NEDERLANDSE **TRANSPLANTATIE** VERENIGING

# Bootcongres 2023

Wetenschappelijke voorjaarsvergadering

Nederlandse Transplantatie Vereniging

**14 en 15 juni 2023**

**De Oosterpoort te Groningen**

georganiseerd in samenwerking met

UMC Groningen Transplantatiecentrum

umcg

# Inhoudsopgave

## Algemene informatie



## Schematisch overzicht programma woensdag 11-12



## Schematisch overzicht programma donderdag 13-14

# Er gaat niets boven Groningen!
# Dé slogan voor Stad en Ommeland.

Welkom op het 35ste Bootcongres in Groningen. Wij zijn trots en blij dat wij u mogen verwelkomen in onze mooie stad.

Groningen is veel in het nieuws geweest met het oog op de gaswinning en alle gevolgen die dit met zich mee heeft gebracht. Tot de dag van vandaag is gaswinning een issue. Wij willen er immers allemaal wel graag warm bij zitten maar tegen welke prijs en wat zijn de alternatieven.

Daarom heeft het Lokaal Organiserend Comité (LOC) het thema 'Duurzaam Groningen' gekozen. Duurzaam is op vele manieren uit te leggen; goed omgaan met schaars goed. Onze planeet vraagt dat van ons. Daarom is de plenaire opening van dit congres gewijd aan verschillende perspectieven van duurzaamheid. De ontwikkelingen op het gebied van waterstof gaan razendsnel. Wat kunnen wij hiermee als mens en als zorgprofessional. Waar kunnen wij, ook in de geneeskunde, onze footprint beperken? Wat heeft Groningen hierin te bieden?

Duurzaam omgaan met schaarse goederen in de transplantatiegeneeskunde kan vanuit verschillende perspectieven opgepakt worden. Immers organen zijn schaars. De ontwikkeling in de orgaanperfusie, die de basis in Groningen heeft is zo'n voorbeeld; marginale organen zo herstellen dat ze geschikt zijn voor transplantatie. Daarnaast kan, ook voor- en na transplantatie specifieke aandacht voor leefstijl bijdragen aan goed omgaan met een schaars goed. Op deze verschillende manieren eren wij de bijzondere gift die de donor en familie heeft gegeven.

De tweede dag begint met de meerwaarde van duurzame samenwerkingen vanuit het perspectief van de biobank cohorten Lifelines en Transplantlines. Wat brengt deze samenwerking ons? Duurzame samenwerking komt ook naar voren in de young professional sessie waarbij een aantal jonge professionals met de supervisor een duo-presentatie verzorgen.

Dit Bootcongres belooft een prachtig inspirerend congres te worden waarbij de donatie- én transplantatieprofessional op de hoogte wordt gebracht van de nieuwste ontwikkelingen in het vakgebied. Daarnaast hopen wij een inspirerende visie mee te geven op duurzaamheid.

Groningen bekijkt het graag vanaf boven!

Namens het LOC Groningen,
Erik Verschuuren

**Organisatiecommissie Bootcongres 2023**
*Vanuit het Universitair Medisch Centrum Groningen:*

Stefan Berger
Marjan Bijmolen-Nieboer
Charlotte Bootsma-Robroeks
Tji Gan
Martine Hummel
Shalina Katerberg-Duursma
Rosa Lammerts
Henri Leuvenink
Vincent de Meijer
Cyril Moers
Robert Pol
Jan-Stephan Sanders
Marion Siebelink
Erik Verschuuren
Frederike van Vilsteren
Liza Aerts

*Bestuursleden Nederlandse Transplantatie Vereniging:*

Niels van der Kaaij, voorzitter
Arnold van der Meer, penningmeester
Dorottya de Vries, secretaris
Marleen van Buren
Sarwa Darwish Murad
Sebastiaan Heidt
Jan-Stephan Sanders

*Secretariaat NTV te Haarlem*

Jeanine van Aalst
Roelie Koeleman
Charissa van Geenen
Marie José van Gijtenbeek
Sarah Smit
Marja Weber

# Accreditatie is aangevraagd bij de volgende verenigingen:

Nederlandse Vereniging voor Heelkunde

Nederlandse Vereniging voor Immunologie

Nederlandse Internisten Vereniging

Nederlandse Vereniging voor Kindergeneeskunde

Nederlandse Vereniging van Artsen voor Longziekten en Tuberculose

Nederlandse Vereniging van Maag-Darm-Leverartsen

Nederlandse Vereniging voor Thoraxchirurgie

Nederlandse Vereniging voor Urologie

V&VN, kwaliteitsregister algemeen

V&VN, kwaliteitsregister, deskundigheidsgebied Dialyse

V&VN, verpleegkundig specialisten register

Nederlandse Associatie van Physician Assistants

## Locatie:

De Oosterpoort
Trompsingel 27
9724 DA Groningen
https://www.spotgroningen.nl/de-oosterpoort/
WiFi: ter plaatse via QR code


### Bereikbaarheid met openbaar vervoer

De Oosterpoort is per openbaar vervoer uitstekend bereikbaar. Vanaf station Groningen rijdt bus 8 richting Coendersborg, na een rit van 5 minuten uitstappen bij halte Trompstraat. U kunt ook te voet vanaf station Groningen naar De Oosterpoort, dit duurt 10 minuten.

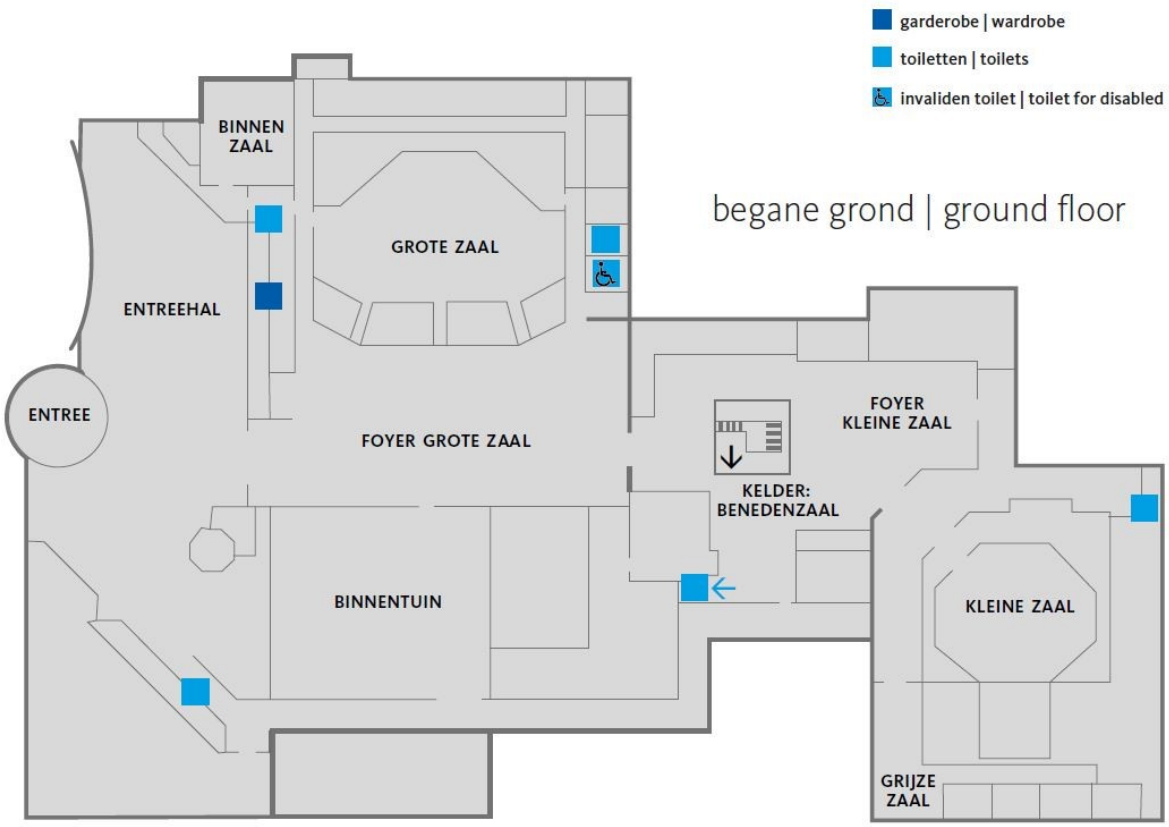
### Bereikbaarheid met de auto

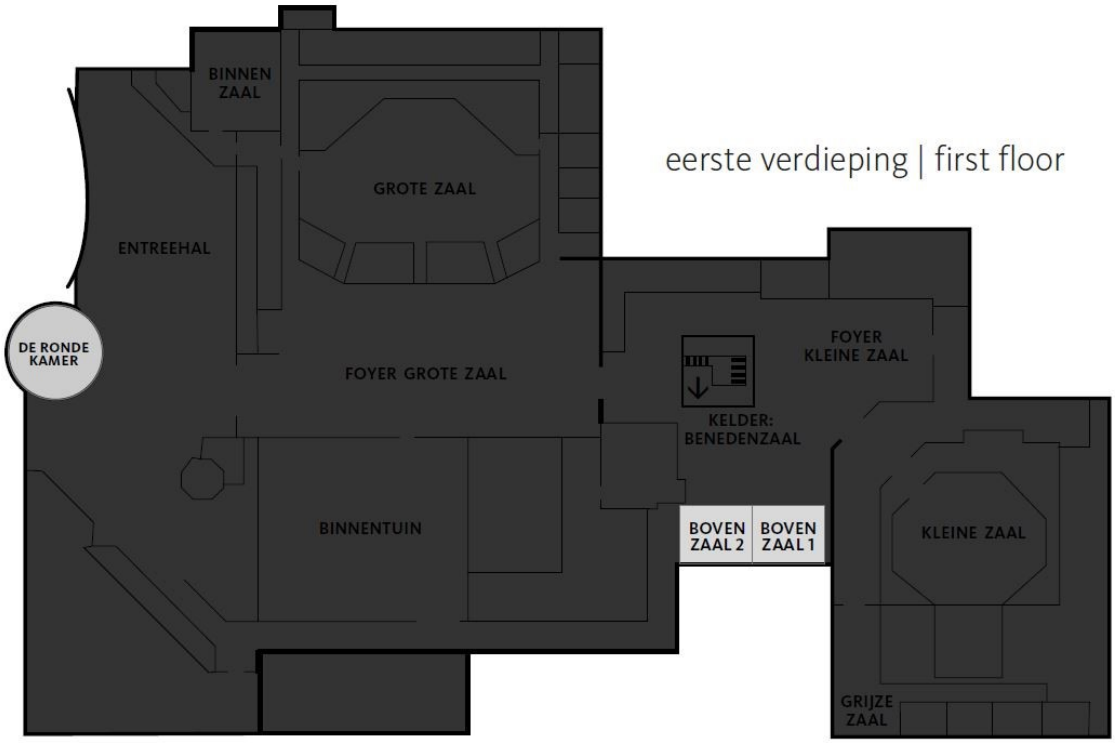
Indien u met een navigatiesysteem De Oostpoort wilt bereiken, voert u dan ‘Trompsingel 27, Groningen’ in als adres.

### Parkeermogelijkheden

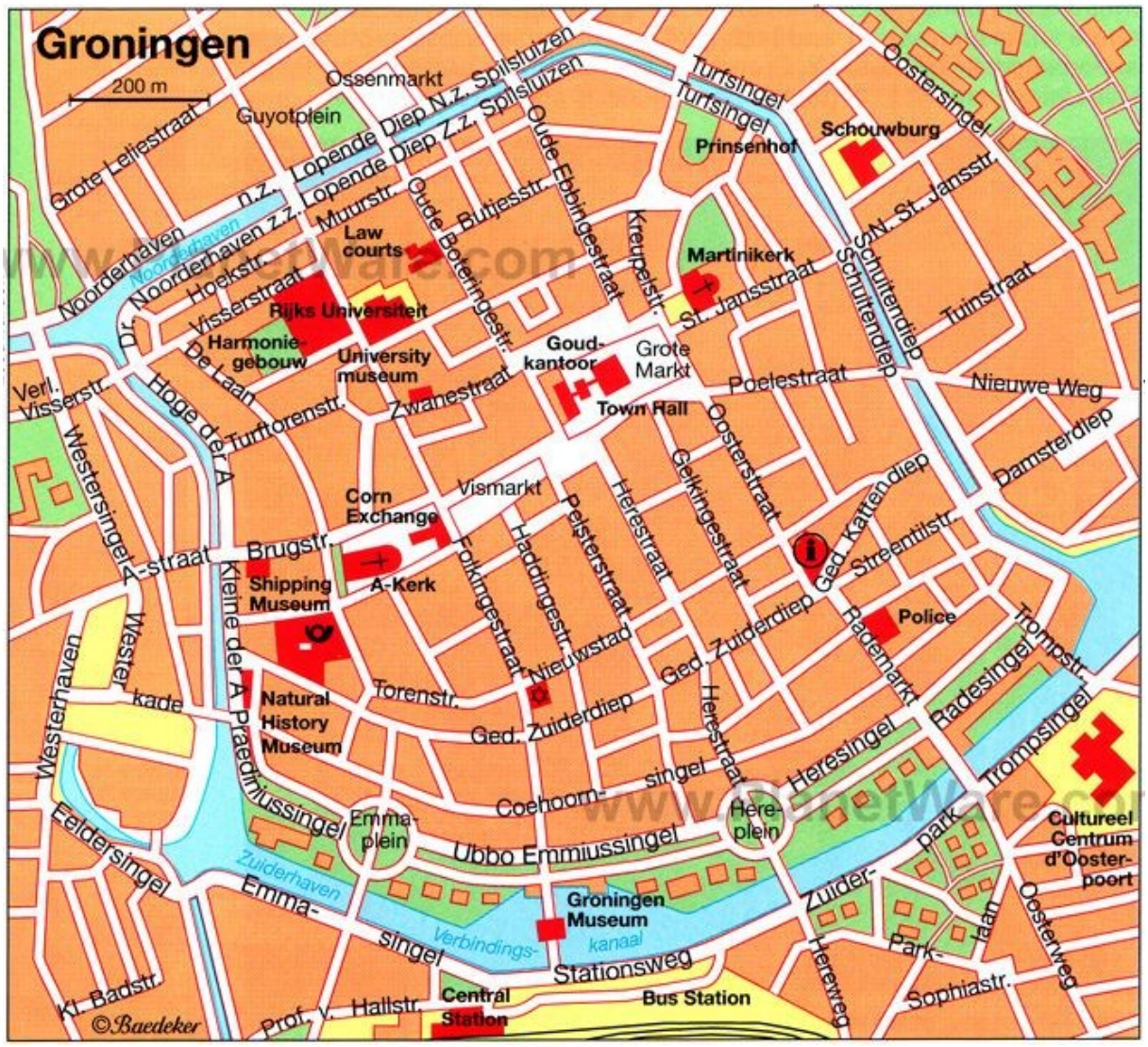
De dichtstbijzijnde parkeergarage is parkeergarage ‘Q-Park Oosterpoort’.
Vanaf de parkeergarage kunt u lopend naar De Oosterpoort. Een dagkaart kost € 13,50.
Het uurtarief op straat is € 2,50.

# Plattegrond De Oosterpoort



# Stadsplan Groningen



## Inleveren presentaties

Wij verzoeken sprekers zo spoedig mogelijk na aankomst de presentatie in te leveren in de 'Groene Kamer' van de Oosterpoort. Deze ruimte bevindt zich rechts van de Grote Zaal.

## E-posters

De deadline voor het inleveren van de E-poster is vastgesteld op maandag 5 juni om 12.00 uur. Alle inzenders hebben bericht ontvangen met verdere instructies. De presentaties vinden plaats in de foyer van de Grote Zaal.

## Tijdstip van de maaltijden

### Woensdag

| | |
|---|---|
| Lunch De Oosterpoort | 12.00 – 13.00 uur |
| Diner en avondprogramma | 19.00 – 00.30 uur |

### Donderdag

| | |
|---|---|
| Lunch Oosterpoort | 12.30 – 13.30 uur |

# Sponsoren NTV

| | |
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| Entry | Organ Assist / XVIVO |

# Woensdag 14 juni 2023
# Schematisch overzicht programma

| Woensdagochtend | De Oosterpoort |
|---|---|
| 10.00 – 10.30 | Ontvangst met koffie |
| 10.30 – 12.00 | **Plenaire sessie I**<br>*voorzitters: Erik Verschuuren en Niels van der Kaaij* |
| 10.30 | Opening congres door Erik Verschuuren, voorzitter LOC en introductie programma |
| 10.40 | Transitie naar duurzame zorg<br>*Johan Douma, Manager Business Development Hydrogen Import, Gasunie:* Gasunie: op weg naar de energievoorziening van de toekomst<br>*Meiltje de Groot, directeur Groningen Airport Eelde:* Verduurzaming van de luchtvaart begint op Groningen Airport Eelde<br>*Maria Koijck, kunstenaar:* Duurzame zorg |
| 11.40 | **Prijsuitreikingen**<br>Chiesiprijs 2023 – Beste Idee in Transplantatie<br>Astellas Transplantatie Researchprijs 2023<br>Voordracht winnaar Astellas prijs 2022: *Dr. G. Nieuwenhuijs-Moeke, Anesthesioloog, UMC Groningen* |
| 12.00 - 13.00 | Lunch en gemodereerde e-postersessies |

# Woensdag 14 juni 2023
# Schematisch overzicht programma

| Woensdagmiddag | Grote Zaal | Binnenzaal | Kleine zaal |
|---|---|---|---|
| 13.00 - 14.15 | **Parallell sessie I**:<br>Liver (clinical)<br>*Voorzitters: Dr. Frederike van Vilsteren en Dr. Caroline den Hoed* | **Paralell sessie II:**<br>Kidney (science)<br>*Voorzitters:* Dr. *Robert Pol en Prof. dr. Carla. Baan* | **Paralell sessie III:**<br>Verpleegkundig<br>*Voorzitters: Monique Mullens en Martine Hummel* |
| 14.20 - 15.35 | **Parallell sessie IV**:<br>Young Professionals<br>*Voorzitter: Dr. Femke Vrieling-Prince* | **Paralell sessie V:**<br>Kidney I (clinical)<br>*Voorzitters:* Dr. *Charlotte Bootsma-Robroeks en Dr. Azam Nurmohamed* | **Paralell sessie VI:**<br>ODC<br>*Voorzitter: Shalina Katerberg-Duursma* |
| 15.35 - 16.00 | Koffiepauze | | |
| 16.00 - 17.30<br><br><br><br>16.05<br><br>16.35<br>16.55 | **Plenaire sessie II**<br>*Voorzitter: Prof. dr. Vincent de Meijer*<br><br>Thema: Machineperfusie voor duurzaam orgaangebruik<br>*Keynote: Sarah Hosgood, Senior Research Associate, Dept. of Surgery, University of Cambridge, UK:* Normothermic machine perfusion in kidney transplantation: Latest developments<br>*Prof. dr. Henri Leuvenink, onderzoeker, UMCG:* 10 years organ perfusion in Groningen<br>*Bert Visscher, cabaretier:* videoboodschap | | |
| 17.00 | Algemene ledenvergadering | | |
| 17.30 | Forum borrel | | |
| 19.30 | Avondprogramma | | |

# Donderdag 15 juni 2023
# Schematisch overzicht programma

| **Donderdagochtend** | **De Oosterpoort** | | |
|---|---|---|---|
| 08.30 – 09.00 | Ontvangst en registratie | | |
| 09.00 – 10.45<br><br><br><br><br>09.05<br>09.25<br>09.45<br><br>10.45 | **Plenaire sessie III**<br>*Voorzitter: Prof. dr. Stefan Berger*<br><br>Thema: Duurzame samenwerking<br><br>*Prof. dr. Jochen Mierau, wetenschappelijk directeur Lifelines:* Wettelijk verankerde gezondheidsdoelen<br>*Prof. dr. Rinse Weersma, Hoofd MDL, UMCG:* Groninger studiecohorten, microbioom, Transplantlines<br>*Prof. dr. Stephan Bakker, internist-nefroloog, UMCG:* Transplantlines<br><br>**Prijsuitreikingen 2023** | | |
| 10.45 - 11.15 | Koffiepauze | | |
| | **Grote Zaal** | **Binnenzaal** | **Kleine zaal** |
| 11.15 – 12.30 | **Parallelle sessie VII**:<br>Machine perfusion I<br>*Voorzitters: Prof. dr. Henri Leuvenink en Dr. Robert Minnee* | **Parallelle sessie VIII**:<br>Immunology & infection<br>*Voorzitters: Dr. Bouke Hepkema en Dr. Dave Roelen* | **Parallelle sessie IX**:<br>Lung<br>*Voorzitters: Dr. Tji Gan en Dr. Merel Hellemons* |
| 12.30 – 13.30 | Lunch met gemodereerde e-postersessies | | |

# Donderdag 15 juni 2023
# Schematisch overzicht programma

| Donderdagmiddag | Grote Zaal | Binnenzaal | Kleine zaal |
|---|---|---|---|
| 13.30 – 14.45 | **Parallell sessie X:**<br>Kidney II (clinical)<br>*Voorzitters: Dr. Jan-Stephan Sanders en Dr. Dorottya de Vries* | **Parallell sessie XI**:<br>Donation & allocation<br>*Voorzitters: Dr. Kirsten Ma en Ellen van Tiggelhoven* | **Parallell sessie XII**:<br>Machine perfusion II<br>*Voorzitters: Dr. Cyril Moers en Prof. dr. Ian Alwayn* |
| 14.45 - 15.15 | Koffiepauze | | |
| | **Grote Zaal** | | |
| 15.15 | **Plenaire sessie IV**<br>*Voorzitter: Dr. Rosa Lammerts*<br><br>Thema: Young Professionals | | |
| 15.20 | Effect of a nationwide intervention to reduce hepatectomy times in Dutch organ procurement teams<br>*I.J.C. Dielwart, H.C.R. Verberght, K.M. de Vries, S.J.L. Bakker, S.W.M. Olde Damink, M.C.G. van de Poll, R.A. Pol, J. de Jonge* | | |
| 15.40 | Modifying tacrolimus related toxicity after liver transplantation comparing meltdose tacrolimus (Envarsus®) and extended release tacrolimus (Advagraf®): a multicenter randomized, controlled trial (MOTTO )<br>*M.B. Mulder, B. van Hoek, W.G. Polak, I.P.J. Alwayn, B.C.M. de Winter, S. Darwish Murad, L. Elshove, A. van den Burg, N.S. Erler, D.A. Hesselink, C.M. den Hoed, H.J. Metselaar* | | |
| 16.00 | Deep learning-based histopathologic segmentation of peritubular capillaries in kidney transplant biopsies.<br>*D. van Midden, M. Hermsen, L.B. Hilbrands, E. Steenbergen, N. Kozakowski, J. Kers, Z. Kikic, J. van der Laak* | | |
| 16.20 | Chimeric HLA Antibody Receptor (CHAR) T-cell engineering – a new approach to target HLA sensitization<br>*I. Gille, P.M.W. van der Meer-Prins, R.S. Hagedoorn, M.H.M. Heemskerk, S. Heidt* | | |
| 16.45 | Sluiting congres | | |

## Plenaire sessie I - Transitie naar duurzame zorg — Grote Zaal

10.00 Ontvangst met koffie

*Voorzitters:* *Dr. Erik Verschuuren, internist-klinisch immunoloog, voorzitter organisatiecomité UMCG*
*Dr. Niels van der Kaaij, cardiothoracaal chirurg, voorzitter NTV, UMC Utrecht*

*De voertaal van deze sessie is Nederlands.*

10.30 Opening congres door voorzitter LOC en introductie programma

10.40 Gasunie: op weg naar de energievoorziening van de toekomst
*Johan Douma, Manager Business Development Hydrogen Import, Gasunie*

11.00 Verduurzaming van de luchtvaart begint op Groningen Airport Eelde
*Meiltje de Groot, directeur Groningen Airport Eelde*

11.20 Duurzame zorg
*Maria Koijck, kunstenaar*

11.40 **Prijsuitreikingen 2023**

Pitches Chiesi prijs 2023 – Beste Idee in Transplantatie

Astellas Transplantatie Researchprijs 2023

Voordracht winnaar Astellas prijs 2022:
VITALISE-Pilot, a feasibility project to test methods and feasibility for the definite VITALISE study: ex VIvo opTimisAtion of donor Lungs wIth SEvoflurane during normothermic ex vivo lung perfusion; a dose and time finding project from bench to bedside
*Dr. G. Nieuwenhuijs-Moeke, anesthesioloog, UMC Groningen*

12.00 Lunch en gemodereerde postersessies

**Postersessie I** **Foyer Grote Zaal**

*Moderator:* *Dr. Tji Gan, longarts, UMCG*

12.15 Clinical relevance and outcome of routine endomyocardial biopsy to detect rejection after heart transplantation (p. 47)
*L.C. Kieviet[1], M.M. Fluitman[1], M.D.J. Nagtegaal[1], M.K. Szymanski[1], M.G. van der Meer[1], N.P. van der Kaaij[2], N. de Jonge[1], L.W. van Laake[1], M.I.F.J. Oerlemans[1], [1]Hartfalen, UMC Utrecht, Utrecht, [2]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, The Netherlands.*

12.20 Parainfluenza virus infections in lung transplant recipients: a multicenter comparison with influenza virus and assessment of ribavirin efficacy (p. 48)
*A.E.S. De Zwart[1], A. Riezebos-Brilman[2], A. Rasoul[3], H.D. Luijk[4], H.A.M. Kerstjens[5], C.T. Gan[6], J.W.C. Alffenaar[7], E.A.,.M. Verschuuren[6], [1]Dept. of Pulmonary Diseases and Tuberculosis, University of Groningen, University Medical Centre Groningen, Groningen. [2]Laboratory for Medical Microbiology and Public Health, Labmicta, Hengelo. [3]Dept. of Respiratory Medicine, University Medical Center Utrecht, Utrecht. [4]Longziekten, UMCU, Utrecht. [5]Longziekten en tuberculose, UMCG, Groningen. [6]Longziekten, UMCG, Groningen, The Netherlands. [7]Faculty of Medicine and Health, School of Pharmacy, University of Sydney, Sydney, Australia.*

12.25 The effects of hemoadsorption during ex situ perfusion of porcine hearts (p. 49)
*M.T. Vervoorn[1], S.E. Kaffka genaamd Dengler[1], S.A. van Tuijl[2], P.A.F.M. Doevendans[3], J.P.G. Sluijter[4], N.P. van der Kaaij[1], [1]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, [2]LifeTec Group, Eindhoven. [3]Cardiologie, Universitair Medisch Centrum Utrecht, Utrecht. [4]Experimentele Cardiologie, Universitair Medisch Centrum Utrecht, Utrecht, The Netherlands.*

12.30 Serum proteomics for fibrotic markers in early detection of bronchiolitis obliterans syndrome after lung transplantation (p. 126)
*E.A. van der Ploeg[1], A. Faiz[2], G.J. Teitsma[3], B.N. Melgert[4], P. Horvatovich[5], J.K. Burgess[6], C.T. Gan[7], [1]Dept. of Pulmonary Medicine, University of Groningen, University Medical Centre Groningen, Groningen, [2]Respiratory Bioinformatics and Molecular Biology (RBMB), School of Life Sciences, University of Technology Sydney, School of Life Sciences, Sydney, Australië. [3]Groningen Research Institute for Asthma and COPD (GRIAC), University of Groningen, University Medical Centre Groningen, Groningen, [4]Dept. of Molecular Pharmacology, University of Groningen,Groningen Research Institute of Pharmacy, Groningen, [5]Dept. of Analytical Biochemistry, University of Groningen, Groningen Research Institute of Pharmacy, Groningen, [6]Groningen Research Institute for Asthma and COPD (GRIAC), University of Groningen, Groningen Research Institute of Pharmacy, Groningen, [7]Longziekten, UMCG, Groningen, The Netherlands.*

## Postersessie II — Foyer Grote Zaal

*Moderator:* *Dr. Cyril Moers, chirurg, UMCG*

12.15 Fasting porcine kidneys during normothermic machine perfusion does not affect mitochondrial function (p. 50)
*L.A. van Furth[1], D. Efraimoglou[2], N.A. Spraakman[3], L.H. Venema[1], A. Gerding[4], B.M. Bakker[5], R.W.F. de Bruin[6], H.G.D. Leuvenink[7], [1]Chirurgie, Universitair Medisch Center Groningen, Groningen. [2]Surgery, UMCG, Groningen. [3]Anesthesiologie, Universitair Medisch Centrum Groningen, Groningen. [4]Pediatrics, UMCG, Groningen. [5]Kindergeneeskunde, Universitair Medisch Center Groningen, Groningen. [6]Transplantatie Instituut, Erasmus MC, Rotterdam. [7]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

12.20 17β-estradiol associated with methylprednisolone treatment modelates renal inflammation after brain death in female rats (p. 51)
*M. Vidal-dos-Santos[1], L. Ferreira-da-Anunciacão[2], R.A.J. Armstrong-Jr[1], F. Yamamoto Ricardo-da-Silva[2], C.J.C. De Jesus Correia[3], L.F. Pinho Moreira[2], H.G.D. Leuvenink[4], A.C. Breithuapt-Faloppa[2], [1]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [2]Cardiopneumology, Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazilië. [3]Cardiopneumologia, Universidade de São Paulo, São Paulo, Brazilië. [4]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

12.25 The effect of nutrients on energy metabolism of porcine cyclosporine-stimulated precision-cut kidney slices (p. 52)
*D. Efraimoglou[1], L.A. van Furth[2], N.A. Spraakman[3], L.H. Venema[2], P. Olinga[4], A. Gerding[5], H.G.D. Leuvenink[6], [1]Surgery, UMCG, Groningen. [2]Chirurgie, Universitair Medisch Center Groningen, Groningen. [3]Anesthesiologie, Universitair Medisch Centrum Groningen, Groningen. [4]Faculty of Science and Engineering, UMCG, Groningen. [5]Pediatrics, UMCG, Groningen. [6]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

## Postersessie III — Foyer Grote Zaal

*Moderator:* *Prof. dr. Stefan Berger, internist-nefroloog, UMCG*

12.15 Iron deficiency and cadmium levels in kidney transplant recipients (p. 53)
*P. Rawee[1], D. Kremer[1], D.J. Touw[2], M.H. de Borst[3], S.J.L. Bakker[4], M.F. Eisenga[1], [1]Nefrologie, UMCG, Groningen. [2]Klinische Farmacie en Farmacologie, Universitair Medisch Centrum Groningen, Groningen. [3]Internal medicine, University Medical Center Groningen, Groningen. [4]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

12.20 Cardiovascular risk factors in living kidney donors and recipient kidney function (p. 54)
*T.M.F. Ferwerda[1], D. Kremer[1], S.P. Berger[2], S.J.L. Bakker[3], M.V.L. van Londen[1], [1]Nefrologie, UMCG, Groningen. [2]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen. [3]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

12.25 Indirect insulin resistance indices and their cut-off values for post-transplantation diabetes mellitus in kidney transplant recipients (p. 55)

*S. Sokooti Oskooei[1], T. Szili-Torok[2], H. J. L. Heerspink[3], R. P.F. Dullaart[4], S.J.L. Bakker[5], [1]Nephrology, University Medical Center Groningen, Groningen. [2]Internal Medicine, University Medical Center Groningen, Groningen. [3]Clinical pharmacology, University Medical Center Groningen, Groningen. [4]Endocrinology, University Medical Center Groningen, Groningen. [5]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

12.30 Validity of CT defined body composition as a prognostic factor for long term functional outcome in kidney transplantation recipients (p. 56)

*T.D.A. Swaab[1], E.E. Quint[1], L.B. Westenberg[1], M. Zorgdrager[2], D.L. Segev[3], M.A. McAdams DeMarco[4], S.J.L. Bakker[5], A.R. Viddeleer[2], R.A. Pol[1], [1]Chirurgie, Universitair Medisch Centrum Groningen, Groningen. [2]Radiologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Chirurgie, NYU Grossman School of Medicine, New York, Verenigde Staten. [4]Chirurgie, NYU Grossman School of Medicine, New York, Verenigde Staten. [5]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

12.35 Dietary oxalic acid intake and plasma oxalic acid concentration in patients with chronic kidney disease (p. 57)

*W.J. Visser[1], G. Post Hospers[2], A.M.E. de Mik-van Egmond[2], M. Laging[2], J.G.H.P. Verhoeven[2], S. Baart[3], C.R.B. Ramakers[4], D.A. Hesselink[5], J. van de Wetering[2], M.E.J. Reinders[6], E.J. Hoorn[7], D. Severs[2], J.I. Roodnat[2], [1]Interne geneeskunde, dietetiek, Erasmus MC, Rotterdam. [2]Interne geneeskunde, ErasmusMC Rotterdam, Rotterdam. [3]Biostatistiek, Erasmus MC, Rotterdam. [4]Clinical Chemistry, ErasmusMC Rotterdam, Rotterdam. [5]Nefrologie, Erasmus MC, Rotterdam. [6]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [7]Interne geneeskunde, Erasmus MC, Rotterdam, The Netherlands.*

## Postersessie IV — Foyer Grote Zaal

*Moderator:* *Dr. Suomi Fouraschen, chirurg, UMCG*

12.15 Dual hypothermic oxygenated machine perfusion (DHOPE) is associated with improved recovery of acute kidney injury after donation after circulatory death liver transplantation (p. 58)

*F.H.C. de Goeij[1], R. van Rijn[2], I.J. Schurink[3], J.E. de Haan[4], C.M. den Hoed[5], A.P. van den Berg[6], V.A.L. Huurman[7], V.E. de Meijer[8], I.P.J. Alwayn[7], R.J. Porte[9], J. de Jonge[10], [1]Heelkunde, HPB- en transplantatie chirurgie, Erasmus MC Transplantatie Instituut, Rotterdam. [2]Heelkunde, HPB- en transplantatie chirurgie, Universitair Medisch Centrum Groningen, Groningen. [3]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam. [4]Intensive Care, Erasmus MC Transplantatie Instituut, Rotterdam. [5]Gastroenterology and Hepatology, Erasmus MC, Rotterdam. [6]Hepatologie, Universitair Medisch Centrum Groningen, Groningen. [7]Heelkunde, Leids Universitair Medisch Centrum, Leiden. [8]Hepato-pancreato-biliare chirurgie, Universitair Medisch Centrum Groningen, Groningen [9]Heelkunde, UMC Groningen, Groningen. [10]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

12.20 Maximum liver function (LiMAx) test enables assessment of liver function during hypothermic oxygenated machine perfusion (p. 59)
*E.H. Küçükerbil[1], J. Willemse[2], I.J. Schurink[2], P.C. Groen[2], S.H. Luijmes[2], R. Broere[1], F.J. van der Heijden[2], F.H.C. de Goeij[3], R.J. Porte[4], L.J.W. van der Laan[2], W.G. Polak[5], J. de Jonge[6], [1]Heelkunde, Erasmus MC, Rotterdam. [2]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam. [3]Heelkunde, Erasmus Medisch Centrum, Rotterdam. [4]Heelkunde, UMC Groningen, Groningen. [5]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam. [6]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

12.25 Positive antibody response in liver transplant recipients on mycophenolate mofetil after the third, fourth and fifth SARS-CoV-2 vaccination; an observational cohort study (p. 60)
*M.B. Mulder[1], M.S. van Daalen[1], A.A. van der Eijk[2], C.H. Geurts van Kessel[3], N.S. Erler[4], W.G. Polak[5], H.J. Metselaar[6], C.M. den Hoed[6], [1]Hospital Pharmacy, Erasmus MC, Rotterdam. [2]Virology, Erasmus MC, Rotterdam. [3]Viroscience, Erasmus MC, Rotterdam. [4]Biostatistics and epidemiology, Erasmus MC, Rotterdam. [5]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam. [6]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, The Netherlands.*

12.30 The impact of Surgical Site Infections (SSI) on outcome after deceased donor liver transplant (p. 61)
*F.H.C. de Goeij[1], C.A.M. Schurink[2], B.J.A. Rijnders[3], C.M. den Hoed[4], W.G. Polak[5], J. de Jonge[6], [1]Heelkunde, HPB- en transplantatie chirurgie, Erasmus MC Transplantatie Instituut, Rotterdam [2]Interne geneeskunde, Microbiologie en Infectieuze ziekten, Erasmus MC Transplantatie Instituut, Rotterdam. [3]Interne geneeskunde, Microbiologie en infectie ziekten, Erasmus MC Transplantatie Instituut, Rotterdam. [4]Gastroenterology and Hepatology, Erasmus MC, Rotterdam. [5]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam. [6]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

## Postersessie V — Foyer Grote Zaal

*Moderator:* *Dr. Jan-Stephan Sanders, internist-nefroloog, UMCG*

12.15 Repeated COVID-19 vaccination of immunocompromised kidney transplant recipients leads to the induction of a functional T-cell subset associated with antibody production (p. 62)
*Y. den Hartog[1], S.R.K. Malahe[2], M. Dieterich[1], L. Gommers[3], D. van Baarle[4], F.J. Bemelman[5], D.A. Diavatopoulos[6], R.T. Gansevoort [7], C.H. Geurts van Kessel[3], L.B. . Hilbrands[8], M.M.L. Kho[1], A.L. Messchendorp[9], R.G. van der Molen [10], E.B.M. Remmerswaal [11], J.S.F. Sanders[12], M.E.J. Reinders[1], R.D. de Vries[3], C.C. Baan[1], [1]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam. [2]Dept. of Internal Medicine, Nephrology and Transplantation, Erasmus MC Tran, Erasmus MC, Rotterdam. [3]Viroscience, Erasmus MC, Rotterdam. [4]Medical Microbiology and Infection Prevention, University Medical Center Groningen, Groningen. [5]Nefrologie, Amsterdam UMC, Amsterdam. [6]Of Laboratory Medicine, Laboratory of Medical Immunology, Radboud University Medical Center Nijmegen, Nijmegen. [7]Internal Medicine, Division of Nephrology, University Medical Center Groningen, Groningen. [8]Nefrologie, RadboudUMC, Nijmegen. [9]Nefrologie, UMCG, Groningen. [10]Molecular Life Sciences, Radboud University Medical Center Nijmegen, Nijmegen. [11]Experimental Immunology, University of Amsterdam, Amsterdam. [12]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

12.20 Prevalence of post-COVID-19 condition in patients with chronic kidney disease, on dialysis and living with a kidney transplant (p. 63)

*S.R.K. Malahe[1], P. Bouwmans[2], A.L. Messchendorp[3], P. Vart[4], J.S.F. Sanders[5], R.T. Gansevoort[6], A.P.J. de Vries[7], A.C. Abrahams[8], F.J. Bemelman[9], J.P.M. Vervoort[4], L.B. Hilbrands[10], M.A. ten Dam[11], M.A. van den Dorpel[12], M.E.J. Reinders[13], M.H. Hemmelder[14], [1]Dept. of Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam. [2]Nefrologie, Maastricht UMC+, Maastricht. [3]Nefrologie, UMCG, Groningen. [4]Medical Sciences, UMC Groningen, Groningen. [5]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen. [6]Internal Medicine, Division of Nephrology, University Medical Center Groningen, Groningen. [7]Nierziekten, LUMC, Leiden. [8]Nefrologie, UMCU, Utrecht. [9]Nefrologie, Amsterdam UMC, Amsterdam. [10]Nefrologie, RadboudUMC, Nijmegen. [11]Nefrologie, Canisius Wilhelmina ziekenhuis, Nijmegen. [12]Nefrologie, Maasstad Ziekenhuis, Rotterdam. [13]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam. [14]Nefrologie, MUMC+, Maastricht, The Netherlands.*

12.25 Allogeneic mesenchymal stromal cell therapy in kidney transplantation: should repeated HLA mismatches be avoided? (p. 64)

*S. Bezstarosti[1], P. Erpicum[2], G. Maggipinto[3], G.J. Dreyer[4], M.E.J. Reinders[5], S. Meziyerh[6], D.L. Roelen[7], J.W. de Fijter[8], J. Kers[9], L. Weekers[2], Y. Beguin[10], F. Jouret[2], S. Heidt[7], [1]Immunologie, Leiden Universitair Medisch Centrum, Leiden, The Netherlands. [2]Division of Nephrology, CHU Liège, University of Liège, Liège, België. [3]Division of Immuno-Hematology, CHU Liège, University of Liège, Liège, België. [4]Dept. of Internal Medicine (Nephrology), Leiden University Medical Center, Leiden, The Netherlands. [5]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [6]Interne Geneeskunde, LUMC, Leiden. [7]Immunologie, LUMC, Leiden. [8]Nefrologie, LUMC, Leiden. [9]Pathologie, LUMC, Leiden, The Netherlands. [10]Division of Hematology, CHU Liège, University of Liège, Liège, België.*

12.30 Incidence and severity of COVID-19 in relation to anti-RBD IgG antibody level after COVID-19 vaccination in kidney transplant recipients (p. 65)

*A.L. Messchendorp[1], J.S.F. Sanders[2], A.C. Abrahams[3], F.J. Bemelman[4], P. Bouwmans[5], M.A. van den Dorpel[6], L.B. . Hilbrands[7], C. Imhof[8], M.E.J. Reinders[9], T. Rispens[10], M. Steenhuis[10], M.A. ten Dam[11], P. Vart[12], A.P.J. de Vries[13], M.H. Hemmelder[14], R.T. Gansevoort [15], [1]Nefrologie, UMCG, Groningen. [2]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen. [3]Nefrologie, UMCU, Utrecht. [4]Nefrologie, Amsterdam UMC, Amsterdam. [5]Nefrologie, Maastricht UMC+, Maastricht. [6]Nefrologie, Maasstad Ziekenhuis, Rotterdam. [7]Nefrologie, RadboudUMC, Nijmegen. [8]Nephrology, UMCG, Groningen. [9]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam. [10]Immunopathologie, Sanquin Research, Amsterdam. [11]Nefrologie, Canisius Wilhelmina ziekenhuis, Nijmegen. [12]Medical Sciences, UMC Groningen, Groningen. [13]Nierziekten, LUMC, Leiden. [14]Nefrologie, MUMC+, Maastricht. [15]Internal Medicine, Division of Nephrology, University Medical Center Groningen, Groningen, The Netherlands.*

*Moderator:* *Dr. Marion Siebelink, Medisch ethicus en manager UMC Groningen Transplantatie Centrum*

12.15 Association of plasma tacrolimus but not whole-blood tacrolimus with c-reactive protein in transplant recipients (p. 66)
*T.R. Zijp[1], T.J. Knobbe[2], C.T. Gan[3], H. Blokzijl[4], S.J.L. Bakker[5], D.J. Touw[1], [1]Klinische Farmacie en Farmacologie, Universitair Medisch Centrum Groningen, Groningen. [2]Nefrologie, Universitair Medisch Centrum Groningen, Groningen. [3]Longziekten, UMCG, Groningen. [4]Hepatologie, Universitair Medisch Centrum Groningen, Groningen. [5]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

12.20 Anesthesia and ICU practice in pediatric kidney transplantation; an European survey (p. 67)
*M. Voet[2], E.A.M. Cornelissen[1], J. Lemson[3], I.M. Malagon-Calle[2], [1]Amalia Kinderziekenhuis, kindernefrologie, Radboudumc. [2]Anesthesie, Radboudumc, Nijmegen. [3]Intensive care, Radboudumc, Nijmegen, The Netherlands*

12.25 The results of robotic-assisted donornephrectomy (p. 68)
*M.M. Idu[1], M. Willems[1], J. van de Geest-van Zoest[2], A. Molenaar[2], V. Jongkind[1], A. Hoksbergen[1], K.A. van der Pant[2], S.A. Nurmohamed[2], F.J. Bemelman[2], [1]Vaat/Transplantatie Chirurgie, Amsterdam UMC, Amsterdam. [2]Nefrologie, Amsterdam UMC, Amsterdam, The Netherlands.*

12.30 Therapeutic drug monitoring of the drug - drug interaction between tacrolimus and azoles in lung and kidney recipients (p. 69)
*F.H. Hadi[2], T.R. Zijp[1], D.J. Touw[1], [1]Klinische Farmacie en Farmacologie, Universitair Medisch Centrum Groningen, Groningen. [2]Dept. of Clinical Pharmacy and Pharmacology, University Medical Center Groningen, Groningen, The Netherlands.*

## Parallel sessie I - Liver (clinical) — Grote Zaal

*Voorzitters:* *Dr. Frederike van Vilsteren, MDL-arts, UMCG*
*Dr. Caroline den Hoed, MDL-arts, Erasmus MC*

*Voordrachten in het Engels, 6 minuten presentatie en 2 minuten discussie.*

13.00 Graft steatosis and donor diabetes mellitus additively increase the risk of retransplantation and death in adult liver transplantation - data from the eurotransplant registry (p. 70)
*M.J. Sonneveld[1], F. Parouei[1], C.M. den Hoed[2], J. de Jonge[3], M. Salarzaei[1], R.J. Porte[4], H.L. Janssen[1], M. de Rosner-van Rosmalen[5], S. Vogelaar[5], A. van der Meer[1], R. Maan[1], S. Darwish Murad[6], W.G. Polak[7], W.P. Brouwer[1], [1]Maag- darm- en leverziekten, Erasmus MC, Rotterdam, [2]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, [3]Chirurgie, Erasmus MC, Rotterdam, [4]Heelkunde, UMC Groningen, Groningen, [5]Eurotransplant, Leiden, [6]Afd. MDL, Erasmus MC Transplantatie Instituut, Rotterdam, [7]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands.*

13.08 Radiological classification of ischemic cholangiopathy after deceased-donor liver transplantation (p. 71)
*M. van den Tweel[1], F.E.J.A. Willemssen[2], S. Darwish Murad[3], F.H.C. de Goeij[4], J. de Jonge[5], W.G. Polak[6], C.M. den Hoed[7], [1]Maag, darm, Leverziekten, Erasmus MC Transplantatie Instituut, Erasmus MC, Rotterdam, [2]Radiologie, Erasmus MC, Rotterdam, [3]MDL, Erasmus MC Transplantatie Instituut, Rotterdam, [4]Heelkunde, Erasmus Medisch Centrum, Rotterdam, [5]Chirurgie, Erasmus MC, Rotterdam, [6]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, [7]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, The Netherlands.*

13.16 Indocyanine green (ICG) clearance as marker for liver function during ex vivo normothermic machine perfusion (p. 72)
*I.J. Schurink[1], S.H. Luijmes[1], J. Willemse[1], F.H.C. de Goeij[2], P.C. Groen[1], E.H. Küçükerbil[3], W.G. Polak[4], L.J.W. van der Laan[1], J. de Jonge[5], [1]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, [2]Heelkunde, Erasmus Medisch Centrum, Rotterdam, [3]Heelkunde, Erasmus MC, Rotterdam, [4]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, [5]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

13.25 The association between neuro-radiologic parameters and outcome in children with Acute Liver Failure (ALF): a national cohort study (p. 73)
*K.J. Schouwstra[1], R. Scheenstra[2], R.H.J. de Kleine[3], V.E. de Meijer[3], S.T.H. Bontemps[4], L.C. Meiners[5], H.J. Verkade[2], D.A. Sival[6], [1]Pediatric Gastroenterology and Hepatology and Pediatric Neurology, University Medical Center Groningen, Groningen, [2]Pediatric Gastroenterology and Hepatology, University Medical Center Groningen, Groningen, [3]Hepato-pancreato-biliare chirurgie, Universitair Medisch Centrum Groningen, Groningen, [4]Pediatric Intensive Care, University Medical Center Groningen, Groningen, [5]Radiology, University Medical Center Groningen, Groningen, [6]Pediatric Neurology, University Medical Center Groningen, Groningen, The Netherlands.*

13.33 RNAi therapy as substitute for liver transplantation in Primary hyperoxaluria type 1 (p. 74)
*L.J. Deesker[1], E.L. Metry[2], S.F. Garrelfs[2], J.W. Groothoff[2], On behalf of ODAP committee[3], [1]Kindernefrologie, Emma kinderziekenhuis, Amsterdam UMC, Amsterdam, [2]Afdeling kindernefrologie, Emma kinderziekenhuis, Amsterdam UMC, Amsterdam, [3]ODAP, Amsterdam, The Netherlands.*

13.41 Maximum liver function capacity test (LiMAx) during in-situ abdominal normothermic regional perfusion as predictor of graft function after transplantation (p. 75)
*I.J. Schurink[1], F.H.C. de Goeij[2], F.J. van der Heijden[1], R.M. van Rooden[3], M.C. van Dijk[4], W.G. Polak[5], L.J.W. van der Laan[1], V.A.L. Huurman[3], J. de Jonge[6], [1]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [2]Heelkunde, Erasmus Medisch Centrum, Rotterdam, The Netherlands. [3]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [4]LUMC Transplant Center, Dept. of Surgery, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [5]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [6]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

13.49 The Early Allograft Failure Simplified Estimation (EASE) score outperforms classic Olthoff EAD in predicting 90-day graft loss in liver transplantation from donation after circulatory death (DCD) donors (p. 76)
*F.H.C. de Goeij[1], M. van Reeven[2], I.J. Schurink[3], B.E. Hansen[4], C.M. den Hoed[5], J.E. de Haan[6], J.N.M. IJzermans[2], W.G. Polak[7], J. de Jonge[8], [1]Heelkunde, HPB- en transplantatie chirurgie, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [2]Heelkunde, HPB en transplantatie chirurgie, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [3]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [4]Epidemiologie, biostatistiek, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [5]Maag-darm-leverziekten, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [6]Intensive Care, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [7]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [8]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

13.57 Patterns and predictors of dropout of potential liver transplant candidates: from first pretransplant visit to liver transplantation (p. 77)
*S. Darwish Murad[1], S. de Reus[2], B.E. Hansen[3], C.M. den Hoed[4], H.L. Janssen[5], R.J. Porte[6], R. Maan[5], W.G. Polak[7], [1]MDL, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [2]MDL, Erasmus MC, Rotterdam, The Netherlands. [3]Epidemiologie, biostatistiek, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [4]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, The Netherlands. [5]Maag- darm- en leverziekten, Erasmus MC, Rotterdam, The Netherlands. [6]Heelkunde, UMC Groningen, Groningen, The Netherlands. [7]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands.*

14.05 Untargeted metabolomics confirmed therapeutic drug use, detected illicit and contraindicated drugs, and identified nonactivated metabolites of azathioprine and mycophenolate mofetil in liver and kidney transplant recipients (p. 78)
*F. Klont[1], S.J.L. Bakker[2], E. Hak[1], D.J. Touw[3], G. Hopfgartner[4], [1]Groningen Research Institute of Pharmacy, Rijksuniversiteit Groningen, Groningen, The Netherlands. [2]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Klinische Farmacie en Farmacologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Spectrométrie de masse du vivant, Université de Genève, Genève, Zwitserland.*

**Parallel sessie II – Kidney (science)** **Binnenzaal**

*Voorzitters:* *Dr. Robert Pol, Vaat-en transplantatie chirurg, UMCG*
*Prof. Dr. Carla Baan, Hoofd Transplantatie Laboratorium, Erasmus MC*

*Voordrachten in het Engels, 8 minuten presentatie en 2 minuten discussie.*

13.00 A single cell transcriptomic landscape of kidney endothelial cells, from kidney organoids to mature kidney (p. 79)
*H. Tejeda Mora[1], M.W.F. van den Hoogen[1], C.C. Baan[2], R. Minnee[3], L.J.W. van der Laan[4], M. Hoogduijn[5], [1]Internal Medicine, Erasmus MC Transplant Institute, Rotterdam, The Netherlands. [2]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [3]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands. [4]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [5]Internal medicine, Erasmus MC, Rotterdam, The Netherlands.*

13.10 Platelet and endothelium mediated extracellular trap formation in donor kidney grafts (p. 80)
*M. van Zyl[1], R.A.J. Armstrong-Jr[2], M. van Rooy[3], J.A. Lisman[4], H.G.D. Leuvenink[5], J.L. Hillebrands[1], [1]Pathology and Medical Biology, University Medical Center Groningen, Groningen, The Netherlands. [2]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [3]Dept. of Physiology, University of Pretoria, Pretoria, Zuid-Afrika. [4]Experimentele Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

13.20 Evaluation of the protective effect of alkaline phosphatase against ischaemia and reperfusion injury in porcine kidneys (p. 81)
*R.A.J. Armstrong-Jr[1], M. Vidal-dos-Santos[1], L.V.D.S. Van-der-Scheer[1], P.J.O. Ottens[2], H.G.D. Leuvenink[3], [1]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [2]06206791 87, University Medical Center Groningen, Groningen, The Netherlands. [3]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

13.30 Single cell RNA sequencing of donor-reactive T cells reveals role of apoptosis in donor-specific hyporesponsiveness of kidney transplant recipients (p. 82)
*A.C.J. van der List[1], N.H.R. Litjens[2], R.W.W. Brouwer[3], M. Klepper[2], A.T. den Dekker[3], W.F.J. van Ijcken[3], M.G.H. Betjes[2], [1]Interne Geneeskunde, Erasmus MC, Rotterdam, The Netherlands. [2]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, The Netherlands. [3]Center for Biomics, Erasmus MC, Rotterdam, The Netherlands.*

13.40 Perfusate from normothermic machine perfused discarded human donor kidneys has an anti-inflammatory effect on monocyte-derived dendritic cells (p. 83)
*L.W.D. Knijff[1], A.S. Arykbaeva[2], S.W. van der Kooij[1], D.K. de Vries[2], M.F. van Essen[1], I.P.J. Alwayn[3], R.J. Ploeg[4], C. van Kooten[1], [1]Nephrology, Leiden University Medical Center, Leiden, The Netherlands. [2]Surgery, Leiden University Medical Center, Leiden, The Netherlands. [3]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [4]Nuffield Dept. of surgical sciences, University of Oxford, Oxford, UK.*

13.50 Towards the use of immortalized, perfusate-isolated human endothelial cells for the screening of non-HLA antibodies in kidney transplant recipients (p. 84)
*D.H.A. Altulea[1], R.G.L. Lammerts[2], W.A.D. Dam[1], J.V.D.B. van den Born[1], J.S.F. Sanders[3], C.F. Figueiredo[4], S.P. Berger[5], [1]Internal Medicine, University Medical Center Groningen, Groningen, The Netherlands. [2]Transplant Immunology, University Medical Center Groningen, Groningen, The Netherlands. [3]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Nstitute of Transfusion Medicine and Transplant Engineering, Medizinische Hochschule Hannover, Hannover, Duitsland. [5]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

14.00 HLA class I protein disappearance in kidney organoids (p. 85)
*A. Bas-Cristóbal Menéndez[1], Z. Du[2], H. Lin[3], T.P.P. van den Bosch[4], Y. den Hartog[5], N.H.R. Litjens[6], J. Mulder[7], M. Hoogduijn[2], [1]Internal medicine/pediatrics, Erasmus MC, Rotterdam, The Netherlands. [2]Internal medicine, Erasmus MC, Rotterdam, The Netherlands. [3]Internal Medicine, Erasmus MC, Rotterdam, The Netherlands. [4]Pathologie, Erasmus MC, Rotterdam, The Netherlands. [5]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [6]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, The Netherlands. [7]Pediatrics, Erasmus MC, Rotterdam, The Netherlands.*

## Parallel sessie III – Verpleegkundig — Kleine Zaal

*Voorzitters:* *Monique Mullens, research verpleegkundige, Maastricht Universitair Medisch Centrum*
*Martine Hummel, transplantatie verpleegkundige, UMCG*

*Voordrachten in het Nederlands, 8 minuten presentatie en 2 minuten discussie.*

13.00 Opening sessie door de voorzitters.

13.05 Nurse-led self-management support after organ transplantation – a multicenter, multi-organ stepped wedge randomized controlled trial (p. 86)
*R. van Zanten[1], M. van Dijk[2], J. van Rosmalen [3], D.K. Beck[1], B. Zietse[4], A. van Staa[5], E.K. Massey[6], [1]Inwendige geneeskunde, Transplantatie Instituut, Erasmus MC, Rotterdam, The Netherlands. [2]Afd. Interne geneeskunde en kinderchirurgie, sectie verplegingswetenschap, Erasmus MC, Rotterdam, The Netherlands. [3]Biostatistiek, Erasmus MC, Rotterdam, The Netherlands. [4]Interne geneeskunde, Erasmus MC Rotterdam, Rotterdam, The Netherlands. [5]Kenniscentrum Zorginnovatie, Hogeschool Rotterdam, Rotterdam, The Netherlands. [6]Interne Geneeskunde, Erasmus MC, Rotterdam, The Netherlands.*

13.15 Parents' and young children's experiences in clinical research during kidney transplantation (p. 89)
*G. Lucker[1], M. Voet[2], N. Eijgenraam[2], N. Maas[3], M.F.P. van der Jagt[4], P.P.C. Poyck[4], E.A.M. Cornelissen[5], Y. Engels[2], [1]Anesthaesiology, Pain and Palliative Care, Radboudumc, Nijmegen, The Netherlands. [2]Anesthesie, Radboudumc, Nijmegen, The Netherlands. [3]Medische Psychologie, Radboudumc, Nijmegen, The Netherlands. [4]Heelkunde, Radboudumc, Nijmegen, The Netherlands. [5]Amalia Kinderziekenhuis, kindernefrologie, Radboudumc, Nijmegen, The Netherlands.*

13.25 Influencing factors on the development and implementation of a prehabilitation program for kidney transplant candidates: A mixed-methods contextual analysis (p. 88)
*A.J. Haanstra[1], Y. van der Veen[2], E.E. Quint[3], H. Maring[4], S.P. Berger[5], A.V. Ranchor[6], E.J. Finnema[1], J.H. Annema[7], [1]Gezondheidswetenschappen, sectie Verplegingswetenschap, Universitair Medisch Centrum Groningen, The Netherlands, [2]Dietetiek, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands, [4]Fysiotherapie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [6]Gezondheidswetenschappen, sectie gezondheidspsychologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [7]Gezondheidswetenschappen, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

13.35 The self-regulation skills instrument in transplantation (SSIt): Development and measurement properties of a self-report self-management instrument (p. 87)
*R. van Zanten[1], M. van Dijk[2], A. Van Hecke[3], V. Duprez[4], J.H. Annema[5], A. van Staa[6], J.M.J. Been-Dahmen[6], A. de Weerd[7], L. Maasdam[1], M. van Buren[8], E. Ista[9], E.K. Massey[7], [1]Inwendige geneeskunde, Transplantatie Instituut, Erasmus MC, Rotterdam, The Netherlands. [2]Afd. Interne geneeskunde en kinderchirurgie, sectie verplegingswetenschap, Erasmus MC, Rotterdam, The Netherlands. [3]Vakgroep Volksgezondheid en Eerstelijnszorg, Universitair Centrum voor Verpleegkunde en Vroedkunde, Gent, België. [4]Directie Verpleging, Universitair Ziekenhuis Gent, Gent, België. [5]Gezondheidswetenschappen, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [6]Kenniscentrum Zorginnovatie, Hogeschool Rotterdam, Rotterdam, The Netherlands. [7]Interne Geneeskunde, Erasmus MC, Rotterdam, The Netherlands. [8]Transplantatie Instituut, Erasmus MC, Rotterdam, The Netherlands. [9]Internegeneeskunde en kinderchirurgie, sector verplegingswetenschap & IC kinder, Erasmus MC, Rotterdam, The Netherlands.*

13.45 Vernieuwende opleiding Transplantatieverpleegkunde
*Tally Norder, verpleegkundig specialist – longtransplantatie, UMCG*

13.55 De kracht van de Transplantatieverpleegkundige
*Else Dijkstra, verpleegkundige longtransplantatie, UMCG*
*Florie Westerhof, regieverpleegkundige longtransplantatie, UMCG*
*Rodney Bilijam, verpleegkundige Maag-, Darm-, Levertransplantatie, UMCG*

14.10 Vragen en discussie

## Parallel sessie IV – Young Professionals — Grote Zaal

*Voorzitter:* *Dr. Femke Vrieling-Prince, kindernefroloog, Erasmus MC*

*Voordrachten in het Nederlands*

14.20 Duurzaamheid in de transplantatiegeneeskunde, is een nieuw cross-over programma de oplossing?

Deze interactieve sessie wordt verzorgd door de volgende sprekers:
*Dr. Joke Roodnat, Internist-Nefroloog, Erasmus MC*
*Dr. Annelies de Weerd, Internist-Nefroloog, Erasmus MC*
*Dr. Jacqueline van de Wetering, Internist-Nefroloog, Erasmus MC*

## Parallel sessie V – Kidney 1 (clinical) Binnenzaal

*Voorzitters:* *Dr. Charlotte Bootsma-Robroeks, kinderarts – kindernefroloog, UMCG*
*Dr. Azam Nurmohamed, internist-nefroloog, Amsterdam UMC, loc. VUmc*

*Voordrachten in het Engels, 8 minuten presentatie en 2 minuten discussie.*

14.20 65 Years of experience in pediatric kidney transplantation in the Netherlands (p. 90)
*L. Oomen[1], L.L. de Wall[1], H. de Jong[2], A.H. Bouts[3], M.G. Keijzer-Veen[4], E.A.M. Cornelissen[5], W.F.J. Feitz[1], C.M.H.H.T. Bootsma-Robroeks[6], [1]Urology, Radboudumc Amalia Children's Hospital, Nijmegen, The Netherlands. [2]Kindernefrologie, Erasmusmc, Rotterdam, The Netherlands. [3]Kindernefrologie, AmsterdamUMC, Amsterdam, The Netherlands.[4]Kindernefrologie, Utrecht UMC, Utrecht, The Netherlands. [5]Amalia Kinderziekenhuis, kindernefrologie, Radboudumc, Nijmegen, The Netherlands. [6]Pediatric Nephrology, Radboudumc Amalia Children's Hospital, Nijmegen, The Netherlands.*

14.30 Non-invasive detection of rejection in the first 2 weeks after kidney transplantation using urinary chemokines (p. 91)
*A.M.A. Peeters[1], D.A. Hesselink[2], C.C. Baan[3], K. Boer[1], [1]Inwendige Geneeskunde, Erasmus MC Transplant Institute, Rotterdam, The Netherlands. [2]Nefrologie, Erasmus MC, Rotterdam, The Netherlands. [3]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands.*

14.40 Solvent-accessible amino acid mismatches on donor HLA are associated with kidney graft outcomes; a pivotal step towards personalizing surveillance and immunosuppression? (p. 92)
*S. Meziyerh[1], S. Bezstarosti[2], J. Kers[3], T. van Gelder[4], D. van der Helm[5], P.J.M. van der Boog[6], J.W. de Fijter[7], D.J.A.R. Moes[4], D.L. Roelen[8], G.W. Haasnoot[8], A.P.J. de Vries[6], S. Heidt[8], [1]Interne Geneeskunde, LUMC, Leiden, The Netherlands. [2]Immunologie, Leiden Universitair Medisch Centrum, Leiden, The Netherlands. [3]Pathologie, LUMC, Leiden, The Netherlands. [4]Toxicologie en Farmacologie, LUMC, Leiden, The Netherlands. [5]Transplantatienefrologie, LUMC, Leiden, Nederland. [6]Nierziekten, LUMC, Leiden, The Netherlands.[7]Nefrologie, LUMC, Leiden, The Netherlands. [8]Immunologie, LUMC, Leiden, The Netherlands.*

14.50 Gene expression profiles in 3 month biopsies associate with progression to kidney transplant rejection before detection of histological changes (p. 93)
*B. Duygu[1], M. Groeneweg[1], M.A. Abdul-Hamid[2], L.C. van Kempen[3], M.A. Gelens[4], M.H. Christiaans[4], C.E.M. Voorter[1], L. Wieten[1], [1]Transplantation Immunology, Tissue Typing Laboratory, Maastricht University Medical Centre, Maastricht, The Netherlands. [2]Pathology, Maastricht University Medical Centre, Maastricht, The Netherlands. [3]Pathology, University of Antwerp, Antwerp, België. [4]Internal Medicine, Division of Nephrology, Maastricht University Medical Centre, Maastricht, The Netherlands.*

15.00 The influence of mycophenolate mofetil on top of tacrolimus on blood pressure in a randomized cohort of kidney transplant recipients (p. 94)
*Z. Al Fatly[1], A. Bekkaoui[1], M.E.J. Reinders[2], M.G.H. Betjes[3], A. de Weerd[4], [1]Nefrologie en niertransplantatie, Erasmus MC, Rotterdam, The Netherlands. [2]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [3]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, The Netherlands. [4]Interne Geneeskunde, Erasmus MC, Rotterdam, The Netherlands.*

*Woensdag 14 juni 2023*

15.10 Are hemodynamic targets related to renal-injury biomarker excretion during paediatric kidney transplantation? (p. 95)
*M. Voet[1], E.A.M. Cornelissen[2], P.P.C. Poyck[3], M.F.P. van der Jagt[3], J. Lemson[4], D.P. van Lier[4], P. Pickkers[4], [1]Anesthesie, Radboudumc, Nijmegen, The Netherlands. [2]Amalia Kinderziekenhuis, kindernefrologie, Radboudumc, Nijmegen, The Netherlands.[3]Heelkunde, Radboud umc, Nijmegen, The Netherlands. [4]Intensive care, Radboudumc, Nijmegen, The Netherlands.*

15.20 Peri-operative kinetics of plasma mitochondrial DNA levels during living donor kidney transplantation (p. 96)
*M. Kroneisl[1], N.A. Spraakman[2], F.H. Hoogstra-Berends[1], H.G.D. Leuvenink[3], M.M.R.F. Struys[2], R.H. Henning[1], G.J. Nieuwenhuijs-Moeke[2], [1]Farmacologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Anesthesiologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

15.30 Koffiepauze

## Parallel sessie VI – ODC — Kleine Zaal

*Voorzitters:* *Shalina Katerberg-Duursma, orgaandonatiecoördinator, UMCG*
*Hanne Verberght, ODC en arts-onderzoeker, Maastricht UMC*

14.20 Kind protocol
*Dr. Marion Siebelink, Medisch ethicus en manager UMC Groningen Transplantatie Centrum*

14.30 Casus kind donatie ODC/ Kinderintensivist
*Dr. Marjet Braamskamp, kinderintensivist, UMC Groningen*
*Miranda Danhof, transplantatiecoördinator, UMC Groningen*

14.50 Split lever
*Prof. dr. Robert Porte, chirurg, Erasmus MC, Rotterdam*

15.10 Levende leverdonatie
*Dr. Marieke de Boer, HPB- levertransplantatiechirurg, UMCG*

15.30 Koffiepauze

## Plenaire sessie II - Machineperfusie voor duurzaam orgaangebruik — Grote Zaal

*Voorzitter:* *Prof. dr. Vincent de Meijer, chirurg, UMCG*

*This session is English spoken.*

16.00 Opening and introduction speakers

16.05 **Key note**
Normothermic machine perfusion in kidney transplantation: Latest developments
*Sarah Hosgood, Senior Research Associate, Dept. of Surgery, University of Cambridge, UK*

16.35 10 years organ perfusion in Groningen
*Prof. dr. Henri Leuvenink, onderzoeker, UMCG*

16.55 Videoboodschap
*Bert Visscher*

17.00 Algemene ledenvergadering

17.30 Forum borrel

19.30 Diner en avondprogramma

*Donderdag 15 juni 2023*

## Plenaire sessie III – Duurzame samenwerking — Grote Zaal

*Voorzitters:* *Prof. dr. Stefan Berger, internist-nefroloog, UMCG*

*De voertaal van deze sessie is Nederlands.*

09.00 Opening sessie en introductie sprekers

09.05 Wettelijk Verankerde Gezondheidsdoelen
*Prof. dr. Jochen Mierau, Wetenschappelijk directeur Lifelines*

09.25 Groninger studiecohorten, microbioom, Transplantlines
*Prof. dr. Rinse Weersma, Hoofd MDL, UMCG*

09.45 Transplantlines
*Prof. dr. Stephan Bakker, internist-nefroloog, UMCG*

## Prijsuitreikingen — Grote Zaal

*Voorzitters:* *Dr. Erik Verschuuren, internist-klinisch immunoloog, voorzitter organisatiecomité UMCG*
*Dr. Niels van der Kaaij, cardiothoracaal chirurg, voorzitter NTV, UMC Utrecht*

**Uitreiking LWTV Innovatie-Kwaliteitsprijs 2023**
*door Monique Mullens, voorzitter LWTV*

**Presentatie winnaar LWTV Innovatie-Kwaliteitsprijs 2022**
*Project:* Verbeterplan: Het belang van anoniem contact
*Janneke Vervelde, verpleegkundig specialist, LUMC, Leiden*

**Uitreiking NTV Innovatie in Transplantatie Onderwijs Subsidie**

**Uitreiking Gauke Kootstra Prijs 2023**
*door Prof. dr. G. Kootstra*

**Presentatie winnaar Gauke Kootstra 2023**
**winnaar nog niet bekend**

**Uitreiking NTV Wetenschapsprijs 2023**
*door Niels van der Kaaij, voorzitter NTV*

**Presentatie winnaar NTV Wetenschapsprijs 2022**
Psychosocial well-being as a prerequisite for optimal transplant outcomes
*Dr. Emma Massey, onderzoeker/pscycholoog, Erasmus MC, Rotterdam*

10.45 Pauze

## Parallel sessie VII – Machine perfusion I — Grote Zaal

*Voorzitters:* *Prof. dr. Henri. Leuvenink, onderzoeker, UMCG*
*Dr. Robert Minnee, chirurg, Erasmus MC*

*Voordrachten in het Engels, 7 minuten presentatie en 2 minuten discussie.*

11.15 Long-term preservation of kidneys by means of cryoperfusion: The next step in organ preservation? (p. 97)

*C. Campos Pamplona[1], T.L. Hamelink[2], C. Moers[3], T.D.A. Swaab[4], A. Papandroudis[1], M.B.F. Pool[5], T.A. Berendsen[1], [1]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [2]Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands. [3]Dept. of Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands. [4]Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Chirurgie – Orgaandonatie en Transplantatie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

11.24 Magnetic resonance imaging of renal oxygen metabolism by means of 17O administration during ex vivo organ perfusion (p. 98)

*L. Vicari[1]*, C. Campos Pamplona[1], J. Castelein[2], T.L. Hamelink[3], V.A. Lantinga[4], B. Ogurlu[5], J.H. Potze[2], M. Bock[6], H.G.D. Leuvenink[7], C. Moers[8], R.J.H. Borra[9], [1]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [2]Radiology, University Medical Center Groningen, Groningen, The Netherlands. [3]Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands. [4]Dept. of Surgery, Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [5]Chirurgie – Orgaandonatie en Transplantatie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [6]Radiology, University Medical Center Freiburg, Freiburg, Duitsland. [7]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [8]Dept. of Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands. [9]Dept. of Radiology, UMCG, Groningen, The Netherlands.*
** Presenter*

11.33 Magnetic resonance imaging assessment of functional differences between kidneys in vivo and during ex vivo normothermic machine perfusion (p. 99)

*T.L. Hamelink[1], B. Ogurlu[2], C.C. Pamplona[1], V.A. Lantinga[3], S.S. Bennedsgaard[4], H. Qi[5], M. Eijken[5], B. Jespersen[5], H.G.D. Leuvenink[6], E.S.S. Hansen[7], C. Laustsen[7], S. Ringgaard[7], R.J.H. Borra[8], A. Krarup Keller[4], C. Moers[9], [1]Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands. [2]Chirurgie – Orgaandonatie en Transplantatie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Dept. of Surgery, Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [4]Dept. of Urology, Aarhus University Hospital, Aarhus, Denemarken. [5]Dept. of Renal Medicine, Aarhus University Hospital, Aarhus, Denemarken. [6]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [7]Dept. of Clinical Medicine, Aarhus University Hospital, Aarhus, Denemarken. [8]Dept. of Radiology, UMCG, Groningen, The Netherlands. [9]Dept. of Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands.*

11.42 The setup used for ex vivo renal normothermic perfusion influences a kidney's behavior on the machine (p. 100)

*V.A. Lantinga[1], A.S. Arykbaeva[2], N.A. Spraakman[3], W.P. Blom[4], T.M. Huijink[4], D.K. de Vries[2], I.P.J. Alwayn[5], H.G.D. Leuvenink[6], C. Moers[7], L.L. van Leeuwen[6], [1]Dept. of Surgery, Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.[2]Surgery, Leiden University Medical Center, Leiden, The Netherlands. [3]Anesthesiologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Chirurgie, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [5]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [6]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [7]Dept. of Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands.*

11.51 The influence of hypothermic machine perfusion as standard preservation method on the incidence of delayed graft function of donor kidneys – a local analysis (p. 101)

*S.W. Geerts[1], B.J. Petri[2], A.D. van Zuilen[1], [1]Nefrologie, Universitair Medisch Centrum Utrecht, The Netherlands. [2]Vaatchirurgie, Universitair Medisch Centrum Utrecht, The Netherlands.*

12.00 CNN-based models of real-time-available non-invasive imaging during normothermic machine perfusion of marginal donor kidneys potentially predict acute rejection (p. 102)

*I. Cristoferi[1], F. Akram[2], S. Bouari[3], Y. Fang[4], E. Rijkse[3], M. Hoogduijn[5], R.W.F. de Bruin[6], C.C. Baan[7], M.C. Clahsen-van Groningen[8], A.P. Stubbs[9], R. Minnee[10], [1]Surgery, Erasmus MC Transplant Institute, Rotterdam, The Netherlands. [2]Dept. of Pathology & Clinical Bioinformatics, Erasmus MC, Rotterdam, The Netherlands. [3]Dept. of Surgery, Erasmus MC Transplant Institute, Rotterdam, The Netherlands. [4]Transplant Institute, ERASMUS MC, Rotterdam, The Netherlands. [5]Internal medicine, Erasmus MC, Rotterdam, The Netherlands. [6]Transplantatie Instituut, Erasmus MC, Rotterdam, The Netherlands. [7]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [8]Pathologie, Erasmus MC, Rotterdam, The Netherlands. [9]Dept. of Pathology & Clinical Bioinformatics, Erasmus MC Transplant Institute, Rotterdam, The Netherlands. [10]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands.*

12.09 Normothermic machine perfusion alters renal gene expression patterns (p. 103)

*V.A. Lantinga[1], T.L. Hamelink[2], B. Ogurlu[3], C.C. Pamplona[2], A.K. Keller[4], H.G.D. Leuvenink[5], L.L. van Leeuwen[5], L.L. Lin[6], C. Moers[7], [1]Dept. of Surgery, Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [2]Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands. [3]Chirurgie – Orgaandonatie en Transplantatie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Dept. of Renal Medicine, Aarhus University Hospital, Aarhus, Denemarken. [5]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [6]Dept. of Biomedicine, Aarhus University Hospital, Aarhus, Denemarken. [7]Dept. of Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands.*

12.18 Pre-transplant kidney assessment during normothermic machine perfusion using novel imaging techniques (p. 104)
*Y. Fang[1], A.V. Nikolaev[2], L. van Ooijen[3], G. Ambagtsheer[1], J. Essers[4], J. Dankelman[3], G. van Soest[2], R.W.F. de Bruin[5], R. Minnee[6], [1]Transplant Institute, ERASMUS MC, Rotterdam, The Netherlands. [2]Dept. of Biomedical Engineering, ERASMUS MC, Rotterdam, The Netherlands. [3]Dept. of Biomechanical Engineering, Delft University of Technology, Delft, The Netherlands. [4]Dept. of Molecular Genetics, ERASMUS MC, Rotterdam, The Netherlands. [5]Transplantatie Instituut, Erasmus MC, Rotterdam, The Netherlands. [6]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands.*

12.30 Lunch en gemodereerde postersessies

## Parallel sessie VIII – Immunology & Infection — Binnenzaal

*Voorzitters:* *Dr. Bouke Hepkema, medisch immunoloog, UMCG*
*Dr. Dave Roelen, medisch immunoloog, LUMC*

*Voordrachten in het Engels, 8 minuten presentatie en 2 minuten discussie.*

11.15 Vaccination responses to pneumococcal, tetanus and influenza in kidney transplant recipients using tacrolimus with and without mycophenolate mofetil: a randomized controlled study (p. 105)
*Z. Al Fatly[1], M.G.H. Betjes[2], W.A. Dik[3], R.A.M. Fouchier[4], M.E.J. Reinders[5], A. de Weerd[6], [1]Nefrologie en niertransplantatie, Erasmus MC, Rotterdam, The Netherlands. [2]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, The Netherlands. [3]Medische immunologie, Erasmus MC, Rotterdam, The Netherlands. [4]Viroscience en moleculaire virologie, Erasmus MC, Rotterdam, The Netherlands. [5]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [6]Interne Geneeskunde, Erasmus MC, Rotterdam, The Netherlands.*

11.25 Repeated COVID-19 vaccination enhances memory T-cell IL-21 and memory B-cell responses in immunocompromised kidney transplant recipients (p. 106)
*S.R.K. Malahe[1], Y. den Hartog[2], D. van Baarle[3], F.J. Bemelman[4], D.A. Diavatopoulos[5], R.T. Gansevoort [6], D. Geers[7], C.H. Geurts van Kessel[7], L.B. Hilbrands[8], M.M.L. Kho[2], R. de Kuiper[1], A.L. Messchendorp[9], R.G. van der Molen[10], A.M. Ras[1], D. Reijerkerk[1], E.B.M. Remmerswaal[11], J.S.F. Sanders[12], R.D. de Vries[7], M.E.J. Reinders[2], C.C. Baan[2], [1]Dept. of Internal Medicine, Nephrology and Transplantation, Erasmus MC Tran, Erasmus MC, Rotterdam, The Netherlands. [2]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [3]Medical Microbiology and Infection Prevention, University Medical Center Groningen, Groningen, The Netherlands. [4]Nefrologie, Amsterdam UMC, Amsterdam, The Netherlands. [5]Of Laboratory Medicine, Laboratory of Medical Immunology,, Radboud University Medical Center Nijmegen, Nijmegen, The Netherlands. [6]Internal Medicine, Division of Nephrology, University Medical Center Groningen, Groningen, The Netherlands. [7]Viroscience, ErasmusMC, Rotterdam, The Netherlands.[8]Nefrologie, RadboudUMC, Nijmegen, The Netherlands. [9]Nefrologie, UMCG, Groningen, The Netherlands. [10]Medische Immunologie, Radboudumc, Nijmegen, The Netherlands. [11]Experimental Immunology, University of Amsterdam, Amsterdam, The Netherlands. [12]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

11.35 The clinical utility of post-transplant monitoring of donor-specific antibodies in stable renal transplant recipients: A consensus report with guideline statements for clinical practice (p. 107)

*D.A.J. van den Broek[1], S. Meziyerh[2], K. Budde[3], C. Lefaucheur[4], E. Cozzi[5], D. Bertrand[6], C. López del Moral[7], A. Dorling[8], M. Emonds[9], M. Naesens[10], A.P.J. de Vries[11], [1]Nierziekten, transplantatiecentrum., Leids Universitair Medisch Centrum, Leiden, The Netherlands. [2]Interne Geneeskunde, LUMC, Leiden, The Netherlands. [3]Dept. of Nephrology and Medical Intensive Care, Charité Universitätsmedizin Berlin, Berlin, Duitsland. [4]Kidney Transplant Department, Paris Translational Research Center for Organ Transplantation, Parijs, Frankrijk. [5]Dept. of Cardiac, Thoracic and Vascular Sciences and Public Health, Padua University Hospital, Padua, Italië. [6]Dept. of Nephrology, Transplantation and Hemodialysis, Rouen University Hospital, Rouen, Frankrijk. [7]-, Valdecilla Biomedical Research Institute (IDIVAL), Santander, Spanje. [8]Dept. of Inflammation Biology, Centre for Nephrology and Transplan, King's College, Guy's Hospital, London, UK. [9]Histocompatibility and Immunogenetics Laboratory (HILA), Belgian Red Cross-Flanders, Mechelen, België. [10]Dept. of Microbiology, Immunology and Transplantation, KU Leuven, Leuven, België. [11]Nierziekten, LUMC, Leiden, The Netherlands.*

11.45 Characteristics and function of donor and recipient tissue resident lymphocytes in kidney transplants (p. 108)

*D.M. Hullegie-Peelen[1], H. Tejeda Mora[2], D.A. Hesselink[3], E.M.J. Bindels[4], T.P.P. van den Bosch[5], M.C. Clahsen-van Groningen[5], M. Dieterich[6], S. Heidt[7], R. Minnee[8], G.M.G.M. Verjans[9], M. Hoogduijn[10], C.C. Baan[6], [1]Interne geneeskunde - Nefrologie & Transplantatie, Erasmus MC, Rotterdam, The Netherlands. [2]Internal Medicine, Erasmus MC Transplant Institute, Rotterdam, The Netherlands. [3]Nefrologie, Erasmus MC, Rotterdam, The Netherlands. [4]Hematologie, Erasmus MC, Rotterdam, The Netherlands. [5]Pathologie, Erasmus MC, Rotterdam, The Netherlands. [6]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [7]Immunologie, LUMC, Leiden, The Netherlands. [8]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands. [9]Viroscience, Erasmus MC, Rotterdam, The Netherlands. [10]Internal medicine, Erasmus MC, Rotterdam, The Netherlands.*

*Voordrachten in het Engels, 3 minuten presentatie en 2 minuten discussie.*

11.55 Functional outcomes after alemtuzumab therapy for T-cell mediated, antibody-mediated and mixed-type kidney transplant rejection (p. 109)

*L.K. van Vugt[1], M. van der Zwan[2], M.C. Clahsen-van Groningen[3], B.C.M. de Winter[4], M.E.J. Reinders[5], P. Miranda Afonso[6], D.A. Hesselink[7], [1]Nefrologie, Erasmus MC, ROTTERDAM, The Netherlands. [2]Nefrologie, Albert Schweitzer ziekenhuis, Dordrecht, The Netherlands. [3]Pathologie, Erasmus MC, Rotterdam, The Netherlands. [4]Hospital Pharmacy, Erasmus MC, Rotterdam, The Netherlands. [5]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [6]Biostatistiek en Epidemiologie, Erasmus MC, ROTTERDAM, The Netherlands. [7]Nefrologie, Erasmus MC, Rotterdam, The Netherlands.*

12.00 Visualizing the effect of BCL6 inhibition on B and T lymphocytes by the small molecule compound 79-6 by means of imaging flow cytometry (p. 110)

*R. Kraaijeveld, D.A. Hesselink, C.C. Baan, Internal medicine - Division of Nephrology and Transplantation, Erasmus MC - Transplant institute - University Medical Center, Rotterdam, The Netherlands.*

12.05 Potential immunogenicity and sensitivity to IFNγ of kidney tubuloids (p. 111)
*T. Kardol-Hoefnagel[1], D. Oztoprak[1], H. Hokke[1], C. Pou Casellas[2], C.M.E. Ammerlaan[2], M.B. Rookmaaker[3], M.C. Verhaar[3], H.G. Otten[4], [1]Center for Translational Immunology, UMC Utrecht, Utrecht, The Netherlands. [2]Dept. of Nephrology and Hypertension, Hubrecht Institute-Royal Netherlands Academy of Arts and Sciences + UMC Utrecht, Utrecht, The Netherlands. [3]Dept. of Nephrology and Hypertension, UMC Utrecht, Utrecht, The Netherlands. [4]Center for Translational Immunology + Central Diagnostic Laboratory (CDL), UMC Utrecht, Utrecht, The Netherlands.*

12.10 The risk of microbial infection in recipients of donor livers that underwent hypothermic or normothermic machine perfusion (p. 112)
*B.L. Lascaris[1], C.E. Endo[2], I.M.A. Brüggenwirth[3], V.E. de Meijer[4], E.H.E. Doting[5], R.J. Porte[6], [1]Surgery, Section of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, Groningen, The Netherlands. [2]Dept. of Surgery, Section of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, Groningen, The Netherlands. [3]Hepato-Pancreato-Biliare Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Hepato-pancreato-biliare chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Dept. of Microbiology, University Medical Center Groningen, University Medical Center Groningen, Groningen, The Netherlands. [6]Heelkunde, UMC Groningen, Groningen, The Netherlands.*

12.15 Multiparameter analysis of alloreactive T cells identified by activation-induced markers (AIMs); different AIMs recognize specific T cell subsets (p. 113)
*N.H.R. Litjens[1], A.C.J. van der List[2], M. Klepper[1], F. Prevoo[1], E.M. van der Valk[1], M.G.H. Betjes[1], [1]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, The Netherlands. [2]Interne Geneeskunde, Erasmus MC, Rotterdam, The Netherlands.*

12.20 Discussie

12.30 Lunch en gemodereerde postersessies

*Voorzitters:* *Dr. Tji Gan, longarts, UMCG*
*Dr. Merel Hellemons, longarts, Erasmus MC*

*Voordrachten in het Engels, 5 minuten presentatie en 2,5 minuten discussie.*

11.15 Lung function after thoraco-abdominal normothermic regional perfusion in a porcine DCD model (p. 114)
*M.A. Hu[1], Z.L. Zhang[1], N. Moeslund[2], P. Ryhammer[3], L. Ilkjaer[2], M. Pedersen[4], S. Tsui[5], W. Timens[6], H. Eiskjaer[7], M.E. Erasmus[1], [1]Cardiothoracale Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Cardiothoracale Chirurgie, Aarhus University hospital, Aarhus, Denemarken. [3]Anesthesiologie, Region Hospital Silkeborg, Silkeborg, Denemarken. [4]Clinical Medicine, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Cardiothoracale Chirurgie, Royal Papworth Hospital NHS Foundation Trust, Cambridge, UK. [6]Pathologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [7]Cardiologie, Aarhus University hospital, Aarhus, Denemarken.*

11.22 Effect of (micro)thrombi in donor lungs on lung function during ex vivo lung perfusion and post-operative outcomes (p. 115)
*M.A. Hu[1], Z.L. Zhang[1], R.H. Hoffmann[1], C. van de Wauwer[1], E.A.„.M. Verschuuren[2], H.G.D. Leuvenink[3], M.E. Erasmus[1], [1]Cardiothoracale Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Longziekten, UMCG, Groningen, The Netherlands. [3]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

11.29 Brain death induced lung inflammation is ameliorated after 17β-estradiol and methylprednisolone treatment in female rats (p. 116)
*M. Vidal-dos-Santos[1], L. Ferreira-da-Anunciacão[2], R.A.J. Armstrong-Jr[1], F. Yamamoto Ricardo-da-Silva[2], C. Jesus Correia[2], L.F. Pinho Moreira[2], H.G.D. Leuvenink[3], A.C. Breithuapt-Faloppa[2], [1]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [2]Cardiopneumology, Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazilië. [3]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

11.36 The ability of an electronic nose to distinguish between acute cellular rejection and infection in lung transplant recipients (p. 117)
*N. Wijbenga[1], R.A.S. Hoek[1], B.J. Mathot[1], L. Seghers[1], D. Bos[2], O.C. Manintveld[3], M. Hellemons[4], [1]Respiratory Medicine, Erasmus MC, Rotterdam, The Netherlands. [2]Radiology & Nuclear Medicine, Erasmus MC, Rotterdam, The Netherlands. [3]Cardiology, Erasmus MC, Rotterdam, The Netherlands. [4]Longziekten, Erasmus MC, Rotterdam, The Netherlands.*

11.43 Lung transplant airway complications treated with biodegradable stents; a multi-center experience (p. 118)
*R. van Pel[1], C.T. Gan[1], K. Klooster[1], J.M. Daniels[2], D. Ruigrok[3], M. Hellemons[4], D.J. Slebos[1], [1]Longziekten, UMCG, Groningen, The Netherlands. [2]Longziekten, Amsterdam UMC, Amsterdam, The Netherlands .[3]Longziekten, UMCU, Utrecht, The Netherlands.[4]Longziekten, Erasmus MC, Rotterdam, The Netherlands.*

11.50 Pregnancy after lung transplantation in the Netherlands (p. 119)
*J.R. Meinderts[1], M.C. Heeres[1], G.A. Ruigrok[2], A.T. Lely[3], E.A,.M. Verschuuren[4], M.F.C. de Jong[1], [1]Dept. of nephrology, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Dept. of Pulmonary Diseases, Universitair Medisch Centrum Utrecht, Utrecht, The Netherlands. [3]Dept. of obstetrics and gynecology, Universitair Medisch Centrum Utrecht, Utrecht, The Netherlands. [4]Longziekten, UMCG, Groningen, The Netherlands.*

11.57 The effect of Kaftrio on tacrolimus dose and blood levels, interim analysis of the KaftriO After Lung TrAnsplantation (KOALA) multicenter study (p. 120)
*K.A. Visser[1], J.P. Gemert[5], C.M.E. Hansen[2], H.D. Luijk[3], M. Hellemons[4], H.G.M. Heijerman[3], H. Vaart [5], E.A.,.M. Verschuuren[5], W.N. Steenhuis[5], [1]Dept. of pulmonary diseases and tuberculosis, University Medical Center Groningen, [2]Dept. of Clinical Pharmacy & Pharmacology, UMCG, Groningen, The Netherlands. [3]Longziekten, UMCU, Utrecht, The Netherlands. [4]Longziekten, Erasmus MC, Rotterdam, The Netherlands. [5]Longziekten, UMC Groningen, The Netherlands.*

12.04 Malnutrition in lung transplant candidates: phenotype and nutrition impact symptoms (p. 121)
*I.M.Y. van Vliet[1], F. Geelhoed[1], K.A. Visser[2], E.A.,.M. Verschuuren[3], H. Jager-Wittenaar[4], [1]Dept. of Dietetics, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands. [2]Dept. of pulmonary diseases and tuberculosis, University Medical Center Groningen, Groningen, The Netherlands. [3]Longziekten, UMCG, Groningen, The Netherlands. [4]Research Group Healthy Ageing, Health Care and Nursing, Hanze University of Applied Sciences, Groningen, The Netherlands.*

12.11 Lung transplant associated diaphragm dysfunction (p. 122)
*K. .L. Parlevliet[1], J.P. van Gemert[2], M. .L. Duiverman[1], M.E. Erasmus[3], J. .M. Droogh[4], W.N. Steenhuis[1], E.A.,.M. Verschuuren[1], C.T. Gan[1], [1]Longziekten, UMCG, Groningen, The Netherlands. [2]Longziekten en tuberculose, UMCG, Groningen, The Netherlands. [3]Cardiothoracale Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Intensive Care, UMCG, Groningen, The Netherlands.*

12.18 Genomic landscaping of post-transplant lymphoproliferative disorders using circulating tumor DNA (p. 123)
*N. Veltmaat[1], G.W. Tan[2], J.A.A. Bult[1], Y. Zhong[1], W.J. Plattel[1], R. Mous[3], P.G.N.J. Mutsaers[4], W. Stevens[5], J.S.P. Vermaat[6], E.A.,.M. Verschuuren[7], M. Chamuleau[8], A. Diepstra[2], J.H.M. van den Berg[2], F.M. Montes de Jesus[9], M. Nijland[1], [1]Hematology, Univeristy Medical Centre Groningen, Groningen, The Netherlands. [2]Pathology & Medical Biology, Univeristy Medical Centre Groningen, Groningen, The Netherlands. [3]Hematology, University Medical Centre Utrecht, Utrecht, The Netherlands. [4]Hematology, Erasmus Medical Centre, Rotterdam, The Netherlands. [5]Hematology, Radboud University Medical Centre, Nijmegen, The Netherlands. [6]Hematology, Leiden Univeristy Medical Centre, Leiden, The Netherlands. [7]Longziekten, UMCG, Groningen, The Netherlands. [8]Hematology, Amsterdam University Medical Centre, Amsterdam, The Netherlands. [9]Nuclear Medicine, Univeristy Medical Centre Groningen, Groningen, The Netherlands.*

12.30 Lunch en gemodereerde postersessies

## Postersessie VII — Foyer Grote Zaal

*Moderator:* *Dr. Erik Verschuuren, internist-klinisch immunoloog, voorzitter organisatiecomité UMCG*

12.45 Successful aortic arch cannulation and perfusion of a heart donated after circulatory death: a case report (p. 124)
*M.T. Vervoorn[1], P. van Kaam[2], M.M. Mokhles[3], N.P. van der Kaaij[1], M. Gianoli[3], [1]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, [2]Klinische Perfusie, HeartBeat Dutch Perfusion Services, Eemnes, [3]Cardiothoracale chirurgie, UMC Utrecht, Utrecht, The Netherlands.*

12.50 Non-tuberculous mycobacteria infection pre-lung transplantation: A systematic review of the treatment regimens and duration pre- and post-transplant (p. 125)
*J.P. van Gemert[1], S.J. Ravensbergen[1], E.A.M. Verschuuren[2], H.A.M. Kerstjens[1], B.W.M. Willemse[3], J. van Ingen[4], W. Hoefsloot[5], O.W. Akkerman[1], [1]Longziekten en tuberculose, UMCG, Groningen, [2]Longziekten, UMCG, Groningen, [3]Kinderlongziekten, UMCG, Groningen, [4]Microbiologie, Radboudumc, Nijmegen, [5]Longziekten, Radboudumc, Nijmegen, The Netherlands.*

## Postersessie VIII — Foyer Grote Zaal

*Moderator:* *Dr. Robert Pol, Vaat-en transplantatie Chirurgie, UMCG*

12.45 Age-related differences in onset of donor-specific hyporesponsiveness in stable renal transplant recipients post transplantation (p. 128)
*A.C.J. van der List[1], N.H.R. Litjens[2], M. Klepper[2], F. Prevoo[2], M.G.H. Betjes[2], [1]Interne Geneeskunde, Erasmus MC, Rotterdam, [2]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, The Netherlands.*

12.50 Furosemide attenuates tubulointerstitial injury and allows functional testing of porcine kidneys during normothermic machine perfusion (p. 127)
*B. Ogurlu[1], T.L. Hamelink[2], V.A. Lantinga[3], H.G.D. Leuvenink[4], M.B.F. Pool[1], C. Moers[5], [1]Chirurgie – Orgaandonatie en Transplantatie, Universitair Medisch Centrum Groningen, Groningen, [2]Surgery - Organ Donation & Transplantation, UMCG, Groningen, [3]Dept. of Surgery, Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, [4]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, [5]Dept. of Surgery - Organ Donation & Transplantation, UMCG, Groningen, The Netherlands.*

## Postersessie IX — Foyer Grote Zaal

*Moderator:* *Dr. Charlotte Bootsma-Robroeks, kinderarts-kindernefroloog, UMCG*

12.45 Apolipoprotein B-48 and incident graft failure in renal transplant recipients (p. 129)
*U.J.F. Tietge[4], A. Soteriou[2], M.H. de Borst[2], S.J.L. Bakker[3], Tamas Szili-Torok[1]*, [1]Internal Medicine, University Medical Center Groningen, Groningen, [2]Internal medicine, University Medical*

*Center Groningen, Groningen, [3]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Division of Clinical Chemistry, Karolinska Institutet, Stockholm, Zweden.*
**Presenting*

12.50 The development of a population pharmacokinetic model for melt dose tacrolimus (Envarsus®) in elderly kidney transplantation patients (p. 130)
*J. Kamp[1], P.J.M. van der Boog[2], A.P.J. de Vries[2], D.J.A.R. Moes[3], [1]Klinische Farmacie & Farmacologie, Leids Universitair Medisch Centrum, Leiden, [2]Nierziekten, LUMC, Leiden, [3]Toxicologie en Farmacologie, LUMC, Leiden, The Netherlands.*

12.55 Urinary biomarkers in a living donor kidney transplantation cohort – predictive value on early and long-term graft function (p. 131)
*G.J.J. Huisman[1], N.A. Spraakman[2], A.M. Talsma[3], R.A. Pol[4], M.M.R.F. Struys[2], S.P. Berger[5], H.G.D. Leuvenink[6], G.J. Nieuwenhuijs-Moeke[2], [1]Anesthesiologie/chirurgie, UMCG, Groningen, [2]Anesthesiologie, Universitair Medisch Centrum Groningen, Groningen, [3]Anesthesiologie, UMCG, Groningen, [4]Chirurgie, Universitair Medisch Centrum Groningen, Groningen, [5]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, [6]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands.*

13.00 Uptake of home-monitoring after kidney transplantation: a retrospective analysis (p. 132)
*B. Hezer[1], E.K. Massey[1], M.E.J. Reinders[2], M. Tielen[1], J. van de Wetering[3], D.A. Hesselink[4], M.W.F. van den Hoogen[5], [1]Interne Geneeskunde, Erasmus MC, Rotterdam, [2]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, [3]Interne geneeskunde, ErasmusMC Rotterdam, Rotterdam, [4]Nefrologie, Erasmus MC, Rotterdam, [5]Internal Medicine, Erasmus MC Transplant Institute, Rotterdam, The Netherlands.*

## Postersessie X — Foyer Grote Zaal

*Moderator:* *Dr. Frederike van Vilsteren, MDL-arts, UMCG*

12.45 A low abundance of hla in urinary extracellular vesicles hinders the identification of donor-specific vesicles in urine after kidney transplantation (p. 134)
*L.W.U. Wu[1], C.C. Baan[2], M. Van Heugten[1], D.A. Hesselink[3], K. Boer[4], [1]Internal Medicine Department, Erasmus Medical Center, Rotterdam, [2]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, [3]Nefrologie, Erasmus MC, Rotterdam, [4]Inwendige Geneeskunde, Erasmus MC Transplant Institute, Rotterdam, The Netherlands.*

12.50 Immune cell repertoire in kidney transplant biopsies classified as acute rejection (p. 135)
*H. Varol[1], K. Hoeft[2], K. Lila[1], I. Cristoferi[3], C.C. Baan[4], D.A. Hesselink[5], R. Kramann[6], M.E.J. Reinders[4], J.H. von der Thusen[1], T.P.P. van den Bosch[1], M.C. Clahsen-van Groningen[1], [1]Pathologie, Erasmus MC, Rotterdam, [2]Institute of Experimental Medicine and Systems Biology, RWTH Aachen University, Aachen, Germany. [3]Surgery, Erasmus MC Transplant*

*Institute, Rotterdam, [4]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, [5]Nefrologie, Erasmus MC, Rotterdam, The Netherlands. [6]Interne Geneeskunde, RWTH Aachen University, Aachen, Germany.*

12.55 Pre-transplant proportions of polyfunctional donor-reactive T cells are associated with acute T-cell mediated rejection of the kidney transplant within the first year after transplantation (p. 133)
*N.H.R. Litjens[1], A.C.J. van der List[2], M. Klepper[1], F. Prevoo[1], K. Boer[3], D.A. Hesselink[4], M.G.H. Betjes[1], [1]Internal Medicine, Division of Nephrology and Transplantation, Erasmus MC Transplant Institute, University Medical Center Rotterdam, Rotterdam, [2]Interne Geneeskunde, Erasmus MC, ROTTERDAM, [3]Inwendige Geneeskunde, Erasmus MC Transplant Institute, Rotterdam, [4]Nefrologie, Erasmus MC, Rotterdam, The Netherlands.*

## Postersessie XI — Foyer Grote Zaal

*Moderator: Dr. Marion Siebelink, onderzoeker, UMCG*

12.45 Gene expression in intestinal transplant patients treated with vedolizumab (p. 136)
*G. Trentadue[1], S. Xu[2], B.H. Jansen[2], K.N. Faber[2], G. Dijkstra[2], [1]Maag-, Darm- en Leverziekten, Universitair Medisch Centrum Groningen, Groningen, [2]Gastroenterology and Hepatology, University Medical Center Groningen, Groningen, The Netherlands.*

12.50 Decoding donor and recipient cell dynamics in the small bowel graft within six months post-transplantation (p. 137)
*W.T.C. Uniken Venema[1], N. Karmi[1], R. Oelen[2], M.G.P. van der Wijst[2], E. Bigaeva[1], M.X.L. . Dijkema[3], S. De Jong[1], F. van der Heide[1], R.K. Weersma[1], E.A.M. Festen[1], G. Dijkstra[4], [1]MDL, UMCG, Groningen, [2]Genetica, UMCG, Groningen, [3]Genetics, UMCG, Groningen, [4]Gastroenterology and Hepatology, University Medical Center Groningen, Groningen, The Netherlands.*

12.55 'Walking is fun but walking together is even more fun': an evaluation of the Walk&Talk program in the Netherlands (p. 138)
*J.H. Annema[1], N. van Dijk[2], [1]Gezondheidswetenschappen, Universitair Medisch Centrum Groningen, Groningen, [2]Transplantation division, Chiesi Pharmaceuticals B.V., Schiphol, The Netherlands.*

13.00 Older living liver donors can enlarge the donor pool: a systematic review and meta-analysis (p. 139)
*H.W. ter Burg[1], A.J. Chorley[1], W.G. Polak[2], L.W. Kranenburg[3], M.U. Boehnert[4], R. Minnee[5], [1]Hepato-Pancreato-Biliaire (HPB)/Transplantatie Chirurgie, Erasmus Medisch Centrum Rotterdam, Rotterdam, [2]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, [3]Psychiatrie, Erasmus Medisch Centrum Rotterdam, Rotterdam, [4]Organ Transplant Center of Excellence, King Faisal Specialist Hospital and Research Center, Riyadh, Saoedi-Arabië. [5]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands.*

## Parallel sessie X – Kidney II — Grote Zaal

*Voorzitters:* *Dr. Jan-Stephan Sanders, internist-nefroloog, UMCG*
*Dr. Dorottya de Vries, chirurg, LUMC*

*Voordrachten in het Engels, 8 minuten presentatie en 2 minuten discussie.*

13.30 Short-term outcome after simultaneous pancreas and kidney transplantation with alemtuzumab versus basiliximab induction; a single-center retrospective study (p. 140)
*T.D.A. Swaab[1], M.J. Crop[2], J.S.F. Sanders[3], S.P. Berger[2], H.S. Hofker[1], R.A. Pol[1], C.A. te Velde-Keyzer[2], [1]Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

13.40 Robotic-assisted kidney transplantation: Initial results and comparison with the open conventional technique (p. 141)
*M.M. Idu[1], M. Willems[1], V. Jongkind[1], K.A. van der Pant[2], S.A. Nurmohamed[2], F.J. Bemelman[2], [1]Vaat/Transplantatie Chirurgie, Amsterdam UMC, Amsterdam, The Netherlands. [2]Nefrologie, Amsterdam UMC, Amsterdam, The Netherlands.*

13.50 Burden of side effects: a cross-sectional study in kidney transplant recipients (p. 142)
*N.L. Riemersma[1], T.J. Knobbe[2], D. Kremer[3], S. Nolte[1], U. Bultmann[4], J.H. Annema[5], S.P. Berger[6], S.J.L. Bakker[7], [1]Interne geneeskunde, UMCG, Groningen, The Netherlands. [2]Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Nefrologie, UMCG, Groningen, The Netherlands. [4]Community and Occupational Medicine, UMCG, Groningen, The Netherlands. [5]Gezondheidswetenschappen, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [6]Interne Geneeskunde - Nefrologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [7]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

14.00 Adverse outcomes after alemtuzumab therapy for kidney transplant rejection (p. 143)
*L.K. van Vugt[1], M. van der Zwan[2], M.C. Clahsen-van Groningen[3], B.C.M. de Winter[4], M.E.J. Reinders[5], P. Miranda Afonso[6], D.A. Hesselink[7], [1]Nefrologie, Erasmus MC, ROTTERDAM, The Netherlands. [2]Nefrologie, Albert Schweitzer ziekenhuis, Dordrecht, The Netherlands. [3]Pathologie, Erasmus MC, Rotterdam, The Netherlands. [4]Hospital Pharmacy, Erasmus MC, Rotterdam, The Netherlands. [5]Internal Medicine, Nephrology and Transplantation, Erasmus MC, Rotterdam, The Netherlands. [6]Biostatistiek en Epidemiologie, Erasmus MC, ROTTERDAM, The Netherlands. [7]Nefrologie, Erasmus MC, Rotterdam, The Netherlands.*

14.10 Kidney transplantation in patients with aorto-iliac stenosis: is it safe? (p. 144)
*J.J.M. Hamm[1], Y. Fang[2], H. Kimenai[1], R.W.F. de Bruin[3], R. Minnee[1], [1]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands. [2]Transplant Institute, ERASMUS MC, Rotterdam, The Netherlands. [3]Transplantatie Instituut, Erasmus MC, Rotterdam, The Netherlands.*

14.20 Modelling changes in the pharmacokinetics of tacrolimus during pregnancy after kidney transplantation: a retrospective cohort study (p. 145)
*M.R. Schagen[1], A.N. Ulu[2], M.I. Francke[1], J. van de Wetering[3], M.C. van Buren[1], D.A. Hesselink[4], B.C.M. de Winter[5], [1]Nefrologie & Transplantatie, Erasmus MC, Rotterdam, The Netherlands. [2]Ziekenhuisapotheek, Erasmus MC, Rotterdam, The Netherlands. [3]Interne geneeskunde, ErasmusMC Rotterdam, Rotterdam, The Netherlands. [4]Nefrologie, Erasmus MC, Rotterdam, The Netherlands. [5]Hospital Pharmacy, Erasmus MC, Rotterdam, The Netherlands.*

14.30 Atherosclerosis and intrarenal resistance index in kidney transplant recipients (p. 146)
*N.T. Bloemendal[1], R. Hertsig[1], S. Benjamens[2], A. van de Kuit[1], T.D.A. Swaab[3], D. Yakar[4], R. Minnee[5], I.F.J. Tielliu[6], S.J.L. Bakker[7], R.A. Pol[3], [1]Chirurgie, niertransplantatie, UMCG, Groningen, The Netherlands. [2]Chirurgie, Erasmus MC, Rotterdam, The Netherlands. [3]Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [4]Chirurgie, radiologie, UMCG, Groningen, The Netherlands. [5]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands. [6]Vaatchirurgie, UMCG, Groningen, The Netherlands. [7]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

14.45 Koffiepauze

## Parallel sessie XI - Donation & allocation — Binnenzaal

*Voorzitters:* *Dr. Kirsten Ma, orgaanperfusionist / transplantatiecoördinator, UMCG*
*Ellen van Tiggelhoven, orgaandonatiecoördinator, LUMC*

*Voordrachten in het Engels, 8 minuten presentatie en 2 minuten discussie.*

13.30 The quality of life of living liver donors post-donation: an ambidirectional cohort study (p. 147)
*H.W. ter Burg[1], A.J. Chorley[1], L. Elshove[2], L.W. Kranenburg[3], C.M. den Hoed[2], M.U. Boehnert[4], R. Minnee[5], [1]Hepato-Pancreato-Biliaire (HPB)/Transplantatie Chirurgie, Erasmus Medisch Centrum Rotterdam, Rotterdam, The Netherlands. [2]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, The Netherlands. [3]Psychiatrie, Erasmus Medisch Centrum Rotterdam, Rotterdam, The Netherlands. [4]Organ Transplant Center of Excellence, King Faisal Specialist Hospital and Research Center, Riyadh, Saoedi-Arabië. [5]Transplantatiechirurgie, Erasmus MC, Rotterdam, The Netherlands.*

13.40 Activation of the complement system early on during brain death management (p. 148)
*L.W.D. Knijff[1], S.W. van der Kooij[1], D.J. van Gijlswijk-Janssen[1], M.F. van Essen[1], J.F. Mulvey[2], M.L. Lo Faro[3], R.J. Ploeg[3], C. van Kooten[1], [1]Nephrology, Leiden University Medical Center, Leiden, The Netherlands. [2]Surgical Sciences, Oxford University, Oxford, UK. [3]Nuffield Dept. of surgical sciences, University of Oxford, Oxford, UK.*

13.50 Risk factors for primary graft dysfunction after heart transplantation - a systematic review and meta-analysis (p. 149)
*M.T. Vervoorn[1], S.E. Kaffka genaamd Dengler[1], J. Kernkamp[2], E.M. Ballan[3], M. Mishra[2], N.P. van der Kaaij[1], [1]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, The Netherlands. [2]Cardiothoracale chirurgie, UMC Utrecht, Utrecht, The Netherlands. [3]Cardiothoracale Chirurgie & Experimentele Cardiologie, UMC Utrecht, Utrecht, The Netherlands.*

14.00 How Dutch intensivists discuss patient's donor registration in the recently introduced soft opt-out system for organ and tissue donation: a qualitative embedded multiple-case study (p. 150)
*S.P.C. van Oosterhout, A.G. van der Niet, G. Olthuis, J.L.P. van Gurp, IQ healthcare, Radboud University Medical Center, Nijmegen, The Netherlands.*

14.10 Luminal preservation of the human intestine with a polyethylene glycol solution applicable for transplantation: the LUMINTRAL study (p. 151)
*G. Trentadue[1], M. Clarysse[2], J.B. van Praagh[3], E. Canovai[2], H.G.D. Leuvenink[4], J. Pirenne[2], K.N. Faber[5], G. Kats-Ugurlu[6], J.W. Haveman[3], L. Ceulemans[2], G. Dijkstra[5], A.M. de Jong[1], [1]Maag-, Darm- en Leverziekten, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Dept. of Microbiology Immunology and Transplantation, University Hospitals Leuven, Leuven, België. [3]Surgery, University Medical Center Groningen, Groningen, The Netherlands. [4]Dept. of Surgery – Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [5]Gastroenterology and Hepatology, University Medical Center Groningen, Groningen, The Netherlands. [6]Pathology and Medical Biology, University Medical Center Groningen, Groningen, The Netherlands.*

14.20 Permissive or hostile recipient environments? Proteomic and metabolomic profiles of recipients of kidney donor pairs with contrasting outcomes (p. 152)
*L.J.S. Lerink[1], M.L. Lo Faro[2], I.P.J. Alwayn[3], R.J. Ploeg[2], S. Shaheed[2], J.H.N. Lindeman[1], [1]Transplantatie Centrum, LUMC, Leiden, The Netherlands. [2]Nuffield Dept. of surgical sciences, University of Oxford, Oxford, UK. [3]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands.*

14.30 Organ donation after euthanasia – an increase of a substantial number of donors and transplantations in 10 years; resulting in the 100th donation procedure (p. 153)
*N.E. Jansen[1], H. van Wezel[1], B.J.J.M. Haase-Kromwijk[2], [1]B&O, NTS, Leiden, The Netherlands. [2]RvB, NTS, Leiden, The Netherlands.*

14.45 Koffiepauze

## Parallel sessie XII - Machine perfusion II — Kleine Zaal

*Voorzitters:* *Dr. Cyril Moers, chirurg, UMCG*
*Prof. dr. Ian Alwayn, chirurg, LUMC*

*Voordrachten in het Engels, 7 minuten presentatie en 2 minuten discussie.*

13.30 Ex situ pressure-volume loop analysis during oxygenated normothermic heart perfusion: a proof of concept (p. 154)
*I.A. Ertugrul[1], V. van Suylen[1], B.D. Westenbrink[2], H. van Goor[3], M.E. Erasmus[1], [1]Cardiothoracale Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Cardiologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Pathologie en Medische microbiologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

13.39 The need for an artificial kidney for long-term normothermic machine perfusion of human donor livers up to one week (p. 155)

*B.L. Lascaris[1], M.W.N.N. Nijsten[2], R.J. Porte[3], V.E. de Meijer[4], [1]Surgery, Section of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, Groningen, The Netherlands. [2]Critical Care, University Medical Center Groningen, Groningen, The Netherlands. [3]Heelkunde, UMC Groningen, Groningen, The Netherlands. [4]Hepato-pancreato-biliare chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

13.48 Prolonged hypothermic machine perfusion to enable daytime liver transplantation – a randomized clinical trial (p. 156)

*I.M.A. Brüggenwirth[1], V.A. Lantinga[2], B.L. Lascaris[3], A.M. Thorne[4], M. Meerdink[4], R.H.J. de Kleine[4], H. Blokzijl[5], A.P. van den Berg[5], K.M.E.M. Reyntjens[6], J.A. Lisman[7], R.J. Porte[8], V.E. de Meijer[4], [1]Hepato-Pancreato-Biliare Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [2]Dept. of Surgery, Organ Donation and Transplantation, UMCG, University Medical Center Groningen, Groningen, The Netherlands. [3]Surgery, Section of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, Groningen, The Netherlands. [4]Hepato-pancreato-biliare chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Hepatologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [6]Anesthesiologie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [7]Experimentele Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [8]Heelkunde, UMC Groningen, Groningen, The Netherlands.*

13.57 Improved pancreatic islet isolation yield after abdominal normothermic regional perfusion of controlled donation after circulatory death donors (p. 157)

*R.M. van Rooden[1], J.B. Doppenberg[2], M.C. van Dijk[3], F.H.C. de Goeij[4], F.J. van der Heijden[5], I.P.J. Alwayn[1], E.J.P. de Koning[6], J. de Jonge[7], M.A. Engelse[6], V.A.L. Huurman[1], [1]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [2]Transplantatie, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [3]LUMC Transplant Center, Dept. of Surgery, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [4]Heelkunde, Erasmus Medisch Centrum, Rotterdam, The Netherlands. [5]Dept. of Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [6]Nierziekten, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [7]Chirurgie, Erasmus MC, Rotterdam, The Netherlands.*

14.06 Perfusion pressures, intrahepatic perivascular edema, and paradoxical weight loss during normothermic machine perfusion of human donor livers (p. 158)

*B.L. Lascaris[1], S.B.B. Bodewes[1], A.M. Thorne[2], M.C.H. van den Heuvel[3], R.J.H. de Haas[4], M.W.N.N. Nijsten[5], V.E. de Meijer[2], R.J. Porte[6], [1]Surgery, Section of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, Groningen, The Netherlands. [2]Hepato-pancreato-biliare chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [3]Pathology, University Medical Center Groningen, Groningen, The Netherlands. [4]Radiology, University Medical Center Groningen, Groningen, The Netherlands. [5]Critical Care, University Medical Center Groningen, Groningen, The Netherlands. [6]Heelkunde, UMC Groningen, Groningen, The Netherlands.*

14.15 Optimization of ex vivo normothermic liver perfusion through the addition of (un)conjugated bile acid infusion (p. 159)

*L.J. Stevens[1], J.B. Doppenberg[2], J. Dubbeld[1], M.P. Caspers[3], B. van Hoek[4], E. van de Steeg[5], I.P.J. Alwayn[6], [1]Dept. of Surgery, Leiden University Medical Center (LUMC), Leiden, The Netherlands. [2]Transplantatie, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [3]Microbiology & Systeem biologie, TNO, Leiden, The Netherlands. [4]Gastroenterology and*

*Hepatology, LUMC, Leiden, The Netherlands. [5]Metabolic Health Research, TNO, Leiden, The Netherlands. [6]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands.*

14.24 Plasma matrix metalloproteinase-9 levels post-transplant correlate to worse ischemia reperfusion injury and are partially ameliorated by normothermic machine perfusion in liver transplantation (p. 160)

*A.M.P. den Dekker[1], S. Shaheed[2], D. Nasralla[3], P. Friend[3], M.E. Tushuizen[4], B. van Hoek[5], I.P.J. Alwayn[6], M.L. Lo Faro[2], [1]Dept. of transplant surgery, Leiden University Medical center, Leiden, The Netherlands. [2]Nuffield Dept. of surgical sciences, University of Oxford, Oxford, UK. [3]Nuffield Dept. of surgical sciences, Oxford University, Oxford, UK. [4]Dept. of GE and hepatology, Leiden University Medical center, Leiden, The Netherlands. [5]Gastroenterology and Hepatology, LUMC, Leiden, The Netherlands. [6]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands.*

14.33 Biomarkers for cardiac hypothermic machine perfusion: a multitargeted approach (p. 161)

*E.M. Ballan[1], M.T. Vervoorn[2], S.E. Kaffka genaamd Dengler[2], J. Marsman[3], M. Mishra[4], S.C.A. de Jager[3], J.P.G. Sluijter[3], P.A.F.M. Doevendans[5], F.W. Asselbergs[6], M. Mokry[3], N.P. van der Kaaij[2], [1]Cardiothoracale Chirurgie & Experimentele Cardiologie, UMC Utrecht, Utrecht, The Netherlands. [2]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, The Netherlands. [3]Experimentele Cardiologie, Universitair Medisch Centrum Utrecht, Utrecht, The Netherlands. [4]Cardiothoracale chirurgie, UMC Utrecht, Utrecht, The Netherlands. [5]Cardiologie, Universitair Medisch Centrum Utrecht, Utrecht, The Netherlands. [6]Cardiologie, University Medical Center Amsterdam, Amsterdam, The Netherlands.*

14.45 Koffiepauze

## Plenaire sessie IV – Young professionals — Grote Zaal

*Voorzitter:* *Dr. Rosa Lammerts, Medisch immunoloog i.o. UMCG*

*This session is English spoken.*

15.15 Opening

15.20 Effect of a nationwide intervention to reduce hepatectomy times in Dutch organ procurement teams (p. 162)
*I.J.C. Dielwart[1], H.C.R. Verberght[2], K.M. de Vries[3], S.J.L. Bakker[4], S.W.M. Olde Damink[2], M.C.G. van de Poll[5], R.A. Pol[6], J. de Jonge[3], [1]Interne Geneeskunde/Chirurgie, UMCG, Groningen, The Netherlands. [2]Chirurgie, Maastricht UMC, Maastricht, The Netherlands. [3]Chirurgie, Erasmus MC, Rotterdam, The Netherlands. [4]Interne Geneeskunde, Universitair Medisch Centrum Groningen, Groningen, The Netherlands. [5]Chirurgie / Intensive Care, Maastricht UMC, Maastricht, The Netherlands. [6]Chirurgie, Universitair Medisch Centrum Groningen, Groningen, The Netherlands.*

15.40 Modifying tacrolimus related toxicity after liver transplantation comparing meltdose tacrolimus (Envarsus®) and extended-release tacrolimus (Advagraf®): a multicenter randomized, controlled trial (MOTTO ) (p. 163)
*M.B. Mulder[1], B. van Hoek[2], W.G. Polak[3], I.P.J. Alwayn[4], B.C.M. de Winter[1], S. Darwish Murad[5], L. Elshove[6], A. van den Burg[6], N.S. Erler[7], D.A. Hesselink[8], C.M. den Hoed[6], H.J. Metselaar[6], [1]Hospital Pharmacy, Erasmus MC, Rotterdam, The Netherlands. [2]Gastroenterology and Hepatology, LUMC, Leiden, The Netherlands. [3]Surgery, Division of HPB and Transplant Surgery, Erasmus MC, Rotterdam, The Netherlands. [4]Heelkunde, Leids Universitair Medisch Centrum, Leiden, The Netherlands. [5]MDL, Erasmus MC Transplantatie Instituut, Rotterdam, The Netherlands. [6]Gastroenterology and Hepatology, Erasmus MC, Rotterdam, The Netherlands. [7]Biostatistics and epidemiology, Erasmus MC, Rotterdam, The Netherlands. [8]Nefrologie, Erasmus MC, Rotterdam, The Netherlands.*

16.00 Deep learning-based histopathologic segmentation of peritubular capillaries in kidney transplant biopsies (p. 164)
*D. van Midden[1], M. Hermsen[1], L.B. Hilbrands[2], E. Steenbergen[1], N. Kozakowski[3], J. Kers[4], Z. Kikic[5], J. van der Laak[6], [1]Pathology, Radboud University Medical Center (Radboudumc), Nijmegen, The Netherlands. [2]Nefrologie, Radboudumc, Nijmegen, The Netherlands. [3]Pathology, Medical University of Vienna, Vienna, Oostenrijk. [4]Pathologie, LUMC, Leiden, The Netherlands. [5]Nephrology, Medical University of Vienna, Vienna, Oostenrijk. [6]Pathologie, Radboud University Medical Center (Radboudumc), Nijmegen, The Netherlands.*

16.20 Chimeric HLA Antibody Receptor (CHAR) T-cell engineering – a new approach to target HLA sensitization (p. 165)
*I. Gille[1], P.M.W. van der Meer-Prins[2], R.S. Hagedoorn[3], M.H.M. Heemskerk[3], S. Heidt[4], [1]Immunologie, Leiden University Medical Center, Leiden, The Netherlands. [2]Immunology, Leiden University Medical Center, Leiden, The Netherlands. [3]Hematologie, Leiden University Medical Center, Leiden, The Netherlands. [4]Immunologie, LUMC, Leiden, The Netherlands.*

16.45 Afsluiting congres

**Clinical relevance and outcome of routine endomyocardial biopsy to detect rejection after heart transplantation**

*L.C. Kieviet[1], M.K. Szymanski[1], M.G. van der Meer[1], N.P. van der Kaaij[2], N. de Jonge[1], L.W. van Laake[1], M.I.F.J. Oerlemans[1], [1]Hartfalen, UMC Utrecht, Utrecht, [2]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, The Netherlands.*

Background: After heart transplantation (HTx), endomyocardial biopsies (EMBs) are the gold standard to monitor cardiac allograft rejection. However, a clear consensus on the optimal frequency and duration of EMB monitoring is lacking. Since the first HTx in 1985 in our center, EMB protocols have gradually changed to a low-frequency schedule. We assessed the diagnostic yield and complication rate of the three different EMB protocols used during the past 37 years.
Methods: In this retrospective, single centre, observational study, all biopsy data of routine EMBs after HTx between 1985 and 2022 were collected for analysis. Patients with symptom-driven biopsies were excluded. The total number of biopsies, type of rejection and complications were evaluated.
Results: In a total of 434 patients (70.3% male, mean age at transplant 48±13 years), 6547 routine surveillance EMB procedures were performed. The average number of biopsy procedures per patient was 24±9 for protocol 1 (n=45, 1985-1994), 17±4 for protocol 2 (n= 214, 1994-2009) and 11±3 for protocol 3 (n=175, 2009-2022). Cellular rejection was detected in 9.15%, of which grade I, II and III cellular rejections were seen in 7.5%, 1.60% and 0.05%, respectively. The frequency of ≥ ISHLT grade 2R requiring additional treatment was 1.65% and decreased over time with each EMB protocol (2.90%, 1.76%, and 0.77%). Complication rate was 1.66%, mainly consisting of puncture of the carotid artery (57.8%). Independent of the EMB protocol used, the majority of rejections occurred within the first six months after HTx (67.9%).
Conclusions: Complications of EMB after HTx are rare. Cellular rejection mostly occurs within the first 6 months after HTx. The incidence of clinically relevant cellular rejection (≥ISHLT grade 2) has declined over time, partly due to improved immunosuppressive therapy. A conservative approach using a low-frequency EMB schedule seems feasible and safe.

**Parainfluenza virus infections in lung transplant recipients: a multicenter comparison with influenza virus and assessment of ribavirin efficacy.**

*A.E.S. De Zwart[1], A. Riezebos-Brilman[2], A. Rasoul[3], H.D. Luijk[4], H.A.M. Kerstjens[5], C.T. Gan[6], J.W.C. Alffenaar[7], E.A.„.M. Verschuuren[6], [1]Dept. of Pulmonary Diseases and Tuberculosis, University of Groningen, University Medical Centre Groningen, Groningen. [2]Laboratory for Medical Microbiology and Public Health, Labmicta, Hengelo. [3]Dept. of Respiratory Medicine, University Medical Center Utrecht, Utrecht. [4]Longziekten, UMCU, Utrecht. [5]Longziekten en tuberculose, UMCG, Groningen. [6]Longziekten, UMCG, Groningen, The Netherlands. [7]Faculty of Medicine and Health, School of Pharmacy, University of Sydney, Sydney, Australia.*

Background: Influenza virus and parainfluenza virus are among the most common respiratory virus infections in lung transplant recipients and have been associated with chronic lung allograft dysfunction (CLAD). Large multicenter studies evaluating disease and treatment outcomes (especially ribavirin for PIV) are lacking however.
Methods: We conducted a large multicenter retrospective cohort study including all LTR with an influenza or parainfluenza infection. Infected LTR were 1:1 matched to parainfluenza/influenza uninfected controls for baseline variables using propensity scores. Outcome measures were CLAD incidence, mortality and FEV1 recovery over time. Ribavirin efficacy for parainfluenza was studied using inverse propensity of treatment weighting (IPTW) analyses to minimize treatment selection bias.
Results: 261 cases (150 influenza, 111 parainfluenza) and 181 controls were included. Parainfluenza showed similar morbidity to influenza, both showed considerably faster CLAD development compared to controls (influenza: HR 2.78 [1.26; 6.13], parainfluenza: HR 2.48 [1.11; 5.53]). Clinical presentation with severe FEV1 drop was associated with CLAD (HR 3.99 [1.83; 8.67]) and worse FEV1 recovery over time (-7.8% [-10.8; -4.7]). In contrast, patients with mild drops at presentation tended to recover favourably and at a similar rate to controls (mild drop vs. controls: HR 2.06 [0.91; 4.7]). Ribavirin therapy for parainfluenza had no effect on CLAD development (HR 0.41 [0.11-1.49]), mortality (HR 1.39 [0.30-6.58]) or FEV1 recovery over time (+2% [-3.8;7.8]) in IPTW analyses.
Conclusions: Influenza and parainfluenza cause strikingly similar and significant morbidity in LTR, especially in patients showing a relevant FEV1 drop at presentation. Mild infections recovered well. Clinical relevance of ribavirin for parainfluenza is questionable, as it was not associated with improved outcomes.

**The effects of hemoadsorption during ex situ perfusion of porcine hearts**

*Sluijter[4], N.P. van der Kaaij[1], [1]Cardiothoracale Chirurgie, UMC Utrecht, Utrecht, [2]LifeTec Group, Eindhoven. [3]Cardiologie, Universitair Medisch Centrum Utrecht, Utrecht. [4]Experimentele Cardiologie, Universitair Medisch Centrum Utrecht, Utrecht, The Netherlands.*

Background: Ex situ heart perfusion (ESHP) has increased the pool of available donors by allowing the transplantation of hearts that were previously rejected for transplantation. However, preclinical studies have demonstrated that normothermic ESHP results in declining cardiac function as time progresses. A pro-inflammatory response might be an important contributor to this time-dependent decline in function, triggered by exposure to an extracorporeal circuit. Therefore, removal of cytokines and damage-associated molecules might benefit cardiac preservation during ESHP. The CytoSorb® (CytoSorbents Inc, Monmouth Junction, NJ, USA) is a polymer bead-based hemoadsorption system designed for removal of cytokines in circulating blood. Experimental studies using CytoSorb® during ex situ perfusion of kidneys and lungs show a reduction in perfusate cytokine levels and improved function. Therefore, the goal of this study is to assess the effects of hemoadsorption during normothermic ESHP on heart function and cytokine profiles in porcine hearts.
Methods: Hearts were obtained from 12 Dutch Landrace pigs bred for human consumption. After harvesting, hearts were subjected to 2 hours of static cold storage and 4 hours of normothermic ESHP on the PhysioHeart platform (LifeTec Group, Eindhoven). Hemoadsorption was used in 6 hearts, the remaining 6 hearts served as a control group. After 60 minutes of unloaded perfusion, the PhysioHeart was switched to loaded perfusion for 180 minutes. Serial assesment of heart function, biochemistry and cytokine levels were conducted after 90, 120, 180 and 240 minutes of normothermic ESHP. Cytokine levels were assessed using a porcine-specific multiplex assay (IFN-g, IL-1 a, IL-1 b, IL-1ra, IL-6, IL-8, IL-10,IL-12, IL-18, TNF-a).
Results: No significant difference was found in heart function during ESHP. Early coronary flow was significantly increased in the hemoadsorption group (T0, T30, T60), but this difference disappeared over the course of perfusion. No difference in electrolytes, hemoglobin and glucose levels were found. We're still awaiting results from cytokine analysis at this point.
Conclusions: The addition of hemoadsorption did not improve heart function during normothermic ESHP compared to controls. The association between hemoadsorption and increased coronary flow is consistent with what is known in the literature and is most likely related to an altered balance in vasoactive substances. Although we're still awaiting results from cytokine analysis, we expect these to be significantly lower in the hemoadsorption group compared to controls based on a pilot study that showed a significant reduction in tumor necrosis factor alpha in hearts subjected to hemoadsorption.

**Fasting porcine kidneys during normothermic machine perfusion does not affect mitochondrial function**

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Background: Machine perfusion as preservation technique for kidneys from marginal donors is used more often. Normothermic Machine Perfusion (NMP) enables assessment and reconditioning during the preservation period due to full metabolic activity. However, knowledge of mitochondrial metabolism and how to sustain this during NMP is lacking. Oxygen and nutrients are the two important sources for aerobic metabolism in mitochondria. It is known that oxygen is needed during NMP, but not much is known about the need for nutrients. Therefore, this study aims to investigate the effect of the presence or absence of nutrients in the perfusate during NMP on mitochondrial function.
Methods: Porcine kidneys were procured at a local slaughterhouse. After 30 minutes of warm ischemia the kidneys were perfused with oxygenated hypothermic machine for 24 hours. Thereafter, kidneys were flushed with Ringer's lactate and normothermically perfused for 6 hours, during which they were either fed ($n$=6) with glucose, fatty acids and glutamine, or fasted ($n$=6) without any nutrients. Furthermore, the perfusion solution contained autologous red blood cells, albumin, insulin, creatinine, Dulbecco's Modified Eagle Medium (DMEM) without nutrients and antibiotics. Every hour biopsies were taken to assess mitochondrial respiration, using the Oxygraph-2k. Moreover, metabolites and adenine triphosphate (ATP) were measured in tissue, perfusate and urine samples and perfusion parameters were registered.
Results: No differences in mitochondrial function, reflected by their maximal respiration, were observed between the groups. However, oxygen consumption of the whole kidney was higher during 6 hours of NMP in the fed group compared to the fasted group. During the first two hours of NMP the fasted kidneys were able to produce ATP from their remaining sources, as reflected by the increasing glucose levels and decreasing pyruvate and lactate levels. This is different in the fed group where stable glucose and pyruvate levels and decreasing lactate levels are observed. In the remaining four hours of NMP the metabolites show a similar pattern in both groups. Furthermore, a trend towards higher ATP levels after 6 hours of NMP was seen in the fed group. Kidney function, reflected by the fractional sodium excretion, was not significantly different between the groups and also perfusion parameters did not differ between the groups.
Conclusions: No differences in mitochondrial function were observed between groups despite significant differences in oxygen consumption, glucose and pyruvate levels during NMP. More in depth analyses about the resources for ATP production of fasted kidneys during NMP are currently executing.

## 17β-estradiol associated with methylprednisolone treatment modelates renal inflammation after brain death in female rats

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Background: Brain dead donors are an important source of organs for transplantation. Brain death (BD) triggers systemic alterations and these patients present a higher inflammatory frame in comparison to other types of donors. Also, organs from female patients present worse prognoses in comparison to male organs. This scenario is associated with increased inflammation due to acute reduction of female sex hormones after BD, especially estradiol (E2). In females, evidence suggests that the presence of both E2 and corticoids hormones is important to ensure an adequate response to inflammation. The aim of this study is to evaluate the associated treatment of E2 and methylprednisolone (MP) in female rats after BD.
Methods: Female Wistar rats were submitted to BD by rapid inflation of an intracranial balloon catheter and maintained for 6h. Rats received MP (MP, 4 mg/ml i.v–2 ml/h) or MP and E2 (MP/E2, 50 hg/ml i.v–2 ml/h) after 3h of BD until the end of experiment. Sham-operated (S) rats were used as controls. After 6h, kidney samples were collected for homogenate and relative gene expression analyzes. IL-1β, IL-6, IL-10, VEGF and TNF- α were quantified in tissue homogenate. Gene expression of IL-1β, IL-6, IL-10, TNF- α and KIM-1 was also evaluated
Results: After BD, in kidney homogenate samples, IL-6 (IL-6-S:26.97±8.52; BD:74.87±25.65; MP/E2:13.62±3.91; MP:13.27±4.12 pg/mg/protein - $p$=0.0076) and VEGF (VEGF-S:2.45±2.32; BD:23.45±28.72; MP/E2:2.75±2.99; MP:3.18±4.95 pg/mg/protein - $p$=0.024) were increased in comparison to S and both molecules were reduced in MP/E2 and MP groups. Regarding IL-10 (S:17.39±16.24; BD:53.39±47.60; MP/E2:9.99±9.25; MP:11.97±12.10 pg/mg/protein - $p$=0.025) and TNF-α (S:0.00107±0.002; BD:0.0103±0.017; MP/E2:0.0002±0.0002; MP:0.0003±0.0002 pg/mg/protein - $p$=0.025), there was no difference between S and BD groups, but there is a significant reduction with both treatments. There were no changes in IL-1β.
Conclusions: These data point to an increased inflammation after BD compared to Sham animals, as shown by IL-6 levels. Both treatments were able to modulate inflammation after BD in a similar manner, by reducing the release of interleukins in kidney tissue.
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**Cyclosporine stimulates mitochondrial respiration of porcine precision-cut nutrient-supplied kidney slices, a pilot study**

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Background: The optimal nutrient-rich perfusion solution for preserving mitochondria during normothermic machine perfusion (NMP) is unknown. To study prolonged normothermic preservation, we developed a precision-cut kidney slice (PCKS) model. A limitation of the model for metabolic studies is that the slices do not use their full energy-producing capacity because of the lack of renal physiological function such as reabsorption, which is present during NMP. Cyclosporine (CyA) can partly uncouple mitochondrial respiration, thus we hypothesized that the addition of CyA can challenge renal tubuli by increasing their metabolic activity. In this pilot study, we aimed at finding the CyA concentration that is able to decrease spare respiratory capacity (SRC), which can make the PCKS model a better representative of NMP.
Methods: Porcine kidneys *(n=3)* were obtained from a local slaughterhouse. After 30 minutes of warm ischemia, they were placed in oxygenated Hypothermic Machine Perfusion (HMP) for 3 hours. Next, cortical kidney cores were drilled and transferred to a Krumdieck slicer to produce PCKS, which were then placed into an oxygenated incubator at 37oC. The basic incubation medium was Dulbecco's Modified Eagle Medium (DMEM) without glucose and pyruvate. The Nutrients group included glucose, glutamine and fatty acids and the Control group had no nutrients. Both groups had four subgroups, one without CyA and three with different concentrations (0,01mg/ml, 0,05mg/ml, 0,1mg/ml). Every 24 hours, slices and incubation medium were sampled for $O_2$ consumption, measured using the Oxygraph-2k, and LDH analysis.
Results: After 48 hours, the PCKS incubated in the nutrient-containing medium showed a dose-dependent response in mitochondrial respiration. The doses of 0,01mg/ml CyA resulted in higher state 3 mitochondrial respiration. In line with this finding, this 0,01mg/ml CyA group had a significantly lower SRC than slices without CyA, in the nutrient group. LDH, as general injury marker, was also significantly lower in PCKS incubated with the lowest dose of CyA, independent of the incubation medium.
Conclusions: CyA supplementation can stimulate PCKS respiration in a dose-dependent manner. The optimal concentration to achieve stimulation is 0,01mg/ml, due to its effect of higher mitochondrial respiration, lower SRC and lower toxicity compared to higher dosages.

**Iron deficiency and cadmium levels in kidney transplant recipients**

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Background: A higher plasma level of cadmium, a nephrotoxic divalent heavy metal, has been associated with an increased risk of graft failure in kidney transplant recipients (KTRs). We hypothesize that iron deficiency (ID) increases cadmium absorption and accumulation by upregulation of divalent metal transporters. Here, we first investigated whether ID is associated with higher plasma cadmium levels. As increased cadmium levels have previously been associated with cancer, cardiovascular disease, and diabetes in other populations, we also examined whether plasma cadmium levels are associated with all-cause mortality in KTRs.
Methods: We used data from stable KTRs ≥1 year after transplantation who participated in the TransplantLines Food and Nutrition Cohort study. Plasma cadmium and iron status parameters, i.e., ferritin, iron, and transferrin saturation (TSAT), were measured at baseline. ID was defined as TSAT<20% and ferritin <300 µg/L. Linear regression analyses were applied to study the association between iron status parameters and cadmium levels. Multivariable Cox regression analyses were used to investigate the association of plasma cadmium levels with all-cause mortality, adjusted for age, sex, BMI, smoking status, history of cardiovascular disease, glucose, HbA1c, systolic blood pressure, eGFR, cholesterol, and ID at baseline.
Results: We included 670 KTRs (age 53±13 years, 58% males, median 5.4 (IQR, 1.9-11.7) years after transplantation). KTRs with ID (30% of all KTRs, median plasma cadmium level 63 (IQR, 48-76) ng/L) had higher cadmium levels than KTRs without ID (median 56 (IQR, 42-75) ng/L, P=0.01). ID was not associated with plasma cadmium after adjustment for age, sex, and smoking status. However, within the ID group, TSAT (β=-0.016, P=0.01) and serum iron (β=-0.023, P=0.01) were inversely associated with log-transformed cadmium levels, independently of age, sex, and smoking status. Furthermore, in Cox regression analysis, KTRs in the highest tertile of plasma cadmium levels (70 ng/L to 330 ng/L) had an increased risk of mortality (HR 2.80, 95%CI 1.47-5.36, P=0.01), compared to KTRs in the lowest cadmium tertile (19 ng/L to 48 ng/L) during a median follow-up of 4.9 (IQR, 3.5-5.5) years. No significant interaction by iron status was observed for the association between plasma cadmium and mortality.
Conclusions: KTRs with ID had higher cadmium levels than KTRs without ID, and higher plasma cadmium levels were independently associated with a higher mortality risk. The association of cadmium with mortality was not different between individuals with and without ID at baseline. Further investigations should determine whether ID correction prevents cadmium accumulation in KTRs.

**Cardiovascular risk factors in living kidney donors and recipient kidney function**

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Background: Transplantation with a kidney from a living donor is the best treatment for most patients with end-stage kidney disease. Because of a shortage of donor organs, selection criteria for living kidney donors have been liberalised towards allowing for donors with increased cardiovascular risk. This may reduce donor organ quality and function. While donor kidney function and age are known to affect recipient kidney function, this is unknown for cardiovascular risk factors of the donor.
Methods: In a longitudinal cohort study of n=713 living kidney donor-recipient pairs, we measured donor cardiovascular risk factors and glomerular filtration rate (GFR) during the screening moment. Recipient GFR was measured one year after transplantation by means of iothalamate infusion. In univariable and multivariable linear regression analyses, we studied the associations of donor age, sex, GFR, body-mass index, smoking, blood pressure, HbA1c, and cholesterol levels, with recipient GFR.
Results: Living donors were 52 ± 11 years old, 54% were female and their pre-donation GFR was 101 ± 16 mL/min/1.73m$^2$. The recipients were 48 ± 15 years old, 40% were female and their GFR one year after transplantation was 54 ± 15 mL/min/1.73m$^2$. We found an association between donor age (St. β -0.31, P<0.001), donor GFR (St. β 0.31, P<0.001), systolic blood pressure (St. β -0.19, P<0.001), HbA1c (St. β -0.12, P=0.003) and cholesterol levels (St. β -0.10, P=0.010) with recipient GFR. In a multivariable model donor age (St. β -0.20, P<0.001), GFR (St. β 0.21, P<0.001) and systolic blood pressure (St. β -0.13, P<0.001) were associated with recipient GFR, determining 18% of the recipient GFR variance.
Conclusions: We show that living kidney donor age, donor GFR and systolic blood pressure are independent determinants of recipient GFR at one year after transplantation. These results indicate that the selection of living kidney donors may influence recipient kidney function, underlining the importance of adequate donor screening.

**Indirect insulin resistance indices and their cut-off values for post-transplantation diabetes mellitus in kidney transplant recipients**

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Background: Insulin resistance determination in kidney transplant recipients (KTRs) plays an important role to identify KTRs at risk of posttransplantation diabetes mellitus (PTDM) development. The current methods of direct insulin resistance determination are complicated and invasive. As a result, indirect insulin resistance indices such as homeostasis model assessment-insulin resistance (HOMA-IR), visceral adiposity index (VAI), lipid accumulation product (LAP), or triglycerides-glucose (TyG) index, are used in epidemiological and clinical studies in the general population due to their simplicity and ease of use. However, it is unknown to what extent those indices may contribute to determine insulin resistance and PTDM development in KTRs. Therefore, this study aimed to investigate the role of indirect insulin resistance indices to determine insulin resistance and PTDM development in KTRs.
Methods: We included 472 stable outpatient KTRs (with a functioning graft ≥1 year) without diabetes from a prospective cohort study. Crude and multivariable Cox proportional hazards regression analysis were performed to determine whether indirect insulin resistance indices (HOMA-IR, VAI, LAP, and TyG index) were prospectively associated with incident PTDM. We analyzed each measure using receiver operating characteristic (ROC) curve for the development of PTDM. The cut-off value was determined as the value with the highest Youden index score in the specificity dominant area.
Results: During a median 9.6 years [interquartile range (IQR) 6.6–10.2] of follow up, 68 (14%) KTRs developed PTDM. In Cox regression analyses, all indirect insulin resistance indices associated with incident PTDM, independent of potential confounders. ROC curve was 0.764 (95% CI,0.703-0.826) for HOMA-IR, 0.685 (95% CI,0.615-0.757) for VAI, 0.743 (95% CI,0.678-0.808) for LAP, and 0.698 (95% CI,0.629-0.766) for TyG index, with no significant difference between them (p=0.05). We determined the cut-off values with their corresponding sensitivity and specificity for each index. To test this cut-off value, the association between the indices and incident PTDM was examined by using each index as a categorical variable (HOMA-IR<2.47 vs ≥2.47; VAI<4.01 vs ≥4.01; LAP<87.04 vs ≥87.04; TyG index<4.94 vs ≥4.94). Indirect insulin resistance indices as a categorical variable predicted incident PTDM independent of age, sex, smoking, time to transplantation, systolic blood pressure, eGFR, and medication.
Conclusions: Indirect insulin resistance indices could be used to predict incident PTDM in KTRs. In addition to HOMA-IR, insulin-free surrogates of insulin resistance might serve as useful methods to identify KTRs at risk for PTDM development.

**Validity of CT defined body composition as a prognostic factor for long term functional outcome in kidney transplantation recipients.**

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Background: Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength which increases the risk of adverse postoperative outcomes. Its prevalence is markedly higher in kidney transplant candidates than in the general population.
Methods: We studied the impact of computed tomography (CT) defined preoperative sarcopenia on postoperative physical functional outcomes (grip strength, 4 meter walking test, timed up and go, sit to stand) at 6 months follow up. A total of 107 patients transplanted between 2015 and 2019 were included in this single center study.
Results: Mean age was 60.3 (±13.1) and 68.2% of patients were male. Ten patients (9.4%) were identified as sarcopenic. Sarcopenic patients were younger (20.9 (±2.7) vs. 27.4 (±3.9)), more likely to be female (60% vs. 28.9%), and had an increased dialysis vintage (19.2 (±16.3) vs. 14.0 (±20.0)) in comparison to their non-sarcopenic counterparts. In univariate analysis they had a significantly lower body mass index (BMI), skeletal muscle area (SMA) and skeletal muscle index (SMI) (P= <0.001). In multivariate regression analysis SMI was significantly associated with grip strength and timed up and go performance.
Conclusions: In conclusion, we identified a significant association between low SMI (sarcopenia) and poorer physical functioning with respect to hand grip strength and timed up and go tests at six months post kidney transplantation. These results could be used to preoperatively identify patients with an increased risk of poor postoperative physical functional outcome, allowing for preoperative interventions to mitigate these risks.

**Dietary oxalic acid intake and plasma oxalic acid concentration in patients with chronic kidney disease**

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Background: High oxalic acid concentration may be caused by genetic disorders, enteric diseases, but also by kidney insufficiency per se. It may result in kidney oxalic acid stones, kidney function decline, and failure. This study aimed to investigate whether dietary oxalic acid intake influences plasma oxalic acid concentration in a population undergoing kidney transplantation.
Methods: Dietary oxalic acid intake was assessed using a Food Frequency Questionnaire. Based on frequency and portion size, average daily oxalic acid intake in the past year and in the last 24 hours was calculated. A blood sample for determination of plasma oxalic acid concentration was drawn on the operation ward before transplantation. For multivariable analysis seventeen recipient related variables were gathered.
Results: 418 patients were included. The median age of the participants was 62 year, 60% were male, all had an eGFR <20 ml/min/1.73 m$^2$, and 66% were on dialysis with a median dialysis vintage of 13 months. The median plasma oxalic acid concentration was 32.2 µmol/L (range 4.6-243.2). In 98.3% of patients oxalic acid concentration was above the upper limit of normal. The average oxalic acid intake was 199 mg/day (range 4-1599), while it was 138 mg/day in the last 24 hours before transplantation (range 0-3906). Multivariable linear regression analysis showed that plasma oxalic acid concentrations were significantly higher in recipients with higher average ($p$<0.001) and last 24 hours oxalic acid intake ($p$=0.002), lower age ($p$<0.001), lower residual diuresis ($p$<0.001), higher body mass index ($p$<0.001), longer dialysis vintage ($p$=0.032), hemodialysis ($p$<0.001), and peritoneal dialysis ($p$<0.001) versus preemptive status.
Conclusions: In pre-kidney transplant patients, plasma oxalic acid concentration is above upper normal limit in 98.3% of patients and is multifactorially determined. As all other factors are not modifiable, the only way to decrease plasma oxalic acid concentration is dietary restriction.

**Dual hypothermic oxygenated machine perfusion (DHOPE) is associated with improved recovery of acute kidney injury after donation after circulatory death liver transplantation**

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Background: The use of donation after circulatory death (DCD) donor livers is associated with acute kidney injury (AKI) and chronic kidney disease (CKD) after liver transplantation (LT). End-ischemic dual hypothermic oxygenated machine perfusion (DHOPE) resuscitates donor livers prior to implantation and mitigates ischemia reperfusion injury, compared to static cold storage (SCS) alone. In this study we analyzed the impact of DHOPE on the incidence of AKI and CKD after DCD LT.
Methods: In this post-hoc analysis of a multicenter randomized controlled trial, patients received either a DCD liver after SCS alone (control) or after end-ischemic treatment with DHOPE. The incidence of AKI based on serum creatinine within the first week and CKD at 6 months after LT were scored according to KDIGO. Rapid reversal of severe AKI (stage 2&3) within 48 hours (transient AKI) was assessed.
Results: 99 patients without prior renal dysfunction were included. There were no significant differences in risk factors associated with AKI, including donor and recipient BMI, blood product transfusions and recipient warm ischemia time. Postreperfusion syndrome occurred in 12% of the DHOPE group and in 27% in the control group (risk ratio, 0.43; 95% CI, 0.20 to 0.91).
In controls 23% (12/52) developed severe AKI (KDIGO stage 2&3) vs 28% (13/47) in the DHOPE group (p=0.600). Reversal of severe AKI within 48 hours was 0% (0/12) in controls vs 38% (5/13) in the DHOPE group (p=0.016). At 6 months after DCD LT, the incidence of severe CKD (severe CKD & end-stage renal disease) was 6.3% (3/48) in controls vs 0% (0/42) in DHOPE (p=0.099).
Conclusions: DHOPE did not reduce the incidence of AKI, however DHOPE was associated with improved early recovery of AKI after DCD LT. This translated into a trend towards less severe chronic kidney injury at 6 months after DCD LT.

**Maximum liver function (LiMAx) test enables assessment of liver function during hypothermic oxygenated machine perfusion**

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Background: Persistent mortality on the waiting list, due to shortage of suitable donor livers, drives physicians to use extended criteria donor (ECD) livers for transplantation. Dual hypothermic oxygenated machine perfusion (DHOPE) is shown to resuscitate grafts before transplantation, by providing oxygen while metabolism is reduced by 85%. However, so far no real-time hepatocyte specific functional assessment is available. The maximum liver function capacity (LiMAx) test is a clinically validated cytochromal breath test, based on metabolism of $^{13}$C-methacetin, to assess liver function before liver surgery. We aim to evaluate the feasibility of the LiMAx test for liver function assessment during DHOPE.
Methods: We performed the LiMAx test after 60 minutes of cold perfusion. LiMAx was performed during DHOPE and warm liver perfusion of ECD grafts (DHOPE-NMP; n = 11). In eight DHOPE-NMP procedures, consecutive LiMAx testing was performed during both DHOPE and NMP. During DHOPE-NMP, grafts were evaluated and transplanted after reaching evaluation criteria, independent of LiMAx results. Median values are given with their interquartile range.
Results: The LiMAx score ranged between 19 and 540 µg/kg/h. In the eight consecutive DHOPE-NMP measurements, all LiMAx scores during DHOPE (80 (51-251) µg/kg/h) were lower than during NMP (869 (579-991) µg/kg/h) with a median reduction of 89% (76-91%). Six livers were declined for transplantation based on biliary and hepatocellular acceptance criteria. The five transplanted livers had a significant higher LiMAx score during DHOPE, compared to the declined liver grafts (303 (240-358) vs. 60 (47-87) µg/kg/h, P = 0.017). Furthermore, a higher LiMAx score during DHOPE correlated significantly with increased lactate clearance during NMP (R = 0.62, P = 0.04). A cut-off LiMAx value of 100 µg/kg/h during DHOPE seems to separate transplantable from non-transplantable livers (AUROC 0.93, 95% CI, 0.78-1.0).
Conclusions: In conclusion, the LiMAx test enables assessment of liver metabolism during DHOPE after adjusting the $^{13}$C-methacetin dosage for reduced metabolism. This test is the first real-time function test to assess ECD grafts in the cold. In the future, it may enable safe decision-making in selection of extended criteria donor livers during DHOPE.

**Positive antibody response in liver transplant recipients on mycophenolate mofetil after the third, fourth and fifth SARS-CoV-2 vaccination; an observational cohort study**

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Background: The negative influence of mycophenolate mofetil (MMF) on the immunogenicity in LT recipients raised the question whether the dosage of the drug should be altered during following SARS-CoV-2 vaccination. This study aimed to investigate the immunogenicity in LT recipients in relation to mycophenolic acid (MPA; the active substance of MMF) blood levels after a third, fourth or fifth mRNA vaccination.
Methods: In this observational, cohort study, we determined the immunogenicity to SARS-CoV-2 vaccination in liver transplant (LT) recipients in relation to the MPA blood levels after the 3th, 4th and 5th dose of mRNA vaccines or the vector vaccine ChAdOx1 nCoV19. Multiple linear regression models were fitted, investigating the association between the antibody response on SARS-CoV-2 and the MPA trough levels for the vaccinations.
Results: In total, 86 LT recipients were included with 92 IgG anti-spike SARS-CoV-2 titers; six patients had titers available after multiple vaccinations. Significantly more LT recipients had positive IgG SARS-CoV-2 serology after the third vaccination (41/48, 85.4%) compared to the second vaccination (20/48, 41.7%), $p<0.001$. This increased to 90% after the fourth and fifth vaccination. MPA trough levels were not significantly associated with an effect on the IgG SARS-CoV-2 anti-spike antibodies response after a third, fourth or fifth vaccination.
Conclusions: Additional SARS-CoV-2 vaccination was highly effective in our cohort with seroconversion in 85.4% of the LT recipients using MMF after three vaccinations. Regardless the MPA trough levels, LT recipients using MMF show positive IgG anti-spike SARS-CoV-2 levels after additional vaccination. MMF could be continued during additional vaccination.

**The impact of Surgical Site Infections (SSI) on outcome after deceased donor liver transplant**

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Background: Infections are a significant cause of morbidity and mortality after liver transplant (LT). The first period after LT is mainly characterized by the occurrence of deep and organ/space surgical site infections (SSI). Perioperative antimicrobial prophylaxis is aimed to prevent these SSIs. The objective of this study is to evaluate the incidence, etiology, timing, and outcomes of SSIs in LT.
Methods: All deceased donor LT recipients between 2016-2019 in the Erasmus Medical Center were included. All relevant donor and recipient parameters were collected. SSIs within the first 90 days after transplantation were scored according to the CDC definition.
Results: Of the 187 patients included, 43 patients (23%) experienced a total of 55 SSI events. Median time until first SSI was 9 (6-13) days after LT. The most common pathogen was *Enterococcus spp*. in 64% (35/55) of all SSI events and in only 8% the pathogen was multi-drug resistant. In 60% the SSI was a peritonitis. In patients with SSI compared to patients without SSI, the median units of blood products transfused was higher (14 vs 6; p=0.002), the duration of an-hepatic time was longer (50 min vs 45 min; p=0.005) and the incidence of early re-laparotomy was higher (19.1% vs 8.2%, p=0.011). Patients with SSI more often had a choledochojejunostomy in 29.5% vs 16.1% (p=0.48).Patient survival at 1 year was 84% for SSI vs 97% for no SSI (p<0.001). Graft survival at 1 year was 80% for SSI group vs 96% for no SSI (p=0.001). Risk factors for SSI were re-laparotomy after LT Odds Ratio (OR) 29.383(95% CI 3.406-253.475, p=0.002) and a choledochojejunostomy OR 2.516 (95% CI 1.044-6.062, p=0.040).
Conclusions: SSIs occur frequently after LT, and result in increased morbidity and mortality. In patients with SSI, *Enterococcus spp*. lead to even worse survival rates. Peri-operative antibiotic prophylaxis should target *Enterococcus spp*. if risk factors are present.

**Repeated COVID-19 vaccination of immunocompromised kidney transplant recipients leads to the induction of a functional T-cell subset associated with antibody production**

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Background: Spike (S) specific memory T cells play an important role in the control of a SARS-CoV-2 infection. However, the immunogenicity of COVID-19 vaccines is severely hampered in kidney transplant recipients (KTR), and little is known about the phenotype of T cells induced by vaccination. Here, we investigated cytokine profiles that were produced by memory T cells obtained after alternative repeated COVID-19 vaccination strategies of KTRs, and correlated these cytokine profiles to antibody production.

Methods: KTRs (n=92) without detectable antibodies after two or three doses of an mRNA-based vaccine were randomized to receive 100 μg mRNA-1273 (n=31), 2x 100 μg mRNA-1273 (n=29) or Ad26.COV2.S (n=32). Whole blood obtained pre and 28 days post vaccination was stimulated with peptides covering the S protein in a commercially available IFN-γ release assay (QuantiFERON, QIAGEN). After stimulation, cytokines (IL-2, -4, -5, -6, -9, -10, -13, -17A, -17F, -22, IFN-γ and TNF-α) were measured in plasma by a multiplex bead assay. Patients were clustered to identify cytokine production profiles via unsupervised clustering. Cytokine clusters and levels of S1 specific binding antibodies were compared pair wise by a Mann-Whitney *U* test.

Results: Clustering analysis revealed three distinct cytokine profiles. Cytokine profile 1 was characterized by significantly higher concentrations of Th1 (IL-2, IFN-γ, and TNF-α) and Th2 (IL-4, -5 and -13) cytokines in comparison to the other two profiles. This was also significantly associated with higher S1 specific antibody production ($p<0.05$). Cytokine profile 2 and 3 differed in the concentration of IL-2, -6 and -10, but this did not result in a significant difference in antibody production. The identified cytokine profiles were not driven by the type of alternative vaccination strategies due to their even distribution across the profiles.

Conclusions: Repeated vaccination increased SARS-CoV-2 specific memory T cell cytokine responses in KTRs with an initially poor serological response to previous mRNA-based priming. Balanced memory T cell cytokine profiles were associated with a good SARS-CoV-2 specific humoral immune response. However, there was no significant impact of the type of alternative vaccination strategy on differences in memory T cell cytokine responses and profiles.

**Prevalence of post-COVID-19 condition in patients with chronic kidney disease, on dialysis and living with a kidney transplant**

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Background: The prevalence of post-COVID-19 condition (PCC) is estimated to be 13% in healthy individuals. We analyzed the prevalence and disease burden of PCC in patients with chronic kidney disease (CKD) G4/5, dialysis patients and kidney transplant recipients (KTR).
Methods: Patients participated in the RECOVAC study, in which SARS-CoV-2 antibodies were measured in CKD G4/5, dialysis patients and KTR after the second and third COVID-19 vaccination in the Netherlands. The presence of long-lasting symptoms was assessed by a questionnaire, which was sent to 4868 participants one year after initial vaccination. PCC was defined according to the WHO clinical case definition. Blood samples at one month after the second and third vaccination were analysed with anti-RBD IgG ELISA. COVID-19 diagnosis was assessed by questionnaire or positive anti-nucleocapsid IgG antibodies. Logistic regression analysis was used to compare the presence of one or more long-lasting symptoms between COVID-19 positive and negative patients, to identify predictors of PCC, and to estimate the association between log-transformed antibody levels and PCC.
Results: 2747 patients were included, of which 222 patients with CKD G4/5, 390 dialysis patients and 2135 KTR. PCC was present in 25%, 16%, and 21% of CKD G4/5 patients, dialysis patients and KTR with high or very high symptom burden in 57%, 61% and 71%, respectively. In COVID-19 negative patients, long-lasting symptoms were present in 15%, 13% and 18%, respectively. COVID-19 positive patients (n= 1004) were at higher odds of having one or more long-lasting symptoms compared with COVID-19 negative patients (n=1743) (OR: 1.33 [1.09-1.61], p=.005). Predictors of PCC were chronic lung disease (adjusted OR 2.04 [1.18-3.50], p=.01) and hospital/ICU admission (adjusted OR 5.03 [3.22-7.86], p<.001). Log anti-RBD IgG antibody level was negatively associated with PCC (adjusted OR: 0.79 [0.66-0.94], p=.008).
Conclusions: Patients with CKD G4/5, dialysis patients and KTR are at risk for PCC with a high symptom burden, especially if antibody levels after COVID-19 vaccination are low.

**Allogeneic mesenchymal stromal cell therapy in kidney transplantation: should repeated HLA mismatches be avoided?**

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Background: Mesenchymal stromal cells (MSC) are a promising therapy in kidney transplantation (KTx). While most studies have investigated autologous MSC, using allogeneic MSC as an off-the-shelf product is more feasible in clinical settings. However, allogeneic MSC could potentially induce an immune response directed towards the kidney allograft in case of shared mismatches between kidney and MSC donor. The Neptune Study from the LUMC investigated MSC therapy in KTx by selecting MSC to avoid repeated HLA antigen mismatches between kidney and MSC donors, while a study from the University of Liège did not perform specific MSC selection. We performed in-depth analysis of these cohorts to determine whether repeated HLA mismatches should be avoided to prevent donor-specific antibody (DSA) formation.
Methods: Liège patients (n=10) received 1 infusion of MSC at day 3 post-KTx, while Leiden patients (n=10) received 2 infusions at week 25 and 25 post-KTx. Patients and donors were HLA typed for 11 loci at the second field. Two Liège patients were excluded because no material for high resolution typing was available. Amino acid mismatch (AAmm) analysis with HLA-EMMA was performed between kidney donor and recipient and MSC donor and recipient, and repeated AAmm were identified. Single antigen bead (SAB) data up to 5 years post-Tx were analyzed.
Results: Previously, DSA formation in 2 out of 8 Liège patients was reported within 1 year post-Tx. Re-analysis of the SAB data in the light of high-resolution typing revealed that 1 previously DSA detected at 1 month post-Tx was misclassified. In the same patient, DSA were detected at a later timepoint, directed against a shared AAmm (55R). As this DSA was detected 16 months post-KTx, it is unlikely that it was induced by the MSC infusion. In another patient, previously assigned DSA were dismissed due to high background signal in the SAB assay. There was no DSA formation in the Leiden cohort. In the Liège cohort, 4 out of 8 patients had repeated antigen mismatches, while in the Neptune cohort, 1 repeated antigen mismatch occurred. Total repeated AAmm were higher in the Liège cohort, but this was not statistically significant (median 16 versus 8, $p = 0.056$). Importantly, although one Leiden patient did not have any repeated antigen mismatch for HLA-DQB1, there was a high number of AAmm (14).
Conclusions: Selection of MSC to avoid repeated HLA mismatches at the split antigen level is not sufficient to prevent repeated mismatches at the amino acid level. As the clinical relevance of repeated AAmm seems limited for the risk of DSA formation, our study suggests that it is not necessary to prevent repeated HLA mismatches in allogeneic MSC therapy in KTx to prevent DSA.

**Incidence and severity of COVID-19 in relation to anti-RBD IgG antibody level after COVID-19 vaccination in kidney transplant recipients**

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Background: Kidney transplant recipients (KTRs) remain at increased risk for severe COVID-19 after vaccination, most likely due to an impaired immune response. However, the exact clinical impact of this impaired response remains unclear. Therefore we analysed the relationship between antibody levels after vaccination and the occurrence and severity of COVID-19 in a large cohort of KTRs.
Methods: All KTRs, living in the Netherlands, who received COVID-19 vaccination were invited to participate in this observational cohort study. At approximately 28 days after the 2nd vaccination blood samples were obtained by a home-based finger-prick method and analysed for IgG antibodies against the receptor-binding domain of the SARS-CoV-2 spike protein (anti-RBD IgG). Participants were classified as either seronegative or seropositive using an anti-RBD IgG threshold of 50 BAU/mL. Participants who previously experienced COVID-19 were excluded. Primary endpoint was the incidence of COVID-19 from the moment the blood sample for anti-RBD IgG measurement was obtained until 6 months thereafter. Multivariable Cox and logistic regression analyses were performed to analyse which factors affected the occurrence and the severity of COVID-19 in terms of hospitalization.
Results: In total 12,159 KTR were approached of whom 3,828 agreed to participate. In 2,885 subjects successful antibody measurement was performed after the 2nd COVID-19 vaccination. Among those, 1,578 (54.7%) became seropositive, whereas 1,307 (45.3%) remained seronegative. During a follow-up of 6 months, seropositivity was associated with a lower risk for COVID-19 incidence, also after adjusting for age, sex, socio-economic status and adherence to COVID-19 restrictions (HR 0.48 (0.27-0.86), p=0.01). COVID-19 was also significantly less severe in seropositive as compared to seronegative participants (OR 0.14 (0.03-0.67), p=0.01). When studied on a continuous scale, we observed a log-linear relationship between antibody level and risk for COVID-19 incidence (HR 0.52 (0.31-0.89) per tenfold higher anti-RBD IgG antibody level, p=0.02). A threshold above which optimal protection was offered could not be detected. A similar association was found for COVID-19 severity.
Conclusions: In conclusion, antibody level after COVID-19 vaccination is associated in a log-linear relationship with the occurrence and severity of COVID-19 in KTRs. Therefore higher antibody levels, and not only reaching seropositivity, should be the aim of COVID-19 vaccination in KTRs. Immunosuppressed patients who have no or low antibody levels after vaccination should be offered repeat vaccinations, whether or not via alternative vaccination strategies, or passive immunization.

**Association of plasma tacrolimus but not whole-blood tacrolimus with c-reactive protein in transplant recipients**

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Background: Tacrolimus requires therapeutic drug monitoring (TDM) in transplant recipients (TxR). Inflammation, indicated by increased c-reactive protein concentrations (CRP), may down-regulate liver enzymes that metabolise tacrolimus, and increase tacrolimus trough concentrations (C0)[1]. "Free" unbound fractions are in rule pharmacologically active and related to effectivity and safety, and plasma C0 is linearly related to unbound tacrolimus[2]. Therefore, plasma C0 was analysed in addition to routine whole blood C0. We aimed to compare associations of plasma and whole blood C0 with CRP in stable lung, kidney and liver TxR.

Methods: Plasma and whole blood C0, and CRP were measured in samples of the ongoing Transplant-Lines Biobank and Cohort study. Samples were collected from stable lung, kidney and liver TxR at ≥ 12 months after transplantation. Linear relationships were assessed with Pearson's correlation on log2-transformed data. Non-parametric differences for plasma and whole blood C0 were determined per CRP group (<1.0 mg/L, 1.0-3.0 mg/L and >3.0 mg/L)[3] and per TxR group with the Kruskal Wallis test.

Results: Complete data were available of 1016 TxR at median 2.2 years after transplantation. Median CRP was 1.9 (interquartile range 0.8-4.9) mg/L. There was a linear relationship between plasma C0 and CRP (Pearson's R=0.11, P<0.001), but not between whole blood C0 and CRP (R=-0.02, P=0.43). Median plasma C0 was 0.12 (0.08-0.17) μg/L for Tx recipients with CRP<1.0 mg/L, and 0.11 (0.09-0.17) μg/L for CRP 1.0-3.0mg/L, and 0.14 (0.09-0.20) μg/L for CRP>3.0 mg/L (P<0.01). Plasma C0 of lung and kidney TxR differed significantly between CRP groups (P<0.01), but not for the liver TxR. For whole blood C0 there were no significant differences between investigated groups.

Conclusions: Increased plasma C0 is associated with CRP in lung and kidney TxR, who have higher therapeutic ranges than liver TxR. This relation was not identified for whole-blood C0, routinely used for TDM.

## Anesthesia and ICU practice in pediatric kidney transplantation; an European survey

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Background: Pediatric kidney transplantations (PKT) are performed in relative low numbers, even in expertise centers. Despite the high perioperative risk profile of both patient and procedure, international guidelines for anesthesia care are lacking. Furthermore, local guidelines show inconsistence particularly in hemodynamic (HD) monitoring, -targets and -support. Especially in small children receiving an adult donor kidney, hemodynamic changes are considerable and support of blood pressure and kidney perfusion can be challenging. Aim of our study is to investigate anesthesia and ICU practices in European PKT centers. These data can be used for an international consensus guideline.
Methods: International survey. An anonymized link was send from a Castor database to contacts in European reference centers. Inclusion criteria were; medical doctor in anesthesia, ICU or pediatric nephrology working in a PKT expertise center and signed informed consent. Questions considered center information and topics considering surgery, anesthesia and ICU practice. Data were analyzed using descriptive statistics.
Results: The survey was completed by 25 replicants, from ten countries. Replicants represented anesthesiologists (52%), pediatric nephrologists (32%) and ICU doctors (16%). 68% of centers perform more than 10 PKT a year of which less than 30% in acceptors < 5 yrs. In only 24% of centers, the majority of PKT is with a living donor. A team of diverse surgical specialists performs the PKT, in 36% of centers. When acceptors have low weight (<15 kg), all centers anastomose the donor kidney on aorta and caval vene. Perioperative HD therapy is guided by central venous pressure (CVP; 68%), arterial blood pressure (ABP; 90%) and cardiac output (CO; 32%). Most centers use intra-arterial BP measurements and CVP- or CO-guided HD therapy in the youngest recipients. HD targets vary between centers, although ABP targets show the least variation. Albumin, isotonic crystalloids and norepinephrine are the most reported fluids and vasopressor used to reach targets. Around reperfusion, furosemide (58%) and mannitol (58%) are given per protocol in most centers.
Postoperative care is mainly located in pediatric ICU. Smaller recipients always go to ICU. In 20% of responses, the smallest acceptors get postoperative ventilation per protocol for 1 or 2 days.
Conclusions: The results of our survey reveal a variety in anesthesia and ICU practice in European PKT centers. Diversity is most apparent in CVP- and CO targets, use of furosemide and mannitol, and type of surgical specialist performing the transplantation. These data can be a starting point to come to a network and a consensus guideline; www.ankitc.eu

**The results of robotic-assisted donornephrectomy.**

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Background: To evaluate the results of robotic-assisted laparoscopic donornephrectomy (RADN) and comparison with the hand-assisted laparoscopic donornephrectomy (HALDN) and laparoscopic donornephrectomy (LDN).
Methods: Retrospective study from January 2019 to January 2023 of 160 consecutive RADN, 79 HALDN and 68 LDN procedures. Donor and recipient variables were analyzed.
Results: Right kidneys were harvested in 16% of the RADN group, 18% of the HALDN group and 15% of the LDN group. A complex vascular anatomy was present in 18% of the RADN group, 22% of the HALDN group and 16% of the LDN group. There was no difference in mean age and BMI between the groups. There was no significant difference in warm ischemia time and post-operative length of hospital stay between the different groups. There was a significant difference in blood loss between the RADN (29 ml), HALDN (124 ml) and LDN (126 ml) group ($p<0.001$). There was a significant difference in mean operation time between the RADN (168 min), HALDN (171 min) and LDN (145 min) group ($p<0.001$). There was a significant difference in the total number of all complications (intra and post-operative) between the RADN (4,4%), HALDN (5%) and LDN (16,2%) group ($p=0.005$). There was no significant difference between the groups in the serum creatinine levels of the recipients at 1 week, 1 month and 3 months after transplantation.
Conclusions: Robotic-assistance during donornephrectomy is safe for the donor and the graft and it may improve the results of the living kidney donation.

**Therapeutic drug monitoring of the drug - drug interaction between tacrolimus and azoles in lung and kidney recipients**

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Background: Tacrolimus (TAC) is an immunosuppressant used in solid organ transplant recipients (SOTR) to improve graft survival but increases the risk for fungal infections (FI). Treatment of FI with azole antifungal drugs is complex considering drug-drug-interactions. Therapeutic Drug Monitoring (TDM) of TAC is therefore important. It is unknown to what extent TDM should occur, how TDM is practiced, and what factors contribute to TAC $\Delta C_{min}/D$ ratio variability and adverse events occurrence.
Methods: In this retrospective cohort study, characteristics of TDM of TAC were investigated when combined with azoles (voriconazole, fluconazole or posaconazole) in lung- (LTxR), kidney/pancreas- (KTR) and recently transplanted KTR (KTR-RT). Patients were selected with SlicerDicer in Epic electronic patient dossier (EPD). Data was collected from the EPD, extracted into REDCAP, an online database platform, and analyzed using SPSS. Primary outcome was the rate (%) of lung- and kidney recipients that had a TAC measurement within therapeutic range during and directly after azole discontinuation, and if dose adjustments were conform protocol. Correlations between relevant parameters and $\Delta C_{min}/D$ ratio were assessed with Pearson's correlation test. Influence of baseline variables on occurrence of adverse events was assessed with linear regression analysis.
Results: A total of 75 SOTR were included. 59 SOTR used TAC before the azole treatment from which 86.4% had a dose adjustment of TAC just before the treatment as a precaution for the interaction. 36% had a dose reduction less than required and 22% had a dose reduction more than required. At the first TAC measurement after azole start, 22% was within therapeutic range. However, 75% reached the therapeutic range of TAC within the azole treatment period (LTxR: 82%, KTR: 63%, KTR-RT: 46%). After azole discontinuation 61% reached therapeutic range within 6 measurements (LTxR: 65%, KTR: 57%, KTR-RT 54%), within a median 46.45 days (IQR 14.6-159.3). Change in albumin was correlated with $\Delta C_{min}/D$ ratio (-0.399, P=0.008). No significant parameters influenced adverse events occurrence.
Conclusions: While a total of 25% of SOTR did not reach therapeutic range during azole treatment, even a higher percentage, 39% does not reach therapeutic range directly after treatment. Change in albumin may affect the TAC $\Delta C_{min}/D$ ratio.

**Graft steatosis and donor diabetes mellitus additively increase the risk of retransplantation and death in adult liver transplantation - data from the eurotransplant registry**

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Background: Steatosis in the graft has been associated with an increased risk of adverse outcomes after liver transplantation. Presence of other metabolic risk factors increases the risk of advanced liver disease among patients with hepatic steatosis. We studied the association between graft steatosis and metabolic risk factors in the donor with recipient outcomes after liver transplantation.
Methods: We analysed data from all consecutive first adult full-graft DBD liver transplantations performed in the Eurotransplant region between 2010 and 2020. Presence of graft steatosis was assessed through review of donor imaging reports. Presence of diabetes mellitus (DM), hypertension (HT) and dyslipidaemia was assessed through review of donor medical history reports. The association between graft steatosis and metabolic risk factors in the donor with retransplantation-free survival of the recipient was assessed through the Kaplan-Meier method and multivariable Cox regression models.
Results: We studied 12174 transplantations. Median donor age was 56 (IQR 45–67), median donor BMI was 26 (24–28). Graft steatosis was detected in 2689 (22.1%), and diabetes mellitus, hypertension and dyslipidaemia was present in 1245 (10.2%), 5056 (41.5%) and 524 (4.3%) of donors.
In univariable analysis, graft steatosis (Hazard Ratio [HR] 1.247, p<0.001), and presence of DM (HR 1.274, p<0.001), HT (HR 1.144, p<0.001), and higher BMI (HR 1.014, p<0.001) in the donor were associated with impaired retransplantation–free survival, whereas donor dyslipidaemia was not (P=0.810). In multivariable Cox regression analysis, graft steatosis (adjusted HR [aHR] 1.197, p<0.001) and donor DM (aHR 1.157, p=0.004) were independently associated with an increased risk of retransplantation or death in the recipient, whereas hypertension, dyslipidemia and donor BMI were not. When compared to donors without graft steatosis and DM, the risk of recipient retransplantation or death was increased for grafts from donors with DM alone (aHR 1.155, p=0.019), or steatosis alone (aHR 1.199, p<0.001) and highest for grafts obtained from donors with both steatosis and DM (aHR 1.362, p<0.001). Observed retransplantation-free survival at 1, 5 and 10 years was 79%, 65% and 48% among recipients of a non-steatotic graft from a non-diabetic donor, compared to 69%, 53% and 29% for recipients of a steatotic graft from a diabetic donor (p<0.001).
Conclusions: Graft steatosis and donor DM additively increase the risk of retransplantation or death in DBD livetransplantation. Future studies should focus on methods to assess and improve the quality of these grafts. Until such time, caution should be exercised when considering these grafts for transplantation.

**Radiological classification of ischemic cholangiopathy after deceased-donor liver transplantation**

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Background: Ischemic cholangiopathy (IC) is a feared complication after liver transplantation (LT). There is growing evidence that rather than a single entity, IC presents as a spectrum with distinct radiological findings, with different outcomes. Recently, Croome et al. proposed a classification for IC after DCD-LT based on radiological patterns. This study aimed to investigate whether IC classified by these radiological patterns can predict the clinical outcomes, for both DCD and DBD-LT.
Methods: All adult patients that underwent a first-time deceased-donor LT between 2011 and 2020 with symptomatic IC were included. IC was defined as any narrowing of the donor bile ducts documented by MRCP, in the presence of a patent hepatic artery. An expert radiologist classified patients into 4 groups according to the radiological patterns as proposed by Croome et al.: diffuse necrosis (DN), multifocal progressive (MP), confluence dominant (CD) and minor form (MF). The primary outcome was graft survival. Secondary outcomes were related to hospitalization and stent therapy. Graft survival was estimated by using the Kaplan-Meier method and compared with the Log-rank test.
Results: 90 patients (16.8% of total LT) developed a form of symptomatic IC documented by MRCP. DN was found in 2, MP in 17, CD in 40 and MF in 31 patients. DN and MP groups were merged, which resulted in 19 patients with multifocal, severe stenoses. Graft survival was significantly different between DN/MP and CD patients (P=0.032). This was ascribable to differences in graft survival between groups for DCD-LT patients (N=48, P=0.013). However for DBD patients (N=42) no significant between-group differences in graft survival were found. Overall, 17 patients (18.9%) were relisted and 12 (13.3%) were retransplanted (26.3% of DN/MP, 7.5% of CD and 12.9% of MF patients). MF patients had the shortest total length of hospital stay due to cholangitis. CD patients were most likely to undergo endoscopic stent placement and had the longest duration of stent therapy.
Conclusions: IC after DCD-LT can be classified into subtypes, as previously described by Croome et al., with distinct clinical outcomes. The severity and location of IC after DCD-LT are indicative of the risk of graft loss and the need for hospitalization and stent therapy. However in DBD-LT patients this classification does not have prognostic value.

**Indocyanine green (ICG) clearance as marker for liver function during ex vivo normothermic machine perfusion**

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Background: Normothermic machine perfusion (NMP) enables assessment of donor liver viability pre-transplantation. However, objective tests for measuring integrated liver function during NMP are lacking. We assessed the clinically validated indocyanine green (ICG) elimination test to objectively evaluate liver function during ex-vivo machine perfusion
Methods: A combination of dual-hypothermic machine perfusion (DHOPE) and NMP was performed on extended criteria donor livers in an optimization phase (n=10) and clinical phase (n=22). In the optimization phase, the ICG test was performed during DHOPE and NMP, with optimization for use during NMP. In the clinical phase, the ICG clearance was correlated to clinical perfusions parameters and post-transplantation outcomes.
Results: During DHOPE no ICG perfusate elimination was seen. During NMP, significant ICG plasma elimination was demonstrated. The ICG plasma disappearance rate (PDR) was dependent on perfusion blood flow and plasma volume. After correcting the PDR for these factors, this corrected NMP-PDR was closely correlated to the hepatic extraction rate (R=0.923; P>0.001) and also to ATP content in liver biopsies (R=0.692; P=0.027). The NMP-PDR was however not correlated to liver damage (ALT, AST, LDH, and TUNEL).
In the clinical phase, 22 liver grafts were evaluated for transplantation, being blind for outcome of ICG testing. Eleven livers were transplanted. The NMP-PDR was higher in the transplanted cohort than in the non-transplanted cohort (16.7 (12.9-23.3) vs 10.3 (8.5-12.1) %/L·Kg; P>0.0001). Both the overall hepatocellular and cholangiocellular acceptance criteria were correlated to the NMP-PDR. One transplanted liver developed early allograft dysfunction (12.3 %/L·Kg) and one non-anastomotic biliary stenosis (13.3 %/L·Kg).
Conclusions: We demonstrated that ICG elimination is not present during DHOPE, but the test is feasible during NMP. A NMP-PDR ≥13.3 %/L·Kg is indicative for absence of post-transplant hepatocellular or biliary failure in extended criteria donor livers. The ICG plasma elimination test has the potential to increase the donor liver utilization rate, while at the same time preventing complications after transplantation.

**The association between neuro-radiologic parameters and outcome in children with Acute Liver Failure (ALF): a national cohort study**

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Background: Pediatric Acute Liver Failure (PALF) is a rare, life-threatening condition in children, necessitating liver transplantation (LTx) in absence of spontaneous recovery. In the pre-transplant period, the neurological condition can deteriorate rapidly, resulting in morbidity and mortality. In individual patients, obtaining pre-transplant insights into the (ir)reversibility of the neurological condition has been notoriously difficult, hampering medical and surgical decision making. Therefore, we aimed to investigate pre-transplant neurological parameters in relation to outcome.
Methods: We performed a retrospective, observational cohort study of PALF patients with hepatic encephalopathy (HE) grade III-IV, admitted between 1993-2020. According to neurologic parameters and brain MRI descriptions, we subdivided the patients: (1) intact pupillary and brainstem reflexes; (2) absent pupillary and/or brainstem reflexes without radiologically proven brain herniation; (3) radiologically proven brain herniation. Primary outcome was defined as survival within 1 year after discharge. We compared the groups for pre-transplant neurological parameters and neurological outcome after treatment.
Results: We included 47 patients, of whom 27/47 (57%) ultimately underwent LTx. Survival rates were 73% (24/33), 43% (3/7) and 14% (1/7) for group 1, 2 and 3, respectively. Survival rates were higher in the LTx group vs. the no-LTx group (74% (20/27) vs. 30% (6/20); p=.006). After LTx, 16/21 patients from group 1 survived with no neurological impairment (14/16) or moderately severe impairment (2/16). From the no-LTx group, 8/12 patients survived, 7 with no neurological impairment and 1 with moderately severe impairment. Absent pupillary reflexes and/or absent brain stem reflexes were not necessarily associated with poor outcome in the LTx group, as 3/3 patients survived with full neurological recovery. All 4 patients from the no-LTx group died. Radiologically proven brain herniation (beginning or advanced) was the only parameter associated with subsequent mortality (6/7) or minimally conscious state (1/7) in both treatment groups (LTx and no-LTx).
Conclusions: In patients with PALF and grade III-IV HE, radiological signs of brain herniation are associated with subsequent mortality or severe neurological damage, irrespective of LTx. Absent pupillary reflexes and/or absent brain stem reflexes do not exclude full neurological recovery after LTx in our cohort and should therefore be interpreted with great caution.

**RNAi therapy as substitute for liver transplantation in Primary hyperoxaluria type 1**

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Background: Primary hyperoxaluria (PH) is a rare genetic metabolic disorder that leads to kidney failure. Combined liver and kidney transplantation is currently the golden standard for PH patients with a B6- insensitive mutation and kidney failure. RNA interference (RNAi) therapy offers a promising alternative to liver transplantation by effectively reducing endogenous oxalate production.
Methods: We describe two cases of RNAi who received solo kidney transplantation under RNAi therapy with Lumasiran. In one case Lumasiran was combined with Nedosiran.
Results: Patient 1 was diagnosed at childhood and developed kidney failure at the age of 43. At the age of 45, the patient successfully received a kidney transplant after five months of Lumasiran. RNAi therapy effectively reduced plasma oxalate levels from 91 µmol/L to 49 µmol/L, enabling performing kidney transplantation without elevated risk of reoccurring oxalate nephropathy in the kidney graft. The plasma oxalate level 3 months after transplantation was 7 µmol/L. Three and a half months after transplantation, kidney function declined to 25 ml/min/1.73m$^2$ as a result of BK nephropathy. Kidney graft biopsy did not show any signs of oxalate deposits. No adverse events of Lumasiran occurred.
Patient 2 was a 5-year-old girl with kidney failure and systemic oxalosis. Plasma oxalate decreased from 241 µmol/L to 91 µmol/L under highly intensive dialysis and Lumasiran monotherapy. As the risk of post-transplant recurrence of oxalate nephropathy was considered still too high, Nedosiran was added. Plasma oxalate further decreased to 55 µmol/L, allowing successful kidney transplantation, without the need for a liver transplant.
Conclusions: These cases show promising results of solo kidney transplantation in PH patients under both RNAi therapies. Follow-up research is needed to appreciate and define its place as a replacement for liver transplantation. Lumasiran is registered for use in the Netherlands and PH patients may be eligible for treatment with Lumasiran as part of the Orphan Drug Access Protocol (ODAP) for Lumasiran within the Netherlands.

**Maximum liver function capacity test (LiMAx) during in-situ abdominal normothermic regional perfusion as predictor of graft function after transplantation**

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Background: Abdominal normothermic regional perfusion (aNRP) enables assessment of donor liver viability during donation after circulatory death (DCD). However, a gold standard for adequate liver function is lacking, and livers are usually subjectively assessed, with the risk of under-utilization. We aimed to assess the maximum liver function capacity (LiMAx) test to objectively grade liver function during aNRP.
Methods: aNRP was performed for salvage of extended criteria DCD liver grafts in 18 consecutive donors and grafts were transplanted after positive evaluation criteria (n=13). After one hour of aNRP, the LiMAx test was performed, using the aNRP. LiMAx scores were compared to aNRP variables and post-transplantation outcomes.
Results: The LiMAx test was performed successfully in 17 aNRPs donors (94%). LiMAx scores ranged between 35 and 510 µg/kg/h. During aNRP, LiMAx scores of livers with good lactate clearance were significantly higher compared to livers with impaired lactate clearance (396 (IQR:301-451) versus 105 (IQR:70-158) µg/kg/h; P=0.006). Furthermore, livers that demonstrated a stress hyperglycemia peak (>20mmol/l glucose) had a higher LiMAx score compared to grafts with no glucose peak (P=0.032). LiMAx scores significantly correlated with ALT (R=-0.755; P<0.001) and AST (R=-0.800; P<0.001) levels at the end-aNRP. The LiMAx scores of the 13 transplanted grafts were significantly higher compared to the 4 non-transplanted grafts (397 (IQR:346-453) versus 154 (IQR:87-206) µg/kg/h; P<0.001). The LiMAx score during aNRP did not correlate with post-transplantation hepatic injury markers (ALT and AST) but it was significantly correlated to lactate levels at 24 hours (R=-0.585; P=0.045).
Conclusions: We demonstrated that LiMAx testing is feasible during aNRP. The LiMAx test is the first objective method that can reliably assess liver-specific function during aNRP. We propose a LiMAx score of >240 µg/kg/h during aNRP as a safe cut-off for use of extended criteria donor livers.

**The Early Allograft Failure Simplified Estimation (EASE) score outperforms classic Olthoff EAD in predicting 90-day graft loss in liver transplantation from donation after circulatory death (DCD) donors**

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Background: The use of DCD liver grafts has significantly increased. Early allograft failure (EAF) following liver transplantation (LT) unequivocally predicts adverse graft and patient outcomes. The original Olthoff Early Allograft Dysfunction (EAD) definition is still most widely used. However it appears to be unsuitable for Donation after Circulatory Death (DCD) LT, because this score is mainly dictated by postoperative levels of transaminases and EAD was validated in cohorts with at most 10% DCD recipients. In DCD LT, postoperative transaminases are significantly higher, without necessarily affecting outcome. This study validates the existing risk scores for EAF to predict 90-day graft survival in DCD-only LT.
Methods: Between 2001 and 2021, the data of all DCD liver transplant recipients in the Erasmus MC were retrospectively analyzed. Patients who were re-transplanted or died before post-operative day 3 and machine-perfused grafts were excluded. The Olthoff EAD, UK-DCD risk, L-Graft$_7$, MaDiRe, MEAF and EASE score were determined. The ability to predict 90-days graft survival was assessed.
Results: 203 patients received a DCD liver graft. Out of the calculated scores, the EASE score was superior in predicting 90-days graft survival with an AUC of 0.81. According to the EASE-score, patients could be stratified in 5 distinct categories showing good separation in 90-days graft survival of 96.6%, 95.8%, 83.3%, 50%, 54.5%, which also translated to good separation at 1 year. The EASE score was not accurate in predicting 3-year graft survival with an AUC of 0.64.
Conclusions: This study shows that the EASE-score is superior to estimate the EAF risk and to predict 90-days graft survival in a pure DCD cohort. The EASE-score strongly outperforms the classic Olthoff score and would be preferable as surrogate marker in future studies addressing DCD liver transplantation.

**Patterns and predictors of dropout of potential liver transplant candidates: from first pre-transplant visit to liver transplantation**

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Background: The number of active patients on the Dutch waitlist (WL) for liver transplantation (LT) has decreased more than explained by increased LT rates over the past five years. Hence, we aimed to evaluate patterns of and risk factors for dropout from referral to LT.
Methods: Consecutive adult patients considered for LT between 2018 and 2022 were included in our retrospective single-center study. Data included LT indication, etiology of liver disease, Carlson comorbidity index (CCI), MELD score, BMI, and gender. We defined three stages: first preLT visit to screening, screening to WL, and WL to LT. Primary endpoint was dropout, defined as not proceeding to the next stage. Reasons of dropout were: "too good"(i.e. no indication or recompensation), "too bad" (unacceptable perioperative risk), "absolute contraindication" (e.g. malignancy outside LT criteria, incurable infection) and death. Results were expressed in N (%) or median (range) and compared using Chi-square, Mann-Whitney U test and Cox regression analysis (HR; 95CI) with significance level set at $p<0.05$.
Results: Of 720 potential LT candidates, 383 (53%) were eventually transplanted and 337 dropped out at any time because they were "too good" (40%), "too bad" (21%), contraindication (22%) or died (17%). Over time, the percentage of dropout due to being "too good" increased gradually, reaching 53% in 2022, whereas mortality remained stable. After first preLT visit, high BMI (HR 1.05; 1.01-1.09), non-alcoholic steatohepatitis (NASH, HR 1.95; 1.22-3.11), and chronic liver failure (HR 2.26; 1.57-3.50) increased risk of dropout while patients with cholestatic disease (HR 0.61; 0.38-0.98), other etiologies (HR 0.64; 0.42-0.99), acute on chronic liver failure (ACLF, HR 0.19; 0.05-0.80) and high MELD (HR 0.95; 0.93-0.97) were more likely to proceed. After screening, high CCI (HR 1.17; 1.01-1.23) and NASH (HR 1.89, 1.03-3.47) predicted dropout and MELD exception was protective (HR 0.46, 0.22-0.95). On the WL, patients with ACLF (HR 3.13, 1.24-7.95) and high age (HR 1.02; 1.00-1.04), CCI (HR 1.21; 1.09-1.36) and MELD (HR 1.04, 1.02-1.07) were delisted while those with MELD exception (HR 0.31, 0.13-0.73) underwent LT more often. Reasons of dropout in NASH were different at each stage: at first visit 50% too good, after screening 53% too bad and 67% were delisted because of contraindication.
Conclusions: We conclude that risk factors for dropout vary per stage and patterns have changed over time with more patients considered too good for LT. Etiology impacted dropout after first visit and screening, while comorbidities determined dropout after screening and on WL. At all stages, NASH increases and MELD exception decreases the risk of dropout.

**Untargeted metabolomics confirmed therapeutic drug use, detected illicit and contraindicated drugs, and identified nonactivated metabolites of azathioprine and mycophenolate mofetil in liver and kidney transplant recipients**

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Background: Metabolomics is frequently employed in clinical research with the aim of identifying disease-related mechanisms, biomarkers, and druggable targets. This technique is also used increasingly to obtain molecular evidence of chemical exposures, including dietary (e.g. caffeine, ethanol), lifestyle (e.g. tobacco smoke, illicit drugs), and medical exposures (e.g. therapeutic drugs). Such evidence could enable the verification of clinical data retrieved through anamnesis and questionnaires, while it could also provide insights into un- and underreported exposures. Thereby, metabolomics may reduce information bias in clinical exposure and pharmacoepidemiological research.
Methods: Here we describe the application of untargeted 'SWATH' metabolomics to 24-hour urine samples of 1258 kidney (KTR) and 316 liver transplant recipients (LTR) included in the TransplantLines Food and Nutrition Biobank and Cohort Study (NCT02811835) and/or TransplantLines Biobank and Cohort Study (NCT03272841). Corresponding data were evaluated in order to validate self-reported drug use, detect illicit (e.g. cocaine) and contraindicated drugs (e.g. NSAIDs after kidney transplantation), and assess whether observed drug metabolite profiles are in agreement with published (consensus) metabolic patterns.
Results: Based on several drug classes, we demonstrated the capability of metabolomics to validate self-reported drug use, with both data sources being in good agreement (Cohen's kappa ≥0.90). However, the selection of target chemicals can be challenging, for example for (es)omeprazole which we targeted through five oxidation products, including 5-hydroxyomeprazole and omeprazole sulfone, with none of them being detected in the urine of all (es)omeprazole users. Regarding detection of un-/underreported exposures, we identified cocaine and varying adulterants in the urine of 5 (0.4%) KTR and NSAIDs in the urine of 49 (4%) KTR, for which the latter drugs are contraindicated. Finally, we unveiled disagreement between the consensus and real-world metabolism of azathioprine and mycophenolate mofetil by discovering previously-unreported drug metabolites. In fact, our data suggest that considerable portions of both prodrugs are not converted to their active forms, which warrants further investigations to rule out potential underdosing.
Conclusions: In conclusion, we demonstrated novel applications of metabolomics in clinical transplantation research which could, for example, contribute to further personalization of drug treatments.

## A single cell transcriptomic landscape of kidney endothelial cells, from kidney organoids to mature kidney

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Background: Kidney endothelial cells (KEC) are the main barrier between the circulatory system and the kidney graft. Targeting these cells holds potential as a therapeutic approach to mitigate the effects of inflammation, hypoxia, and drug toxicity. Kidney organoids (KO) provide a useful model to study KEC therapies and have the potential to serve as clinically transplantable auxiliary tissue. However, the structure of KO is immature and does not fully replicate the functional kidney. To fully utilize the potential of KO as a drug screening model and for tissue repair, it is crucial to thoroughly understand the molecular signatures of EC that drive the further differentiation of the kidney's vasculature.
Methods: We dissected the heterogeneity of renal EC from different sources (human iPSC KO, implanted human iPSC KO, embryonic and adult kidney tissue) using single-cell RNA sequencing. We performed a trajectory analysis and checked transcription factor (TF) activity in KEC. By conducting differential gene and pathway analysis with a Wilcoxon rank sum test on all genes with a logFC of 1, we were able to identify alterations in injured KEC, whether caused by ischemia-reperfusion or upon immune response.
Results: Our analysis of the transcriptome of KEC from various sources and tissues revealed a heterogeneous landscape, with shared features related to ion channels, nutrient transporters, and some angiocrine growth factors serving as common denominators. However, angiogenesis, fibrosis, and hypoxia-related markers were identified as the primary drivers of heterogeneity among KEC (p-value < 0.01). Trajectory analysis provided a comprehensive view of KEC profiles across development, starting from iPSC-derived KO, followed by embryonic, iPSC-implanted KO, and ending with adult KEC, capturing the progression of KEC transcriptomic signatures over maturation. We also identified specific sets of transcription factors that switch during KEC development. Finally, we found that KEC upregulate genes such as PKHD1, FHIT, WWOX, and RUNX1 during stress conditions such as ischemia-reperfusion injury and allogenic immune cell exposure.
Conclusions: We present a comprehensive analysis of the transcriptomic changes in KEC across development and injury. Our findings highlight the activity of transcription factors as potential targets for modulation, which could accelerate the maturation of kidney organoids and enable their use in exploring the underlying mechanisms of kidney disorders.

**Platelet and endothelium mediated extracellular trap formation in donor kidney grafts**

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Background: Kidney grafts from deceased donors have inferior quality compared to grafts from living donors. However, a large percentage of transplanted grafts are derived from deceased donors. During brain or circulatory death, the pro-inflammatory environment primes the activation of various immune cells. Neutrophils and macrophages can release extracellular traps (ETs) in response to specific stimuli, causing tissue damage. The formation of ETs in this context might be mediated by activated endothelium and platelets, which have been shown to infiltrate grafts and form microthrombi. This study aimed to determine whether neutrophil and macrophage ETs are present before transplantation in grafts from deceased donors and to investigate its association with platelet infiltration, endothelial cell activation and oxidative stress.
Methods: Extracellular traps in rat donor kidneys were investigated through immunohistochemistry of citrullinated histone 3 (CitH3) and immunofluorescence of DNA, CitH3, myeloperoxidase (MPO) and CD68 (a pan-macrophage marker) colocalization. Oxidative stress was analysed through the measurement of free thiol levels in plasma of rat donors. These experiments are to be complemented with immunofluorescence of platelets and activated endothelial cell colocalization with ETs and measurement of circulating ETs in plasma through MPO-DNA complexes. The measurements are also to be repeated on human donor samples from the TransplantLines biobank.
Results: Preliminary results revealed increased expression of CitH3 in kidneys from brain- and circulatory dead rat donors compared to sham-operated rats [3.41 (1.87), 5.52 (1.52) vs 1.72 (1.05) cells/mm$^2$]. DNA, CitH3, MPO and CD68 co-localized in the cortical region of rat donor kidneys. A trend towards lower free thiol levels was observed in the plasma of brain-dead rats [66.82 (33.67) µM] compared to sham-operated rats [90.06 (36.11) µM].
Conclusions: The pilot data demonstrated that ETs are already present in grafts from deceased donors before transplantation. The presence of ETs in the cortical region suggests that ET formation may cause damage to glomeruli in kidneys of deceased donors. A trend towards lower free thiol levels in deceased donors, indicate a greater oxidative burden – which is consistent with ET formation and can lead to further priming of neutrophils and macrophages for increased ET- and microthrombi formation. The presence of ETs in the grafts of the rat donors may thus prime grafts for dysfunction before transplantation, which might be linked to increased oxidative stress.

**Evaluation of the protective effect of alkaline phosphatase against ischaemia and reperfusion injury in porcine kidneys**

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Background: Kidney transplantation has been established worldwide as the last treatment for end-stage renal failure. However, ischemia-reperfusion injury (IRI) inevitably occurs during kidney transplantation. The most severe form of IRI leads to delayed graft failure, which is an important cause of morbidity and mortality after renal transplantation. A promising novel therapy strategy is the enzyme alkaline phosphatase (AP). Clinical and experimental evidences described great effect of AP therapy in modulate the inflammatory response in sepsis-associated acute kidney injury. Here we investigated the protective effect of bovine intestinal alkaline phosphatase (BiAP) on IRI and renal function in porcine kidneys.
Methods: Sixteen viable porcine kidneys (n = 8/group) were obtained from a slaughterhouse. All kidneys were submitted to 30 min of warm ischemia, 24h of oxygenated hypothermic machine perfusion (HMP), and 4h of normothermic machine perfusion (NMP). BiAP was added at the beginning of each step in the AP group. Non-treated kidneys (C) were used as controls. Biopsies and samples were taken to assess the renal injury.
Results: Kidneys treated with BiAP presented higher HMP flow (C:8.6± 2.9; AP 17.4±3.4 ml/min/100g; P=0.0313). In parallel, the treated group showed higher values in ATP concentration in renal biopsies after NMP (C: 21.74±9.362; AP36.88 ±11.99 *µmol/g protein; P= 0.014*). Regarding tissue damage, treated kidneys presented lower values to ASAT (C:704.2±580.6; AP:449.9±317.8 U/L, P=0.0625) and LDH (C:918.6±681.2; AP:638.6±371.8 U/L, P=0.0625).
Conclusions: Preliminaries data presented here suggest a protective effect of BiAP, preserving renal microcirculation, cellular metabolic activity and consequently avoiding tissue damage. Once AP was developed as an anti-inflammatory sepsis therapy, further analysis focusing on inflammatory parameters can elucidate the protective mechanism of the BiAP against IRI in kidneys.

**Single cell RNA sequencing of donor-reactive T cells reveals role of apoptosis in donor-specific hyporesponsiveness of kidney transplant recipients**

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Background: After kidney transplantation (KT) donor-specific hyporesponsiveness (DSH) of recipient T cells develops over time. Recently, apoptosis was identified as a possible underlying mechanism.
Methods: In this study, both transcriptomic profiles and complete V(D)J variable regions of TR transcripts from individual alloreactive T cells of kidney transplant recipients were determined with single cell RNA sequencing. Alloreactive T cells were identified by CD137 expression after stimulation of peripheral blood mononuclear cells (PBMCs) obtained from KT recipients (N=7) prior to and 3-5 years after transplantation with CD3-depleted PBMCs of their donor or a third party control. The alloreactive T cells were sorted, sequenced and the transcriptome and T cell receptor profile analyzed using unsupervised clustering.
Results: Alloreactive T cells retain a highly polyclonal TRA/TRB repertoire over time. Clustering based on the transcriptome divided the donor-reactive T cells into three main groups; one cluster of cytotoxic CD8+ T cells and two clusters of CD4+ T cells with distinct activation profiles. Differential expression analysis revealed that donor-reactive CD4+ T cells in both clusters had downregulation of genes involved in apoptosis and intracellular signaling pathways post-transplant. Remarkably, no change in the transcriptome of donor-reactive cytotoxic CD8+ T cells was observed over time. Inclusion of third-party controls enabled us to ascertain that the differences we detected post-transplant were truly donor-specific and not due to the influence of immunosuppression.
Conclusions: Single cell expression profiling demonstrated a loss of activated and pro-apoptotic donor-reactive CD4+ T cell clones after transplantation in stable kidney transplant recipients. This supports a role of apoptosis of highly activated alloreactive CD4+ T cells in the development of donor-specific hyporesponsiveness in stable kidney transplant recipients.

**Perfusate from normothermic machine perfused discarded human donor kidneys has an anti-inflammatory effect on monocyte-derived dendritic cells**

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Background: Information about the immunological state of the kidney during machine perfusion is limited. We hypothesize that immunogenicity of the organ might be reflected by the release of damage associated molecular patterns (DAMPs) into the perfusate. Dendritic cells (DCs) are potent antigen presenting cells, forming the bridge between the innate and adaptive immune system, and are able to sense DAMPs. We hypothesized that a model of monocyte-derived DCs could be used to monitor the release of DAMPs by analysing the DC activation state.
Methods: Perfusate was obtained from the PROPER trial where discarded human donor kidneys (n=15) were perfused for 6h at 37°C. Monocytes were isolated from buffy coats and cultured with IL-4 and GM-CSF for 5 days to allow differentiation into DCs. DCs were incubated for 24h with 4x diluted perfusate from four timepoints. DC supernatant was analysed by Luminex analysis with a 27 cytokine panel. Relevant cytokines were validated with ELISA. DCs were analysed with flow cytometry for expression of co-stimulatory markers. DCs were also cocultured with allogenic T cells in a mixed leukocyte reaction.
Results: DCs showed a decrease of costimulatory marker CD86 when incubated with perfusate from 3 and 6h of normothermic machine perfusion (NMP) compared with the start of perfusion. Luminex analysis of the DC supernatant showed increased levels of G-CSF, IL-8 and IL-10. However, IL-8 and G-CSF were released from the kidney and already increased in the perfusate. In contrast, IL-10 was specifically produced by DCs. DCs incubated with perfusate showed less T cell stimulatory capacity compared with non-exposed perfusion solution, as shown by reduced alloreactive CD4 and CD8 T cell proliferation and lower levels of IFN-y production. One perfusate sample induced a pro-inflammatory DC profile with high expression of CD80, CD83, CD86 and HLA-DR, along with high IL-6 levels. However, also in this case, the alloreactive T cell proliferation was still reduced.
Conclusions: Addition of perfusate from prolonged NMP of discarded human donor kidneys to human monocyte-derived DCs leads to a more anti-inflammatory DC phenotype and function. The compound responsible for this appears strong enough to override a pro-inflammatory DC phenotype. Further studies should focus on identifying the compound(s) responsible for this anti-inflammatory DC profile.

**Towards the use of immortalized, perfusate-isolated human endothelial cells for the screening of non-HLA antibodies in kidney transplant recipients**

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Background:Endothelial cells (ECs) are important targets for both cellular and antibody mediated rejection in transplanted kidneys. Recent studies have shown that antibodies directed against non-human leukocyte antigens (HLAs) may play an important role in immunity, yet screening for these antibodies is not routinely performed prior to transplantation due to uncertainty about the clinical relevance and the lack of validated detection assays . A few cell-based crossmatching assays have been described for the screening of non-HLA antibodies using either primary ECs such as the HUVECs, Tie-2+ cells, or cell lines such as the CiGeNCs as the targets. However, despite the promising results of these assays, HUVECs and Tie-2+ ECs are not organ specific, and CiGeNCs, despite being kidney-specific, are derived from a single donor and thus lack heterogeneity in protein expression.Therefore, the development of an ideal EC crossmatching assay with organ and donor specificity is warranted. We aimed to establish a cell bank of kidney-derived ECs covering a broad array of HLA and non-HLA targets,upon which, an EC-based crossmatch assays will be developed using ECs isolated from the liquid of machine-perfused kidneys.
Methods: Human cells were collected and cultured from the perfusate after post-mortem kidney donation and perfusion, then, ECs were isolated based on the expression of CD31. Transduction of the ECs was performed utilizing a lentiviral vector encoding for the SV40 large T antigen with mCherry as the reporter gene. Expression of common EC markers was performed using a flow cytometry-based cell surface staining.
Results: To assess the success of the transduction, the expression of the reporter gene was investigated using fluorescence microscopy. Reporter gene positive cells were cultured for a period of 5-8 weeks until a suitable expansion level, then checked for the expression of ECs markers including CD31, CD34, VEGFR-2, ET-1, and vWF with flow cytometry. The analysis revealed that the transduced cells maintained a homogenous, stable expression of these markers following transduction after a prolonged period in culture.
Conclusions: Our results showed that the transformed cells expressed the selected common ECs markers even after a long period of culturing, confirming their endothelial characteristics, and therefore making them a suitable option as target cells for the screening of non-HLA antibodies. Additional single cell sequencing analyses, as well as HLA silencing are planned in the near future.

## HLA class I protein disappearance in kidney organoids

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Background: Induced pluripotent stem cells (iPSCs)-derived kidney organoids are a powerful tool to study human kidney development and disease, and hold great potential in the field of regenerative medicine. Therefore, immunogenicity of the organoid tissue is an important aspect that has to be addressed before their use in implantation. We hereby report a novel discovery of Human Leucocyte Antigen class I (HLA-I) protein downregulation during the process of kidney organoid generation. HLA-I is expressed on the cell surface of nucleated cells, and plays a central role in both innate and adaptive immunity. Thus, a better understanding of the mechanisms behind the modulation of HLA-I expression in kidney organoids could facilitate their therapeutic use in the future.
Methods: Kidney organoids were generated using a 20 day protocol, and samples were collected at different stages of differentiation, from the iPSC stage to the fully mature organoids. HLA-I expression was then assessed using several methodologies, including Western blot, flow cytometry, qPCR and immunohistochemistry.
Results: iPSCs showed normal HLA-I protein expression as determined by flow cytometry and Western blot, whilst during differentiation organoids started showing a downregulation of the protein from early stages of differentiation. Interestingly, mRNA levels of HLA-I components such as $\beta_2$-microglobuline (B2M) and the $\alpha$ chains did not show a downregulation in kidney organoids in comparison to iPSCs. Therefore we theorize that transcription of the HLA-I components is not affected, however translation is truncated during organoid generation. Moreover, direct co-culture of kidney organoids with peripheral blood mononuclear cells (PBMCs) to provide an inflammatory stimulation did not reverse the HLA-I downregulation.
Conclusions: This finding could open a door to a better understanding of mechanisms involved in HLA-I expression, which could facilitate organoid implantation in the future, as well as have potential clinical applications in the transplantation context.

**Nurse-led self-management support after organ transplantation – a multicenter, multi-organ stepped wedge randomized controlled trial**

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Background: After organ transplantation effective self-management skills are essential to deal with medical, emotional and role challenges and for optimal clinical outcomes. However, interventions to support post-transplant self-management skills among transplant recipients are lacking. To fill this gap we developed a nurse-led self-management support intervention. The aim of this study was to implement and test effectiveness of the ZENN intervention in promoting self-management skills among heart, kidney, liver and lung transplant recipients in comparison to standard care.
Methods: This multi-centre stepped wedge randomized controlled trial was performed within six departments of five University Medical Hospitals between September 2020 and November 2022. All departments started in the control group after which the departments were randomly assigned to a start date to commence the experimental group. Before starting the experimental phase the nurse practitioners were trained in carrying out the intervention. Patients in the control group received care as usual and completed questionnaires at baseline (T0) and after 6 months (T1). Patients in the experimental group received standard care plus the ZENN intervention and completed the same questionnaires at T0 and T1. The primary outcome to measure self-management is the Skills and technique acquisition scale of the HeiQ. Secondary outcomes included medication adherence.
Results: The majority of the participants in both control and intervention groups (n=105 vs. n=65) were male 68% vs. 55%), had a lower education (40% vs. 43%), had a kidney transplantation (86.7% vs. 83%). The mean age was 53 years old. At baseline (T0) the experimental group scored significantly lower than the control group on self-management skills,. Self-management increased between T0 and T1 among the experimental group ($p = .03$) whereas there was no significant change over time in the control group. There was no significant difference between the control and intervention group at T1 ($p = .80$). At T1 29.4% of the recipients in the control group did not adhere to their medication, and for the intervention group this was 22.9% ($p = .46$).
Conclusions: There appears to be a selection bias in the experimental group. This group benefitted from the intervention as we found an improve in self-management skills and was comparable to the control group at T1. Preliminary results suggest that among recipients who have difficulties with self-management this intervention may be of added value.

**The self-regulation skills instrument in transplantation (SSIt): Development and measurement properties of a self-report self-management instrument**

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Background: Recipients of an organ transplantation face a number of challenges and often need to change their health behavior. Good self-management skills are essential for optimal clinical outcomes. Self-management skills include self-regulation skills, such as goal setting and goal pursuit. As a healthcare professional it is important to gain insight into these self-regulation skills, in order to provide tailor-made self-management support. Currently available measures of self-reported self-management tend to focus only on the medical aspects of self-management. Moreover, measures that do focus on psychosocial components of self-management often do not incorporate self-regulation skills. The aim of the study was to develop a self-management instrument for organ transplant recipients that incorporates self-regulations skills and to determine its measurement properties.
Methods: The instrument includes concepts from social cognitive models: problem awareness, attitude, self-efficacy, motivation, social support, goal setting, goal pursuit, skills and goal affect. The measurement properties were evaluated based on the COSMIN guidelines. Face and content validity were determined through patient assessment, Three-Step Test-Interview and expert assessment using the Content Validity Index. Structural validity and reliability were tested using exploratory factor analysis and Cronbach's alpha. Construct validity was tested by comparing subscales with the Health Education Impact Questionnaire (heiQ).
Results: After face and content validity assessment 47 items were entered into the exploratory factor analysis. The analysis included 252 completed questionnaires and showed two meaningful factors, with internal consistency of 0.90 and 0.89. Spearman correlations between the subscales and heiQ were moderate (0.55; 0.46). The final version consists of 21 items, divided into two scales: 'Setbacks' and 'Successes'.
Conclusions: The Self-regulation skills instrument in transplantation (SSIt) is a valid and reliable instrument to asses necessary skills for self-management after transplantation. Insight into self-regulation competencies can help healthcare professionals to tailor self-management support.

**Influencing factors on the development and implementation of a prehabilitation program for kidney transplant candidates: A mixed-methods contextual analysis**

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Background: The overall fitness of kidney transplant candidates (KTCs) is often compromised due to chronic kidney disease, comorbidities and dialysis. Prehabilitation, comprised of exercise, nutritional and psychological interventions, may be an effective way to improve the overall fitness of KTCs. However, implementation of a multicomponent intervention is challenging.
This study aimed to gain insight into contextual and implementation related factors that are of influence on the development and implementation of prehabilitation for KTCs.
Methods: A contextual analysis using the Context and Implementation of Complex Intervention Framework was performed to gain a deeper understanding of current practices, preferences, possible barriers and facilitators for prehabilitation by using qualitative and quantitative methods. In-depth interviews (n=22) and focus group meetings (n=5) were performed with KTCs, their significant others, kidney transplant recipients and healthcare providers (HCPs). In addition, a survey (n=87) was conducted among waitlisted KTCs.
Results: In current practice, care for KTCs has a medical focus. In addition, dieticians and social workers are often involved. Both KTCs and HCPs indicated that little attention is paid to physical activity. Ninety-two percent of the KTCs encountered one or more problems regarding physical activity, nutritional status and/or psychological wellbeing. Perceived barriers to engage in healthy life style behaviors were mainly fatigue and a lack of motivation and/or knowledge. Perceived facilitators included social support and guidance from a healthcare professional. Furthermore, 79% of the KTCs indicated that they felt the need for a prehabilitation program, in which 73% would like to improve their strength and endurance, 48% to obtain a healthy nutritional status and 30% to cope with stress and/or fatigue. The majority of KTCs (64%) preferred a personalized, home-based-training program, with guidance from a healthcare professional.
Conclusions: The high percentage of KTCs encountering physical and psychological problems, the limited attention for physical activity in current practice and the felt need for prehabilitation, suggests that prehabilitation may be a promising intervention to improve the overall fitness of KTCs before transplant.

## Parents' and young children's experiences in clinical research during kidney transplantation

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Background: Research in children lags behind, partly due to more strict Institutional Review Board (IRB) regulations. Clinical research data from the adult population are often extrapolated to children. IRB's base their decision for approval on limited data of children's discomfort during research procedures. Our study aims to investigate parents' and young children's experiences and discomfort when participating in extensive clinical research during kidney transplantation.
Methods: This is a single center, semi-structured interview study. Subjects participated in the Circulation and Hemodynamics in Living Donor Kidney Transplantation (CHILD-KiTC) study. In this study there are extra procedures before transplantation (cardiac ultrasound (US)), during anesthesia (MRI, kidney US and blood sampling), as well as postoperatively (blood sampling, cardiac and kidney US and MRI). As the participants are young children, they were interviewed with their parents using pictograms. Interviews were analyzed following the principles of thematic content analysis.
Results: Nine couples were interviewed. Median age of the children at the time of surgery was 4 years (IQR 3; interval: 4-7). Median time between participation and the interview was 24 months (IQR 1; interval 21-31). Most children were not aware having participated in a study. It was not clear for them if procedures were part of standard of care or research related. Reported extra burden varied from "not at all" to "heavy combined with intense clinical treatment". Frequently reported parental motivations to participate were: not too burdensome for the child, contributing to science and extra checkups. Physical discomforts were mostly pain caused by blood withdrawal and wound pressure from kidney ultrasound. A needle puncture was rated as painful, stressful or unpleasant in all patients, whereas the discomfort of other procedures varied between children. Children's negative experiences were long waiting times in hospital and missing school. Parents reported spending much time in the hospital and suboptimal planning as burdensome. Positive experiences were funny and kind healthcare professionals, and interesting explanations during the procedures. In general, distraction and funny stories helped to reduce fear or boredom.
Conclusions: A broad variation of both negative and positive experiences was reported. Needle puncture for blood sampling was uniformly rated as most discomforting. Our results correspond with earlier studies. Age-appropriate information, distraction, good communication and planning all have a positive impact on the reported experiences. When these requirements are met, there is no need to exclude children from research.

## 65 Years of experience in pediatric kidney transplantation in the Netherlands

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Background: The first pediatric kidney transplant (PKT) in the Netherlands was performed in 1966 and care has continued to evolve ever since. This study aims to provide an overview of changes in pediatric kidney transplantation in the Netherlands with regard to protocols and outcomes.
Methods: All PKT during the period of 1966-2021 were analysed with the use of the prospective NOTR (Nederlandse OrgaanTransplantatie Registratie; Dutch Organ Transplantation registry) database. Extensive recipient, donor, and transplantation-related data were collected such as donor age, HLA mismatches, previous therapy and underlying disease causing kidney failure. Graft survival was analysed using Kaplan-Maier curves.
Results: A total of 1425 PKT in 1200 patients were performed between 1966 and 2021. The first living related transplantation was performed in 1966, the first pre-emptive transplantation was performed in 1980, and the first living unrelated transplantation was performed in 2005. In the deceased donor (DD) group, both patients and donors were younger and had fewer HLA mismatches than the LD group ($p<0.05$). Graft survival significantly improved over time ($p<0.01$): 10-year graft survival was 42% for transplantations before 1990, compared with the current value of 92%. Most important cause of graft loss was rejection. Over time, the use of living donors (LD) increased significantly (10% before 1990, 72% after 2010, $p<0.05$), as did the number of pre-emptive transplantations (2% to 41% respectively, $p<0.05$). With regard to immunosuppressive protocols there have been significant changes of which the introduction of Tacrolimus in 1986 and the immunosuppression TWIST protocol (without steroids) was implemented in 2012. Over time, more HLA-mismatches were accepted.
Conclusions: Care for PKT recipients has considerably improved over time. The number of LD and pre-emptive transplantations has increased and graft survival improved to a current 10-years graft survival of 92%. Optimalisation of personalized care keeps evolving and multidisciplinary and international collaboration can contribute to this quest.

**Non-invasive detection of rejection in the first 2 weeks after kidney transplantation using urinary chemokines**

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Background: Novel biomarker assays for the non- (or minimally) invasive detection of rejection, such as for example, donor-specific cell free DNA, are unable to diagnose rejection in the first 2 weeks after transplantation. The aim of this study was to examine if the urinary chemokines CXCL9 and CXCL10 can accurately detect biopsy-confirmed allograft rejection (BCAR) early after kidney transplantation.
Methods: Available urine samples collected at the time of a first biopsy performed within 14 days after transplantation (n=54, 50% deceased donors) were used from a cohort of 225 consecutive kidney transplant recipients. Biopsies were categorized into i. BCAR (n=16), ii. presumed rejection (n=16) or iii. no rejection (n=22). Urine samples collected at day 7 (no biopsy in the first 6 months after transplantation) served as controls (n=76, 54% deceased donors). Urinary CXCL9 and CXCL10 concentrations were determined with ELISA.
Results: Biopsies were performed at a median of 7 days (range: 2-14 days) after transplantation. Urinary CXCL9 concentrations were significantly higher at BCAR (368 pg/ml, range: 0-49619 pg/ml) compared to day 7 (4.5 pg/ml, range: 0-1577 pg/ml; p<0.001; ROC-AUC 0.82, 95%CI: 0.68 to 0.96), as well as compared to no rejection biopsies (0 pg/ml, range: 0-321 pg/ml; p<0.0001; ROC-AUC 0.86, 95%CI: 0.73 to 0.99). Similarly, CXCL10 concentrations were significantly higher at BCAR (238 pg/ml, range: 16-11949) compared to day 7 (28 pg/ml, range: 0-1320 pg/ml; p<0.001; ROC-AUC 0.83, 95%CI: 0.71 to 0.95), as well as compared to no rejection biopsies (35 pg/ml, range: 4-2037 pg/ml, p<0.05; ROC-AUC 0.77, 95%CI: 0.62 to 0.92). The positive predictive value for BCAR was 55% (day 7) and 62% (no rejection biopsies) for CXCL9 and 46% (day 7) and 35% (no rejection biopsies) for CXCL10. In contrast, the negative predictive value for BCAR was 94% (both day 7 and no rejection biopsies) for CXCL9 and 93% (day 7) and 92% (no rejection biopsies) for CXCL10. CXCL9 and CXCL10 concentrations were comparable between living donors and deceased donors.
Conclusions: Urinary chemokines CXCL9 and CXCL10 identify BCAR in the first 2 weeks after kidney transplantation. As a non-invasive measurement these markers have a high potential to augment clinical decision making in the early period after kidney transplantation.

**Solvent-accessible amino acid mismatches on donor HLA are associated with kidney graft outcomes; a pivotal step towards personalizing surveillance and immunosuppression?**

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Background: Current guidelines advise the use of traditional HLA antigenic mismatches to assess the risk of alloimmunity in kidney transplant recipients (KTR). This approach is however too crude to allow personalization of surveillance and immunosuppression. Recently, the HLA epitope mismatch algorithm (HLA-EMMA) was developed to quantify solvent-accessible amino acid (saAA) mismatches that could interact with B cell receptors responsible for the humoral allo-immune response. Until date, HLA-EMMA has only been associated with graft outcomes in relatively small cohorts with a limited number of events. This observational study aimed to examine the relationship between HLA-EMMA and transplant outcomes in a large and deeply phenotyped cohort of 1580 KTR by cox regression analyses.
Methods: The primary outcomes of interest were patient death, death-censored graft failure, biopsy-proven acute rejection, overall de novo donor-specific antibody (dnDSA) development, and dnDSA development per HLA locus (A, B, C, DQ, and DR). Hazard ratios (HR) and confidence intervals (CI) were adjusted for type of transplantation, recipient and donor age/gender, number of prior transplantations, and pre-transplant DSA's.
Results: During a median follow-up of 5.5 years (IQR: 2.8-9.0), 270 (17%) patients died, 185 (12%) suffered from graft failure, 302 (19%) suffered from BPAR, and 272 (17%) developed dnDSA. dnDSA against HLA-DQ were most common (n=164).
Multivariable analysis showed that HLA-EMMA (total, class I, and class II saAA) mismatch scores were independently and significantly associated with patient death, death-censored graft failure, biopsy-proven acute rejection, overall dnDSA occurrence as well as HLA-specific dnDSA formation as shown in Figure 1. For locus-specific dnDSA, HRs per 10 saAA mismatches were 2.68 (95% CI: 1.93-3.71,p<.001), 2.34 (95% CI:1.34-4.09,p<.001), 3.78 (95% CI: 1.91-7.47,p<.001), 2.13 (95% CI: 1.77-2.55,p<.001), and 2.06 (95% CI: 1.68-2.53,p<.001) for HLA-A, -B, -C, -DQ, and -DR, respectively.
Conclusions: This is the first study to investigate the association between saAA mismatches and kidney transplant outcomes calculated by HLA-EMMA in a large and deeply phenotyped cohort of KTR. These findings suggest that HLA-EMMA may be a useful tool to stratify immunological risk to potentiate personalized surveillance and immunosuppression after transplantation.

**Gene expression profiles in 3 month biopsies associate with progression to kidney transplant rejection before detection of histological changes**

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Background: Allograft rejection remains a major cause of kidney function loss after transplantation. The histological analysis of graft biopsy is the gold standard to diagnose rejection and guide immunosuppressive treatment. However, histology can yield inconclusive results, leading to a delay in optimal treatment. Moreover, once detected in histological analysis, injury is often irreversible. Therefore, we compared gene expression profiles of biopsies from patients without *versus* with early and late rejection to identify molecular changes associated with progression to rejection before histological changes occur.
Methods: RNA was isolated from frozen biopsies, all taken at 3 months after transplantation, including samples from patients without rejection in the first year (n=6), with biopsy proven rejection at 3 months (n=4, early rejection group) and with no rejection at 3 months, but biopsy proven rejection at 12 months, (n=4, late rejection group). Gene expression analysis was performed with Nanostring's Human Organ Transplant panel.
Results: Distinct gene expression profiles were observed between control and early rejection groups (138 genes differentially expressed). Importantly, gene expression, 103 genes were differently expressed at 3 months in the late rejection group as compared to control group. Interestingly, 83 of these genes were also differentially expressed between early rejection group and control and 3 month expression pattern of the late rejection group closely resembled that of the early rejection group. This pattern includes genes involved in oxidative stress, inflammasome and NLR signalling such as NOX4, FAS, JAK2, NFKB1, BCL2 and BMP7 (p-Adj < 1,641e-02).
Conclusions: Our results demonstrate that a distinct gene expression profile precedes histological evidence of injury. This can potentially be used to predict rejection and adjust treatment to prevent it.

**The influence of mycophenolate mofetil on top of tacrolimus on blood pressure in a randomized cohort of kidney transplant recipients**

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Background: Animal experimental data suggest a blood pressure lowering effect of mycophenolate mofetil (MMF). However, data from a randomized controlled trial in humans are lacking.
Methods: A randomized controlled weaning trial was performed in low immunologically risk kidney transplant recipients (EudraCT nr.: 2014-001372-66). Recipients were randomized to standard tacrolimus (TAC)/MMF or to TAC monotherapy (TACmono), from 9 months onwards after transplantation, without steroids. Outpatient clinic blood pressure measurements were performed at month 6 (baseline), 9 and 12 after transplantation. At each timepoint, blood pressure was measured 7 times with 5-minute intervals by a research nurse after 30-minutes rest. The WHO developed Daily defined dose (DDD) was used to compare the number and type of antihypertensive drugs. At each timepoint 24-hour urinary sodium, potassium and protein excretion was also assessed.
Results: Between 2015 and 2018, 79 recipients were randomized, of whom 73 completed 12 months follow-up in the blood pressure study (39 TAC/MMF and 34 TACmono). At baseline six months after transplantation, patients were 62 (56-69) years of age with an eGFR of 55(±16) ml/min and proteinuria of 14.0 (10.0-23.0) mg/mmol, TAC trough levels of 7.4 (2.5) µg/L in both groups and MMF dose of 1000 mg daily (1000-1500) in TAC/MMF. Systolic blood pressure at baseline, was comparable in TAC/MMF compared to TACmono (134.3 (±15.2) mmHg vs 133.2 (±10.4), p = 0.63) and did not change significantly from month 6 to 12 after transplantation between TAC/MMF and TACmono, p = 0.75. DDD of TAC/MMF and TACmono was comparable at baseline. From month 6 to 12 the DDD changed from 1.5 (0.7-2.7) to 1.1 (0.7-2.3) in the TAC/MMF group, compared to an increase from 2.0 (1.0-4.0) to 2.3 (1.1-3.8) in TACmono (p=0.02). Urinary sodium, potassium and protein excretion were comparable between both groups. Sodium excretion increased from 146 (106-180) at month 6 to 173 (123-231) mmol/day at month 12 after kidney transplantation (p<0.001).
Conclusions: Discontinuation of MMF after kidney transplantation in a tacrolimus/MMF immune suppressive regimen increased the use of antihypertensive drugs significantly. These data support the concept of a blood pressure lowering effect of MMF.

**Are hemodynamic targets related to renal-injury biomarker excretion during paediatric kidney transplantation?**

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Background: The large donor-acceptor size-mismatch in kidney transplantation with young acceptor and adult donor, requires significant increases in the acceptors cardiac output and blood pressure to optimize donor-kidney perfusion. Therefore, perioperative supraphysiological hemodynamic targets are recommended. But liberal administration of fluids and vasopressors risks fluid overload and limited graft perfusion. To evaluate the effects of this approach on post-ischaemic kidney injury, we analysed postoperative renal-injury biomarker profiles in relation to hemodynamic variables.
Methods: Observational, single centre study of all children transplanted since 2012 with an adult living donor kidney and CO (cardiac output) measurements available. Patient characteristics, hemodynamic variables, norepinephrine infusion rates, urine output and renal clearance data were collected. By protocol, hemodynamic management was guided by target cardiac index (CI = CO/$m^2$) >3.5 L/min/$m^2$ and mean arterial pressure (MAP) >65 mmHg. Urine samples were taken from 4 hours postreperfusion until three days postoperative at 8-12-hours intervals. Biomarkers KIM-1, NGAL, LFABP, IGFBP-7 and TIMP-2 were analysed with commercially available ELISA kits. Data analysis included correlation analyses of total splint urine biomarker excretion with perioperative CI, MAP, central venous pressure (CVP) and norepinephrine infusion rates at one and four hours postreperfusion.
Results: Fifteen patients were included with mean [IQR] age 6 [5-8] years, weight 21[16-25] kg and donor/acceptor BSA-mismatch of 2.4 [2.1-3.0]. All patients had diuresis within one hour after kidney reperfusion and good renal function at discharge.
Statistically significant correlations were found at 4 hours postreperfusion between CI with IGFBP-7 and MAP with TIMP2. At both timepoints a trend to negative correlation was found for CI with all biomarkers. A trend to positive correlation was found for CVP and norepinephrine with IGFBP-7 and TIMP-2. No trend was found for MAP.
Conclusions: The trend to negative correlation between CI and renal-injury biomarker excretion supports the hypothesis that supraphysiologic CO prevents post-ischaemic kidney injury. The trend to positive correlation between CVP and norepinephrine infusion to IGBPF-7 and TIMP-2 suggests that careful titration of fluids and vasopressors is important to limit kidney injury. Research in larger sample sizes could reveal whether these trends reach statistical significancy and are of clinical importance.

**Peri-operative kinetics of plasma mitochondrial DNA levels during living donor kidney transplantation**

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Background: During ischemia and reperfusion injury (IRI), mitochondria may release mitochondrial DNA (mtDNA). mtDNA can serve as a propagator of further injury during and after kidney transplantation. Aim of this study was to measure the perioperative plasma kinetics of mtDNA during living donor kidney transplantation (LDKT) and the potential of plasma mtDNA levels as markers of graft outcome parameters.
Methods: This is a post-hoc analysis of plasma samples of the Volatile Anaesthetic Protection of Renal Transplants-1 (VAPOR-1) study. All donor-recipient couples of the Volatile Anaesthetic Protection of Renal Transplants-1 (VAPOR-1) trial were included (n=57). Systemic venous, systemic arterial and renal venous samples were taken at multiple timepoints in the peri-operative period. Real-time PCR analysis was used to measure 3 mtDNA genes: displacement loop (D-loop), NADH ubiquinone oxidoreductase subunits 1 and 6 (ND1 and ND6).
Results: Levels of mtDNA genes changed over time and differed between sample origin. Donor mtDNA levels were significantly lower compared to recipients at pre-transplantation (all $P<0.001$). Systemic venous D-loop levels significantly increased from pre-transplantation till day 9 post transplantation ($P<0.05$). Systemic arterial mtDNA genes all significantly increased at 2 hours post transplantation (all $P<0.001$). Renal venous mtDNA levels at 30 sec after reperfusion were significantly higher compared to later timepoints ($P<0.05$). No association to graft outcome parameters was found after correction for multiple testing. Several donor, recipient and transplant characteristics had a significant effect of the dynamics of mtDNA over time.
Conclusions: These results demonstrate mtDNA release during the LDKT procedure. Furthermore, mtDNA release differed over time. In addition, different concentrations of mtDNA were measured in different sample origin, demonstrating the importance of timing and sample origin to study the diagnostic potential of mtDNA.

**Long-term preservation of kidneys by means of cryoperfusion: The next step in organ preservation?**

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Background: In contrast to cell lines and small biopsies, cryopreservation of whole organs brings extra hurdles such as temperature gradients and ice crystal formation that potentially damages cell viability. Cryopreservation during continuous organ perfusion could counteract these aspects by homogeneously distributing temperature and cryoprotectant agents. This study aimed to generate first pilot data on renal cryoperfusion at -15°C.
Methods: Porcine kidneys were subjected to 30 min of warm ischemia and randomized into a control and a cryoperfusion group. Control kidneys were preserved with hypothermic machine perfusion (HMP) at 0-8°C for 24h and cryoperfusion kidneys were first preserved 3h in HMP, followed by 6h of cryoperfusion at -15°C and then 15h in HMP overnight. During cooling, the concentration of cryoprotectant agent (CPA) was increased from 10% to 35% in steps, and during rewarming the CPA was sequentially diluted back to the starting concentration. The next day, both kidneys underwent 4h of normothermic machine perfusion (NMP) for viability assessment.
Results: After cryoperfusion, none of the kidneys displayed macroscopic signs of ice crystal formation. During NMP, cryopreserved kidneys produced significantly more urine ($p=0.0286$) and had significantly lower flow rates ($p=0.0004$) per 100g. Kidneys which underwent the cryoperfusion protocol had a higher total mass gain after NMP ($p=0.0085$), suggesting increased edema. Perfusate lactate concentration, electrolyte balance, and oxygen consumption in both groups were similar, indicating that cryoperfused kidneys did seem to function within a normal range during NMP. Injury markers ASAT and LDH at the end of perfusion were not statistically different between groups ($p=0.1508$ and $p=0.2222$, respectively).
Conclusions: Although our cryoperfusion protocol still requires multiple protocol improvements, these pilot results suggest, for the first time, that kidneys cryoperfused at -15°C still hold some functionality after reperfusion without inflicting major cellular injury. This suggests that cryoperfusion could potentially show to be a viable long-term preservation technique for whole-organs, which in turn could lead to better donor-recipient matching, and worldwide organ exchange.

**Magnetic resonance imaging of renal oxygen metabolism by means of 17O administration during ex vivo organ perfusion**

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Background: Renal normothermic machine perfusion (NMP) is a novel strategy to assess pretransplant renal function and injury, but it remains unclear which markers can provide information about renal viability during NMP. Magnetic resonance imaging (MRI) is commonly used to evaluate tissue morphology, metabolism, and function, and recently it has been applied to study ex vivo renal viability. The oxygen-17 ($^{17}O$) isotope offers a unique tool for the assessment of metabolic rate. By administering $^{17}O$ to the organ, $H_2{}^{17}O$ is produced and the occurrence of this immediate end product of oxidative metabolism can be selectively imaged and quantified by functional MRI sequences. This project aimed to perform direct $^{17}O$ MRI sequences on porcine kidneys during NMP to assess the feasibility of $^{17}O$ imaging over time.
Methods: Porcine kidneys were retrieved at a local slaughterhouse, subjected to 30min of warm ischemia time (WIT), and preserved by hypothermia. Kidneys were subsequently perfused for 3h at 37°C. Initially, oxygenation was administered with 95% $O_2$ / 5% $CO_2$. After 1h of NMP, perfusion to the inferior pole of one of the kidneys was blocked for 75min using a balloon catheter and then reperfused for 30min before $^{17}O$ infusion. $^{17}O$ was then supplied to the organ and anatomic and dynamic radial $H_2{}^{17}O$ MR images were acquired before, during, and after $^{17}O$ administration.
Results: $H_2{}^{17}O$ -magnitude imaging displayed that kidneys with partial ischemia had de signal intensity in the inferior pole after reperfusion, while kidneys without any additional WIT displayed a well distributed signal intensity over the whole organ. This signal shift after reperfusion could not be visualized with other functional MRI sequences such as T2* mapping, a surrogate to assess tissue oxygenation.
Conclusions: This pilot study showed the first evidence of the quantification of regional production of $H_2{}^{17}O$ in isolated perfused porcine kidneys. With this novel MRI method, we were able to image the impact of ischemic injury on the rate of oxidative metabolism in renal tissue, which could not be visualized by any other functional MRI sequence after reperfusion. This suggests that $^{17}O$ imaging during NMP could offer a valuable new tool for the assessment of renal metabolism and injury.

**Magnetic resonance imaging assessment of functional differences between kidneys in vivo and during ex vivo normothermic machine perfusion**

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Background: Normothermic machine perfusion (NMP) is a promising method for pre-transplant donor kidney quality assessment. Although its potential is increasingly being recognized, it remains unclear which NMP parameters convey information about graft viability. This is largely due to our very limited understanding of ex vivo organ physiology. To increase our knowledge about organ biology during NMP, we combined non-invasive functional magnetic resonance imaging (MRI) with renal normothermic perfusion in a porcine model. This project aimed to determine the differences between *in vivo* and *ex vivo* regional renal tissue oxygenation and diffusion patterns.
Methods: Pigs (n=30) weighing 80 kg were anesthetized and brought into a clinical-grade MRI scanner (Siemens Skyra 3T). In vivo MRI scans were performed to provide information about regional tissue oxygenation using T2* mapping and water diffusion patterns using diffusion weighted imaging (DWI) and apparent diffusion coefficient (ADC) maps. Subsequently, a bilateral nephrectomy was performed to retrieve kidney pairs, which were randomized to sustain either minimal warm ischemia (WI) or 75 min WI. After WI and 4-5 hours of cold machine preservation, both kidneys were simultaneously connected to an MRI-compatible NMP circuit and perfused for 6 hours. Hourly, T2* maps and DWI images were acquired from both kidneys. Regions of interest were drawn in the cortex and medulla to calculate the mean signal intensity.
Results: *In vivo*mean T2* corticomedullar (CM) ratio (1.71±0.21) differed significantly from the mean *ex vivo* CM ratio of the minimal WI group (0.60±0.13, $P < 0.0001$) and the 75 min WI group (0.62±0.16, $P < 0.0001$). In vivo cortical ADC values (2.1±0.15 x $10^{-3}$ $mm^2/s$) were significantly higher compared to the minimal WI group (1.46±0.25, $P < 0.0001$) and the 75 minutes WI group (1.76±0.09, $P = 0.002$).
Conclusions: These results provide the first evidence for the existence of remarkable differences in regional tissue oxygenation and diffusion patterns between a normal physiological *in vivo* environment and during *ex vivo* normothermic machine perfusion. These findings highlight that renal function during *ex vivo* perfusion is very different from what we are used to in our *in vivo* reference frame. Therefore, organ viability assessment during NMP should likely consider other parameters than those functional markers that are common *in vivo*.

**The setup used for ex vivo renal normothermic perfusion influences a kidney's behavior on the machine**

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Background: Along with a growing interest in renal normothermic machine perfusion (NMP) came an increase in the number of different clinically available perfusion devices. While all perfusion systems have the same aim, there are significant differences in the circuit, pumps, sensors, and software. Also, the NMP protocols used in combination with these devices vary. Therefore, we evaluated three different NMP protocols using porcine and human kidneys, hereby assessing two clinically approved perfusion devices.
Methods: Twelve porcine kidneys were subjected to 30min of warm ischemia, 24h of static cold storage, and subsequently exposed to 6h of NMP. Four kidneys were perfused on the Kidney Assist (KA, XVIVO) with a mean arterial pressure (MAP) of 75 mmHg. Four kidneys were perfused on the KA device incorporating several workaround improvements to the standard protocol and a MAP of 85mmHg (KA+WA). Four kidneys were perfused with the Perlife perfusion device (PL, Aferetica). To validate findings, six human discarded kidneys from DCD donors were perfused on the KA (KA-h) or KA+WA (KA+WA-h) (n=3 per group) protocol.
Results: Kidneys of the PL group reached the device's upper flow limit of 500ml/min after 1h of NMP and were consequently pumped with a significantly lower pressure compared to KA and KA+WA ($p$<0.0001). The arterial $pO_2$ was significantly lower in the PL group ($p$<0.0001). Yet, the Hb increased over time, and the oxygen consumption was significantly higher ($p$<0.001). Fractional sodium excretion was significantly lower in the PL group ($p$<0.01). Tissue ATP levels, urine production, and creatinine clearance rates did not differ between groups. The KA+WA-h group showed a significantly lower vascular resistance, higher oxygen delivery, and lower levels of injury markers in the perfusate compared to the KA-h group.
Conclusions: This study shows that differences in NMP protocols and machines can have a relevant influence on perfusion characteristics and kidney function on the pump, which should therefore be interpreted with caution. There is a need to develop optimized consensus protocols for renal NMP to obtain comparable results between centers.

**The influence of hypothermic machine perfusion as standard preservation method on the incidence of delayed graft function of donor kidneys – a local analysis**

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Background: A frequent occurring complication of kidney transplantation is delayed graft function (DGF). Hypothermic machine perfusion (HMP) decreases the incidence of DGF. HMP has therefore replaced cold storage (CS) as standard preservation method of donor kidneys of deceased donors in 2018 in the Netherlands. The aim of this study was to assess the impact of this switch in our centre.
Methods: An observational retrospective cohort study based on the 'Dutch organ transplantation organisation' (Nederlandse Orgaantransplantatie Registratie) was conducted. Patients who received a kidney from a deceased donor between 01-01-2010 and 01-06-2022 were included. The primary outcome was DGF, defined as either the need for dialysis or less than 30% decrease of serum creatinine, within 7 days after transplantation. Secondary endpoints were the eGFR and protein/creatinine ratio in urine at three months; and the occurrence of clinical rejection within 3 months after transplantation. All the analysis were conducted in SPSS version 26, using the chi squared test, Mann Whitney U-test and a multivariate logistic regression.
Results: In total, 212 CS kidneys and 100 HMP kidneys were included in our analysis. The HMP cohort had a significant lower incidence of DGF (63.7% vs 44.0%, p=0.001). Moreover, the eGFR was higher in this cohort (42.35 ml/min/1.73 m2vs 48.20 ml/min/1.73 m2, p=0.037). The CS cohort had significantly more patients who suffered from rejection of the kidney (23.6% vs 13.0%, p=0.030). Important confounders were donor type and duration of both the first and second warm ischemic time.
Conclusions: In conclusion, the implementation of HMP as standard preservation method led to a decrease in the incidence of DGF. Moreover, the HMP cohort had a lower rejection rate and a higher eGFR at 3 months posttransplant. Based on this study it could thus be concluded that the implementation of HMP led to better patient outcomes compared to CS in our centre.

**CNN-based models of real-time-available non-invasive imaging during normothermic machine perfusion of marginal donor kidneys potentially predict acute rejection**

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Background: Normothermic machine perfusion (NMP) recreates a more physiologic environment that could allow for better organ preservation and objective graft evaluation which are key for the use of marginal donor kidneys. Accurate graft viability assessment could prove crucial in decision-making over the usage of organs of doubtful quality, expanding the donor pool. However, an objective graft assessment tool for marginal donor kidneys undergoing NMP is missing. Useful information could be acquired through novel non-invasive imaging techniques such as laser speckle contrast imaging (LSCI) that provides high-resolution information about microcirculatory perfusion and oxygen delivery. In this study, we investigated the potential use of real-time-available LSCI of marginal donor kidneys undergoing NMP for post-transplant outcome prediction.
Methods: Fifteen marginal donor kidneys initially preserved under hypothermic machine perfusion underwent 2 additional hours of NMP prior to the transplant procedure. Nine kidneys were included in the training and validation set and six kidneys were included in the test set. LSCI data was acquired during NMP after 15, 75, and 105 minutes. Multiple convolutional neural network (CNN)-based deep learning models were developed to predict the future development of acute rejection (AR) within the first three months after kidney transplantation or the development of delayed graft function (DGF), separately. Positive predictive value (PPV), negative predictive value (NPV), and F1-score were chosen as performance metrics.
Results: Among the included kidneys, nine developed DGF and five developed AR. LSCI performed after 105 minutes of NMP was able to discriminate kidneys within the test set that will develop AR in the first three months following kidney transplantation (PPV = 1.00, NPV = 0.80, F1-score = 0.66). The same data collected at earlier time points failed to identify these kidneys. LSCI data at any of the assessed time points was not able to identify kidneys that will develop DGF.
Conclusions: LSCI shows great potential for real-time-available graft quality assessment of marginal donor kidneys undergoing NMP for periods longer than 90 minutes. Surprisingly, LSCI showed to be potentially able to discriminate kidneys that will develop AR before the donor kidneys were transplanted in the recipient. This novel insight needs to be verified in other studies with larger cohorts.

**Normothermic machine perfusion alters renal gene expression patterns**

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Background: Renal normothermic machine perfusion (NMP) is gaining interest because of its potential for viability assessment and graft repair prior to transplantation. During NMP, in vivo-like conditions are pursued. However, physiology during NMP is still incompletely understood, and it is likely that in vivo functional markers, such as creatinine clearance and fractional sodium excretion, are not appropriate for ex vivo viability assessment. Therefore, a better understanding of ex vivo physiology is warranted to further develop NMP as an assessment tool. We aimed to unravel ex vivo organ biology by analyzing the RNA profiles of kidneys in vivo and during NMP.
Methods: Thirty landrace pigs were anesthetized and prepared for a bilateral nephrectomy. During surgery, an in vivo biopsy was taken. One kidney was exposed to 75 minutes of warm ischemia (WI), while the contralateral kidney sustained no WI. Kidney grafts were cold preserved for six hours, followed by six hours of NMP. Cortical biopsies were taken before the start of NMP and at 1, 2, 3, and 6 hours of NMP. RNA sequencing was performed in all biopsies and aligned to a reference genome. Sequencing results were analyzed using the Seurat pipeline in R. Clusterprofiler was used for functional analysis of identified gene clusters.
Results: A total of 27,626 genes were identified. Unsupervised clustering analysis revealed distinct clustering between the different time points and exposure to WI. In the kidneys without WI, only two significantly differentially expressed genes (DEG) were identified after cold preservation compared to in vivo (P adj < 0.05). However, during NMP, gene expression profiles changed considerably. After 1h of NMP, 1,485 DEG were identified compared to in vivo (P adj < 0.05). This number increased up to 10,002 DEG at 6h of NMP. Functional enrichment analysis of protein-coding genes revealed downregulation of genes involved in mitochondrial respiration and upregulation of inflammatory processes during NMP. Kidneys exposed to WI showed upregulation of the genes related to stress responses compared to the kidneys with no WI.
Conclusions: These results show that in vivo renal function significantly differs from function during NMP, emphasizing that the interpretations based on our in vivo reference frame should be carefully weighed. Additionally, the duration of NMP and the timing of viability assessment are of great importance, as the active physiological processes change over time.

**Pre-transplant kidney assessment during normothermic machine perfusion using novel imaging techniques**

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Background: Normothermic machine perfusion (NMP) provides a platform to assess donor organ quality prior to transplantation, which is significant when using marginal donor kidneys. As novel imaging techniques, photoacoustic imaging (PAI) can identify different tissue molecules, and laser speckle contrast imaging (LSCI) can visualize the movement of particles. The aim of this study is to investigate the value of both PAI and LSCI as kidney quality assessment tools during NMP.
Methods: Two independent studies using slaughterhouse porcine kidneys were conducted. In the 1st study, kidneys (n=16) were subjected to 30 minutes (n=8) and 75 minutes (n=8) warm ischemia time (WIT) respectively. Volumetric PAI of the renal cortex was acquired for each kidney every 20 minutes during 120 minutes of NMP. The PAI data were used to quantify the oxygen saturation (SO2). In the 2nd study, all kidneys (n=10) were subjected to 30 minutes of WIT. LSCI was used to measure one-sided microcirculation in the first 100 minutes of NMP, followed by measurement on both ventral and dorsal aspects after clamping one renal artery branch to induce ischemia.
Results: In the 1st study, kidneys with 30 minutes WIT showed significantly higher SO2, blood flow, creatinine clearance and oxygen consumption compared to the kidneys with 75 minutes WIT. Renal cortical SO2 had a positive correlation with renal blood flow ($r=0.82$, $p<0.001$) and oxygen consumption ($r=0.73$, $p<0.001$). In the 2nd study, the increase of renal cortical perfusion could be visualized with LSCI. LSCI fluxes from each kidney correlated linearly with renal blood flow (R squared=0.90, $p<0.001$). Kidneys showed comparable creatinine clearance, fractional excretion of sodium and total sodium reabsorption after occlusion of the inferior renal artery branch as before, while the decrease in renal cortical perfusion could be visualized and quantified by LSCI.
Conclusions: PAI and LSCI are promising imaging techniques in real-time kidney perfusion measurement during NMP. PAI can be a valuable addition to evaluate renal metabolism and LSCI can visualize cortical microcirculation. The combination of using PAI and LSCI helps assess pre-transplant kidney quality.

**Vaccination responses to pneumococcal, tetanus and influenza in kidney transplant recipients using tacrolimus with and without mycophenolate mofetil: a randomized controlled study.**

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Background: Immune suppressive medication is a risk factor for severe infections and insufficient vaccination responses. The impact of mycophenolate mofetil (MMF) on top of tacrolimus (TAC) on vaccination responses is not well characterized in a randomized cohort of kidney transplant recipients.
Methods: A randomized controlled trial was performed in immunologically low risk kidney transplant recipients (EudraCT nr.: 2014-001372-66). Patients were randomized to standard TAC/MMF or to TAC monotherapy (TACmono) from 9 months onwards after transplantation, without steroids. One year after transplantation patients were vaccinated against pneumococcus (PPV23), tetanus (tetanustoxoid) and, if in season, influenza. Blood was sampled before and 21 days after vaccination. Adequate vaccination responses were defined as: for PPV23 ≥9 serotypes with antibodies ≥1.00 mg/mL; for tetanus antibodies ≥ 1.0 IU/mL and ≥ 1.5-fold increase if baseline was ≤ 1.0 IU/mL or ≥ 2.5-fold increase if baseline was > 1.0 IU/mL; for influenza post-vaccination titers ≥40 IU/mL or 4-fold increase for all 3 strains.
Results: 71 patients received PPV23 and tetanus vaccinations (TAC/MMF n=37,TACmono n=34). Of those, 29 were also vaccinated against seasonal influenza (TAC/MMF n=15, TACmono n=14). Patients were 60 (54-66) years of age and 72% male, with median eGFR of 54 (44-67) ml/min. 42% of the patients had diabetes. TAC trough levels were 6.1 (5.4-7.0) µg/L in both groups and MMF dose was 1000 mg daily (500-2000) in TAC/MMF.
Adequate vaccination responses were measured for PPV23 in 43% vs 74%, for tetanus in 35% vs 82% and for seasonal influenza in 20% vs 71% of TAC/MMF vs TACmono patients, respectively p=0.03, p <0.001 and p = 0.009. Only 7% of TAC/MMF responded adequately to all 3 vaccinations compared to 36% of TACmono, p=0.08. Furthermore, only 60% of TAC/MMF patients responded adequately to at least one of the three vaccinations, compared to 100% of TACmono, p=0.02.
Conclusions: MMF on top of tacrolimus severely hampered serological responses to pneumococcus, tetanus and influenza vaccinations.

**Repeated COVID-19 vaccination enhances memory T-cell IL-21 and memory B-cell responses in immunocompromised kidney transplant recipients**

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Background: COVID-19 vaccines are poorly immunogenic in kidney transplant recipients (KTR). For the development of virus-specific antibodies, T-cell mediated help to B-cells is required, in which the cytokine IL-21 plays a key role.
Methods: We compared three alternative vaccination strategies to a single dose mRNA-1273 vaccination (control): (1) a double dose of mRNA-1273 vaccination, (2) heterologous vaccination, and (3) temporary discontinuation of the immunosuppressant mycophenolate mofetil (MMF) in KTR with a poor serological response after two or three doses of an mRNA-based vaccine. They were randomized to receive 100 μg mRNA-1273 (n=25), 2x 100 μg mRNA-1273 (n=25) or Ad26.COV2-S vaccination (n=25). In addition, 50 KTR who received 100 μg mRNA-1273, were randomized to continue (MMF+, n=25) or discontinue (MMF-, n=25) MMF treatment for 2 weeks.
Results: All vaccination strategies resulted in a significant increase in the number of SARS-CoV-2-specific IL-21 producing T-cells and memory B-cells (both $p<0.01$, measured by ELISpot), except for the memory B-cell response in the double mRNA-1273 group. The IL-21 response was higher in the MMF+ group compared with the MMF- group (160 vs 77 spots/$10^6$ PBMCs, $p=0.04$), but did not differ between single mRNA-1273 (200), double mRNA-1273, (173), and Ad26.COV2-S (73). Also, the memory B-cell response did not differ between single mRNA-1273 (35), double mRNA-1273 (20), and Ad26.COV2-S (30), nor between the MMF+ (183) and MMF- (295) groups. Furthermore, both cellular responses correlated with the production of neutralizing antibodies (Spearman's ρ 0.52 and 0.86, respectively, both $p<0.001$).
Conclusions: Repeated vaccination enhances SARS-CoV-2-specific memory T and B-cell responses and antibodies in KTR with an initially poor serological response. A higher dose, a heterologous vaccination, or two weeks discontinuation of MMF were not superior in boosting these responses compared to a normal mRNA based vaccination dose. These findings support the recommendation for repeated vaccination in KTR.

**The clinical utility of post-transplant monitoring of donor-specific antibodies in stable renal transplant recipients: A consensus report with guideline statements for clinical practice**

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Background: This consensus report aims to appraise the clinical utility of DSA monitoring in recipients without overt signs of graft dysfunction (i.e. subclinical DSA). The Wilson & Junger (W&J) criteria for assessing the validity of a screening practice were utilized to ensure all relevant aspects are reviewed. These relate to: having a sufficient understanding of the latent condition one wishes to screen for, the prognostic value of the biomarker, possible therapeutic and diagnostic ramifications, cost-effectiveness of the screening program and the envisioned screening strategy.
Methods: The European Society for Organ Transplantation convened a dedicated workgroup, comprised of experts in transplantation nephrology and immunology. Relevant clinical questions were formulated according to the PICO methodology for each W&J criterium. A subsequent literature search was conducted by the Centre for Evidence in Transplantation. Relevant literature was reviewed and graded according to the GRADE methodology. This led to the development of proposed guideline statements or recommendations. These were discussed during a consensus conference that took place in person in November 2022 in Prague using a modified Delphi method.
Results: Consensus (>80%) was reached for eleven statements and recommendations. In summary, there was broad consensus to perform an allograft biopsy in case of development of subclinical de novo DSA (dnDSA) to diagnose possible underlying latent rejection, including both antibody-mediated rejection and notably T-cell mediated rejection. This is necessary to further stratify the risk that subclinical DSA infers and differentiating between the type of rejection can guide further therapy. Optimization of maintenance therapy is recommended for all patients with subclinical dnDSA. Further antirejection therapies should only be initiated after performing an allograft biopsy. More research is required to fully determine the optimal screening strategy and its cost-effectiveness, but annual screening with an additional screening at three to six months post-transplant seems a routine approach.
Conclusions: Based upon the identified literature and the assessment of each W&J criterium, the workgroup suggests that there is clinical utility in standardized monitoring for development of DSA in stable renal transplant recipients. A routine approach for such a strategy could be annual monitoring with an additional assessment within the first three to six months post-transplant.

**Characteristics and function of donor and recipient tissue resident lymphocytes in kidney transplants**

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Background: Tissue resident lymphocytes (TRL) are key players in local immune surveillance. In immunosuppressed transplant recipients, however, the function and characteristics of TRL are less well defined. The current study aims 1) to investigate which TRL populations are present in kidney transplants, 2) to examine the frequencies and characteristics of donor and recipient TRL populations and 3) to unravel the function of TRL.
Methods: Renal lymphocytes were obtained by enzymatic digestion of kidney transplantectomy specimens (n=24) and were subsequently examined by flow cytometry to identify TRL populations and their origin (donor or recipient). The molecules CD69, CD103 and CD49a were used to define tissue residency and HLA-discrepancies between donor and recipient to define the origin of TRL. In-depth analysis of donor and recipient TRL functionality was performed using single-cell transcriptome sequencing, single-cell T cell receptor (TCR) sequencing and virus dextramer staining.
Results: CD4 tissue resident memory (TRM), CD8 TRM, NK resident, NKT resident and helper innate lymphoid cells were all present in kidney transplants (median: 13%, 67%, 7%, 4%, 2% of total TRL, respectively). TRL chimerism was present in 43% of kidney transplants with the highest proportion of donor cells observed among NKT resident cells (median: 32%). The proportion of donor TRL was negatively correlated with the time between transplantation and explantation ($r=-0.74$, $p=0.046$). Single-cell sequencing showed that recipient but not donor TRM cells have an activated phenotype and hyper-expanded TCR clonotypes, suggestive of alloreactivity. Tissue resident regulatory T cells of recipient origin were also detected, indicating that recipient TRL may not be solely harmful. Virus dextramer staining revealed that CD8 TRM of both donor and recipient origin showed antigen specificity against EBV, BKV, CMV and Influenza.
Conclusions: This study detected innate and adaptive TRL populations of both donor and recipient origin in kidney transplantectomy specimens. Infiltrating recipient TRL have alloreactive and regulatory properties. CD8 TRM of donor and recipient origin are responsive to several viral pathogens supporting the notion that these cells play a role in local immune surveillance.

**Functional outcomes after alemtuzumab therapy for T-cell mediated, antibody-mediated and mixed-type kidney transplant rejection**

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Background: Lymphocyte-depleting therapy is advised for severe or glucocorticoid-resistant T cell-mediated rejection (TCMR) and is one of the recommended modalities for treating antibody-mediated rejection (ABMR). Alemtuzumab has been used off-label for these indications; however, its efficacy for the treatment of different subtypes of kidney transplant rejection has not been compared. We present the functional outcomes of different subtypes of kidney transplant rejections in a large cohort of alemtuzumab-treated patients.
Methods: Clinical data of patients treated with alemtuzumab for severe kidney transplant rejections between January 1st 2012 and January 1st 2022 were retrospectively evaluated by type of rejection. The cause-specific cumulative incidence of graft loss with death as competing risk was calculated. The trend in estimated glomerular filtration rate (eGFR) over time was modelled with a linear mixed effects model.
Results: During the study period, alemtuzumab was given for 216 unique, biopsy-proven rejections. There were 138 TCMR, 47 ABMR and 31 mixed-type rejections. Graft loss was comparable during the first five years of follow-up, with five-year cumulative incidences of 35.8% [95%-CI 26.7 to 45.0] for TCMR, 39.1% [95%-CI 23.8 to 54.4] for ABMR and 42% [95%-CI 22.9 to 61.1] for mixed-type. After the first five years of follow-up, significantly more grafts were lost after mixed-type rejection, with ten-year cumulative incidences of 78% [95%-CI 56.3 to 99.4] versus 37.3% [95%-CI 27.9 to 46.8] (TCMR) and 39.1% [95%-CI 23.8 to 54.4] (ABMR). Kidney function over time tended to decrease and decline faster after mixed-type rejection, but this result was not statistically significant.
Conclusions: Graft survival after alemtuzumab therapy for different types of kidney transplant rejection is comparable during the first five years, but long-term graft survival is worse for patients with mixed-type rejection. We hypothesize that this late graft loss is due to gradual loss in kidney function by ongoing immunological activity in the kidney transplant. Current data were insufficient to support this hypothesis via linear mixed effects modelling.

**Visualizing the effect of BCL6 inhibition on B and T lymphocytes by the small molecule compound 79-6 by means of imaging flow cytometry**

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Background: BCL6 is a transcription factor involved in T and B cell activation during germinal center formation and maintenance, which is essential for antibody formation. Therefore, targeting BCL6-expressing T and B cells might prevent humoral alloreactivity.Using imaging flow cytometry, which combines conventional flow cytometry with single cell fluorescence images, we were able to study the effect of a small molecule BCL6 inhibitor (79-6) on immunological T-B cell synapse formation and activation, and the expression of BCL6 on T and B cells before and after polyclonal stimulation.
Methods: To study 79-6's effect on T-B cell synapse formation, stimulated T cells of healthy controls (HC) (1-day PHA, 6-days IL-2) and Raji cells were co-incubated with a superantigen (staphylococcal enterotoxin B), either with/without 100 µg/ml of 79-6 to induce synapse formation and activation.
To test the effect of 79-6 on BCL6 expression, naïve T helper cells and B cells from HC's were both polyclonally stimulated (α-CD3/α-CD28/IL-12/IL-21 and α-IgM/α-CD40L/IL-21, respectively) in the presence/absence of 100 µg /ml of 79-6, and studied using imaging flow cytometry.
Results: After co-incubation, immunological synapses were successfully formed and polarization of LFA-1 indicated synapse activation. The presence 79-6 had no significant effect on synapse formation and activation. In naïve T helper cells, before polyclonal stimulation, BCL6 expression could not be detected, as compared to its isotype control (IC). 5 days of stimulation, led to upregulation of BCL6, (MFI 90%> IC), while in the presence of 100 µg/ml of 79-6 this was partly inhibited (MFI 39%> IC). In B cells, BCL6 expression was detected before stimulation (MFI 67%> IC). After stimulation, BCL6 expression was markedly increased (MFI 159%> IC), while in the presence of 79-6, this was decreased to MFI 15%> IC.
Conclusions: Using imagestream technology, we were able to show that direct activation of immunological synapses between T and B cells was not affected by BCL6 inhibitor 79-6. Nevertheless, this compound was able to lower BCL6 expression of both B and T cells after polyclonal stimulation, implying inhibition of humoral responses.

**Potential immunogenicity and sensitivity to IFNγ of kidney tubuloids**

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Background: Dialysis and kidney transplantation are the conventional treatment options for patients with kidney failure, but the lack of donated organs is one of the main challenges. An alternative treatment to restore kidney function could be transplantation of adult stem or progenitor cell-based kidney tubuloids. However, before the tubuloids can be used in clinical practice, potential immunogenicity and sensitivity to immune-mediated damage needs to be assessed.
Methods: Kidney tubuloids were cultured for 3 days in expansion medium and treated with expansion or differentiation medium for another 7 days. Cells were grown in Basement membrane extract type 2 to create a 3D structure. In some experiment, tubuloids are treated with 50 ng/mL interferon-gamma (IFNγ) for 72 h to mimic an inflammatory environment. Cells were recovered by Cell Recovery Solution and a single cell solution was made by incubation with accutase. Expression of surface markers associated with immune recognition was assessed by flow cytometry. Cytokine expression profiles were assessed on the Luminex. The functionality of membrane complement regulatory proteins (mCRPs) was assessed by performing a complement-dependent cytotoxicity assay (CDC).
Results: Several cytokines (including RANTES, IL-10, IP-10) were significantly elevated (≥ 2-fold increase) in supernatant from IFNγ-stimulated kidney tubuloids compared to untreated organoids. The percentage HLA Class II$^+$ cells was increased upon stimulation with 50 ng/mL IFNγ (15% unstimulated, 30% stimulated), as well as ICAM, while expression of mCRPs (CD46, CD55 and CD59) and 4-1BBL was only slightly affected by IFNγ treatment. Furthermore, older tubuloid culture passages showed reduced surface marker expression compared to younger passages. A pilot experiment illustrated that tubuloids expressing mCRPs were more protected against complement-mediated cell lysis, suggesting that mCRPs present on tubuloids are also functional.
Conclusions: In conclusion, the data showed expression of HLA Class II on kidney tubuloids, which is further upregulated upon stimulation with IFNγ. Kidney tubuloids also expressed moderate to high levels of mCRPs that could protect tubuloids against unwanted complement-mediated cell lysis, whereas expression levels of multiple markers depend on the passage. For clinical application, autologous kidney tubuloids as well as tissue from earlier passages might be preferred to reduce the risk of rejection and diminish the immunogenicity of organoids.

## The risk of microbial infection in recipients of donor livers that underwent hypothermic or normothermic machine perfusion

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Background: Hypothermic and normothermic machine perfusion are increasingly used to preserve and/or assess donor livers for transplantation. Compared to traditional static cold storage (SCS), machine perfusion exposes livers to an additional risk of microorganism contamination during perfusion. However, information on the risk of microbial transmission after machine perfusion is lacking. We aimed to determine the risk of microbial infection after either (dual) hypothermic oxygenated ((D)HOPE) or normothermic machine perfusion (NMP).
Methods: Between April 2014 and September 2022, 108 (D)HOPE and 85 combined DHOPE-NMP procedures were performed in our center, resulting in 108 and 53 liver transplantations, respectively. All machine perfusion procedures were performed after SCS ("back-to-base"). The machine perfusion solution for (D)HOPE did not contain antibiotics, while cefazolin and metronidazole were added to the NMP solution. Cultures were taken from SCS solution, perfusion solution, and from abdominal drain fluid in recipients up to postoperative day 7. All recipients received prophylaxis with cefotaxime and metronidazole for 48 hours, and fluconazole for 7 days.
Results: Baseline SCS preservation solution cultures were positive for at least one microorganism in 54% (53/99) of the livers that underwent (D)HOPE and in 58% (30/52) of the livers that underwent DHOPE-NMP. In the (D)HOPE group, two (6%) of the machine perfusion solution cultures taken at the end of the procedure were positive for a microorganism; one similar to that of the SCS solution, and the other was a *de novo* contamination that had occurred during (D)HOPE or during processing of the sample. In both cases this did not result in a recipient infection. In the DHOPE-NMP group, one microorganism (2%) was transferred from the SCS solution through machine perfusion to the recipient. This patient remained asymptomatic but received targeted antibiotics for several days. Overall, a proven microbial transmission occurred in 1/151 (0.7%) recipients of a machine perfused liver.
Conclusions: Microorganisms in SCS preservation solutions may survive machine perfusion with subsequent transfer to the recipient, but the frequency is extremely low (0.7%). Yet, it is advisable to take routine cultures of the machine perfusion solution, to enable prompt initiation of targeted antibiotics in recipients when indicated.

**Multiparameter analysis of alloreactive T cells identified by activation-induced markers (AIMs); different AIMs recognize specific T cell subsets**

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Background: Expression of activation-induced markers (AIMs) after T-cell receptor-mediated activation is used to identify alloreactive T cells but whether these markers recognize similar subsets of alloreactive T cells is largely unknown.
Methods: Alloreactive T cells were characterized following a short-term co-culture of responders peripheral blood mononuclear cells (PBMCs) with allogeneic CD3-depleted PBMCs or autologous CD3-depleted PBMCs as a negative control (background signal). T cells were analyzed by multi-parameter flow-cytometry using a combination of monoclonal antibodies directed to commonly used AIMs (CD69, CD134, CD154 and CD137) and CD45RA and CCR7 for T cells subset analysis (naïve, central memory (CM), effector memory (EM) and terminally differentiated CD45RA-expressing effector memory (EMRA)). Both supervised and unsupervised data analysis (FlowSOM) were performed.
Results: Median proportions of CD137, CD154 and CD134 total (including single as well as co-expressing other AIMs) alloreactive CD4 T cells amounted to 0.34%, 0.52%, 0.16%, respectively with a low background signal. CD69 expression on CD4+ T cells was high (median 4.16%) with a substantial background (median 3.24%). CD137 expression was preferentially found on EM ($P<0.05$) while CD154 and CD134 were preferentially found on CM cells ($P<0.05$). Of all CD137-expressing CD4+ T cells 36.3% were EM versus 19.6% and 7.1% for CD134- and CD154-expressing CD4+ T cells, respectively, with minimal overlap between EM alloreactive CD4+ T cells identified by different AIMs. Proportions of alloreactive CD4+ T cells co-expressing AIMs (59%) were higher in the CM subset when compared to single-AIM expressing (47%) ($P<0.05$). Alloreactive CD8+ T cells can be best detected using CD137, as CD134 and CD154 were hardly expressed.
Conclusions: AIMs are differentially expressed according to the differentiation status of alloreactive CD4+ T cells but in general overlap between these different AIMs is surprisingly low. Identification of alloreactive CD4+ T cells by AIMS should therefore include at least CD137, CD134 and CD154.

## Lung function after thoraco-abdominal normothermic regional perfusion in a porcine DCD model

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Background: Thoraco-Abdominal Normothermic Regional Perfusion (TA-NRP) is a relatively new method to assess potential donor organs in vivo. This platform enables in situ reperfusion of both thoracic and abdominal donor organs with oxygenated blood in donation after circulatory death (DCD) settings. Our purpose was to investigate the lung function during and after TA-NRP in a porcine DCD model while simultaneously monitoring the effect of low and high oxygenation on donor cardiac function.

Methods: Danish landrace pigs (80 kg) underwent 15 minutes anoxic circulatory arrest after disconnecting from mechanical ventilation. Subsequentially, resuscitation was initiated with TA-NRP through central cannulation. The animals received either high oxygen ($FiO_2$ 1.0, decreased to 0.6 post TA-NRP) or low oxygen ($FiO_2$ 0.21, increased to 0.40 during and post TA-NRP). Thereafter, 180 min of assessment post TA-NRP was followed. Blood gases, inflammatory cytokines and 8-isoprostane as oxidative stress marker were measured. Ventilation parameters were recorded. Tissue samples were taken from the ventral side for histological analysis and wet/dry weight ratio.

Results: In total 15/19 animals (7/9 in the low and 8/10 in the high oxygen group) were able to wean from TA-NRP. $PaO_2$ was significantly higher during TA-NRP and after 180 min in the high oxygen group compared to baseline. In both groups the $PaO_2$ remained acceptable and stable after TA-NRP. However, peak airway pressure was significantly increased and dynamic compliance significantly decreased during and post TA-NRP, independent of oxygen strategy. A higher trend in pro-inflammatory cytokines was seen in the high oxygen group. No differences were found in 8-isoprostane and fluid concentration in the tissue samples

Conclusions: Lungs in both low and high oxygen groups maintained a stable and acceptable oxygenation capacity post TA-NRP. However, dynamic compliance decreased and peak airway pressure increased suggesting that TA-NRP is affecting the donor lung function which needs to be further investigated. No significant differences were observed in pro-inflammatory cytokines, oxidative stress and oedema development. Further studies are necessary to determine lung function after transplantation.

**Effect of (micro)thrombi in donor lungs on lung function during ex vivo lung perfusion and post-operative outcomes**

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Background: All donor lungs contain to a greater or lesser extent thrombi. Therefore, we hypothesize that thrombi remaining in donor lungs may play an important role in initial impaired lung function. Our purpose was to investigate the correlation between coagulation- and fibrinolytic markers, lung function during Ex Vivo Lung Perfusion (EVLP) and outcomes after lung transplantation (LTx) of initially discarded and standard criteria human donor lungs.
Methods: EVLP was performed with n=8 standard criteria (logistical indication) and n=11 initially discarded (medical indication) donor lungs. LTx was followed if standard EVLP acceptance criteria were met. D-dimer, urokinase Plasminogen Activator Receptor (uPAR), Plasminogen Activator Inhibitor-1 (PAI-1) and Prothrombin Fragment 1+2 (F1+2) were measured in the perfusate after 90 and 180 min. Lung function during EVLP, Primary Graft Dysfunction (PGD) and Chronic Lung Allograft Dysfunction (CLAD) score were recorded.
Results: Post EVLP, 7/8 and 9/11 donor lungs with logistical and medical indication respectively were transplanted. A significant increase between 90 min and 180 min was observed in both groups in terms of uPAR, PAI-1 and D-dimer levels. F1+2 levels remained stable over time. PAI-1 at 90 min and D-dimer at 90 and 180 min were significantly higher in the medical group than in the logistical group. In both groups, no significant correlations were observed at 180 min between the venous $pO_2$, pulmonary vascular resistance, dynamic compliance, PGD 72h post-LTx and CLAD.
Conclusions: Increased uPAR, PAI-1 and D-dimer levels indicating (micro)thrombi during EVLP did not seem to be correlated with adverse EVLP parameters and negative clinical outcomes. Interestingly, significant higher D-dimer levels in initially discarded donor lungs may indicate the presence of more thrombi. Further studies and increasing sample size may be required to investigate potential correlations.

**Brain death induced lung inflammation is ameliorated after 17β-estradiol and methylprednisolone treatment in female rats**

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Background: Brain death (BD) leads to systemic alterations that compromise organ viability, especially lungs. After BD, lungs from female donors present higher inflammation in comparison to male donors, which was associated with the acute reduction of female hormones, especially estradiol (E2). Higher inflammation could lead to worse prognosis in the recipient after transplantation. Both E2 and corticoids are important to ensure an adequate modulation of inflammation in the female sex. In that context, the aim of this study is to evaluate the associated treatment of E2 and methylprednisolone (MP) in female rats after BD.
Methods: Female Wistar rats were submitted to BD by rapid inflation of an intracranial balloon catheter and maintained for 6h. Rats received MP (MP, 4 mg/ml i.v–2 ml/h) or MP and E2 (MP/E2, 50 hg/ml i.v–2 ml/h) after 3h of BD until the end of experiment. Sham-operated (S) rats were used as controls. After 6h, lung samples were collected for homogenate and relative gene expression analyzes. IL-1β, IL-6 and CINC-1 were quantified in homogenate. In parallel, IL-1β and IL-6 gene expression was also evaluated.
Results: In lung tissue, BD increased IL-6 after 6h and the MP/E2 treatment was able to reduce this cytokine (S:917.0±773.7; Bd:1780±631.4; MP/E2:928.1±695.9; MP:910.6±373.5 pg/mg/protein - $p$=0.0288). Also, both treatments were capable of reducing IL-1β (S:426.9±346.7; BD:859.2±344.4; MP/E2:274.2±119.1; MP:361.9±164.5 pg/mg/protein - $p$=0.0057). There were no differences among groups in CINC1 ($p$=0.609). Also, lung relative gene expression of IL-1β was reduced with both treatments (S:5.79±4.63; BD:7.07±6.51; MP/E2:1.57±1.07; MP:1.75±1.07 relative gene expression - $p$=0.020). There were no differences in IL-6 ($p$=0.286).
Conclusions: Our data showed that the associated treatment of female rats with MP and E2 modulates lung inflammation by reducing the release and expression of interleukins and chemokines, such as IL-1β and IL-6. These data point to a potential positive effect of the association of corticotherapy and estradiol in improving lung quality in female donors.
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**The ability of an electronic nose to distinguish between acute cellular rejection and infection in lung transplant recipients**

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Background: Acute cellular rejection (ACR) is a frequent and feared complication after lung transplantation, which occurs in ±30% of lung transplantation recipients (LTR) in the first year post-transplantation. LTR with ACR may be asymptomatic or present with non-specific pulmonary function alterations as well as non-specific symptoms such as cough, dyspnea, low-grade fever, and sputum production, making it hard to reliably discriminate ACR from infection. For the definite diagnosis of ACR bronchoscopy with transbronchial biopsies is required, which is an invasive procedure, with potential iatrogenic complications. As such, it is of interest to assess alternative non-invasive modalities as a diagnostic modality, such as exhaled breath analysis. We aimed to assess the ability of exhaled breath analysis using an electronic nose (eNose) to distinguish ACR from infection.
Methods: LTR with either a FEV1 decline OR increased obstruction, OR new respiratory symptoms OR acute respiratory insufficiency, and subsequently proven (bacterial, viral, or fungal) infection or proven ACR were included. Exhaled breath analysis was performed using an eNose (SpiroNose). Partial least squares discriminant analysis was used to assess the discrimination of ACR from infection.
Results: In total, 44 LTR were included; 27% were female, median age was 61 (18 - 73) years, time after LTx was 1.5 (0.1 – 14.7) years. Of these LTR, 23 were diagnosed with ACR and 21 with infection. The eNose accurately discriminated between ACR and infection with an AUC of 0.90 (CI 0.81 – 0.99), a sensitivity of 67%, specificity of 96%, and accuracy of 82%.
Conclusions: Exhaled breath analysis using eNose technology has the potential to non-invasively discriminate between ACR and infections in LTR and hence might limit the need of bronchoscopy and transbronchial biopsies in the future.

**Lung transplant airway complications treated with biodegradable stents; a multi-center experience**

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Background: Introduction: Treatment of anastomotic airway complications post lung transplantation (LTx) is challenging. When the results of conventional treatment, such as debridement and balloon dilatation are insufficient, airway stent treatment may be indicated. Conventional airway stents, including self-expandable metal stents and silicone stents, are associated with complications such as mucus impaction, stent migration, biofilm formation, colonization with pathogenic microorganisms, inability- or difficult stent removal and excessive tissue granulation. Alternatively, biodegradable airway stents (BDS) can be used. In this study we explore the feasibility and complications of treatment with BDS for post LTx airway complications.
Methods: All LTx patients of the three Dutch lung transplant centers treated with a BDS were included in this retrospective multicenter study. Feasibility, life span of the stent, occurrence of complications, and evolution of lung function were evaluated.
Results: Between april 2019 and april 2022, Fifty-seven BDS were placed in 12 patients (6 malacia and 6 stenosis), ranging from 1 to 10 successive stent placements per patient. 6 patients had been treated previously with conventional airway stents, which were removed before BDS placement. Median time between LTx and treatment with BDS was 4 months (range 3-19 months) for the stent naïve patients and 87 months (range 21-221) months for the previously conventional stent treated patients. Median stent life span was 112 days (range 66-202). No complications occurred during stent placement. Post placement, in 5 out of 57 stent placements, a single additional bronchoscopy was necessary because of mucus accumulation (n=4) or excessive granulation tissue proximal to the stent (n=1). All these adverse events occurred in patients who had been pre-treated with a conventional airway stent. No stent migration or infectious colonization occurred. Compared to pre stent treatment baseline, median delta FEV1 was +44% (range +18 to +233%) after the first BDS stent placement, and +68% (range –32 to +121%) after the last BDS.
Conclusion: In this study we showed the feasibility and safety of BDS for post LTx airway complications stenosis and malacia, with only mild adverse events occurring. Clinically significant improvement of lung function occurred which persisted during treatment.

**Pregnancy after lung transplantation in the Netherlands**

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Background: Data on pregnancy after lung transplantation (LTx) is scarce. Most data about pregnancy after solid organ transplantation comes from pregnancies after kidney or liver transplantation. Data from the American National Transplant Pregnancy Registry (NTPR) (n=46 pregnancies) shows that these pregnancies are associated with a high risk of pregnancy complications such as (pre)eclampsia, graft rejection, deterioration of renal function, preterm birth and maternal mortality. Primary aim of this study is to examine the neonatal and maternal outcomes of pregnancy after LTx in the Netherlands.
Methods: In this retrospective multicenter cohort study all patients with a pregnancy after LTx in the Netherlands were eligible for inclusion. Data, including demographic data, pregnancy complications, kidney function (slope) and lung function, was collected from the medical files of the patients. Due to the low number mainly descriptive statistics were used.
Results: We included 11 pregnancies >20 weeks in 8 women. 7/8 women had cystic fibrosis (CF) as the underlying disease leading to LTx and 1/8 pulmonary hypertension. Hypertension during pregnancy occurred in 3/11 pregnancies and preeclampia in 2/11. One patient with pre-existent CF-related diabetes had progressive renal insufficiency during pregnancy. In one patient post-transplant lymphoproliferative disorder (PTLD) was diagnosed in the second trimester of pregnancy. Lung function remained >80% of FEV1 % of baseline at last follow-up in all patients. 1 woman died 3.5 years after her first pregnancy and 2 years after her second pregnancy due to PTLD (this was another woman then the former PTLD patient). All children were born alive, 10/11 children were born preterm and the median gestational age was 35 weeks (range 27-38). 11/11 children were born with a birth weight <3500 grams and the median birth weight was 2340 grams (range 1020-3300). Median follow-up after pregnancy was 5 years (range 2 months-7 years). All children were reported as healthy on last follow-up. However, no specific tests were performed.
Conclusions: In conclusion, in this national cohort study, pregnancy after LTx leads to an increased risk for pregnancy complications for both the mother and the child. This is in line with existing research. On the longer term results appear reassuring with no deterioration of lung function after pregnancy and with healthy children. However, 13% of the mothers died, which is in line with the survival of women with a pregnancy after liver of kidney transplantation.

**The effect of Kaftrio on tacrolimus dose and blood levels, interim analysis of the KaftriO After Lung TrAnsplantation (KOALA) multicenter study**

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Background: Cystic fibrosis (CF) is a multisystem hereditary disease caused by mutations in the cystic fibrose transmembrane conductance regulator (CFTR) gene. CFTR modulatory therapy (Kaftrio) has been shown to reduce lung exacerbations and improve lung function and quality of life in CF patients. In addition, it also may effect abdominal complaints, weight, chronic sinus disease, CF-related diabetes, and pancreatic insufficiency.
Post-lung transplant (LTx) CF patients still experience extrapulmonary symptoms and might benefit from CFTR modulator therapy. Not much is known about the interaction between Kaftrio and immune suppressants, especially tacrolimus.
The multi-center KOALA study aimed to gain more insight into the effect of Kaftrio in post-LTx patients. The aim of this interim analysis is to describe the effect of Kaftrio on tacrolimus dose and tacrolimus levels
Methods: Multicenter observational study in the Netherlands. Currently 12 CF patients (mean age 40.6, 75% male) with at least one F508del mutation, after LTx were included and started with Kaftrio. Outcomes included change in tacrolimus dose and tacrolimus levels in blood as well as adverse events. The tacrolimus doses were collected before start and at two weeks. The tacrolimus trough levels were measured at start, at one and two weeks. Doses were adjusted according to trough levels. Data were analysed with SPSS statistics 28 using Wilcoxon signed rank test.
Long-term outcomes consisting of change in BMI, HbA1c, SNOT-22 score, abdominal complaints (signalling list gastrointestinal symptoms in CF) score, lung function and quality of life (CFQ-R) are collected and will be reported later.
Results: At the start of the study the median dose of tacrolimus was 4 mg (IQR 2.8-5) At two weeks the median dose was 3.5 (IQR 1.75-4.25). The change in median tacrolimus dose was -15 % (IQR 11--30% ), (p=0,03).
Despite this reduction in dose, the level of tacrolimus minimally increased. Median (IQR) tacrolimus trough level at baseline was 8.1 ug/L (IQR 6.2-10.6 ) and median trough level at 2 weeks was 9.0 (IQR 6.45-11.2) (p= 0.45)
Conclusions: Kaftrio in LTx patients with CF leads to a rise in tacrolimus trough level necessitating a significant reduction of tacrolimus dose already at 2 weeks after start Kaftrio.

**Malnutrition in lung transplant candidates: phenotype and nutrition impact symptoms**

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Background: Patients with end-stage lung disease are often malnourished, and this has been associated with poor outcomes after lung transplantation. Therefore, assessing and optimizing nutritional status before transplantation is of upmost importance. The current evaluation of body mass index (BMI) for transplant candidacy, however, does not provide information on body composition or direction for intervention. Therefore, we aimed to evaluate the nutritional status of lung transplant candidates in terms of phenotype (BMI and body composition) and potentially modifiable nutrition impact symptoms.
Methods: Nutritional status and nutrition impact symptoms of adult lung transplant candidates were assessed using the Patient-Generated Subjective Global Assessment (PG-SGA stage B/C = malnourished) by trained dietitians within the context of regular care, during admission for transplant eligibility screening in the University Medical Center Groningen. Body composition was evaluated using multifrequency bio-electrical impedance analysis (low muscle mass: fat-free mass index <17 kg/m$^2$ in men, <15 kg/m$^2$ in women).
Results: Of 82 patients analyzed (56% female, median age 57 [IQR 50-62] years, BMI 23.4 [IQR 21.6-26.7] kg/m$^2$), 45% fulfilled criteria for malnutrition. Of the malnourished patients, 32% were overweight according to BMI (>25 kg/m$^2$) and 46% had low muscle mass. Malnourished patients reported more nutrition impact symptoms (median 2 vs. 0, p<0.001). Most frequently reported symptoms were 'feel full quickly' (54%), 'no appetite' (49%), 'fatigue' (46%) and 'nausea' (19%).
Conclusions: Malnutrition is present in almost half of lung transplant candidates, which is not precluded by presence of overweight. Rather, in these patients, malnutrition is characterized by presence of multiple nutrition impact symptoms. Assessment of nutritional status irrespective of BMI, including body composition and presence of nutrition impact symptoms, is recommended, to facilitate interventions to optimize the nutritional status of lung transplant candidates for transplantation.

**Lung transplant associated diaphragm dysfunction**

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Background: Diaphragmatic dysfunction is a complication after lung transplantation (LTx) which can lead to prolonged respiratory failure and is associated with longer intensive care unit (ICU) stay and hospitalization and the need for non-invasive ventilation (NIV). Besides phrenic nerve injury, prolonged ventilation and critical illness may play a role in the etiology of diaphragm dysfunction. In this study we aimed to 1) evaluate the incidence of post-LTx diaphragm dysfunction and the need for NIV, 2) identify risk factors for diaphragm dysfunction.
Methods: In this retrospective cohort study we evaluated all patients ($n$ = 237) who underwent LTx between January 2015 and December 2021. Diaphragm dysfunction was defined as paralysis or paresis identified with either fluoroscopy or ultrasound. Patient characteristics, invasive mechanical ventilation time, the use of NIV, LTx procedure complications and time were retrieved from patient records. Mann–Whitney U-test and Chi-squared test were used to compare these parameters between patients with and without diaphragm dysfunction.
Results: A total of 235 LTx patients were included: 119 female patients (49.4%), median age 56 years (IQR 46-61). They underwent bilateral ($n$=220, 93.6%) or unilateral LTx ($n$=12, 5.1%) or combined heart-lung transplantation ($n$=3, 1.3%). Indications for LTx were COPD/ Alpha-1 antitrypsin deficiency (47.2%), pulmonary fibrosis (26%), pulmonary hypertension (14%) and cystic fibrosis (6.8%). The incidence of diaphragm dysfunction after LTx was 22.6% ($n$=53). Of those 20 (37.7%) had bilateral dysfunction, 15 (28.3%) had right sided dysfunction and 18 (34.0%) had left sided dysfunction. 18 of these patients (34%) needed NIV because of prolonged respiratory failure. Longer post-LTx invasive mechanical ventilation time was associated with diaphragm dysfunction: 6 days in the diaphragm dysfunction group (IQR 1-22) versus 1 day (IQR 1-4) in the group without diaphragm dysfunction ($p < 0.001$). Patient characteristics, surgical complications, operation time and the use of NIV before LTx were not associated with diaphragm dysfunction ($p > 0.05$ for all).
Conclusions: This retrospective study shows that diaphragm dysfunction is a common complication seen after LTx. Longer invasive mechanical ventilation time is associated with post-LTx diaphragm dysfunction, whereas surgical complications and operation time are not

**Genomic landscaping of post-transplant lymphoproliferative disorders using circulating tumor DNA**

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Background: Diagnosis of post-transplant lymphoproliferative disorder (PTLD) can be challenging and typically involves tissue analysis and imaging. This study investigates the use of cell-free DNA (cfDNA) in plasma as a minimally invasive method for PTLD detection and genotyping using next generation sequencing (NGS).
Methods: In this multi-center observational cohort study of 18 patients diagnosed with monomorphic PTLD, we performed deep targeted NGS for single nucleotide variation (SNV) detection and low-coverage whole genome sequencing (lcWGS) for copy number variation (CNV) detection. NGS was targeted on a panel of genes (n = 39) recurrently mutated in B-cell lymphomas (244 kbp). CNAclinic was used to identify genome wide CNAs and fraction of the genome altered (FGA). IchorCNA was used to determine the ctDNA fraction in cfDNA samples. SNVs were called using an in-house pipeline, combining 4 (cfDNA) SNV calling tools.
Results: The majority of patients had stage IV disease (n=13, 76%). All of the PTLD cases were histologically proven, of diffuse large B cell lymphoma type and 10/18 patients (55%) were considered to have an EBV-negative tumor. EBV copy number in plasma was performed by qPCR in 12 patients and was elevated in four patients (>5000 copies/mL).
The fraction of reads mapping to the EBV genome was compared between controls (n=8), EBV-negative PTLD (n=10) and EBV-positive PTLD (n=8). In EBV-positive tumors, the median fraction of EBV reads was 3-log higher as compared to controls.
CNVs were detected in cfDNA of 11/18 (61%) patients. Two of the patients in whom no CNVs were detected had initiated therapy at the time of plasma sampling. Median FGA was higher in EBV-negative tumors than in EBV-positive tumors, albeit not significant.
In the top 15 recurrently mutated genes, 180 SNVs were found across all 18 samples. The median amount of SNVs found in each sample was 11 (range 6-25). The most frequently mutated gene was *CREPPB* (12/18, 67%). *ARID1A* was mutated in 10/18 cases (56%), followed by *KMT2D* (9/18, 50%). *TET2*, *TP53*, *MEF2B &TNFAIP3* were mutated in 7/18 cases (39%). These findings highlight the disruption of epigenetic regulation, NFkB pathway, and DNA damage response as drivers of PTLD.
Conclusions: Using an inhouse pipeline, lcWGS in combination with targeted sequencing allows for detection of CNVs and SNVs in diagnostic samples of patients with monomorphic PTLD. This approach can potentially be applied for screening, diagnosis and response monitoring.

**Successful aortic arch cannulation and perfusion of a heart donated after circulatory death: a case report**

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Background: In this case report we highlight the feasibility of aortic arch cannulation for perfusion of a heart donated after circulatory death (DCD), matched to a 47 year old recipient that developed advanced heart failure symptoms after a prior Mustard operation for transposition of the great arteries. Due to the altered anatomy of our patient, a prolonged aorta and pulmonary artery (PA) were requested. Although Transmedics OCS™ Heart User Guide strictly advises against cannulation of the aortic arch, we proved that this is feasible if required.
Methods: Bicaval excision of the heart was conducted. The arch vessels were identified and cut separately, the aortic arch was transected proximal to the left subclavian artery. The pulmonary artery was transected proximal to the bifurcation. During backtable preparation the aortic arch was cannulated using a medium sized aortic cannula, ligating the left carotid artery in the process. The brachiocephalic trunk was closed using pledgeted prolene 4-0 sutures. The heart was mounted on the OCS™ for reperfusion.
Results: The prolonged aorta resulted in lower positioning of the heart, warranting manual reposition of the electrode pads and a slight clockwise rotation to avoid aortic torsion. Adequate perfusion without "ballooning" of the prolonged aorta was established based on periodic lactate sampling and the heart was accepted. The heart was dismounted after 4.5 hours of uneventful perfusion. The anatomy of the harvested heart matched the requirements for transplantation into the recipient. Echocardiography showed adequate right and left ventricular function after implantation. The recipient was transferred to the intensive care unit and weaned off the ventilator on the first postoperative day. He was transferred to a medium care ward for further recovery on the third postoperative day.
Conclusions: We successfully harvested, perfused and transplanted a DCD heart into a recipient with altered anatomy due to prior congenital cardiac surgery, which warranted cannulation of the aortic arch for perfusion. Even thought the Transmedics OCS™ Heart User Guide strictly advises against cannulation of the aortic arch, we proved that this is feasible without torsion or "ballooning" of the aorta if required.

**Non-tuberculous mycobacteria infection pre-lung transplantation: A systematic review of the treatment regimens and duration pre- and post-transplant**

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Background: There is a lack of consensus on non-tuberculous mycobacteria pulmonary disease (NTM-PD) treatment regimen and duration in patient listed for lung transplantation (LTx). We conducted a systematic review on treatment regimen and duration pre- and directly post-LTx, for patients with known NTM-PD pre-LTx. Additionally, we searched for risk factors for NTM disease development post-LTx and for mortality.
Methods: A literature review was performed using PubMed, Embase and the Cochrane Library, for articles published from inception to January 26, 2022. Individual patient data were sought.
Results: Sixteen studies were included reporting data on 92 patients with NTM-PD pre-LTx. Median treatment duration pre-LTx was 10 months (IQR 6-17) and directly post-LTx 2 months (IQR 2-8). Treatment regimens for *Mycobacterium abscessus* (MAB) and *Mycobacterium avium Complex* (MAC) included a combination of 3 different agents. Most frequent used agents for MAB were aminoglycosides and macrolides and for MAC macrolides and tuberculostatic agents. The median treatment duration pre-LTx was 10 months (IQR 6-17) and 2 months (IQR 2-8) directly post-LTx. 46% of the patients with NTM-PD pre-LTx developed NTM disease post-LTx. NTM related mortality rate was 10%. Longer treatment duration pre-LTx ($p< 0.001$) and the absence of sputum conversion ($p= 0.003$) were significantly associated with development of NTM-disease post-LTx. Longer treatment duration pre-LTx ($p= 0.004$), younger age ($p< 0.001$) and the absence of sputum conversion ($p= 0.044$) were risk factors for NTM related death.
Conclusions: Treatment duration pre-LTx was longer dan directly post LTx. Patients with longer treatment duration for NTM-PD pre-LTx and without sputum conversion are at risk for NTM disease post-LTx and for NTM-related death. Children were particularly at risk for NTM related death.

**Serum proteomics for fibrotic markers in early detection of bronchiolitis obliterans syndrome after lung transplantation**

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Background: The obstructive phenotype of chronic lung allograft syndrome, bronchiolitis obliterans syndrome(BOS), is diagnosed after lung transplantation(LTx) when irreversible airway obstruction is already present. This study aims to investigate which serum biomarkers have the potential to detect BOS before lung function decline occurs in LTx recipients.
Methods: All LTx recipients transplanted between 1990 and 2017 were screened, from which 18 recipients progressed to BOS stage 3. These patients were matched with 18 non-BOS LTx recipients. Only patients for whom lung function and longitudinal serum samples were available (three months before BOS onset, at BOS stage 1 and BOS stage 3) were included. Serum samples were analysed by label free proteomics analysis. At the timepoints of data collection other causes of lung function decline were excluded.
Results: Two proteins were identified to have differential expression in BOS recipients compared to non-BOS recipients. SERPINA3 expression significantly increased in BOS stage 3 compared to 3 months before BOS onset ($p<0.001$) and increased through stages of BOS. In addition, SERPIN A3 expression was overall significantly higher in BOS recipients than in non-BOS recipients($p=0.04$). Furthermore, C-reactive protein (CRP) expression was increased overall in BOS vs non-BOS(FDR<0.05). CRP increased over BOS stages in BOS recipients compared to non-BOS recipients ($p<0.01$).
Conclusions: Although we did not find serum biomarkers able to detect BOS before lung function decline, the increase in SERPINA3 suggests an anti-protease reaction in recipients who develop BOS. SERPINA3 might play an unknown role in the pathway leading to fibrotic obliteration in BOS. In addition, the slight increase in CRP could indicate low grade inflammation during BOS development. Both markers should be investigated and validated in more cohorts and may aid in expanding knowledge on the development of BOS.

**Furosemide attenuates tubulointerstitial injury and allows functional testing of porcine kidneys during normothermic machine perfusion**

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Background: Normothermic machine perfusion (NMP) is a promising pretransplant kidney quality assessment platform, but it remains of crucial importance to increase its diagnostic potential whilst ensuring minimal additional injury to the already damaged kidney. Interventions that alter tubular transport could influence renal function and injury during perfusion. This study aimed to determine whether furosemide and desmopressin can affect renal function and injury during NMP.
Methods: Eighteen viable porcine kidneys (n = 6 per group) sustained 30 min of warm ischemia and 3-5 hours of oxygenated hypothermic perfusion before being subjected to 6 hours NMP. Each organ was randomized to receive either no drug, furosemide (750 mg), or desmopressin (16 μg) during NMP.
Results: Compared to other groups, the addition of furosemide resulted in significantly increased urine output, fractional excretion of sodium and potassium, and urea clearance during NMP. Urinary neutrophil gelatinase-associated lipocalin levels decreased significantly with furosemide supplementation compared to other groups. The addition of desmopressin did not result in any significantly different outcome measurement compared to the control group.
Conclusions: This study suggests that adding furosemide could affect renal function while attenuating tubulointerstitial injury during NMP. Therefore, furosemide supplementation may provide renal protection and serve as a functional test for pretransplant kidney viability assessment during NMP.

**Age-related differences in onset of donor-specific hyporesponsiveness in stable renal transplant recipients post transplantation**

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Background: Elderly recipients of a kidney transplant have a lower risk for both early and late acute T-cell mediated rejection (TCMR). Recently, we identified alloreactive memory CD4 T cells expressing at least two pro-inflammatory cytokines (poly-alloCD4) as pivotal cells for TCMR. The decline of poly-alloCD4 after transplantation leads to donor-specific hyporesponsiveness (DSH). Therefore, we hypothesized that the frequency and kinetics post-transplantation of poly-alloCD4 in elderly recipients differs from younger recipients.
Methods: Peripheral blood mononuclear cells (PBMCs) of N=16 young (<45 years) and N=14 elderly (>55 years) stable renal transplant recipients were obtained before, at 6 months, 12 months, and at 3-5 years after transplantation. Expression of the co-stimulatory molecule CD137 was used to identify donor-reactive T cells following co-culture of recipient PBMCs with CD3-depleted PBMCs from their donor or third-party control. The phenotype and proportions of cytokine producing donor-reactive CD137+ T cells as well as the proliferative capacity of T cells in response to donor antigen was evaluated using flow cytometry. Unsupervised clustering was used to compare cytokine profiles measured in the supernatant of co-cultures performed with pre-transplant and 3-5 years post-transplant PBMCs.
Results: The frequency of poly-alloCD4 and poly-alloCD8 T cells prior to transplantation was similar in both age groups and also without differences at the level of T cell differentiation. In both the young and elderly, the frequency of poly-alloCD4 T cells declined early after transplantation. This effect was most significant in the donor-reactive IL2+TNFa+ CD4 T cells. The proliferative alloreactive T cells response pre-transplant was lower in the elderly although statistically only significant for the CD8 T cell subset. Analysis of the cytokine production after co-culture showed significantly less IL-2 production in the elderly recipients which was significantly correlated with the proliferative response.
Conclusions: Older age does not significantly impact the frequency of polyfunctional alloreactive CD4 T cells and the decline of these cells after kidney transplantation. Instead, the proliferative capacity of alloreactive T cells is less in the elderly which is associated with decreased production of IL-2.

## Apolipoprotein B-48 and incident graft failure in renal transplant recipients

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Background: Transplant vasculopathy, which resembles atherosclerotic plaque formation, is a major contributor to chronic graft failure in renal transplant recipients (RTR). Remnant lipoproteins (RLP) and triglycerides are important drivers of the atherosclerotic plaque formation. RLP are apolipoprotein B-48 (apo B-48) containing chylomicrons from the intestines and apo B-100 containing VLDL from the liver. The current study investigated the association between baseline apo B-48 concentrations and incident chronic graft failure.
Methods: 481 RTR with at least one year of functioning graft were included in this prospective longitudinal cohort study. The primary endpoint was chronic graft failure, defined by the re-initiation of dialysis or re-transplantation. Fasting apo B-48 concentrations were measured by enzyme-linked immunosorbent assays.
Results: During the median [interquartile range] follow-up of 9.5 [6.5,10.7] years 61 RTR developed graft failure (12.7%). In baseline characteristic analysis, RTR with higher apo B-48 levels had decreased kidney function ($p<0.001$), higher urinary protein excretion ($p=0.001$), lower HDL cholesterol concentrations ($p<0.001$) and increased triglyceride levels ($p<0.001$). Cox proportional hazards regression models showed that baseline apo B-48 was prospectively associated to incident graft failure (Hazard Ratio [95% confidence interval], 1.59 [1.22-2.07], $p<0.001$), even after adjusting for several potential confounders such as immunosuppressive medication use (HR, 1.88 [1.35, 2.61], $p<0.001$) and baseline eGFR (HR, 1.50 [1.06, 2.12], $p=0.021$).
Conclusions: Combined, these results demonstrate that apo B-48 is a strong predictor of graft failure independent of several potential confounders. Since apo B-48 containing lipoproteins originate from the intestines, this study lends plausibility for exploring pharmacological interventions targeted at decreasing lipid absorption in RTR.

**The development of a population pharmacokinetic model for melt dose tacrolimus (Envarsus®) in elderly kidney transplantation patients.**

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Background: Prolonged release tacrolimus (Envarsus) is a relatively new formulation of tacrolimus and is marketed as achieving an improved bioavailability and a more consistent tacrolimus exposure. Due to the narrow therapeutic window, Therapeutic Drug Monitoring (TDM) is necessary to maintain adequate exposure. Relaxation of the upper age limits for solid organ transplantations has resulted in larger numbers of elderly patients receiving tacrolimus. Due to physiological changes, tacrolimus pharmacokinetics (PK) might be altered in these patients, necessitating dose adjustments. The primary aim of this study was to develop a population PK model for Envarsus in elderly kidney transplant patients and to identify potential covariates for initial dose differentiation. Secondly, a limited sampling strategy was developed, to aid dose individualization.
Methods: Kidney transplant patients aged ≥ 65 years, starting on Envarsus directly after transplantation, were included in this study. A full and a reduced $AUC_{0\text{-}24h}$ were performed 1 and 6 weeks post transplantation respectively, after reaching steady state tacrolimus concentrations. PK data were analyzed by nonlinear mixed effect modeling methods. Tested covariates included: Body Weight, Age, Time after transplantation, Sex, hematocrit, serum albumin, serum creatinine, use of calcium blockers, corticosteroid dose, CYP3A5 status and delayed absorption.
Results: Thirty four patients were included in the analysis, with a total of 546 tacrolimus samples. Pharmacokinetic data were best described by a 2-compartment mixture model, with a delayed oral absorption model incorporating 3 transit compartments and an additional lag time for some patients. Estimated PK-parameters were as follows: lag time, 2.24h ; apparent clearance and intercompartmental clearance were 17.2 and 61.9 L/h per 70 kg respectively; apparent central and peripheral volumes of distribution were 243 and 500 L per 70 kg respectively. Hematocrit and CYP3A5 status showed a significant effect on clearance.
Conclusions: We developed a population PK model that adequately described the PK of melt dose tacrolimus in elderly kidney transplant patients. The current population PK model, together with data on hematocrit and CYP3A5 status, can be used to determine the initial dose. In addition, a limited sampling strategy was developed.

**Urinary biomarkers in a living donor kidney transplantation cohort – predictive value on early and long-term graft function**

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Background: An early non-invasive assessment tool for the detection and prediction of graft function post transplantation is essential since interventions might prevent further deterioration. The aim of this study is to analyze the dynamics and predictive function of the urinary biomarkers kidney injury molecule-1 (KIM-1), heart-type fatty acid binding protein (H-FABP), N-acetyl-β-D-glucosaminidase (NAG) and neutrophil gelatinase-associated lipocalin (NGAL) in a living donor kidney transplantation (LDKT) cohort.
Methods: Biomarkers were measured up till 9 days post-transplantation of 57 recipients participating in the VAPOR-1 trial. Linear mixed modelling and regression analyses were performed.
Results: Dynamics of KIM-1, NAG, NGAL and H-FABP significantly changed over the course of 9 days post-transplantation. KIM-1 day 1 and NAG day 2 post-transplantation significantly predicted post-transplantation GFR with a positive estimate, whereas NGAL and NAG day 1 post-transplantation had negative predictive values. Prediction by multivariate analysis for GFR outcome improved after addition of these biomarker levels. Several donor, recipient and transplantation factors significantly predicted the dynamics of urinary biomarkers.
Conclusions: Urinary biomarkers are of added value for prediction of graft outcome, but influencing factors, like timing of measurement and transplantation factors need to be considered.

## Uptake of home-monitoring after kidney transplantation: a retrospective analysis

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Background: Innovations in telemedicine, such as teleconsultations and home-monitoring of clinical parameters, are rapidly developing in the field of transplantation, accelerated by the COVID-19 pandemic. In order to facilitate monitoring and treatment at home during the pandemic, we implemented the 'SelfCare after Renal Transplantation' (SeCReT) box and a smartphone application (Luscii®) with a custom made protocol and integration to the electronic patient file (HIX® by Chipsoft). In this study we evaluated uptake and use of this home-monitoring system after kidney transplantation.
Methods: We performed a retrospective analysis of enrollment into the home-monitoring program. All de novo kidney transplant recipients were considered eligible for inclusion, without upfront exclusion criteria. The protocol in Luscii® included measurements (SeCReT-box), questionnaires (on wound healing, pain, stool frequency, smoking, sexual problems, adherence via BAASIS® and satisfaction with the home-monitoring program) as well as info on various topics after kidney transplantation. The frequency of measurements decreased as time after transplantation passed.
Results: A total of 177 patients underwent kidney transplantation of which 167 (94% of all recipients) initiated the home-monitoring program, of which 155 used both the SeCReT-box and Luscii®. 12 patients used only the SeCReT-box, mainly due to digital illiteracy or lack of a smartphone, and wrote their measurements on paper. Of the 167 recipients that initiated home-monitoring, only 4 (2.4%) stopped using the SeCReT-box and/or Luscii® deliberately. Currently there are 142 active users, 8 recipients stopped due to graft failure, 3 recipients died and 10 recipients stopped because they were referred back to their local hospital. In all, 9 of 177 recipients (5.1%) could not start, or stopped home-monitoring deliberately. An in-depth analysis of usage is ongoing.
Conclusions: Uptake and continued use of home-monitoring was very high (95%) among this varied group of kidney transplant recipients. Further analysis is needed on barriers and facilitators of its use, in order to reach a more widely adopted use.

**Pre-transplant proportions of polyfunctional donor-reactive T cells are associated with acute T-cell mediated rejection of the kidney transplant within the first year after transplantation**

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Background: Acute T-cell mediated rejection (aTCMR) still remains a clinical problem after kidney transplantation despite significant improvements in immunosuppressive regimens. Polyfunctional T-cells, i.e. T-cells producing multiple pro-inflammatory cytokines, are believed to be the most relevant T-cells in an immune response. The aim of this study was to determine whether pre-transplant proportions of polyfunctional donor-reactive T-cells are associated with aTCMR.
Methods: In a case-control study, 49 kidney transplant recipients with a biopsy-proven aTCMR in the first year after transplantation were included, as well as 51 controls without aTCMR. Circulating donor-reactive T-cells were identified by the expression of CD137 using a multiparameter flow cytometric assay following a short-term co-culture with donor antigen-presenting cells. Proportions of interleukin (IL)-2, tumor necrosis factor (TNF)-α and interferon (IFN)-γ cytokine producing cells and combinations thereof were determined. Polyfunctional donor-reactive T-cells were further characterized by dissection into different T-cell subsets encompassing the spectrum of naïve to terminally-differentiated effector T-cells.
Results: Prior to kidney transplantation, proportions of donor-reactive CD4+ (0.03% versus 0.02%; P<0.01) and CD8+ (0.18% versus 0.10%; P<0.01) CD137high-expresssing (CD137++) T-cells were significantly higher in recipients with a biopsy-proven aTCMR versus non-rejectors. Polyfunctionality (proportions of triple as well as double cytokine producing cells) was higher (P=0.03) in this subset of CD137high-expressing T-cells. These cells were predominantly of the EM/EMRA-phenotype, with polyfunctional donor-reactive CD137++CD4+ T-cells predominantly co-expressing CD28 whereas approximately half of the polyfunctional CD137++CD8+ T-cells co-expressed CD28. In addition, at the time of a biopsy, polyfunctional donor-reactive CD137++ CD4+, but not CD8+, T-cells, were specifically decreased by 75% compared to before transplantation in recipients with as well as those without an aTCMR.
Conclusions: Prior to transplantation, the proportion of polyfunctional donor-reactive CD137++ T-cells is associated with the occurrence of a biopsy-proven aTCMR within the first year after transplantation.

**A low abundance of hla in urinary extracellular vesicles hinders the identification of donor-specific vesicles in urine after kidney transplantation**

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Background: Urinary extracellular vesicles (uEVs) might reflect the integrity and condition of the kidney allograft. The aim of the present study was to identify donor-specific uEVs based on human leukocyte antigen (HLA) mismatching with the recipient.
Methods: Donor-specific CD9 (tetraspanin, general uEV marker) and HLA-A2 double-positive (CD9+/HLA-A2+) uEVs were quantified from the urine of 12 HLA-A2-positive kidney donors and were compared to urine samples of 12 HLA-A2-negative recipients, using an isolation-free imaging flow cytometry (IFCM) protocol. Paired plasma (positive control) and urine samples collected from 10 healthy controls (HC) were used to investigate the general HLA-class-I+ uEVs (CD9 colocalized) using IFCM, time-resolved fluoroimmunoassay (TR-FIA), or immunogold-staining electron microscopy (IGS-EM). In addition to unprocessed urine samples, uEV isolates were 266-fold concentrated from the HC urine by ultracentrifugation (UC). Lastly, cell-derived CD9+/HLA-class-I+ EVs were spiked into the urine to investigate if the urine matrix (pH, osmotic pressure, ion concentration) affects uEV HLA detection.
Results: CD9+/HLA-A2+ uEV concentrations detected by IFCM could not discriminate HLA-A2+ donor from HLA-A2- recipient urine. In HC plasma, we observed 5.2 ± 4.4 × $10^6$/mL CD9+/HLA-class-I+ EVs, while significantly lower CD9+/HLA-class-I+ EVs were detected in unprocessed urine samples from HCs (5.6 ± 1.6 × $10^4$/ mL, p = 0.0046) and resuspended uEV isolates (1.4 ± 0.8 × $10^4$/mL, p = 0.0044). In TR-FIA, the Europium intensity, reflecting HLA-class-I expression of EVs from plasma (5220 ± 2053), was significantly higher than EVs from urine (2077 ± 85, p = 0.001), and the control with only buffer/ PBS (2641 ± 48, p = 0.0032). In the IGS-EM, vesicle surface HLA-class-I expression was undetectable in uEV isolates. The spike-in IFCM experiments revealed 4.6 ± 2.3 × $10^6$/mL cell-derived CD9+/HLA-class-I+ EVs directly after the spike-in and comparable numbers (3.5 ± 2.1 × $10^6$/mL, p = 0.23) after incubation in the urine at 37°C for 8 hours ruling out a matrix effect preventing HLA-class-I detection in urine.
Conclusions: HLA-class I cannot be used to identify donor-derived uEV, likely because HLA-class-I+ EVs are not excreted into the urine under physiological conditions.

**Immune cell repertoire in kidney transplant biopsies classified as acute rejection**

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Background: The diagnosis of kidney transplant (KTx) rejection is strongly based on the pathology findings of a KTx biopsy according to the Banff Classification of Renal Allograft Pathology. However, based on the current classification, a clear-cut category of rejection is sometimes difficult to diagnose. Here we describe the feasibility of using novel multiplex immunofluorescent analysis on formalin fixed paraffin embedded (FFPE) KTx biopsy previously used for histomorphological assessment combined with digital image analysis to investigate the immune cell repertoire of different types of acute KTx rejection.
Methods: Two novel multiplex immunofluorescent panels were designed and performed on 76 KTx FFPE biopsies retrieved from the archives of the dept. of Pathology, Erasmus MC Rotterdam. Antibodies to panel 1: CD3, CD8 and, CD68 and panel 2: CD14, CD16, CD163 and CD56 were used. Three groups were compared: antibody-mediated rejection (AMR, n=25), acute T cell-mediated rejections (aTCMR, n=19), and non-rejection (ATN, n=32). Digital image analysis was performed using QuPath and data was analyzed using Graphpad Prism software.
Results: In both AMR and aTCMR, almost all inflammatory cells were significantly more prevalent in glomeruli and tubulointerstitium than in control cases, except for CD14+ and CD16+ cells in the glomeruli and, CD14+CD16+ and CD16+CD56+ cells in the tubulointerstitium. The tubulointerstitium of aTCMR showed a higher abundance of T cells compared to AMR (CD3+ and CD3+CD8+, $p < 0.05$). No differences in glomerular T cells were seen. The glomeruli of AMR showed significantly more monocytes and macrophages than aTCMR (CD14+, CD16+, CD68+, CD163+ and, CD16+CD56+, $p < 0.05$).
Conclusions: Multiplex immunofluorescent panels on KTx FFPE biopsies is a feasible method for investigating T cells, monocytes and macrophages. Comparing rejection cases to ATN, there were significantly more T cells, monocytes and macrophages in both glomeruli and tubulointerstitium. In our small cohort, TCMR and AMR cases showed a different immune cell repertoire.

**Gene expression in intestinal transplant patients treated with vedolizumab**

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Background: Two patients with different disease backgrounds underwent intestinal transplantation (ITx) and afterwards had either acute cellular rejection (ACR, patient 1) or chronic allograft enteropathy (CAE, patient 2). Both patients received vedolizumab, which successfully managed their rejection episodes and have been free of complaints ever since. Vedolizumab is a monoclonal antibody that targets the integrin α4β7, expressed in inflammatory cells of the intestine, and blocks the interaction with its endothelial cell receptor MAdCAM-1, preventing migration of these cells into the intestinal mucosa. This study aims to explore the effects of vedolizumab on the transcriptome of the gut mucosa in these patients.
Methods: Small intestinal biopsies taken before and during treatment with vedolizumab were analysed by RNA sequencing. Nine sequential biopsies from patient 1 (five before treatment), seven from patient 2 (four before treatment), and three from another patient with ACR that received regular treatment (steroids, tacrolimus and anti-thymocyte globulin), where analysed for differential expression of their whole transcriptome associated to clinical, endoscopic, and histopathological data.
Results: Twenty-one genes from the three patients were differentially expressed when treatment with vedolizumab was present. Pathway enrichment analyses showed decreased expression of genes involved in zinc homeostasis and no effect on vedolizumab targets was found. However, individual gene expression analyses showed that genes related to cell migration and adhesion were affected by treatment with vedolizumab. Patient-related effects were detected at this level on apoptosis-related genes in patient 1 and ischaemia-related genes in patient 2.
Conclusions: This is the first study presenting gene transcript profiling of small intestinal biopsies of patients with ACR and CAE after ITx that were treated with vedolizumab. This drug may affect cell migration and adhesion other than, or in addition to, the α4β7-MAdCAM-1 axis. These broader effects than initially proposed may be at play to resolve rejection in these patients.

**Decoding donor and recipient cell dynamics in the small bowel graft within six months post-transplantation**

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Background: Transplantation of the small bowel is a last resort for patients with severe gastrointestinal failure. The procedure, however, is costly and of high risk. Half of all patients endure acute graft rejection within 5 years and we do not know why.
The gut constitutes the largest reservoir of immune cells in our bodies. How and when these cells repopulate after transplantation is yet to be specified. We hypothesize that the recipient immune cell population in the graft grows after transplantation and that this process is disrupted in small bowel graft rejection. Furthermore, we think that graft rejection is preceded by impaired substitution of donor immune cells with recipient cells in the transplanted small intestine.
Methods: We studied three patients up to six months post small bowel transplantation. We longitudinally sampled 28 small intestine biopsies of the graft, dissociated these and profiled >90.000 cells using single-cell RNA sequencing. Post-sequencing, we applied the python package "Souporcell" which uses the genetic background to distinguish donor from recipient cells.
Results: We are able to differentiate between donor and recipient cells. Overall, recipient cells show more myeloid cell presence, whereas the donor immune cells population consists mainly of T cells. We observe a similar recipient immune cell composition in the first 30 days post-transplantation for the three transplants. Recipient immune cell counts are variable over time post-transplantation and with rejection grades.
Conclusions: We find no evidence for the expansion of the recipient immune cell population with time post-transplantation. Furthermore, we state that donor immune cell presence is independent of graft rejection, although we see increased recipient immune cell presence in high grade rejection.

**'Walking is fun but walking together is even more fun': an evaluation of the Walk&Talk program in the Netherlands**

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Background: In 2019, the first Walk&Talk group was established in the Netherlands. Walk&Talk is a physical intervention for and organized by transplant recipients (TRs). The aim of Walk&Talk is to promote physical activity and peer support among TRs and their significant others. Upon request, transplant professionals can join. Walk&Talk is financially supported by Chiesi Pharmaceuticals. The aim of this study was to evaluate the development of the Walk&Talk program, the satisfaction of Walk&Talk participants, and its effect on wellbeing.
Methods: A mixed-methods study was performed among Walk&Talk participants using a brief survey (n=38) after each walk and semi-structured interviews with ten participants (summer 2022). Data were analyzed using descriptive statistics and content analysis.
Results: Seven Walk&Talk groups have been established since the start of the program. Each group organizes a monthly walk of about one hour. Although most groups consist of a total of 20 participants, five to ten participants are present at each Walk&Talk. Some TRs were joined by a significant other, most often their partner. Coordinators (n=4) were motivated to take this role because they wanted to promote physical activity among TRs. Participants (n=6) mainly wanted to get in touch with other TRs and/or their partners. Overall, participants were satisfied with the frequency, duration, and intensity of the walk. Although transplant professionals did not join the walks frequently, participants appreciated their presence when they did as this setting made them feel more comfortable discussing personal, transplant-related problems. Regarding the effect of Walk&Talk on wellbeing, participants indicated that the program helped them to get in touch with other TRs and their significant others. By talking to their peers, they felt heard and experienced a strong feeling of mutual understanding. This helped them process the transplant experience, which consequently made them feel stronger mentally. As most participants were already physically active, only a few participants indicated that it improved their physical fitness.
Conclusions: Walk&Talk is an easy-to-start physical intervention for TRs and their significant others that enhances peer support, which may have a positive effect on their psychosocial wellbeing.

**Older living liver donors can enlarge the donor pool: a systematic review and meta-analysis**

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Background: Living donor liver transplantation (LDLT) is an option to solve the donor liver shortage. Due to the aging population, older potential donors are increasingly willing to donate. This study aims to systematically assess the differences in donor peri- and postoperative complications, mortality, and quality of life (QoL) between younger (≤50 years) and older (>50 years) living liver donors. Methods: Embase, Medline, and Cochrane Central Register of Controlled Trials were searched for studies published between 2002 and August 3, 2022. Studies' methodological quality was assessed using the Newcastle Ottawa Scale. For donor complications and major complications, meta-analyses were conducted, donor mortality and QoL results were systematically described. Results: The literature search resulted in 7838 studies, of which 17 were included (13 on complications, 2 on mortality, 2 on QoL). In 673/7607 (8.8%) donors, complications occurred, 85.4% in younger and 14.6% in older donors. The risk ratio (RR) for complications in younger donors was 1.08 [0.90, 1.31] (P=0.41). Risk ratios for major complications in younger donors were 0.98 [0.64, 1.48] and 0.89 [0.50, 1.57] using Clavien-Dindo ≥III and ≥IIIb as a major complication, respectively. RR for biliary complications in younger donors was 1.59 [1.05, 2.42] (P=0.03). In 60/14227 (0.4%) donors, mortality occurred, 47 (78.3%) in younger and 13 (21.7%) in older donors. One study on early mortality reported a RR in younger donors of 0.28 [0.06, 1.46], and 1 study on long-term mortality a RR in younger donors of 0.23 [0.12, 0.44]. QoL data was recorded for 414 (72.9%) younger and 154 (27.1%) older donors. Mean physical summary score in younger donors was 51.87 and in older donors 51.29. Mean mental summary score in younger donors was 52.93 and in older donors 55.40. Conclusions: Older donors do not have a higher complication rate or mortality rate than younger donors after LDLT. They do have a lower rate of biliary complications. In addition, older donors have a similar QoL after LDLT compared to younger donors. With careful selection, older donors can be included in screening programs for living liver donation to expand the donor pool.

**Short-term outcome after simultaneous pancreas and kidney transplantation with alemtuzumab versus basiliximab induction; a single-center retrospective study**

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Background: Both T-cell depletion by alemtuzumab (ALEM) as well as IL-2 receptor blocking by basiliximab (IL2R)are used as induction for simultaneous pancreas-kidney (SPK) transplantations. Multiple studies have reported higher rates of infections with ALEM versus IL2R. Due to the COVID-19 pandemic we adapted our standard induction from ALEM to IL2R for low immunological risk SPK transplantations. We compared 180-days transplantation outcomes between ALEM and IL2R induction.
Methods: Patients with low immunological risk who underwent SPK between September 2015 and June 2022 at our center were analyzed. Induction was either ALEM (30 mg, until February 2020) or IL2R (2x 20 mg, from February 2020 onwards) and triple maintenance therapy (prednisolone, tacrolimus, mycophenolate acid). All pancreas allograft transplants were performed using enteric drainage. Standard prophylaxis included antibacterial, antifungal and antiviral therapies. Valganciclovir prophylaxis for cytomegalovirus (CMV) infection was risk stratified. All patients routinely went to the intensive care unit postoperatively.
Results: Thirty-five SPK transplant recipients were included , consisting of 67% males and with a mean age of 42±10 years. Fifty-four percent of patients were transplanted pre-emptively, 37% received organs from a DBD donor and the mean donor age was 31±11 years. Twenty-one recipients received ALEM and 14 recipients IL2R induction therapy. Two pancreas grafts were lost in the ALEM group, and one kidney graft was lost in the ILR2 group. No patient deaths occurred within the 180-day post-operative period. No differences between ALEM and IL2R groups in 180 days post-transplant kidney (creatinine 144 vs. 115 µmol/L, resp.) and pancreas (HbA1c 38 vs 35 mmol/mol, resp.) graft function or rejection incidence were observed. More recipients in the ALEM group suffered from bacterial (81% vs. 50%, p = 0,05) and viral infections (57% vs. 38%, p = 0.21) compared to the IL2R group. The median duration of initial hospitalization was longer for the ALEM group compared to the IL2R group (28 [20-39] vs. 12 [10-16] days, p = <0,001). The percentage of recipients with hospital readmission was equal (57%) for both groups.
Conclusions: Our experience, although limited, with IL2R induction for SPK transplants with low immunological risk has shown encouraging results with equivalent short-term graft function and decreased post-operative infection rates and hospital admission duration compared to ALEM induction.

**Robotic-assisted kidney transplantation: Initial results and comparison with the open conventional technique**

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Background: To evaluate morbidity and renal function of the recipient after robotic-assisted kidney transplantations (RAKT) and comparison with the conventional open kidney transplantation (OKT).
Methods: Our initial 21 consecutive RAKT procedures were compared with an matched group of 21 OKT. Our first RAKT was done in November 2021 and all other RAKT were done after March 2022. All were living donor kidney transplantations. Matching for the OKT group was done according to donor aspects (donor age and gender). Donor left kidneys were used in 85% of the transplantations. All implantations in the RAKT group were done on the right side. Recipient variables were analyzed.
Results: There was no significant difference in age and gender between the two groups. The mean operation time (OT), anastomosis time (AT) and cold ischemic time (CIT) for the RAKT and OKT group were respectively 243 and 155 min (OT, $p<0.001$), 46 min and 28 min (AT, $p<0.001$), and 227 and 187 min (CIT, $p=0.004$). All robotic anastomoses were completed successfully. The mean BMI was 28 kg/m2 in both groups. There was no significant differences in renal function (serum creatinine and eGFR) at 1 week and 1 month after transplantation between the two groups. There were a total of 6 complications (combined peri- and post-operative complications) in de RAKT group and 9 in the OKT group. In the RAKT group one graft failed six weeks after transplantation because of a therapy resistant combined humoral and cellular rejection. In the OKT group 1 graft failed 5 days after transplantation because of a venous thrombosis. There were no significant differences in number of rejections and mean post-operative length of hospital stay between the RAKT and the OKT group.
Conclusions: Robotic-assisted kidney transplantation is an evolving minimal invasive surgical technique for kidney transplantation, which may be beneficial especially for the growing number of obese kidney transplant recipients. From our initial results robotic-assisted kidney transplantation seems to be safe for the recipient and for the kidney graft of living donors, but longer follow-up is necessary.

**Burden of side effects: a cross-sectional study in kidney transplant recipients**

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Background: Kidney transplant recipients (KTR) often report a poor health-related quality of life (HRQoL), which may partly be attributable to side effects of immunosuppressive therapy. We therefore aimed to assess prevalence, distress, and burden of side effects in a large cohort of KTR. Furthermore, we aimed to assess associations of symptom burden with clinical outcomes, such as HRQoL, medication non-adherence, depression, and societal participation.
Methods: Data from KTR at least 6 months after transplantation, enrolled in the TransplantLines Biobank and Cohort Study between June 2015 and February 2022, were used. Side effects were assessed using the revised Modified Transplant Symptom Occurrence and Distress Scale (MTSOSD-59R). RIDIT analyses, a valid and effective technique to analyse ordered categorical data, was performed to calculate RIDIT scores of symptom prevalence and symptom distress. Symptom burden was calculated by multiplying symptom prevalence by symptom distress. HRQoL was assessed using the Short-Form 36.
Results: We included 936 KTR (39% female; mean age 56 ± 13 years) at median [IQR] 2 [1 to 9] years after transplantation. Tiredness, bruises, and lack of energy were the most prevalent symptoms. Menstrual problems (female), impotence (male), and joint pain were the most distressful symptoms. Lack of energy and tiredness were the most burdensome symptoms. In linear regression analyses, higher symptom burden scores were associated with both lower mental and physical HRQoL (β -3.00, 95% CI -3.32 to -2.67, p<0.001; β -2.29, 95% CI -2.56 to -2.03, p<0.001; respectively). In regression analyses, higher burden scores were strongly associated with medication non-adherence (OR 1.06, 95% CI 1.03 to 1.10, p<0.001), depression (OR 1.43, 95% CI 1.33 to 1.55, p<0.001), and less societal participation (frequency of activities: OR 0.94, 95% CI 0.91 to 0.97, p<0.001; restrictions: OR 0.73, 95% CI 0.70 to 0.77, p<0.001; satisfaction: OR 0.83, 95% CI 0.80 to 0.87, p<0.001). All results remained significant after adjustment for potential confounders.
Conclusions: Side effects are a major clinical problem among KTR, and burden of side effects is strongly associated with lower HRQoL, medication non-adherence, depression, and less societal participation. Our findings highlight the need to reduce the side effects of immunosuppressive regimen after transplantation, for instance by individualizing immunosuppression.

## Adverse outcomes after alemtuzumab therapy for kidney transplant rejection

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Background: Alemtuzumab is used off-label as a lymphocyte-depleting therapy for severe or glucocorticoid-resistant kidney transplant rejection. Despite the efficacy and apparent short-term safety of alemtuzumab, concerns about the long-term adverse effects of lymphocyte depletion remain. To date, the impact of alemtuzumab-therapy on patient survival, infection and malignancy are unclear. In this retrospective study, we report the occurrence of death, infections and malignancy of a large cohort of patients treated with alemtuzumab for kidney transplant rejection.
Methods: We compared clinical data of kidney transplant recipients treated with and without alemtuzumab for rejection between January 1st 2012 and January 1st 2022. Using a multivariable, time-varying Cox proportional hazard model we evaluated the effect of alemtuzumab on the general risk of death and risk of death from infection or malignancy. Additionally, the association between alemtuzumab and malignancy incidence was analyzed with a negative binomial regression model.
Results: During the study period, 213 kidney transplant recipients were treated with alemtuzumab for rejection. 1691 kidney transplant recipients were included who didn't receive alemtuzumab as an anti-rejection treatment. Baseline characteristics were comparable. Alemtuzumab-therapy was associated with a higher probability of death (HR 1.63, 95%-CI 1.22 to 2.20) and infection-related death (HR 1.82, 95%-CI 1.08 to 3.05), but not with malignancy-related death. Alemtuzumab-therapy was also not associated with a higher incidence of overall malignancies, solid malignancies, skin malignancies or hematological malignancies.
Conclusions: Treatment with alemtuzumab for kidney transplant rejection is associated with a higher probability of death and infection-related death, but not malignancy-related death or the number of malignancies. These results suggest that infections are the most important long-term complication of alemtuzumab for kidney transplant recipients.

**Kidney transplantation in patients with aorto-iliac stenosis: is it safe?**

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Background: Kidney transplantation is the standard treatment for end-stage renal disease (ESRD). It brings patients a survival benefit and better quality of life compared to dialysis. Unfortunately, not all patients are eligible for transplantation. Peripheral arterial disease is considered a relative contra-indication for kidney transplantation, particularly aorto-iliac stenosis. This study aims to investigate outcome in kidney transplant recipients with aorto-iliac stenosis and whether graft placement, ipsilateral or contralateral side of the stenosis, affects outcome.
Methods: A retrospective cohort study was conducted in the Netherlands. All patients (n=2127) who underwent kidney transplantation between January 1st, 2010 and December 31st 2020 were included. Aorto-iliac stenosis was verified by contrast enhanced imaging and classified using the TASC II classification. Using propensity score matching all patients with an aorto-iliac stenosis were matched with patients without stenosis in a 1:4 ratio. Patient and graft survival were compared between the two populations.
Results: In total 655 patients were included in this study after matching. Of these patients, 131 had an aortoiliac stenosis. Patients without stenosis had a significant higher long-term survival rate compared to the patients with stenosis ($p<0.001$). The 10-year survival rate of patients with no stenosis was 46.6% compared to 31.8% for TASC A/B and 11.4% for TASC C/D. There was no significant difference in death-censored graft survival between patients with- and without stenosis. Patients with a stenosis had a significant lower uncensored graft survival compared to the patients without stenosis ($p<0.001$). The 10-year graft survival rate was 38.5% for patients without a stenosis compared to 28.2% for TASC A/B and 10.9% for TASC C/D. There was no significant difference in death-censored graft survival between patients with ipsi- or contralateral placement of the graft.
Conclusions: Kidney transplantation can effectively improve the long-term survival and quality of life for patients with aorto-iliac stenosis. Therefore, patients with aorto-iliac stenosis should not be denied for kidney transplantation. Additional attention should be warranted to the patients with severe aortoiliac stenosis to reduce the mortality related to vascular factors.

**Modelling changes in the pharmacokinetics of tacrolimus during pregnancy after kidney transplantation: a retrospective cohort study**

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Background: Pregnancy after kidney transplantation (KT) is a realistic option but maintaining tacrolimus whole-blood pre-dose concentrations during pregnancy is complicated as physiological changes affect the pharmacokinetics of and hence exposure to tacrolimus. The aim of this study was to investigate the changes in tacrolimus whole-blood pre-dose concentrations throughout pregnancy in kidney transplant recipients and correlate these with covariates in a population pharmacokinetic (popPK) model.
Methods: Data of pregnant women using a twice-daily oral tacrolimus formulation after KT were retrospectively collected from six months before conception, throughout gestation, and up to six months postpartum. Pharmacokinetic analysis was performed using non-linear mixed effects modelling software (NONMEM). The final model was evaluated using goodness-of-fit plots, visual predictive checks and a bootstrap analysis.
Results: A total of 244 whole-blood tacrolimus pre-dose concentrations from 13 women who became pregnant after KT were included. Tacrolimus apparent clearance (CL/F) increased during pregnancy from 33.2 to 41.9 L/h, with the highest change observed in the first trimester. Haematocrit (delta objective function value (ΔOFV) -84.37) and gestational age (ΔOFV = -83.40) were negatively correlated with CL/F (p-value <0.01). These covariates explained 45% of the inter-individual and 82% of the inter-occasion variability on CL/F. Simulated whole-blood tacrolimus pre-dose concentrations, with the gestational age correlated to mean haematocrit values of that period, show a clear distinction between non-pregnant state and pregnancy on CL/F. A rapid decrease in tacrolimus concentrations occurred during the first trimester, which decreased a bit further during the second trimester and stayed stable during the last trimester. This change rapidly disappeared postpartum.
Conclusions: Gestational age and haematocrit impact the exposure to tacrolimus during pregnancy. To maintain target whole-blood tacrolimus pre-dose concentrations during pregnancy, a dose increase is suggested. This popPK model may be used in the future for tacrolimus dose adjustments in pregnant kidney transplant recipients.

## Atherosclerosis and intrarenal resistance index in kidney transplant recipients

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Background: Atherosclerosis of the aortoiliac vessels can adversely affect kidney perfusion after kidney transplantation. Atherosclerosis severity can be determined using the calcium score (CaScore). Potential problems with posttransplantation kidney perfusion can be determined using the intrarenal resistance index (RI). This study investigated the association between aortoiliac CaScore and RI in kidney transplant recipients.
Methods: Kidney transplant recipients (2004-2019), for whom the CaScore and RI were determined, were included in this dual-center cohort study. CaScore was measured in 3 aortoiliac segments using noncontrast CT imaging. RI was determined using Doppler ultrasound. Multivariable linear regression analyses were performed between the CaScore and RI, adjusted for confounding variables.
Results: The mean age of the 389 included patients was 59 (±13) y. The mean RI (unitless) was 0.71 (±0.09), and the median CaScore (unitless) was 3340 (399-7833). In univariable linear regression analyses with RI as the dependent variable, CaScore ($\beta$ = 0.011; $P$ < 0.001) was positively associated with RI. Moreover, recipient age ($\beta$ = 0.014; $P$ < 0.001), history of diabetes ($\beta$ = 0.029; $P$ = 0.003), recipient history of vascular interventions ($\beta$ = 0.032; $P$ = 0.002), prior dialysis ($\beta$ = 0.029; $P$ = 0.003), deceased donor transplantation ($\beta$ = 0.042; $P$ < 0.001), donation after cardiac death ($\beta$ = 0.036; $P$ = 0.001), an increase in cold ischemia time ($\beta$ = 0.011; $P$ < 0.001), and the Comprehensive Complication Index ($\beta$ = 0.006; $P$ = 0.002) were also positively associated with RI, whereas preoperative recipient diastolic blood pressure ($\beta$ = -0.007; $P$ = 0.030) was inversely associated. In multivariable analyses, CaScore and RI remained significantly ($P$ = 0.010) associated, independent of adjustment for potential confounders. Furthermore, in univariable linear regression analyses, multiple graft function characteristics were associated with RI.
Conclusions: A significant association was found between CaScore and RI, independent of adjustment for multiple potential confounding factors, leading to a better insight into the development and interpretation of RI. Aortoiliac atherosclerosis should be considered when interpreting the RI and determining the possible cause of malperfusion and graft failure after kidney transplantation.

**The quality of life of living liver donors post-donation: an ambidirectional cohort study**

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Background: Living donor liver transplantation (LDLT) is a viable option for the donor liver shortage. A systematic review showed elevated pain levels 3 months post-donation. This study compares the quality of life (QoL) of living liver donors (LLD) post-donation to pre-donation and to the QoL of the general Dutch population.
Methods: Donors are included from May 2004 to May 2023. Donors filled in Short Form-36 Health Survey (SF-36), and EuroQol-5 Dimension-5 Levels (EQ-5D-5L) pre-donation, and 3-, and 12- months post-donation. These 3 time points were compared with a reference (Dutch population) and with each other. Subgroup analyses were done for sex, age (<40 vs ≥40), donor hospital stay (<7 vs ≥7 days), and donor and recipient complications. For these factors and body mass index, multiple linear regression analyses were done.
Results: Forty-eight donors are included. For SF-36, mean Physical Component Score (PCS) was 91.5 pre-donation, 87.4 3 months post-donation, and 89.9 12 months post-donation. Mean Mental Component Score (MCS) was 87.6 pre-donation, 87.9 3 months post-donation, and 85.3 12 months post-donation. For both, there were no significant differences between the 3 time points and all means were significantly higher than the reference (PCS: P=0.004, P<0.001, P<0.001; MCS P=0.004, P<0.001, P=0.002). Mean pain 3 months post-donation was 87.9 and did not differ from the other 2 time points or the reference. Subgroup analyses showed a significantly 6.3 higher PCS pre-donation in older donors (P=0.02). Multiple linear regression showed no predictors of PCS and MCS. For EQ-5D-5L, mean Visual Analog Scale (EQ-VAS) was 82.5 pre-donation, 89.2 3 months post-donation, and 84.9 12 months post-donation. Mean composite Time Trade-Off (cTTO) was 0.97 pre-donation, 0.98 3 months post-donation, and 0.89 12 months post-donation. There were no significant differences between the 3 time points. Mean EQ-VAS 3 months post-donation (P<0.001) and cTTO at all 3 time points (P=0.03, P<0.001, P=0.04) were significantly higher than the reference. Subgroup analyses and multiple linear regression showed no significant differences or predictors.
Conclusions: QoL of LLDs 3 months after LDLT returned to their pre-donation QoL. Three months post-donation, pain scores are back to baseline levels. Older donors report better physical QoL pre-donation than younger donors. QoL of LLDs is often higher compared to the general Dutch population. Our results show a faster QoL recovery than the current literature.

**Activation of the complement system early on during brain death management**

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Background: Brain death (BD) results in an inflammatory environment, including activation of the complement system. Currently, the clinical impact of prolonged duration of BD on the donor organ is still unknown. Here, we investigated how different BD durations impact complement activation levels both systemically and locally within renal tissue.
Methods: The QUOD biobank was used to obtain EDTA-plasma samples and kidney biopsies from BD donors. Samples were routinely taken at several time points during BD management. Samples were grouped based on short (<15h), average (18-22h) or long (>25h) BD duration. Furthermore, groups were divided based on the presence of delayed graft function (DGF) (6 groups, n=20 per group for plasma, n=10 per group for biopsies).
Results: ELISAs were used for specific quantification of C4d, C3c and C5b-9 in plasma samples. All three complement activation factors showed high levels at the start of donor management (DB2). C4d levels decreased over time, and were significantly lower in samples taken just before organ retrieval (DB4) compared with DB2 (mean 5731 ng/mL vs. 3321 ng/mL, p=<0.001). C3c and C5b-9 also showed a similar trend towards lower complement activation levels at the end of donor management (DB3) and at DB4 compared with DB2. Preliminary analysis between different BD duration groups did not show a difference in C4d, C3c and C5b-9 levels. C4d and C3c levels, at any point during BD management, did not appear to influence the development of DGF. In contrast, C5b-9 showed significantly higher levels at DB3 in donors whose kidney later developed DGF compared with those who did not develop DGF (mean 2295 mU/mL vs. 1164 mU/mL, p=0.02). Biopsies (collected at time of organ retrieval) have been stained for C4d, C3d and C5b-9 and showed clear signs of local complement activation at different compartments, including glomerular, tubular and peritubular regions. The quantification of different staining patterns is currently under investigation.
Conclusions: In conclusion, the complement system is activated in BD donors already early on during the management period, and is decreasing over time. Prolonged duration of BD does not appear to be associated with increased levels of C4d, C3c and C5b-9. Future studies on administering complement inhibitors to BD donors could benefit from starting therapy early on during management period.

**Risk factors for primary graft dysfunction after heart transplantation - a systematic review and meta-analysis**

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Background: Primary graft dysfunction (PGD) is an important contributor to early mortality after heart transplantation (HTX). The International Society for Heart and Lung Transplantation (ISHLT) published a consensus definition of primary graft dysfunction in 2014. We conducted a systematic review and meta-analysis of published literature aimed at identifying risk factors for PGD according the ISHLT consensus definition.
Methods: Studies were identified using Medline and Embase and were included if published after the establishment of the consensus definition, the population consisted of adults receiving isolated HTX and outcome was specified as development of PGD according to the ISHLT consensus definition. PRISMA-guidelines were applied. Only risk factors identified with multivariate analysis were included and inserted into meta-analysis if reported in ≥2 studies. Pooled odds ratios (OR) and 95% confidence intervals (CI) were calculated using the inverse variance method with a DerSimonian and Laird random-effects model.
Results: A total of 29 studies were included. Significant heterogeneity was noted regarding severity of PGD and risk factor definition, limiting pooling of data for meta-analysis. After meta-analysis, the only significant predictor for all PGD was recipient mechanical circulatory support status prior to HTX (OR: 2.48; 95% CI: 1.38-44.6), while recipient amiodarone treatment (OR: 4.95; 95% CI: 2.48-9.86), female sex of the donor (OR: 2.08; 95% CI: 1.42-3.03) and cold ischemic time per hour-increment (OR: 1.91; 95% CI: 1.74-2.11) were significant predictors of severe PGD. No risk factors for right ventricular PGD or PGD after cardiac donation after circulatory death (DCD) could be identified.
Conclusions: This is the first systematic review and meta-analysis specifically focused on risk factors for PGD according to the ISHLT consensus definition. Identified risk factors for severe PGD include recipient amiodarone treatment, female sex of the donor and cold-ischemic time per hour increment. An important observation was the significant heterogeneity among identified studies regarding severity of PGD and risk factor definition, that restricted the ability to reliably pool data for meta-analysis. Future studies should take this into consideration to improve multi-center comparison, reproducibility and statistical power of future meta-analysis. Furthermore, focus should be aimed at identifying risk factors for right ventricular PGD and PGD after cardiac DCD.

**How Dutch intensivists discuss patient's donor registration in the recently introduced soft opt-out system for organ and tissue donation: a qualitative embedded multiple-case study**

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Background: In the Netherlands, a soft opt-out system for organ and tissue donation and the accompanying Quality Standard Donation were implemented in 2020. The default changed from non-donation to donation, and relatives in presumed consent cases have only *informal ability to oppose* to the donation and should not be asked to *provide consent*. We explored how intensivists discuss patient's donor registration of (presumed) consent in donor conversations in a soft opt-out system.
Methods: We performed a qualitative embedded multiple-case study in eight Dutch hospitals. A thematic analysis was conducted based on direct observations and audio-recordings of donor conversations (n=15) and supplementary interviews with intensivists (n=16).
Results: Our preliminary results show that intensivists bring their expectations, personal considerations, and prior experiences with the family to the donor conversations. This, combined with contextual factors, defines their point of departure. From the data we constructed four routes in which intensivists apply patient's donor registration. In the consent route (A), intensivists followed the explicit donation wish of the patient and family perspectives were minimally verified. The presumed consent donor registration appeared a grey area for interpreting patient's donation wish, which made intensivists delegate part of their responsibility to the amended Donor Act and verify with the family. In the presumed consent route (B), intensivists strictly followed the amended Donor Act intending to effectuate donation, which was more easily achieved when families went with the patient's donor registration. In the consensus route (C), intensivists provided families some participation in decision-making, while in the family consent route (D), families were still given full decisional capacity to pursue optimal bereavement.
Conclusions: Intensivists discuss patient's donor registration through four routes and start the conversations based on their individual points of departure. Our data explains that while soft opt-out legislation entails an implicit norm of saving lives, clinical practice shows a shift to moral neutrality when intensivists are left with concerns regarding patient's consent. This is especially the case in Route C and D. Insight into this shift, the four routes and the Act's implicit normativity seem to acknowledge the counter-intuitive approach of donor conversations for intensivists under soft opt-out legislation.

**Luminal preservation of the human intestine with a polyethylene glycol solution applicable for transplantation: the LUMINTRAL study**

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Background: Intestinal transplantation (ITx) has shown sub-optimal graft survival rates for the last ten years, mostly due to rejection and subsequent sepsis. This could be improved by reducing initial preservation injury. Experimental studies applying luminal preservation (LP) to animal and human intestines show promising results. Herewith presented is the first trial of luminal preservation LP of human intestines from suitable donors in a clinical setting.
Methods: Twenty-five bowels (small intestine and ascending colon) from brain-dead donors meeting criteria for ITx (age extended to ≤ 70 years) were divided into four groups in two European centres that use different vascular perfusion solutions (University of Wisconsin, UW, or Institut Georges Lopez-1, IGL-1). Two groups served as controls (only vascular perfusion), two as LP treatment groups with additional ice-cold polyethylene glycol 3350 (PEG). LP occurred before and during vascular perfusion via the existing nasogastric tube, placed manually in the duodenum during procurement. Samples from procurement and after seven and fourteen hours of cold storage were scored histologically for intestinal preservation injury (IPI).
Results: Implementation of LP did not prolong procurement times. PEG reached the terminal ileum but did not pass into the large intestine (colonic samples were thus not analysed). LP significantly reduced jejunal mucosal damage at procurement, independently of the vascular flush solution used, compared to control groups (median IPI scores 2 in control groups, 0 in treated groups 0, $p < 0.001$). LP protected the jejunum during cold storage when IGL-1 was the vascular preservation solution. LP had little effect on the ileum, though a marginally worsened mucosa was observed after seven hours in UW vascular flush group (IPI 3 in both groups, higher range values in treated group, $p = 0.01$).
Conclusions: Luminal preservation with ice-cold PEG is clinically applicable without generating changes in procurement times or techniques. LP reduced jejunal IPI at procurement and during cold storage in vascular IGL-1-preserved intestines, but not after vascular preservation with UW.

**Permissive or hostile recipient environments? Proteomic and metabolomic profiles of recipients of kidney donor pairs with contrasting outcomes.**

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Background: Decisions whether or not to accept a donor kidney for transplantation are essentially based on donor characteristics. However, it is consistently concluded that donor aspects explain less than 10% of the transplant outcomes.
These observations imply that donor characteristics may be less important than commonly thought and point towards significant involvement of (non-immunological) recipient factors in transplant outcomes. To test the latter, we explored the concordance rates for early graft loss (EGL; i.e. graft failure within the first 90 days post-transplant) in donor kidney pairs. The observed low concordance rate of EGL in donor pairs again implies a limited role of donor factors.
Based on these observations, we hypothesize that recipient factors are critical to successful engraftment – i.e. a recipient environment should be considered 'permissive' or more 'hostile'. While general recipient factors (e.g. age) are known to influence transplant outcomes, an in-depth molecular exploration is lacking. In this explorative study, we therefore performed a proteomic and metabolomic comparison of serum samples to identify potential differences between recipients pairs who received a kidney from the same donor but manifested asymmetrical outcomes.
Methods: Pre-transplant serum samples of recipients pairs that manifested asymmetric outcomes (EGL vs primary function) were analysed. Top14-depleted serum samples were analysed by shotgun discovery proteomics and metabolomics using Orbitrap Fusion LC-MS. Subsequently, data and pathway analysis was performed.
Results: Minimal impact of long-term storage was observed in the serum samples; metabolites and proteins were detected in high quantity and quality. Data analysis is currently being performed and will be finalized before the congress date.
Conclusions: This explorative study identifies proteomic/metabolic patterns of serum samples from recipients of kidney donor pairs with contrasting outcomes, and is the first to provide insight in molecular differences amongst recipients and their potential association with early-transplant outcomes.

**Organ donation after euthanasia – an increase of a substantial number of donors and transplantations in 10 years; resulting in the 100th donation procedure**

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Background: Euthanasia is legally allowed in the Netherlands since the law 'Termination of Life on Request and Assisted Suicide' passed in 2001. Other countries where euthanasia is permitted are: Belgium, Luxemburg, Spain, Colombia, Canada, parts of Australia and New Zealand. Euthanasia, or assisted dying, was performed 7,666 in 2021 in the Netherlands, which is 4,5% of all death[1]. In December 2012 the first organ donation after euthanasia was performed in the Netherlands. This was the beginning of a new phase in organ donation. It took a number of years to professionalize donation after euthanasia, slowly resulting in a stable number of all post mortem donors nowadays.
Methods: Data of the NTS are used to get insight into the effect on the total number of post mortem organ donors and the number of transplantations.
Results: From 2012 until 2014 there were low numbers of organ donors after euthanasia, two per year. In 2015 and 2016 the numbers increased to 8 per year. From 2017 onwards, the average is approximately 13 donors a year (5% of all donors per year). In January 2023 we reached the 100th donation procedure. The number of organs successfully transplanted also increased, to an average of approximately 51 per year since 2017 (7% of all post mortem organ transplantations).
In 2017 a patient requested to start the euthanasia trajectory in his home, in order to say farewell to his family in his home setting instead of in a hospital[2]. After sedation the patient was intubated, medically ventilated and transported to the hospital, where he received the final euthanatics. In total four procedures have been finalized, starting in the home situation, at the end of 2022. In March 2021 a new innovation was launched, DCD heart donation, which was also possible for patients requesting donation after euthanasia. In total 5 hearts have been transplanted. Initially only patients suffering from ALS, MS or Huntington were included for organ donation after euthanasia, but nowadays also patients suffering from psychiatric diseases (28,9%)[3]. Facilitating donation in this last category is still a matter of debate for some hospitals.
Conclusions: Ten years after the first organ donation after euthanasia we see a stable number of donors each year. Resulting in a substantial additional number of organs being transplanted.

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**Ex situ pressure-volume loop analysis during oxygenated normothermic heart perfusion: a proof of concept**

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Background: A novel design of ex situ pressure-volume loop analysis during ex vivo oxygenated normothermic heart perfusion is shared in this study. The system consists of a fluid-tight balloon-cylinder-piston combination, a motor and control unit. The internal volume of the system is a constant and known volume which can be pressurized, enabling simulation of a virtual physiological pre- and afterload on the left ventricle. The software detects changes in pressure and volume displacement, enabling the software to switch between the four phases of the cardiac cycle. The system provides pressure-volume loop analyses at different preloads which can be used to derive useful indexes of left ventricular function that are less influenced by loading conditions. These indexes are hypothesized to better correlate with clinical post-transplant function.
Methods: Ovine hearts obtained from the slaughterhouse (n=5) were flushed with cardioplegia (Custodiol, HTK) and preserved for 3 hours with oxygenated subnormothermic machine perfusion (15°C). Subsequently, reperfusion and testing was performed for 3 hours with normothermic machine perfusion (37°C). At 60, 120 and 180 minutes of reperfusion, left ventricular function was assessed by pressure-volume loop analyses. Pressure-volume loops were recorded while the pre-load was gradually increased. Left ventricular systolic (LV-ESPVR and dP/dt max) and left ventricular diastolic (LV-EDPVR and dP/dt min) functions were analyzed. The end-systolic elastance ($E_{es}$) and preload recruitable SW (PRSW) were calculated as load-independent indexes of left ventricular contractility.
Results: All hearts were successfully resuscitated and evaluated with pressure-volume loop analyses. A gradual numerical decline in left ventricular function was measured over time: $E_{es}60$= 1.98±0.27, $E_{es}120$= 1.84±0.23, $E_{es}180$= 1.72±0.36 and PRSW60= 0.38±0.11, PRSW120= 0.34±0.09, PRSW180= 0.29±0.15. These values of left ventricular contractility are comparable to values obtained in studies with in vivo pressure-volume analyses is ovine hearts.
Conclusions: The novel technique of ex situ pressure-volume loop analysis could provide clinicians with a feasible and easily applicable platform for ex situ donor graft function assessment prior to transplantation. This technique may therefore improve our ability to identify viable donor hearts.

**The need for an artificial kidney for long-term normothermic machine perfusion of human donor livers up to one week**

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Background: Normothermic machine perfusion (NMP) is a method to preserve and/or test (extended) criteria donor livers prior to transplantation. During NMP, the liver is metabolically active and produces waste products, which are recirculated in the perfusion solution. Especially for long-term NMP (≥24h) the addition of an artificial kidney is necessary to protect the liver against self-intoxication. In this study, we investigated the utility of a simple dialysis system for long-term NMP.
Methods: Five discarded human donor livers underwent NMP using a modified Liver Assist device (XVIVO, Groningen, Netherlands) for up to 7 days. Several hours after initiation of NMP, a pediatric hemoconcentrator (BC 20 plus, Maquet, Getinge Netherlands B.V., the Netherlands) in combination with a roller pump (Reglo ICC, Ismatec, Masterflex, USA) were added to the perfusion circuit. As a substitution fluid Prismasol 2, Phoxilium 1.2 mmol/l phosphate or Biphozyl (all from Baxter Holding B.V., the Netherlands) were used. The perfusate was analyzed every 4-8 hours for urea and osmolality, and every 12 hours for sodium, potassium, calcium, chloride, phosphate, and magnesium concentrations.
Results: Already after a few hours of NMP a linear increase in (waste) products, such as urea and phosphate, was observed, reaching supraphysiological levels. Moreover, osmolality increased to potentially detrimental levels (≥320 mOsmol/kg). After initiation of dialysis, these disturbances were swiftly corrected to (near) physiological values and could be maintained steadily for up to 7 days of NMP. The electrolyte composition of the perfusate varied significantly between the different types of substitution fluid studied.
Conclusions: The addition of a pediatric hemoconcentrator to the NMP circuit can be used as a simple and inexpensive model to maintain a physiological perfusate during long-term NMP up to 7 days. To achieve the desired electrolyte composition, the choice of substitution fluid is most important.

**Prolonged hypothermic machine perfusion to enable daytime liver transplantation – a randomized clinical trial**

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Background: Liver transplantation is emergency surgery because the graft deteriorates with each additional minute of cold ischemia. To ease logistics and allow daytime transplantation, the DHOPE-PRO trial was initiated to assess safety and feasibility of dual hypothermic oxygenated machine perfusion (DHOPE) to prolong liver preservation time.
Methods: Donation after brain death donor livers were randomized to prolonged (PRO) or conventional (CON) DHOPE based on donor hepatectomy time. Livers were assigned to PRO when donor hepatectomy was finished between 16:00–3:59 hours, followed by prolonged DHOPE until implantation the following day. Livers were assigned to the CON when donor hepatectomy was finished between 4:00–15:59 hours, followed by 2 hours DHOPE prior to implantation. The primary endpoint was a composite of all serious adverse (device) events [SA(D)E] up to 30 days after liver transplantation.
Results: From September 2020 to July 2022, 24 patients received a liver randomized to PRO (n=12) or CON (n=12). Median DHOPE duration and total preservation times in the PRO group were 9:18 hours and 14:32 hours, versus 2:10 hours (P<0.001) and 7:54 hours (P<0.001) in the CON group, respectively. In each group, 3/12 patients (25%) developed a SA(D)E (P=1.00). In the CON group, one device error occurred, and 2 patients developed post-reperfusion syndrome. In the PRO group, 3 patients experienced post-reperfusion syndrome. Immediate postoperative liver function and injury markers were similar in both groups. After a minimum follow-up time of 6 months no patients have developed non-anastomotic biliary strictures, with 100% patient and graft survival in both groups. Markers of ischemia-reperfusion injury and oxidative stress were not different between the groups.
Conclusions: DHOPE is a safe and feasible method to prolong the preservation time of donor livers. Implementation of this technique has the potential to transform current clinical practice by changing liver transplantation from emergency surgery into a semi-elective, daytime operation.

**Improved pancreatic islet isolation yield after abdominal normothermic regional perfusion of controlled donation after circulatory death donors**

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Background: Shortage of suitable donor organs has led to increasing interest in abdominal Normothermic Regional Perfusion (aNRP). This is an in-situ normothermic oxygenated donor perfusion technique that can be used prior to procurement during controlled Donation after Circulatory Death (cDCD) procedures. It allows organ evaluation and potentially improves transplantation outcomes. There are few data on the effect of aNRP on pancreatic islet isolation outcome. Our aim is to evaluate the impact of aNRP on extended criteria pancreatic islet isolation outcomes.
Methods: A retrospective analysis was performed on pancreatic islet isolation outcomes from cDCD+aNRP (n=9), regular cDCD (n=41) and Donation after Brainstem Death (DBD, n=15) pancreata. These isolations were performed using a standardized procedure on comparable, matched for donor age (60-75), donor pancreata. Islet isolation outcome was expressed in Islet Equivalent (IEQ) per gram pancreas weight. To assess pancreatic islet function, a dynamic Glucose Stimulated Insulin Secretion (dGSIS) test was performed. Islet survival was assessed by calculating the ratio between the change in IEQ of day 0 and day 1.
Results: Donor baseline characteristics were not different between groups. Isolations from cDCD+aNRP pancreata yielded more islets (6500±2607) compared to cDCD (2285±1455, $p<0.01$) or DBD (2646±1681, $p=0.14$) pancreata. The islet survival rate after culture was also higher for the cDCD+aNRP islets (96%±21.8%) compared to cDCD (75%±15.3%, $p=0.82$) and DBD (77%±19.8%, $p=0.41$) islets, although this difference was not significant. dGSIS tests in 5 cDCD+aNRP islet preparations showed a mean stimulation index of 4.48, indicating good functionality.
Conclusions: aNRP may lead to higher islet yield after an islet isolation procedure of a cDCD pancreas, the islets were viable and showed good functionality. aNRP could increase utilization of islet preparations that can be used for islet transplantation.

**Perfusion pressures, intrahepatic perivascular edema, and paradoxical weight loss during normothermic machine perfusion of human donor livers**

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Background: Normothermic machine perfusion (NMP) is increasingly used to preserve and assess donor livers prior to transplantation. NMP, however, may also cause adverse effects, such as formation of intrahepatic perivascular edema (IPE). We investigated the effect of perfusion pressures during NMP on the development of IPE after transplantation.
Methods: All donor livers transplanted after a NMP procedure (Liver Assist; XVIVO, Groningen, The Netherlands) between March 2019 and March 2022 were included. Data on perfusion settings, perfusate composition, and clinical outcome parameters were collected. Livers were weighted before and after NMP. Liver biopsies obtained before and after NMP were histologically graded for cell injury and size. CT scans performed in the first week after transplantation were reviewed for presence of IPE.
Results: A total of 36 livers were transplanted after NMP. In the first half of the study period, post-transplant CT scans frequently revealed increased IPE. This prompted us to lower NMP perfusion pressure settings from a median (IQR) of 48mmHg (40-56mmHg) to 34mmHg (30-44mmHg) for the hepatic artery (HA), and from 8mmHg (7-10mmHg) to 7mmHg (5-8mmHg) for the portal vein (PV), respectively. This change led to a reduction of IPE noted on CT scans, but did not affect lactate clearance or hepatocellular injury markers during NMP. Despite the observed IPE, median liver weight decreased with 5.0% (88 gram) during NMP. Change in liver weight correlated significantly with the applied PV pressure during NMP ($r= -0.52$, $p= 0.005$) but not with HA pressure ($r= -0.10$, $p= 0.61$), or perfusate osmolality ($r= -0.11$, $p= 0.63$).
Conclusions: NMP of human donor livers is associated with increased risk of IPE. Despite this, livers lose weight during NMP, which is more pronounced when a low PV pressure is applied. To avoid IPE, we advocate to apply the lowest perfusion pressures possible to reach adequate flows and oxygen supply during NMP.

**Optimization of ex vivo normothermic liver perfusion through the addition of (un)conjugated bile acid infusion**

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Background: *Ex vivo* liver normothermic machine perfusion (NMP) does not fully recapitulate physiological liver function due to the absence of the enterohepatic circulation as only infusion of the bile acid taurocholate is applied. From a physiologic perspective, this can have major consequences for downstream feedback processes. Here, we aimed to study the effect of taurocholate infusion only and to improve physiological resemblance of liver NMP through the addition of a representative bile acid enterohepatic circulation.
Methods: Human discarded(n=4) – and porcine livers(n=5) were perfused with standard taurocholate infusion (0.1g/h) for 360min. Porcine liver (n=2) perfusion was performed with infusion of an (un)conjugated bile acid blend (gCDCA, gCA, CA, CDCA) for 720 min. Pressure controlled dual portal and arterial flow was initiated at 37°C. Blood gas analyses were performed hourly to study liver viability. Biopsies were taken in time for RNAseq expression analysis and bile was collected to study bile composition.
Results: Perfusion with taurocholate resulted in a decreased expression of bile acid synthesis related genes, increased gene expression of cholesterol metabolism related genes and a decreased expression in bile acid-dependent uptake and efflux transporters. Bile acid synthesis rates were higher than has been reported in human physiology, suggesting high energy consumption, although bile acid composition was similar. Upon infusion of (un)conjugated bile acid pool, stable bile production, flow and lower AST and ALT values was achieved until 720 min of perfusion. Additionally, better ICG clearance was observed compared to taurocholate infusion protocol. Gene expression showed a delayed increase/decrease compared to the taurocholate protocol.
Conclusions: This study showed that standard perfusion protocols using taurocholate, affect gene expression which during long term perfusion can have detrimental effects. Portal infusion of (un)conjugated bile acids led to better liver functioning and stabilized gene expression. Current studies focus on addition of bile acids in combination with cholesterol (VLDL) supplementation.

**Plasma matrix metalloproteinase-9 levels post-transplant correlate to worse ischemia reperfusion injury and are partially ameliorated by normothermic machine perfusion in liver transplantation**

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Background: Matrix metalloproteinase-9 (MMP-9) is a collagenase that breaks down the extracellular matrix. In liver ischemia reperfusion injury, it allows leukocytes to enter liver parenchyma and thereby modulates tissue injury. In a rodent model, liver-selective inhibition of MMP-9 decreased ischemia reperfusion injury (IRI). In humans, normothermic machine perfusion (NMP) is a potential medium to deliver therapies during the preservation period prior to liver transplantation (LT). Therefore, in this study we aimed to investigate MMP-9 levels and their correlation with IRI during and after NMP compared to traditional static cold storage (SCS), as the basis for further interventional studies.
Methods: Perfusate and recipient plasma samples (collected prior to and 1h after transplant) from n=40 LTs were selected from the Consortium for Organ Preservation in Europe (COPE) Liver NMP trial cohort (NMP n=30, SCS n=10). Samples were matched for donor and recipient demographics and analysed by enzyme linked immunosorbent assay (ELISA).
Results: MMP-9 increased in plasma after reperfusion in NMP ($p=0.002$) but more so in SCS ($p=0.001$), with fold changes of 4 and 9, respectively ($p<0.001$, fig 1). During NMP, perfusate MMP-9 decreased throughout perfusion with a fold change of 0.14 ($p<0.001$) and was higher overall in grafts with steatosis ($p<0.001$). The fold change of perfusate MMP-9 was negatively correlated to cholestatic markers in perfusate during NMP; bilirubin ($R=-0.549$, $p=0.032$) alkanine phosphate ($R=-0.579$, $p=0.024$), GGT ($R=0.645$, $p=0.009$) and in recipient plasma post-transplant; bilirubin ($R=0.392$, $P=0.032$) and GGT ($R=-0.468$, $p=0.018$). Elevated plasma MMP-9 levels were correlated to early allograft dysfunction ($p=0.016$), model for early allograft function ($R=0.518$, $p=0.002$), and their components; AST ($R=0.495$, $p=0.001$), ALT ($R=0.560$, $p<0.001$) and INR ($R=0.427$. $p=0.006$). Post-reperfusion syndrome ($p=0.05$), post-transplant renal function (creatinine, $R=0.369$, $p=0.019$) and need for renal replacement therapy ($p<0.001$) were also associated with elevated plasma MMP-9 concentrations.
Conclusions: Multiple risk factors and outcomes related to liver IRI are correlated to MMP-9 in LT, making it a potential therapeutic target during preservation. Liver NMP decreased overall levels of recipient plasma MMP9 when compared to SCS, providing a potential platform for further intervention.

**Biomarkers for cardiac hypothermic machine perfusion: a multitargeted approach**

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Background: Hypothermic machine perfusion (HMP) is an emerging method of donor organ preservation. Its application for heart transplantation is currently being studied in a clinical trial. Due to the limited ability to assess graft quality during HMP, a reliable prognostic biomarker is needed for quality assessment and prediction of heart function after implantation. This study was designed to identify prognostic biomarkers during HMP of porcine hearts using a multitargeted approach.
Methods: A total of 7 slaughterhouse porcine hearts were subjected to 4 hours HMP, followed by 4 hours of normothermic machine perfusion (NMP) for functional assessment. Perfusate samples were collected at baseline and after 4 hours of HMP, for analysis of damage markers and cell-free DNA. Additionally, an Olink Organ Damage T96 panel was performed, after which proteins of interest were identified based on a significant change in expression between baseline and 4 hours HMP. Prognostic value of each protein of interest was determined by correlating expression values at the end of HMP with cardiac function after 4 hours of NMP using Spearman's R.
Results: Both ammonia (r=0.8571; P=0.0238) and troponin-I (r=0.7857; P=0.0480) were positively correlated with cardiac index, while lactate (r=-0.8108; P=0.0381) was negatively correlated with coronary flow index. Both mitochondrial and nuclear cell-free DNA displayed a decrease in expression during HMP and showed no significant correlation with cardiac function. Olink data revealed that YES1 was negatively correlated with cardiac index (r=-0.8571; P=0.0238), coronary flow (r=-0.7857; P=0.0480) and coronary flow index (r=-0.8571; P=0.0238).
Conclusions: Our study identifies YES1 as a potential prognostic biomarker when assessed during HMP, as reflected by the negative correlation with cardiac function. Future research into the translational value of YES1 and the involved physiological pathways, is needed. Furthermore, troponin-I expression during HMP shows an interesting inverse correlation with functional outcome. We hypothesize that the increased troponin-I values during HMP are reflective of improved wash-out of damage markers due to better preserved microvasculature. This might explain the improved function of hearts with high troponin-I expression during HMP.

**Effect of a nationwide intervention to reduce hepatectomy times in Dutch organ procurement teams**

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Background: Donor hepatectomy time > 60 minutes is associated with poorer transplantation outcomes. The Dutch organ procurement committee executed a nationwide audit to evaluate hepatectomy times of procedures performed from December 2017 until February 2018. Liver procurements exceeded the 60-minute threshold in more than 50% of cases. Subsequently, a nationwide improvement program ("intervention") was enrolled to reduce hepatectomy time, ideally below 40 minutes. Aim of this study was to determine whether this intervention successfully reduced hepatectomy time.
Methods: A nationwide, retrospective database study of organ procurement procedures, both DBD and DCD was conducted. All procedures from January 2013 until October 2022 were included. Donor hepatectomy time was defined as time between start of abdominal flush and hepatectomy. The intervention period, from March 2018 till June 2018, was excluded from analysis. We compared hepatectomy times before and after intervention, of procurement teams who were affiliated to a liver transplant center (n=3) with those not affiliated to a liver transplant center (n=2).
Results: In total 1749 liver procurements were analyzed, of which 876 before and 873 after intervention. Median hepatectomy time significantly decreased from 50 (39-63) to 35 (28-43) minutes, p<0.01 for affiliated procurement teams and from 67 (52-84) to 34 (28-42), p<0.01 for non-affiliated procurement teams. Before intervention 24.1% of the hepatectomies in the Netherlands were performed within 40 minutes. This increased to 69.5% after the intervention (p<0.01). Before intervention, simultaneous procurement of thoracic organs was significantly associated with increased hepatectomy time (B=0.31 95% CI: 0.24-0.38, p<0.001), while this was not the case after intervention (B=0.03 95% CI: -0.35-0.10 p=0.37). There was no significant difference in preventable surgical damage before or after the intervention (p=0.27).
Conclusions: The nationwide audit and the subsequent intervention resulted in a significant decrease in hepatectomy times for all procurement teams. Therefore, we recommend implementing such procurement analysis in all ET countries. Monitoring and intervention, if needed, will assure the same procurement standards, and increase donor liver quality.

**Modifying tacrolimus related toxicity after liver transplantation comparing meltdose tacrolimus (Envarsus®) and extended-release tacrolimus (Advagraf®): a multicenter randomized, controlled trial (MOTTO )**

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Background: The hypothesis of this study was that meltdose tacrolimus (Envarsus®) compared to extended-release tacrolimus (Advagraf®) will result in less chronic kidney disease (CKD), new-onset diabetes after transplantation (NODAT) and new-onset hypertension.
Methods: In this multicenter RCT, patients were randomized at discharge after liver transplantation (LT) in a 1:1 ratio to 1) Advagraf® (control group) or 2) Envarsus® (interventional group). The primary endpoint was a composite endpoint of any of three events at 12 months: CKD defined as eGFR <60 ml/minute/1.73 $m^2$ for >3 months, sustained (>3 months post LT) NODAT or new-onset hypertension. Secondary endpoints included: safety, quality of life, neurotoxicity (tremors), graft and patient survival, rejection, liver steatosis and fibrosis, pharmacokinetics and –dynamics.
Results: A total of 106 patients were included and baseline characteristics were comparable for both groups. In the intention-to-treat analysis, significantly less LT recipients reached the primary endpoint at 12 months in the interventional group compared to the control group (50.9% and 71.2%, p = 0.005). No significant difference was shown between interventional group and control group in the percentage of LT recipients developing NODAT (15.1% and 21.2%, p=0.35) or new-onset hypertension (30.2% and 36.5%, p=0.42). Significantly less LT recipients developed CKD in the interventional group compared to the control group (26.4% and 42.3%, p=0.03). The per protocol analysis showed comparable results and in addition significantly less LT recipients developed new-onset hypertension in the interventional group compared to the control group (27.6% and 42.9%, p=0.04). In total, 95.3% (101/106) of the LT recipients developed serious adverse events (SAEs, n=156). SAEs most frequently reported: fever (23.7%), infections (10.3%) and cholangitis and bile duct obstruction (10.3%).
Conclusions: After 1 year, meltdose tacrolimus (Envarsus®) results in a significant reduction in the prevalence of the composite endpoint and a significant reduction of CKD compared to extended-release tacrolimus (Advagraf®)

**Deep learning-based histopathologic segmentation of peritubular capillaries in kidney transplant biopsies**

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Background: Peritubular capillaritis scoring is an important feature for diagnosing antibody-mediated rejection (ABMR). This task suffers from interobserver variability and might benefit from automation. As a first step towards automatic peritubular capillaritis quantification, we developed a peritubular capillary (PTC) segmentation algorithm.
Methods: Multicentric kidney transplant biopsies (n=80) were 1) stained with periodic-acid Schiff (PAS), 2) scanned into whole-slide images (PAS WSI), 3) re-stained using CD34-antibody, and 4) scanned again (CD34 WSI). Guided by the CD34 WSI, a pathologist manually annotated approximately 25.000 PTCs on the PAS WSI. The dataset was used to train (n=60) and test (n=20) a deep learning (DL)-based network.
Results: We developed a U-net DL network architecture, with an Efficientnetb2 backbone and a pre-trained encoder using ImageNet. The network was trained using 12,000 patches (512 x 512 pixels) per epoch. Various techniques were applied to prevent overfitting and to improve the model's generalization. Training the network on a resolution of 0.5 µm/pixel using a non-PTC/PTC ratio of 3:1 yielded an F1 score of 0.74, with a precision and recall of 0.78 and 0.70, respectively. We observed reduced performance on cases with prominent interstitial alterations, as PTCs become less recognizable, while certain pathologies mimic PTCs (e.g. atrophic tubules, matrix deposition).
Conclusions: This study presents a DL-based algorithm for the segmentation of PTCs in PAS-stained kidney transplant biopsies. This is a first step towards a more accurate, reproducible scoring of peritubular capillaritis using DL. The results highlight the applicability of DL for clinical use to guide pathologist in routine diagnostics. Next steps will include incorporation of this algorithm in the development of a fully automated Banff classification algorithm, as part of our DIAGGRAFT project, funded by the Dutch Kidney Foundation.

## Chimeric HLA Antibody Receptor (CHAR) T-cell engineering – a new approach to target HLA sensitization

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Background: An increasing number of patients awaiting a donor organ is sensitized against HLA. These patients harbour antibodies and memory B cells directed against allogeneic HLA molecules, thereby significantly decreasing their chance to receive a compatible donor organ. Desensitization therapies non-specifically target circulating antibodies and/or B cells, and are accompanied by several side effects. Therefore, more precise and potent therapies are needed to specifically target HLA-specific humoral immune memory. Chimeric Antigen Receptor (CAR) T cells have been proven to eliminate target cells with unprecedented specificity, which is why we decided to use this concept for targeting HLA-specific B cells with Chimeric HLA Antibody Receptor (CHAR) T cells.
Methods: Viral vectors encoding CHAR molecules were constructed comprising the extracellular part of an HLA-A2 or HLA-A3 molecule coupled to CD28 costimulatory and CD3ζ intracellular signaling domains. The CHARs were introduced by retroviral gene transfer into various cells, after which CHAR conformation at the cell surface was investigated by flow cytometry. CHAR-transduced cells were stimulated with beads coated with HLA-specific monoclonal antibodies (mAbs), or cell lines expressing HLA-specific B-cell receptors. Recognition of mAb coated beads or target cells was determined by T-cell activation marker expression using flow cytometry, IFNγ secretion measured by ELISA. Killing of target cells was determined by chromium release assays, and target cell death quantified by IgG ELISpot assays.
Results: CHAR molecules were efficiently expressed on the cell surface of various cell types. HLA-A2 CHAR transduced cells were specifically activated by HLA-A2 mAb coated beads, and not by HLA-A3 mAb coated beads and vice versa as shown by the induction of T cell reporter genes. Furthermore, $CD8^+$ T cells transduced with HLA-A2 or HLA-A3 CHARs cocultured with HLA-A2- or HLA-A3 surface antibody-bearing cell lines, respectively, efficiently produced IFNγ with high specificity as determined by ELISA. Finally, HLA-A2 or HLA-A3 CHAR T-cells were capable of specifically lysing hybridoma cells expressing HLA-A2- or HLA-A3 specific B-cell receptors, respectively. This finding was confirmed by a diminished number of IgG-producing cells upon co-incubation with the CHAR T cells of corresponding specificity.
Conclusions: These data are promising for further research into CHAR T cells. We hypothesize that CHAR T cells may serve as precision immunotherapy to desensitize (highly) sensitized kidney transplant candidates and to treat humoral rejection after solid organ transplantation.