POSTER PRESENTATIONS

BASIC SCIENCE

PO-001

## HEPATOCYTE TRANSPLANTATION AFTER MAJOR LIVER RESECTION IMPROVES POSTOPERATIVE RECOVERY OF LIVER FUNCTION IN MINI PIGS

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**Introduction:** Post-hepatectomy liver failure still remains a challenging complication after liver resection with high mortality due to limited therapeutic options. Hepatocyte transplantation (HTx) represents a potential treatment for acute liver dysfunction after liver resection. Hence, we developed a porcine model of intraportal HTx following major liver resection to investigate the feasibility, effectiveness and safety of this novel approach.
**Methods:** Portal pressure controlled HTx was performed either directly after pigs received major liver resection ($n$=6) or on the third postoperative day ($n$=5), and was compared individually and combined to animals which received major liver resection only ($n$=5). Both HTx-groups included subgroups with transplantation of low ($<500\times10^6$cells) and high ($>500\times10^6$cells) number of hepatocytes, allowing cross-over subgroup analyses.
**Results:** There were no serious adverse events during HTx and all animals remained stable concerning vital parameters. Major liver resection significantly impaired liver function as observed by postoperative courses of lactate, coagulation factors as well as the maximum liver function capacity (LiMAx) amongst others. Animals additionally treated with HTx showed improved recovery of liver function compared to the control group as exemplarily shown for the LiMAx value on postoperative day 7 (331.25±69.02 μg/kg/h in the control group vs. 556.40±51.06 μg/kg/h in the HTx group). High numbers of transplanted hepatocytes did not reveal advantageous for liver function recovery.
**Conclusion:** HTx after major liver resection seems feasible, effective and safe. However, further studies are necessary to improve this novel approach to support recovery of post-hepatectomy liver dysfunction.

PO-004

## NR4A1 AGONIST CYTOSPORONE B DOES NOT ATTENUATE CAV IN A MOUSE MODEL DESPITE REPORTED ANTI-PROLIFERATIVE AND ANTI-INFLAMMATORY EFFECTS

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**Introduction:** NR4A1 (= Nur77) is a nuclear receptor acting as a transcription factor. It is a so-called "orphan receptor", because its natural ligand is unknown. The expression of NR4A1 is induced by atherogenic and inflammatory stimuli in endothelial cells, vascular smooth muscle cells (VSMCs) and monocytes/macrophages and it then mediates anti-inflammatory and anti-proliferative effects. Because of these properties it seemed a promising substance for the prevention of cardiac allograft vasculopathy (CAV), which is characterized by inflammation (leukocyte accumulation, cytokine production) and proliferation (neointima formation via VSMC proliferation). We therefore evaluated the NR4A1 agonist cytosporone B (Csn-B) in the CAV mouse model of abdominal aortic transplantation.
**Methods:** CBA ($H2^k$) mice underwent abdominal aortic transplantation with a C57BL/6 ($H2^b$) donor aorta. Csn-B was intraperitoneally injected daily for 2 or 4 weeks using a previously reported effective dose. The control group received DMSO in PBS. Transplants were retrieved after 2 weeks for PCR analysis of inflammatory cytokines and after 4 weeks for (immuno-) histologic analysis. Lumen obliteration by neointima development was measured and percentages of neointimal smooth muscle myosin heavy chain (SM-MHC), macrophages ($F4/80^+$) and NR4A1 expression were quantified.
**Results:** Treatment with Csn-B had no influence on luminal obliteration of the aortic transplant by neointima [50.5±5.9% vs. 46.1±11.4% (control)]. Aortic transplants of Csn-B treated mice also showed similar amounts of SM-MHC expression [69.6±4.7% of neointimal area vs. 72.3±6.5% (control)], F4-80 expression [20.8±7.4% of neointimal area vs. 23.4±4.6% (control)] and NR4A1 expression [45.5±10.2% of neointimal area vs. 49.4±15.4% (control)]. Additionally, mRNA expression of typical inflammatory cytokines, adhesion molecules and growth factors was unimpaired by Csn-B treatment.
**Conclusion:** Despite promising characteristics of Csn-B in previous publications, it had no positive effects in our CAV mouse model.

PO-006

## MODIFICATION OF THE VESSEL SUTURE TECHNIQUE IN A RODENT RENAL TRANSPLANT MODEL: REPORT OF A SAFE AND FAST ALTERNATIVE TO THE STANDARD APPROACH

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**Introduction:** We studied a modified continuous suture technique for the renal vessel anastomosis in the Fischer to Lewis rat renal transplant at model. In this model, many different variations of renal vessel anastomosis are commonly used. For long-term experimental kidney transplantation in rats the renal vessel end-to-end anastomosis remains the recommended gold standard. In this study we used a modified continuous end-to-end suture technique for the renal vessels and assessed survival as well as function of the renal allograft.
**Methods:** 20 Fischer to Lewis orthotopic renal allo-transplantations were performed. The donor kidneys were either transplanted immediately or subjected to static cold ischemia for four hours in HTK prior to transplantation. For anastomosis, a modified continuous suture technique of the renal artery and vein was applied. The ureter was reconstructed by end-to end anastomosis with 6 single sutures. Cyclosporine A was applied to the recipients for the first ten days after transplantation.
**Results:** 19 out of 20 of the rats survived at least 30 days after transplantation and reached the endpoint of the experiment after either 12 ($n$=9) or 28 weeks ($n$=19). The mean warm ischemia time was 23:09±2:26 minutes the fastest time being 19:22 minutes. There was only one animal loss due to surgical complications (bowel obstruction on day 5 after transplantation). After 12 weeks, mean proteinuria was 6.7±2.2 mg/24 hrs the group with no cold ischemia (CIT) of the allograft and 5.4±2.2 mg/24 hrs in the group with a CIT of four hours. At 28 weeks after transplantation, proteinuria increased significantly and was 207±106 mg/24 hrs in the group with no CIT and 213±82 mg/24 hrs in the group with a CIT of four hours.
**Conclusion:** The reported modification of the anastomosis technique is fast and safe allowing long-term studies in this renal transplant model.

PATIENT EDUCATION/ETHICS/QUALITY OF LIFE/ADHERENCE

PO-011

## ATTACHMENT STYLE AND ATTITUDES TOWARDS NON-DIRECTED KIDNEY DONATION IN HEMODIALYSIS PATIENTS

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**Introduction:** The current study was designed to assess the attachment style of hemodialysis patients, their attachment security (anxiety/avoidance) and their theoretical readiness to donate a kidney to (1) a stranger (2), a close friend or family member or to receive a non-directed kidney donation (NKD). Our review of articles for motivations to donate altruistically found a connection between healthy individuals' experience with nephrological diseases and a favorable attitude towards NKD. In this study we aimed at detecting associations between attachment and attitude towards different forms of kidney donation, particularly NKD, which is legally prohibited in Germany. We hypothesized that patients with low anxiety or low avoidance would show higher readiness. So far, there is no study on attitudes and readiness related to attachment from patients with end-stage kidney disease.
**Methods:** The study included 101 patients with end-stage renal disease at Cologne University Hospital. The patients completed a self-designed questionnaire on kidney donation attitudes, the short German version of the "Experience in Close Relationships – Revised" questionnaire (ECR-RD12) and questions on demographics. Recruitment took place from July 2016 until December 2018.

**Results:** Over 90% of all respondents believe that NKD is acceptable and 50.5% (literature data of general population: 15 – 30 %) would even donate a kidney to a stranger if they were eligible and the procedure was legal. Patients with low anxiety or low avoidance are even more willing compared to patients with higher anxiety (60.0% vs. 6.7%, p<0.001*) or higher* avoidance (58.7% vs. 15.4%, p<0.001). In comparison no substantial difference in readiness to accept a kidney from an anonymous donor (Anxiety: 89.3% vs. 73.3%, p=0.247; avoidance: 88% vs. 76.9%, p=0.605) was found. Readiness to donate was not related to having a religious affiliation (p=0.983).
**Conclusion:** Our findings show that patients with end-stage renal disease have a favorable attitude towards NKD. While a higher readiness to make a non-directed donation was found in patients with low anxiety or low avoidance, no difference in readiness could be found regarding receiving NKD.

## PO-015 ACCURACY AND CONCORDANCE OF MEASUREMENT METHODS TO ASSESS NONADHERENCE AFTER RENAL TRANSPLANTATION – A PROSPECTIVE STUDY

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We wish to thank the staff of the nephrologic outpatient clinic at the University Hospital of Erlangen for enabling the organization and conduction of this project. We especially would like to thank all patients for taking part in our study.

**Introduction:** Non-adherence (NA) to immunosuppressants (IS) among renal transplant recipients (RTRs) is associated with higher risk of allograft rejection, graft loss, and mortality. A precise measurement of NA is indispensable, although its prevalence differs greatly depending on the respective measurement methods. The objective of this study was to assess the accuracy and concordance of different measurement methods of NA in patients after renal transplantation.
**Methods:** This was a single-center prospective observational study. At baseline (T0), NA was measured via physicians' estimates (PE), self-reports (SR), and tacrolimus trough level variability (CV%) in 78 RTRs. A Visual Analogue Scale (VAS, 0–100%) was applied both for SR and PE. In addition, we used BAASIS© for SR and a 5-point Likert scale for PE. NA was measured prospectively via electronic monitoring (EM, VAICA©) during a three month period. Meanwhile, all participants received phone calls in a two week interval (T1-T6) during which SRs were given.
**Results:** Seventy-eight RTRs participated in our study. At t0, NA rates of 6.4%, 28.6%, and 15.4% were found for PE, SR, and CV%, respectively. No correlation was found between these methods. During the study, the percentages of self-reported and electronically monitored adherence remained high, with a minimum mean of 91.2% for the strictest adherence measure (Timing Adherence±30 min). Our results revealed a moderate to high association between SR and EM. In contrast to PE and CV%, SR significantly predicted electronically monitored adherence. Overall, a decreasing effect of electronically monitored adherence was found for both taking and timing adherence (±2 h, ±30 min) over the course of the study.
**Conclusion:** The moderate to high concordance of SR and EM suggests that both methods measure NA equally accurately. The increased adherence at the beginning of the study and its subsequent decrease suggests an intervention effect. Surveillance of IS intake via EM with intermittent phone calls could improve adherence on a short-term basis. To establish long-term effects, further research is necessary.

## PO-016 COVID-19 PANDEMIC INDUCES STRESS-INDUCED SOMATIZATION IN WAIT LIST PATIENTS

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**Introduction:** While COVID-19 pandemic associated with quarantine, social distancing and isolation influenced many aspects of people's lives including stress and mood regulation only little is known about the psychological impact on patients waiting for liver or kidney transplantation. Thus this study was designed to fill this scientific gap.
**Methods:** Twenty-seven wait list patients and 43 healthy controls underwent the Beck Depression Inventory (BDI-2), 12-item Operationalized Psychodynamic Diagnosis Structure Questionnaire (OPD-SQS), Brief Symptom Inventory-18 (BSI18), Pittsburgh Sleep Questionnaire (PSQI), Alcohol Use Identification Test (AUDIT), and a questionnaire to determine cognition, attitude and fear related to COVID-19.
**Results:** Levels of the BSI subscale somatization were increased in wait list patients ($F$=4.41, p=0.04). There was no difference between patients and healthy controls in the depression scores (BDI) (BDI: *F(1,66),* p=0.998; 3.33±3.92 vs. 3.6±3) and PSQI sleep components ($F$(7.54)=1.23, p=0.3, Eta=0.137); however, COVID-specific fears ($F$(3.65)=3.84, p=0.014, Eta=0.151) was different between groups indicating more fear of infecting others with the Coronavirus in controls ($F$=5.8, p=0.019, Eta=0.08; 3.3±3.44 vs. 5.12±2.5). In addition, partial correlation analyses between the emotional distress due to social distancing and the symptom load scales indicated a relationship between somatization and anxiety ($r$=0.53, p<0.001) in wait list patients. Further depression correlated positively with the items loneliness, boredom, and frustration in patients.
**Conclusion:** Results of our study clearly demonstrates that COVID-19 pandemic significantly increases somatization in wait list patients most likely due to stress while healthy controls experience more COVID-19 associated fears. Thus effective strategies for stress reduction, more information on their illness, medication, skills for emotional regulation and healthy lifestyle are needed.

# HEART AND LUNG TRANSPLANTATION

## PO-017 LONG-TERM RESULTS OF EVEROLIMUS REGARDING RENAL FUNCTION AND REJECTION AFTER HEART TRANSPLANTATION IN A REAL-LIFE SCENARIO

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**Introduction:** Clinical study results are still controversial about the start of everolimus (ERL) with and without calcineurin inhibitor (CNI) after heart transplantation (HTx). Thus, we analyzed long-term data of the effect of ERL on renal function in a real-life scenario.
**Methods:** 105 patients, who received HTx between 2005 and 2015, were divided into three groups(Gs) according to the time of ERL start; G1≤ 3 months (mo) after HTx ($n$=46), G2 4–12 months after HTx ($n$=33) or G3 >12 months after HTx ($n$=26). Additionally, we analyzed patients either with CNI withdrawal ≤3mo (sub-group, SG1, $n$=25) after ERL start, or with concomitant CNI therapy >12 mo (SG2, $n$=71) after ERL start. Renal function was calculated using the MDRD formula for the glomerular filtration rate (GFR) in relation of baseline value before ERL, and up to 60mo after ERL start (ΔGFR mL/min). Incidence of BPACR (≥2R) was assessed.
**Results:** At 12mo after ERL start ΔGFR was a significant better in patients of G2 compared to patients of G3 (G2:+3.98 vs. G3:-4.98, p=0.04). However, patients of G1 had a higher ΔGFR at 60mo after ERL start compared to patients of either G2 or G3 (G1:+1.6, G2:-12.7, G3:-6.3, p1 vs. 2=0.04 and p1 vs. 3=0.27). In all three Gs, patients with early CNI withdrawal had a higher ΔGFR than patients with concomitant CNI therapy at 60mo (SG1: G1: +5.5; G2: +0.4; G3: −22.3, p1 vs. 3 =0.01, p1 vs. 2 =0.02; SG2: G1 −0.8, G2: −22.1, G3: −6.7, p1 vs. 3 =0.045; p1 vs. 2 =0.02). Incidence of BPACR at 12mo after HTx was not different between the groups (G1: 15.2%, G2: 19.1%, G3: 19.2%, p=0.72). All BPACR were without hemodynamic compromise.
**Conclusion:** In a real-life scenario early ERL therapy within 3mo after HTx had a long-term beneficial effect on renal function. Early CNI withdrawal further enhanced the nephroprotective effect. Graft function was not severely impaired.

## PO-018 GENDER-SPECIFIC DIFFERENCES IN MECHANICALLY UNLOADED HEARTS – ANALYSIS OF CARDIAC REVERSE REMODELING

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**Introduction:** There are growing numbers of reports identifying sex-related differences in the development and prognosis of heart failure. Thus, we analyzed gender differences in cardiac reverse remodeling in mechanically unloaded hearts of patients with left ventricular assist device (LVAD)
**Methods:** 166 patients with end-stage heart failure underwent LVAD implantation with a HeartWare device in our institution between January 2004 and August 2019, 13.3% ($n$=22) were female (mean follow-up 18.95±12.36 months). In $n$=10 female and $n$=63 male patients functional 1-year follow-up data were obtained and retrospectively analyzed focusing on reverse remodeling.
**Results:** Mean age at implantation was 57.0±15.2 for female (F), and 55.0±11.9 years for male (M) patients (p=0.087). HF etiology was DCM in 36.4% vs. 46.5% ($n$=8 vs. $n$=67), ICM in 54.5% vs. 45.1% ($n$=12 vs. $n$=65), toxic cardiomyopathy in 4.5% vs. 1.4% ($n$=1 vs. $n$=2), and transplant failure in 4.5% vs. 1.4% ($n$=1 vs. $n$=2), without significant gender differences, myocarditis (3.5%, $n$=5) was only seen in male patients. Mean INTERMACS profile was

2.7±1.1 in F vs. 2.9±1.2 in M (p=0.78). 30-day and long-term mortality how long? showed no significant differences in gender distribution (p=0.765; p=0.980), and there was no significant difference in INTERMACS adverse events (p=0.0719). 9.1% F vs. 3.0% M underwent LVAD-explantation (p=0.191), 13.6% F vs. 9.6% M (patients underwent heart transplantation (p=0.471) during follow-up.
Functional data in the 1-year follow-up group showed proBNP improved 78.12% in F vs. 59.93% in M (p=0.567). 6-min walk test improved by 8.3% in F vs. 18.8% in M patients (p=0.287). LVEDD improved by 4.6% vs. 3.4% (p=0.850), respectively. TAPSE decreased by 12.79 % in F and increased by 18.43% in M (p<0.01). Basal, mid and apical RVEDD improved by 18.8% (F) vs. 24.6% (M) (p=0.026).
**Conclusion:** Functional remodeling showed a tendency towards better recovery in male patients with significantly improved recovery of right heart function. Underlying mechanisms of differential right heart remodeling between sexes need to be studied in more detail.

## PO-019

### THE REPERFUSION RESPONSE IN PLASMA OF COMBINED HEART/LUNG TRANSPLANTED PATIENTS IS GUIDED BY HEART-ASSOCIATED CYTOKINE PATTERNS IN CONTRAST TO THE ISCHEMIC INJURY PERFUSION SOLUTIONS FOLLOWING A LUNG-ASSOCIATED PATTERN

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**Introduction:** Organ-specific differences are discussed for ischemia/reperfusion injury (IRI) in cardiothoracic transplantation but rarely compared directly in a clinical setting. Therefore, we compared a cohort of combined heart/lung transplants (HLTx) with cohorts of isolated heart (HTx) or lung transplantations (LuTx) with respect to cytokines and endothelial markers in blood and perfusates. Our aim was to determine whether the microenvironment of HLTx patients and perfusates would be rather related to the HTx or LuTx setting.
**Methods:** Blood plasma pre Tx and post Tx at T0, T24 and 3 weeks as well as perfusion solutions (taken from the storage bags at the end of cold ischemia) of 5 HLTx, 24 HTx and 21 LuTx patients were analysed for cytokines, chemokines and soluble endothelial markers (60 proteins) using multiplex assays.
**Results:** Early after transplantation at T0 and T24, HLTx and HTx were clustered together and separated from LuTx recipients based on their significantly higher plasma levels of IL-6, CXCL8/IL-8, Ang-2, IGFBP-1, PAI-1 compared to LTx recipients that returned to baseline after three weeks. Endoglin, IL-18, sFASL, TNF-α, VEGF-A, -C, -D, HB-EGF, EGF uPA and PIA-1 contributed to the discriminative pattern between the three groups with similar kinetics of a significant increase at T0 (all p<0.01). HLTx perfusates were grouped together with LuTx and not HTx based on their significantly higher levels IGFBP-1, PAI-1, IL-6 etc. indicating that perfusates are dominated by the lung.
**Conclusion:** A direct comparison of combined heart/lung with isolated heart or lung transplantation revealed that the early systemic reperfusion response of HLTx recipients in blood is dominated by heart-associated endothelial markers like IGFBP-1, Ang-2, and PAI-1 which groups them together with HTx patients. In contrast, the ischemic damage pattern of HLTx perfusates was clustering closer to lung than to heart perfusates. These differences between recipient blood and perfusates strongly suggest that the ischemia response is dominated by lung whereas the systemic reperfusion response is guided by heart. These results underline the organ-specific impact on IRI with distinct heart- vs. lung-associated signatures.

## PO-020

### SARS-COV-2 INFECTIONS IN FOUR LUNG TRANSPLANT RECIPIENTS: A SINGLE-CENTER EXPERIENCE

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**Introduction:** To date, 23 lung transplant recipients have been described with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections worldwide. Eight had severe coronavirus disease 2019 (COVID-19), but none were placed on extracorporeal membrane oxygenation (ECMO) support. We aimed to describe our experience.
**Methods:** Lung transplant recipients who were admitted to our hospital with SARS-CoV-2 infections from the beginning of the pandemia until May 25th, 2020 were included. Clinical charts were retrospectively retrieved and data analysed.
**Results:** Four patients (3 males, 75%) with a median age of 58.5 years (47–66) were admitted for SARS-CoV-2 infections in our center. Three patients had double-lung transplantation for chronic thromboembolic pulmonary hypertension, idiopathic pulmonary fibrosis and cystic fibrosis. One patient had single-lung transplantation for non-specific interstitial pneumonia. SARS-CoV-2 infections were diagnosed by nasopharyngeal swabs in all patients within one month post-transplant ($n$=2), or after 13 months ($n$=1) and 15 years ($n$=1). Dyspnea was present in all patients. Worsening of symptoms occurred in three patients after a median of 8 days (1 to 8) after diagnosis. Imaging showed a highly variable degree of infiltrations. Mechanical ventilation was required in three patients. They all underwent prone positioning. Veno-venous ECMO was required in two patients. In all patients, immunosuppression consisted of prednisone and tacrolimus, while mycophenolate mofetil was stopped. Treatment with hydroxychloroquine was attempted in the first three patients. At last follow-up, one patient was discharged home and one was weaned from mechanical ventilation. Both ECMO supported patients died from multiple organ failure, despite ECMO could be weaned in one patient.
**Conclusion:** A highly variable course of COVID-19 disease was observed in four patients after lung transplantation. More data is needed to better understand prognostic factors and management of this patient cohort.

## PO-021

### THE RATIO BETWEEN NAÏVE AND MEMORY B CELLS IS ASSOCIATED WITH DEVELOPMENT OF EARLY DONOR-SPECIFIC ANTIBODIES WITHIN THE FIRST MONTH AFTER LUNG TRANSPLANTATION

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**Introduction:** After lung transplantation (LuTx), the development of early donor HLA-specific antibodies (eDSA) has been shown to be associated with antibody-mediated rejection (AMR) and poor graft survival. Since 2013, patients with eDSA within the first month after LuTx in our center are treated with IgA/IgM enriched intravenous immunoglobulins (IgGAM), combined with anti-CD20 antibody (Rituximab). We addressed the hypothesis that naïve vs. memory B cell subsets differ between eDSA-positive and negative patients already early after LuTx before onset of the treatment regimen.
**Methods:** In a pilot study of 31 out of 97 LuTx recipients in our immune monitoring cohort, B cell subsets were analysed pre, post (T0), 24 h (T24) and 3 wks after LuTx. B cells were phenotyped using flow cytometry with CD19, CD27, IgD, CD24 mab. The kinetics of B cell subsets were compared between eDSA-positive ($n$=7) and –negative ($n$=24) patients.
**Results:** During the first 24 h, relative B cell frequencies increased and returned to baseline at 3 wks without differences between eDSA-positive and negative LuTx patients. In eDSA-positive patients, higher frequencies of $IgD^{+}CD27^{-}CD24^{hi}$ naïve and lower frequencies of $IgD^{-}CD27^{-}CD24^{lo}$ memory B cell subsets were observed constantly pre, at T0, T24 and 3 wks. In contrast, a transient decrease in IgG+CD27 + switch memory B cells was detected at T0 in both groups, returning to baseline levels already at T24.
**Conclusion:** In the context of lung transplantation, the ratio between naïve and memory B cells even before and directly after LuTx may be associated with the development of de novo DSA. Therefore, a refined B cell monitoring may be able to identify patients with a higher risk for eDSA development. The impact of the treatment regimen on these B cell subsets is currently further investigated in terms of differential effects on their depletion and reconstitution, respectively.

## PO-022

### EARLY ACTIVATION OF LYMPHANGIOGENESIS LEADS TO ELEVATED LYMPHATIC DENSITY DURING THE DEVELOPMENT OF CHRONIC LUNG ALLOGRAFT DYSFUNCTION

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**Introduction:** Lung transplantation displays the worst long-term survival of all solid organ transplantations due to chronic lung allograft dysfunction (CLAD). VEGFR3 signaling can activate lymphatic vessels, regulate interstitial drainage and leukocyte trafficking, therefore affects alloimmunity. VEGFR3 signaling in

heart kidney transplantation has been described, but its role in CLAD development is unclear.
**Methods:** Mouse orthotopic left lung transplantation with a single mismatch (HLA-A2 knock-in C57BL/6 to C57BL/6) was used as CLAD model. The allografts were collected at 7, 14, 28 and 56d after surgery. Syngeneic transplantations were used as control. We analyzed the change of lymphatic density, lymphatic phenotype and the activation of pro-lymphangiogenic genes during CLAD development. To mimic ischemia-reperfusion injury (IRI) in vitro, macrophages were treated with lipopolysaccharide to analyze the activation of VEGF-C and VEGFR3 expression.
**Results:** In vitro IRI model demonstrated the activation of *Vegfc* and *Vegfr3* expression in macrophages via NF-κB signaling. We found increased expression of PROX-1 7d after transplantation in CLAD model, indicating early activation of lymphangiogenesis. We further observed an increase of lymphatic vessel activation leading to elevated lymphatic density during a 56-day period after transplantation in CLAD model.
**Conclusion:** Expression of *Vegfc* and *Vegfr3* in macrophages during IRI is mediated by NF-κB signaling. Lung transplantation leads to the rapid activation of pro-lymphangiogenic phenotype with consequent increase of lymphatic vessel density and lymphatic activation in CLAD model. The early activation of lymphangiogenesis during the CLAD development thus seems to be associated with chronic alloimmune response. Therapeutic targeting of VEGF-C/VEGFR3 signaling in lung transplantation might prevent CLAD.

## PO-023 LUNG TRANSPLANTATION FOLLOWING INHALATION INJURY: A BICENTRIC STUDY

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**Introduction:** Toxic gas inhalation may occur in the home environment, in the workplace and on battle-fields. Severity of injury depends on the type and concentration of chemical agent as well as on the duration of exposure. Inhalation of chemical agents may lead to both acute and chronic respiratory disease. Depending on the chemical agent, there is usually no specific medical treatment and best supportive care is usually offered. We aimed at describing the role of lung transplantation following inhalation injury.
**Methods:** Patients who underwent lung transplantation between 1997 and 2020 following toxic inhalation injury from two centers were included. Clinical charts were retrospectively retrieved and data analyzed.
**Results:** Out of 2,861 lung transplantations, four (0.14%) patients were identified. They were all males, with a median age of 39 years (range 36 to 46). Responsible chemical agent for inhalation injury was sulfur mustard (SM, *n*=2), sulfuric acid (SA, *n*=1) or ammonia (AM, *n*=1). In three patients, chemical agent-related extra-pulmonary injuries were present to the skin (*n*=2), eye (*n*=1) and esophagus (*n*=1). Single left lung transplantation was performed after SA exposure. Double lung transplantation was performed in the other three patients. Patients after SA and AM exposure had lung transplantation 2 months after chemical agent exposure. They were bridged to lung transplantation with mechanical ventilation and extracorporeal life support. Both other patients were transplanted 9 and 22 years after SM exposure. Lung pathology were bronchiolitis obliterans (*n*=2), ARDS (*n*=1), bronchiectasis (*n*=1), tracheobronchial stenosis (*n*=1) and bullous emphysema (*n*=1). After a median follow-up of 12 years (range 0 to 23), all patients were alive with functional lung allografts. One patient underwent double lung re-transplantation for chronic lung allograft dysfunction 10 years after initial transplantation.
**Conclusion:** Lung transplantation for the treatment of inhalation injury is exceedingly rare. It is a life-saving procedure that can be performed in the acute phase after inhalation injury or decades later with good outcome.

### IMMUNOSUPPRESSION

## PO-027 EBV-ASSOCIATED POST-TRANSPLANT LYMPHOPROLIFERATIVE DISORDER: IN VITRO MODEL FOR A RATIONAL MODIFICATION OF IMMUNOSUPPRESSION

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**Introduction:** Post-transplant lymphoproliferative Disorder (PTLD) is a life-threatening complication of long-lasting immunosuppression following transplantation. The most important reason is a failure of the immune system to control Epstein-Barr-Virus (EBV)-infected and transformed B-lymphocytes. This control is provided mainly by T cells and differently impaired by certain types of immunosuppressants. Therefore, a modification of immunosuppression is the first and most common treatment, but has to be balanced with respect to the risk of allograft rejection.
**Methods:** We performed an in vitro study of EBV-antigen specific T cell cultures from healthy donors in the absence or presence of the immunosuppressants tacrolimus (TAC), cyclosporin A (CSA), prednisolone (PRED), rapamycin (RAPA) and mycophenolic acid (MPA) in clinically relevant concentrations. After a total of three weeks of culture we measured the proliferation, viability and phenotypes of the T cells and their activation marker profile, cytokine production as well as cytotoxicity upon restimulation with autologous lymphoblastoid cell lines (LCLs).
**Results:** We observed substantial differences in the monitored parameters between the immunosuppressants. T cells treated with RAPA showed the most favourable outcome in terms of proliferation, viability, functionality and cytolytic activity. Proliferation and viability of T cells was most prominently affected by MPA, while TAC and CSA were the strongest suppressors of cytokine production and cytolytic activity.
**Conclusion:** With our data, we provide a basis for the clinical decision for the reduction of immunosuppression in patients in risk of or affected by PTLD and add information to the complex puzzle of maintaining anti-viral immunity while preventing acute rejection. In line with the published clinical studies on this topic, a reduction of calcineurin inhibitors while keeping mTOR inhibitors seems to be a promising strategy for the modification of immunosuppression according to our in vitro model.

## PO-029 SINGLE CENTER, OPEN-LABEL, RANDOMIZED, CONTROLLED, CROSS OVER STUDY TO EVALUATE THE PHARMACOKINETIC AND BIOAVAILABILITY OF ENVARSUS® IN COMPARISON TO ADVAGRAF® IN DE NOVO LIVER TRANSPLANT RECIPIENTS

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**Introduction:** LCP-Tacrolimus (Envarsus®) is a novel, melt-dose, extended-release preparation of tacrolimus that has been developed for once-daily administration. First data after liver transplantation (LT) show improved pharmacokinetic (PK) properties with a higher bioavailability and a significantly lower peak-trough fluctuation, with the same effectiveness compared to standard twice-daily tacrolimus (Progaf®). However, the PK profile of Envarsus® has not been compared with once-daily tacrolimus (Advagraf®) in de novo LT recipients.
**Methods:** We performed a single center, open-label, randomized and controlled clinical cross over trial. Patients were randomized in group 1 or 2 between LT and postoperative day 30 after LT. After LT all patients received standard twice-daily tacrolimus which was stopped and changed to Envarsus® or Advagraf® depending on randomization. Study medication was started the same morning for a period of 14 days with a target level of 6–10 mg/dL. 24 h-PK sampling was done at the end of the period in the steady state of the medication, thereafter medication was switched again for a period of 14 days to Envarsus® or Advagraf® with terminal PK.
**Results:** 20 subjects were planned, screened and randomized for the study; thereof 9 patients (45.0%) completed the study. Main reasons for non-completion of the study were failure to reach tacrolimus target or stable level within the time limit and different patient and study reasons. The tacrolimus trough levels were comparable for both treatments arms at the start of PK profile (Envarsus® 6.9 mg/dL; Advagraf® 6.0 mg/dL). The peak to trough fluctuation was slightly lower for Envarsus® with adjusted geometric mean of 1.1 and 1.4, respectively (ratio: 84.3% (CI: 46.6% – 152.5%)) and we found a higher AUC (Envarsus® 262.7; Advagraf® 230.7). Additionally, the ratio $C_0/dose_{ss}$ was significantly higher for Envarsus (adj. geoM ratio: 176.2% (CI: 131.6% – 235.8%)), indicating that the administered dose in relation to pre-dose concentration at steady state was lower for Envarsus.
**Conclusion:** Overall, we have found a preferable PK for Envarsus® in de novo LT patients and, in particular, a lower medication requirement to achieve equivalent trough levels.

**INFECTIOLOGY I**

## PO-030 LOW SEROPREVALENCE OF SARS-COV-2 ANTIBODIES DURING SYSTEMATIC SCREENING FOR COVID-19 INFECTION IN A GERMAN COHORT OF KIDNEY TRANSPLANT RECIPIENTS

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We thank our nurses from outpatient department for collecting serum samples and for their great effort to take care of our transplant patients.

**Introduction:** The COVID-19 pandemic caused by SARS-CoV-2 denotes a global health issue. Despite groups like old, immunocompromised or chronic diseased patients being at high risk, data regarding incidence in kidney transplant recipients (KTR) are sparse.
**Methods:** From March 19th to May 19th we performed a systematic screening for COVID-19 in KTR. Tests included SARS-CoV-2 antibody from serum and/or qRT-PCR from nasal-throat swabs (PCR). KTR tested belonged to one of the following groups: serum samples taken at visits in the outpatient department, swabs from patients (+donor) immediately before undergoing kidney transplantation, serum samples from KTR with PRC-proven COVID-19. Serum samples were analyzed by a recombinant SARS-CoV-2 S protein–based immunofluorescence test and by anti-SARS-CoV-2 S1 IgG and IgA ELISAs.
**Results:** Overall 342 patients were examined for recent or previous COVID-19 infection. Out of 223 samples from outpatients, 13 patients were positive with solely anti-SARS-CoV-2-IgA and 3 with both, anti-IgA and anti-IgG. Using immunofluorescence analysis in addition, recent COVID-19 infection remained highly suspicious in 2 KTR. 62 patients were symptomatic in the past with upper airway symptoms ($n$=46), diarrhea ($n$=3), and/or other unspecific complaints ($n$=13). All 27 swab tests taken right before transplantation (19 deceased-donor recipients, 4 live donor-recipient pairs) were negative. Outside from outpatient visits 5 out of 2,044 KTR from our follow-up program were symptomatic and tested positive by PCR, 4/5 patients recovered, one died. All patients showed seroconversion during the course of disease.
**Conclusion:** This study demonstrated a low seroprevalence in a representative German KTR cohort and seroconversion of IgA and IgG after COVID-19 could be demonstrated. Effective containment strategies including face masks for source control, social distancing, hygienic education, doctor to patient distancing and implementation of telemedical services very likely accounted to the fact that numbers of COVID-19 infections were low and enabled us to continue our transplant program.

## PO-031 THE DIAGNOSTIC DILEMMA OF COVID-19 PNEUMONIA IN A KIDNEY TRANSPLANT PATIENT – A CASE REPORT

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**Introduction:** On March 11, 2020, the WHO declared COVID-19 as global pandemic. Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) is a new strain of coronavirus. By 20 May 2020 there have been nearly five million confirmed cases with COVID-19 and more than 320.000 deaths worldwide. There is still limited data about the course of the disease in transplant patients. Some reports suggest that immunosuppression can have a protective role in patients with COVID-19, however other reports suggest an increased mortality in transplant patients. The specificity and sensitivity of diagnostic tests for SARS-CoV-2 in immunosuppressed patients are also unclear at this point.
**Methods:** We present a case report of diagnostic difficulties of SARS-CoV-2 in a female AB0-incompatible kidney transplant patient with severe COVID-19 pneumonia requiring intubation and mechanical ventilation.
**Results:** Albeit she presented with typical symptoms for at least two weeks, PCR of two nasopharyngeal swabs and one throat wash were negative. Ultimately, typical findings on CT scans and positive stool samples confirmed the diagnosis before bronchoscopy was done and BAL tested positive. Despite immunosuppressive therapy was reduced her condition worsened. Mechanical ventilation was necessary for 17 days, however she was able to recover and could be discharged. Kidney function remained stable without renal replacement therapy.
**Conclusion:** Our findings suggest that – especially in areas or situations where bronchoscopy and CT scans might not be available – stool testing for SARS-CoV-2 might be of additional value to identify, isolate and treat COVID-19 patients. Taken together, this case highlights the importance of different diagnostic approaches when dealing with transplant patients to reach a proper diagnosis of COVID-19. Invasive procedures bear the potential of worsening the clinical course. Non-invasive stool testing might be an interesting supplemental diagnostic method. Moreover, at this point there is only scarce information published in relation to the extent of COVID-19 in transplant patients. Our case shows that reduced immunosuppression and IVIg-therapy was sufficient for a complete recovery with functioning graft.

## PO-032 SUCCESSFUL IMPLEMENTATION OF PREVENTIVE MEASURES LEADS TO LOW RELEVANCE OF SARS-COV-2 IN LIVER TRANSPLANT PATIENTS: OBSERVATIONS FROM A GERMAN OUTPATIENT DEPARTMENT

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**Introduction:** Immunosuppressed liver transplant (LT) patients are considered to be at high risk for any kind of infection. What the outbreak of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) means for the transplant cohort is a question that, as of now, cannot easily be answered. Data on prevalence, relevance of the novel virus and clinical course of the infection in stable LT patients are limited.
**Methods:** Nasopharyngeal swabs were performed in our outpatient department during the shutdown in spring 2020 in Germany in 101 stable LT patients. SARS-CoV-2 detection was conducted via PCR. Clinical and laboratory course was protocolled and mortality in LT patients from our department was analyzed.
**Results:** The prevalence of SARS-CoV-2 was 3%. These patients did not show clinical symptoms and laboratory findings and liver function remained unaltered. Respiratory complaints were common and not associated with SARS-CoV-2 infection. Eleven patients required immediate therapy, either due to bacterial pneumonia or altered liver function. The overall mortality rate of LT patients was 0,23% and was not affected during the shutdown in Germany.
**Conclusion:** If preventive measures are applied, LT-patients do not seem to be at a higher risk for SARS-CoV-2 infection. Telemedicine in the outpatient setting may help to maintain distance and to reduce direct patient contact. However, standard of care must be guaranteed for patients with relevant comorbidities in spite of pandemics, because complications may arise from preexisting conditions.
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## PO-034 ENCOURAGING OUTCOMES OF SOLID ORGAN RECIPIENTS WITH COVID-19

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**Introduction:** Immunosuppression leaves transplanted patients at particular risk for severe acute respiratory syndrome 2 (SARS-CoV-2) infection. The specific features of coronavirus disease 2019 (COVID-19) in immunosuppressed patients are largely unknown and therapeutic experience is lacking.
**Methods:** Seven transplanted patients (two liver, three kidney, one double lung, one heart) admitted to the Ludwig-Maximilians-University Munich because of COVID-19 and tested positive for SARS-CoV-2 were included. The clinical course and the clinical findings were extracted from the medical record. Transplanted patients admitted to the ICU were compared to immunocompetent patients admitted to the ICU ($n$=19).
**Results:** The two liver transplant patients and the heart transplant patient had an uncomplicated course and were discharged after 14, 18 and 12 days, respectively.
Two kidney transplant recipients were intubated within 48 hours after admission. Weaning could be initiated in these patients after 16 and 19 days of mechanical ventilation, respectively.
One kidney and the lung transplant recipients were required to be intubated after ten and 15 days, respectively. This kidney recipient was discharged in good health after 17 days. Thus, only the lung transplant recipient is on mechanical ventilation.
Immunosuppression was adapted in five patients, but continued in all patients. Target trough levels were evaluated regularly and were within range during hospital stay. No graft loss or death was documented.
Compared to non-transplanted patients the inflammatory response was attenuated in transplanted patients, which was proven by decreased IL-6 and LDH blood values.
**Conclusion:** This analysis might provide evidence that continuous immunosuppression is safe and probably beneficial since there was no hyperinflammation evident. Although transplanted patients might be more susceptible to an infection with SARS-CoV-2, their clinical course seems to be similar to immunocompetent patients.

## PO-035 ALLOGRAFT INFILTRATION AND MENINGOENCEPHALITIS BY SARS-COV-2 IN A PANCREAS-KIDNEY TRANSPLANT RECIPIENT

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**Introduction:** COVID-19 primarily affects epithelia of the upper and lower respiratory tract. Thus, impairment of kidney function has been primarily attributed to secondary effects like cytokine release or fluid balance disturbances so far.
**Methods:** We provide evidence that SARS-CoV-2 can directly infiltrate a kidney allograft.
**Results:** A 69-year old male pancreas-kidney transplant recipient presented to our hospital with COVID-19 pneumonia and impaired pancreas and kidney allograft function. Kidney biopsy was performed showing tubular damage and an interstitial mononuclear cell infiltrate. RT-PCR from the biopsy specimen was positive for SARS-CoV-2, while being negative in a peripheral blood sample. Subsequently, he suffered from two convulsive seizures. Magnetic resonance tomography suggested meningoencephalitis, which was confirmed by SARS-CoV-2 RNA transcripts in the cerebrospinal fluid.
**Conclusion:** The present case demonstrates that SARS-CoV-2 can infiltrate diverse organs. The patient suffered from COVID-19 pneumonia, meningoencephalitis and nephritis. SARS-CoV-2 binds to its target cells through angiotensin-converting enzyme 2, which is expressed in a broad variety of tissues including the lung, brain and kidney. SARS-CoV-2 thereby shares features with other human coronaviruses including SARS-CoV that were identified as pathogens beyond the respiratory tract as well. The present case should provide awareness that extrapulmonary symptoms in COVID-19 may be attributable to viral infiltration of diverse organs.

## PO-036 USE OF REMDESIVIR IN A KIDNEY TRANSPLANT RECIPIENT SUFFERING FROM COVID-19 PNEUMONIA

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**Introduction:** Due to limited experience in the management of COVID-19 infection in the posttransplant population [1,2] we want to report a case of a kidney transplant recipient infected with SARS-CoV-2, undergoing a therapy with Remdesivir.
**Methods:** The 38-year old kidney transplant recipient, who received a renal allograft in 10/2019 (unknown underlying kidney disease) was admitted to the emergency department with a history of intermittent fever, beginning oliguria, low blood pressure and somnolence. The laboratory results revealed a slight increase of acute phase reactants, hyponatremia and a low $CD4^+$ T cell count.
**Results:** A naso- and oropharyngeal swab specimen tested positive for SARS-CoV-2; a chest CT scan revealed only minor changes. The patient was started on empirical broad-spectrum antibiotics. Maintenance immunosuppressive agents (mycophenolate mofetil and tacrolimus) were discontinued and hydrocortisone was initiated as a continuous i.v. infusion. Further, valganciclovir and prophylactic anticoagulation with low molecular weight heparin were initiated and ivIG were administered as supportive treatment. About 10 days after admission, the patient had persistent fever and gradually developed dyspnea. A second chest CT scan showed bilateral basal infiltrates with ground glass opacity. Oxygen was administered at 5–7 l/min. Due to acute clinical deterioration and the high risk of progression and significant mortality of SARS-CoV-2 pneumonia [3], a 5-day course of antiviral treatment with Remdesivir in emergency use was started. The patient improved with normalization of inflammatory parameters and fever disappeared. As of today day 25 after admission, the patient has normal blood gas analysis without oxygen supply, normal graft function, and had no rejection episode or CMV reactivation.
**Conclusion:** Despite a few reported cases of COVID-19 infection in the transplant population additional data are needed to optimize management of this patient group [4]. This case report shows the delayed development of SARS-CoV-2 pneumonia in a kidney transplant recipient. The clinical improvement after a 5 day Remdesivir therapy underlines the encouraging results observed with use of Remdesivir in other patients [5].
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## PO-037 TRANSPLANT CENTER GRAZ GUIDELINES FOR LIVER TRANSPLANTATION DURING COVID-19 PANDEMIC

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**Introduction:** The new coronavirus type 2 is responsible for severe acute respiratory syndrome (SARS-CoV-2). The associated disease named Coronavirus Disease 2019 (COVID-19) has spread around the world within a few weeks. Its impact on solid organ transplantation is largely unknown. It can be only assumed that immunosuppression is related with an increase of COVID-19 related morbidity and mortality. Here we describe our Transplant Center Graz guidelines including all preventive measures taken to protect liver transplant recipients from infection during COVID-19 pandemic.
**Methods:** COVID-19 evaluation of donors and recipients comprises epidemiological and clinical evaluation as well as nasal swab COVID-19-PCR testing. An important part of the in hospital recipient management is a special training of both the whole transplant team and the recipient on protective measures against COVID-19 infection. The recipient is isolated in a single bed overpressure room with airlock including private rest room with shower for the recipient. Furthermore, strict visit ban consists and a restricted number of persons is allowed to be in the same room with the patient after transplantation ($n$=2). Members of the transplant team and the recipient wear ffp2 masks when they are together. It is aimed for fast extubation, fast step down from ICU to IMC / normal ward and rapid hospital discharge. The outpatient care includes phone

consulting, immunomonitoring with blood samples drawn at home and sent to our center and limited social contacts to an absolute minimum.
**Results:** During COVID-19 pandemic, LT was safely performed based on our experience and none of the patients transplanted during this time ($n$=4) got sick from COVID-19.
**Conclusion:** Requirements for a safe procedure during COVID-19 pandemic are (i) a low-risk setting (both donor and recipient COVID-19 negative), (ii) internal Transplant Center Graz guidelines (described above) in combination with (iii) low disease severity recipients (labMELD score 10–14) of a low donor risk index graft.

## PO-039 SUCCESSFUL RENAL TRANSPLANTATION SEVEN WEEKS AFTER COVID-19 PNEUMONIA

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**Introduction:** COVID-19 presents a new challenge to transplantation medicine. Patients with kidney transplants and those requiring dialysis do not seem to be more prone to infection with SARS-CoV-2, but case mortality rate is significantly higher. Since the beginning of the global pandemic, dialysis patients have to face the additional problem of a reduced chance of receiving a transplant because organ offers have plummeted. Transplant centers have also temporarily reduced their activity also in order not to put dialysis patients at increased risk due to hospital admission and immunosuppressive therapy
**Results:** In May 2020, a 65-year-old dialysis patient received a kidney from a 70-year-old deceased donor with an eGFR of 94 ml/min. The recipient herself was hospitalised for 14 days due to COVID-19 pneumonia and discharged only 6 weeks before the organ offer. Her course had been mild with nasal oxygen supply and without need high-flow therapy or NIV. At the time of the transplantation, the patient was completely symptom-free with no evidence of residual signs of infection. Chest X-ray did not show infiltrates. The transplantation was without complications with an immunosuppressive regimen consisting of Tacrolimus, mycophenolate and steroids after induction with Basiliximab. The graft achieved primary function with a serum creatinine of 1.5 mg/dl at discharge. While SARS-CoV-2 PCR in the throat gargle sample remained negative, antibody testing for SARS-CoV-2 IgG was positive. In the short-term course, the patient developed no evidence of recurrent symptoms of COVID-19.
**Conclusion:** After full recovery of COVID-19 pneumonia, it is still unclear whether and for long immunity occurs. Moreover, it is unknown whether recovered patients are at risk for reinfection and how long transplantation should be delayed. Since there is no evidence of virus persistence in the literature, we decided to proceed with transplantation at this very early time. Although our follow up period is very short, we feel that the benefits of a successful transplant outweighed the existing risks. Long-term follow up will provide important insights into the course of immune responses to SARS-CoV-2 after renal transplantation.

## PO-040 PREVENTION OF A HEALTH CARE CRISIS ENABLES RESOURCES FOR CONTINUING ORGAN TRANSPLANTATION DURING COVID-19 PANDEMIC

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**Introduction:** Coronavirus disease 2019 (COVID-19) may have a tremendous impact on organ donation and transplantation. In recent publication from Loupy et al. a negative effect on solid organ transplantation in France and USA was identified because of the overwhelming health-care system burden due to COVID-19 [1].
**Methods:** In this present analysis, we implemented all data on organ donation and performed kidney transplantation (KTX) from March 2nd – April 30th 2020 in Germany to estimate a possible influence of COVID-19 pandemic on transplant activities in German transplant centers and especially here in Berlin Charité.
**Results:** Since the beginning of the COVID-19 pandemic, Germany reported 179,157 cases (216/100,000) compared to 181,951 in France (272/100,000) and 1,577,758 in the USA (482/100,000; 22nd May 2020) [2]. In Germany, we did not observe a significant decline in organ donation and KTx in the same period. Noteworthy, compared to the previous year, even more organ donors were identified for procurement ($n$=330 vs. $n$=296), leading to stable numbers of performed KTx in March and April 2020 compared to those in 2019 ($n$=249 vs. $n$=271 [3]; Table 1).
At Charité we continued our transplant program for deceased donor transplantation postponing only high-risk procedures and living donation for four weeks during peak outbreak. Due to an early substantial increase in ICU capacities and massive reduction of elective procedures, we were able to provide a constant high standard of care for all transplant procedures. Strict prevention measures especially intensified screening for SARS-CoV-2 and early containment strategies prevented any in-hospital or outpatient COVID-19 outbreak at our center. Until today, only 6 of 2,044 KTx recipients were tested COVID-19 positive, in contrast to other transplant programs in Europe [4],[5].

Kidney transplantation (DD) numbers in Germany

| | 2020 | 2019 |
|---|---|---|
| 01.03.–15.03 | 60 | 63 |
| 16.03.–29.03 | 54 | 50 |
| 30.03.–12.04 | 74 | 96 |
| 13.04.–30.04. | 61 | 62 |
| Total | 249 | 271 |

**Conclusion:** In summary, it is possible to continue a KTx program during a pandemic if enough health-care resources can be provided for affected patients, and if a COVID-19 "free" regular hospital pathway is in place.
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## PO-041 SAFE CONVERSION FROM BELATACEPT TO CICLOSPORIN IN A RENAL TRANSPLANT PATIENT WITH COVID-19 PNEUMONIA

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**Introduction:** Immunocompromised patients may be at increased risk for complications of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. Although data of SARS-CoV-2 infection in solid organ transplant (SOT) recipients on calcineurin inhibitors are emerging, less is known about the course of COVID-19 pneumonia in SOT patients receiving costimulatory blockade as maintenance immunosuppression.
**Methods:** We present a case report of a 62 year old female renal transplant recipient with COVID-19 pneumonia who was safely switched from belatacept to ciclosporin while suffering from the disease.
**Results:** The patient presented with fever, shortness of breath and weakness at the end of March. Because she had typical symptoms, she was tested for SARS-CoV-2. The test was positive and she was subsequently admitted to our hospital because of worsening dyspnea. Chest X-ray showed infiltrates. Since the diagnosis was established and she was stable with nasal O2 supplementation and not needing ventilatory support, a CT scan was not performed. Due to multiple infectious complications, she did not receive MPA. Her next dose of belatacept was due during her first days in hospital, however she was still complaining about shortness of breath. Instead of treating her with reduced dose of belatacept, we decided to switch her to low dose ciclosporin in order to be able to stop immunosuppression in case of respiratory deterioration. The prednisone dose of 5 mg remained unchanged. However, she recovered without specific therapy. After three weeks the two throat gargle samples were negative. Antibody testing revealed weak presence of SARS-CoV-2 antibodies.
**Conclusion:** Taken together, the presented case shows a mild course of COVID-19 pneumonia in a patient on belatacept immunosuppression. In this case, the switch to ciclosporin was well tolerated and did not change the course of COVID-19 disease. We plan to re-introduce belatacept after 8 weeks after full recovery. Further analysis is warranted whether remaining on costimulatory blockade is safe during COVID-19 pneumonia.

## PO-042 PSYCHOLOGICAL RESPONSES TO THE COVID-19 PANDEMIC IN RENAL TRANSPLANT RECIPIENTS

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**Introduction:** With regard to immunosuppression and the high level of cardiovascular comorbidity renal transplant recipients are supposed to be at substantially increased risk for an adverse course of COVID-19. To date, there are no data on the psychological effects of this knowledge on renal transplant recipients during the pandemic.

**Methods:** Cross sectional study on 62 renal transplant recipients and 30 nephrological outpatients without immunosuppression, who served as control. The study aimed at an assessment of anxiety, mood, and quality of life during the pandemic (April 2020) and six months before. The analysis was performed by means of a questionnaire derived from KPD-38. The KPD-38 encompasses 38 questions on 6 parameters. We extracted 6 questions focussing on two parameters: life satisfaction and competence to act. The corresponding scales ranged from 1 to 4. Statistical analysis was performed using the Wilcoxon Test for the intragroup comparison of the two timepoints and the Mann-Whitney U test for intergroup comparisons.
**Results:** The renal transplant recipients had a mean level of satisfaction of 5.4±1.9 in April 2020 during the pandemic compared to 6.4±1.6 six months ago (p=0.0001). In the control group the life satisfaction was lower during the pandemic than six months ago as well (5.6±1.6 vs. 6.7±2.6, p=0.0073). The level of satisfaction during the pandemic did not significantly differ between transplant recipients and controls (p=0.69). In analogy to the parameter "life satisfaction", the parameter "competence to act" was higher before than during the pandemic in both renal transplant recipients(12.7±3.0 vs. 14.7±2.7, p<0.0001) and control subjects (13.3±3.1 vs. 14.7±2.7, p=0.016) and showed no significant difference between the two groups during the pandemic (12.7±3.0 vs. 13.3±3.1, p=0.361).
**Conclusion:** Life satisfaction and the feeling of "competence to act" were significantly reduced during the COVID-19 pandemic in renal transplant recipients. This phenomenon, however, occurred in the same way in non-immunocompromised subjects with CKD.

## PO-043 MONITORING OF GENERAL IMMUNE STATUS AND SARS-COV-2 REACTIVE T-CELL AND HUMORAL IMMUNITY FACILITATES THE CLINICAL DECISION IN A SEVERE SARS-COV-2-ASSOCIATED PNEUMONIA, MENINGOENCEPHALITIS AND GASTROENTERITIS IN A PANCREAS-KIDNEY TRANSPLANT PATIENT

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**Introduction:** The optimal management in transplant recipients with COVID-19 remains uncertain. The main concern is the ability of immunosuppressed patients to generate sufficient immunity for antiviral protection.
**Methods:** Here, we report on immune monitoring facilitating a successful outcome of severe SARS-CoV-2-associated pneumonia, meningoencephalitis, gastroenteritis and acute kidney and pancreas graft failure in a pancreas-kidney transplant recipient.
**Results:** Despite the very low numbers of circulating B-, NK, and T-cells identified in follow up, a strong SARS-CoV-2 reactive T-cell response was observed. Importantly, we detected T cells reactive to Spike, Membrane and Nucleocapsid proteins of SARS-CoV-2 with majority of T-cells showing polyfunctional pro-inflammatory Th1 phenotype with advanced differentiation stage at all analyzed time points. Antibodies against Spike protein were also detected with increasing titers in follow up. A correlation between cellular and humoral immunity was observed underscoring the specificity of demonstrated data.
**Conclusion:** We conclude that analyzing the kinetics of non-specific and SARS-CoV-2-reactive cellular and humoral immunity can facilitate the clinical decision on immunosuppression adjustment and allow successful outcome as demonstrated in the current clinical case. While the antiviral protection of the detected SARS-CoV-2-reactive T-cells requires further evaluation, our data prove an ability mounting a strong SARS-CoV-2-reactive T-cell response with functional capacity in immunosuppressed patients.

## LIVER TRANSPLANTATION I

## PO-045 COLD ISCHEMIA AND LIVER TRANSPLANTATION – WHO IS AT RISK?

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**Introduction:** Despite organ shortage, major Extended Donor Criteria grafts (maEDC; cold ischemia time (CIT) >14 hours, donor age >65 years and macrovesicular steatosis >40%) are often considered unsuitable for liver transplantation[1,2,3]. We aimed to analyze the differential influence of CIT on outcome after liver transplantation for different indications and identify recipients at risk[4].
**Methods:** We analyzed 40,288 primary adult liver transplants performed between 1998 and 2017 and reported to the Collaborative Transplant Study. Risk factor analysis was performed for 1-year and 5-year graft loss and patient mortality. Survival rates were analyzed using the Kaplan-Meier method with the Mantel Cox log rank test of trend. Cox regression analysis was used to calculate the multivariate hazard ratio (HR) and 95% confidence intervals (95% CI).
**Results:** CIT reduced graft and patient survival only during the first year after transplantation and increased the risk of graft loss by 3.4% per additional hour of cold ischemia (HR=1.034, p<0.001). The impact of CIT was strongest in patients with hepatitis C-related (HCV) cirrhosis and increased the risk of graft loss by 24% already at 8–9 hours (HR 1.24, 95%CI 1.05–1.47, p=0.011), and by 64% at ≥14 hours (HR 1.64, 95%CI 1.30–2.09, p<0.001). Patients with hepatocellular cancer (HCC) and alcoholic cirrhosis tolerated longer cold ischemia up to <10 and <12 hours, respectively (p=0.47 and 0.42). HCC patients with model of end-stage liver disease scores (MELD) <20 tolerated even longer cold ischemia up to 13 hours without significantly impaired graft survival.
**Conclusion:** The influence of CIT on liver transplantation outcome depends on the underlying disease[4]. Patients with HCV-related cirrhosis are at the highest risk of graft loss due to prolonged cold ischemia[4]. Grafts with longer CIT should preferentially be allocated to recipients with less pronounced effect of cold ischemia such as patients with alcoholic cirrhosis and HCC patients with MELD <20[4].
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## PO-046 BILE DUCT DAMAGE SCORE DURING COLD STORAGE CONDITIONS OF DECEASED DONOR LIVERS AND ITS CLINICAL IMPLICATIONS ON LONG-TERM OUTCOME AFTER LIVER TRANSPLANTATION

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**Introduction:** Although patient and allograft survival during the first weeks after liver transplantation (LT) are dependent primarily on parenchymal function, long term allograft viability is determined primarily by biliary wound healing and adequate bile drainage. In 2013 we introduced a bile-duct-damage-score as a prognostic marker for biliary complications (BC), graft and patient survival.
**Methods:** 48 bile ducts were assessed by the BDDS and divided into groups with major biliary duct damage (BDD, *n*=25) and no damage (*n*=23) after cold storage. Liver function and biliary drainage was assessed by evaluation of GOT/GPT, yGT and bilirubin and patients were followed-up for 72-months.
**Results:** 17 patients (68%) of the BDD group developed BC (BD-necrosis, strictures, leakage), compared to 3 (13%) in the no-BDD group. In the first-year liver enzymes (LE) were elevated in both groups. After 36-months LE decreased to normal and were significantly lower in patients with no BDD compared to patients with BDD (p=.006). After 72-months LE were normal in both groups. yGT was higher in the BDD group during the first 36-months

(p = 0.03, 0.03, 0.008) compared to no-BDD, and reached normal levels after 72-months. Bilirubin was higher after 6- and 12-months (3.2 vs. 1.0; 3.6 vs. 1.8), and reached normal levels after 36-months in both groups. The overall survival was lower in the BDD compared to the no-BDD group (p=0.03).
**Conclusion:** BDD after cold storage is associated with inferior long-term outcome after LT. Once BDD occurs, the overall survival is lower, which could be explained by higher frequency of biliary complications that required surgical or endoscopic interventions. However, if interventions are successful, LT recipients survive long-term and LE and cholestasis parameters normalize over time.

## PO-048 HEPATOCELLULAR CARCINOMA RECURRENCE AFTER ORTHOTOPIC LIVER TRANSPLANTATION IS ASSOCIATED WITH EPISODES OF ACUTE REJECTIONS

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All authors have made substantial contributions to the study and approved the submitted manuscript. SGK collected the data, drafted and wrote the manuscript, designed and performed the research. AK and AK performed statistical analysis and revised the manuscript. PH, FK, SW, FT, JP analyzed and critically revised the manuscript. AA, DE, DH collected data. MS designed the research, interpreted the data and critically revised the manuscript.

**Introduction:** Acute rejections (AR) after orthotopic liver transplantation (OLT) for hepatocellular carcinoma (HCC) have an uncertain impact on the outcome of patients. This study aims to investigate whether AR are associated with HCC relapse and overall survival (OS) after OLT for HCC.
**Methods:** Patients undergoing OLT for HCC between 2001 and 2015 were retrospectively analysed with regard to histopathologic proven AR within the median time until recurrence. Univariate and multiple Cox's regression analysis was conducted revealing risk factors for HCC recurrence after OLT.
**Results:** Of 252 analysed patients HCC recurred in 47 patients with a median time until recurrence of 20 months. The frequency of disease recurrence was significantly higher in patients with AR (28.6%) compared to patients without AR (13.0%, p=0.002). Multiple Cox's regression analysis identified AR within 20 months to be an independent risk factor for HCC recurrence both as dichotomized (HR=2.9, 95%CI: 1.3–4.3; p=0.003, p=0.009) and as continuous variable (HR=1.8, 95%CI: 1.4–2.4; p=0.001). HCC-recurrence and AR were associated with higher grades of liver fibrosis one year after OLT, when compared to patients without AR (p=0.019).
**Conclusion:** We here demonstrate an association of AR with recurrent disease after OLT for HCC. Our results have implications for intervals of monitoring in tumor surveillance after OLT. Graft fibrosis and immune mechanisms are potentially related and causal interactions are worth further investigations.
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## PO-050 IMPACT OF DONOR RISK INDEX (DRI) ON THE OCCURRENCE OF EARLY POSTOPERATIVE BILIARY COMPLICATIONS AFTER LIVER TRANSPLANTATION

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**Introduction:** The rarity of deceased donor organs results in the acceptance of extended criteria grafts for selected patients. Donors with additional risk factors will influence outcome of transplantation. The donor risk index (DRI) enables prediction of postoperative outcome after liver transplantation (LTx) and is known to predict vascular complications. However, biliary complications are frequent observations in LTx patients: Anastomosis stenosis or biliary leakage are common early postoperative misery with immediate influence on outcome, whereas ischemic type biliary lesions (ITBL) and occlusion by cast occur at a later stage. In this study, we analyzed the correlation of the DRI with early postoperative biliary complications.
**Methods:** We retrospectively analyzed our LTx cohort of the years 2011 to 2016 for the occurrence of biliary leakage, need of endoscopic retrograde cholangiography (ERC), implantation of biliary stents and the peak bilirubin value. Next, we correlated our findings with the individually calculated DRI. Children and living related LTx were excluded.
**Results:** During the observational period of 5 years, LTx was performed in 164 patients. Within the hospital stay, 11 patients received a re-transplantation. Mean DRI was 1.800 (± 0.378; range 1.013 to 2.778). Among 164 patients, 15 patients (9.1%) had an apparent biliary leakage; in 31 patients (18.9%), an ERC was performed and 19 patients (11.6%) received a biliary stent. Mean peak bilirubin value was 9.08 mg/dl (± 7.22). Statistical analysis did not reveal significant correlation between DRI and biliary complications. In detail, the coefficient was 0.082 for biliary leakage (p=0.284), 0.084 for ERC (p=0.274) and 0.023 for biliary stent implantation (p=0.823). In addition, the peak bilirubin was not significantly associated with DRI (p=0.093).
**Conclusion:** The DRI is a well established tool to predict the outcome after LTx, nevertheless, we demonstrate that the DRI is an inferior application for the prediction of early postoperative biliary troubles. For a better understanding of the predictability of biliary complications after LTx, further analyses should be performed to correlate the DRI with late biliary complications.

## PO-052 CABOZANTINIB AFTER SORAFENIB FAILURE IN LATE RECURRENT HEPATOCELLULAR CARCINOMA AFTER LIVING-DONOR LIVER TRANSPLANTATION: A CASE REPORT

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**Introduction:** Recurrence of hepatocellular carcinoma (HCC) after liver transplantation (LT) remains a major therapeutic challenge. In the last years, new molecular-targeted therapies, such as cabozantinib have been approved for the treatment of advanced HCC. However, clinical experience with the new drugs in the treatment of HCC in the setting of a LT is very limited, since these patients are excluded from the phase 3 trials.
**Methods:** In this report, we present the case of a 36-year-old woman who received 2003 a living donor LT due to a multifocal inoperable HCC in a non-cirrhotic liver out of Milan criteria.
**Results:** Seven years later, a pulmonary and intrahepatic recurrence of the HCC was diagnosed and histologically confirmed. Following an interdisciplinary therapy concept consisting of surgical-, interventional-radiological as well as systemic treatment, the patient has achieved a survival of more than 10 years after diagnosis of tumor recurrence. A systemic first line therapy with sorafenib was accompanied by grade 3–4 toxicities, such as mucositis, hand-foot skin reaction, diarrhea, liver dysfunction and hyperthyroidism, and had to be discontinued. After the switch to cabozantinib from June 2018 to April 2020, a partial remission of all tumor manifestations was achieved. The therapy with cabozantinib was well tolerated, only mild arterial hypertension and grade 1–2 mucositis where observed, which could be easily managed. Liver transplant function was stable during the therapy, no drug interaction with immunosuppressive drugs was observed.
**Conclusion:** In conclusion, this report highlights the tolerability and effectiveness of cabozantinib for the treatment of HCC recurrence after LT. To our knowledge, this is the first case reporting clinical experience with cabozantinib in this setting. Furthermore, we show that patients with a late recurrence of HCC after LT benefit from intensive multimodal therapy concepts, including surgery, radiofrequency ablation and systemic therapy.

**LIVER TRANSPLANTATION II**

PO-054

## INTERPLAY OF TROUGH LEVEL COMPLIANCE IN IMMUNOSUPPRESSION AND RENAL FUNCTION AFTER LIVER TRANSPLANTATION – A FURTHER LOOK AT THE HEPHAISTOS STUDY

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**Introduction:** Majority of immunosuppressive (IS) drugs used today are dosed according to trough levels ($C_0$-levels). In order to achieve an optimal balance between safety and efficacy, it is of utmost importance to avoid both under- and over-immunosuppression. In the past, many studies have been conducted to optimize immunosuppression after transplantation, however, in many cases the pre-defined $C_0$-levels were not met for different reasons. The Hephaistos study [NCT01551212] was designed to evaluate the impact a reduced calcineurin inhibitor (CNI) regimen has on renal function and CNI-induced nephrotoxicity after liver transplantation (LTx).
**Methods:** In this 12 M prospective, open-label, randomized *de novo* LTx study, the primary objective was to show that after 12M, an everolimus-based (EVR: 3–5 ng/ml) IS regimen with reduced tacrolimus (rTAC: <5 ng/ml) results in superior renal function over standard TAC (TAC-C: 6–10 ng/ml). While the full analysis set revealed a numerical improvement in eGFR, a closer look was taken at $C_0$-levels. Interestingly, 31–42% EVR+rTAC patients had $C_0$-levels above pre-defined ranges at different time points of the study. Thus, a further analysis was done to assess a compliance set, comprised only of patients with $C_0$-levels within pre-defined TAC target levels for ≥3 different time points of the study.
**Results:** The compliance set was comprised of 74/169 EVR+rTAC patients and 59/164 patients in the TAC-C arm. Mean eGFR (MDRD4) was significantly higher at M12 for EVR+rTAC (adjusted mean difference of 8.03 mL/min/1.73 $m^2$; p=0.0333). In contrary, only a difference of 1.20 ml/min (p=0.7154) was seen for the non-compliance set (95/169 EVR+rTAC, 105/164 TAC-C). Safety and efficacy were similar (no graft loss or death incidences, 2.7% vs. 3.4% tBPAR, and 2.7% vs. 3.4% BPAR for EVR+rTAC and TAC+C, respectively.
**Conclusion:** This post-hoc analysis clearly shows superiority in renal function for the EVR+rTAC vs. TAC-C group at M12, when TAC C0-levels were maintained within the defined range. Further, safety and efficacy remained the same, thereby demonstrating that EVR+rTAC regimen is well-tolerated and effective, allowing CNI minimization while simultaneously achieving a renal benefit after LTx.

PO-055

## ECONOMIC ANALYSIS OF LIVER TRANSPLANTATIONS IN THE INEK-DRG-SYSTEM

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**Introduction:** Based on the 'sickest-first' principle MELD system prioritized patients by severity of illness. Sicker patients require more resources and as a result costs of liver transplantations increase. Aim of this study was to evaluate whether the costs of liver transplantations are covered by the InEK-DRG-System. Assuming that most costs in liver transplantation arise in the field of ICU we examined whether the intensive care scoring systems TISS-10 and SAPS-II correlate with the proceeds of liver transplantations. In addition, clinical predictors should be determined for increasing costs by liver transplantation, especially predictors who are insufficiently represented by the InEK-DRG system.
**Methods:** In this retrospective, single-center study 179 patients who underwent a liver transplantation from 2011 to 2016 were included. Patient and demographic data, pre-existing conditions, intensive-scoring parameters, postoperative diseases and complications were examined. Applied statistic methods were regression analyses and ROC-analysis.
**Results:** Mean costs of liver transplantation in Kiel were 82.569€ (± 81.820€), whereas the mean covered providing by the InEK-DRG-System was 82.288€ (± 74.769€). Most patients (*n*=85) were grouped in G-DRG A01C. Only the G-DRG A01C (+ 1658€) generated profits on average. All other examined G-DRG groups caused a deficit. Most costs in liver transplantation arise in intensive and inpatient care. TISS-10 and SAPS-II correlate with proceeds of liver transplantations in the DRG-Group A01C and A01B. Several examined pre-existing illnesses and parameters are predictors for high costs. The most important predictor in multivariate analyses was labMELD (p<0.000). Postoperative diseases and complications correlate with increased costs in liver transplantation. Insufficiently represented postoperative complications by the InEK-DRG-System are biliary complications (p<0.014), delirium (p<0.014), CVVHD (p<0.013), IHD (p<0.006) and pneumoniae (p<0.009).
**Conclusion:** Costs of the hospitalized liver transplantation program in Kiel are almost covered by the InEK-DRG-System. Adjustment of remuneration for specific postoperative complications should be reconsidered.

PO-056

## ACUTE PANCREATITIS IN THE PERIOPERATIVE COURSE OF LIVER TRANSPLANTATION – A SINGLE CENTER ANALYSIS

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**Introduction:** Acute pancreatitis is a potentially life-threatening disease arising from a multitude of underlying aetiologies, including (surgical) trauma. In the perioperative course of liver transplantation, acute pancreatitis represents a severe complication with grave impact on outcome. Mortality rates of up to 100% have been reported; however, only limited data from larger patient series is available so far.
**Methods:** Retrospective analysis of all adult liver transplants performed at our center between 01/2009 – 05/2017 was performed to identify graft recipients with perioperative diagnosis of acute pancreatitis defined by radiological and/or clinical signs like edema of the pancreas, fluid around the pancreas or chalky deposits and necrosis in fatty tissue. Graft recipients with isolated elevation of serum lipase and amylase were excluded.
**Results:** In 441 consecutive liver transplants performed, 12 (2.7%) cases of acute pancreatitis were observed in the perioperative course of transplantation. The mortality in these patients was 75%, with the highest mortality rate in graft recipients already presenting morphological aspects of beginning pancreatitis at the time of transplant (4 of 12 recipients, mortality of 100 %). Several different concepts of therapeutic management of acute pancreatitis were applied, including repeated lavage and/or partial or total resection of the pancreas. None of these concepts showed superior results with regards to overall outcome. With respect to the potentially underlying cause, 6 of 12 recipients underwent extensive dissection of the aorta and/or portal vein in order to allow blood vessel anastomosis, primarily due to re-transplantation. In patients who were successfully discharged from hospital (*n*=3; 25%), 5-year survival was not significantly inferior when compared to other patients after liver transplantation (all patients still alive; median follow-up 117 (97–135) months).
**Conclusion:** Perioperative acute pancreatitis after liver transplantation is associated with high mortality, especially in patients suffering from acute pancreatitis at the time of transplant. Patients undergoing re-transplantation seem to be at greater risk for postoperative acute pancreatitis.

PO-057

## GENDER-BASED DISPARITIES VIA MELD-BASED ALLOCATION IN GERMANY AND THE US – A GLOBAL ISSUE

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**Introduction:** Women are disproportionately outnumbered by men as liver transplant recipients. The aim of this study was to analyze gender disparities in access to liver transplantation under MELD-based allocation in the context of different transplant systems.
**Methods:** This study depicts a retrospective analysis of all liver transplantations and waiting list candidates from 2003 to 2017 in Germany as well as US data from 1997 to 2017 (data record of Eurotransplant and the United Network for Organ Sharing). Pediatric patients, patients receiving high urgency status and living organ donation were excluded. Also secondary data of cause of death statistics was analyzed.
**Results:** While gender proportions of liver associated cause of death remained stable over time (approximately 35% females), the ratio of female recipients decreased after the implementation of MELD-based allocation in Germany (37.3% before, 33.4% afterwards) as well as in the US.
Before the introduction of MELD-based allocation gender had no significant influence on the chances of receiving a liver transplantation in Germany (p=0.207, Exp(B)=0.911). However afterwards female waiting list recipients had significantly lower chances (p<0.001, Exp(B)=0.762).
In the US liver transplant system female sex had already been a risk factor for lower access to transplantation before MELD, but the effect size increased significantly with the new system (before p<0.001, Exp(B)=0.852; after p<0.001, Exp(B)=0.740).
Adjusted Cox-Regression analysis reveals that the major contributing factor of this effect can be explained by the influence of height (adjusted effect of female sex; Germany: p=0.003, Exp(B)=0.883; US: p<0.001, Exp(B)=0.822). On the

other side, also positive discrimination of tumor diagnosis respectively MELD exceptional status contributes to this gender gap (adjusted effect of female sex; Germany: p<0.001, Exp(B)=0.828; US: p<0.001, Exp(B)=0.812).
**Conclusion:** The introduction of MELD-based allocation caused aggravated gender-based differences in access to liver transplantation in Germany as well as in the US. Hence, this inequality appears to be a transnational concern of MELD-based allocation and needs international consensual refinement

## PO-058 DONOR-SPECIFIC ANTI-HLA ANTIBODIES AND CLINICAL OUTCOME IN LIVER TRANSPLANTATION – A MATCHED CASE-CONTROL STUDY BASED ON THE COMPONENTS OF THE BALANCE OF RISK-SCORE

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**Introduction:** The role of donor-specific anti-HLA antibodies (DSA) in liver transplantation (LT) is not clearly established. To date, there is only little data on the clinical outcome of DSA-positive (DSA+) LT recipients. We evaluated the impact of DSA presence on the clinical course of LT recipients.
**Methods:** A retrospective data analysis was conducted. All LTs performed between January 1, 2008 and December 31, 2015 at the Charité-Universitätsmedizin Berlin were examined. Living donor-, multivisceral-, high-urgency transplantations, retransplantations and recipients aged under 18 years were excluded from the analysis. DSA were detected by the Luminex® assay. DSA-positivity was defined at a mean fluorescence intensity (MFI) >1000. The clinical courses and mortality of DSA+ recipients were compared to all DSA-negative (DSA-) recipients and to a matched control group of DSA-recipients based on the components of the Balance of Risk (BAR) score.
**Results:** A total of 113 DSA-positive LT recipients (22.2%) were identified and matched 1:1 with 113 DSA- patients. Median BAR score at LT was 8 (3–13) in DSA+ and 7 (4–13) in DSA- patients (p=0.619). One-year patient survival after LT was inferior in DSA+ compared to DSA- recipients with 74.3% vs. 84.8% (p=0.053). In DSA+ patients, sepsis was the leading cause of death within the first year after LT and significantly more often observed compared to DSA- patients (9.7% vs. 1.8%; p=0.046). The subgroup-analysis showed no significant difference in mortality within the first year after LT for patients with *de novo* DSA compared to the DSA- control group (p=0.082). Rejection therapy was more often applied to DSA+ recipients [*n*=77 (68.1%) vs. 37 (32.7%) in the control group, p<0.001]. Patients with preformed DSA received the first rejection therapy significantly earlier than DSA- recipients [*n*=6 (5–16) vs. [9 (7–23) days, p=0.003].
**Conclusion:** DSA have an indirect, negative impact on patient survival within the first year after LT. DSA presence seems to influence the decision-making post LT in terms of rejection therapies and immunosuppression, leading to infectious complications and higher mortality.

## PO-059 WHAT DRIVES DISCONTINUATION RATES IN MULTICENTER TRIALS – ATTITUDES OR FACTS? A COMPARISON OF ATHENA & HEPHAISTOS

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**Introduction:** ATHENA [NCT01843348] and HEPHAISTOS [NCT01551212] were designed to evaluate everolimus [EVR] combined with reduced tacrolimus [rTAC] or reduced cyclosporine A [rCyA] vs. a mycophenolic acid [MPA] + TAC regimen in *de novo* kidney transplant [KTx] recipients, or EVR+rTAC vs. TAC only after *de novo* liver transplantation [LTx], respectively. As it is often claimed that adverse event (AE)-driven treatment discontinuation rates (DRs) are higher under EVR than with conventional regimes, we had a closer look at DRs in these 2 studies.
**Methods:** ATHENA and HEPHAISTOS were both 12M randomized, prospective, open-label multicenter trials. ATHENA randomized 612 patients [pts] in Germany and France at time of KTx to either EVR/rTAC, EVR/rCyA or TAC/MPA. In HEPHAISTOS, 333 pts were randomized between Day 7–21 after LTx to EVR/rTAC or TAC alone, all with steroids until M6.
Results Discontinuation and Adjustment Rates:

| | ATHENA | | | HEPHAISTOS | |
|---|---|---|---|---|---|
| | EVR/ rCyA | EVR/ rTAC | TAC/ MPA | EVR/ rTAC | TAC |
| % total DR (study/ treatment) | 20.7/57.1 | 19.0/45.2 | 11.3/ 24.0 | 1.8/27.2 | 9.8/34.1 |
| % discontinued / % adjusted or interrupted treatment due to AE | 35.4/20.7 | 31.0/25.7 | 14.2/ 45.1 | 23.7/47.3 | 23.2/ 24.4 |

While no AE-specific correlation was seen for either study, demonstrating no EVR-related reason for discontinuation or adjustment, occurrences of total DRs were opposite between the EVR and control arms in both studies.
ATHENA also revealed high in-between-center variations for DRs (0–100%, 0–100% and 0–60% in the EVR/rCyA, EVR/rTAC and TAC/MPA, respectively), while less between-center variability was seen in HEPHAISTOS (0–53% EVR/TAC and 0–62% TAC).
**Conclusion:** In ATHENA (KTx) and HEPHAISTOS (LTx), efficacy and safety of EVR in combination with rTAC or rCyA were confirmed. Striking was the inverse incidence of DRs for KTx and LTx pts in control vs. EVR arms, and an AE analysis revealed that reasons for discontinuation in both studies were not drug-specific, but rather organ- and/or center-driven. These interesting results are so far unexplained. However, attitudes driven by the investigators' experience or background may play a role – which might help in understanding and evaluating differences in results of multicenter clinical trials in the future.

## PO-060 LIVER TRANSPLANTATION FOR ACUTE-ON-CHRONIC LIVER FAILURE ASSOCIATES WITH EXCESS SHORT-TERM MORTALITY AND REDUCED LONG-TERM QUALITY OF LIFE

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**Introduction:** Among patients with cirrhosis, candidate selection and timing of liver transplantation (LT) remain problematic. Acute-on-chronic liver failure (ACLF) is a complication of cirrhosis with high mortality under conservative therapeutic measures. The role of LT in the management of ACLF remains ill-defined. We aimed to assess the impact of ACLF on post-LT survival and long-term graft function, morbidity, and quality of life.
**Methods:** We retrospectively analyzed all patients with liver cirrhosis who underwent their first LT at our institution between 01/2009–12/2014. Median duration of follow-up was 8.7 (IQR 7.0–9.9) years, during which all patients underwent routine medical checkups. All ACLF- and non-ACLF-LT survivors were interrogated at a median of 7.5 years after LT with WHO-QOL-BREF, PHQ4 and EQ-5D-3L questionnaires, with a 59% return rate.
**Results:** Of 250 cirrhotic LT patients, 98 (39.2%) fulfilled the EASL diagnostic criteria for ACLF prior to LT ("ACLF-LT"). ACLF was linked to reduced post-transplant survival (HR for 1-year survival compared to non-ACLF-LT: 0.24, 95% C.I. 0.14–0.42, HR for 10-year-survival: 0.47, 95% C.I. 0.31–0.71; both p<0.001), depending on ACLF grade prior to LT, and mainly inferred by infectious complications both in the early and late phases after LT. In ACLF patients, CLIFc-ACLFs was superior to MELD score at LT in predicting post-LT survival. Long-term follow-up revealed comparable graft functions and similarly high rates of kidney dysfunction, diabetes mellitus, hypertension, dyslipidemia and polypharmacy in ACLF-LT and non-ACLF-LT survivors. In contrast, ACLF-LT patients reported significantly impaired quality of life (QOL), particularly in terms of anxiety/depression (EQ-5D-3L and PHQ4), and physical and psychological health (WHO-QOL-BREF; all p<0.05). LabMELD score, presence of ACLF at LT and duration of post-LT intensive care predicted poor long-term QOL.
**Conclusion:** Our data associate ACLF with impaired post-LT survival. While long-term graft function and comorbidities are comparable in ACLF and non-ACLF LT survivors, the strikingly low quality of life in ACLF-LT recipients warrants further investigation and consideration during follow-up patient care.

PO-062

## DEVELOPMENTS SINCE IMPLEMENTATION OF MELD-BASED LIVER ALLOCATION – A COUNTRY COMPARISON GERMANY – USA

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**Introduction:** The Model for End-stage liver disease (MELD) based allocation system has been implemented in Germany (12/2006) and in the USA (2/2002) in order to reduce waiting list mortality. Purpose of this study is to evaluate post-transplant outcome and waiting list mortality–especially under the aspect of increasing organ shortage in Germany.
**Methods:** All patients undergoing liver transplantation (LT) in Germany (2003 to 2017) and the USA (1999 to 2017) were assessed retrospectively using the electronic record system of Eurotransplant (ET) and UNOS.
**Results:** In the investigated periods 15328 LTs were performed in Germany, whereas 199481 LTs took place in the USA. From 2003 to 2017 the average donors per million inhabitants were 10.4 in Germany and 20.4 in the USA. After MELD implementation in Germany, the median labMELD score of standard allocation LT recipients abruptly increased from 15.5 to 25.5 in 2007. In contrast the MELD score in the USA showed a steadily increase from 19 in the first year of MELD-allocation to 27 in 2017. This difference in MELD change is multifactorial conditioned, but donor shortage in Germany may be one reason. This unique lack of suitable donors is underlined by the ratio of used liver donors to reported donors, which was found to be notably higher in Germany (in average 85.1% since MELD implementation) compared to other ET countries (77.6%). Whereas 3-year survival in the USA significantly increased after MELD implementation ($p>0.001$; Spearman $r=0.93$) the survival in Germany slightly decreased from 72.9% in 2004 to 69.4% in 2012. When analyzing patients who died on waiting list or were removed due to poor health status (= waiting list mortality), the absolute number was constant over the years (median 466; IQR 369–575; $p=0.10$) in Germany. However, the quotient of mortality and actively listed patients increased noticeably from 0.22 to 0.36 ($p<0.001$), whereas all investigated parameter showed improvement for the US-cohort.
**Conclusion:** MELD implementation led to a decreased patient survival and an elevated waiting list mortality in Germany. Countervailing effects in the USA suggest Germany-specific limitations for MELD-based liver allocation.

PO-063

## META-ANALYSIS OF THE COMPARISON OF MODIFIED PIGGYBACK VERSUS STANDARD PIGGYBACK AND CONVENTIONAL CAVA RECONSTRUCTION TECHNIQUES IN ORTHOTOPIC LIVER TRANSPLANTATION

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**Introduction:** In recent decades, the reconstruction techniques of inferior vena cava (IVC) in liver transplantation (LTx) have been modified. The modified piggyback technique is considered as a practical side-to-side cavo-caval anastomosis with the preservation of the recipient IVC requiring only partial cava clamping during the anhepatic phase in LTx. The aim of this meta-analysis was to compare the efficacy of the modified piggyback technique (MPB) with standard piggyback (SPB) and conventional techniques in LTx.
**Methods:** An unrestricted literature search was conducted in Medline/PubMed and Web of Science from their inception through August 2019. Two separate meta-analyses were performed: meta-analysis comparing MPB with conventional technique and meta-analysis comparing MPB technique with the SPB technique. The Meta-effect size of discontinuous and continuous variables were odds ratio (OR) and standard mean differences (SMD) with 95% confidence interval. Data were assessed by meta-analyses using Mantel-Haenszel tests with random effect model.
**Results:** A total of 3282 and 2143 cases were included from 13 and 11 studies in meta-analysis A and meta-analysis B, respectively. MPB has shown to significantly decrease operation time (−0.50, 95%CI: −0.89 to −0.11; p=0.01), and need for blood transfusion (-0.50, 95%CI: −0.84 to −0.16; p=0.004) in comparison with conventional technique. MPB had a trend to decrease the primary non-function and portal vein thrombosis as compared to the SPB technique. The incidence of venous outflow complications were not different between MPB and conventional technique (2.08, 95%CI: 0.46–9.34; p=0.34) and also between MPB and SPB techniques (OR of 0.38, 95%CI: 0.07 to 1.90; p=0.24).
**Conclusion:** The present meta-analysis revealed that MPB can improve perioperative outcomes compared to the conventional technique. MPB can be applied as a safe and appropriate anastomosis technique for caval reconstruction in LTx in almost all recipients undergoing LTx for the first time.

PO-064

## AUXILIARY TWO-STAGED PARTIAL RESECTION (ASPIRE) LIVER TRANSPLANTATION FOR END-STAGE LIVER DISEASE TO AVOID SMALL-FOR-SIZE SITUATIONS

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**Introduction:** Patients with end-stage liver disease and low MELD scores have limited chances to receive deceased donor livers and therefore require consideration of living liver donation. In this setting donor safety is essential. Donor risks are lower in case of a left liver donation because a larger volume of liver remains in the donor. However, due to lower graft volume, the risk for a small-for-size situation in the recipient may increase. This study aims to prevent small-for-size situations in the recipient using an auxiliary two-staged partial resection liver transplantation of living-donated left liver lobes.
**Methods:** Two patients received a two-stage auxiliary liver transplantation using living-donated left liver lobes after left lateral liver resection. The native extended right liver was removed in a second operation after sufficient hypertrophy of the left liver graft had occurred.
**Results:** No donor developed postoperative complications. In both recipients the graft volume increased by an average of 105% (329ml to 641ml), from graft-to-body-weight ratio of 0.54 to 1.08 within 11 days after transplantation, so that the remnant native right liver could be removed. No recipient developed small-for-size syndrome, and after a follow-up time of 25 months graft function and overall condition is good in both recipients.
**Conclusion:** Auxiliary two-staged partial resection liver transplantation using living-donor left lobes is technically feasible and can prevent small-for-size situation in adults/adolescents. This new technique can expand the potential living-donor pool, and in selected recipient/donor combinations enables a living liver donation and contributes to increase donor safety.

### INFECTIOLOGY II

PO-065

## EXTRACORPOREAL PHOTOPHERESIS (ECP) IN REFRACTORY POLYOMAVIRUS-ASSOCIATED NEPHROPATHY (PVAN)

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**Introduction:** Extracorporeal photopheresis (ECP) is a little-invasive therapeutic intervention, particularly used in T-cell mediated diseases. The mode of action primarily encompasses modulation of immunoregulatory processes. In solid organ transplantation, treatment of refractory rejection by ECP has been reported; still the optimal indications for this treatment have yet to be determined. We report our first experience with ECP in a case series of patients with high immunologic risk and refractory polyomavirus-associated nephropathy (PVAN).
**Methods:** Three patients with refractory PVAN to center standard therapy with high immunological risk, where reduction in immunosuppression implied the risk of rejection, were planned to receive 8–10 sessions of ECP.
**Results:** One patient suffered acute rejection early after AB0-incompatible living donor kidney transplantation, and developed PVAN three months later. Two patients displayed kidney allograft dysfunction due to PVAN after simultaneous pancreas and kidney transplantation (SPK). All patients were refractory to the PVAN standard center protocol (conversion to mTOR-based immunosuppression, cidofovir). Reduction in overall immunosuppression resulted in rising HbA1c in SPK patients. After initiation of ECP, the first patient showed remission of PVAN with stabilization of allograft function. One patient after SPK stabilized pancreas function but displayed progressive kidney allograft dysfunction after 8 sessions of ECP. Yet the patient is still off dialysis 11 months after diagnosis of PVAN. The other patient died in the early course due to severe COVID-19 infection, unrelated to ECP.
**Conclusion:** In conclusion, ECP, due to its immunomodulatory effects, might represent a novel therapeutic approach for selected patients with high immunologic risk allowing for reduction of maintenance immunosuppression. Early intervention might be necessary and further data are highly warranted to identify the correct patient selection, treatment cycles and timing.

## PO-066 VACCINATION AGAINST URINARY TRACT INFECTION AFTER RENAL TRANSPLANTATION

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**Introduction:** Recurrent urinary tract infections (UTIs) increase mortality and reduce graft survival after renal transplantation. Since current prophylactic strategies like methionine, cranberry juice, and antibiotics fail to sufficiently prevent recurrent infections in a substantial number of patients, there is a clinical need for alternative approaches. The present work describes first experiences with an immunization strategy against bacterial strains after kidney transplantation.
**Methods:** We performed a retrospective single-center analysis of an immunization approach against ten strains of inactivated bacteria (StroVac$^{R}$). 14 renal transplant recipients with ≥3 UTI episodes/a underwent immunization with three subcutaneous injections of inactivated bacteria (follow-up 12 months before to 12 months after immunization). These subjects were compared to 14 renal transplant patients without immunization that were matched for number of UTIs and time after transplantation (24 months follow-up). We compared the UTI-incidence and potential side effects including development of de novo donor specific antibodies (DSA).
**Results:** The immunization significantly decreased the incidence of UTIs from 3.4±1.3 to 0.9±1.0 by 74.9%. The incidence did not change from year one to year two of the observation period in the control group. Immunization was tolerated well without any clinical complaints. There were no de novo DSA in the first year after immunization.
**Conclusion:** Immunization against inactivated bacterial strains substantially reduced the incidence of UTIs without eliciting any safety concerns in this small cohort of renal transplant recipients. This strategy may be a helpful expansion of our preventive measures in patients with recurrent UTIs.

## PO-068 LETHAL OUTCOME OF DISSEMINATED TOXOPLASMOSIS IN A HEART RECIPIENT

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**Introduction:** Toxoplasmosis is a potentially life-threatening parasitic infection in recipients of solid organ transplantation (SOT). Among SOT recipients, the risk is highest for donor / recipient mismatch (D+/R−) in heart-transplanted patients. The determination of Toxoplasma-IgG and -IgM is a mandatory element of donor characterization enabling the initiation of chemoprophylaxis in selected cases.
**Methods:** Here we report a case of disseminated toxoplasmosis with lethal outcome in a 56-year old male heart transplant recipient.
**Results:** The donor was a 58-year-old male with traumatic brain injury seropositive for Toxoplasma IgG and seronegative for Toxoplasma IgM. The heart recipient was seronegative for Toxoplasma IgG and IgM. Despite chemoprophylaxis, the heart recipient developed a disseminated toxoplasma sepsis and died of multi-organ failure.
**Conclusion:** Although preoperative toxoplasma screening in donor and recipient and chemoprophylaxis of the recipient was performed, our case report describes a fatal transmission of Toxoplasmosis. That shows that a certain risk remains despite prophylaxis. Physicians should be aware of this risk and inform patients about this.

## PO-069 A TWO-CASE COMPARISON: PREEMPTIVE AND PROPHYLACTIC USE OF DIRECT ANTIVIRAL DRUGS IN TRANSPLANTATION OF HCV-INFECTED KIDNEYS TO UNINFECTED PATIENTS

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**Introduction:** The organ shortage especially in blood group 0 forces transplant professionals to discuss new approaches to expand the donor pool. Recently, the successful therapy of HCV with direct antiviral agents in kidney transplanted patients has made the transplantation of HCV-infected kidneys to uninfected patients possible. We compare a preemptive and a prophylactic use of direct antiviral drugs in kidney transplantation patients.
**Methods:** We report the transplantation of two HCV-positive kidneys. One recipient was a female patient, who suffered from ESRD caused by an atypical hemolytic uremic syndrome. The other recipient had autosomal dominant polycystic kidney disease. Since the genotype of the HCV donor can be unknown at the time of transplantation, we decided to use the pangenotypic, fixed-dose combinations Glecaprevir/Pibrentasvir and Sofosbuvir/Velpatasvir.
**Results:** Both patients had blood group 0 and received an AB0-compatible kidney transplant. The initial immunosuppressive therapy consisted of prednisolone, mycophenolate sodium, and tacrolimus. The first patient was given Glecaprevir/Pibrentasvir immediately post-surgery and carried on for 8 weeks as a prophylactic approach. The graft started working on postoperative day four, and the serum creatinine decreased to 1.33 mg/dl on the discharge day and stabilized on this level during further follow-up. Following a preemptive approach, our second patient was treated with Sofosbuvir/Velpatasvir after detection of elevating viral RNA and rising levels of transaminases on post-transplant day 7. The graft started working on day 2, and the serum creatinine decreased to 1,28 mg/dl on the discharge day and stabilized on this level. Frequent HCV-PCRs showed negative results over six months in both patients.
**Conclusion:** We conclude that kidneys from HCV-viremic donors can be transplanted with precaution and both therapeutic strategies showed equally good results. Both methods can easily be implemented into kidney transplantation. We favor the prophylactic approach, because it minimizes the risk of an iatrogenic HCV-related hepatitis. Further studies are needed to find the optimal times with direct antiviral agents for HCV (D+/R−) transplantations.

## PO-070 CLINICAL FEATURES OF BK-POLYOMAVIRUS UND CYTOMEGALOVIRUS CO-INFECTION AFTER KIDNEY TRANSPLANTATION

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**Introduction:** BK Polyomavirus (BKPyV) and Cytomegalovirus (CMV) are the main viral pathogens affecting the graft and recipient outcome after allogenic kidney transplantation. It has recently been found that infection with both viruses has a greater impact on kidney graft function than a single infection.
**Methods:** We retrospectively analyzed a cohort of 723 recipients who received kidney transplantation between 2007 and 2015 after living and postmortal donation for differences in risk and outcome parameters regarding BKPyV (DNAemia) and CMV (CMV DNAemia) co-infection compared to sole viremias and to patients without viremia[1].
**Results:** Of all kidney allograft recipients in our cohort, 8.2 %of developed co-infection with BKPyV DNAemia and CMV DNAemia, 15.1 % showed BKPyV viremia alone and 25.2 % sole CMV DNAemia. Acute rejection was closely linked with co-infection (multivariable analysis, p=0.001). Despite the fact that the estimated glomerular filtration rate of patients with co-infection was noticeably reduced compared to patients with BKV or CMV infection alone, transplant survival and patient survival were only reduced by trend.
**Conclusion:** Co-infection with BKPyV and CMV in kidney transplanted patients is associated with inferior allograft function, higher viral loads and earlier onset compared to a single infection. Since co-infection is strongly associated with and could trigger acute rejection, co-infected individuals should be considered a risk collective.
**References:**
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## PO-072 SERIOUS ADVERSE EVENTS (SAE) AND SERIOUS ADVERSE REACTIONS (SAR) IN ORGAN DONATION AND SOLID ORGAN TRANSPLANTATION – GERMAN DATA 2019

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**Introduction:** The German organ procurement organization (Deutsche Stiftung Organtransplantation – DSO) coordinates organ donation and is responsible for the related process in Germany among them the workup of SAE/SAR. In 2019 3192 organs from deceased donors were transplanted in Germany. We report organ donation and transplanted related SAE/SAR submitted to the DSO in 2019
**Methods:** All incoming SAE and SAR from 1.1.2019 to 31.12. 2019 were assessed by a special team of qualified physicians of the DSO (SAE/SAR Team). All reports were classified as SAE or SAR according to the EU directive 2010/53/EU of July 2010. The imputability was graded according to EUSTITE and SoHO VS in proven, probable, possible, unlikely, excluded and not assessable.
**Results:** A total of 69 SAE and SAR reports were submitted, 53 reports (31 SAE and 22 SAR) concerned German donors and 16 reports (12 SAE and 4 SAR) donors from other countries. 43 (62 %) cases were classified as SAE, 26 (38%) cases as SAR. 8 (11,6%) reports were identified as proven / probable

transmissions of infectious or malignant diseases involving 11 recipients: 6 transmitted infections with one case of E. coli, Enterococcus faecium, VRE, HEV, Candida glabrata and Toxoplasma gondii respectively and 2 tumors involving kidney transplant recipients, one renal cell carcinoma and one urothelial carcinoma. One recipient died of an infection due to Toxoplasma gondii. The two kidney transplant recipients underwent partial / complete nephrectomy.
**Conclusion:** The number of reported SAE and SAR compared to the total number of donors and transplanted organs is low and only in the minority of cases transmission of a disease was probable or proven. The transparent 24/7 active SAE / SAR alerting system allows for a timely information of all transplant centers receiving organs from donors with potential risks for transmission of a disease thereby potentially reducing the impact for other organ recipients. Therefore an SAE /SAR alerting system seems to be crucial.

## KIDNEY TRANSPLANTATION I

### PO-073 ASSOCIATION OF NON-HLA ANTIBODIES AGAINST ENDOTHELIAL TARGETS AND DONOR-SPECIFIC HLA ANTIBODIES WITH ANTIBODY-MEDIATED REJECTION AND GRAFT FUNCTION IN PEDIATRIC RENAL TRANSPLANT RECIPIENTS – A RETROSPECTIVE STUDY

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**Introduction:** Antibody-mediated rejection (ABMR) is the major cause of graft loss in both adult and pediatric renal transplant recipients. The majority of these rejections are caused by preformed and/or *de novo* donor-specific HLA antibodies (HLA-DSA). However, there is a significant subset of patients with histological features of ABMR in the graft biopsy, in whom HLA-DSA cannot be detected in the circulation. Recently there are increasing efforts directed towards the detection and biological characterization of antibodies against other endothelial targets beside HLA.
**Methods:** We analyzed a carefully phenotyped cohort of 62 pediatric renal transplant recipients at increased risk of graft function deterioration. We examined at time of index biopsy the association of antibodies against the angiotensin II type 1 receptor ($AT_1R$), the endothelin type A receptor ($ET_AR$), the MHC class I chain-like gene A (MICA), and vimentin in conjunction with overall and complement-binding donor-specific HLA-DSA with graft histology and function.
**Results:** We observed a high prevalence (62.9%) of non-HLA antibody positivity. Seventy two percent of HLA-DSA positive patients showed additional positivity for at least one non-HLA antibody. Antibodies against $AT_1R$, $ET_AR$ and MICA were associated with the histological phenotype of ABMR. Based on the ROC-AUC values, $AT_1R$ antibody positivity showed the best predictive capacity for differentiating between histologically confirmed ABMR and non-ABMR biopsy phenotypes, followed by $ET_AR$ antibody positivity and MICA antibody positivity. The cumulative load of HLA-DSA and non-HLA antibodies in the circulation was related to the degree of microinflammation in peritubular capillaries. HLA-DSA, non-HLA positivity, eGFR at the time of index biopsy, proteinuria and arterial hypertension were assessed in a multivariate Cox regression model. Non-HLA positivity was an independent risk factor for graft function deterioration (adjusted hazard ratio 6.38, 95%CI, 2.11–19.3).
**Conclusion:** The combined detection of antibodies to HLA and non-HLA targets allows a more comprehensive assessment of the patients' immune responses against the renal allograft and will facilitate immunological risk stratification.
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### PO-075 PREDICTORS OF REJECTION ON RENAL TRANSPLANT RECIPIENTS UNDERGOING PROTOCOL BIOPSY FOR DE NOVO DONOR SPECIFIC ANTIBODIES

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**Introduction:** Development of de novo donor specific antibodies (DSA) is associated with an increased risk of antibody mediated rejection and graft loss. It is discussed controversially, however, whether detection of de novo DSA should prompt a biopsy in subjects without proteinuria or loss of GFR.
**Methods:** Three year single-center retrospective analysis of 34 renal transplant recipients undergoing protocol biopsy for de novo DSA. Diagnosis of antibody mediated rejection was established according to the contemporary Banff criteria (2013 or 2017). A biopsy was regarded as "protocol biopsy", if proteinuria was $\leq$ 300 mg/g and GFR loss was $\leq$ 10 ml/min in the past 12 months.
**Results:** 34 renal transplant recipients underwent a protocol biopsy for de novo DSA between 2016 and 2018. Mean age was 53.2$\pm$11.4 years, mean eGFR 39.3$\pm$16.9 ml/min, mean proteinuria 157$\pm$109 mg/g creatinine and mean time after transplantation 39.6$\pm$39.7 months. *n*=29 (85.3%) of the biopsies provided the diagnosis of rejection (17.2% Borderline, 17.3% cellular rejection, 51.7% antibody mediated rejection, 13.8 % combined). In a logistic regression model, neither age, MFI of DSA, HLA class I/II antibodies, nor time until detection of de novo DSA predicted the overall rejections or antibody mediated rejections ($p>0.05$ each).
**Conclusion:** In the present population protocol biopsies revealed allograft rejection in the majority of renal transplant recipients with de novo DSA. Neither the type or concentration of the DSA, nor the timepoint of detection provided further predictive information. These data render further support to the strategy of performing biopsies in subjects with de novo DSA irrespective of proteinuria and allograft function.

### PO-077 INDIVIDUALIZED CALCINEURIN INHIBITOR THERAPY BY SPECIFIC PHARMACODYNAMIC MONITORING

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**Introduction:** Several attempts have been undertaken to improve immunosuppressive treatment. One step to optimized immunosuppression might be an individualized calcineurin inhibitor (CNI) treatment based on adequate monitoring tools. Pharmacokinetic monitoring is well established in clinical practice but does not reflect the biological activity of the drug. Pharmacodynamic monitoring strategies have been used to directly measure the functional effects of CNIs.
**Methods:** 299 renal allograft recipients at the Transplant Center Heidelberg were included in this prospective observational study. 161 patients (85 CsA, 76 Tac) were on a stable immunosuppression consisting of CNI, mycophenolic acid and low-dose steroids. Pharmacodynamic monitoring was performed by assessment of the residual expression of NFAT-regulated genes, NFAT-RE (interleukin 2; interferon-y; granulocyte-macrophage colony-stimulating factor) in PMA/ionomycin-stimulated peripheral blood by quantitative real-time PCR at predose and 1.5 h after Tac or 2 h after CsA intake.
**Results:** Mean age was 51.6 (20–75) years (55.3% male). NFAT-RE showed a high inter-individual variability. Mean NFAT-RE in CsA was significantly lower compared to Tac (4.5% vs. 18.5%). CsA and Tac patients with high mean NFAT-RE were on increased risk of acute rejection episodes (Cut-offs: CsA >18%, Tac >30%), p=0.016 and 0.027, respectively. CsA patients developing de novo donor-specific antibodies had a mean NFAT-RE of 30% compared to 4% in patients without dnDSA (p=0.014). Tac patients with infections presented a lower NFAT-RE of 7% versus 20% in patients without infections (p=0.016).
**Conclusion:** Monitoring of NFAT-RE in CNI treated transplant recipients might be useful tool to detect patients on risk of rejection due to low immunosuppression and on risk of adverse events due to high immunosuppressive load. NFAT-RE provides an individual profile of response to CNIs.

## PO-078 THERAPEUTIC DRUG MONITORING (TDM) OF TACROLIMUS FROM CAPILLARY BLOOD MICROSAMPLES (CMS)

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**Introduction:** TDM of immunosuppressive drugs, e.g. tacrolimus, is an integral part of transplantation medicine. Critical dose drugs require regular monitoring to prevent graft rejection (underdosage) and severe adverse events including nephro-, cardiac or neurotoxicity (overdosage). Current standards for laboratory medical monitoring of transplant patients require venous blood sampling. This collection step is time-consuming and costly. Additionally, it involves a clinic visit. In contrast, capillary blood samples can be obtained by the patient and sent to the laboratory. Thus, CMS may facilitate TDM e.g. during the COVID-19 pandemic. Here we establish TDM of tacrolimus from CMS in order to increase the efficiency and outsource TDM of transplant patients.
**Methods:** Simultaneously collected venous and capillary blood was used as sample material. CMS was carried out by using a volumetric absorption microsampling device (VAMS) called Mitra (Neoteryx®, Torrance, CA). Laboratory analysis for tacrolimus was performed by a LC-MS/MS method, which has been established as routine in our laboratory for 20 years.
**Results:** Using capillary blood simplifies collection of material for TDM. Mitra VAMS standardize volume and allow shipment. Preliminary investigations of six renal transplant recipients comparing venous and capillary blood samples showed similar drug concentrations of tacrolimus (recovery 93.6% to 105.8%, figure). Percentage error was in an acceptable limit of −7.4% to 5.8% (mean percentage error of 4.1%). Additionally, a stability up to three weeks could be shown.
**Conclusion:** The use of capillary blood to perform TDM of tacrolimus leads to a significant improvement of the aftercare monitoring of transplant recipients. This enables a less invasive method, patient self-sampling from home and forward material to a specialized laboratory. Therefore, transplant patients can reduce visits to the clinic.

## PO-079 OUT-OF-THE-BLACK-BOX: STANDARDISATION OF THE ELISPOT METHOD FOR IMMUNOMONITORING IN PERSONALIZED IMMUNOSUPPRESSION AFTER SOLID ORGAN TRANSPLANTATION

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c: This collaborative work has received funding from the European Union Seventh Framework Programme FP7/2007–2013 undergrant agreement n° 305147BIO-DrIM, BIOmarker-Driven personalized Immunosuppression.

**Introduction:** Individual Immunotherapy for transplantation patients has been moved more and more into the focus of transplant centers, as individualized therapy approaches enable to minimize long-term side effects and increase the quality of life for the patients. The Enzyme-Linked ImmunoSpot assay (EliSpot) has become a powerful tool in solid organ and stem cell transplantation. In a European multicenter study, the Bio-DrIM project [c], the use of the EliSpot has been extensively evaluated with regard to monitoring of viral (Epstein-Barr Virus, EBV; Human Cytomegalovirus, HCMV and BK Virus, BKV) reactivation during immunosuppressive therapy after kidney transplantation.
**Methods:** The reference institute established SOPs and trained the attending sites. Additionally, EliSpot Reader Systems and EliSpot kits were extensively technical validated to guarantee that all centers reach the same results.
**Results:** A total of 21 plates with 1983 wells were counted. Linear regression of all 1983 pairs of values lead to a linear regression line with the equation y=1.026*x+0,06888 and a Pearson correlation coefficient $R^2$=9988, demonstrating the high concordance of each reader system.
To further demonstrate the extraordinary high standardization of the procedure, Inter- and Intra-Assay evaluation was performed. In the set of analyzed results the CV % varied under 20%, which is far below cellular assays specified by the FDA with 25%.
**Conclusion:** In conclusion, the combination of the EliSpot method with the EliSpot Reader System is a high-performance tool for diagnostics and monitoring of immunosuppression. Based on the high standardization potential, this state-of the-art technology will play an important role in diagnostic validation of next generation personalized therapy.

## PO-080 KLOTHO: PREDICTOR OF GRAFT FUNCTION AND GRAFT SURVIVAL

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**Introduction:** Allograft injury should be identified as soon as possible to improve long-term outcome after renal transplantation. Brain death is associated with immune activation, counterregulated by activation of the tryptophan pathway producing kynurenine (Kyn). High mobility group box 1 (HMGB1) is a nuclear factor released as an early mediator of repair, inflammation and destruction. Klotho (K) is a putative aging-suppressor and deficiency is involved in acute kidney injury and chronic kidney disease. In a retrospective study, we compared HMGB1 and Kyn with K in renal transplantation.
**Methods:** Klotho was determined in normal controls ($n$=189; mean age 41±13y) and patients after renal transplantation ($n$=163) (mean age 41±11y, duration of dialysis 40±23 months). Furthermore sera from 97 organ donors (mean age 38.4±12 y.) and 289 sera from patients with chronic kidney disease (CKD, mean age 49.6 + 16 y.) could be evaluated. Klotho and HMGB-1 measurements were done by using an ELISA-kit (Cloud-Clone™, JBL™). For Kyn measurements a colorimetric assay was developed.
**Results:** In CKD patients measurements of K showed significant differences between the stages of CKD (eGFR >90, mean K=389 pg/ml; eGFR 30–59, mean K=329 pg/ml; eGFR <30, mean K=289 pg/ml). Low K values in donors were correlated with minor renal function as well as minor graft survival (p>0.001). HMGB-1 was significant elevated in donors whose transplanted organs showed delayed renal function (DGF). HMGB1 was positive correlated ($r^2$=0,718) to the days until creatinine felt <200 μmol/l (9,66±10 (PF) vs. 25,8±14 (DGF); p<.001). In 24 % of the donors Kyn was elevated (+3s) in contrast to IL-6 and CRP. If Kyn values were <3s in the postoperative period between week 3 and 7, long-term function (10 years) was significantly better (71% vs. 31%).
**Conclusion:** Kyn showed an excellent correlation to rejection and long term-function. Elevated HMGB-1 indicates the grade of injury. HMGB-1 and Klotho are predictive marker of graft injury. Klotho showed early predictive values concerning early renal graft failure and the future long-term outcome. All three parameter could be estimated in saliva which might be an advantage concerning monitoring especially for klotho.

## PO-081 EARLY RISK STRATIFICATION BY TACROLIMUS CONCENTRATION-TO-DOSE RATIO AND PREDICTION OF OUTCOMES AFTER KIDNEY TRANSPLANTATION

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**Introduction:** There is emerging interest in the concentration-to-dose (C/D) ratio of tacrolimus (Tac) as it is linked to outcomes after renal transplantation (RTx). Recently, we were able to show that calculation of the C/D ratio three months after RTx in stable patients allows for risk stratification into slow (≥1.05 μg/L x 1/mg) and fast (<1.05 μg/L x 1/mg) Tac metabolizers, the latter being at increased risk of calcineurin-inhibitor nephrotoxicity and decreased five-year patient and graft survival. Classification by the 3-month C/D ratio proved to be stable beyond the third postoperative month. To identify patients who may profit from a modification of the immunosuppressive regime as early as possible, we questioned if the C/D ratio can be reliably calculated within the first days after RTx.
**Methods:** We retrospectively analyzed 882 patients after RTx between January 2007 and December 2017. The C/D ratio was calculated for each of the first ten postoperative days in cases of available Tac trough level and dosage data and used to categorize patients. C/D ratio cut-off values were calculated for each day based on ROC curve analysis and identification of the Youden-index maximum.
**Results:** We found a C/D ratio of 0.87 on the third day after RTx to allow the best prediction (in comparison to all other postoperative days) of the 3-month Tac metabolism type. However, using this cut-off, the outcomes of slow and fast metabolizers, including patient and graft survival, acute rejections and incidence of delayed graft function, were comparable showing the absent discriminative power of the early C/D ratios after RTx.
**Conclusion:** While the C/D ratio calculated three months after RTx is a simple and valuable tool for risk stratification of RTx patients, the C/D ratio calculation within the first ten days does not predict neither the long-term metabolism type nor the outcome after RTx. Tac clearance is (too) strongly influenced by the posttransplant day which finds its reasoning in e.g. changes in gastrointestinal mobility, albumin, hematocrit, and steroid dosing. Further studies should evaluate whether combined C/D ratios of more than one day or at later time points provide better performance.

PO-082

## COMPUTATIONAL SIMULATIONS TO EVALUATE THE FEASIBILITY OF KIDNEY PAIRED DONATION IN HIGHLY HLA SENSITIZED PATIENTS

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**Introduction:** About one-fifth of patients on the Eurotransplant (ET) kidney waiting list (WL) have current PRA levels above 5% due to previous sensitization events. This is particularly a problem, if the patient has a suitable yet HLA incompatible living donor candidate. In this study we used computer simulations to estimate transplantation pair numbers that can be expected by a local kidney paired donation (KPD) program considering different WL sizes.
**Methods:** A prototypic kidney paired donation platform (KeyPaD) was implemented. The applied allocation algorithm uses a graph data structure to find globally optimal allocations with circles of different sizes. For the purpose of this study the algorithm was configured to a circle size of two (i.e. paired donation). In repeated simulations virtual WLs of HLA incompatible transplant pairs based on NMDP HLA haplotype frequencies and ET-reported demographics were generated and allocation of all participants was carried out. Patient sensitization considered donor HLA type and eplet frequencies. The quality of a network generated by an allocation run was evaluated by the percentage of patients with a compatible donor being allocated.
**Results:** As a baseline, non-immunized transplant pairs were allocated with (A) blood group compatible pairings and with (B) enforced blood group identity. As expected, these scenarios mostly yield extensive networks independent of the WL size (A: 83%, SD: 11%; B: 67%, SD: 12%; at $n$=18). Considering blood group identity and minimal immunization causing the donor candidate being HLA incompatible, the average network size decreased to 54% (SD: 16%). With increasing numbers of HLA incompatibilities, the expected network size further reduces (~30% PRA: 28%, SD: 15%; ~70% PRA: 10%, SD: 10%; ~100% PRA: 2%, SD: 2%), requiring large WLs to find any transplantation pairs. Simulations with varying patient numbers suggest a logarithmic correlation with network size.
**Conclusion:** Our simulations show the potential of KPD to increase local transplant numbers with short WLs of e.g. individual centers. However, it remains challenging to find compatible donors for highly immunized patients even when considering KPD with combined WLs.

PO-083

## IMPROVED GLUCOSE METABOLISM IN PATIENTS ON KIDNEY TRANSPLANT WAITING LIST AFTER RECOMMENDATION FOR LIFESTYLE INTERVENTION – A 4-YR FOLLOW-UP

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**Introduction:** Diabetes mellitus (DM), whether pre-existing or developing after kidney transplantation (PTDM), significantly impairs patient and allograft outcome. Prediabetes prior to transplantation has been shown a key risk factor for PTDM. We have previously shown that 33% of patients on kidney transplant waiting list have unknown disturbances in glucose metabolism. Here we present 4 yr. follow-up data of these patients, after having recommended lifestyle intervention.
**Methods:** Glucose metabolism was assessed in $n$=138 patients on the waiting list in 2013. Patients with newly diagnosed prediabetes or diabetes were recommended to perform lifestyle intervention (increase in physical activity and dietary modification). In 2017, a follow-up investigation of patients on the active waiting list at the Tübingen Collaborative Transplant Center was performed ($n$=134). On both occasions, glucose metabolism was assessed via OGTT and HbA1c and patients were classed into normal glucose tolerance (NGT), prediabetes or diabetes.
**Results:** Of the patients on the waiting list in 2013, $n$=75 had received a kidney allograft until 2017. 22 patients had to be removed due to medical conditions, 91 patients were new entries on the waiting list. In total, $n$=41 patients have remained on the waiting list since 2013 and follow-up data were available. Of those with diabetes or prediabetes, 39% were able to improve glucose metabolism after lifestyle intervention. In total, 53% of all patients remained stable, whereas in 12%, glucose metabolism worsened.
**Conclusion:** Lifestyle intervention is a powerful tool to improve glucose metabolism, also in dialysis patients on kidney transplant waiting list, even outside a structured lifestyle intervention programme. The time on the waiting list is not just passive waiting time but can successfully be used to improve settings for a future transplantation.

PO-084

## DESPITE ADEQUATE GRAFT FUNCTION ONLY A MINORITY OF PATIENTS HAVE NORMAL IPTH LEVELS ONE YEAR AFTER KIDNEY TRANSPLANTATION

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**Introduction:** Hyperparathyroidism (HPT) after kidney transplantation is associated with higher risk of graft loss and death(1). It is assumed that high iPTH after transplantation is mainly caused by reduced kidney function(2).
**Methods:** To elucidate if kidney function is the main reason for persisted HPT we compared 23 kidney transplant patients with an eGFR >=49 ml/min/1.73qm one year post transplantation with 10 kidney donors with a comparable kidney function after donation.
**Results:** Donors and recipients did not differ in age (51 vs. 46 years; p=0.25) or kidney function one year after transplantation or donation. eGFR in the donors was 63.6 compared to 63.0 in the recipients (p=0.88). Despite comparable kidney function iPTH was significantly higher in the recipients (120 vs. 21 pg/ml, p<0.001). Only one donor had iPTH above the norm (105 pg/ml) while only five of 23 recipients had a normal iPTH. Three of five recipients with normal iPTH had received a parathyroidectomy before transplantation and had a normal iPTH before transplantation, too. In patients with HPT pre transplantation there was no correlation of pretransplant iPTH levels with levels one year post transplant. Time on dialysis was slightly but not significantly longer in patients with higher pretransplant iPTH levels (4.7 vs. 3.9 years).
**Conclusion:** In most kidney transplant patients iPTH does not normalize one year after kidney transplantation despite adequate kidney function. Patients with well controlled HPT by parathyroidectomy before transplantation keep normal iPTH levels post transplantation. Since donors with the same kidney function did not develop sHPT after donation, kidney function cannot be the only predictor for persistent HPT post kidney transplantation.
**References:**
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## KIDNEY TRANSPLANTATION II

PO-088

## OUTCOME OF KIDNEY TRANSPLANTATION FROM LIVING DONORS WITH MULTIPLE RENAL ARTERY GRAFTS VERSUS SINGLE RENAL ARTERY GRAFTS

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**Introduction:** It is questionable whether living related kidney transplantations using a multiple renal artery graft (MRA) generate a poorer outcome than using a single renal artery graft (SRA). In a systematic review and meta-analysis, MRA grafts were associated with a higher risk of complications and delayed graft functions but had comparable long-term outcomes for graft and patient survival [1]. As the main objective of the present study, we analysed the correlation between the vascular supply and the outcome after living related kidney transplantation.
**Methods:** In total, 205 patients from one hospital were examined: 87 women (42.4%) and 118 men (57.6%), 51 years (±10.8), 173.3 cm (±10.4), 77.1 kg (±15.4) and BMI 26 kg/m$^2$ (±3.9). In this population, there were 36 MRA (17.6%) and 169 SRA (82.4%) grafts. Mean outcome measures were delayed graft function, total and warm ischaemic time, creatinine on the day of hospital discharge and 1, 2, 3, 4 and 5 years postoperative. Statistical analysis was performed using contingency tables and subgroup analyses.
**Results:** While the outcome parameters show no dependence on the vascular supply, the warm and overall ischaemic times are related to the number of renal arteries. Recipients with MRA grafts present a significantly longer total (231±58 min vs. 199±49 min, p<0.001) and warm (53±17 vs. 44±19,

p=0.004) ischaemic time than SRA graft recipients. Short- and long-term outcomes defined by creatinine level are unrelated to the vascular supply. Median creatinine did not differ significantly at hospital discharge (MRA 1.93±2.1 mg/dl vs. SRA 1.76±1.3 mg/dl, p=0.726), 1 year's (1.5±0.5 vs. 1.69±1.1, p=0.773), 2 years' (1.43±0.4 vs. 1.61±0.7, p=0.640), 3 years' (1.44±0.5 vs. 1.55±0.6, p=0.711), 4 years' (1.47±0.5 vs. 1.55±0.6, p=0.946) and 5 years' postoperative (1.51±0.6 vs. 1.62±0.8, p=0.901). The delayed graft function rate did not significantly differ between MRA and SRA groups (19.4% vs. 14.2%, p=0.445).
**Conclusion:** The number of renal arteries in living kidney donation is not related to the graft function after transplantation in our population. Therefore, using MRA grafts is a safe alternative to expand the number of potential organs.
**References:**
[1] Zorgdrager M, Krikke C, Hofker SH, Leuvenink HG, Pol RA. Multiple Renal Arteries in Kidney Transplantation: A Systematic Review and Meta-Analysis. Ann Transplant. 2016;21:469–478.

## PO-089 PREVENTIVE FENESTRATION CAN REDUCES THE TYPE C LYMPHOCELE AFTER KIDNEY TRANSPLANTATION

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**Introduction:** Lymphatic collections are common surgical complications following Kidney transplantation (KTx). Lymphoceles after KTx remain a challenging complication that requires long-term postoperative interventions. The purpose of this study was to evaluate the outcome of preventive fenestration at the time of KTx in prevention of lymphocele after KTx.
**Methods:** Clinical data of 1239 KTx recipients operated between January 2001 and December 2011 were reviewed for incidence of lymphocele after KTx. Preventive fenestration was performed for KTx patients as a routine procedure between 2008 and 2011 for 488 adult recipients, from which Sixty-two developed lymphocele and were included in the preventive fenestration group. Of a total of 579 adult KTx patients operated before this time (from January 2001 to December 2007, without preventive fenestration), 83 developed lymphocele, and were included in the control group. Patients' data including details of lymphocele management and recurrence were analyzed.
**Results:** The mean recipient age was 52.6±13.7 and 33.8% of patients were female. Reduced but nonsignificant rate of total lymphocele after KTx were detected in the preventive fenestration group (p 0.438 and 0.518 respectively). The necessity of surgical intervention was significantly less in patients in the preventive fenestration group (p 0.007). Multivariate analysis revealed that, preventive fenestration is associated with 66% reduction of lymphoceles requiring surgical management (odds ratio [OR] 0.334, 95% Confidence interval [CI] 0.153–0.730, p=0.006). Furthermore, peritoneal dialysis and implantation of the kidney in the left fossa were shown to be associated with necessity of surgical management of PKTL (OR 2.842, 95%CI 1.354–5.967, p=0.006 and OR 3.614, 95%CI 1.215–10.747, p=0.021 respectively).
**Conclusion:** The results of this study showed that, preventive fenestration may reduce rate of post forms of KTx lymphocele, that require surgical management. Effectiveness and risks of this preventive method have to be evaluated in a randomized trial setting.

## PO-090 DA VINCI DONOR NEPHRECTOMY: PRELIMINARY RESULTS OF THE HEIDELBERG EXPERIENCE

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**Introduction:** The usage of robotic assisted system in the field of transplant surgery is accompanied by increasing the number of living related donor nephrectomies and decreasing the complications. We investigated the safety of donor nephrectomy using the da Vinci Xi Robot System in our division of General, Visceral, and Transplantation Surgery at the University of Heidelberg.
**Methods:** We performed donor nephrectomy with the da Vinci Xi Robot System. Four robotic ports were placed under direct vision in a linear fashion at the lateral border of the rectus muscle. Explantation procedure was performed in a standardized technique. Finally, the graft was extracted through a low transverse suprapubic (Pfannenstiel) incision. All operations were performed by single surgeon.
**Results:** Thirteen patients with mean age of 55±8.57 years underwent robotic-assisted donor nephrectomy. Mean operation time was 246±41.8 minutes and median intraoperative blood loss was 152 (30–350) ml. Also mean warm ischemia time was 12.3±7.5 minutes. No intra- and postoperative major complication was observed, and none of the patients died during follow-up period.
**Conclusion:** Da Vinci Xi surgical system facilitates the donor nephrectomy under optimal and safe operative conditions. Since this is our early experience with initial cases, studies with larger samples and long term follow up of donors and recipients are required to define the safety and efficacy of this procedure.

## PO-094 RENAL TRANSPLANTATION IN PATIENTS WITH POLYCYSTIC KIDNEY DISEASE: RISKS AND BENEFITS – MULTIVARIATE ANALYSIS AND CASE CONTROL STUDY

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**Introduction:** Autosomal dominant polycystic kidney disease (ADPKD) is the most frequent hereditary disease causing end stage renal failure. Clinically, severe cystic infections often cause hospitalization and thus may limit patient or graft survival. Here, we analyzed the long-term risk factors for death, graft failure and urinary tract infection (UTI) in patients with ADPKD following renal transplantation and compared this group to a matched control group.
**Methods:** We identified 193 patients with a diagnosis of ADPKD, who had received a renal transplant at our center between 01.01.2000 and 01.11.2017. Using multivariate analysis, we identified risk factors for death, graft failure and UTIs leading to inpatient treatment. For the matched-pair study, ADPKD patients were matched with control patients with respect to age at transplantation, recipient gender, date of transplantation, donor type and rejection episodes.
**Results:** The median observation time was 72 months (IQR: 38–118). Among the ADPKD group 33 (17%) patients died, in 42 (22%) patients graft failure occurred, and 86 (45%) patients experienced UTI or urosepsis causing hospitalization. Multivariate analysis revealed recipient age, recipient gender, donor type and rejection episodes as significant ($p<0.01$) risk factors for UTI / urosepsis. Matched-pair analysis showed that patient survival (83% vs. 77%, p=0.16) and graft survival (78% vs. 70%, p=0.08) were not different between groups, whereas the prevalence (45% vs. 32% of patients, p=0.008) and number (1.19 vs. 0.69 per patient, $p<0.001$) of UTIs / urosepsis was higher in ADPKD patients as compared to controls.
**Conclusion:** A diagnosis of ADPKD is a significant risk factor for urosepsis / severe UTI leading to hospitalization. Nevertheless, we observed no significant difference in patient and graft survival between patients with ADPKD as compared to patients with other underlying renal diseases. Recipient age, female gender, rejection episodes and deceased donor type significantly increased the risk of UTI / urosepsis in ADPKD patients. The question, whether or not uni- or bilateral nephrectomy should be performed, needs to be evaluated further.

## TRANSPLANTATION IMMUNOLOGY

## PO-095 *IN SILICO* SIMULATIONS DEMONSTRATE THE BENEFIT OF HLA EPITOPE MATCHING FOR KIDNEY ALLOCATION

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**Introduction:** The allocation of donor organs to the best-matched recipients is crucial for an event-free long-term renal allograft outcome. Nowadays, the allocation of donor kidneys within Eurotransplant (ET) is inter alia based on antigen matching for HLA-A, -B and –DR. However, it is well accepted that HLA epitopes, comprising only a limited number of amino acids, are the immunogenic counterparts for the recipient's immune system. Thus, matching for HLA epitopes instead of antigens is hypothesized to be a more appropriate measure for the immunogenicity of an organ and may improve the immunological allograft outcome when implemented in the allocation algorithm. Here, we demonstrate the feasibility and benefit of an epitope- vs. antigen-based allocation algorithm using real world data.
**Methods:** Computer simulations of the established ET Kidney Allocation System (ETKAS) vs. an epitope-based allocation algorithm were initiated using anonymous recipient, donor and transplant data from ET in the period 2006–2019. Both simulations only differed in the antigen vs. epitope-based matching component maintaining all other components (e.g. waiting time, country balance

etc.). Each simulation was benchmarked by the number of transplants per year, HLA match, epitope match, country balance and organ exchange rate.
**Results:** Epitope matching lead to a more evenly distributed antigen matching (0 – 6 mismatches) while at the same time intentionally decreased the overall epitope load. The epitope load could be improved/reduced by >30%. The number of transplants per year and country was equivalent. However, epitope matching seemed to provoke an increase in organ exchange activities over all members of ET. These data confirmed previously reported data on a virtual waiting list cohort.
**Conclusion:** Implementation of epitope matching to substitute conventional antigen matching within ETKAS significantly decreases the average epitope load per transplantation, promotes international organ exchange and decreases waiting time to transplantation. It can be projected that the decrease in epitopes as potential triggers for an alloimmune response reduces the risk for *de novo* DSA formation and premature kidney allograft dysfunction.

## PO-096 INTERLEUKIN-21 – A NEW PLAYER IN ALLOGRAFT REJECTION?

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**Introduction:** The T-cell cytokine interleukin-21 (IL-21) promotes the expansion and cytotoxic activity of T-cells and natural killer (NK) cells. As such, it can drive key effector mechanisms related to allograft rejection. Our aim was to determine if IL-21 expression is elevated within allografts during allograft rejection and if serum IL-21 is related to graft rejection and survival.
**Methods:** We used a fully MHC-mismatched rat kidney transplant (Ktx) model with subtherapeutic immunosuppression (cyclosporine A 5 mg/kg/2d) to allow rejection. We measured intrarenal leukocyte subsets including T cells and NK cells by flow cytometry. Allograft expression of IL-21 and T- and NK-cell markers were analyzed by qRT-PCR. Allograft rejection was evaluated by a nephropathologist according to Banff criteria. Furthermore, the IL-21 concentration was measured in serum samples from a retrospective cohort of 104 kidney transplant recipients from our center. Clinical data was collected regarding demographic characteristics, allograft rejection, graft failure and death.
**Results:** Intra-graft IL-21 expression was elevated in rejecting allografts and was closely linked to the number of T-cells and NK cells in kidney allografts in rats. IL-21 expression also mirrored the degree of allograft rejection according to the Banff classification. In addition, allograft rejection was more frequent in Ktx patients with measurable IL-21 than in Ktx patients without measurable IL-21.
**Conclusion:** Our experiments showed that IL-21 is elevated during allograft rejection and is associated with T-cell and NK cell infiltration into allografts. IL-21 may be an important mediator of allograft rejection and a novel target for pharmacological intervention in kidney transplantation.

## PO-098 18F-GE-180 PET/CT REVEALED REDUCED MICROGLIAL ACTIVITY IN LIVER TRANSPLANTED PATIENTS WITH LONG-TERM IMMUNOSUPPRESSIVE THERAPY

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We would like to thank the colleagues from the Department of Anaesthesiology and Intensive Care Medicine of the Hannover Medical School, especially Carolin Jung and Lukas Hinken, for their excellent assistance.

**Introduction:** Besides acute neurotoxic side effects, Calcineurin inhibitors (CNI) can also cause long-term effects on brain function such as slowly progressing cognitive decline. One possible pathogenetic mechanism is that long-term CNI therapy affects the cerebral immune system. This prospective study used PET imaging with the third-generation translocator protein (TSPO) radio-ligand 18F-GE-180 to evaluate microglial activity in patients after liver transplantation.
**Methods:** Twenty-two liver transplanted patients (3 with CNI free, 9 with low dose CNI and 10 with standard dose CNI treatment) and 9 healthy controls were included. Subjects were categorized as low, mixed or high affinity binders (LAB, MAB, HAB) based on the TSPO genotype. Dynamic 18F-GE-180 PET/CT was performed including arterial blood sampling and measurement of radioactive metabolites in blood. The total 18F-GE-180 distribution volume (VT) was estimated in 12 cortical and subcortical volumes of interest (VOIs) using the invasive graphical Logan method with the metabolite-corrected arterial input function. VT was related to TSPO genotype, CNI therapy group and cognitive function (Repeatable Battery for the Assessment of Neuropsychological Status total scale).
**Results:** VT was about 80% higher in HAB controls ($n$=5) compared to MAB controls ($n$=3, $p<0.0005$). Mean VT corrected for TSPO genotype and VOI was 14% lower in patients compared to controls ($p=0.001$). The reduction was most prominent in patients in whom CNI dose had been reduced previously because of side effects on renal function. There was no association between VT and cognitive performance.
**Conclusion:** These findings support the hypothesis that long-term CNI therapy leads to chronic suppression of microglial activity in liver transplanted patients. The suppression might be an indicator for higher sensitivity to CNI toxicity and potentially relevant for patient management.

## PO-099 DISRUPTION OF TFH:B CELL CROSSTALK PREVENTS ANTIBODY-MEDIATED REJECTION IN AN EXPERIMENTAL KIDNEY TRANSPLANT MODEL

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**Introduction:** Antibody-mediated rejection (AMR) is a major cause of renal allograft failure. We aimed to examine T follicular helper cell and B cell crosstalk in secondary lymphoid organs during rejection in a renal transplant model.
**Methods:** We used a full MHC-mismatched rat renal transplant (Rtx) model and used low dose cyclosporine A (CsA 5 mg/kg/d, "loCNI") to permit formation of donor-specific antibodies (DSA) and allograft rejection. High dose CsA (10 mg/kg/d,"hiCNI") was used for non-rejection. We measured DSA and leukocyte subsets by flow cytometry. Germinal centers (GC), T follicular helper cells (Tfh) and plasma cells, as well as IL-21 expression, were measured by immunofluorescence microscopy. Expression of T cell and B cell molecules was determined using qRT-PCR. Renal allograft rejection was assessed by a nephropathologist in a blinded manner.
**Results:** HiCNI blocked DSA generation and prevented AMR. Formation of GC and activated Tfh, was strongly inhibited by hiCNI treatment and resulted in lower numbers of plasma cells and memory B cells. Expression of B cell activating molecules, such as CD40 ligand, ICOS and the Tfh cytokine IL-21 was strongly inhibited in hiCNI, but not in loCNI. In comparison, other T cell cytokines were less profoundly affected. Tfh-cell promoting factors ICOS ligand and IL-6 were also reduced in hiCNI compared to loCNI.
**Conclusion:** Several important axes of Tfh:B cell crosstalk were inhibited by hiCNI treatment. This prevented B cell activation in germinal centers and blocked formation of donor-specific antibodies and development of antibody-mediated rejection. T follicular helper cells are important targets for the prevention of antibody mediated rejection.

## PO-101 BLOCKADE OF NEUTROPHIL TRANSENDOTHELIAL MIGRATION AMELIORATES INFLAMMATORY GRAFT INJURY IN A MODEL OF PORCINE KIDNEY AUTOTRANSPLANTATION

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**Introduction:** Ischemia reperfusion injury (IRI) an inherent and unavoidable event following solid organ transplantation, characterized by a robust inflammatory response involving graft endothelial cell activation and host neutrophil transendothelial migration (TEM) into the graft. The intensity of this initial inflammatory state critically impacts short- and long-term complications. Therefore, new strategies are urgently needed to ameliorate the unavoidable IRI in kidney transplantation, with Bryostatin-1 (a protein kinase C delta blocker) being a most promising candidate.
**Methods:** A porcine kidney autotransplantation model with 20 hours of standard cold storage time was used, during which kidneys were preserved

with histidine-tryptophan-ketoglutarate (HTK)-solution either supplemented with 100 nM Bryostatin-1 or vehicle. Reperfusion period was 8 h and the post IRI inflammatory state was evaluated in cortical renal biopsies as well as blood and urine samples.
**Results:** Primary endpoint was the degree of graft neutrophil infiltration over the acute 8-hour course of renal IRI. By measuring myeloperoxidase activity (MPO), it was found that graft specific treatment with Bryostatin-1 during cold storage significantly reduced IRI-elicited TEM. The reduced inflammatory state was also evident by lowered systemic levels of interleukin 8. In addition, Bryostatin-1 ameliorated the morphological degree of renal IRI, evident by reduced histological injury and improved electron microscopy score. No significant changes were noted when comparing renal injury markers in urine.
**Conclusion:** Bryostatin-1 is a promising pharmacological agent to ameliorate one of the key steps in the detrimental cascade or IRI-elicited inflammation, neutrophil TEM. It is also encouraging that this compound was able to elicit graft specific effect based on the treatment during static cold storage.

## PO-102 EVALUATION OF CLINICAL AND IMMUNOGENETIC PARAMETERS ON THE OUTCOME OF PAIRED KIDNEY TRANSPLANTS – A PILOT STUDY

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**Introduction:** Donor specific HLA-antibodies (DSA) after transplantation are a risk factor for humoral renal allograft rejection. Using high resolution HLA typing of donor and recipient allows HLA-epitope matching which has been shown recently to be predictive for the development of de novo DSA[1]
**Methods:** We have analysed retrospectively the clinical outcome of recipients of paired kidneys based on HLA-high resolution typing and eplet analysis. Overall 10 patients (3 female, 7 male) transplanted between 2014 and 2015 (age 36 to 72 y) were included.
Routine monitoring for HLA class-I and HLA class-II Ab was performed by Single Antigen Bead (SAB) Assay (One Lambda, Thermo Fisher) Epitope analysis was performed using the EpitopMatching program (HLA Matchmaker Epitope Library Aug 2017)
**Results:** Cold ischemia times in our cohort of paired kidneys were short namely under 12 hours and we observed no differences in longterm clinical outcome, s-creatinine levels three years post-transplantation were <2 mg/dl. There was no correlation between the number of HLA-A-B-DR-DQ-Mismatche and transplant function.
1 patient developed de novo donor specific HLA antibodies (DQ5 and DQ6 MFI>3000) which led to acute renal failure. Acute humoral rejection was diagnosed by biopsy. The patient responded with partial recovery of renal function to antirejection therapy consisting of plasmapheresis, high dose ivIG and steroids. Longterm transplant function is stable now for >4 years after the rejection episode without detection of the former DSA.
**Conclusion:** Our group of paired kidney transplants did show good clinical outcomes. De novo DSA and humoral rejection was observed in one patient with a low Epitope MM score. However clinical improvement could be achieved in this patient with antirejection therapy. Further studies in a larger cohort of paired kidney transplants at our center are ongoing to investigate whether Eplet matching could serve as a predictor for the occurrence of humoral rejection but also for the response to antirejection therapy.
**References:**
[1] "Class II Eplet Mismatch Modulates Tacrolimus Trough Levels Required to Prevent Donor-Specific Antibody Development" C. Wiebe et al.

## MACHINE PERFUSION

## PO-103 TRANSIENT HYPERTHERMIA DURING OXYGENATED REWARMING OF ISOLATED RAT LIVERS

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**Introduction:** Pre-transplant machine perfusion of donor grafts has gained clinical appreciation to improve graft function and survival after transplantation. This study was aimed as pilot investigation to evaluate the additive potential of a transient *ex vivo* heat shock treatment of the isolated organ during machine perfusion to further protect the graft from subsequent reperfusion injury.
**Methods:** Rat livers were retrieved after 20 min of cardiac arrest and preserved for 18 hours by cold storage in HTK solution. Prior to reperfusion, livers were subjected to 2 hours of reconditioning machine perfusion with gradual increase in perfusion temperature up to 35°C. In half of the livers ($n$=7), a brief hyperthermic impulse (10 min perfusion at 42°C) was implemented in the machine perfusion period. Functional recovery of the grafts was observed upon normothermic reperfusion *in vitro*.
**Results:** Induction of heat shock protein 70 was followed on the mRNA and protein level. Chaperone induction by transient hyperthermia was associated with a significant improvement of bile production upon reperfusion and significantly reduced enzyme loss of mitochondrial GLDH. Heat shock treatment further affected pro-inflammatory upregulation in the graft in significantly reducing gene expression as wells as protein release of TNF-alpha.
**Conclusion:** It is concluded, that graft conditioning by controlled hyperthermia *ex vivo* may represent a feasible and useful tool to improve liver recovery after preservation.
**References:**
[1] von Horn, C and Minor, T, Transient hyperthermia during oxygenated rewarming of isolated rat livers, *Transpl Int* 2020; 33: 272–78.

## PO-104 DECREASE OF RENAL RESISTANCE DURING HYPOTHERMIC OXYGENATED MACHINE PERFUSION IS ASSOCIATED WITH EARLY ALLOGRAFT FUNCTION IN EXTENDED CRITERIA DONATION KIDNEY TRANSPLANTATION – A PROSPECTIVE PILOT STUDY

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**Introduction:** Hypothermic oxygenated machine perfusion (HOPE) was recently tested in preclinical trials in kidney transplantation (KT). Here we investigate the effects of HOPE on extended criteria donation (ECD) kidney allografts (KA) in human KT.
**Methods:** Fifteen ECD-KA were submitted to 152±92 minutes of end-ischemic HOPE and were compared to a matched group of 30 patients (1:2 matching) undergoing conventional cold storage (CCS) KT. Primary (delayed graft function-DGF) and secondary (postoperative complications, duration of hospital stay, six-month graft survival, perfusion parameters) endpoints were analyzed within a six-month follow-up.
**Results:** There was no difference in the development of DGF between the HOPE and CCS groups (53% vs. 33%, respectively; p=0.197). Serum urea was lower following HOPE compared to CCS (78±32 mg/dl vs. 103±26 mg/dl; p=0.003), whereas the CCS group displayed lower serum creatinine and higher eGFR rates on postoperative days (POD) 7 and 14. A relativedecrease of renal vascular resistance (RR) following HOPE showed a significant inverse association with serum creatinine on POD1 ($r$=−0.682; p=0.006) as well as with serum urea levels (POD 4, 5, 6, 14) and eGFR (POD 1, 2). Besides, the relative decrease of RR was significantly higher in KA with primary function when compared to KA with DGF (54±16% vs. 25±15% p=0.013). No significant difference was observed in death censored six-month graft survival (93% vs. 100%, respectively; p=0.333)
**Conclusion:** Here we provide preliminary clinical evidence on HOPE in ECD-KT after brain death donation (DBD). The relative decrease of renal vascular resistance as a novel marker to better predict post-transplant allograft function may be an important parameter for real-time viability assessment of HOPE-treated kidney allografts. Further validation in randomized controlled clinical trials is warranted.
**Trial Registration:** clinicaltrials.gov (NCT03378817)

## PO-105 USE OF THE NEW PRESERVATION SOLUTION CUSTODIOL-MP FOR *EX VIVO* RECONDITIONING OF KIDNEY GRAFTS

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**Introduction:** Organ shortage and the increasing use of extended criteria donor grafts for transplantation drives efforts for more efficient organ

preservation strategies from simple cold storage towards dynamic organ reconditioning. The choice of a suitable preservation solution is of high relevance in different organ preservation or reconditioning situations. Custodiol-MP is a new machine perfusion solution giving the opportunity to add colloids according to organ requirements. The present study aimed to compare new Custodiol-MP with clinically established Belzer MPS solution.
**Methods:** Pig kidneys were ischemically predamaged and cold stored for 20 hours. *Ex vivo* machine reconditioning was performed either with Custodiol-MP or with Belzer MPS solution for 90 minutes with controlled oxygenated rewarming up to 20°C. Kidney function was evaluated using an established *ex vivo* reperfusion model.
**Results:** In this experimental setting differences between both types of perfusion solutions could not be observed. Machine perfusion with Custodiol-MP resulted in slightly higher creatinine clearance and less TNC perfusate levels, although differences did not reach significance.
**Conclusion:** For short-term kidney perfusion Custodiol-MP is safe and applicable and provides the unique feature of flexible colloid supplementation, making it attractive in specific experimental and clinical settings.

## PO-107 HYPERSPECTRAL IMAGING OF PORCINE KIDNEYS DURING NORMOTHERMIC EX VIVO PERFUSION – AN ANALYSIS OF TISSUE-RELATED RENAL ISCHEMIA INJURY

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**Introduction:** The preservation and conditioning of kidneys using normothermic machine perfusion (NMP) generate promising results in terms of improved graft function, organ utilization and viability assessment. The provision of a near-physiologic environment enables the maintenance of kidney metabolism and function. This allows the analysis of both injury biomarkers and physiological biomarkers. Investigations concerning the quantitative assessment of physiological tissue parameters lack in this context. Hyperspectral imaging (HSI), a novel optical method combining imaging and spectroscopy, has the potential to monitor the tissue composition ex vivo. The aim of this study is to show the potential of HSI for the measurement of renal tissue parameters during NMP.
**Methods:** Porcine kidneys were exposed to different times of warm and cold ischemia. Afterwards, the kidneys were preserved for four hours in an NMP circuit which enables whole-blood perfusion of isolated organs at physiological oxygen fraction, blood flow rates and body temperature. Kidney images were obtained by a visible-near-infrared HSI camera (500–995 nm) before, during and after the preservation period. Suitable calibration and validation models were generated to approximate tissue characteristics. Based on multivariate data analysis, the oxygen saturation, the tissue water content as well as the tissue lipid content were calculated from HSI recordings.
**Results:** HSI images provided spatially resolved information about the renal tissue composition. Distribution maps of oxygen saturation, tissue water content and tissue lipid content of the normothermic perfused kidneys were calculated. Afterwards, pathological changes in renal tissues were identified, which enabled the distinction of kidneys according to their ischemic injury.
**Conclusion:** In ex vivo machine perfusion experiments, HSI has demonstrated the potential to become a powerful tool to measure physiological kidney tissue parameters. Furthermore, initial investigations showed the ability of this technology to identify ischemic effects of kidney grafts during NMP.

## PO-108 "ASYS-TRANSPLANT" – DEVELOPMENT OF AN ASSISTANCE SYSTEM FOR THE FUNCTIONAL EVALUATION OF DONOR KIDNEYS IN TRANSPLANT-MEDICINE

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The project "ASYS-Transplant" is a translational cooperation project between the Institute for Biomedical Engineering of Technische Universität Dresden (IBMT) and the Medical Faculty of Technische Universität Dresden, Departement of Urology at the University Hospital Carl Gustav Carus Dresden, with funding from the European Regional Development Fund (EFRE) and Freistaat Sachsen.

**Introduction:** Based on the shortage of donor organs, machine perfusion (MP) is gaining more and more importance. It is hypothesized that MP systems, especially with normothermic perfusion, may significantly expand the pool for so-called "marginal organs". However, a clinically applicable MP system has not been developed in Germany so far. Here we describe a translational cooperation project between the Institute of Biomedical Engineering (IBMT) and the Department of Urology at the University of Dresden for the development of a nomothermic MP system.
**Methods:** Different variables of porcine kidneys were measured during normothermic whole blood perfusion and examined to assess the organ condition. We measured several variables, including machine and perfusion parameters as well as biomarkers in tissue, blood and urine and parameters based on hyperspectral imaging.
**Results:** The aim is to develop the existing laboratory prototype up to a prototype in order to make normothermic organ perfusion of kidneys applicable for practice in a human setting. The development of the device technology will be carried out according to the rules of the Medical Device Regulation (MDR), so that the project will create the prerequisites for an approval procedure as a medical device. In addition, a scoring system is to be implemented as an additional aid in the assessment of previous damage to the kidney and thus in deciding whether it is suitable for transplantation.
**Conclusion:** Here we show that normothermic whole blood perfusion of kidneys in a large animal model is a physiologically favourable method for organ preservation.
Based on the principle of translational medicine, it is planned to transfer the perfusion setup into human applications in the future. Measurement of different parameters before and after machine perfusion should provide an additional tool as a decision aid for the possible use of marginal organs for transplantation.

## PO-109 THE MÜNSTER MACHINE EXPERIENCE: FIFTEEN LIVER TRANSPLANTS FOLLOWING NORMOTHERMIC PERFUSION

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**Introduction:** Presently, normothermic machine perfusion (NMP) of liver grafts is the most exciting next evolutionary step in solid organ transplantation. Using NMP harmful cold storage times can be limited, hazardous reperfusion injury will be diverted from the recipient onto the machine and logistics of solid organ transplantation will shift from an emergency setting into a plannable procedure. Additionally, functionality testing prior transplantation will render the liver transplant to a safer intervention reducing early graft dysfunction as well as avoiding primary non-function.
**Methods:** Perfusion with physiological pressure and flow rates was conducted via portal vein and hepatic artery with three packages of packed red blood cells and 500 ml Gelatine-Polysuccinate (Gelafundin® 4%) using the OrganOX metra device. Local protocol required a minimum of 4 hours of NMP before transplantation.
**Results:** Fifteen postmortal donor liver allografts with a median donor age of 57.9 years were connected onto NMP in Münster University Hospital from 10/19 until 04/20. Selecting criteria for NMP was estimated time of arrival of the graft, as well as anatomy, recovery concerns of grafts being suitable for perfusion or recipient issues such as re-transplantation. Average recipient MELD was 26. Despite short cold storage times secondary to the use of NMP the Donor Risk Index (DRI) in our collective was still 1,84. Median NMP time was 12 hours.

Ever since NMP implementation 82% of all liver transplantations were performed during daytime and all were teaching operations. All NMP livers showed sufficient lactate clearance. Peak transaminases were observed during NMP and there was no severe reperfusion injury within the recipient. Primary graft function was 100%.
**Conclusion:** Back to base NMP of liver grafts is a feasible and safe procedure even within Germany. Viability testing of poor quality, extended criteria donor livers using NMP has the potential for increasing the number of transplantable donor organs and thus faces the problem of organ shortage without jeopardizing recipient safety. Additionally, the procedure can be turned into a plannable, non-emergency procedure, allowing better teaching and training conditions.

PO-110

### STATIC PRESERVATION IN PANCREAS TRANSPLANTATION: NO BENEFITS FOR UW EVEN IF COLD ISCHEMIA TIME IS MORE THAN 12 HOURS

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**Introduction:** The success of a pancreas transplantation depends on the use of an optimal preservation solution, especially when marginal donor organs are accepted. Studies on preservation solutions show partly controversial results.
**Methods:** In this study we analyzed the results after static, hypothermic organ preservation with HTK ($n$=133) and UW ($n$=107) solution in 240 pancreas transplantations at a German high-volume transplant center. The demographic data of organ donors and recipients were collected and compared. The laboratory chemical courses of serum lipase, serum amylase serum CRP in the first postoperative week as well as patient and transplant survival were compared. The primary function of the transplanted organs was examined with regard to the need for insulin and dialysis in the first postoperative week. A special focus of the study was on transplantations with cold ischemic times ≥12 hours for the graft pancreas ($n$=54).
**Results:** The analysis revealed significantly higher levels of lipase and CRP in serum after HTK perfusion as a sign of transplant pancreatitis. Pancreatic graft survival, however, was better in the entire patient population with HTK-perfused organs than with UW-perfusion. In the subgroup analysis for grafts with a cold ischemic time ≥12 hours, pancreatic graft survival was slightly better in the UW group, but this difference was not statistically significant.
**Conclusion:** Overall, pancreas graft survival for HTK-perfused organs was significantly better (p=0.013) compared to UW solution, although laboratory chemical analysis had shown more pronounced graft pancreatitis in this historically younger group. At ischemia times ≥12 hours, early pancreatic graft survival indicated advantages for the UW solution, which should be further investigated in prospective studies.

## PANCREAS AND ISLET TRANSPLANTATION

PO-111

### PERCUTANEOUS PANCREAS GRAFT BIOPSIES – FEASIBILITY, RESULTS AND COMPLICATIONS

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**Introduction:** For patients with combined pancreas/kidney transplantation, renal biopsy has been considered the standard procedure for detecting a rejection. The extraperitoneal positioning of the pancreas graft also allows percutaneous sonographic or CT-guided biopsy. In the literature, only laparoscopic sample excisions of the pancreatic graft have been described so far.
**Methods:** This is a retrospective, monocentric evaluation of sonographically or CT-guided biopsies of the pancreas graft performed between 2017–2020, which will evaluate feasibility, results and biopsy-related complications.
**Results:** A total of 63 pancreas graft biopsies were performed in 30 patients. Of these, 36 (57.1%) were CT and 27 (42.9%) sonographically controlled. Indications were: Hyperglycaemia ($n$=46), serum amylase / serum lipase elevation ($n$=16) and the presence of donor-specific HLA antibodies ($n$=7). Technically, depending on the patient's anatomy, 16G, 18G as well as 20G biopsy needles were used. There are considerable variations in the access route (ventral, ventrolateral and dorsal). In 25 (39.7%) biopsies no evaluable pancreatic graft tissue was present. In 76.3% of the cases a rejection could be detected from the valid samples. In parallel, 15 kidney biopsies also showed evidence of rejection, although in 11 cases these differed from the pancreas graft biopsy result. Complications were found in two patients (4.2%), with pancreatic fistula in one case and bleeding with abscess formation in the other. These complications were managed by radiological intervention.
**Conclusion:** In the group of patients examined here, the biopsies of the pancreatic graft are feasible sonographically and CT-guided with an acceptable complication rate. A particular difficulty is that the CT-guided biopsies are performed natively. A learning curve is therefore required for evaluation by both, the biopsy-taking physician and the pathologist who evaluates them.