient selection a key aspect for success.

Aim: We aim to show our experience using the Charlson Comorbidity Score (CCS) and the Clinical Frailty Scale (CFS) in patient selection.

Methods: Of the 159 patients transplanted between 1/2017 and 9/2021 twenty one patients were ≥70 years. Each patient was evaluated for comorbidity using the CCS and CFS to estimate rates for readmission and in-patient mortality as well as the need for post hospital support. Statistical analysis was descriptive with proportions and percentages. Estimated survival rate was calculated using Kaplan-Meir method.

Results: Of the 21 patients 16 (76.2%) were on dialysis treatment with a mean of 42.1 month duration. The cause of ESRD was mainly due to hypertension in 9 patients (43.2%) and 5 with diabetes (24%).The majority of donors were cadaveric (57.1%) the remainder from live donors, their mean age was 59.2 years. Patient evaluation was based on CCS giving patients a minimum score of 5 given for age over 70 and ESRD. In our series, 16 patients (76.2%) had a score of 8 or less, with ischemic heart dieses and diabetes as main cause for additional points. There were two intraoperative complications, both vascular one presented as an ischemic leg and the other as low blood flow to the transplanted kidney. Median follow-up was 13.9 month (0.77-26.47 months); estimated survival rate was 95% for the 1 and 2- years, with one death occurring 3 month after transplant due to CVA. There was additional one graft loss due to septic complication.

When evaluating frailty status, two-thirds of patients received a score of 2 or 3 reflecting a good functional status without need for assistance in ADL. This level of

frailty gives an in-patient mortality risk of less than 3% and an estimated readmission rate between 4–13%. In our study, readmission rates were higher (57.1%) mainly due to delayed graft function, UTI and prolong urinary catheter use. All but one patient were discharged home with minimal assistants in ADL.

Conclusion: careful patient selection of elderly candidates for kidney transplantation is associated with good short-term outcome. The use of CCS and CFS as diagnostic tools should be incorporated into the evaluation process.

Preoperative coronary evaluation in kidney transplanted patients: a retrospective cohort study

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Background: Coronary artery disease is a leading cause of morbidity and mortality in kidney transplant patients in the peri and post-operative period. Noninvasive assessment of potential cardiac ischemia is an essential part of the evaluation of kidney transplant candidates. We aim to examine the prognostic value of preoperative nuclear SPECT test in kidney transplanted patients.

Methods: From a large registry of patients undergoing kidney transplant between 2016-2019 at Rabin Medical Center, patients were categorized according the presurgical evaluation with nuclear SPECT test. Major advance cardiac events (MACE) including non-fatal myocardial infarction, cardiovascular mortality, hospitalization due to cardiovascular disease and need for coronary revascularization following renal transplantation were recorded at 1 month and 1 year.

Results: 575 patients were available for analysis. Of these, 408 (70.9%) patients had nuclear SPECT test before transplant and 83 had evidence of reversible ischemia. Patients who had the scan tend to be older, with longer dialysis duration and higher rates of diabetes, hypertension and history of ischemic heart disease. The incidence of MACE at one month was statistically significant higher among patients with abnormal SPECT test compared to patients with no evidence of ischemia (10.8% vs. 4.3% respectively; P = 0.019). Differences derived mostly from myocardial infarction (8.4% vs 1.8%; P = 0.002). A similar trend was demonstrated for 1 year MACE, without statistical significance (20.5% vs 13.1%; P = 0.88). When adjusting results for conventional cardiovascular risk factors including age, diabetes, duration of dialysis and known ischemic heart disease, the prognostic impact of the abnormal scan diminished completely for all outcomes.

Conclusions: Presurgical evaluation of kidney transplant candidates with nuclear SPECT test failed to predict peri and post-operative MACE in kidney transplant recipients when adjusted for risk factors. A thorough clinical and cardiovascular risk factors evaluation should be considered over relying the SPECT test results.

Pulmonary markers of epithelial cell activity and injury in chronic lung allograft dysfunction

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Background: Airway epithelial injury is thought to be a key event in the pathogenesis of Chronic lung allograft dysfunction (CLAD). We investigated whether markers of epithelial activity and injury in bronchoalveolar lavage (BAL) correlate with CLAD diagnosis and major CLAD phenotypes: bronchiolitis obliterans syndrome (BOS) vs. restrictive allograft syndrome (RAS)-related phenotypes (including RAS, mixed phenotype, and all other patients with RAS-like opacities).

Methods: CLAD status and phenotypes were retrospectively determined in a cohort of all consecutive adult, first, bilateral lung transplants performed 2010-2015. All patients with RAS-related phenotypes were included and 1:1 matched with BOS patients based on time from transplant to CLAD-onset. CLAD-free subjects were used as controls. Proteins that maintain the barrier function of the airway epithelial mucosa (club cell secretory protein (CCSP), surfactant protein-D (SP-D) and epithelial mucins: MUC1, MUC5AC, MUC5B, MUC16), as well as epithelial cell death markers (M30&M65 representing epithelial cell apoptosis and overall death, respectively) were measured in BAL obtained within 6-months from CLAD onset using a double-sandwich ELISA or a multiplex bead assay. Protein levels were compared using Kruskal-Wallis and Mann-Whitney-U-test. Association between protein levels and graft survival was assessed using Cox proportional hazards models, adjusted for CMV serology mismatch status and phenotype.

Results: Fifty-four CLAD (27 BOS, 11 RAS, 7 mixed, 9 others with RAS-like opacities) patients and 26 CLAD-free controls were included. Median BAL levels were significantly higher in patients with CLAD compared to CLAD-free controls for M30 (124.5 vs. 88.9), MUC1 (6.8 vs. 3.28) and MUC16 (121.0 vs. 31.1). When

comparing CLAD phenotypes, M30 was significantly higher in patients with RAS-related phenotypes compared to BOS (160.9 vs. 114.6). In multivariable models, levels of M30 and MUC5B were associated with allograft survival after CLAD onset independent of phenotype ($P<0.05$ for all).

Conclusion: Airway epithelial mucin and cell death markers are enhanced in the BAL fluid of patients with CLAD and can assist in differentiating between CLAD phenotypes. Abnormal airway mucin expression and epithelial cell death may be involved in the airway inflammatory response of CLAD and thus aid in future selection of targeted therapies.

Lung Transplantation after Hematopoietic Stem Cell Transplantation

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Late onset pulmonary complications occur following allogeneic or autologous hematopoietic stem cell transplantation (HSCT). In allogeneic HSCT these are often associated with chronic graft versus host disease (GVHD). Lung transplantation (LTx) often remains the only viable therapeutic option in these patients.

Methods: We retrospectively retrieved all data on patients who had undergone LTx for end stage lung disease as a sequela of HSCT, between 1997 to 2020, in Rabin Medical Center.

Results: A total of 14 patients out of 822 (1.7%) from our cohort of LTx recipients, fulfilled the criteria of LTx as a sequela of late pulmonary complication after HSCT. The mean age at the time of HSCT was 30 (range 3-55). The median time between HSCT and first signs of chronic pulmonary GVHD was 54 months (IQR 12-81). The median time from HSCT to LTx was 84 months (IQR 60-120). Multivariate analysis showed that patients transplanted due to GVHD had similar survival in comparison to patients who were transplanted for other indications.

Conclusions: According to our experience, LTx after HSCT constitutes an important treatment strategy. The overall survival appears to be comparable to patients after LTx for other indications.

Referral rate of patients with interstitial lung disease to lung transplantation based on pulmonary function deterioration

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Background: Some types of progressive interstitial lung disease (ILD) often require lung transplantation (LTx) which has proven benefit on survival. Ideal timing for referral and listing remains challenging, with late referral associated with significant morbidity and mortality. Among other criteria, ILD patients should be considered for LTx if forced vital capacity (FVC)<80% predicted or diffusion capacity for carbon monoxide (DLCO)<40% predicted. Data reporting referral rates are lacking. The objective of this study was to evaluate referral rates of ILD patients with suitable pulmonary function tests (PFT) decline and identify possible barriers associated with non-referral.

Methods: A single-center, retrospective cohort study of ILD patients who had PFT performed at our center between January 1, 2014, and January 1, 2020. Patients with FVC<80% or a DLCO<40% were included in the study. Patients with absolute contraindication were excluded. Referral rates were computed, and patients' characteristics were compared between referred and non-referred subjects. Potential predictors of survival were assessed using Kaplan-Meier and Cox proportional hazards models.

Results: Out of 122 ILD patients who met PFT criteria for referral, only 39 were referred to LTx (31.1%), and eight had undergone LTx. The referral group was younger [58.44 vs. 66.69, P value=0.003], had lower FVC [47.4 vs 62.9, P value<0.001] and DLCO [25.51 vs 35.91, P value<0.001], and presence of pulmonary hypertension [66.7% vs 42.3%, P value=0.03]. Lower FVC and DLCO were associated with higher mortality [HR=0.96, CI 0.94-0.98, P value<0.001 and HR=0.97, CI 0.95-1.00 P value=0.05 respectively]. Patients undergoing LTx had lower GAP index and better 6 min walk test. Referral to LTx did not affect mortality.

Conclusions: Under-referral of potential lung transplant candidates with markers of more severe disease and no significant mortality advantage in the referred patient group may suggest late-referral missing the "transplant window". Further study is required to confirm these findings.

Comparing Predictors of Abdominal Organ and Lung Procurement in DCD Donors: A Retrospective Analysis

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Title: A 20-Year Retrospective Analysis Shows Differential Predictors in Lung Procurement between DCD and DBD Donors

Purpose: As rates of lung transplants in the US grow, wait-list mortality increases. While the literature reports similar survival outcomes of DBD and DCD transplants, research should investigate improvements to DCD lung recovery protocols to increase the total number recovered. Recently, Choi et al. presented donor variables indicative of ultimate lung recovery. However, expansion of DCD lung transplants requires comparison of these indicators to DBD donors for application of similar parameters to increase the rate of DCD lung recovery.

Methods: We performed a retrospective analysis of UNOS data from the Scientific Registry of Transplant Recipients. Donors who donated ≥1 organ from 10/1999-01/2019 were extracted and stratified according to DBD and DCD status. Associated characteristics of potential DCD and DBD lung donors were compared and a multivariable logistic regression model with ≥1 transplanted lung was constructed to evaluate the independent effects of important predictors.

Results: Our data included 179,228 potential lung donors, 162,157 DBD (31,486 donated, 19.4% recovery) and 17,071 DCD (526 donated, 3.1% recovery). Odds of lung nonuse between DBD and DCD donors were significantly associated with blood type, alcohol use, infection, cause of death, smoking history, drug use, death circumstance, ethnicity, gender, hypertension, insulin dependence, intracranial cancer, age, and lung pO2 on 100% P/F ratio (P < .001 for all variables). A multivariable regression analysis showed that donors' who died from MVA or drowning were 0.27 [95% 0.13, 0.53, p<0.001] and 7.13 [95% 2.56, 19.85, p<0.001] times less likely, respectively, to have their lungs procured in DCD vs DBD.

Lungs from donors ages 40-49 are more likely to be procured than those <30 or >50 in both DBD and DCD. However, likelihood of procurement is 1.84 [95% 1.42, 2.38, p<0.001] times higher in 40-49-year-old vs. <30-year-old donors when comparing DBD vs. DCD, and 2.43 [95% 1.83, 3.22, p<0.001] times higher than patients >50 in DBD vs DCD donors. In addition, for each era, the odds for procuring DCD vs. DBD

lungs consistently improved [95% 1.46–2.57, p<0.001].

Conclusion: Despite literature reporting comparable survival of DCD and DBD organs, this study highlights discrepancies in lung procurement practices which evaluate donor characteristics differently in DBD and DCD donors. Further study should investigate whether similar discrepancies exist in the procurement process of other organs.

Bronchoalveolar Lavage Markers of Inflammation Early Post Lung-Transplant are Associated with CLAD and Death

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Background: Surveillance bronchoscopies with bronchoalveolar lavage (BAL) and transbronchial biopsies (TBB) are used in the evaluation of patients after lung transplant to detect acute cellular rejection (ACR) or infection. We have previously shown that a focused BAL protein signature early post-transplant may predict CLAD or death in a subset of clinically-stable patients with A1-grade (minimal) ACR. The aim of the current study was to determine whether similar BAL markers would have similar predictive characteristics irrespective of ACR grade.

Methods: The cohort consisted of all adult, first, bilateral lung transplants performed 2010-2017. Clinical status was categorized as unstable or stable based on presence or absence of ≥10% concurrent drop in FEV1. Clinically stable patients with grade AX TBB (inadequate biopsies, which are not routinely treated at our center, thus avoiding the confounding effect of ACR treatment) during the first-year post-transplant, not preceded by ACR (grade A≥1 or grade B≥1) were included. IL6, S100A8, IL10, TNF-receptor1, IL-1α, pentraxin3 and CXCL10, previously shown to be associated with worse outcomes, were measured in the BAL using a multiplex bead assay. Association with subsequent CLAD or death was assessed using Cox proportional hazards models adjusted for age, sex, native lung disease, and CMV-mismatch.

Results: 107 patients matched the inclusion criteria with a stable AX occurring at a median time of 188 days (IQR 96-279) post-transplant. Median time from AX TBB to CLAD or death was 462 (IQR 330, 928) and 582 days (IQR 251-1410), respectively. In multivariable models, levels of CXCL10 and IL10 were associated with both CLAD development and death while IL6, S100A8 and pentraxin3 were only associated with death ($P<0.05$ for all).

Conclusion: A focused BAL protein signature in clinically stable patients with ungradable TBB, early post-transplant, may be informative in determining increased risk for worse outcome and may benefit from a more aggressive management strategy.

Lung transplantation for artificial stone silicosis, report of 35 patients

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Background: Silicosis is a progressive, fibrotic, occupational lung disease resulting from inhalation of respirable crystalline silica. Lung transplantation (LT) has been performed for end stage silicosis. An outbreak of artificial stone silicosis in Israel leads to 35 patients who underwent LT. The aim of this study is to present our experience with LT for patients with artificial stone silicosis.

Methods: We retrospectively reviewed the files of patients who had LT for silicosis in the Rabin Medical Center between March 2006 and September 2021. We compiled all available demographic and clinical data until September 2021. Follow-up was complete in all patients.

Results: 703 LT were performed in the study period at the Rabin Medical Center, among them 35 patients with silicosis (5%). All patients were men with mean age 52±9 years. Single lung transplantation was performed in 23 patients (76%). Mean follow-up was 51.3±44.9 months. Overall survival rates at 1, 3 and 5 years after transplantation were 80%, 69% and 60%, respectively.

Conclusions: Artificial stone silicosis outbreak in Israel presents a challenge with an increase in the number of patients with severe silicosis who required LT. LT offers an effective therapy for patients with end-stage silicosis with an acceptable outcome.

Outcomes in Patients Bridged to HeartMate 3 LVAD Using VA-ECMO

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Purpose: Implantation of short-term mechanical circulatory support (MCS) devices as a bridge-to-decision has been gaining popularity. However, outcomes using ECMO as a bridge to left ventricular assist device (LVAD) implantation have not been well studied. The aim of this study was to analyze our single center experience with patients who underwent ECMO support as a bridge to HeartMate 3 (HM 3) LVADs.

Methods: From January 2016 through February 2021, 120 patients with chronic heart failure underwent implantation of a HM3 LVAD. we studied 28 Patients bridged with ECMO regarding pre-operative demographics, incidence of post-operative complications, and long-term survival and In addition, we compared them to our patients who underwent an implantation of HM3 LVAD without an ECMO bridge.

Results: 28 patients underwent HM 3 LVAD implantation from ECMO bridging. Mean age was 59± 14 years and mean ejection fraction was 14 ± 8%.

Survival at 30 days, 6 months and a year was 82%, 53% and 44% respectively.

The incidence of bleeding requiring re-exploration, stroke, and RV failure were 37%, 15%, and 0% respectively.

When comparing the ECMO group to the elective LVAD group, the ECMO group had a lower Ejection Fraction (14±8% vs. 18±7%, p<0.015) and were in a worse metabolic status with lower albumin, hemoglobin and higher urea respectively (2.8±0.7 vs. 3.8±0.5, p<0.001; 8.9±0.5 vs. 12.3±1.3, p<0.010; 135±35 vs. 75±47, p<0.079).

Postoperative, in the ECMO group there were more incidence of bleeding requiring re-exploration, stroke and the need of tracheostomy respectively (35.3% vs. 13%, p<0.001; 17.6% vs. 7%, p<0.152; 64.7% vs. 7%, p<0.001). Time of ICU hours, ventilation time and Hospitalization days were higher in the ECMO group respectively (641±280 vs. 141±206, p<0.001; 496±238 vs. 72±174, p<0.001; 48±29 vs. 21±25, p<0.001).

Conclusions: For patients bridged to LVAD using ECMO, there is a high morbidity and mortality in the immediate postoperative period. However, these patients have close to 100% mortality without LVAD. Therefore, this strategy of stabilizing an INTERMACS 1 patient with ECMO and then proceeding to LVAD implantation is warranted. More research is required to determine the optimal timing for transitioning from ECMO to LVAD.

Sarcopenia as an indicator of negative outcomes in kidney transplant patients

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Purpose: Preoperative risk assessment for kidney transplantation is largely subjective. Better measures of kidney transplant risk stratification are needed. Sarcopenia (muscle loss) has been explored as an objective measure for patient frailty in high morbidity procedures such as liver transplantation. Our study investigated the impact of sarcopenia on patients undergoing kidney transplantation. The goal was to explore whether differences in muscle loss groups can predict different outcomes post-transplantation.

Methods: A retrospective analysis was performed. Our study population included 97 kidney transplant recipients with preoperative non-contrast CT scan. Sarcopenia was assessed by measuring total psoas area (TPA) and Hounsfield unit (HU) average at the L3 vertebral level. The measurement was performed manually by the same radiologist using the PACS area drawing tool, measuring both right and left psoas muscles.

Results: The median age at transplantation was 56.6 years (range 22.1-77.8), and most patients were male (64, 66%). The lowest TPA quartile (sarcopenia) was significantly related to older age (OR=1.2 (IQR 1.01-1.44), p=0.03) and male gender (1.9 (1.3-2.9) p=0.03), while negatively associated with higher BMI (0.63 (0.39-0.99) p=0.03).

The lowest HU quartile (sarcopenia) was significantly associated with older age (1.34 (1.06-1.67) p=0.02), and pre-transplantation diabetes (1.98 (1.2-3.1) p=0.04). lowest TPA and HU quartiles were associated with an increased risk of death following transplantation (p=0.05, 0.03 respectively). Lowest HU quartile was significantly associated with inferior kidney graft function as measured by serum creatinine on last day of follow up compared with other quartiles (2.3±1.9 vs 1.4 ±1.0 mg/dl, p=0.043, respectively).

Conclusion: Our study showed that TPA and HU are significant parameters of sarcopenia that can help identify patients at risk before kidney transplantation. Identifying objective measures of preoperative risk is important for improving the care of kidney transplant patients. These findings can aid in predicting post-transplant outcomes and assist in clinical decision making.

The role of angiography in the management of vascular complication following kidney transplantation

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Kidney transplantation is the treatment of choice for end-stage renal disease. Vascular complications may have devastating results. There is an important role for angiography in the diagnosis and treatment of vascular complications. Here in, we share our experience in angiographic intervention following Kidney transplantation:

Material and Methods: A retrospective study of patients who underwent kidney transplantation and subsequent angiography from January 2018 until February 2021 were analyzed. All demographic data, indication for transplantation, pre and post angiography blood test and duplex ultrasound and angiographic findings and treatment were recorded.

Results: A total of 19 patients had an angiography following Kidney transplantation. The mean age was 48.3, 16 males, 17 patients had an arterial angiography and only two patients had a venography.

Eight procedure were non-therapeutics. Seven patients had PTA and two had stents to the artery, one had stent to the renal vein and one had a thrombolysis to the renal vein.

Of those who had an intervention during the angiography, seven was a live donor kidney transplantation. The pre- angiography duplex were suspicious for a vascular stenosis in five patients. Creatinine level has improved in nine patients following the procedure.

Conclusion: There is a remarkable role for angiographic intervention both in the diagnosis and in treatment of vascular complications following kidney transplantation.

Abstracts Session 3
Kidneys

Post-Transplant HUS is associated with other risk factors besides exposure to Calcineurin inhibitors

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Background: Renal transplanted patients are thought to be more vulnerable to the development of HUS than the general population mainly because of the use of Calcineurin inhibitors (CNI). These drugs were found to be associated with HUS based on retrospective data analysis, and extensive laboratory studies demonstrating their multiple thrombotic effects. Nevertheless the incidence of post-transplant HUS (PT-HUS) is rare, although the use of CNI in renal transplanted patients is very extensive. Therefore, it is reasonable to assume that there are other risk factors that contribute to the development of PT-HUS.

Risk factors such as infections, complement gene mutations, antibodies directed against complement components, primary complement associated renal disease, and acute humoral rejection have all been reported to contribute to development of PT-HUS, but their relative impact on PT-HUS development is unknown.

Methods: We studied the impact of these risk factors, including complement gene analysis and anti-factor H and I antibodies, in a cohort of 13 renal transplanted patients that fulfilled criteria for HUS.

Results: Three cases of PT-HUS were found to be associated with infections, and 2 were associated with acute humoral rejection. The original renal disease was complement associated in 4 patients. Five out of 10 patients were positive for gene

mutations, 1 patient had antibodies against factor H and another one had antibodies against factor I.
Eleven of the 13 patients (85%) had at least one additional risk factor.
Conclusion: This shows that in most patients, PT-HUS is associated with at least one other risk factor, on top of exposure to CNI.

Autoimmunity to factor H and factor I in post-transplant hemolytic uremic syndrome

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Background: IgG, IgM, and IgA autoantibodies against alternative complement pathway components have been described in association with HUS, and are thought to enhance the action of the alternative complement system, and to be pathogenic. However, evidence from several autoimmune diseases showed that autoantibodies, especially of the IgM subtype, are not necessarily pathogenic and can even be protective.

Methods: We studied IgG, IgM, and IgA autoantibodies directed to factor H (FH) and factor I (FI) in 9 patients with post-transplant HUS (PT-HUS), 11 renal transplanted patients without PT-HUS and 10 healthy controls.

Results: One patient had high IgG reactivity against FH and another patient had high IgA reactivity against FI. Both of them were positive for a monoclonal peak detected by immunofixation, suggesting that these reactivities were a result of a plasma cell dyscrasia. All other subjects had very low or no IgG and IgA reactivities to FH or FI. In contrast, significant IgM reactivities were found in most of the subjects in the 3 study groups, differed between subjects, and were not associated with disease. The fact that both healthy subjects and transplanted patients without PT-HUS exhibited IgM reactivities against FH or FI suggests that these reactivities are not pathogenic but rather have an immunomodulatory function.

Discussion: These findings propose that normally, the immune system precludes formation of IgG and IgA autoantibodies to FH and FI, and when this is disrupted,

disease may evolve. In this context, IgM antibodies may perhaps have a protective role by competitively inhibiting pathologic IgG or IgA binding to FH and FI, or by down regulating autoreactive B cells producing IgG or IgA anti-FH or FI antibodies. Interestingly, the patient with high IgA autoreactivity was the only subject in the whole cohort that was negative for IgM antibodies directed to FH and FI. We therefore speculate that this anti-FI high IgA reactivity and low IgM reactivity contributed to disease development in this patient.

Robotic-assisted kidney transplantation - Implementation and initial experience at Beilinson Transplant Center

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Introduction: Robotic-assisted kidney transplantation (RAKT) has brought the benefits of minimally invasive surgery to the field of renal transplantation. The robotic platform overcomes some of the major limitations of the laparoscopic approach facilitating complex surgical procedures such as kidney transplantation with non-inferior or improved outcomes, particularly in obese patients.
In this paper we describe the implementation of the RAKT program, donor and recipient selection, our unique surgical technique, and analyze early results
Material and Methods: This is a retrospective study of all RAKTs performed at our center between September 2020 and August 2021. For our initial experience and learning curve we selected non-obese end-stage renal disease patients, with no significant iliac vessels atherosclerosis, and living donor left kidney grafts with single artery.
Results: During the study period 9 patients underwent living donor RAKTs. One case required conversion to open surgery. Mean recipients age was 41.5 years (29-65 years) and 8 were males (89%). Mean body mass index (BMI) was 26.1 Kg/m2 (24-28.9 Kg/m2). Mean operative time was 265 minutes (220-310) and mean warm ischemia time (WIT) was 51 minutes (45-70). No major intraoperative complications occurred and there was no graft loss. All patients had immediate graft function with only one case of delayed graft function (DGF) due to hyperkalemia. One patient was treated empirically for suspected acute rejection with good response. Mean length of hospital stay was 8.25 days (7-10) and all patients were discharged with good renal function. With a mean follow-up time of 8.3 months (3-13 months) all patients have good graft function and RAKT graft survival is 100%.
Conclusions: The robotic approach is a minimally invasive method for kidney transplantation, yielding good results, comparable to the traditional open approach. With further experience RAKT may be an attractive option for patients, particularly obese, necessitating renal transplant.

The reasons why potential kidney donors do not complete the procedure, a comparison between related and non-related potential donors

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רקע:

תורמי כליה עוברים הליך הערכה קפדני על מנת לאתר את התורמים הבריאים ביותר ובעלי הסיכון הנמוך ביותר לפתח תחלואה עתידית הקשורה לתרומת הכליה. אחוז ניכר מהמועמדים לתרומה לא יסיימו את התהליך ולא יתרמו כליה מסיבות מגוונות רפואיות ואישיות.

בעבודה זו השווינו בין מועמדים לתרומת כליה שלא השלימו את תהליך התרומה לאלו שהשלימו את התהליך ותרמו כליה, ובדקנו האם יש הבדל בין אוכלוסיית המועמדים האלטרואיסטים למועמדים המקורבים למקבל.

שיטות: המחקר הוא מחקר תצפיתי, הנתונים נאספו ממאגר נתונים ממוחשב פרוספקטיבי ומגיליון המטופלים שעברו הערכה במרפאת התורמים במרכז השתלות בשיבא.

בוצעה השוואה חד משתנית בין מועמדים אלטרואיסטים למועמדים מקורבים: 1-בסיכוי להשלים את התהליך ולתרום כליה. 2-בסיבות שהביאו לאי השלמת התהליך.

תוצאות: מיוני 2019 - ספטמבר 2021 השלימו הערכה 264 מועמדים. 116 תורמים השלימו את התהליך ותרמו כליה, 148 תורמים נפסלו.

בקבוצת הפסולים - 80 (54.1%) אלטרואיסטים, 60 (40.5%) מקורבים ו-8 (5.4%) שעבורם הנתון לא צוין.

בקבוצת התורמים - 28 (70.6%) אלטרואיסטים, 33 (28.6%) מקורבים ו-1 (0.8%) שעבורו הנתון לא צוין.

מתוך 162 אלטרואיסטים 82 (50.6%) השלימו את התהליך לעומת 33 (35.4%) מתוך 93 מקורבים (Pv < 0.02).

הסיבות לפסילה מצוינות בטבלה הבאה:

סיבת אי סיום התהליך	אלטרואיסטים 80 (%)	מקורבים 60 (%)	אחוז סה"כ
מחלה כלייתית	15 (18%)	9 (15%)	20%
יתר לחץ דם	10 (12.5%)	1 (1.6%)	9.1%
סיבה מטבולית	13 (16.2%)	9 (15%)	18.3%
עודף משקל	4 (5%)	4 (6.6%)	6.6%
עישון	5 (6.2%)	6 (10%)	9.1%
הפסקת תהליך מסיבה שאינה רפואית	21 (26.2%)	17 (28.3%)	31.6%
אחר	10 (12.5%)	12 (20%)	18.3%

דיון: על פי הנתונים למועמד אלטרואיסט יש פי 1.6 יותר סיכוי להשלים את התהליך ולבצע תרומה לעומת מועמד מקורב. ההסבר אפשרי יכול להיות גיל התורמים האלטרואיסטים שהוא נמוך משמעותית (ממוצע 41ש' לעומת 46.2ש' בתורמים מקורבים- Pv<0.01) ולכן הסיכוי להציג תחלואת רקע משמעותית שתביא לפסילה הוא נמוך יותר. הסבר נוסף יכול להיות העובדה שמרבית התורמים האלטרואיסטים מופנים מעמותה שכבר עושה סקר ראשוני ומסננת תורמים שיפסלו לבטח.
עוד עולה מהנתונים כי אין הבדל בין אלטרואיסטים למקורבים בגורמים לאי סיום התהליך (מלבד יתר לחץ דם).

C3 Glomerulopathy recurrence after kidney transplantation

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Background: C3 Glomerulopathy (C3G) has been has been re classified as a glomerular complement mediated disease, with predominant C3 deposits almost a decade ago. Mutations and risk haplotypes in several complement system components have been described causing C3G, mainly in CFH, CFHRs, CFI, MCP, CFB and C3. Circulating autoantibodies result the loss of control of the alternative pathway has also been described in patients with C3G, mainly C3 Nephritic factor, C5 Nephritic factor and also anti CFB and anti C3b and C4 Nephritic factor.
Clinical presentation can range from incidental finding of mild proteinuria and microscopic hematuria up to severe rapidly progressive glomerulonephritis reaching end stage kidney disease requiring dialysis and kidney transplantation.
High incidence of disease recurrence after transplantation is reported – between 30 and 77%, including graft failure due to recurrence in 17–50% of cases. Modalities of preventing and treating C3G recurrence after kidney transplantation include – plasma exchange, Rithuximab, Eculizumab with various reports regarding success.
The aim of our study was to retrospectively describe our cohort of C3G transplanted patients, including treatment modalities and outcomes.
Methods: retrospective cohort study, data regarding patients diagnosed with C3G and underwent kidney transplantation between 2010–2021 was collected including treatment modalities and outcomes after kidney transplantation.
Results: our cohort exhibited high incidence of disease recurrence, 3 patients improved after Eculizumab treatment, one patient reached end stage kidney disease 9 months after transplantation despite treatment with Eculizumab, one patient showed histologic signs of disease recurrence without clinical signs.
Conclusions: C3G recurrence rate after kidney transplantation in our cohort was higher than described in the literature, treatment was successful only in part of the patients, new treatments for the complement alternative pathway are needed in order to safely transplant C3G patients and avoid disease recurrence.

Serological response to the BNT162b2 COVID-19 mRNA vaccine in adolescent and young adult kidney transplant recipients

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Background: Initial reports in adult kidney transplant recipients (KTR) indicate low immunogenicity after 2 doses of the BNT162b2 COVID-19 mRNA vaccine. We describe the immunogenicity of this vaccine compared to the serologic response in naturally infected COVID-19 positive adolescent and young adult KTR.
Methods: For this prospective observational study, the study group included 38 KTR who received 2 doses of the tested vaccine; the control group included 14 KTR who had a previous polymerase chain reaction-confirmed COVID-19 infection.
Results: The mean age was 18 ± 3 y. Positive serologic responses were observed in 63% and 100% of the study and control groups, respectively (P = 0.01). Antibody titers were almost 30-fold higher in the control than the study group (median, interquartile range [IQR]: 2782 [1908-11 000] versus 100.3 [4.7-1744] U/mL, P < 0.001), despite the longer time from the COVID-19 infection to serologic testing compared to time from vaccination (median [IQR]: 157.5 [60-216] versus 37 [20.5-53] d, P = 0.011). Among vaccinated patients, higher proportions of those seronegative than seropositive were previously treated with rituximab (50% versus 8%, P = 0.01). Time from the second vaccine dose to serologic testing was longer in seropositive than seronegative patients (median [IQR]: 24.5 [15-40] versus 46 [27-56] d, P = 0.05). No patient developed symptomatic COVID-19 disease postvaccination.
Conclusions: The BNT162b2 COVID-19 mRNA vaccine yielded higher positive antibody response in adolescent and young adult KTR than previously reported for adult KTR. Antibody titers after vaccination were significantly lower than following COVID-19 infection. Longer time may be required to mount appropriate humoral immunity to vaccination in KTR.

Bortezomib as first line treatment of early antibody mediated rejection – The Jerusalem Experience

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Background: Antibody-mediated rejection (ABMR) is now considered the most common cause of allograft failure after kidney transplantation. ABMR is classified as active or chronic. Active early ABMR may be a devastating condition leading to graft loss. Despite the severe clinical implications of ABMR, there are limited therapeutic options, no formally approved treatments and no consensus guidelines for therapy. Bortezomib is a proteasome inhibitor approved for the treatment of multiple myeloma. It directly targets antibody-producing plasma cells making it an attractive candidate for the treatment of active ABMR. There are numerous reports of the use of this agent, mostly in chronic ABMR. To date it is considered a second line treatment for refractory early ABMR. There is only one case series published recently describing its role as a first line option in acute early ABMR.
We wish to describe our center experience with the use of Bortezomib as first line treatment is very early acute ABMR.
Methods: During 2018-2019 we treated four patients with very early acute ABMR with Bortezomib in addition to plasmapheresis, IVIg and high dose steroids. Three of the patients were female, two underwent a cadaveric Kidney transplantation, only one patient had pre-formed donor specific antibodies before transplant, in a low MFI. All four patients responded to treatment and regained good graft function. Unfortunately, one patient subsequently experienced chronic ABMR and lost her graft. We will describe our protocol, patients' clinical course, outcome during follow-up (18-36 months after transplantation) We will try to point out the advantages of this approach.
Conclusions: In our center the use of Bortezomib as a first line agent in early acute ABMR was efficacious and safe. Given the scares data published – peer discussion of this option is crucial.

Is MAG3 Kidney Scan as Efficient and Specific as Kidney Biopsy in Kidney Transplant Patients?

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Introduction: The Tc-99m mercaptoacetyltriglycin (MAG3) nephrography is used to evaluate the renal function. In transplant patients, the use of this method can help distinguish acute tubular necrosis (ATN) from acute rejection (AR) or other causes of obstruction. However, there is still a wide use of kidney biopsies to accurately identify the cause of the problem. The disadvantage of kidney biopsy is its invasive nature, which might cause bleeding and infections. While the use of ultrasound (US) is effective to evaluate anatomical problems, it cannot evaluate renal function. In this assay we compared the results from the renal nephrography and renal biopsies done to kidney transplant patients.

Methods: The Hadassah data base was scanned for kidney transplant patient who underwent MAG3 scan in the years 2020-2021. The inclusion criteria were renal transplant surgery during 2020-2021, and undergoing MAG3 scan within these years. As all the patients identified were over 18 years of age, there were no exclusion criteria.

Results: A total of 20 patients were identified with average age of the patients was 55.1±15.4 years. Sixteen patients were males. Eleven patients underwent transplantation from a living donor, 6 from DBD donors, and 3 from DCD donors. Only 9/20 (45%) patients underwent kidney biopsy following the MAG3 scan. Of the 20 patients, 10 had MAG3 scan compatible with ATN, 5 with normal scan, 4 with AR, and 1 with renal obstruction. The biopsies showed 4 patients with ATN, 3 with AR (cellular acute rejection), and 2 with normal biopsy. Seventeen patients underwent US-duplex of the transplanted kidney, within 10 days from the MAG3 scan. All demonstrated normal arterial and venous flow, with average maximal resistance index (RI) of 73.4±11.3. Of these patients, 13 had normal graft function without the need of any intervention.

Conclusions: The use of MAG3 scans for patients who underwent kidney transplantation had shown to be accurate and effective. However, the use of kidney biopsy is not completely redundant and can still supply with different answer, which can affect the treatment and the general outcome of the transplantation.

Reconstruction of Multiple Arteries in Kidney Transplantation

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Background: Anatomical anomalies in a kidney graft, such as multiple renal arteries (MRA), may represent a challenge for a surgeon and appear to be a risk factor for vascular complications. Due to the increament in donated organs the criterias for living donor grafts has expanded to include the use of kidneys with MRA. This article reviews the techniques use for arterial reconstruction in cases of kidney transplantation (KT) with MRA and aims to determine whether the use of a kidney with MRA could impair the outcome of the allograft.

Methods: A retrospective analysis of all cases with MRA kidneys that were transplanted between January 2015 and December 2020. A review of the surgical techniques along with graft function and post-operative vascular complications and interventions were done.

Results: During a period of five years twenty eight patients received kidney grafts with two arteries. Laparoscopic nephrectomy and out-of-body vascular reconstruction was performed in all the donors. The reconstruction technique "Pantaloon" was performed in 4 patients, in 7 cases an enlogation of the two arteries with a safena vein was done, an end-to-side anastomosis was performed in 4 cases, a "Carrel patch" was done in 4 patients and in 9 cases the second artery was sacrifice. The median length of hospital stay were 13 days. A surveillance of creatinine levels until day 180 after the KT demostrated a succesfully reduction until a median of 1.39mg/dl . An US duplex was done on the first day and a month after the KT presenting an RI range between 0.61-0.67%. There was no need to perform an angiography in neither of the cases.

Conclusion: Complications in the allograft were rarely seen, leading to a succesfull KT. The presentation of a kidney graft with more than one artery should not be consider as a contraindication to perform a KT, eventhough it can be challenging, it should be consider a good and safe option according to it's success

Results: Between May 2018 and July 2021, 6 adult patients (male/female 4/2) with ESRD underwent combined kidney and bone marrow transplantation from HLA-matched sibling donors (male/female 2/4). Median age was 36 (range, 27 to 45) years. The etiology of kidney failure was IGA nephropathy, diabetes, malignant hypertension, Alport syndrome, reflux and idiopathic ESRD.

Donor hematopoietic stem cells were collected 3 to 6 weeks before kidney transplantation and cryopreserved. The preparatory regimen was well tolerated by all patients. Median time from transplantation to last follow up is 15 (range, 3 to 42) months. All 6 recipients achieved mixed donor chimerism that was maintained until last follow up. None of the recipients experienced clinical kidney rejection or graft-versus-host disease. Three patients discontinued IS 9, 8 and 11 months after transplantation and a fourth patients is expected to discontinue IS within a month. Time from IS discontinuation to last follow up is 33, 13 and 4 months, respectively. **Conclusion:** Combined kidney and hematopoietic cell transplantation for tolerance induction between HLA matched sibling donor-recipient pairs is safe and applicable. We intend to expand our program to haploidentical donor-recipient pairs.

Clinical outcomes associated with induction regimens for kidney transplantation among children in north America

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Background: There are limited studies available which compare induction (IND) agents in pediatric kidney transplants (KTx), and IND is often guided by local practice more so than specific outcome data. We evaluated how different agents affected outcomes in children enrolled in both the North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS) registry and the Pediatric Health Information System (PHIS).

Methods: Retrospective study of merged data from NAPRTCS and PHIS between 1999–2019. Participants grouped by IND: IL2 RB, ATG and alemtuzumab. Estimated GFR (eGFR) was calculated with adjustments for age, diagnosis, repeat KTx status, delayed graft function, and rejection. Subgroup analysis evaluated rejection rates and infectious complications between 2010–2019. Outcomes were compared using chi-square or Kruskal-Wallis tests. Length of stay (LOS) for KTx procedure, index hospitalization cost (IHC) and 1-year post-KTx costs were analyzed.

Results: 2410 KTx recipients with data in both datasets were identified. 340 subjects (14.1%) received no IND, 960 (39.8%) IL2 RB only, 934 (39.1%) ATG/ALG, and 176 (7.3%) alemtuzumab. Index hospitalization cost was lower in the alemtuzumab $82,642 ($70,604, $100,513) compared with IL2RB or ATG ($115,417 ($83,689, $151,863) and $108,147 ($77,769, $168,807) respectively. Table 1 reports eGFR decline using ratios obtained by dividing year's eGFR by the preceding year. Annual decline in eGFR was slower in the ATG group and higher among children transplanted between ages 0–4 years. Table 2 summarizes rejection frequency and infectious complications. Alemtuzumab had lower rates of rejection and BK viremia compared to IL2RB and ATG.

Conclusions: Longitudinal decline in eGFR was similar across all agents, though decline with ATG was lowest. Although rejection and BK viremia was lowest with alemtuzumab, there was no difference with EBV or CMV infection or post-KTx malignancy with limited data regarding these complications. Despite a longer LOS with alemtuzumab, IHC were lower with alemtuzumab for both DDKT and LDKT.

Table 1: Annual change in eGFR

	Ratio (95% CI)	**p-value**
Overall (per year)	0.941 [0.934,0.948]	**<0.001**
Induction Rx		
IL 2	0.936 [0.925,0.947]	
ATG/ALG	0.956 [0.945,0.966]	
Alemtuzumab	0.932 [0.918,0.947]	**0.009**
Age at KTx (yrs.)		
0-4	0.908 [0.896,0.921]	
5-9	0.948 [0.932,0.963]	
10-14	0.955 [0.942,0.968]	
15-17	0.957 [0.941,0.973]	
18+	0.983 [0.950,1.018]	**<0.001**

Table 2: Complications and infections by induction therapy between 2009-2019 rates

Variable	Total	IL2	ATG/ALG	Alemtuzumab	p-value
N, Transplants	830	260 (31.3%)	419 (50.5%)	151 (18.2%)	
Rejection					
No	635 (76.5)	189 (72.7)	316 (75.4)	130 (86.1)	0.006
Yes	195 (23.5)	71 (27.3)	103 (24.6)	21 (13.9)	
Days to first rejection, Median (IQR)	377 (177,771)	420 (193,928)	384 (178,754)	211 (116,504)	0.097
BK Viremia					
No	758 (91.3)	234 (90.0)	377 (90.0)	147 (97.4)	0.015
Yes	72 (8.7)	26 (10.0)	42 (10.0)	4 (2.6)	
Days to first BK Viremia, Median (IQR)	530 (181,1086)	733 (342,1924)	373 (178,1030)	538 (352,755)	0.479
Days to first CMV Viremia Median (IQR)	376 (340,781)	432 (340,869)	370 (343,732)	382 (37,781)	0.903
Days to first EBV Viremia Median (IQR)	750 (363,1643)	1354 (545,2253)	747 (356,1500)	522 (210,1006)	0.123
Malignancy					
No	823 (99.2)	259 (99.6)	416 (99.3)	148 (98.0)	0.213
Yes	7 (0.8)	1 (0.4)	3 (0.7)	3 (2.0)	

Nephrotic syndrome recurrence post-renal transplantation: 10 years' experience at Schneider Children's medical center of Israel

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Introduction: 30-50% of pediatric patients presenting with steroid resistant nephrotic syndrome (SRNS) will reach end stage renal disease (ESRD). In patients with primary SRNS the risk of post-transplant recurrence is around 60% with poor graft outcomes. In the past decade new treatment modalities have emerged to improve graft outcomes. The aim of this study is to describe the clinical experience at Schneider's Children Medical Center of Israel in treating children with post-transplant SRNS in the past decade, and compare its results to a similar study done at the same center in previous years.

Methods: Retrospective chart review. Data regarding demographic characteristics, clinical course and treatment modalities of patients with post-transplant recurrent SRNS were extracted from patients' charts.

Results: 8 patients with post-transplant recurrent SRNS were identified. Median age at initial nephrotic syndrome presentation was 4 (range: 0.8-15) years. Median time to reach ESRD was 43 (range: 12-132) months. All patients were treated with plasmapheresis, seven patients were treated with Rituximab. LDL apheresis, Ofatumumab and Abatacept were used in 1-2 patients each. Median follow-up time post-transplant was 47 (range: 15-93) months. Four patients (50%) responded to treatment, two achieved complete and two partial remission. Four patients reached ESRD within a median time of 24 (range: 12-84) months. Lower rates of acute tubular necrosis and immediate graft loss were observed during the last decade compared to previous years (37.5% vs. 64%; 0% vs. 28.6% respectively).

Discussion and Conclusion: Post-transplant recurrence of SRNS continue to pose a significant treatment challenge. Similar to previous reports, only 50% of our patients responded to treatment while 50% were unresponsive to all treatment modalities and reached ESRD. Immediate post-operative management improved over the last decade, however long- term outcome continues to be grim. There is a need to better identify disease mechanisms that will allow us to tailor more effective treatment modalities to improve patients' outcome.

Combined kidney and hematopoietic cell transplantation for tolerance induction between HLA matched sibling donor-recipient pairs

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Introduction: Recipients of kidney transplants require the lifelong use of immunosuppressive (IS) drugs to prevent graft rejection. These drugs are associated with cumulative side effects, including increased risks of heart disease, infection, cancer, and diabetes. Despite maintenance immunosuppression, chronic rejection results in gradual long-term graft loss. Eliminating the lifelong need for immunosuppressive medications without rejection remains an elusive goal. Recent reports of successful tolerance induction protocols in humans with living donors have been based on transient or persistent chimerism that develops after the infusion of donor hematopoietic progenitor cells. We aimed to determine whether tolerance could be induced in fully HLA matched kidney and hematopoietic cell transplant patients, based on the Stanford protocol, such that IS drugs could be withdrawn safely without kidney graft loss.

Methods: In the current phase 2 study, patients who received kidney transplants from HLA-matched siblings, were given a conditioning regimen comprising of 10 doses of total lymphoid irradiation (120 cGy) targeted to the lymph nodes, spleen, and thymus, and 5 doses of rATG (Thymoglobulin, total dose 7.5 mg/kg) during the first 10 days after kidney transplantation. Highly enriched donor CD34+ stem cells (10×106 per kilogram of body weight) and a defined dose of T cells (1×106 per kilogram) were injected intravenously on day 11. All patients received mycophenolate mofetil (2 g per day after cell infusion) for 1 month and tacrolimus for at least 6 months. Tacrolimus dose was gradually tapered off starting from 6 months from transplant until complete discontinuation as long as donor chimerism persisted for at least 6 months and there was no evidence of graft-versus-host disease or clinical rejection.

E-POSTERS

Organ Transplantation: History, MFI and in-between. One Center Experience

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Background: It is well accepted in renal transplantation that donor-specific antibodies (DSA) directed against the donor's human leukocyte antigen (HLA) associate with graft loss. Different transplantation centers rely on various methods to detect such DSA, before and after transplantations.

Methods: Herein, we present our experience in identifying DSA. Between the years 2016-2020, we evaluated 447 adult patients awaiting kidney transplantation and 254 patients post-transplantation.

Results: Our findings demonstrate that female patients are more sensitized compared to male patients (76.9% vs 47.8% respectively), probably due to previous pregnancies. HLA antibody detection by single antigen bead (SAB) method showed that female patients also had higher mean fluorescent intensity (MFI) levels. Significantly, evaluation of patients post-transplantation revealed that more females developed de-novo DSA compared to males.

We established that positive complement-depended cytotoxicity (CDC) crossmatch (CM) test result correlates with MFI cut-off level of >3000. Similar MFI values were observed for patients exhibiting DSA that developed antibody mediated rejection (AMR) within 3 months post-transplantation.

Conclusions: Taken together, our data contribute to the evaluation of the immunological risk of sensitized patients before transplantation and to a better clinical management post-transplantation.

Immunogenicity and adverse effect of two dose BNT162b2 mRNA vaccine among liver transplant recipients

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Background: BNT162b2 mRNA vaccine against SARS-CoV-2 has been shown to be safe and effective in immunocompetent subjects. The safety and efficacy of this vaccine in liver transplant (LT) recipients is still under evaluation. The objective of this study was to assess the safety and efficacy of BNT162b2 vaccine among transplant recipients.

Methods: The immune responses of 76 LT recipients receiving two doses of the vaccine were compared to those of 174 age-matched immunocompetent controls. Post-vaccination IgG antibodies against the RBD of SARS-CoV-2 and neutralizing antibodies (NA) to BNT162b2 mRNA vaccine were determined at least 14 days after second dose of vaccine. IgG antibody titers $\geq$1.1 were defined as positive antibody. Side effects were monitored during study period.

Results: Following administration of the second dose, transplant recipients showed reduced immune responses as compared with controls (72%vs.94.2%, p<0.0001). At a median time of 38 days after the second vaccination geometric mean of receptor-binding domain IgG and NA titers were 2.05 (95%CI, 1.6-2.6) and 150.2 (95%CI, 96-234) among transplant recipients and 4.56 (95%CI,4.1-5.1) and 429 (95%CI,350-528) in the control group, respectively p<0.0001. Antibody responses were lower in transplant recipients who were receiving combined immunosuppression therapy and in those with impaired renal function. Among LT recipients with negative antibody response, one became infected with SARS-CoV-2 and none with positive antibody response did. Overall, most (n=39[51%]) side effects self-reported by transplant recipients were mild and occurred more often in women than in men. The immune response did not correlate with more severe side effects.

Conclusion: Compared with immunocompetent patients, LT recipients had lower immune response. The durability of immune response to the BNT162b2 vaccine among LT recipients requires further investigation.

Case report: An unusual cause of nephrotic range proteinuria after kidney transplantation

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This case describes an uncommon cause of nephrotic range proteinuria after kidney transplantation. A kidney transplant patient presented with reduced graft function, nephrotic range proteinuria and bilateral lower leg edema. Following a kidney biopsy that revealed normal glomeruli a course of high dose prednisone for presumed minimal change disease was given resulting in no clinical improvement. Digital subtraction angiography revealed stenosis of the ipsilateral external iliac vein. Angioplasty and stenting was performed with resolution of proteinuria and edema and improvement of kidney function. This case demonstrates that the possibility of venous stenosis should be considered when confronting an unexplained reduced allograft function with proteinuria, especially in the presence of lower extremity edema.

Humoral response to booster dose of SARS-CoV-2 vaccine in kidney transplant recipients

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Background: Recent studies demonstrated that in contrast to immunocompetent individuals, the majority of transplant recipients did not develop an appreciable humoral immune response following two doses of mRNA SARS-CoV-2 vaccine.
Design: We analyzed the humoral response following third dose of BNT162b2 (Pfizer-BioNTech) vaccine in a cohort of 130 kidney transplant recipients, compare to 48 healthcare workers, by determining the level of anti-spike antibodies, as well as associated factors, including pre-vaccine cellular immune response, that was tested in a representative group of a patients, by evaluating intracellular cytokine production following stimulation of donor's peripheral blood mononuclear cells (PBMCs) with a Spike-protein peptide mix.
Results: Following two doses and just before the third dose, most of controls had detectable levels of IgG anti spike antibodies (47/48, 98%) while only 40% (52 of 130) kidney recipients were seropositive ($p<0.001$). Among the study group, most of recipients who were seronegative before the booster, developed a serologic response after the booster (47 out 78, 60%), thus bringing the total number of seropositive recipients to 99 out of 130 (76%, as compared to just 40% after 2 vaccine doses).
Following the third dose, there was a significant increase in antibodies titers in both groups (median=1278 (IQR= 68-7075) vs 28358 (15951-36766) AU/mL for study vs controls, respectively, $p<0.001$).
Decreased humoral response was significantly associated with an older age, lower lymphocyte count, and a lower level of antibodies before booster administration.
CD4+TNFa+ and CD4+INFg+ were correlated with mean increase in antibody titers (correlation coefficient=0.58, $p=0.029$; 0.49, $p=0.07$, respectively).

Conclusions: A booster third dose of the Pfizer-BioNTech BNT162b2 vaccine in kidney recipients is safe, and effectively results in increased IgG anti-S levels, including in transplant recipients who were seronegative after two doses. However, long-term studies of the length of the immune response and protection are required.

Two staged native nephrectomy and kidney transplantation in patients with Autosomal Dominant Polycystic Kidney disease- A single center 10 years experience

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Background: Transplantation candidates with Autosomal Dominant Polycystic kidney disease (ADPKD), may require native nephrectomy due to space restrictions or a symptomatic disease, including bleeding, pain and recurrent infections. To date, there is no consensus regarding timing of nephrectomy- with contradicting data advocating for a simultaneous or for a two staged procedures. Our center's policy is to preform a staged procedure for candidates of living donor transplantation, as well as for candidates of cadaveric transplantation at the top of the waiting list.
Methods: Between January 2011 to December 2020, 105 ADPKD patients underwent kidney transplantation. Of those, 27 patients (26%) underwent pre-transplant or simultaneous native nephrectomy. Data regarding peri-operative course, complications, transplantation and graft function were retrospectively collected.
Results: Our cohort consisted of 19 males (70%) and 8 females (30%). Median age at transplantation was 51 years (30-70 years). Nephrectomy was indicated for space evacuation in 21 (78%), symptomatic disease in 3 (11%), and a combination of symptoms and space considerations in 3 (11%) patient. The hand-assisted laparoscopic technique was used, with only 1 conversion to laparotomy due to bleeding. Three patients (11%) required blood transfusion peri-operatively. Immediate complications included severe infection (1) and hemorrhagic shock (1) with no mortality. Median hospital stay was 5 days (3-23 days). Only 1 patient had decreased urine output post nephrectomy. Six patients (22%) have developed post operative ventral hernia, within 2 years post nephrectomy.
Living donor group consisted of 20 patients (74%), of them 9 were pre-dialysis and were initiated on dialysis 1 day before nephrectomy which continued until transplantation, excluding 1 patient who remained pre-dialytic. Median time to transplant in this group was 2 months (1-8 months). Post transplantation outcome were without significant complications and with good graft function and median Creatinine level of 1.22 mg/dl (0.65-2.74 mg/dl), at discharge.
Conclusions: Two staged native nephrectomy and kidney transplantation approach in patients with ADPKD is safe, with low risk for significant post-nephrectomy complications, good post-transplant patient outcome and good graft function.

BNT162b2 Third Booster Dose increased significantly the humoral response assessed by both RBD IgG and Neutralizing Antibodies in Renal Transplant Recipients

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Background: An impaired humoral response to full dose of BNT162b2 vaccine was observed in renal transplant recipients (RTR).

Methods: To reveal predictors for humoral response to third vaccine, patients were divided to positive (N=85) and negative (N=14) response groups based on receptor-binding domain (RBD) IgG $\geq$ 1.1 and neutralizing antibodies (NA) $\geq$ 16 dilution versus RBD IgG < 1.1 or NA < 16 respectively. NA were detected using a SARS-CoV-2 pseudo-virus.

Results: Response rate increased from 32.3% (32/99) before the third dose to 85.9% (85/99) post- third vaccine with a significant rise in geometric mean titers (GMTs) for RBD IgG and NA [0.79 (95% CI 0.65-0.96) vs. 3.08 (95% CI 2.76-3.45), p < 0.001 and 17.46 (95% CI 12.38-24.62) vs. 362.2 (95% CI 220.7-594.6), p < 0.001 respectively]. 80.6% (54/67) seroconverted and 96.9 % (31/32) remained positive following the vaccine with a significant increase in GMTs for RBD IgG and NA.

Age, ESRD secondary to diabetic nephropathy (DN) and renal allograft function were independent predictors for antibody response in RTR. Mycophenolic acid (MPA) use and dose had no impact on humoral response following the third booster. AEs were recorded for 70.1% of RTR population. Systemic AEs were more common in recipients with a positive humoral response as opposed to non-responders (45.2% versus 15.4% respectively, p=0.04).

Conclusion: 85.9% of RTR develop NA to BNT162b2 third vaccine, found effective in both negative and positive responders prior to the vaccine. Antigenic re-exposure overcame the suppressive effect of MPA on antibody response in RTR.

Possible role for the non-HLA antibody anti-AT1R in kidney rejection - case report

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Up until now, the accepted clinical practice in Israel has been to monitor patients on the waiting lists for solid organ transplants for presence of anti-HLA antibodies (Abs). However, emerging data has suggested that non-HLA Abs play key roles in rejection processes of different solid organs - including kidneys, heart and lung. Non-HLA mediated rejection can be acute or chronic, and can be expressed pre- or post-transplant (Tx). Non-HLA Abs can work in synergy with anti-HLA Abs, however, they can also exert their detrimental effect in the absence of anti-HLA Abs.

In the following case report, we present a 29 year old female with ESRD secondary to ANCA-associated disease and a background of triple positive APLA. Pre-Tx there were no detectable anti-HLA Abs, and the serological cross-match (XM) was negative. Due to her autoimmune background, we also performed a self XM, which was also negative. Following transplant, she developed femoral vein thrombosis managed by full anticoagulation that was complicated by perinephric hemorrhage necessitating blood transfusion and surgical drainage. After discharge at 21 days post-transplant she experienced an abrupt rise of Cr. levels from 1.2 to 2.4mg%. A biopsy done after discontinuation of Clexan showed evidence of grade 2-3 Ab-mediated rejection with strongly positive C4d staining. However, no anti-HLA Abs were detected. In an attempt to indirectly check for Ab presence, we performed XM of patient sera from different dates (pre- and post-Tx) against cells from 6 different potential donors. All XMs were negative. Within another 2 days the patient became anuric and lost her graft despite treatment by plasmapheresis and thymoglobulin.

Since we suspected involvement of non-HLA Abs in this case, we subsequently obtained a kit to test the major non-HLA Ab AT1R (angiotensin II type 1 receptor) which has been shown to be upregulated in autoimmune patients. The targets of this Ab are expressed on endothelial cells and have been implicated in Ab-mediated rejection of solid organs. AT1R Abs are the most frequently reported non-HLA Abs

associated with kidney rejection and adverse allograft outcome. Indeed, we were able to demonstrate that the patient was positive for anti-AT1R.

We suggest that the presence of non-HLA Abs in this case may provide an explanation for the development of acute Ab-mediated rejection in the absence of DSA's. We further speculate that the association of ANCA vasculitis as the primary disease with post-Tx endothelial injury may have exposed endothelial antigens to elicit an aggressive immune response.

Portal vein-variceal anastomosis for portal vein inflow reconstruction in orthotopic liver transplantation

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Portal vein thrombosis (PVT) is a frequent and serious complication in patients with cirrhosis, with a prevalence ranging from 0.6% to 26%.

Patients with cirrhosis presenting with or developing portal vein (PV) and/or mesenteric vein thrombosis while awaiting liver transplantation pose a significant surgical challenge for the reconstruction of the liver portal inflow, an essential step for successful orthotopic liver transplantation (OLT).

While an end-to-end donor to recipient portal vein anastomosis is fashioned in the majority of liver transplant recipients, approximately 2% of recipients will require a complex vascular reconstruction due to inadequate recipient portal vein inflow.

Although PVT has long been considered an absolute contraindication to OLT, it is currently regarded as a relative contraindication, depending on the patient clinical status, type of PVT and collateral venous flow, and the surgeon's experience.

The type of PVT is classified according to the nature of the occlusion (complete vs. partial) and the extension in the portal vein, the venous confluence and its contributories - the superior mesenteric vein (SMV) and the splenic vein (SV).

Whenever the thrombus is removed en-bloc with the liver or through an intraoperative PV thrombectomy, a routine porto-portal anastomosis can still be performed, whereas, for more complex cases of complete occlusion or proximal extension of the thrombus, alternative approaches should be used to redirect the portal venous flow into the graft.

For the reconstruction of the liver portal inflow in complex cases of extensive thrombosis there are 3 main strategies: anatomical, physiological (non-anatomical) and non-physiological.

The portal vein-variceal anastomosis is a challenging physiological non-anatomical technique of portal vein inflow reconstruction used and described rarely. Herein we review the various types of PVT, the portal venous inflow reconstruction techniques and describe an extraordinary case of portal vein-left gastric vein anastomosis in orthotopic liver transplantation.

A 54 year-old male of Ethiopian origin with history of cirrhosis and portal hypertension secondary to schistosomiasis who presented with decompensation and a model of end-stage liver disease (MELD) score of 23 necessitating liver

transplantation. Preoperative imaging revealed an extensive portal and mesenteric vein thrombosis with cavernous transformation and splanchnic varices comprising a large left gastric varix (figure 1). The patient underwent orthotopic liver transplant on April 2021 with piggyback venous outflow reconstruction and a portal vein-left gastric varix anastomosis for portal inflow. During the procedure the left gastric vein (LGV) was carefully dissected cephalad and adequate flow was confirmed prior to creation of end-to-side porto-LGV anastomosis (figure 2). Postoperative Doppler sonography documented patent anastomosis with adequate flow (figure 3), a finding which was confirmed by a contrast abdominal computed tomography performed on postoperative day 16 (figure 4). The patient had a relatively benign postoperative course characterized by mild to moderate ascites, as anticipated, controlled initially with drainage and medical treatment and eventually resolved prior to discharge.

Figure 1, preoperative abdominal computed tomography showing an extensive PV (left figure) and SMV (right) thrombosis.

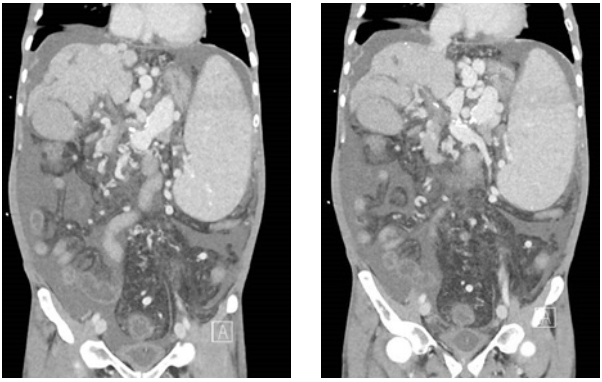


Figure 2, end-to-side portal vein-left gastric vein anastomosis upon completion.

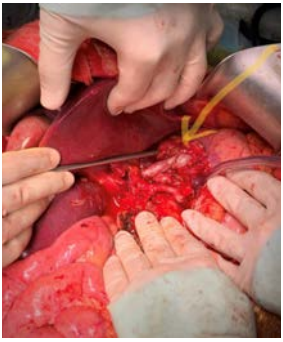


Figure 3, Postoperative Doppler sonography documenting patent anastomosis with adequate flow.

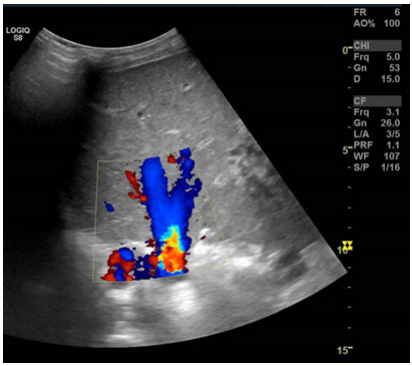
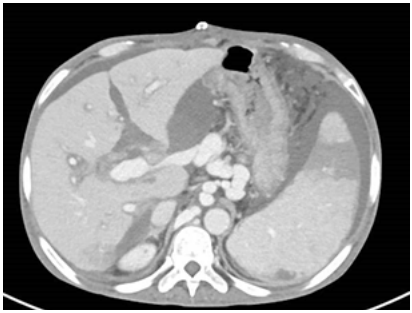


Figure 4, abdominal computed tomography showing patent PV–LGV anastomosis (arrow).



Heart Transplantation in a patient with Persistent Ventricular Fibrillation, RV failure and LVAD – CASE REPORT

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Background: Sustained ventricular tachycardia(VT) and ventricular fibrillation(VF) are life-threatening arrhythmias which remain highly prevalent in patients with advanced heart failure.

Case Summary: We present a54-years-old man supported with aHeartMate3 left ventricular assist device (LVAD) as a bridge to transplantation due to ischemic cardiomyopathy ,who developed recalcitrant right-sided heart failure and persistent VF with unsuccessful defibrillator shocks. Although the patient remained stable on the ventricular arrhythmia with no progression to asystole, by the third week of VF he collapsed hemodynamically.

His management was challenging and demanded an emergency parallel mechanical circulatory support with extracorporeal mechanical oxygenator (ECMO) concomitant with the LVAD. After 3 long weeks on the high urgency waiting list on continuous VF, supported with combined ECMO and LVAD, the patient underwent successful heart transplantation and was discharged home two weeks later.

Discussion: LVAD patients may tolerate life-threatening ventricular arrhythmias for certain period of time as the device supports their native cardiac function. When the ventricular arrhythmia is combined with RV failure, the case becomes more challenging with the need for further mechanical circulatory support with the inherent complex interplaying hemodynamics.

A New Era at Sheba Transplant Unit

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Background: In 2016 Sheba medical center received the Ministry of Health approval to renew its kidney transplant (KT) activity, after a more than a decade of being inactive. Since 2019 transplantion rate was significantly increased. We aim to summarize the results of our transplant program during this current era.

Methods: We performed a retrospective review of data collected from electronic files and patient records between June 2019 and September 2021. During this time period, 141 kidney transplants were performed. Two exchange cases, 2 double kidney transplants and one kidney-pancreas transplant were perforemed. The following parameters were reviewed: patient demographics, primary kidney disease, dialysis status, transplant number, donor type and comorbidities. Primary outcome was patient and graft survival rates and secondary outcomes included rejection rate, complication rate, agraft function at last follow-up and readmission rate.

Results: Median follow-up was one year (range 0.8 -28 months). Patients' age was 53.5 years -/+ 14.55 (21-84 years). Donor age was 49 -/+ 13.5 (18-83 years). Most transplants were from live donors (81.6%). The vast majority (91.5%) were first transplant. Seven, 4, and 1% were second, third and fourth re-transplantation, respectively. The most frequent primary disease cause of end-stage renal disease were diabetic nephropathy (21.3%), glomerulonephritis and lupus nephritis (19.9%), PCKD (13%), and chronic hypertension/nephrosclerosis (10.6%) and other diseases and. Most patients (79.4%) were on dialysis prior to transplant.

Patient survival was 97% for the first and second year. Two patients died during follow-up, one from CVA as complication of H1N1 infection (3 month after transplant) and one from sepsis (5.3 month after transplant). Graft survival was 94.6%. Three cases of graft non-function, one humeral rejection, one due to cardiogenic shock.

Rejection rate was 9.9%. Thirteen cases due to (ATCR) acute cellular rejection (ACR), two antibody mediated rejection (ABR), & 3 borderline rejection. Only one patient lost the graft for ABMR 7 weeks post-transplant, while the others responded well

to anti-rejection treatment. Post-operative complications occurred in 24% of patients, including infections in 22%, and cardiac, vascular and bleeding in 11% each. Readmission was required in 21.3% of cases. Average creatinine level at last follow-up was 1.33 +/- 0.52mg%

Conclusion: The new transplantation center at Sheba medical center provides an improved medical service before and after transplant by lowering the workload and proving favorable outcome results.

Presentation and outcomes of patients post kidney transplantation hospitalized in the diabetic foot unit

קובי גורין

מתמחה, רפואה פנימית, בי"ח הדסה עין כרם, ירושלים

מדריכים:

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מבוא: חולי סוכרת הסובלים מכיב סוכרתי הינם בעלי פרוגנוזה עגומה, בהשוואה לאלו אשר לא פיתחו כיב סוכרתי, כולל צורך בקטיעות ושיעור תמותה מוגבר (1). המידע בספרות כיום לגבי חולים המפתחים כיב סוכרתי לאחר השתלת איבר סולידי בכלל, והשתלת כליה בפרט, מוגבל. הצורך בטיפול מדכא חיסון מוביל לפגיעה ביכולת ריפוי פצעים בחולים אלו (2). יש אף עדויות המעידות על זמן החלמה כפול לעומת חולים שאינם מושתלים (3). על כן, חולים אלו בסיכון גבוה לפתח כיבים עם סיכון מוגבר לקטיעות.

שיטות: מחקר רטרוספקטיבי בו אנו בוחנים ומשווים את ההתייצגות והתוצאים של מטופלים שאושפזו ליחידת כף הרגל הסוכרתית במוסדנו בין השנים 2014-2019, וביצוע השוואה בין המטופלים לאחר השתלת כליה לעומת שאר המטופלים. הערכה קלינית בוצעה לפי מדד WAGNER ו-SINBAD. התוצאים העיקריים שנבדקו הם שיעור הקטיעות המאז'וריות (מוגדר כקטיעה פרוקסימלית לעצם העקב) ושיעור התמותה בשנה הראשונה. תוצאים נוספים שנבדקו הם שיעור קטיעות כולל ומשך אשפוז.

תוצאות: נכללו במחקר 537 מטופלים, מתוכם 18 לאחר השתלת כליה. סה"כ 56.8% הזדקקו לקטיעה כלשהי, 30% לקטיעה מאז'ורית. 50 מטופלים (9.3%) נפטרו באשפוז, עם שיעור תמותה לשנה של 27.2%. לא היו הבדלים מובהקים בין הקבוצות, הן מבחינת התייצגות והן מבחינת תוצאים.

סיכום: במחקר זה בדקנו את ההתייצגות והתוצאים של מטופלים שאושפזו ליחידת כף הרגל הסוכרתית כאשר אנחנו משווים בין חולים מושתלי כליה לבין שאר המטופלים. לא נראה הבדל מובהק בין הקבוצות. הסבר אפשרי לכך הוא שחולים מושתלי כליה עוברים הערכה מדוקדקת טרם ההשתלה ובה מנסים לאזן מחלות רקע, כמו כן חולים אלו במעקב רפואי תדיר. מספר המושתלים בעבודה זו קטן יחסית וקשה להסיק מסקנות. יש מקום לשיתוף פעולה בין מוסדי לאיסוף נתונים לגבי התוצאים של קבוצת מטופלים ייחודית זו ובהתאם לשקול שינוי טיפול בעתיד.

Response to Tozinameran (BNT162b2) booster in twice-vaccinated kidney transplant and maintenance dialysis patients

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Background

Patients needing chronic RRT are at risk for severe COVID-19 and mount a lesser response to mRNA vaccination. We describe the impact of booster administration in these patients, amidst a third wave of infections (**Fig.1**).

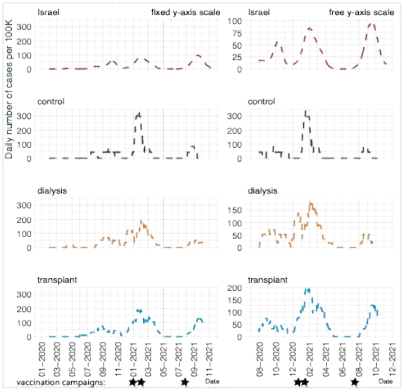


Figure 1: Daily infection rate per 100,000 population (4-week moving average)

Methods

In the setting of a prospective COVID-19-centred cohort study in dialysis and kidney transplant patients we examined humoral responses to booster vaccination, and subsequent infection risk.

Results

We quantified antibodies (DiaSorin) in 207 maintenance dialysis patients, 336 kidney transplant patients and 85 controls (**Tab.1**). **Fig.2** schematically shows summarized values, in participant *without* prior infection. Prior to boosting, **79%** of **controls**, **35%** of **dialysis** and **11%** of **transplant** patients had levels ≥59 AU/ml (putatively protective), while 8-54 days after a third injection, respective rates were **100%**, **93%** and **58%**. Risk factors for antibodies <59 AU/ml despite booster injection were transplant vs dialysis, OR=18.4 (p<0.0001), transitioning from dialysis to transplantation or vice versa, OR=15.7 (p<0.01) and time post injection, OR=0.953 per day (p<0.05). Antibody step-up stimulated by the booster dose inversely correlated with the step-up after the 2nd dose (r=-0.33, p<0.01). In the current (latest) surge, **2 controls**, **6 dialysis** and **20 transplant** patients had COVID-19. Antibody levels ≥59 AU/ml at any time point independently associated with reduced risk of infection during this surge, OR=0.26 (p<0.05), **Fig.3**.

Table 1: Characteristics of study participant by group

		Control, N=85	Dialysis, N=207 (180 HD, 27 PD)	Transplant, N=336	P-value
Age, years	mean (SD)	43.6 (14.3)	65.1 (15.0)	53.5 (14.4)	<0.001
Female	N (%)	46 (64.8)	70 (40.0)	84 (33.3)	<0.001
Hypertension	N (%)	2 (2.8)	73 (41.7)	82 (32.5)	<0.001
Diabetes	N (%)	1 (1.4)	57 (32.6)	49 (19.4)	<0.001
Prior COVID-19	N (%)	5 (5.9)	20 (9.7)	29 (8.6)	0.578
Vaccine inoculations	0	11 (12.9)	32 (15.5)	43 (12.8)	NS
	1	4 (4.7)	9 (4.4)	18 (5.4)	
	2	25 (29.4)	63 (30.4)	53 (15.8)	
	3	45 (52.9)	103 (49.8)	222 (66.1)	
Time from Tx, years	median (range)	-	-	4.0 (0.25-49.0)	-
Dialysis vintage, years	median (range)	-	2.8 (0.47-18.6)	-	-
URR, %	mean (SD)	-	72.1 (8.2)	-	-
Creatinine, µmol/l	median (IQR)	67.5 (16.5)	-	123.3 (73.4)	<0.001
eGFR, ml/min/1.73m²	mean (SD)	92.4 (17.5)	-	52.8 (21.8)	<0.001
Drug levels, ng/ml	mean (SD)	-	-	6.8 (1.9)	-
Hemoglobin, g/dl	mean (SD)	13.6 (1.6)	10.5 (1.1)	12.8 (1.8)	<0.001
WBC count per µl	mean (SD)	7.6 (1.9)	7.6 (2.7)	8.4 (2.4)	0.004
Lymphocytes per µl	mean (SD)	2.2 (0.7)	1.2 (0.6)	1.7 (0.9)	<0.001

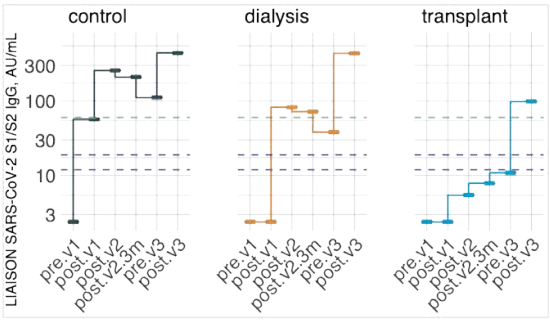
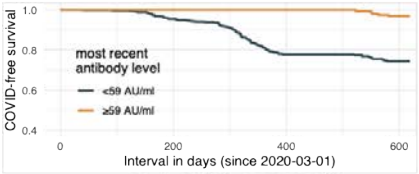


Figure 2: Mean anti-S1/S2 antibody levels across groups and timepoints dotted lines denote borderline range (12-19) and protective cutoff (≥59)

Figure 3: KM curves showing COVID-19 according to most recent serology result



Discussion

We show that a third dose of tozinameran boosts antibody levels in patients receiving RRT, as it did in controls. Most patients have now reached antibody levels likely to protect from infection. Antibodies were higher after the third dose compared to previous peaks, which may hint that the latest immune response may be more robust and sustainable, even in immune-compromised patients. Kidney transplant recipients showed the most striking enhancement, exhibiting >5.5-fold increase in the percentage of patients with protective antibody levels.

However, many transplant patients remain below threshold even after boost injection, necessitating further boosting strategies.

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