Transplant International

Orals

Session 3

OP01 EFFECTS OF RAPAMYCIN AND COBALT PROTOPORPHORINON INDUCTION OF HAEM OXYGENASE-1 AND ISCHEMIA REPERFUSION INJURY IN THE RAT LIVER

Alwine Kist[1,2], Joris Wakkie[1,2], Vincent Nieuwenhuijs[1], Robert Porte[1], Rob Padbury[2], Greg Barrit[2]; [1]HPB Surgery and Liver Transplantation, UMCG, Groningen, The Netherlands; [2]Department of Medical Biochemistry, Flinders Medical University, Adelaide, Australia

Background/Aims: Upregulation of HO-1 has showed beneficial results in rat liver ischemia reperfusion (I/R) experiments. The upregulation of HO-1 by rapamycin and cobalt protoporphyrin (CoPP) has been described in the literature. The aim of this study was to investigate the protective effects of increased HO1 expression initiated by rapamycin and CoPP induced HO-1 against the early stage of I/R injury in the rat liver, as assessed in the measurements of bile flow.

Materials and methods: Rats were randomly allocated in four experiments:

1. Rapamycin ($n = 4$) vs. vehicle solution ($n = 4$) 20 h prior to I/R.
2. CoPP ($n = 6$) vs. vehicle ($n = 3$) solution 20 h prior to I/R.
3. CoPP ($n = 3$) vs. vehicle ($n = 3$) solution 20 h prior to a sham-operation.
4. CoPP ($n = 3$) vs. vehicle ($n = 2$) solution 20 h prior to rapid extraction of the liver.

A rat model of segmental ischemia (45 min for CoPP and 60 min for rapamycin) and reperfusion (60 min for CoPP and 90 min for rapamycin) was used. The HO-1 relative fold induction was determined by measuring the HO-1 mRNA expression with a Q-RT-PCR. Bile was collected during the procedure and was measured gravimetrically.

Results: CoPP administration showed an induction of HO-1; 16-fold after Rapid Extraction, 6-fold after Sham-operation and 6-fold after I/R injury. Administration of rapamycin caused an increase in blood rapamycin concentration but this was variable. The highest increase in blood concentration was associated with an increase in HO-1 mRNA. In both the rapamycin and the CoPP pretreatment there was a decrease of bile flow.

Conclusion: Pharmalogical preconditioning with CoPP induces substantial HO-1 mRNA expression, while rapamycin had only small effects under conditions.

OP02 CONTEMPORANEOUS PORTAL AND ARTERIAL VERSUS PORTAL REPERFUSION DURING LIVER TRANSPLANTATION: A PROSPECTIVE RANDOMIZED STUDY

Umberto Baccarani, Gian Luigi Adani, Anna Rossetto, Dario Lorenzin, Maria Gabriella Costa, Chiara Comuzzi, Vittorio Bresadola; Department of Transplantation, University of Udine, Udine, Italy

The sequence of liver reperfusion during liver transplantation (LT) is still a matter of debate. Aim of this study is to prospectively compare portal (group 1) versus combined portal and arterial reperfusion (group 2) in heart-beating cadaveric LT. Thirty-eight patients were randomized 1:1 to group 1 or 2. No differences in the demographics characteristics nor in indications to LT. MELD was 17 ± 7 vs. 13 ± 5 ($P = 0.11$). Donor age was 52 ± 18 vs. 52 ± 14 ($P = 0.98$). Four grafts in each groups have macrosteatosis >15%. Duration of LT was 392 ± 155 vs. 370 ± 62 min ($P = 0.49$). Cold and warm ischemia time were respectively 478 ± 147 vs. 447 ± 89 ($P = 0.43$) and 37 ± 7 vs. 66 ± 8 min ($P < 0.001$). Units of blood transfused were 6 ± 4 vs. 7 ± 4 ($P = 0.48$). Plasma transfusion was 1300 ± 1175 vs. 2379 ± 1959 ml ($P = 0.05$). No PNF in both groups. ICU stay was 7 ± 4 vs. 5 ± 2 days ($P = 0.16$). AST at day 1, 3 and 7 were 912 ± 1745 vs. 822 ± 874 ($P = 0.84$), 262 ± 388 vs. 259 ± 219 ($P = 0.97$) and 46 ± 31 vs. 38 ± 21 ($P = 0.35$). ALT at day 1, 3 and 7 were 621 ± 1041 vs. 754 ± 807 ($P = 0.66$), 493 ± 763 vs. 613 ± 531 ($P = 0.57$) and 130 ± 180 vs. 137 ± 77 ($P = 0.94$). Bilirubin was higher in group 2 at day + 3 (2 ± 2 vs. 4 ± 3 mg/dl, $P = 0.058$) as gamma-glutamyltransferase (97 ± 81 vs. 164 ± 119, $P = 0.049$). Creatinine was higher at day + 3 in group 1 (1.41 ± 0.86 vs. 0.93 ± 0.34 mg/dl, $P = 0.03$). Biliary complications occurred in 31% vs. 21% in group 1 and 2 ($P = 0.46$) (follow-up 11 ± 6 months); 1 thrombosis and 1 stenosis of the hepatic artery in group 1 vs none in group 2 ($P = 0.14$). One year estimated survival was respectively 89% vs. 94% ($P = 0.53$). Contemporaneous portal and arterial reperfusion, although characterized by longer warm ischemia time, is not different from traditional portal reperfusion in terms of early graft function, vascular and biliary complications.

OP03 IMPACT OF RECIPIENT MELD AND NA+, DONOR AGE ON SHORT PATIENT SURVIVAL FOLLOWING LIVER TRANSPLANTATION

Martina Gambato; Institution of Gastroenterology, Padova, Italy

"Sickest first" principle still guides prioritization in waiting list for liver transplantation (LT) in most countries, however benefit of LT may be reduced in more severe recipients of suboptimal donors. We have evaluated the impact of donor and recipient features on patient survival during the first 12 months following LT. All adult patients who underwent LT from 02-2005 to 02-2009 were included. Data related to donor age, patient MELD, MELD-Na, D-MELD and patient Na+ at LT were collected. HCC patients were prioritized according to a score based on response to downstaging treatment. Overall and stratified according to donor/recipient variables patient survival was assessed at 3, 6 and 12 months after LT. Two hundred and thirty four patients underwent LT in the study period. Mean donor age was 54 years, mean MELD, MELD-Na and D-MELD at LT was 16, 18 and 848 respectively. Donor age >60 years, MELD, MELD-Na, D-MELD, Na+ <130 mEq/l were not significantly different in HCV+ versus HCV-, whereas MELD ($P < .001$), MELD-Na ($P < .001$) and D-MELD ($P = .006$) were significantly lower in HCC versus non-HCC at LT. Three, six and twelve-months patient survival was 90%, 88% and 86% respectively. According to Kaplan–Meier analysis MELD>25 was found to be correlated with lower 3-, 6-months patient survival ($P = .009$; $P = .04$), MELD-Na>15 ($P = .03$) and D-MELD>1600 ($P = .01$) with lower 3-months patient survival. Donor age>60 years was not associated with lower patient survival rates at any time interval. Patient survival rates were not significantly different in HCV+ versus HCV-, and in HCC vs non- HCC at any time intervals. At the multivariate analysis, MELD>15 and MELD-Na>15 were independent predictors of higher patient mortality at 3-, 6-, 12-months after LT. The use of multiple donor and recipient scores does help in the identification of adequate donor-recipient matching resulting, at least in our series, in no difference patient survival according to HCV status and HCC.

OP04 CHARACTERISTICS ASSOCIATED WITH OUTCOME AFTER LIVER-TRANSPLANTATION AND VALIDATION OF THE DONOR-RISK-INDEX IN EUROTRANSPLANT

Andries Braat[1], Joris Blok[1], René Adam[2], Andrew Burroughs[3], Nigel Kooreman[1,6], Jeroen Dubbeld[1], Hein Putter[1], Axel Rahmel[4], Robert Porte[5], Xavier Rogiers[6], Jan Ringers[1]; [1]Department of Surgery, Leiden University Medical Center, Leiden, The Netherlands; [2]European Liver Transplant Registry, Paris, France; [3]Liver Transplantation and Hepatobiliary Medicine, Royal Free Hospital, London, United Kingdom; [4]Eurotransplant International Foundation, Leiden, The Netherlands; [5]Department of Surgery, University Medical Center Groningen, Groningen, The Netherlands; [6]Department of Surgery, Ghent University Hospital Medical School, Ghent, Belgium

Introduction: In Eurotransplant over 50% of livers are from extended-criteria-donors (ECD). Not every ECD is as much extended, and limits of use are being explored. A more continuous scoring system for analyzing transplant results is warranted. Such a scoring system, the Donor-Risk-Index (DRI), has been developed in UNOS (Feng, AJT 2006; 6:783).

Objective: Analysis of donor characteristics associated with liver graft failure and validation of DRI in Eurotransplant.

Methods: Database analysis of all 5946 liver-transplantations from deceased donors into adult recipients from 1-1-03 to 12-31-07 in Eurotransplant. Data were gathered from Eurotransplant- and ELTR-databases. Outcome was patient death or graft failure, whatever occurred first.

Results: From 5517 patients follow-up data were available with a mean of 2 years. Multivariate analysis showed these significant factors influencing outcome: donor age, ALAT, cardiac death (DCD), split-liver, allocation (local, regional or interregional), recipient age, urgency status and disease. To validate the DRI we added DRI in multivariate analysis after which it remained as most significant factor ($P < 0.0001$). Kaplan–Meier curves per DRI category showed significant correlation between DRI and outcome ($P < 0.0001$).

Discussion: The associated characteristics we found were slightly different from UNOS, but in a remarkably different donor population (mean DRI Eurotransplant 1.7 versus UNOS 1.3), we were able to validate the DRI for use in Eurotransplant. Kaplan-Meier curves showed identical outcome in both regions when correcting for DRI. The DRI is the strongest predictor for outcome of all donor, transplant and recipient variables and we would strongly advocate its use when looking at outcome data.

Conclusion: In Eurotransplant the DRI outweighs all other factors as predictor of outcome after liver-transplantation. The DRI is validated for scoring donor liver quality and should be used when comparing outcome data.

OP05 COMBINED LIVER-KIDNEY TRANSPLANTATION IN CHILDREN: A SINGLE CENTER EXPERIENCE

Vittorio Corno[1], Alessandro Lucianetti[1], Paola Stroppa[2], Eliana Gotti[3], Michela Bravi[2], Giovanni Rota[5], Ezio Bonanomi[4], Giuseppe Locatelli[5], Daniela Codazzi[4], Giuseppe Remuzzi[3], Michele Colledan[1]; [1]Liver and Lung Transplantation Center, Ospedali Riuniti, Bergamo, Italy; [2]Pediatrics, Ospedali Riuniti, Bergamo, Italy; [3]Nephrology, Ospedali Riuniti, Bergamo, Italy; [4]Pediatric Intensive Care Unit, Ospedeali Riuniti, Bergamo, Italy; [5]Pediatric Surgery, Ospedali Riuniti, Bergamo, Italy

Introduction: Combined liver-kidney transplantation (CLKT) is become a viable option for a group of patients with severe liver and kidney disease. CLKT remains a relatively infrequent procedure in children.

Methods: From October 1997 to December 2009 we performed 371 primary liver transplantations in children from cadaveric donors. Among them nine

children received a CLKT (median age 9 years, median weight 24 kg). Indication for CLKT were primary hyperoxaluria (3), congenital hepatic fibrosis (2), methylmalonic acidemia (1), progressive familial intrahepatic cholestasis with chronic kidney disease of unknown origin (1), cranioectodermal dysplasia with incomplete biliary cirrhosis (1), biliary atresia with chronic kidney failure (1). Three whole liver and six left lateral segment grafts from an in situ split were used. Immunosuppression was based on basiliximab, tacrolimus and steroids.

Results: No rejection of the kidney was observed. One patient 1 year after CLKT developed a hepatitis B and was put on lamivudine. One patient 8 years after CLKT developed a Non Hodgkin lymphoma and was treated with chemotherapy and rituximab. In another patient 1 year after CLKT Mofetil Mycophenolate was added to tacrolimus due to an early chronic rejection of the liver. One patient, 4 months after CLKT, developed a septic shock due to cholangitis and underwent a re-transplantation of the liver and eventually died during the operation. The patient who underwent CLKT for methylmalonic acidemia died 18 months later for a metabolic crisis. Overall patient and graft survival is 89%/89% and 78%/78% at 1 and 5 years. One patient 8 years after CLKT showed an initial alteration of the renal function.

Conclusions: CLKT is a viable option for children with diseases that affect the function of both the liver and kidney with good results even in the long term.

OP06 TACROLIMUS ONCE-DAILY FORMULATION (ADVAGRAF®) IN DE NOVO IMMUNOSUPPRESSION AFTER LIVER TRANSPLANTATION

Miguel Angel Suarez Muñoz, Belinda Sanchez Pereez, Jose Luis Fernandez Aguilar, Jose Antonio Perez Daga, Cesar Pablo Ramírez Plaza, Jose Manuel Aranda Narvaez, Mª Custodia Montiel Casado, Antonio González Sánchez, Alberto Titos García, Miguel Lebrón Gallardo, Cesar Aragon Gonzlaez, Juan Miguel Rodrigo Lopez, Miguel Jiménez Perez, Julio Santoyo Santoyo; General and Digestive Surgery Service, Hepatology Service-Intensive Care Unit (Liver Transplant, Unit), Universitary Hospital Carlos Haya, Malaga, Spain

Introduction: Tacrolimus once-daily (Advagraf®) is a new oral formulation of the well established immunosuppressant tacrolimus. It is administered in the morning as unique dose, and preliminary results show a safety and efficacy profile similar to obtained with standard Tacrolimus twice-daily.

Objective: To present the results obtained in a group of liver transplant patients, treated with Advagraf as de novo immunosuppressant agent.

Material and methods: Descriptive study of a prospective cohort of patients who received Advagraf from the early postoperative period. Advagraf was administered in combination with corticosteroids since the first postoperative day. In patients with renal dysfunction, induction with basiliximab was employed and Advagraf added since the fifth postoperative day. As parameters of safety and efficacy we considered acute rejection rate, renal function, metabolic disorders and discontinuity of the treatment. Related to the bioavailability profile, we take in account the first day in which the therapeutic level was reached, and the dose at hospital discharge.

Results: Twenty four patients received Basiliximab + Advagraf + steroids, and 13 Advagraf + steroids. The incidence of acute rejection was 14% in the overall series (five cases). In only two patients we use bolus of steroids. In 73% of cases, therapeutic level (>5 ng/ml) were reached at third postoperative day. Forty three percent of patients showed creatinin levels >1.5 mg/dl and in 22% of cases Mycophenolate mofetil (MMF) was added. Twenty one percent of patients discontinued the treatment with Advagraf due to adverse effects (hyperglycemia, neurotoxicity, toxic levels of the drug). The median dose at discharge was 0.15 mg/kg/day, and 0.14, 0.12 and 0.09, respectively at three, six and twelve months of follow-up.

Conclusions: In de novo liver transplant patients, Advagraf provide an excellent immunosuppressive effect, with good renal tolerance and appropriate absorption profile.

Session 4

OP07 ELEVATED PROCALCITONIN LEVELS PREDICT DELAYED GRAFT FUNCTION BUT NOT INFECTIOUS COMPLICATIONS AFTER ORTHOTOPIC LIVER TRANSPLANTATION – PRELIMINARY RESULTS

Falk Rauchfuß, Juliane Neumann, Margerita Druschla, Rigo Voigt, Michael Heise, Utz Settmacher; Department of General, Visceral and Vascular Surgery, University Hospital Jena, Jena, Germany

Introduction: Elevated procalcitonin (PCT) levels are supposed to predict bacterial infections. However, their prognostic value for infections in patients after orthotopic liver transplantation (OLT) remains unclear. The aim of this study was the evaluation of PCT levels in post-OLT patients for its prognostic significance with respect to graft function and infectious complications in a single-center analysis.

Methods: We performed a retrospective analysis of the PCT levels in patients after OLT. Endpoints were delayed graft function (DGF) and infectious complications.

Results: Eighty seven patients were included in this study. 15 (17.2 %) had a delayed graft function, 18 (20.7%) had infectious complications in the early postoperative period. The PCT values showed no difference between patients with or without infectious complications, respectively. Interestingly, patients with a DGF had significantly elevated PCT values on the postoperative days (POD) 3, 4 and 5. The PCT peak in DGF patients (POD 4; 48, 5 ng/ml) was delayed compared to the group without DGF (POD 1; 26, 7 ng/ml).

Discussion: Our results indicate that elevated PCT levels are not predictive for infectious complications after OLT. A delayed PCT peak during the postoperative course may suggest a delayed graft function. This phenomenon might be explained by the thus secondary impaired hepatic production of PCT.

OP08 MANAGEMENT OF PORTAL VEIN (PVT) AND SPLACNIC VEINS THROMBOSIS (SVT) IN LIVER TRANSPLANTATION CANDIDATES

Kryssia Rodriguez[1], Patrizia Burra[1], Giorgio Pivetta[2], Maria Sartori[3], Valeria Rosetto[3], Patrizia Boccagni[4], Umberto Cillo[4], Marco Senzolo[1]; [1]Department of Surgical and Gastroenterological Sciences, Padua University Hospital, Padua, Italy; [2]Department of Radiology, Padova University Hospital, Padua, Italy; [3]Department of Clinica Medica II, Padua University Hospital, Padua, Italy; [4]Department of Liver Transplantation and Hepatobiliary Unit, Department of Surgical and Gastroenterological Sciences, Padua University Hospital, Padua, Italy

Introduction: Portal vein thrombosis occurs in 8% liver transplantation candidates, and its extension into splacnic veins can contraindicate transplantation. The objective of the study was to prospectively evaluate a comprehensive algorithm including transjugular intrahepatic portosystemic shunt (TIPS) in case of therapeutic failure of anticoagulation.

Patients and methods: We included liver transplant candidates with PVT and/or splacnic vein thrombosis. All were screened for prothrombotic genetic defects and risk factors for local thrombosis. Anticoagulant therapy was indicated in all patients except those who had cavernous transformation or varices with high risk of bleeding despite endoscopic treatment. TIPS were attempted in case of severe complications due to portal hypertension, progression of the thrombotic process and/or in case of contraindications to anticoagulant therapy.

Results: Twelve patients were included: 8 males(56,25 ± 5 SD years-old), 11 cirrhotics, 1 with Budd Chiari syndrome, 8 patients with partial PVT, 2 with total PVT, 1 patient with isolated superior mesenteric vein thrombosis. Prothrombotic genetic defects or local risk factors for thrombosis were identified in 5/12 patients (40%). Anticoagulant therapy was undertaken in eight patients; 4/8 (50%) had recanalization of the vessel (two partially and two totally), while two who were not anticoagulated presented progression of the thrombotic process, requiring evaluation for combined liver-intestine transplantation. TIPS were positioned in six patients: one with acute Budd Chiari syndrome, three with contraindications to anticoagulation therapy, two with progression of the thrombus. Four patients underwent liver transplantation.

Conclusions: A comprehensive algorithm including anticoagulant therapy and indications for TIPS for the treatment of PVT with or without thrombosis of the splenic veins in liver transplantation candidates is safe and seems useful in the prevention of thrombus progression and the complications after liver transplantation.

OP09 ACUTE ALLOGRAFT REJECTION AFTER LIVER TRANSPLANTATION: INCIDENCE, RISK FACTORS AND IMPACT ON OUTCOME

Giacomo Germani[1,3], Sabin Caroline[2], Patrizia Burra[1], Marco Senzolo[1], Emanoulis Tsochatzis[3], Keith Rolles[3], Andrew Burroughs[3]; [1]Department of Surgical and Gastroenterological Sciences, Gastroenterology, University of Padua, Padova, Italy; [2]Research Department of Infection and Population Health, Division of Population Health, Royal Free Campus, London, United Kingdom; [3]The Royal Free Sheila Sherlock Liver Centre and Division of Surgery, Royal Free Hospital, London, United Kingdom

Background and aims: Acute allograft rejection (ACR) remains an important problem after liver transplantation (LT), and, complications related to immunosuppression remain a predominant cause of post transplantation morbidity and mortality. The aim of this study was to determine the incidence, risk factors and the impact of acute rejection on patient and graft survival.

Materials and methods: Liver transplantation patients at the Sheila Sherlock Liver Centre, Royal Free Hospital (London, UK) (October 1988–May 2008) were retrospectively evaluated. Detailed information concerning the recipient, the donor and surgical aspects were collected. We considered only histological-proven ACR at the protocol biopsy (first biopsy performed within 10 days of LT).

Results: A cohort of 738 liver transplanted patients has been evaluated. 627 (85%) underwent protocol liver biopsies. At protocol liver biopsy, 76.1% demonstrated evidence of ACR (40.7% mild, 31.4% moderate, 4.0% severe), 12.4% had a normal biopsy and 11.5% had other signs.

Factors associated with ACR at first protocol biopsy were no requirement for renal support (p = 0.0001) and suboptimal organ appearance ($P = 0.006$); being transplanted for HBV-related liver cirrhosis ($P = 0.06$) or a higher MELD score at transplant ($P = 0.0007$) were both associated with a lower risk of ACR. Two hundred and twenty seven patients died and 64 were re-transplanted. Individuals with any sign of rejection at first protocol biopsy did not appear to be at increased risk of transplant failure ($P = 0.74$). However individuals with mild rejection were 43% more likely to experience transplant failure than those with a normal biopsy. In contrast, those with moderate or severe rejection did not appear to have a worse prognosis.

Conclusions: Findings from this study could assist in decision-making for the use of immunosuppressive regimens and call into question whether complete elimination of all rejection or all reactivity is a desirable goal in liver transplantation.

OP10 WAITLIST CHARACTERISTICS AT A SINGLE CENTER INTESTINAL AND MULTIVISCERAL TRANSPLANT PROGRAM

Undine Gerlach[1], Ulrich-Frank Pape[2], Peter Neuhaus[1], Andreas Pascher[1]; [1]Department for General, Visceral and Transplantation surgery, Charite-Universitaetsmedizin Berlin, Campus Virchow Klinikum, Berlin, Germany; [2]Department for Internal Medicine, Hepatology and Gastroenterology, Charite-Universitaetsmedizin Berlin, Berlin, Germany

The intestinal and multivisceral transplant program at the Charité Berlin, Germany, was established in 2000. We analyzed all patients, referred to our center concerning referral criteria, waitlist characteristics, and outcome prior to and after transplantation prospectively.77 patients (41 male, 36 female; median age 39.3 ± 13.4 years) were referred to our center until 2009, who presented with irreversible intestinal failure due to ultra short bowel syndrome or motility disorder. Evaluation was initiated due to a complicated course of disease under total parenteral nutrition (TPN).

Of the 77 patients, 58 were evaluated for ITX or MVTX, 9 were found not eligible, 10 were in stable condition without TPN. The underlying disease was mainly mesenterial ischaemia (37.6%) and chronic intestinal pseudo-obstruction (12.9%). Thirty seven of the evaluated patients were listed at EUROTRANSPLANT (ET), indications were intestinal failure associated liver disease (IFALD), impaired venous access and recurrent line-infections. Median time on waitlist was 320.6 ± 253.2 days for ITX, 283.2 ± 134.8 days for MVTX. Median number of organ offers for ITX was 8.2 ± 14.4 and 7.7 ± 8.8 for MVTX. Reasons for declining organ offers were: miss match of body mass index (27.9%), prolonged ICU-stay of the donor (14.3%), and donor age (10.5%). Waitlist mortality was 0% for ITX and 40% for MVTX. Eighteen patients received ITX and 6 MVTX, 1- and 5 year survival was 78% and 72% for ITX and 67% for MVTX. Seventy percent of patients referred to our center were evaluated for ITX, 48% were listed at ET and 19% were in a progressive state of disease, requiring MVTX. Waitlist mortality for MVTX is high due to strict donor criteria and organ shortage. The indication for ITX should be considered in time, before onset of secondary organ failure.

OP11 CATASISTOL: REGIONAL TRANSPLANT PROGRAM WITH DONORS AFTER CARDIAC DEATH (DCD) MAASTRICHT TYPE II

Angel Ruiz[1], Pilar Palma[2], Roser Deulofeu[3], Francisco Caballero[4], Jordi Vilardell[1], Joaquim Rios[2], Jacinto Gallardo[2], Fernando García[2], Margarita Anroma[3], Alba Ibalta[3], Antonio Lopez-Navidad[4], Blanca Miranda[1]; [1]Transplant Coordination Unit, Hospital Clinic De Barcelona, Barcelona, Spain; [2]Sistema D'emergències Mèdiques (Sem), Sistema D'emergències Mèdiques (Sem), Barcelona, Spain; [3]Catalan Transplant Office (Ocatt), Catalan Transplant Office (Ocatt), Barcelona, Spain; [4]Tranplant Coordination Unit, Hospital Sant Pau, Barcelona, Spain

Aim: Report the experience of the DCD type II program in Barcelona after the implementation of CatAsistol regional transplant program.

Material and methods: CatAsistol regional program developed the following steps: a hospitallary and extrahospitallary preexisting protocol review, two educational courses, the establishment of a reference procurement center (Hospital Clínic), the increase of the influence area: the whole city and the southern metropolitan area (from half million to 2.2 millions of inhabitants), the creation of a regulatory commission (integrated by the emergency services, the catalan transplant office (OCATT), Hospital Clínic and Hospital Sant Pau), the establishment of a new DCD classification with organ distribution implications, the offer to all the kidney transplant centers of Catalonia to participate. A retrospective and descriptive review was made comparing the 4 years of the CatAsistol period (from February 2006 until January 2010) with the precedent period of 4 years.

Results: Previous CatAsitol Period (48 months) CatAsistol Period(48 months) Δ Activations 106 241 127% Potential Donors 103 222 115% Clinical Contraindications 40 (38.8%) 113 (50.9%) 12.1% Family Refusals 15 (14.6%) 15 (6.7%) -7.9% Judicial Refusals 6 (5.8%) 11 (4.9%) -0.9% Donors 41 (39.8%) 83 (37.3%) -2.5% Non-effective Donors 15 (36.6%) 23 (27.7%) -8.9% Procured Organs 78 Kidneys 164 Kidneys 110% 26 Livers 57 Livers 119% Procurement Rate 2.5 2.7 8% Transplanted Organs 41 Kidneys (52.5%) 111 Kidneys (67.7%) 15.2% 9 Livers (34.6%) 19 Livers (33.3%) -1.3% Transplant Rate 1.2 1.6 33.3%

Conclusion: After the CatAsistol implementation, even with an increase of the clinical contraindications and the decrease of the percentage of the total real donors, the observed results showed a significant increase in the number of potential DCD type II as well as transplant rates and other activity parameters.

OP12 UTILITY OF COMBINED DCD-ECD ORGAN DONORS: ONE OPO EXPERIENCE

Michael Hagan; Department of Quality Improvement, Gift of Life Michigan, Ann Arbor, United States

The ever increasing disparity between the number of patients waiting for an organ transplant and the number of organs available continues to drive the search for innovative ways to increase the organ supply. One approach is to look at donation after cardiac death (DCD) donors that also meet the criteria for expanded criteria donors (ECD). We examined a full five year history of combined DCD-ECD donors at Gift of Life Michigan from 2005 through 2009 which comprised a total of 251 DCD donors, 38 of which also met the ECD criteria. Of the 38 cases there were 18 cases where no organs were transplanted. From the remaining 20 cases there were 79 organs recovered, 74 kidneys, 3 livers, and 2 lungs. Of those 79 organs, 35 organs were transplanted: 33 kidneys, one liver, and one lung. Five years after the first case 32 of the 35 organs, (91%), are still functioning: 31 kidneys and one lung. The overall organs transplanted per donor was 0.92, with a range of 0.4–1.25 annually. While the early OPO DCD-ECD experience was not very impressive, our most recent experience is promising. In the most recent year there were 16 organs recovered from DCD-ECD donors, with 10 of them transplanted, which is a 62% transplant rate and 1.25 organs transplanted per donor. We believe that pursuing combined DCD-ECD donors is effective, resulting in good organ function post transplant, and saving lives of those on the waiting list.

Session 7

OP13 DONATION AFTER CARDIAC DEATH IN LIVER TRANSPLANTATION: A CALCULATED RISK

Andries Braat[1], Joris Blok[1], René Adam[2], Andrew Burroughs[3], Nigel Kooreman[1,6], Jeroen Dubbeld[1], Hein Putter[1], Axel Rahmel[4], Robert Porte[5], Xavier Rogiers[6], Jan Ringers[1]; [1]Department of Surgery, Leiden University Medical Center, Leiden, The Netherlands; [2]European Liver Transplant Registry, Paris, France; [3]Liver Transplantation and Hepatobiliary Medicine, Royal Free Hospital, London, United Kingdom; [4]Eurotransplant International Foundation, Leiden, The Netherlands; [5]Department of Surgery, University Medical Center Groningen, Groningen, The Netherlands; [6]Department of Surgery, Ghent University Hospital Medical School, Ghent, Belgium

Introduction: The donation-after-cardiac-death (DCD) procedure is potentially harmful to the liver. Only donors with little other risk factors are being evaluated compared to donation-after-brain-death (DBD) donors.

Objective: Analysis of DCD as risk factor for liver transplantation.

Methods: Database analysis of all 5946 liver transplantations from deceased donors into adult recipients from 1-1-03 to 12- 31-07 in Eurotransplant. Data were gathered from Eurotransplant- and ELTR-databases. Outcome was patient death or graft failure, whatever occurred first.

Results: There were 5819 DBD vs 127 DCD donors. DCD procedures were only performed in Belgium and The Netherlands. Significantly different donor factors ($P < 0.001$) between both groups were: mean age (DCD 41 vs DBD 48), cause of death (more CVA in DBD), no split livers in DCD, allocation (DCD mainly local and regional), and shorter cold-ischemia time (DCD 7.6 vs DBD 9.8). Recipients for DCD livers seemed better, regarding lower recipients age ($P = 0.016$) and fewer high urgency status ($P = 0.001$). Donor risk index (DRI) was clearly higher in the DCD group (2.0 vs 1.7). When DCD itself was not taken into account, DRI was much better in the DCD group (1.3 vs 1.7). Multivariate analysis showed DCD as significant factor influencing outcome ($P = 0.009$), with a hazard ratio of 1.54 (95% CI 1.11-2.14). Because of fewer other risk factors in DCD procedures, outcome was equally good in both groups with similar Kaplan-Meier curves ($P = 0.83$). 3-months, 1-year and 3-years outcome was 80%, 72% and 65% respectively for DBD donors versus 80%, 74% and 63% for DCD donors.

Conclusion: DCD is a significant factor influencing outcome, with a hazard ratio of 1.54. Selection of donors and recipients with fewer associated risk factors for these DCD procedures results in equally good outcome after liver transplantation for DCD and DBD donors.

OP14 RESOURCE IMPLICATIONS OF EXPANDING THE USE OF NHBD IN LIVER TRANSPLANTATION

Robert Broomhead; Department of Anaesthesia, Royal Free Hospital, London, United Kingdom

Background: Donation following NHBD has been seen as a way to increase the number of organs available for transplantation (1). For 2008/9, 20% (110/646) of UK donor liver grafts were NHBD. There is evidence from the literature that long term outcome from NHBD is worse with a greater risk of graft failure (2) and ischaemic cholangitis (3).

Aim: To determine if NHBD LT was associated with increased resource utilisation compared to HBD LT.

Methods: We compared NHBD recipients ($n = 16$) in our centre with a matched (MELD/diagnosis) cohort of HBD LT recipients for the period 2007–2009.

Results: NHBD was associated with more profound post-reperfusion hypotension and lysis requiring antifibrinolytic therapy. ITU, length of stay and ventilator hours were longer and there was greater need for vasopressor and renal replacement therapy (CVVHF). Ninety day survival was 100% in both groups, 2/16 NHBDs required retransplant for PNFG. HBD ($n = 16$) NHBD ($n = 16$) P value Age 52(43–57) 54(41–62) NS MELD 16.5(13–20) 18(13.5–21) NS Cold Ischaemic Time (mins) 488(431–589) 397(361–423) 0.015 Time with Systolic BP<100 post reperfusion (mins) 0 45(30–64) 0.0001 Tranexamic acid (%) 0 43 0.003 Total ITU vasopressor hours 9.5(5–16) 20.5(12–37) 0.002 Total ITU ventilator hours 11(7–19)

22(10–113) 0.026 ITU length of stay (days) 2(1.5–3.5) 3.75(2.5–6.5) 0.021 Renal Replacement therapy 0 3 0.01 Data presented as median (IQR)

Discussion: It is apparent that there are significant resource implications of using NHBD grafts which result in substantially increased costs and patient morbidity. This raises many important questions especially as the NHBD LT resource may be increasing at the expense of HBD grafts.

References:

(1) Ann Surg 2006; 244:555–562.
(2) Liver Transpl 2009; 15:1072–1082.
(3) Surgery 2009; 146:552–553.

OP15 DONATION AFTER CARDIAC DEATH LIVER TRANSPLANTATION: IS DONOR AGE AN ISSUE?

Oliver Detry[1], Arnaud Deroover[1], Jean-Paul Squifflet[1], Marie-France Hans[1], Bernard Lambermond[2], Sévrine Lauwick[3], Michel Meurisse[1], Jean Delwaide[4], Pierre Honoré[1]; [1]Department of Abdominal Surgery and Transplantation, CHU de Liège, Sart Tilman B35, Liège, Belgium; [2]Department of Intensive Care Medicine, CHU de Liège, Sart Tilman B35, Liège, Belgium; [3]Department of Anesthesiology, CHU de Liège, Sart Tilman B35, Liège, Belgium; [4]Department of Hepatogastroenterology, CHU de Liège, Sart Tilman B35, Liège, Belgium

Background: Donation after cardiac death (DCD) liver transplantation has been proposed to increase the number of transplantable liver grafts. As older liver grafts may be more sensitive to ischemia, DCD donors older than 55 years are usually not considered suitable for DCD liver donation. Our local policy is to not refuse DCD liver grafts based on age. Our aim was to compare the outcome of patients receiving older DCD livers to the younger ones.

Methods: We retrospectively compared the results of DCD liver transplantations in our centre from 2003 to 2009. DCDs were divided into two groups according to age: younger donors (Y-DCD) <55 years, and older donors (O-DCD) >55 years. We compared donor and recipient demographics, peak laboratory values during the first postoperative week and results at one year.

Results are expressed as mean ± SEM. $P < 0.05$ was considered as significant.

Results: Thirty three DCD liver transplantations (Y-DCD $n = 15$, mean age: 44 ± 2.2 years, extremes: 25-53; O-DCD $n = 18$, mean age: 66 ± 1.5 years, extremes: 56–79) were performed in the study period. No difference other than age in donor characteristics was noted between both groups. Mean age of the recipients was not different. Mean cold ischemia was 305 ± 28 min in the O-DCD group and 257 ± 18 min in the Y-DCD group (NS). Peak AST (UI/ml) and peak bilirubin (mg/dl) were 2.944 ± 1432 and 46.8 ± 9.5 in the Y-DCD group and 2.086 ± 494 and 60 ± 12 in the O-DCD group (NS). There was no PNF. Graft and patient one-year survivals were 100% in the Y-DCD group and 94% O-DCD group (NS).

Conclusion: In view of our experience, donor age >55 years should not be a contraindication to DCD liver transplantation, that could lead to excellent results, if cold ischemia is limited to 5 h.

OP16 A SINGLE CENTER LIVER TRANSPLANTATION EXPERIENCE OF 20 YEARS FOLLOW-UP WITH LIVERS FROM CONTROLLED DONORS AFTER CARDIAC DEATH

Henryk E. Wilczek[1], Shinji Yamamoto[1], Frans F.F. Duraj[2], Carl-Gustav Groth[1], Bo-Göran Ericzon[1]; [1]Division of Transplantation Surgery, Department of Clinical Science, Intervention and Technology, (CLINTEC), Karolinska Institute, Stockholm, Sweden; [2]Division of Transplantation and Liver Surgery, Department of Surgery, Uppsala University Hospital, Uppsala, Sweden

Background: Because of a severe worldwide organ shortage, the interest in using grafts from donors after cardiac death (DCD) has received new attention. Although, the first liver transplantation (LTx) in Sweden was performed in 1984, brain death as a legal death criterion was not accepted until 1988. We retrospectively analysed the long-term outcome in recipients of DCD livers and in recipients of heart-beating donor (HBD) livers done during the same period.

Methods: We performed 40 consecutive LTxs in 32 patients between November 1984 and May 1988. Twenty-four grafts were from DCDs and 16 grafts from HBDs. All DCDs met the criteria of brain death and were in Maastricht class Category III (controlled DCD). Donor and recipient parameters, operative parameters, postoperative peak laboratory liver values, follow-up liver biopsies and supervening postoperative complications were analyzed.

Results: Recipients of HBD grafts comprised more females and more preoperative hospitalizations. There was no difference regarding donor and operative parameters between the groups. Significantly more hepatic artery thrombosis and biliary complications occurred in the DCD group ($P < 0.01$ and $P < 0.05$, respectively). Graft and patient survival did not differ between the groups. Numerically better graft survival in non-malignant than malignant patients was seen, though this did not reach statistical significance. Multivariate analysis disclosed cold ischemia time and post-LTx peak ALT to be independent predictive factors for graft survival in the DCD group. In the 11 livers surviving 20 years or more, follow-up biopsies were performed 18–20 years post-LTx ($n = 10$) and 6 years post-LTx ($n = 1$). Signs of chronic rejection were seen in 3 cases, with no difference between DCD and HBD.

Conclusion: Our 20-year follow-up analysis suggests that controlled DCD liver grafts might be a feasible option to increase the donor pool.

OP17 RESULTS OF LIVER TRANSPLANTATION FROM DONORS AFTER UNEXPECTED CARDIAC DEATH (DCD)

Eduardo Flores, Constantino Fondevila, Angel Ruiz, Amelia Hessheimer, Nuria Mestres, David Calatayud, Pilar Taura, Miguel Navasa, Antonio Rimola, Jose Fuster, Juan Garcia-Valdecasas; Department of Surgery, Hospital Clinic, University of Barcelona, Barcelona, Spain

Objective: To report clinical results using livers from unexpected DCD systematically maintained with normothermic ECMO prior to extraction.

Patients and methods: DCD were included 12/02–12/09. Donors met the following criteria: <65 years, no contraindication for donation, and <30 min of cardiac arrest without advanced CPR. Once death was declared, the donor was placed on a cardio compressor. Femoral vessels were cannulated to establish cardiopulmonary bypass, which was run with oxygenated blood at 37ordm; C. During NECMO, flows were maintained >1.7 l/min, and initial and final transaminases were <3 and <4 x ULN, respectively. After consent for donation was obtained, NECMO was maintained until organ recovery.

Results: Of 85 potential donors, 26 transplants were performed. DCD livers were rejected for the following reasons: poor perfusion 19 (32%), steatosis 13 (22%), biliary ischemia 8 (14%), prolonged organ ischemia 4 (7%), and other 15 (25%). The average NECMO time was 183 min and average cold ischemic time 396 min. Mean age and MELD scores of the recipients were 55 years (25–75% interquartile range 49–58 years) and 20 (17–23), respectively. Implanted grafts failed due to ischemic cholangiopathy ($n = 2$), primary non-function ($n = 1$), hepatic artery thrombosis ($n = 1$), and autoimmune hepatitis recurrence ($n = 1$); all the recipients were successfully re-transplanted. Six recipients died due to sepsis/multi-organ failure ($n = 3$), HCV recurrence ($n = 2$), and diffuse Kaposi sarcoma ($n = 1$). At 22-mos median follow-up, patient and graft survival was 75 and 64%, respectively.

Conclusions: Using NECMO to maintain unexpected DCD until extraction allows us to obtain good-quality grafts for transplant.

OP18 SEVERE HEPATITIS C VIRUS (HCV) RECURRENCE IN TRANSPLANTED LIVERS USING ALLOGRAFTS FROM DONATION AFTER CARDIAC DEATH (DCD) DONORS

Jeffrey Shum[1], Mohammed Mawardi[2], Mamoun Al-Basheer[1], Kris Croome[1], Paul Marotta[2], Douglas Quan[1], William Wall[1], Roberto Hernandez-Alejandro[1]; [1]Department of General Surgery/Multi-Organ Transplant, The University of Western Ontario, London, Canada; [2]Department of Hepatology/Gastroenterology, The University of Western Ontario, London, Canada

Currently, the reported 1-year graft survivals of liver transplants from DCD and DBD donors are 69% and 82% respectively. Despite evidence in the literature, observations have suggested that in HCV recipients, DCD grafts tend to have even lower rates of 1-year graft survival compared to patients transplanted with DBD organs. Early-onset with severe HCV recurrence may be associated with this trend.

To determine the onset, severity and outcomes of HCV recurrence in HCV recipients of DCD transplants compared to those with DBD grafts. We retrospectively reviewed our experience of 26 DCD liver transplants, of which 13 were transplanted in HCV recipients between 2006 and 2009. Patient outcomes were analyzed in comparison to a matched cohort of 78 DBD liver transplants of which 33 were in HCV recipients. Patient characteristics were similar including hepatitis C genotype. Recurrent HCV infection was defined as biochemical graft dysfunction with histological findings of stage 2 fibrosis or greater within the 1st-year post liver transplant (LT). Severe HCV recurrence rate was 73% within 1-year of transplantation in patients who received a DCD graft compared to 7% who received a DBD graft ($P < 0.05$). Graft survival at 1-year in the DCD-HCV transplant recipients was 77%, compared to a 1-year graft survival of 93% in HCV transplant recipients who received a DBD graft (P = NS). HCV recurrence was observed to be severe, more frequent and progressed rapidly in HCV recipients who received grafts from DCD donors compared to HCV recipients who received DBD organs. Even though the 1-year graft survival difference was not statistically significant, our findings suggest that patients with HCV may be at a significantly higher risk of severe hepatitis C viral recurrence with subsequent DCD graft failure.

OP19 THE IMPACT OF SEVERE HCV RECURRENCE AND BILIARY (BC) COMPLICATIONS FOLLOWING DONATION AFTER CARDIAC DEATH LIVER TRANSPLANTATION (DCD-LT)

Jorge Ortiz[1], Eyob Feyssa[2], Ashaur Azhar[2], Afshin Parsikia[1], Kashif Tufail[2], Nikroo Hashemi[2], Ashraf Malek[2], Mumtaz Niazi[2], Stalin Campos[1], Kamran Khanmoradi[1], Radi Zaki[1], Victor Araya[2]; [1]Division of Transplant Surgery, Albert Einstein Healthcare Network Program, Philadelphia, United States; [2]Division of Hepatology, Albert Einstein Healthcare Network Program, Philadelphia, United States

Background: The course of Hepatitis C (HCV) recipients and the long-term effects of BC after DCD-LT are not clearly defined.

Objectives: Compare LT outcomes between HCV and non-HCV DCD-LT. Determine severe HCV recurrence (sHCVr) rate and to examine the effects of BC on survival.

Methods: Retrospective review of 39 sequential DCD-LT recipients (21 HCV and 18 non-HCV). Protocol biopsies were performed at 6, 12, 24, 36 months for the HCV group. sHCVr defined as grade/stage2+.
Results: We found no significant difference in recipient and donor demographics, ischemic times, primary non-function (PNF), BC and hepatic artery complications (HAT). The 6, 12, 24 and 36-month sHCVr rates were 60%, 73%, 87% and 94%, respectively. 6/19 HCV patients (excluding 2 PNF) developed cirrhosis at median 56 (14–119) months. 4/6 of the cirrhotics died at a median of 10.5 (2–41) months after cirrhosis was diagnosed. There is no significant 3-year allograft and patient survival difference between HCV and non-HCV ($P > 0.05$). 5/21 HCV versus 6/18 non-HCV developed a total of 35 BC. Higher donor BMI (mean BMI 28 vs. 24, $P = 0.01$) and organs procured regionally (45% vs. 10.5% locally, $P = 0.017$) were associated with BC. Of the 11 patients who developed BC, six patients died at a median of 14.5 (2–36) months. Patients without BC versus with BC had a better survival [mean months (± SD): allograft: 64.6 (± 43) vs. 24 (± 20.3); patient: 68 (± 42) vs. 30 (± 19); $P < 0.05$].
Conclusions: Severe HCV recurrence was nearly universal but didn't lead to increased graft loss at 3 years. BC when present, were multiple and resulted in shorter allograft and patient survival. However, there are no differences in the rate or type of BC between HCV and non-HCV groups.

OP20 IMPACT ANALYSIS OF A MAASTRICHT TYPE II NON HEART BEATING DONOR LIVER TRANSPLANT PROGRAM IN SPAIN

Manuel Abradelo, Vanessa López, Iago Justo, Meneu Juan Carlos, Manrique Alejandro, Gimeno Alberto, Calvo Jorge, Pérez-Saborido Baltasar, García-Sesma Alvaro, Fundora Yilliam, Alvaro Edurne, López-Sterup Rosemarie, Moreno Enrique, Jiménez Carlos; [1]Abdominal Organs Transplant, Hospital 12 de Octubre, Madrid, Spain; [2]Hospital Calderón Guardia, San Jose, Costa Rica

Even though Spain has a high donation rate, an increasing donor shortage forces us to look for new sources. After a 3 years experience, we analyze the impact of our uncontrolled non heart beating donors (UNHBD) program. The donor family refusal rates on the family donation requests were compared between UNHBD and brain death donors (BDD). We compared the waiting list times, before and after UNHBD program start (periods 2001–2005 and 2006–2009). The waiting times for UNHBD recipients and for BDD recipients were also compared. We included in our survival study 28 UNHBD liver recipients and 180 BDD liver recipients. A minimum 6 month follow-up time was accomplished.
Results: A strongly significant difference ($P = 0.0027$) has been observed for the NHBD donor family acceptance (6.2% refusal), much more favourable than for BDD donation (22.3% refusal). We noticed a progressive increase in our waiting list time, from the first period with 273.05 + 215.04 days, to the second one with 321.33 + 187.06 days ($P = 0.007$). Similar waiting times were observed for the recipients who obtained their grafts from a UNHBD (321.02 + 141.02 days) and for those who were transplanted with livers from BDD (321.40 + 193.16 days) once the new program was started. When comparing results after a 661 + 429.00 days follow-up, we found a 3 year cumulative patient and graft survival of 65.9% and 50.4% for the UNHBD recipients and a 69% and 66.8% for the BDD recipients($P = 0.844$ and $P = 0.242$). In conclusion, UNHBD donation has been widely accepted by donor families. There is a global benefit in terms of waiting list time reduction for liver transplant candidates when a UNHBD program is started, with an acceptable patient and graft survival.

Session 10

OP21 PRELIMINARY RESULTS OF A PROSPECTIVE STUDY ON INTRAOPERATIVE HEMODYNAMICS OF DONATION AFTER CARDIAC DEATH GRAFTS

Mauricio Sainz-Barriga, Xavier Rogers, Bernard de Hemptinne, Roberto Troisi; Department of General and Hepatobiliary Surgery, Liver Transplantation Service; Ghent University Hospital and Medical School, Ghent, Belgium

With the aim of characterizing the hemodynamics of donation after cardiac-death grafts (DCD), we compared DCD grafts with full size grafts (FS). Herein we present the preliminary results of this ongoing study.
Methods: Eighty-three consecutive liver transplantations were included in the analysis, 74 FS and 9 DCD. Flows were measured with the transit-time method after graft revascularization and reported as ml/min·100 gr/LW. Portal pressure was measured at the same time by direct puncture of the portal vein. Hepatic artery resistance was calculated as: mean arterial pressure minus central venous pressure divided by hepatic artery flow.
Results: The median follow-up was 11 months. The graft weight was significantly higher in the DCD (1828 ± 387 vs. 1521 ± 368, $P = 0.032$). The graft-to-recipient weight ratio showed a trend for higher values in the DCD group (2.42 ± 0.55 vs. 2.09 ± 0.65, $P = 0.090$). Donor weight was comparable between both groups (74.8 ± 14 in the FS vs. 78.2 ± 18.9 in the DCD group ($P = 0.91$). Measured median portal vein flows were 107 (30–307) in the FS group and 106 (16–156) in the DCD group ($P = 0.69$). Median hepatic artery flows were 16 (3–48) in the FS group and 9.5 (3–26) in the DCD group ($P = 0.69$). Hepatic artery resistance was 3.53 (1.14–21.17) in the FS group and 5.36 (2.08–15.83) in the DCD group ($P = 0.23$).
Conclusion: Donation after cardiac death grafts showed significant higher liver weight compared to FS grafts in spite of comparable donor weight. These results, together with the lower arterial flow are consistent with reports of graft edema and decreased compliance after warm ischemia and cold preservation. Indeed we observed an almost doubled resistance of the hepatic artery although this result did not reach significance. This early experience suggests that DCD grafts show a reduced compliance, with a resulting inferior hepatic artery flow. Further experience is needed to confirm these results.

OP22 EFFECTS OF EXTRA CORPOREAL MEMBRANE OXYGENATION (ECMO) ON LIVER FUNCTION AND HISTOLOGY, IN A PORCINE MODEL OF UNCONTROLLED NON HEART BEATING DONOR (NHBD)

Aditya Kanwar[1], Christopher Ray[1], Saleem NoorMohammed[1], Susan Stamp[2], Steven Ray[1], Soroush Sohrabi[1], Brian Shenton[2], Patrick Kesteven[1], Robert Peaston[1], Louis Libberecht[1], Diethard Monbaliu[1], Jon Smith[1], Anne Cunningham[1], Noel Carter[1], David Talbot[1]; [1]Liver/Renal transplant unit, Freeman hospital, Newcastle upon Tyne, United Kingdom; [2]Surgical and reproductive sciences, Newcastle University, Newcastle upon Tyne, United Kingdom

Aims: ECMO has been introduced by certain groups with success, in NHBD's for liver transplantation. We sought to compare the effects of ECMO, with those from Cold Preservation (CP) method of intra-vascular and -peritoneal cooling, on NHBD livers.
Methods: Eleven landrace pigs were grouped as, ECMO ($n = 5$) and CP ($n = 6$). Under general anaesthesia, all animals underwent laparotomy, cannulation of great vessels, placement of microdialysis catheters, abdominal closure and euthanasia. After 30 mins of warm ischaemia, ECMO (using a circuit for normothermic oxygenated perfusion with autologous blood) or CP (using a peritoneal cooling circuit along with cold intra-aortic infusion) was established for 2 hours. Liver were retrieved, cold stored and then re-perfused on a normothermic, oxygenated, ex-vivo circuit for 2 hours. Multiple samples were collected and analysed using ANOVA (with Bonferroni) and Mann–Whitney U test, as appropriate. Tissue samples were analysed using a semi-quantitative score, by an expert liver histopathologist, blinded to the groups.
Results: During preservation, liver tissue lactate levels at 2 hours were significantly higher in the ECMO group (Z = 2.121; $P = 0.034$). Lactate pyruvate ratio was significantly lower in the ECMO group at 1 hour (Z = -2.449; $P = .014$); at 2 hours those trends continued to be better, but without significant difference. During re-perfusion, bile production increased in the ECMO group (Z = -2.25; $P = 0.0240$). Trends in AST levels were higher in the CP group, but not statistically significant. No differences were found in ALT, factor-VII, oxygen consumption, weight gain, albumin and tissue lactate levels. On histological analysis, liver parenchyma was significantly better preserved in the ECMO group (mean damage-16.6%, median-2.5%) in comparison to extensive damage consistently noted in the CP group(mean damage-72%, median-90%) ($P = 0.016$). The damages featured hepatocytes with shrunken nuclei, discohesive plates and microvacuolar appearance of the cytoplasm.
Conclusion: ECMO appears to cause much lesser damage to NHBD livers and therefore is probably better in preserving the tissue, in comparison to the CP method.

OP23 HEPATOCYTE ISOLATION A SURROGATE FOR LIVER TRANSPLANT- EXTRACORPOREAL MEMBRANOUS OXYGENATION A VALUABLE TOOL FOR IMPROVED HEPATOCYTE VIABILITY IN A NON-HEART BEATING PORCINE MODEL

Mohamed Noormohamed[1,2], Aditya Kanwar[2], Christopher Ray[2], David Cowie[1], Susan Stamp[1,2], Derek Manas[1,2], Mathew Wright[1,2], David Talbot[2], Steve White[1,2]; [1]Liver research group, Institute of cellular medicine, Newcastle University, Newcastle upon tyne, United Kingdom; [2]The Department of Tranplant and Hepatobiliary Surgery, Freeman Hospital, Newcastle upon Tyne, United Kingdom

Introduction: The non heart-beating donor (NHBD) liver is a potential source of extra livers for transplantation However despite refinements in organ preservation techniques prolonged ischaemia is still a significant risk factor for poor post-operative graft function. Recently the NHBD liver has also become a valuable source for hepatocyte transplantation which can be used to treat end-stage liver disease in infants and as a bridge to later liver transplantation. One such technique to improve preservation is extracorporeal membranous oxygenation (ECMO).
Aim: The aim of this study is to determine whether ECMO improves viability of isolated hepatocytes from a porcine NHBD liver.
Method: Porcine livers were subjected to 30 min of warm ischemia and then randomised to either in situ intra-vascular cooling with HTK and intra-peritoneal cooling for 2 hours ($n = 5$) or in situ ECMO for 2 hours ($n = 7$). Livers were retrieved from both groups and then placed on a normothermic reperfusion circuit for 2 hours. Liver tissue was analysed and sampled throughout this procedure Hepatocytes were then isolated by collagenase perfusion/digestion. Hepatocyte viability was assessed by trypan blue dye exclusion, culture seeding efficiency and MTT reduction.
Results: Test Cooling ECMO P value Trypan Blue (%) 90.6 (SD = 4.04) 95.7 (SD = 1.64) 0.015 MTT 0.65 (SD = .222) 1.29 (SD = .114) 0.0006 Seeding Efficiency (%) 45.5 (SD = 20.3) 67.1 (SD = 24.9) 0.0380 ADP/ATP Pre I/R 3.1 (SD = 1.92) 1.65 (SD = 2.01) 0.29 Glutathione/protein 121.53 (SD = 63) 34.505 (SD = 17.6) 0.0018** Pre I/R Glycogen/ Protein 19.2 (SD = 19.3) 2.44 (SD = 3.2) 0.0224** Pre I/R.

Conclusion: Our Preliminary results indicate there is a significantly better hepatocyte viability and culture seeding efficiency when liver tissue is preserved with ECMO prior to isolation.

OP24 HEMOGLOBIN BASED OXYGEN CARRIERS FOR MACHINE PRESERVATION LIVERS AT 21° C

Peter Olschewski, Paul Gass, Volker Schmitz, Kerstin Jasse, Martin Mentzel, Peter Neuhaus, Gero Puhl; Department for General, Visceral and Transplant surgery, Charrite-Universitätsmedizin Berlin, Berlin, Germany

The potential benefit of MP is the provision of substrates and oxygen for maintaining aerobic metabolism. Liver preservation usually is performed at 4° C using e.g. UW, HTK or Belzer-MPS. Recently some evidence emerged that sub normothermic temperatures might be an alternative. In the present study machine preservation at 21° C was compared to conventional static cold storage (CS) or MP at 4° C. An artificial haemoglobin based oxygen carrier (Oxyglobin®) was used for providing sufficient oxygen under low flow conditions.

Methods: Livers from non-heparinized Lewis rats were harvested 60 min after cardiac death. Livers were preserved for 6 hours either by CS (HTK-CS) or oxygenated MP (5 mls/minflow rate) at 4° C (Belzer-MP, HTK-MP) and 21° C (Oxyglobin based solution, Oxy-MP) respectively. Finally livers were transplanted using Lewis rats as recipients (n≥5) After 6 hours of MP HTK-MP 4° C Belzer-MP 4° C, Oxy-MP 21° C HTK-CS 4° C AST mU/l/g 16713 ± 7793 3538 ± 1885 4809 ± 2682 n.a. ALT mU/l/g 13179 ± 2920 4308 ± 8763 2123 ± 2014 n.a. O_2 consump. 2.45 ± 0.56 1.65 ± 0.90 182 ± 62 n.a. ATP content 335.54 ± 63 473.02 ± 241 319.52 ± 169 32.96 ± 18, 30 min after oLTX HTK-MP 4° C Belzer-MP 4° C Oxy-MP 21° C HTK-CS 4° C AST mU/l 3173 ± 1054 1993 ± 1653 1032 ± 238* 2927 ± 788 ALT mU/l 2814 ± 1200 2250 ± 2080 820 ± 245* 2498.50 ± 663 MPO content 63.43 ± 25 17.29 ± 2.21 50.83 ± 30.85 70.71 ± 34.14 Survival (>60 days) after oLTX HTK-MP 4° C (0/5) Belzer-MP 4° C(5/6) Oxy-MP 21° C(6/6)HTK-CS 4° C(3/5).

Summary: Machine perfusion facilitates revitalizing and transplantation of marginal livers even after 60 min of warm ischemic time. Livers preserved at 4° C using Belzer-MP solution or at 21° C using an artificial haemoglobin based solution prevailed a markedly lower release of transaminases already during machine perfusion and after transplantation, resulting in a significantly improved survival rate compared to simple cold storage. In conclusion for successful machine preservation appropriate perfusion solutions should be applied and for preservation at elevated temperatures the use of artificial haemoglobin based oxygen carriers seems to be a feasible option.

OP25 IMPACT OF GRAFT STEATOSIS ON OUTCOMES OF DCD LIVER TRANSPLANTION

Laura Tariciotti, Chiara Rocha, Darius Mirza, Simon Bramhall, Paolo Muiesan; HPB and Liver Transplant Unit, University Hospital Birmingham Queen Elizabeth Hospital, Birmingham, United Kingdom

Aim: To evaluate the outcomes of LT using steatotic liver grafts from DCD.

Methods: From November 2004 to September 2009, 52 adults were transplanted with DCD livers. Core needle postreperfusion biopsy was available in 38 cases. Steatosis of the graft at liver biopsy was defined as mild (<30%), moderate (30 to 60%) or severe (>60%).

Results: Out of the 38 DCD LT recipients with available post-reperfusion biopsies, 4 (10.5%) patients received a non steatotic, 23 (60.5%) a mildly steatotic and 11 (28.9%) a moderately steatotic graft. Two groups were analysed: A: mild or absent steatosis (71%); B: moderate steatosis (28.9%). Median follow-up post-transplantation was 290 days (range 1–1739). Donor and recipient population were homogeneous. Overall survival at 1 year was 94.7% and 89.5% for recipients and grafts. There were six deaths, three for sepsis, and three for haemorrhagic, cerebrovascular and cardiovascular complications respectively. Two patients were re-transplanted, one for primary non function and one for early hepatic artery thrombosis. There was no significant difference in patient or graft survival between the two groups. One-year patient survival was 92.3% vs. 100% ($P = 0.33$) and graft survival was 88.5% vs. 91.7% ($P = 0.75$) in groups A and B respectively.

Three recipients, in group A, developed biliary complications (11.5%) including 2 strictures and one bile leak. One patient in group B developed a bile leak (9.1%). There was no statistically significant difference between the two groups in terms of biliary complications.

Conclusion: In selected cases, steatotic DCD grafts are suitable for transplantation, provided the total ischemia time is kept as short as possible. Technologies which provide a timely visual evaluation of the DCD graft, thus allowing the transplant team an early start of the transplant and potentially contributing to keeping CIT short.

OP26 NHBD PANCREAS TRANSPLANTATION IN THE UK: SHOULD WE GO ON?

Anand Rathnsamy Muthusamy[1], Lisa Mumford[2], Alexander Hudson[2], Anil Vaidya[1], Jens Brockmann[1,3], Sanjay Sinha[1], Susan Fuggle[1], Peter Friend[1,3]; [1]Transplant Surgery, Oxford Transplant Centre, Churchill Hospital, Oxford, United Kingdom; [2]Organ Donation and Transplantation, UK Transplant Registry, Bristol, United Kingdom; [3]Nuffield Department of Surgery, University of Oxford, Oxford, United Kingdom

The aim of this retrospective study of data obtained from the UK Transplant Registry was to compare the early results of pancreas transplantation from non-heart beating donors (NHBD) and heart-beating donors (HBD) in the United Kingdom. Between 1 January 2006 and 30 November 2009, 735 pancreas transplants were performed in the UK including 649 HBD and 86 NHBD. NHBD pancreases were retrieved if donor asystole occurred within 60 min of treatment withdrawal. No premortem cannulation or pharmacologic interventions were performed.

NHB donors were younger (median ± interquartile range) (27(18–40) years vs. 37(24–46), $P < 0.01$), had lower BMI (23(20–24) vs. 24(22–26), $P = 0.003$), lower serum creatinine (μmol/l), (62(50–82) vs. 76(60–94), $P = 0.01$), less cerebrovascular cause of death (27 vs. 59%, $P < 0.0001$). NHBD grafts tended to be utilized locally (74 vs. 65%, $P = 0.08$) and resulted in more isolated pancreas transplants (PA) (48 vs. 15%, $P < 0.0001$). NHBD grafts 0 had longer cold ischemia (13 hours 49 min vs. 12 hours 33 min, $P = 0.01$).

Overall pancreas graft survival was similar in HBD and NHBD (85 vs. 83%, $P = 0.5$), with comparable results in SPK (91%, (CI 88–93) vs. 84%(67–92), $P = 0.2$) and PA (81%, (CI 70–88) vs. 76%(57–87), $P = 0.5$), with more NHBD grafts lost tothrombosis (8% vs. 4%, P = NS). SPK survival was significantly better than PA in both cohorts. Patient survival was comparable (99% vs. 94% in SPK, $P = 0.06$), 96% vs. 97% in PA, $P = 0.9$).

The NHB donors were younger with lower BMI, less vascular disease and better renal function although the grafts had longer cold ischemia. The outcomes in the NHBD cohort were similar to the HBD grafts. These early results suggest that carefully selected NHBD are a feasible source of donor pancreases with acceptable graft and patient outcomes. Reducing cold ischemia could contribute to improving outcomes of the NHBD pancreas transplants.

Session 13

OP27 LUNG TRANSPLANTATION FROM NON-HEART-BEATING DONORS ENLARGED OUR DONOR POOL BY 13%

Dirk Van Raemdonck[1], Geert Verleden[2], Lieven Dupont[2], Willy Coosemans[1], Herbert Decaluwe[1], Paul De Leyn[1], Philippe Nafteux[1], Toni Lerut[1]; [1]Thoracic Surgery, University Hospitals Leuven, Leuven, Belgium; [2]Pneumology, University Hospitals Leuven, Leuven, Belgium

Aim: We reviewed our total experience with lung transplantation (LTx) from non-heart-beating donors (NHBD). Methods: Between 2007–2009, 17/145 (11.7%) LTx were performed from controlled NHBD.

Results: Nine male and 8 female recipients [median age 55(23–63) years] underwent LTx (16DL-1SL) for emphysema(9), bronchiolitis obliterans(3), pulmonary fibrosis(3), and cystic fibrosis(2) after a waiting time of 172(29–499) days. Lungs were recovered from 17 donors [9 male–8 female; age 50(19–68) years] after withdrawal of life support and cardiac death in OR (13) or in ICU (4). In four donors a request for euthanasia was granted. The other donors suffered from severe brain insult with infaust prognosis (trauma: 4; bleeding 4; hypoxia: 4; ischemia: 1). Heparine was administered to all donors. Circulatory arrest occurred after 12[1–28] min. The warm ischemic interval between asystolie and cold Perfadex® anterograde + retrograde flush perfusion was 15(10–22) min. Lungs were implanted sequentially via 2 thoracotomies without extracorporeal support in 16/17. The total ischemic time was 296(220–414) min for the first lung and 475(346–641) min for the second lung. One fibrotic recipient (5.9%) died in the ICU from multiple problems 3 months post-LTx with good functioning lungs. Other patients were extubated after 2(1–11) days and discharged from ICU after 5(2–66) days and from hospital after 29(18–101) days. No donor-related complication was seen. All patients are alive with a median follow up of 7(1–35) months. FEV1 increased from 25 (15–50) % pre-transplant to 72(56–102) % at discharge. Actuarial survival at 1 and 3 years is 94.1%. Survival did not differ compared to patients transplanted from heart-beating donors ($n = 128$) in same period ($P = 0.7$). Also freedom from BOS ≥ 1 was comparable ($P = 0.19$).

Conclusions: LTx from controlled NHBD results in excellent early and mid-term outcome comparable to HBD. It enlarged transplants from conventional donors by 13.3% (145/128).

OP28 LUNG TRANSPLANTATION FROM CONTROLLED NON-HEART BEATING DONORS (NHBD) IS AS SAFE AND SUCCESSFUL AS CONVENTIONAL HEART BEATING DONOR TRANSPLANTATION: HAREFIELD HOSPITAL EXPERIENCE

Saleem Haj-Yahia[1], Toufan Bahrami[1], Mohamed Amrani, Fotini Ampatzidou[1], Nandy Marcin[1], Fabio De Robertis[1], Behzad Soleimani[1], Asghar Khaghan[1], Karen Redmond[1], Nicky Crounchen[1], Martin Carby[1], Mario Petrou[1]; Department Cardiothoracic & Transplantation Surgery, Royal Brompton & Harefield Hospital, London, United Kingdom

Lung transplantation (LT) from NHBDs remains limited owing to scarce clinical experience and concerns about outcome. Aim: to compare NHBD Maastricht-IV (Group-A) with conventional LT from HBDs (Group-B).

Methods: Donor's demographics, recipient's pre and postoperative characteristics, outcome and follow-up for patients undergoing LT between 2007 and 2009 at our institution were obtained and analysed.

Results: 7/10 (70%) in Group-A were male and 22/39 (56.4%) in Group-B ($P = 0.4$). Age at transplant was 41.6 + 14.2 and 39 + 12.4 years for Groups-A and B, respectively ($P = 0.57$). Seven donors (70%) in Group-A were life-smokers and twelve (30.7%) in Group-B ($P = 0.033$). The commonest indication for transplant was cysticfibrosis for both groups. Five (50%) donors

in Group- A were male and sixteen (41%) in B ($P = 0.73$). Donors' mean age was 39 + 13.2 years in Group-A and 39.2 + 15 years in B ($P = 0.4$). Mean donor PaO2/1.0FiO2 ratio prior to withdrawal of treatment or cross-clamp was 469.5 ± 42.5mmHg and 492.7 ± 6.4 mmHg for Groups A and B, respectively ($P = 0.032$). Organ's mean ischaemia time was 293.5 ± 42.4 and 249.79 ± 44.64 mins for Groups A and B, respectively ($P = 0.015$). Group-B had a better gas exchange at six hours postoperatively ($P = 0.03$). The median postoperative duration of ventilation, ICU, hospital stay and survival rate were satisfactory and similar between the two groups. No cases of primary graft dysfunction, rejection or bronchiolitis-obliterans were encountered in either group. Group-A, however, had a better improvement rate in FEV1 and FVC at follow-up.

Conclusion: LT from controlled NHBDs category-IV can be performed safely and effectively with results at least as good as LT from conventional-HBD. Greater improvement in post-transplant lung functions was noted in the NHBD group on long follow-up, however.

Conclusion: Our experience of DCD kidneys produced promising results for graft survival (96%). Immunosuppression protocol needs to be tailored in view of avoiding CNI toxicity and long term outcome needs further evaluations.

OP29 EXPLODING THE MYTHS: THE REAL POTENTIAL FOR LUNG TRANSPLANTATION FROM NON-HEARTBEATING DONOR (NHBD) LUNGS

Bronwyn Levvey, Anne Griffiths, Glen Westall, Tom Kotsimbos, Helen Whitford, Trevor Williams, Gregory Snell; Department Lung Transplant Service, Alfred Hospital, Melbourne, Australia

Purpose: Non-Heart-Beating Donors (NHBD) now represent a potential alternative source of lungs for lung transplantation (LTx). The absolute potential to impact on the donor lung pool is unclear, with concerns that availability, acceptability, recovery and post-LTx outcomes may limit applicability.

Methods: NHBD referrals to our Service between May 2006 and December 2009.

Results: Forty three NHBD Maastricht Category 3 referrals came from 8 hospitals in 4 Australian states. 17(39%) were not accepted for further consideration: lungs unsuitable (n=10, 23%), technical/legal issues ($n = 2$), became brain dead ($n = 5$, 4 of which became brain dead donors). There were 26 potential retrievals attended. 21(81%) died in the 90 min window (5 did not), but in 1 lungs were unsuitable at explant. 20 donors resulted in 19 bilateral and 2 single LTx. 19/21(95%) curently alive up to 3.6 years, with otherwise excellent clinical outcomes. 11/20 (55%) donors were 'extended' lung donors with abnormal chest Xrays ($n = 11$), age >55 years ($n = 4$) and airway secretions/aspiration ($n = 2$ each) with last paO2 /FiO2 = 426 + 54 in this 9. In 2009 in our centre NHBD LTx represents an additional 22% LTx. Nationally, in 2006, 2007, 2008 and 2009; 2.1%, 10.7%, 6.1% and 19% respectively, of all LTx, were from NHBD donors. This represents a steady increase in overall LTx numbers.

Conclusions: Contrary to initial scepticism, and despite relatively few hospitals being currently set up for NHBD donation, the reasonable utility and excellent clinical results demonstrate that NHBD donor LTx is an important lung source and should be considered at all NHBD opportunities. 'Extended' NHBD lung donors and paired single LTxs are also possible.

OP30 SURFACTANT ALTERATIONS IN NON-HEART-BEATING DONOR LUNGS

Ilhan Inci[1], Stephan Arni[1], Christa Acevedo[2], Wolfgang Jungraithmayr[1], Demet Inci[3], Peter Vogt[4], Sven Hillinger[1], Walter Weder[1]; [1]Department Thoracic Surgery, University Hospital Zurich, Zurich, Switzerland; [2]Hannover Medical School, Hannover, Germany; [3]Division of Respiratory Medicine, Institution University Children's Hospital, Zurich, Switzerland; [4]Department of Pathology, University of Zurich, Zurich, Switzerland

Background: The use of lungs from non-heart-beating donors (NHBDs) is one of the strategies to increase the donor pool. Surfactant reduces the surface tension at the air-fluid interface and prevents alveolar collapse at end-expiration. The aim of this study is to assess the surfactant alterations in donor lungs from NHBDs.

Methods: Pigs were sacrificed and left untouched for 1 (NHBD1), 2 (NHBD2) and 3 (NHBD3) hours. Lungs were then topically cooled with saline for 1, 2 or 3 hours to reach a total ischemic time of 4 hours. In the heart-beating donor (HBD) control group, the lungs were flushed, explanted, and stored for 4 hours in cold (4°C) Perfadex® solution. Bronchoalveolar lavage (BAL) samples were taken from right lungs after explantation and assessed for protein levels and surfactant function using pulsating bubble surfactometer. Left lungs were prepared for *ex-vivo* evaluation. Hemodynamic and oxygenation parameters were measured. Wet to dry weight ratio was calculated.

Results: Pulmonary vascular resistance (PVR), oxygenation, airway pressure and wet-to-dry weight ratio were significantly different between HBD and NHBD3 ($P < 0.05$). BAL protein levels were statistically higher in NHBD3 compared to HBD ($P < 0.05$). Surface tension and surface tension measured at minimal bubble diameter (adsorbtion) was significantly lower in HBD compared to NHBD groups ($P < 0.05$). Adsorbtion was also significantly lower in NHBD1 compared to NHBD2 ($P < 0.05$). Adsorbtion and surface tension were significantly correlated with oxygenation and airway pressure ($P < 0.05$).

Conclusion: Our data shows that surfactant administration might be a good strategy to improve the graft function following lung transplantation from NHBDs.

OP31 FUNCTIONAL AND METABOLIC RECOVERY OF THE RESUSCITATED NHBD HEART

Ayyaz Ali[1], Bo Xiang[2], Rakesh Arora[2], Paul White[1], Trevor Lee[2], Euan Ashley[3], Stephen Large[1], Ganghong Tian[2], Darren Freed[2]; [1]Cardiothoracic Surgery, Papworth Hospital, Papworth Everard, Cambridge, United Kingdom; [2]Cardiothoracic Surgery, University of Manitoba, Winnipeg, Canada; [3]Cardiovascular Medicine and Surgery, Stanford University Medical Center, Palo Alto, United States

Background: Using porcine models of organ donation we sought to compare function and myocardial energetics in the resuscitated NHBD heart to that of the brainstem dead (BD) heart.

Methods: Brainstem death (BD) or hypoxic cardiac arrest (NHBD) was inflicted in pigs ($n = 7$). NHBD hearts were subjected to 15 min of warm ischemia followed by reperfusion using cardiopulmonary bypass (CPB). Left ventricular (LV) contractility was assessed using the end-systolic pressure volume relationship (ESPVR). Magnetic resonance spectroscopy (MRS) and imaging (MRI) were undertaken to investigate myocardial energetics and biventricular function in NHBD heartS.

Results: BD was followed by a decline in the ESPVR (BD pre 1.09 ± 0.54 vs. post 0.55 ± 0.19, $P = 0.03$). In contrast there was a significant increase in ESPVR after resuscitation of the NHBD heart (NHBD pre 1.04 ± 0.55 vs. post 2.45 ± 1.18, $P = 0.006$). Following cardiac arrest the NHBD heart demonstrated an increase in the ratio of myocardial inorganic phosphate to phosphocreatinine (Pi/Pcr: pre 0.34 ± 0.13 vs. arrest 2.14 ± 0.91, $P = 0.002$) and a decrease in the ratio of phosphocreatinine to ATP (PCr/ATP: pre 3.53 ± 1.3 vs post 2.04 ± 0.79, $P = 0.06$). Following resuscitation there was normalization towards baseline of the Pi/Pcr: 0.39 ± 0.25, $P = 0.69$ and an increase above baseline in the PCr/ATP: 5.8 ± 1.6, $P = 0.06$). MRI of the NHBD heart demonstrated a non significant decrease in LV ejection fraction (LVEF) (pre 51 ± 11 vs. post 34 ± 15, $P = 0.11$) after resuscitation. There was a decrease in Right ventricular (RV) EF (pre 37 ± 10 vs. post 18 ± 4, $P = 0.03$) with an accompanying increase in RV volume (pre 74 ± 21 ml vs, post 118 ± 2 ml, $P = 0.02$.)

Conclusion: Cardiac resuscitation in the NHBD yields viable organs with excellent LV contractility. Further evaluation of RV recovery in this setting is warranted prior to establishing the NHBD heart as a source of organs for clinical cardiac transplantation.

OP32 THE RESUSCITATED NHBD HEART IS FUNCTIONALLY SUPERIOR TO THE BRAINSTEM DEAD DONOR HEART

Ayyaz Ali[1], Giovanni Fajardo[2], Shoichi Tsuda[1], Grant Budas[2], Ziad Ali[2], Thomas Quertermous[2], Daniel Bernstein[2], Robert Robbins[2], Michael Fischbein[2], Stephen Large[1], Euan Ashley[2]; [1]Cardiothoracic Surgery, Papworth Hospital, Papworth Everard, United Kingdom; [2]Cardiovascular Medicine and Surgery, Stanford University Medical Center, Palo Alto, United States

Background: The number of transplants from NHBD has increased ten-fold over the past decade. Hearts from NHBD are not currently utilized due to concerns over myocardial injury. Using rodent models of organ donation we sought to compare cardiac function in the resuscitated NHBD heart to that of the brainstem dead (BD) heart.

Methods: Male rats were subjected to hypoxic cardiac arrest (NHBD, $n = 8$) followed by 15 minutes of warm ischemia or brainstem death via subdural balloon inflation (BD, $n = 8$. Cardiac resuscitation in the NHBD group was achieved using extracorporeal membrane oxygenation. Left ventricular contractility was assessed using the end-systolic pressure volume relationship (ESPVR). LV myocytes isolated from each group were field stimulated with 50% suprathreshold voltage at 0.5 Hz for analysis of sarcomeric contractility which was expressed as percentage of sarcomere shortening.

Results: Both groups of animals demonstrated a decline in contractile function (ESPVR) compared to baseline (NHBD pre 0.81 ± 0.23 vs. post 0.53 ± 0.1, $P < 0.01$; BD pre 0.77 ± 0.22 vs. post 0.32 ± 0.16, $P < 0.001$). The resuscitated NHBD heart demonstrated superior contractility to the BD heart (0.53 ± 0.1 vs. 0.32 ± 0.16), $P < 0.01$. Sarcomere shortening was decreased in BD myocytes ($n = 20$, 7.4% ± 0.4) compared to NHBD ($n = 17$, 10.6 ± 0.6) and control myocytes ($n = 18$, 10.6% ± 0.5), $P < 0.01$. Isoproterenol stimulation increased contractility in all myocyte groups, however sarcomere shortening was lower after isoproterenol in BD myocytes (12.3% ± 0.9) compared to NHBD (16.3% ± 0.7) and control (16.8% ± 0.4), $P < 0.05$.

Conclusions: Contractility of the NHBD heart was superior to the BD heart, which is currently used for transplantation. The resuscitated NHBD heart maintains viability and recovers satisfactory function following reperfusion. In the face of an ongoing shortage of donor organs the human NHBD heart should be evaluated for use in clinical cardiac transplantation.

OP33 THE USE OF NON-HEART-BEATING LUNG DONORS CATEGORY III CAN INCREASE THE DONOR POOL

Caroline Van De Wauwer[1], Erik Verschuuren[2], Wim van der Bij[2], George Nossent[2], Michiel Erasmus[1]; [1]Department of Cardiothoracic Surgery, UMC Groningen, Groningen, The Netherlands; [2]Department of Pulmonary Disease and Lung Transplantation, UMC Groningen, Groningen, The Netherlands

Background: The use of non-heart-beating (NHB) lung donors has been propagated as an alternative to overcome organ shortage. We describe our experience in 35 adult lung transplantations using nonheparinized category III NHB donors.

Methods: The donor and recipient data of all NHB category III lung transplantations between January 2005 and December 2009 were reviewed. For comparison, we collected recipient and donor data of a cohort of heart-beating (HB) lung transplantations ($n = 77$). PGD was graded (0–3) according to the recommendations of the ISHLT considering the PaO2/FiO2 ratio and the findings on chest X-ray, the incidence was compared at different time points (T0, T24, T48 and T72).

Results: Thirty-five NHB lung transplantations were performed. Five single LTx and 30 bilateral LTx in 12 male and 23 female patients. The donor oxygenation capacity was 61 kPa (42 – 82). Warm ischemia time was 29 (12 – 24) min. Cold ischemic time of the last implanted lung was 458 min (244 – 682). Heart lung machine was used 13 times. PGD (1 –3) was observed in 45% of the patients at T0, in 42% at T24, in 53% at T48 and in 50% at T72. PGD 3 decreased from 24% at T0 to 6% at T72. The use of NO within 24 hours after transplantation was necessary in three patients with successful weaning in all. There was no significant difference for donor and recipient characteristics between NHB and HB lung transplantations. Occurrence of PGD was equal to the HB cohort.

Conclusion: Lungs from nonheparinized category III NHB donors are well suited for transplantation and can safely increase the donor pool.

OP34 CAN DOCTOR-LED UK AIR AMBULANCE TEAMS CONTRIBUTE TO NON HEART BEATING DONATION?

Keith Roberts, Simon Bramhall, David Mayer, Paolo Muiesan; Department Liver Surgery, Queen Elizabeth Hospital, Birmingham, United Kingdom

A strategy to increase non heart beating donation (NHBD) could utilise pre-hospital physicians to identify and recruit potential donors; this is difficult in the United Kingdom where pre-hospital care is provided almost exclusively by paramedics. Exceptions are doctor-led air ambulance teams. To identify the potential to recruit from this pool of donors we reviewed the caseload of such a unit.

Methods: The Warwickshire and Northamptonshire air ambulance tends to medical and trauma emergencies; we reviewed 64 months activity of this unit identifying all patients who entered pre-hospital cardiac arrest (PHCA) at any time point. We observed rates of bystander resuscitation, witnessed cardiac arrest, presence of family members in addition to patient demographics.

Results: During 8374 missions 448 patients entered PHCA. 149 were clearly deceased and underwent no resuscitation attempt. 61 patients were successfully resuscitated and transported to emergency department alive. 238 patients underwent unsuccessful attempts at resuscitation and comprise the study group. There were six paediatric cases; 28 cases of 17–50 -year olds and 36 cases of 50–70 -year old. Cardiac arrest was witnessed in 74% of cases and there was bystander resuscitation in 47%. At 15% of cases relatives of the deceased were present though the actual figure may be higher as this data was not recorded in 76% of cases.

Conclusions: A doctor-led regional air ambulance could contribute to the national NHBD programs. Given that there are 31 air ambulances in England and Wales we estimate that there could be up to 400 additional potential NHBD per year, a possible significant contribution to improve the chronic organ shortage in transplantation within the UK.

Session 14

OP35 RESUSCITATION OF KIDNEY FROM UNCONTROLLED DONORS AFTER CARDIAC DEATH WITH ONE HOUR WARM ISCHEMIC TIME BY NORMOTHERMIC EXTRACORPORAL PERFUSION IN SITU WITH OXYGENATED AND LEUKOCYTE-FREE DONORS BLOOD

Oleg Reznik[1], Andrey Skvortsov[1], Igor Loginov[1], Alexey Ananyev[1], Sergey Bagnenko[1], Yan Moysuyk[1,2]; [1]Transplant Department, State Research Institute for Emergency, Saint-Petersburg, Russia; [2]Kidney-Liver Transplantation, Shumakov Federal Center of Transplantology, Moscow, Russia

The main problem in uncontrolled kidney donors after cardiac death is damaging factor of the warm ischemical time (WIT). Definition of the limit of WIT was the one task of our work and other one is development of preservation protocol which could save quality of such kind of kidneys.There have been 7 uncontrolled donors with warm ischemic time from 45 up to 91 min (76.7 ± 16.7min). The WIT was defined as the time between declaration of death and start of perfusion procedure. The last one had been started when procurement team arrived in hospital, as a rule in one hour after donors' death. In order to resuscitate these kidneys was adapted extracorporeal perfusion device for isolated abdominal pulsatile preservation in situ, inside donor, before the procurement. The main attention was paid to elimination of leucocytes from oxygenated donors blood circulated in device by leukocyte filter and to oxygen supply for restoration of kidney viability. The average time of extracorporal normothermic perfusion in situ with membrane oxygenation and leucocytes depletion (ENP) was 138.6 ± 14.6 min. In 6 of the cases from 14 the immediate function of kidney grafts had been observed (42.8%). The duration of DGF had been 16.9±9.5 days (min-4d, max-36) To the end of third month, the average creatinine was 120.6 ± 22.15 mmol/L, no one rejection episodes happened.

Resuscitation and treatment of ischemically damaged kidneys inside uncontrolled donors after one-hour and more warm ischemic time by normothermic extracorporal hemoperfusion with membrane oxygenation and leucocytes depletion could have considered as challenging protocol leading to rehabilitation of kidney quality before procurement and next successful transplantation. This practice demands further study and large number of observations.

OP36 MACHINE PERFUSION OF NON HEART BEATING DONOR (NHBD) KIDNEYS: CONTINUOUS VERSUS PULSATILE PERFUSION

Muhammad Khurram[1], Aditya Kanwar[1], Susan Stamp[2], John Asher[1], Hugh Wyrley-Birch[1], Muhammad Gok1, Brian Shenton[2], Mettu Reddy[1], Anne Cunningham[3], Noel Carter[3], Derek Manas[1], David Rix[1], Naeem Soomro[1], Brian Jaques[1], David Talbot[1]; [1]Liver/Renal transplant unit, Freeman hospital, Newcastle upon Tyne, United Kingdom; [2]Surgical and reproductive sciences, Newcastle University, Newcastle upon Tyne, United Kingdom; [3]Pharmacy, health and well being, University of Sunderland, Sunderland, United Kingdom

Machine perfusion of Non Heart Beating Donor (NHBD) kidneys is one of the several measures that have been used to potentially improve recipient outcomes. It has shown to improve both viability as well as long term graft function. But there has been very little evidence to suggest the preferred type of machine perfusion. Our study compares the long term outcomes between NHBD kidneys subjected to either continuous or pulsatile machine perfusion from matched donors.

Methods: It is a retrospective study from November 2004 to October 2007 with 75 recipients from 49 NHBD donors. 19 dual transplants were excluded and 4 kidneys which failed viability test were not used. 48 kidneys from 24 donors were finally included in the study. One kidney from each donor received either of the two methods of perfusion before transplantation. Recipients were followed up for upto 5 years. Patient and graft survivals were the primary and secondary end points respectively and long term estimated Glomerular Filtration Rates (eGFRs) were calculated using MDRD formula and were used as indicators of graft function. Patient and graft survivals were calculated using Kaplan Meier survival curves and long term function was calculated by Sign test.

Results: There was no significant difference in patient survival (91.7% vs. 87.5%) and graft survival (95.8% vs. 83.3%) rates in recipients from continuous and pulsatile groups respectively. Long term eGFR(ml/min/1.73 m^2) results are as follows: Time period in months 3m 12m 24m 36m 48m 60 m Pulsatile mean eGFR 38.5 38.51 41.73 38.83 40.84 36.09 Continuous mean eGFR 42.15 40.17 35.34 36.88 45.72 68.51 Exact Sig. (2-tailed) 1.000a .359a .077a .180a 1.000a n/a

Conclusion: There appears a slightly improved patient and graft survival with continuous machine perfusion but this was not statistically significant.

OP37 A NEW HYPOTHERMIC OXYGENATED PULSATILE PERFUSION MACHINE, MAGNETIC RESONANCE COMPATIBLE, TO TEST MARGINAL KIDNEYS VIABILITY. EXPERIMENTAL STUDY

Jean-Bernard Buchs[1], Francois Lazeyras[2], Solange Moll[3], Leo Buhler[1], Antonio Nastasi[1], Raphael Ruttimann[1], Philippe Morel[1];; [1]Visceral and Transplantation Service, University Hospital Geneva, Geneva, Switzerland; [2]Service of Radiology – CIBM, University Hospital Geneva, Geneva, Switzerland; [3]Departement of Pathology, University Hospital Geneva, Geneva, Switzerland

Objectives: Using recommended criteria (Vascular Resistance, Flow and Glutathione-S-Transferase level) for marginal organs viability evaluation is underrated. Marginality includes older donors (risk of transmission of cancers) and NHBD (increasing ischemic lesions). Our objective was to develop a perfusion machine compatible with extensive MRI/MR-spectroscopy analysis to establish a more precise score of organs' viability.

Method: Marginal pigs' kidneys have been studied. During perfusion (KPS-1), organs have been tested by T2 sequence for tumor research or other major pathologies. 31P MR spectroscopy has been applied to measure ATP resynthesis, as a proof of organs' viability. Gadolinium-perfusion was realized to visualize arteries and organs perfusion. Gd-perfusion lets measure the redistribution of flow between Cortex and Marrow due to ischemic medulla. Fast T1 mapping sequence lets estimate the Gadolinium leakage in the interstitial space as a consequence of ischemic lesions. The MR results have been compared with histological evaluation of the organs following the Groningen score. We present here a kidney with 30 min of WIT followed by 20 hours. of perfusion before NMR evaluation.

Results: The obtained score demonstrates a viable organ: Absence of tumor or major pathology (T2); fast T1 mapping sequence shows the preservation of the C-M gradient of flow (300 ms) meaning absence or very low Gd leakage in the interstitial space; Gd-perfusion: showing absence of shunt effect and normal vascular anatomy; demonstration of ATP resynthesis.

Our results compared with histological score, were in correlation.

Conclusion: This technique of perfusion lets evaluate marginal organs during their necessary perfusion of reanimation. The histology concordance is essential to understand the links between the MRI/MR-spectroscopy findings with the physiopathology. This will permit to identify cut-off values to predict the risk of a non functional organ.

OP38 OXYGENATED MACHINE PERFUSION OF DCD KIDNEYS: TOWARDS FURTHER REDUCING DGF AND IMPROVING GRAFT QUALITY

Raphael Thuillier[1,5], Jerome Cau[1,5], Arjan van der Plaats[3], William Hebrard[4], Henri Leuvenink[2,5], Gerhard Rakhorst[2], Thierry Hauet[1,4,5]; [1]Inserm U927, Faculte de Medecine et Pharmacie, CHU de Poitiers, Poitiers, France; [2]Institution University Medical Center Groningen, Groningen, The Netherlands; [3]Institution Organ Assist b.v. Groningen, The Netherlands; [4]Laboratory of Experimental Surgery, GEPA INRA, Surgeres, France; [5]Institution FLIRT (Federation pour L'etude de l'Ischemie Reperfusion en Transplantation), France

Purpose: Expanded use of deceased after cardiac death donors (DCD) could solve the organ shortage crisis. These organs are more sensible to ischemia reperfusion lesions thus hypothermic preservation using machine perfusion (MP) is recommended, as it improves early graft function and has long term beneficial effects. However these are still limited and MP must be optimized to enhance use of DCD organs. We designed a MP device able to oxygenate the preservation solution to overcome ischemia reperfusion injury.

Methods: Kidney function after warm ischemia (30 min), cold preservation (4° C, 20 hours) and transplantation was studiedin an autotransplant model using Large White pigs. Cold preservation was performed by conventional non-oxygenated MP (MPgroup, $n = 3$) or oxygenated MP (MPO2-group, $n = 3$).

Results: Oxygenated perfusion (MPO2 grafts) allowed for a lower serum creatinine peak after reperfusion as well as a quicker return to normal levels (151.7 ± 11.5 vs. 284.0 ± 14.7 μmol/L at day 11, $P < 0.01$). Preliminary RT-PCR on 10 min kidney biopsies showed increased expression of EPO, a major growth factor (18.8 ± 5.6 vs. 1.1 ± 0.2 folds to control in MP). MPO2 grafts showed decreased expression of MCP-1, a major inflammatory cytokine involved in ischemia reperfusion injury (3.9 ± 0.4 vs. 8.5 ± 3.5 folds in MP), as well as IL-6, described as being produced by stressed epithelial cells (2.9 ± 0.2 vs. 4.4 ± 1.6 folds in MP).

Conclusion: Our preliminary data suggests that oxygenated MP is superior to standard MP, as we demonstrated enhanced capacity of the graft to withstand preservation stress, as well as a quicker recovery of its functional capabilities. We are currently conducting long term analysis of graft outcome between these two protocols. This novel organ preservation method should enhance the pool of donors and improve patients quality of life.

OP39 INDUCTION WITH ATG IN DCD IMPROVES PATIENT OUTCOMES AND IS COST EFFECTIVE COMPARED TO IL2 MONOCLONAL ANTIBODIES (IL2MAB)

Reena Popat, Z Buckhoree, C Pulliatti, R Cacciola; Department Nephrology and Transplantation, Barts and the London NHS Trust, London, United Kingdom

DCD transplants have a greater risk of DGF and increased morbidity. Induction immunosuppression may contribute to reduce risks but controversy remains as to the optimal regime. In this study we analysed outcomes and cost effectiveness of induction with ATG vs IL2Mab.

Method: Forty five consecutive DCD renal transplant recipients were reviewed for 6 months(24 received IL2Mab and 21 received ATG induction). Outcome analysis was based on: patient and graft survival, DGF, BPAR, infections and serum Cr. Cost analysis included: hospital stay post transplant and for readmission, HD sessions, immunosuppression and clinic visits.

Results: In both groups demographics, HLA mismatch, CIT and donor characteristics were comparable. Patient survival was 90.5% vs. 95% (NS) and graft survival was 95.2% vs. 100% (P 0.0001) respectively for ATG vs. IL2Mab. Analysis was performed on the remaining patients. In the ATG arm; DGF ($P = 0.08$), HD sessions (P 0.0001), BPAR (P 0.003)and infections requiring admission ($P < 0.0001$) were significantly less compared to the IL2Mab arm. Average Sr Cr and average bed stay days post transplant were non significant.

Cost analysis included all patients with a functioning transplant at 6 months and results showed statistically significant savings in the ATG arm with respect to bed stay days post transplant (P 0.0004), bed stay days for readmission ($P < 0.0001$), HD sessions ($P < 0.0001$) , clinic visits (P 0.007), total cost (P 0.002) and cost per patient (P 0.002). Cost of immunosuppression was not significant.

Conclusion: At 6 months, patients in the ATG arm had better outcomes and incurred lower cost when compared to IL2Mab. Whilst this is a single centre study with small numbers, these results suggest that ATG is a cost effective induction agent and may contribute to improving patient outcomes.

OP40 CALCINEURIN-FREE IMMUNOSUPPRESSION IN NON-HEART-BEATING DONOR KIDNEY TRANSPLANT RECIPIENTS

Federico Oppenheimer, Vanessa De la Fuente, Nuria Esforzado, Ignacio Revuelta, Luis Quintana, Marta Arias, Nuria Serra, Miquel Blasco, Vicens Torregrosa, Federico Cofan, Maria Ricart, Josep Campistol; Nephrology and Kidney Transplantion Department Hospital Clínic, Barcelona, Spain

Kidneys obtained from non-heart-beating-donors (NHBD) usually show prolonged delayed graft function and consequently are at higher risk for acute rejection. Therefore, the use of a strong but non-nephrotoxic immunosuppression may be beneficial. A prospective pilot study using ATG, sirolimus and MMF was started in our centre in December 2002.

Patients and Methods: Eighty nine patients (age 48.9 ± 12.2 year) received kidneys from Maastricht type-2 NHBD (age 46.9 ± 14.3 year). Normothermic recirculation through cardiopulmonary bypass was used in all donors. Pulsatile machine perfusion was used in 30% of the grafts. Cold ischemia time was 13.9 ± 4.1 hours. Median HLA-A, B, DR mismatches was 5 (range 3–6). Sequential immunosuppression consisted of MMF 2 gr/day, prednisolone at standard doses, rabbit-ATG (Thymoglobulin) 1.25 mg/kg/ for 7 days, and sirolimus that was initiated on day 5 (three loading doses of 6 mg/day, followed by 2 mg/day to achieve blood through levels between 8–12 ng/ml).

Results: One patient died 22 days after transplantation (colonic perforation) before recovering graft function. Four early grafts losses were observed: Two non-primary function and two grafts thrombosis. DGF was present in 74.6% of the transplants, mean duration 18.7 ± 9.7 days. Serum creatinine at 12 m was 1.59 ± 0.56 mg/dL and proteinuria 0.56 ± 0.85. Actuarial risk of being free of rejection at one year was 90.3%. Patient survival was 98.8% at one year and 94.6% at five years and death-censored graft survival was 87.2% and 77.2% respectively. Baseline immunosuppression was changed in 51% of the patients over the first year, mainly due to sirolimus-related side effects.

Conclusion: ATG in combination with sirolimus and MMF provides effective immunosuppression for recipients of NHBD kidney transplants. The low rate of acute rejection and the excellent graft survival and renal function achieved are the most remarkable results.

OP41 ECMO PRIOR TO DEATH: A NEW CATEGORY OF NHBDS

Paolo Geraci[1,6], Massimo Abelli[2], Antonio Dal Canton[3], Maurizio Raimondi[1], Antonio Braschi[5], Giorgio Iotti[5], Marco Maurelli[5], Elena Ticozzelli[2], Marco Sacchi[1,4], Alessandro Nanni Costa[6]; [1]Transplant Coordination Unit, Fondazione IRCCS Policlinico San Matteo, PAVIA, Italy; [2]Kidney Transplantation Unit, Fondazione IRCCS Policlinico San Matteo, PAVIA, Italy; [3]Nephrology Dialysis Transplantation Unit, Fondazione IRCCS Policlinico San Matteo, PAVIA, Italy; [4]AREU Lombardia, AAT 118 Pavia, Fondazione IRCCS Policlinico San Matteo, PAVIA, Italy; [5]Anaesthesia and Intensive Care (1,2,3) Department, Fondazione IRCCS Policlinico San Matteo, PAVIA, Italy; [6]talian National Transplant Centre, talian National Institute of Health, ROMA, Italy

As the techniques of extracorporeal-membrane-oxygenation (ECMO) become easier to apply, it is increasingly being used during resuscitation when patients do not respond to advanced-cardiac-life-support. ECMO is used to prevent brain damage in patients with cardiac arrest or severe cardio-respiratory failure while attempts are made to restore heart beat. e have experienced cases where subjects undergoing ECMO succumb to irreversible cessation of cardiac activity with simultaneous irreversible brain damage. If they are suitable and consent has been given, such subjects are unequivocally nonheart-beating donors (NHBD), irrespective of the criterion by which death is ascertained. From the point of view of organ preservation, they do not, however, fit any of the existing NHBD profiles (I-IV Maastricht, V Madrid). Because resuscitation with ECMO is prolonged in duration and the patients are often admitted to intensive care, these cases are not completely consonant with the definition for category II (unsuccessful resuscitation) donors. Nor do they correspond to the definition for category IV donors (cardiac arrest during the diagnosis of brain death) because their donor status is unknown. They do not fit category III (imminent cardiac arrest) because cardiac arrest has already occurred. For the same reason, they cannot be classed as category V donors (unsuccessful resuscitation after unexpected cardiac arrest). The most salient characteristic of these subjects is that circulation was already maintained by ECMO prior to death and continues after ascertainment of death. Our experience suggests that these subjects are good potential NHBDs and that their organs can be well preserved even after hours of ECMO. We propose the addition of a 6th NHBD-category, whose profile would indicate the use of ECMO prior to death and following death ascertainment, to give a more accurate idea of organ preservation for harvesting purposes.

Session 17

OP42 PORCINE MODEL OF EXTRA-CORPOREAL MEMBRANE OXYGENATION (ECMO) IN THE UNCONTROLLED NON-HEART BEATING DONOR; ASSESSING TISSUE INJURY

Christopher Ray[1], Aditya Kanwar[1], Saleem Noormohamed[1], Alex Navarro[1], Soroush Sohrabi[1], Stephen Ray[1], Susan Stamp[3], Hugh Wyrley-Birch[1], Noel Carter[2], Anne Cunningham[2], Brian Shenton[3], Jon Smith[1], Kath White[3], Katrina Wood[3], Steve White[1], David Talbot[1]; [1]Department of Liver and Renal Transplant Surgery, Freeman Hospital, Newcastle-Upon-Tyne, United Kingdom; [2]Department of Pharmacy Health and Wellbeing, University of Sunderland, Sunderland, United Kingdom; [3]Department of Surgical and Reproductive Science, University of Newcastle-Upon-Tyne, Newcastle-Upon-Tyne, United Kingdom

Aims: We compared the impact of ECMO versus combined intravascular and intra-peritoneal cooling on attenuation of ischaemic tissue injury, from primary warm ischaemia, in a renal model of Maastricht category II organ donation.

Methods: Using cross-Yorkshire-landrace pigs ($n = 11$), we studied two groups. Under general anaesthetic, an initial laparotomy for probe placement and cannulation was performed.

- All animals were euthanized, and subjected to 30 min of warm ischaemia.
- Both groups were then administered thrombolysis
- In the 'Cooling' group(n = 5), intravascular flush was administered, with peritoneal cooling, over a 2-hour period.
- In the 'ECMO' group (n = 6), a primed extra-corporeal oxygenation circuit was commenced at this stage. The abdominal organswere perfused with oxygenated normothermic blood for 2 hours.
- The abdomen was re-opened, iced and organs retrieved.
- After 18 hours cold machine perfusion they were each re-perfused on an *ex-vivo* oxygenation circuit to simulate transplantation and re-animation.

Electronmicroscopy ischaemic damage was quantified by measuring glomerular podocyte foot process width. Increasing footprocess- width corresponds with ischaemic injury.

The histological tissue injury score comprised of a grading of necrosis, epithelial flattening and cell vacuolation.

Results: Kidneys in the 'cooling' group demonstrated more severe histological ischaemic damage than the ECMO group. The mean score for the ECMO group was 3.3 (SD ± 1.5) vs. 'Cooling group' mean 5.4 (± 1.8) $P < 0.01$.EM evidence of ischaemic damage was more severe in the cooling group. Mean glomerular foot process width (FPW) was 538 ηm (± 45) in the ECMO group versus 702 ηm (± 58) in the cooling group, $P < 0.05$.

Conclusion: Tissue analysis suggests that extra-corporeal membrane oxygenation results in less renal ischaemic injury than the use of combined intra-vascular and −peritoneal cooling in a Maastricht category II donor model.

OP43 EXTRACORPOREAL SUPPORT DURING DONATION AFTER 30MIN OF CARDIAC ARREST: SUITABILITY OF DELAYED HEPARINIZATION

Alvaro Rojas[1,2], Peter Sassalos[2], Joshua Pohlmann[2], Lauren Sall[2], Kelly Koch[2], Monica Martusiewicz[2], Keith Cook[2], Robert Bartlett[2], Jeff Punch[1,2]; [1]General Surgery, Division of Transplantation, University of Michigan, Ann Arbor, United States; [2]General Surgery, ECMO Laboratory, University of Michigan, Ann Arbor, United States

Objective: Organ donation after cardiac death (DCD) has become increasingly common in the US and protocols are being developed to recover organs from Maastricht Type 1 and 2 donors, termed ''unexpected DCD'' (u-DCD). In these cases, heparinization of u-DCD may not occur prior to cessation of cardiac massage. The impact of this factor is unknown. The present study was designed to assess the suitability of organs treated with extracorporeal support (ECS) in non-heparinized DCD.

Methods: A swine model of u-DCD (n = 3) was used. Animals sustained 30 min of asystole/cardiac arrest prior to anticoagulation. ECS was then performed for 3 hour at room temperature until organ procurement. All donors were heparinized (10 000 U) at the initiation of ECS. After 4−6 hour of cold storage, renal grafts (n = 6) were transplanted in nephrectomized healthy swine. Data to assess immediate organ function was collected including renal artery flows, urine output, creatinine clearance, renal vascular resistance, and urine protein.

Results: Adequate ECS circulation was achieved in two non-heparinized u-DCD after 3 hour of room temperature perfusion (ECS flows >50 ml/kg/min). In one animal ECS flows only reached 40−50 ml/kg/min, possibly due to microthrombi in the circulation. , Immediately after transplantation, renal artery flows were obtain in all grafts, but only 50% (3:6) of them had adequate flows for the entire 4-hour period (90−140 ml/min). Urine output was produced in 33% (2:6) of the grafts between 10−120 ml/hour.

Conclusions: Resuscitation to transplant after 30 min of cardiac arrest in u-DCD without heparin is possible but inconsistent and unpredictable. Further study including fibrinolytic drugs is indicated.

OP44 PORCINE MODEL OF EXTRA-CORPOREAL MEMBRANE OXYGENATION (ECMO) IN THE UNCONTROLLED NON-HEART BEATING DONOR; THE EFFECT ON RENAL VIABILITY

Christopher Ray[1], Aditya Kanwar[1], Saleem Noormohamed[1], Alex Navarro[1], Soroush Sohrabi[1], Stephen Ray[1], Susan Stamp[3], Hugh Wyrley-Birch[1], Noel Carter[2], Anne Cunningham[2], Brian Shenton[3], Jon Smith[1], Steve White[1], David Talbot[1]; [1]Department of Liver and Renal Transplant Surgery, Freeman Hospital, Newcastle-Upon-Tyne, United Kingdom; [2]Department of Pharmacy Health and Wellbeing, University of Sunderland, Sunderland, United Kingdom; [3]Department of Surgical and Reproductive Science, University of Newcastle-Upon-Tyne, Newcastle-Upon-Tyne, United Kingdom

Aims: We sought to compare the effect of ECMO on renal viability in a Maastricht Category II donor model, with our current standard; intravascular flush and intra-peritoneal cooling.

Methods: Using cross-Yorkshire-landrace pigs (n = 11), we studied two groups. Under general anaesthetic, an initial laparotomy for probe placement and cannulation was performed.

- All animals were euthanized, and subjected to 30 mins of warm ischaemia.
- Both groups were then administered thrombolysis
- In the 'Cooling' group (n = 5), intravascular flush was administered, with peritoneal cooling, over a 2-hour period.
- In the 'ECMO' group(n = 6), a primed extra-corporeal oxygenation circuit was commenced at this stage. The abdominal organs

were perfused with oxygenated normothermic blood for 2 hours.

- After this 2-hour period, the abdomen was re-opened, iced and organs retrieved.
- After 18 hours cold machine perfusion the kidney was re-perfused on an *ex-vivo* oxygenation circuit.

Results: Comparative viability testing of the organs on an extra-corporeal circuit revealed markedly different behaviour depending on whether the organ had been exposed to in cooling, or ECMO.

- In all parameters of viability the 'ECMO organs' appeared superior to 'Cooling organs'
- Renal arterial resistance is known to be indicative of organ damage, Glutathione-S-Transferase is a marker of cell damage and an increasing lactate-pyruvate ratio is a marker of anaerobic metabolism and cell damage
- Analysis of the trends with a repeated measure ANOVA revealed a significant difference between the groups for level of Glutathione-S-Transferase ($P < 0.01$), renal resistance ($P < 0.05$) but no significant difference for mean Lactate/Pyruvate Ratio.

Conclusion: Initial results from this animal model suggest that extra-corporeal membrane oxygenation, applied in a Maastricht Category II donor model, is superior to combined arterial and peritoneal cooling in preservation of renal viability.

OP45 EFFECTS OF THE IMPLANTATION OF A MECHANIC CARDIO-COMPRESSION DEVICE (LUCAS) IN THE PRESERVATION OF ORGANS FROM DONORS AFTER CARDIAC DEATH (DCD) MAASTRICHT TYPE II

Angel Ruiz[1], Francesc Carmona[2], Marta Alberola[1], David Paredes[1], Camino Rodríguez[1], Pilar Palma[2], Jacinto Gallardo[2], Jaume Fontanals[3], Mercedes Agustí[3], Roser Deulofeu[1], Blanca Miranda[1]; [1]Transplant Coordination Unit, Hospital Clinic de Barcelona, Barcelona, Spain; [2]Sistema d'emergències Mèdiques (sem), Sistema d'emergències Mèdiques (sem), Barcelona, Spain; [3]Anestesiology and Reanimation, Hospital Clinic de Barcelona, Barcelona, Spain

Aim: Analyze the impact of a mechanic cardio-compression device (LUCAS®) during the transport of the potential DCD type II to the hospital and the repercussion in the procurement and transplant of organs.

Material and methods: Prospective and comparative study of potential DCD type II from January 2006 until January 2010. Potential DCD reanimated using manual cardio-compression (group A) and using LUCAS® (group B) were compared. DCD selection criteria were: age ≤ 65, time of asystolia without reanimation under 30 min, total warm ischemia time under 150 min, no absolute contraindications for donation. Age, sex, procured organs, transplanted organs, causes of no donation and causes of rejection of organs were evaluated. There was no conflict of interests with the manufacturing company.

Results: From 212 potential DCD, 118 were considered in group A and 94 in group B, with an age average of 46.5 ± 13.1 and 83.5% of males, with no differences between age ($P = 0.57$) and sex ($P = 0.09$) in both groups. Real donors were 33.9% (n = 40) and 36.2% (n = 34) respectively. From group A 78 kidneys and 28 livers were procured (2,65organs/donor) and from group B 68 kidneys and 25 livers (2,73organs/donor) ($P = 0.19$). Kidney transplant rate in group A was 127kidneys/donor (n = 51) and 1,5kidneys/donor(n = 51) in B ($P = 0.28$). Rejected kidneys were discarded due to poor perfusion in 74% in group A and 47% ingroup B ($P < 0.001$).

Conclusion: LUCAS® cardio-compression has shown to be as effective as the manual cardio-compression. The LUCAS® group showed an increase in the percentage of potential donors that became real donors, the kidney procurement and transplant rate, although with no statistical significance. The decrease of the percentage of kidneys rejected due to poor perfusion was significant in LUCAS® group.

OP46 IMPROVEMENT IN QUALITY OF LIFE WITH KIDNEY TRANSPLANT FROM NON-HEART BEATING DONORS

Mohamed Morsy, Chantal Pinto, Debasish Banerjee, Eric Chemla, Nicos Kessaris, Jiri Fronek; Renal Transplant Unit, St George's Hospital, London, United Kingdom

Background: Health related quality of life (QOL) improves with kidney transplantation. Due to organ shortage, kidneys from non-heart beating donors (NHBD) are used, with extended criteria marginal organs are used more and more. The QOL in recipients after NHBD kidney transplantation is not well studied.

Methods: We studied the QOL, using SF-36 form, in a cohort of 40 kidney transplant recipients from NHBD (2005−2009); before transplantation and at 6 weeks, 6 months and 12 months after transplantation. These results were compared with 96 haemodialysis patients and 140 healthy controls. The questionnaire for the haemodialysis group was handed to the patients after a haemodialysis session.

Results: The mean age of the NHBD kidney transplant recipients (50.7 years) was similar to that of the controls 49.1 years, but the haemodialysis patients were older (63.2 years) ($P < 0.001$). There was no difference in SF-36 total score assessed before and at six weeks after transplantation (60.2% vs. 62.4%; $P = 0.8$). But, when compared to the total scores at six months (60.2% vs. 78.4%; $P < 0.001$) and 1 year after transplantation (60.2% vs. 87.2%; $P < 0.001$) there was a significant improvement over time. The haemodialysis

patients had poor SF-36 total scores compared to controls. The pre-transplant score for recipients was better compared to the haemodialysis group (60.2% vs. 49.2%; $P < 0.05$). Finally, the score was higher in controls compared to one year post-transplant (87.2% vs. 92.1%; $P = 0.06$).

Conclusion: This study showed an improvement in QOL after NHBD kidney transplantation that support expanding the donor pool to NHB marginal donors compared with being on haemodialysis. This improvement occurs after six weeks post-transplant and continues at 1 year. However it never matches that of the controls. A comparison between NHBD versus brain stem dead donors and live kidney transplants is underway.

OP47 DCD LIVER TRANSPLANTION: IS IT SAFE WITH OVERWEIGHT DONORS?

Chiara Rocha, Laura Tariciotti, Darius Mirza, Simon Bramhal, Paolo Muiesan; Liver Unit, Queen Elizabeth Hospital, Birmingham, United Kingdom

Aim: Outcomes of Liver Transplantation (LT) using grafts from overweight DCDs.

Methods: We reviewed 52 adults transplanted with DCD livers (2004–2009). Donor BMIs were recorded and recipients divided in group A BMI < 25 and B BMI ≥ 25.

Results: Of 52 recipients, 29 (55.7%) were included in group A, 23 (44.2%) in group B. Median follow-up post-LT was 290 days (1–1739). The two groups were homogeneous.

Seven patients in group A (24.1%) and 10 in B (43.5%) required temporary haemofiltration for renal impairment post-LT. Overall mean serum Creatinine (CR) was 142 μmol/L at day seven post-transplant and 112 μmol/L at 3 months. Eight patients in group A (27.6%) and 10 in B (43.5%) had a CR > 142 μmol/L at day seven; nine patients in group A (31%) and eight in B (34.8%) had a CR > 112 μmol/L at 3 months ($P = 0.238$). Three recipients in group A developed hepatic artery (HA) complications (10.3%), two thromboses (6.9%) and one stenosis (3.4%). One patient in group B developed left HA stenosis (4.3%), $P = 0.77$. Three recipients in group A developed biliary complications (10.3%) two strictures and one leak. One patient in group B developed bile leak (4.3%), $P = 0.184$. Overall patient and graft 1-year survival was 88.2% and 84.3%. One-year patient survival was 99.6% vs. 77.3% ($P = 0.04$), graft survival 93.1% vs. 72.7% ($P = 0.05$) in groups A and B respectively. There were five deaths in group B (22%), three for sepsis and two for haemorrhagic and cardiovascular complications, and one in group A (3.4%) for cerebrovascular accident. Two patients were re-transplanted, one for PNF (group B), one for HAT (group A).

Conclusion: There was a significantly worse survival in recipients of overweight DCDs, showing that BMI may be a relevant factor for selection of liver DCD grafts.

Posters

ALLOCATION – MELD/OTHER SYSTEMS

PP01 SINGLE CENTER EXPERIENCE IN LIVER TRANSPLANT FOR HIGH MELD RECIPIENTS

Andre David, Ben-Hur Ferraz-Neto, Maria Paula Coelho, Sergio Meira, Marcelo Rezende, Gustavo Coelho, Marcio de Almeida, Renato Hidalgo, Tadeu Thome, Bianca Della Guardia, Rogerio Afonso; Transplant Hospital Israelita Albert Einstein, Sao Paulo, Brazil

Body: According to the United Network for Organ Sharing, 15,758 candidates wait for orthotopic liver transplantation and in Brazil 6,505 patients, according to the Brazilian Organ Transplant Association. Model for end-stage liver disease (MELD) criteria has been used to allocate donor's organ to liver transplant recipients and to identify higher death risk.
Aim: Analyze results of a single center with high MELD recipients. Casuistic: Data collected of 33 liver transplant recipients (MELD ≥30) from 2005 to 2008.
Results: Donor's characteristics (medians): age 42 years, 54.6% with 1 vasopressor, 42.4% with >1 vasopressors, BMI 25 kg/m Sodium 153 mEq/l, ALT 42.0 U/L, AST 44.0 U/L, 63.6% cardiac arrest and 42.4% controlled infection. Causes of death: 42.5% cranioencephalic trauma, 48.5% hemorrhagic cerebral vascular accident and 9% others. Graft's characteristics: 33.3% had grade I liver steatosis, 51.5% grade II and 15.2% had grade III Arterial anomalies in 26.7%. Medians of cold ischemia time: was 490.5 and warm ischemia time was 59.5 mins. Recipient's characteristics (medians): age was 56 years, MELD score: 33, 39.4% HCV, 30.3% Laennec's cirrhosis, 21.2% auto-immune liver disease and 15.2% cryptogenic cirrhosis. Intraoperatory blood transfusion was 3, intensive care stay was 3 days, and length of hospital stay was 20.5 days. Vascular complications: one with hepatic artery thrombosis (re-transplanted) and other with hepatic artery stenosis (endovascular stent). Graft survival rate was 75.8% in the first year. Patients' survival was 90.9% in 3 months, 78.8% in one year and 69.7% in two years.
Conclusion: Liver transplant can have acceptable results in high meld recipients.

PP02 QUANTITATIVE LIVER FUNCTION CAPACITY IN CIRRHOTIC PATIENTS BEFORE TRANSPLANTATION

Johan Lock, Maciej Malinowski, Susanne Biele, Peter Neuhaus, Martin Stockmann; Department of General, Visceral and Transplantation Surgery, Charité - Universitätsmedizin Berlin, Berlin, Germany

Background: The LiMAx test can determine quantitative liver function based on the maximal capacity of cytochrome P450 1A2. Its diagnostic performance was recently been demonstrated in liver surgery and transplantation. Hereby the first analysis of patients with cirrhosis is presented. The aim was to explore the correlation of LiMAx versus MELD and Child-Pugh score.
Methods: Seventy-four patients were prospectively enrolled before surgery. The LiMAx test was performed by IV application of 2 mg/kg 13C-methacetin and a consecutive breath analysis of 60 min (readout shown in [μg/kg/h]; normal values >315). Three patients with acute liver failure and another with cholangiocarcinoma in non-cirrhotic liver were excluded. Nonparametric analysis was done by Spearmen's rank correlation coefficient and Mann–Whitney test. Data was shown as median with interquartile range.
Results: Seventy patients [46 male, 24 female; 54 (48–60) years] with hepatitis C ($n = 21$), alcoholic ($n = 21$), or biliary cirrhosis ($n = 12$), hepatocellular carcinoma ($n = 6$), and other liver diseases ($n = 10$) were analyzed. The reported MELD score was 15 (11–20), the length of time on the waiting list was 36 (10–68) weeks. Histo-pathological examination revealed fibrosis grade VI ($n = 62$), V ($n = 5$) and IV ($n = 3$) according to the classification of Ishak et al. Pretransplant LiMAx was 103 (56–174) μg/kg/h. Patients with carcinoma ($n = 13$) revealed higher LiMAx readouts of 169 (121–232) vs. 95 (46–151) μg/kg/h ($P = 0.010$). LiMAx readouts were correlated with reported MELD ($r = 0.530$; $P < 0.0001$) and with pretransplant labMELD (0.692; $P < 0.0001$). A similar correlation was observed with Child–Pugh score ($r = 0.707$; $P < 0.0001$). In addition, significant correlations were observed for serum bilirubin, albumine, INR but not for creatinine.
Conclusion: LiMAx readouts are strongly correlated with established parameters of liver function before transplantation. The LiMAx test might be a valuable tool for the assessment of disease severity in liver cirrhosis.

PP03 THE CORRELATION BETWEEN LIVER FIBROSIS AND FUNCTIONAL IMPAIRMENT – CONSEQUENCES FOR EVALUATION TO LIVER TRANSPLANTATION

Martin Stockmann[1], Johan Lock[1], Maciej Malinowski[1], Alfonso Scharfenberg[1], Lars Morawietz[2], Peter Neuhaus[1]; [1]Department of General, Viaceral, and Transplantation Surgery, University Hospital Charité, Berlin, Germany; [2]Institute of Pathology, University Hospital Charité, Berlin, Germany

Background: The histological diagnosis of cirrhosis might incorporate a wide range of remaining functional capacity, which is an essential factor for listing to transplantation. We hypothesized, that actual liver function is strictly dependent from the fraction of hepatocyte parenchyma. Hence, individual histology was compared with functional capacity in a large series.
Methods: A new classification of liver fibrosis was developed, based on the grading of Ishak et al. Liver cirrhosis (former grade VI) was divided into four additional subclasses: mild cirrhosis with thin bridging; advanced cirrhosis with thick bridging; severe cirrhosis with massive bridging and small parenchyma nodules; and terminal cirrhosis with few parenchyma nodules in predominant fibrotic tissue. Patients were assessed by LiMAx test either before hepatectomy or liver transplantation. The LiMAx test [readout shown in (μg/kg/h); normal values >315] was performed as described recently (Ann Surg 2009). Liver samples were collected during surgery and underwent blinded histopathological examination by three independent pathologists. Statistical analysis by Spearmen's rank correlation coefficient and t-test.
Results: One hundred and eighty patients undergoing hepatectomy or liver transplantation were analyzed. Noncirrhotic patients had LiMAx readouts of 368 ± 145 μg/kg/h, cirrhotic patients (32% of all) had reduced readouts of 150 ± 131 μg/kg/h ($P < 0.0001$). The subclassification of cirrhosis revealed the following functional capacities (median LiMAx with IQR): mild cirrhosis with 171 (112–255) μg/kg/h; advanced cirrhosis with 129 (95–212) μg/kg/h; severe cirrhosis with 89 (46–154) μg/kg/h; and terminal cirrhosis with 80 (29–123) μg/kg/h. The correlation between LiMAx and the new classification was $r = -0.626$ ($P < 0.0001$).
Conclusion: The LiMAx test can accurately detect cirrhosis, and further differentiate cirrhotic subclasses. A functional classification of cirrhosis might be more effective than conventional histological grading and could enhance the evaluation process to liver transplantation. A respective prospective study will be conducted.

COMBINED LIVER–KIDNEY TRANSPLANTS

PP04 COMBINED LIVER AND KIDNEY TRANSPLANTATION A SINGLE CENTRE EXPERIENCE

Maria Clara Dezza[1,2], Abdallah Slim[1], Alessandro Giacomoni[1], Andrea Lauterio[1], Iacopo Mangoni[1], Plamen Mhiaylov[1,3], Stefano Di Sandro[1,3], Luciano De Carlis[1]; [1]General Surgery and Transplant Unit, Ospedale Niguarda Ca'Granda, Milan, Italy; [2]Scuola di Specialità in Chirurgia Generale, Università degli studi di Milano, Milan, Italy; [3]Università degli studi di Pavia, Scuola di Specialità in Chirurgia Generale, Pavia, Italy

Introduction: The number of combined liver and kidney transplants (CLKT) has increased worldwide since the introduction of MELD score. However, controversy surrounds simultaneous transplantation of a kidney and a liver because the practice is increasing, and organs for the transplant are limited.
Method: Between January 2001 and December 2009 we performed 508 liver transplants from cadaveric donor, we reviewed our experience with 6/508 (1%) CLKT.
Results: Median age of the recipient was 47.3 years (range: 44.4–59.02), 5/6 were male. Causes of liver failure were: hepatitis C (3), alcoholic cirrhosis (1), cryptogenic cirrhosis (1), polycystic disease (1); in 3 recipients cirrhosis was associated with hepatocellular carcinoma. Causes of kidney disease were: chronic glomerulopathy (2), chronic rejection (1), polycystic disease (1), hepatorenal syndrome (1) and unknown (1). Median Glomerular Filtration Rate (GFR) at transplantation was 20.17 ml/min (range: 11.8–31.5). Two patients were on hemodialysis before CLKT. In hospital dead were two: one patient died 74 days after transplantation of a Morganella Morganii induced pneumonia and sepsis, one died 60 days after transplant of an Enterococcus Faecium induced sepsis, both died with a non functioning renal graft. Both at time of listing had also a cardiac disease. One patient died 4 years after CLKT after a left emicholectomy for diverticular disease complicated by a leakage and sepsis. Three patient are alive in good conditions, with median GFR 70.3 ml/min (range: 63.8–72.9), median follow up 743 days (range: 632–2855).
Conclusion: Although our centre has a large volume of isolated liver and kidney transplants we had a limited experience with CLKT. Very likely in the next years the number of CLKT will increase. Standardized strategies for evaluation of the candidates are necessary to improve organ allocation in those with both liver and kidney disease.

COORDINATION FOR NHBD

PP05 CONSENSUS-PAPER FOR THE RELAUNCH OF THE NON-HEART-BEATING-DONOR-PROGRAM IN SWITZERLAND

Franziska Beyeler, Susanna Wälchli-Bhend, Hans-Peter Marti, Franz F. Immer; Institution Swiss transplant, Swiss National Foundation for organ donation and transplantation, Bern, Switzerland

Introduction: In Switzerland, organ-retrieval from Non-Heart-Beating-Donors was performed in Geneva and Zürich for several years. After the implementation of the first national transplantation law in 2007, those programs have

been stopped for different reasons. There was uncertainty if the new law allowed the organ retrieval from donors in cardiac death.

Methods: We collected information by interviews and lectures. For planning the relaunch, it was necessary to discuss this matter with professionals, who will be in charge. A consensus-meeting was the right frame for this discussion. We invited opinion leaders from the ICUs, nephrologists, lawyers, and emergency-physicians. As a guest-speaker we engaged the responsible for the development of the guidelines and the implementation of the NHBD-program in France. We asked all participants to prepare a feasibility study. After the inputs of all the opinion leaders, we discussed and created an action plan.

Results: All participants argued for the relaunch of the NHBD-program. The study of the law and the SAMW (Swiss Academy of Medical Sciences) guidelines showed that Maastricht 1 and 2 are not problematic with respect to the law, and it is possible to restart instantly. For Maastricht 3 it is recommendable to modify the wording of the law. In a first step we created a small working group, who cares about the adaptation of the SAMS-guidelines and a possible change of the law. After solving the mentioned problems, two working groups have elaborated guidelines for Maastricht 1 and 2 donors and as well for Maastricht 3 donors. Those guidelines will act as recommendations for the hospitals that will start this program.

Conclusions: All Maastricht categories are feasible, according the law. The SAMW guidelines will be adapted accordingly, and possibly the transplantation law needs to be amended.

PP06 FEASIBILITY STUDY OF NHBD IN SOUTHERN SWITZERLAND THROUGH STAFF TRAINING AND INFORMATION

Veronica Gerli; Department Cure Intense, Ospedale Regionale Lugano, Lugano, Ticino, Switzerland

The aim of the project is to verify: the potential rate of acceptance of the NHBD protocol within the Ticino population, and the feasibility of the implementation of NHBD within the Lugano hospital in terms of skills, instruments, technology and logistics. The last Swisstransplant report highlights the following situation regarding the Swiss Confederation in 2008: 942 patients have been on the waiting list while only 459 transplantations have been performed. In Switzerland there are 16.8 living donors PMP and 11.8 deceased donors PMP. Since Switzerland emerges as the second last country within the European benchmark as far as number of transplants, the introduction of NHBD could potentially add a positive contribution to the overall number of transplants performed in the Confederation. The outlined project aims at assessing the acceptability of NHBD in Switzerland's South (Ticino), estimating the potential increase in organ supply and running a feasibility study for the region's main hospital. Within 18 months, together with the University of Lugano's Health Communication department, we will run an empirical study in three stages: the first part will consist in a fundamental literature research about NHBD in Switzerland and best practices among the European neighbours. In a second step there will be a survey among the hospital staff of the regional hospital about their attitude towards NHBD. In the same time we plan an estimation study about the potential to increase the donor rate with NHBD by analyzing the medical archives for the precedent and upcoming year. Finally we will conduct a representative survey among the Ticino population about their attitude towards NHBD. Overall the aim of the project is to verify the feasibility of the introduction of NHBD in Ticino to increase the total number of organ donors.

DONOR RISK INDICES

PP07 ESTIMATED-DONOR-GLOMERULAR-FILTRATION RATEWITH USING IN-SITU-COOLING DOUBLEBALLOON CATHETERS SYSTEM DONOR

Kazuo Mizutani[1], Ryohei Hatttori[1], Masashi Kato[2], Tsuneo Kinukawa[2], Osamu Kamihira[3], Shin Yamada[4], Momokazu Gotoh[1]; [1]Urology, Nagoya University Graduate School of Medicine, Nagoya, Aichi, Japan; [2]Chukyo Hospital, Nagoya, Japan; [3]Komaki Shimin Hospital, Komaki, Japan; [4]Okazaki Shimin Hospital, Okazaki, Japan

The worldwide shortage of deceased donor kidneys for transplantation has become a serious issue in the past decade and marginal donor kidneys have been studied. However, both the availability and feasibility of kidneys from deceased donors is still unclear. Some kidney donor candidates have been rejected because of increased creatinine (Cr) levels prior to death, while some transplants have had good renal function in spite of the high Cr levels of the donors. In order to reduce the discarded donor kidney rate, we performed in situ cooling with specially designed double-balloon catheters. The aim of the present study was to estimate availability of deceased donor kidney with using in-situ-cooling double-balloon catheters system, and find better evaluation method to estimate donor kidney function rather than using donor Cr. We studied 129 deceased renal transplant recipients who received kidneys from non-heart-beating donors beginning in 1984. Calcineurin Inhibitors (Cyclosporine or Tacrolimus) were given to all transplants. Those donors were in Maastricht Donor Categories III and IV and we performed in situ cooling with specially designed double-balloon catheters to minimize warm ischemic kidney damage. Three non-functioning transplants were excluded from this study. The average donor Cr levels at admission were 0.3 – 2.1 mg/dl Average 1.0) and those level before death were 0.3 – 15.9 (Average 2.7. The average recipient Cr levels at 1 year after transplant were 0.5 – 5.9 Average 2.0). Although the average donor Cr levels before death were high levels, transplanted kidneys had good function with using our catheter system. There was no statistically significant difference between Cr levels of donor (at admission and before death) and those of recipient at 1 year after transplants.

PP08 LIVER TRANSPLANTATION UTILIZING OLD DONOR ORGANS – A GERMAN SINGLE CENTER EXPERIENCE

Falk Rauchfuß, Rigo Voigt, Yves Dittmar, Michael Heise, Utz Settmacher; Department of General, Visceral and Vascular Surgery, University Hospital Jena, Jena, Germany

Introduction: Due to the current profound lack of suitable donor organs, transplant centers are increasingly forced to accept so-called marginal organs. One criterion for marginal donors is the donor age above 65 years. We present the impact of higher donor age on graft and patient survival.

Patients and Methods: Since 2004, 230 liver transplantations have been performed at our center. Fifty four donor organs (23.5%) were from donors >65 years. We performed a retrospective analysis according to the recipient and graft survival.

Results: The 1-year mortality was 22.2% (12/54). In the group of recipients from donors <65 years 1-year mortality was 19.5%. When the donor organs are grouped according to their age there is the following distribution: 1-year mortality in patients receiving organs from donors age 65–69 years: 30% (6/20); 1-year mortality in patients receiving organs from donors 70–74 years: 29.4% (5/17) and 1-year mortality in patients receiving organs from donors >75 years: 5.9% (1/17). There was no statistically significant correlation between mortality and the number of additional criteria of a marginal donor organ.

Discussion: The current lack of donor organs forces the transplant centers to accept organs from older donors while increasingly older patients are being recruited for the donor pool. Our results show that older organs may be transplanted with acceptable outcomes. This is consistent with data from current literature. It should be emphasized, however, that caution is advised when considering the acceptance of older organs for patients with hepatitis C related cirrhosis.

ETHICS/CONSENT FOR NON STANDARD DONORS

PP09 DONATION AFTER CARDIAC DEATH : A SOLUTION FOR ORGAN SHORTAGE IN ITALY?

Paola Parente, Maria Luisa Di Pietro; Department Bioethics, Università Cattolica del Sacro Cuore, Rome, Italy

Worldwide there is an ever-widening chasm between the supply and demand for organ donation. In many countries all over the world organ donation after cardiac death (DCD) is viewed as a new source of organs. In Italy there are no DCD protocols and donors' pool mainly consists of patient died after brain arrest. We sought to determine how much donors' pool in our Hospital could be expanded introducing DCD. Retrospectively were examined charts of all patients, aged from 18 to 55, deceased in the intensive care units of University Hospital A. Gemelli in Rome, from 2005 to 2007. Obtained data were compared with those gathered from donation registry, concerning same age and time range. On 408 patients, 379 were excluded according to our selection criteria; 29 patients represent our potential DCD donors. Main cause of death was trauma; other causes included myocardial infarction, aorta dissection, brain haemorrhages and gun shot 15 patients died less than 24 h after recovery; five died in 72 h and nine were recovered for more than 3 days. In the same period, 11 patients were potential donors according to neurological criteria of death. DCD could have quadrupled potential donors' pool in our hospital. Our data refers to II category of donors of Maastricht classification. In Italy, according to our law, no-touch time consists in 20 min. Literature data show warm ischemia time ≥25 min as an increased risk factor for primary non function and delayed graft function1 in transplantation 2. Any assessment of an Italian DCD protocol cannot ignore what would be the WIT and has to take into account ethical, socio-economical and political issues. For instance, withdrawal of life sustaining treatment is not allowed, so Maastricht category III donors cannot expand pool.

NHBD KIDNEY AND PANCREAS

PP10 KIDNEY TRANSPLANTATION FROM DONATION AFTER CARDIAC DEATH (DCD): A FRENCH ACADEMIC HOSPITAL EXPERIENCE

Imad Abboud[1], Fabienne Fieux[2], François Gaudez[3], France Roussin[2], Denis Glotz[1]; [1]Department of Nephrology and Transplantation, Saint Louis Hospital, Paris, France; [2]Department of Anaesthesia and Critical Care, Saint Louis Hospital, Paris, France; [3]Department of Urology, Saint Louis Hospital, Paris, France

Purpose: Because of a growing demand for organs, Donation after Cardiac Death (DCD) kidney retrieval has been introduced into clinical practice in France since June 2006, utilizing uncontrolled Maastricht categories 1 and 2

donors. We report our results from 46 DCD renal transplantations performed in our center from February 2007 to September 2009.

Methods: All DCD kidneys were tested for viability using the continuous-hypothermic pulsatile preservation system before transplantation. Immunosuppression protocol included induction with anti-thymocyte globulins and maintenance with standard dose cyclosporine (CsA) and mycophenolate mofetil (MMF, 2 g/d) without steroids. Since November 2007, CsA dosage was minimized and MMF increased to 3 g/d. Data were expressed as mean (range).

Results: Recipients were 47 (23–61) years old. M/F ratio was 33/13. Mean cold ischemia time was 13.5 h (7–18). There was one primary graft non function (cortical necrosis due to prolonged warm ischemia >150 min). One graft was lost several days after transplantation because of a non immunologic vein thrombosis (twisting). Of the remaining 44 kidneys, 2 had immediate and 42 had delayed graft function (mean 18 days). Mean GFR at 3 months (measured by 51 chrome-EDTA clearance) was 46.3 ml/min (17.2–70.5). Pre-implantation histological evaluation constantly showed acute tubular necrosis. Renal biopsies at 3 months showed frequent minimal interstitial fibrosis–tubular atrophy and signs of calcineurin inhibitors toxicity. Patients having minimized CNI (i.e. after November 2007) had better GFR (MDRD) at all time points after transplantation : 43 (11–86) vs. 40 (16–55) ml/min/1.73m2 at 3 months and 52 (25–99) vs.41 (33–48) ml/min/1.73m2 at 1 year.

PP11 NHBD PROGRAM IN ITALY: ONE YEAR RESULTS AND FOLLOW-UP OF KIDNEY TRANSPLANTATION

Paolo Geraci[1,6], Massimo Abelli[2], Antonio Dl Canton[3], Maurizio Raimondi[4], Elena Ticozzelli[2,5], Marco Sacchi[1,4], Antonella Degani[1], Giuliano Barbierato[1], Teresa Rampino[3], Ciro Esposito[3], Antonella Brancaglione[4], Manuela Guerci[4], Jacopo Ferrario di Tor Vajana[2], M.Antonietta Bressan[5], Sante Venettoni[6], Lucia Rizzato[6], Paola Di Ciaccio[6], Alessandro Nanni Costa[6]; [1]Transplant Coordination Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [2]Kidney Transplantation Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [3]Nephrology Dialysis Transplantation Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [4]AREU Lombardia, AAT 118 Pavia, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [5]Emergency Room Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [6]Italian National Transplant Centre, Italian National Institute of Health, Rome, Italy

Kidney harvesting from NHBDs started in Pavia, Italy, in 2008. The program relies on extracorporeal membrane oxygenation (ECMO) after death determination (DD) (20 min, under Italian law) to reduce warm ischemia time (WIT); and on a pulsatile perfusion machine (PPM) to preserve and evaluate kidneys during cold ischemia time (CIT). Maastricht category II consenting donors were recruited. After DD, donors underwent ECMO by femoral vessel cannulation. Organ evaluation was based on donor characteristics, WIT, ECMO parameters, macroscopic appearance of the kidneys, perfusion after recovery and biopsy findings. After organ extraction, PPM (RM3, Waters Medical Systems) was used. Results are reported in terms of delayed graft function (DGF), need for dialysis, primary non-function (PNF), graft loss and follow-up. Four NHBDs were utilized between September 2008 and June 2009. The three kidneys utilized from the first two donors (47, 57 years), were preserved with static cold preservation (SCP) before transplantation. Two of them (CIT = 16 and 18 h respectively) were lost to PNF and a venous thrombosis respectively. The third (CIT = 14 h) had DGF (19 days) and needed nine dialyses. Donor three (60 years) was unviable, showing severe atherosclerosis which prevented cannulation for ECMO, severe histological lesions at pre-transplant kidney biopsy and high intrarenal vascular resistances by PPM (0.7). The fourth donor's (52 yrs) kidneys were preserved on PPM and transplanted: the right one (CIT = 16 h) had DGF (7 days), and needed two dialyses; the left one (CIT = 19 h) functioned immediately. The three recipients presently have creatinine values of 2.0, 1.08, and 1.53 mg/l respectively. Our preliminary results suggest the feasibility of procuring suitable kidneys for transplant from NHBD, even after 20 min of DD, using ECMO and PPM.

PP12 CURRENT LONG TERM OUTCOMES IN CONTROLLED AND UNCONTROLLED NON HEART BEATING DONOR (NHBD) KIDNEYS – A FIVE YEAR FOLLOW UP STUDY

Aditya Kanwar[1], Muhammad Khurram[1], Susan Stamp[2], Layal El-Asir[1], Hugh Wyrley-Birch[1], Muhammad Gok[1], Brian Shenton[2], Mettu Reddy[1], Anne Cunningham[3], Noel Carter[3], Derek Manas1, David Rix[1], Naeem Soomro[1], Brian Jaques[1], David Talbot[1]; [1]Liver/Renal transplant unit, Freeman hospital, Newcastle upon Tyne, United Kingdom; [2]Surgical and reproductive sciences, Newcastle University, Newcastle upon Tyne, United Kingdom; [3]Pharmacy, health and well being, University of Sunderland, Sunderland, United Kingdom

Introduction: The contribution of the Non Heart Beating Donor (NHBD) organs to the donor pool is ever increasing. Recent evidence suggests comparable long term outcomes of NHBD kidneys to HBD kidneys. But those results are generally from controlled NHBD kidneys, as such, very limited evidence exists for uncontrolled NHBD kidneys. In this study, we aim to analyse outcomes of both our controlled and uncontrolled NHBD kidney recipients, with five years follow up. We specifically studied patients who were transplanted post 2003, when we introduced improved preservation techniques such as usage of phentolamine and thrombolysis before retrieval and dual transplantation.

Methods: A retrospective analysis form January 2004 till April 2009. A total of 170 kidneys were retrieved from 85 NHBD's (18 uncontrolled, 67 controlled). Thirteen kidneys failed viability testing; 21 pairs were transplanted as duals. One hundred and thirty six recipients were finally followed up for post-transplant creatinine at 3, 12, 24, 36, 48 and 60 months. Estimated Glomerular Filteration Rate (eGFR) were calculated using MDRD formula and analysed using Mann–Whitney U. Long term patient and graft survival were estimated using Kaplan–Meier survival curves.

Results: No significant difference was found in patient survival (87% vs. 88.5%) and graft survival (78.3% vs. 91.2%) rates of recipients from uncontrolled and controlled NHBD's, at 5 years (p = ns). Long term eGFR (ml/min/1.73m2) results are as follows: eGFR in months- 3 mts, 12 mts, 24 mts, 36 mts, 48 mts, 60 mts Controlled Mean- 44.06, 44.29, 40.99, 39.85, 44.95, 47.70 *n* = 108, 85, 65, 38, 23, 13 Uncontrolled Mean- 47.76, 47.87, 47.06, 50.27, 42.09, 78.41 *n* = 22, 19, 19, 13, 8, 2 Mann–Whitney U- 1089.00, 758.00, 511.00, 212.00, 83.00, 5.00, Asymp. Sig.(2-tailed)- 0.539, 0.677, 0.255, 0.449, 0.685, 0.174.

Conclusion: In our study, contrary to the popular belief, the long term outcomes of uncontrolled donors are comparable to the controlled donors. And therefore, they are a precious means to help in improving the severe current organ shortage.

PP13 UTILITY OF A STEP-WISE EVALUATION TO IMPROVE EFFICACY AND FUNCTIONALITY OF NHBD MAASTRICHT TYPE II KIDNEYS IN CATALONIA

David Paredes[1], Angel Ruiz[1], Camino Rodriguez-Villar[1], Marta Alberola[1], Lluis Perl[2], Vanessa De la Fuente[3], Antonio Alcaraz[2], Frederic Oppenheimer[3], Blanca Miranda[1]; [1]Transplant Coordination Unit - Transplant Services Foundation, Hospital Clinic, Barcelona, Spain; [2]Urology Department, Hospital Clinic, Barcelona, Spain; [3]Kidney Transplant Unit, Hospital Clinic, Barcelona, Spain

Introduction: The agreement with emergency services and the implementation of a Regional NHBD-Transplant Program in Catalonia has supposed an increase in the potential NHBD donors. We have applied a step-wise evaluation of donor and organ in order to compare incidence of DGF and PNF between Pulsatile Perfussion Machine (PPM) and Cold Storage (CS) kidney preservation.

Methods: Description of Step-wise evaluation of donors from January 1999 to December 2009: Step 1.Medical NHBD acceptance criteria, family/coroner consent; 2.Hemodynamic and functional kinetic evolution of ECMO-regional normothermic recirculation; 3.Macroscopic evaluation; 4.Kidney biopsy; 5.PPM.

Results: We have evaluated 352 potential NHBD. After Step 1–2, 125 cases (35.5%) were finally transferred to OR. After Step 3, 89 donors were accepted (71%), obtaining 178 kidneys. After Step 4–5, 155 kidneys where grafted (87%). PPM and CS groups were not different in gender and mean age, although donors older than 60 (28.7% vs. 14.3% $P = 0.04$), stroke as cause of death (12.6% vs. 6.1% $P = 0.017$), presence of high blood pressure (22.7% vs. 4.9%, $P = 0.017$) and DM (8% vs. 4.7% NS) were higher in PPM group. Transplant results analyzed only in kidneys transplanted in Hospital Clinic (PPM = 46 and CS = 44).

Mean cold ischemia time was not different between groups (13.4 h vs. 12.6 h). There was a 20% in DGF incidence in PPM group (60.9% vs. 79.5%, $P = 0.02$). In-hospital stay (20.35 days vs. 32.81 days $P = 0.001$); dialysis need (3 vs. 7.3 $P = 0.051$) and 1 year survival (100% vs. 88% $P = 0.052$) improved in PP group. No PNF was found in PP, while three in CS.

Conclusions: A step-wise evaluation of NHBD with a complete analysis of kidney functionality allows identifying organs with better suitability and transplant outcomes. The importance of PPM appears as additional tool for better organ selection and preservation.

PP14 OUTCOME OF RENAL TRANSPLANT WITH NON HEART-BEATING DONORS

Manuel Rengel, Úrsula Verdalles, Soralla Abad, Almudena Vega, Eduardo Verde; Renal Transplant Unit, Hospital General Universitario "Gregorio Marañón", Madrid, Spain

Despite renewed interest in Non Heart-Beating Donors (NHBD) kidney transplantation, very few clinical programmes have been developed this type of grafting. We analyzed the function and outcome of kidney transplants performed from NHBD in our hospital. From 1999 until September 2009, 32 patients were grafted with kidneys from NHBD. This group was compared with recipients of heart beating donor (HBD) matched for age, sex, number of transplants and HLA. Immunosupression was performed with Basiliximab, Predinisone, Tacrolimus and Micophenolate Mofetil. Acute rejection episodes were treated with Methylprednisolone boluses, and ATG-FRESENIUS® when necessary. The delayed graft function rate was higher on NHBD transplants than in HBD graft. Serum creatinine levels were significantly better in the NHBD, 1.6 mg/dl vs. 1.8 mg/dl. Graft survival at 5 year was 81% in NHBD and 85% in HBD. Patient survival in both groups was 100%. Patients grafted with NHBD were hospitalized longer and needed more dialysis. Acute rejection episodes were more frequent in NHBD.

In Conclusion: This source of kidneys has evidence of equivalent graft function and survival, compared with standard cadaveric donor organ and may contribute to expand de donor pool.

PP15 THROMBOELASTOGRAPHY-DIRECTED ANTICOAGULATION DOES NOT REDUCE RISK OF THROMBOSIS IN NON-HEARTBEATING DONOR PANCREAS TRANSPLANTS

Sushma Shankar[1,2], Anand Muthusamy[1], Mohammed Rahman[1], Anil Vaidy[1], Sanjay Sinha[1], Jens Rockmann[1,2], Peter Friend[1,2]; [1]Oxford Transplant Centre, Oxford, United Kingdom; [2]Nuffield Department of Surgery, Oxford University, Oxford, United Kingdom

Background: Vascular thrombosis is the leading non-immunological cause of early pancreas graft loss. Our previous data demonstrated that thromboelastography (TEG)-directed anticoagulation reduces thrombotic graft loss in HBD pancreases. Its effectiveness has not been studied in NHBD recipients.
Methods: From 04/2004 to 12/2009, 306 pancreas transplants were performed (HBD $n = 272$; NHBD $n = 34$). All recipients received TEG-directed anticoagulation, and underwent graft imaging within 28 days post-transplant to exclude thrombus. These were retrospectively analysed for thrombosis, and TEG-Coagulation Index (CI) at time of thrombosis noted. Recipients demonstrating no thrombus served as control.
Results: Within HBD, 7% ($n = 18$) of recipients had partial/complete thrombus on imaging, compared to 18% ($n = 6$) of recipients within NHBD. Of those grafts which developed thrombosis, 6% ($n = 1$) of HBD grafts and 50% ($n = 3$) of NHBD grafts were lost to thrombosis ($P < 0.05$). Mean TEG-CI in HBD recipients at time of thrombosis was significantly higher than mean CI within HBD control ($P < 0.05$) supporting previously reported association of thrombosis with hypercoagulability. However, mean TEGCI in NHBD recipients at time of thrombosis, was no different (−3.4 ± 3.9) compared to NHBD control (−3.9 ± 5.4). The HBD graft lost to thrombosis failed due to technical reasons; examination of the thrombosed NHBD grafts revealed no technical cause. Median time to thrombosis from transplant was 4 days (range 1−17) in HBD and 3 days (range 1−20) in NHBD.
Conclusion: More NHBD pancreases are lost early to thrombosis. NHBD graft thrombosis is not associated with hypercoagulability within 28 days post-transplant, unlike the case in HBD grafts. TEG-directed anticoagulation does not resolve problems of thrombosis in management of NHBD pancreas grafts, suggesting that factors other than hypercoagulability play a role in pathogenesis of NHBD thrombosis. Better understanding of this process is needed to optimise outcomes of NHBD pancreas transplants.

PP16 LATE ACUTE HUMORAL REJECTION: PRELIMINARY EXPERIENCE IN SIMULTANEOUS KIDNEY-PANCREAS TRANSPLANTATION

Ilanit Shetzigovski; Department surgery B, Sourasky Medical center, Tel Aviv, Israel

Background: The distinction between cellular rejection and humoral is important as the treatment for each process is different.
Objectives: The concept of de novo alloantibody production is not well-described following simultaneous pancreas-kidney transplantation (SPKT). We report on the diagnosis and management of four patients who developed late acute humoral rejection of the kidney allograft following SPKT.
Methods: Retrospective analysis of prospectively collected data. All SPKT's were performed following a negative ELISA crossmatch. Data collected included clinical presentation, laboratory and pathological findings, treatment, graft outcome. Kidney biopsies were taken upon any unexplained rise in creatinine and were classified as positive for humoral rejection based on the Banff criteria, including routine stains for C4d antigens. Pancreas biopsies were not taken.
Results: Of 44 patients (2/2003−1/2009) who underwent SPKT, four (three females, one male; mean age: 36) experienced late acute humoral rejection (incidence, 9%). All rejection episodes occurred between 2−3 weeks after transplantation. Interestingly, during the episode, glucose and C-peptide levels remained in the normal range. All patients were treated successfully with daily plasmapheresis and IVIG for ten days with return of full graft function and normal creatinine levels (average 1.1; range 0.9−1.3). At long term a follow-up one patient returned to dialysis after 2.3 years. Two patients have a normal kidney function and one has creatinine levels of three (but has also mechanical problems and chronic allograft nephropathy).
Conclusions: Acute humoral rejection is not uncommon following SPKT. While the renal graft is affected functionally and morphologically, the function of the pancreatic graft is well preserved. Timely diagnosis is crucial. Early aggressive treatment yielded excellent recovery for the short term but long-term graft function may be impaired.

PP17 POTENTIAL FOR USING UNCONTROLLED DCD KIDNEYS

Bart Stubenitsky[1], Lauren Brasile[1,2], Philip Glowacki[2]; [1]Department Reconstructive Surgery, University Medical Center Utrecht, Utrecht, The Netherlands; [2]Breonics Inc, Albany, United States

We previously demonstrated that cold ischemia (CI) is the limiting factor in expanding donor criteria in kidneys from uncontrolled-DCD (uDCD). In the early era of transplantation, retrieval of kidneys from uDCD donors involved a prolonged period of warm ischemia (WI), with a minimal period CI since preservation was in its infancy. Today we have the inverse situation with limited WI and prolonged CI due to mandated organ sharing algorithms. In the present study we demonstrate that oxidative metabolism of sufficient magnitude to support reparative processes can be accomplished ex vivo in human kidney allografts following as much as 3 h of WI.
Methods: Human kidneys ($n = 5$) were recovered following cardiac arrest with a mean WI of 2.5+/−0.70 h. Kidneys were flushed of blood and placed on an acellular near-normothermic perfusion for 24-h. During warm perfusion parameters evaluating resuscitated oxidative metabolism, cytoskeletal damage and reparative processes involving new synthesis were monitored. Controls ($n = 5$) consisted of human kidneys that were hypothermically perfused. Two critical regenerative pathways involving new synthesis were evaluated: Junctional integrity protein, ZO-1 was used to assess cytoskeletal integrity. Up-regulation of proliferating cell nuclear antigen (PCNA) was used to assess recovery of synthetic functions.
Results: Kidneys that were warm perfused (32° C) demonstrated recovery in terms of restored oxidative metabolism (oxygen consumption >0.14 cc/min/g), time-dependant normalization of cytoskeletal integrity and up-regulation of DNA synthesis. In contrast, control kidneys that were hypothermically perfused (4° C) for 24-h did not demonstrate recovery.
Conclusions: Lack of recovery in controls is not surprising as hypothermia inhibits oxidative metabolism by 96%, thereby preventing cellular reparative processes. Resuscitation of metabolism leading to up-regulation of DNA synthesis as observed in warm perfused kidneys allows for regeneration of cytoskeletal integrity. Ability to "repair" ischemically damaged kidneys ex vivo presents opportunities for expanded donor criteria.

PP18 RESCUING DCD: ANTICOAGULANT DURING PRESERVATION SUPRESSES CHRONIC KIDNEY INFLAMMATION, FIBROSIS AND GRAFT LOSS

Raphael Thuillier[1,2], Sebastien Giraud[1,2], Olivier Page[1,2], Thierry Hauet[1,2]; [1]Inserm U927, Université de Poitiers, CHU de Poitiers, Poitiers, France; [2]FLIRT (Federation pour L'etude de l'Ischemie Reperfusion en Transplantation), France

Purpose: Organs from diseased after cardiac death (DCD) donors are more sensitive to Ischemia reperfusion injury (IRI). Since coagulation is a key of IRI, we propose to alleviate the lesions by supplementing the graft preservation solution with an anticoagulant.
Methods: We used a Large White pig autotransplantation model mimicking death after cardiac arrest donor conditions, in which kidneys underwent 60 min of warm ischemia then 24 h of cold preservation in UW supplemented with heparin. We tested the benefits of replacing heparin by fondaparinux, a Xa inhibitor.
Results: Compared to heparin, fondaparinux decreased creatinemia at day 3 post-transplantation (625 ± 189 μmol/l vs.1480 ± 450). In addition, creatinemia levels reached sham operated values at day 7 in fondaparinux group (Fig1). On the long term, fondaparinux treatment drastically improved survival at 3 month (Fig2) and decreased proteinuria (0.9 ± 0.3 vs. 4.8 ± 0.7 g/24 h, $P < 0.01$). Interstitial Fibrosis and Tubular Atrophy (IFTA) was also reduced (5.9 ± 0.4% vs. 59.3 ± 2.8% Sirius Red staining, $P < 0.01$). Transcriptomics analysis demonstrated that fondaparinux grafts showed a decreased expression of endothelial activation markers Pselectin and Thrombospondin, as well as innate immunity marker TLR4. The adaptative immune system also appeared downregulated, as expression of Th1 cytokine: IL2, as well as Th2 markers: IL10 and IL1Rn. Finally, expression of WNT4 was increased, a marker classically found in fetal kidneys.
Conclusion: Coagulation is a determining element of IRI. Herein, we demonstrate the long term benefits of supplementing the preservation milieu with fondaparinux. Indeed, fondaparinux improves post reperfusion function, as well as long term outcome of graft with downregulation of major lesional pathways. This strategy could be precious to the transplantation community, as it is easily adapted to a clinical setting and bring a wide array of benefits.

PP19 IMPROVE DCD WITHOUT A MACHINE: CURCUMIN SUPPLEMENTATION RESCUES GRAFT OUTCOME

Raphael Thuillier[1,3], Jean-michel Goujon[1], Cedric Nadeau[1], Jaakko Parkkinen[2], Lauri Vaahtera[2], Thierry Hauet[1,3]; [1]InsermU927, CHU de Poitiers, Faculte de Medecine et Pharmacie, Poitiers, France; [2]University of Helsinki, Helsinki, Finland; [3]FLIRT (Federation pour L'etude de l'Ischemie Reperfusion en Transplantation), France

Purpose: Kidney transplantations from deceased after cardiac arrest donors (DCD) suffer from ischemia reperfusion injury (IRI) and show increased occurrence of delayed graft function (DGF) and lower long term survival. Oxidative stress and NF-kB activation are well described elements of IRI. We evaluated the benefits of supplementing the current preservation protocol with curcumin, a potent antioxidant and NF-kB inhibitor.
Methods: We used an autologous DCD kidney transplantation model in Large White pigs. Kidneys undergo warm ischemia for 60 min before being preserved at 4° C for 24 h using UW supplemented with Heparin. Cyclodextrin-complexed curcumin, a novel water soluble formulation, was added to the preservation solution.
Results: Curcumin supplementation greatly improved recovery of function: animals resumed urine production two days before controls, serum creatinine started recovering at day 5 (vs. day 11) and reached stable levels by day 11, while controls did not reach similar levels by day 30. Animal survival was critically improved for the curcumin group (83.3% vs. 29% in controls, $P < 0.05$). IFTA was also critically reduced (7.1 ± 0.5% vs. 37.3 ± 2.8%, $P < 0.05$).

We are currently conducting analysis with immunohistofluoresence, transcriptomics and proteomics to define the mechanism of action and benefits on graft chronic fibrosis development, inflammation, and pathways involved in graft loss.

Conclusion: Curcumin supplementation of UW in a pre-clinical transplantation model with stringent ischemia reperfusion injury rescued kidney grafts from an unfavorable prognosis. Early graft function was recovered faster and survival was substantially improved. As curcumin has proved well tolerated and nontoxic, this preservation strategy shows great promise for translation to clinical kidney transplantations: it requires little addition to current protocols and although further analysis is needed to define the mechanisms involved, curcumin supplementation can have substantial benefits to graft outcome.

PP20 A PROSPECTIVE RANDOMISED PAIRED TRIAL OF SIROLIMUS VERSUS TACROLIMUS AS PRIMARY IMMUNOSUPPRESSION FOLLOWING NON HEART BEATING DONOR KIDNEY TRANSPLANTATION AFTER ANTI-IL2 MONOCLONAL ANTIBODY INDUCTION.

Hugh Wyrley-Birch[1,2], Aditya Kanwar[1], Dhakshinamoorthy Vijayanand[1], Alex Navarro[1], Mettu Reddy[1], Colin Wilson[1], John Asher[1], Ajay Gupta[1], Nikhil Vasdev[1], Naeem Soomro[1], David Rix[1], Bryon Jaques[1], Derek Manas[1], Nicholas Torpey[1,2], David Talbot[1]; [1]Liver/Renal Transplant, Newcastle upon Tyne Hospitals NHS Trust, Newcastle upon Tyne, United Kingdom; [2]Nephrology, Newcastle upon Tyne Hospitals NHS Trust, Newcastle upon Tyne, United Kingdom

Introduction: Non heart beating donor (NHBD) kidneys are subjected to significant ischaemia/reperfusion injury. This study aimed to determine whether sirolimus used in combination with MMF and prednisolone minimises nephrotoxicity and thereby maximizes long-term function.

Methods: In this prospective, open, paired study, recipients of kidneys from each NHBD received daclizumab induction and were then commenced on MMF (2 g/day) and prednisolone (20 mg/day). Once renal function improved (creatinine <350 micromol/l) recipient pairs from each donor were randomised to start either sirolimus or tacrolimus (target trough 5–10 mcg/l for both drugs) and once a therapeutic drug level had been achieved the MMF was reduced to 1 g/day. The primary endpoint was eGFR at 1 year (Cockroft–Gault) and secondary endpoints were biopsy proven acute rejection (BPAR), patient and graft survival and safety.

Results: Of the 30 consecutive donors, recipient pairs from 19 donors were recruited (pairs were excluded for various reasons e.g. refusal, graft thrombosis etc). The intention to treat (ITT) and switch censored analyses showed that patient and graft survival and eGFR's at all time points were similar. One year eGFR's in the sirolimus and tacrolimus groups were 51.5 and 59.4 (ITT) and 58.1 and 60.7 (switch censored) mls/min/1.72m2 respectively. Ten of the sirolimus group had to be switched to tacrolimus for either BPAR or sirolimus complications. All BPAR in the tacrolimus group (21%) occurred prior to starting tacrolimus whereas in the sirolimus group, BPAR (26%) occurred after starting sirolimus and within 3 months of transplant.

Conclusion: Sirolimus instead of tacrolimus as primary immunosuppression following NHBD kidney transplantation does not improve longterm graft function.

NHBD LIVER

PP21 DOES VITAMIN D RECEPTOR POLYMORPHISMS HAVE EFFECT IN LIVER TRANSPLANT RECIPIENTS?

Negar Azarpira, Mahdokht Aghdai, Saman Nikeghbalian, Bita Geramizadeh, Marjan Rahsaz, Mehrzad Banihashemi, Tahereh Heidari, Zahra Malekpoor, Masumeh Darai, Ramin Yaghubi, Maryam Ayatolahi; Transplant Research Center, Shiraz, Iran

Liver transplant is an established treatment for end stage liver failure in a variety of medical conditions. Vitamin D has been shown to exert multiple immunomodulatory effects, which acts through its own receptor (VDR). The association between Iranian patients with liver transplant and the polymorphism of VDR FokI T>C (rs10735810) was investigated in 51 Iranian patients. In this study, we have found no evidence to suggest that VDR FokI polymorphism determines the incidence of acute rejection after liver transplantation. Larger epidemiologic studies are needed to elucidate the importance of VDR gene polymorphism in transplant recipients

PP22 PLATELET TRANSFUSION REDUCES ALLOGRAFT INJURY AND REJECTION FOLLOWING NON-HEART BEATING DONOR LIVER TRANSPLANTATION

Ricky Bhogal, Bridget Gunson, Rupesh Sutaria, Peter Nightingale, Simon Bramhall, Darius Mirza, David Adams, Simon Afford; Queen Elizabeth Hospital, Birmingham, United Kingdom

Background: The effect of intra-operative transfusion of blood products during orthotopic liver transplantation (OLT) is controversial. In particular, platelet transfusions can be beneficial or detrimental after OLT with the effects following non-heart beating donor (NHBD) OLT not having been assessed.

Methods: Forty nine patients underwent NHBD OLT in our centre between January 2006 and December 2009. For analysis, patients were divided into those not given a platelet transfusion (NPT) ($n = 15$) and those receiving a platelet transfusion (PT) ($n = 34$). Primary outcomes assessed were hepatic reperfusion injury and hepatic regeneration determined by serial blood AST and ALP levels respectively and incidence of biopsy proven rejection. Primary human hepatocytes were isolated from NHBD livers not used for OLT and then subjected cells to flow cytometry to determine cell death.

Results: The study group consisted of 31 male and 18 female. Median donor patient age was 45.5 years and median recipient age 59.5 years. There was no significant difference between the PT and NPT group in terms of primary diagnosis, pre-operative parameters or surgical indices. The PT group had significantly lower post-operative blood AST levels than the NPT group ($P < 0.05$). Indeed whereas platelets induce cell death in normal human hepatocytes those isolated from NHBD liver are protected from platelet mediated cell death ($P < 0.05$). The PT group had higher blood ALP levels on post-operative day 5 and 6 when compared to the NPT group suggesting platelets stimulate liver regeneration in the NHBD liver. Finally, the incidence of biopsy proven rejection in the NPT group was 46% compared to 14% in the PT group ($P < 0.05$).

Conclusion: Platelet transfusion reduces hepatocyte cell death, allograft injury, promotes hepatic regeneration and reduces rejection after NHBD OLT. This has important implications for transfusion practice in NHBD OLT.

PP23 DONATION AFTER CARDIAC DEATH IN LIVER TRANSPLANTATION: A CALCULATED RISK

Andries Braat[1], Joris Blok[1], René Adam[2], Andrew Burroughs[3], Nigel Kooreman[1,6], Jeroen Dubbeld[1], Hein Putter[1], Axel Rahmel[4], Robert Porte[5], Xavier Rogiers[6], Jan Ringers[1]; [1]Department of Surgery, Leiden University Medical Center, Leiden, The Netherlands; [2]European Liver Transplant Registry, Paris, France; [3]Liver Transplantation and Hepatobiliary Medicine, Royal Free Hospital, London, United Kingdom; [4]Eurotransplant International Foundation, Leiden, The Netherlands; [5]Department of Surgery, University Medical Center Groningen, Groningen, The Netherlands; [6]Department of Surgery, Ghent University Hospital Medical School, Ghent, Belgium

Introduction: The donation-after-cardiac-death (DCD) procedure is potentially harmful to the liver. Only donors with little other risk factors are being evaluated compared to donation-after-brain-death (DBD) donors.

Objective: Analysis of DCD as risk factor for liver transplantation.

Methods: Database analysis of all 5946 liver transplantations from deceased donors into adult recipients from 1-1-03 to 12- 31-07 in Eurotransplant. Data were gathered from Eurotransplant- and ELTR-databases. Outcome was patient death or graft failure, whatever occurred first.

Results: There were 5819 DBD vs. 127 DCD donors. DCD procedures were only performed in Belgium and The Netherlands. Significantly different donor factors ($P < 0.001$) between both groups were: mean age (DCD 41 vs. DBD 48), cause of death (more CVA in DBD), no split livers in DCD, allocation (DCD mainly local and regional), and shorter cold-ischemia time (DCD 7.6 vs. DBD 9.8). Recipients for DCD livers seemed better, regarding lower recipients age ($P = 0.016$) and fewer high urgency status ($P = 0.001$). Donor risk index (DRI) was clearly higher in the DCD group (2.0 vs. 1.7). When DCD itself was not taken into account, DRI was much better in the DCD group (1.3 vs. 1.7). Multivariate analysis showed DCD as significant factor influencing outcome ($P = 0.009$), with a hazard ratio of 1.54 (95% CI 1.11–2.14). Because of fewer other risk factors in DCD procedures, outcome was equally good in both groups with similar Kaplan–Meier curves ($P = 0.83$). Three-months, 1-year and 3-years outcome was 80%, 72% and 65% respectively for DBD donors vs 80%, 74% and 63% for DCD donors.

Conclusion: DCD is a significant factor influencing outcome, with a hazard ratio of 1.54. Selection of donors and recipients with fewer associated risk factors for these DCD procedures results in equally good outcome after liver transplantation for DCD and DBD donors.

PP24 SIMILAR LIVER TRANSPLANTATION SURVIVAL WITH SELECTED CARDIAC DEATH DONORS AND BRAIN DEATH DONORS IN THE NETHERLANDS

Jeroen Dubbeld[1], Jan Ringers[1,2], Harm Hoekstra[3], W Farid[5], Robert Porte[3], Herold Metselaar[5], Andre Baranski[1], Geert Kazemier[6], Aad van den Berg[4], Bart van Hoek[2]; [1]Surgery, Leiden University Medical Center, Leiden, The Netherlands; [2]Gastrenterology and Hepatology, Leiden University Medical Center, Leiden, The Netherlands; [3]Surgery, University Medical Center Groningen, Groningen, The Netherlands; [4]Gastroenterology and Hepatology, University Medical Center Groningen, City Groningen, The Netherlands; [5]Gastroenterology and Hepatology, Erasmus Medical Center, Rotterdam, The Netherlands; [6]Surgery, Erasmus Medical Center, Rotterdam, The Netherlands

Background: The outcome of orthotopic liver transplantation (OLT) with grafts from controlled donors with cardiac death (DCD) usually is inferior to OLT with grafts from donors deceased from brain death (DBD). The aim of this study was to compare outcomes from OLT with DBD donors versus only controlled DCD donors with predifined restrictive acceptance criteria.

Design: Prospective cohort-study.

Methods: All adult recipients in the Netherlands in 2001–2006 with full size OLT from DCD ($n = 55$) and DBD ($n = 471$) were included. Kaplan-Meier, log-rank and Cox's regression were used.

Results: One and 3-year patient survival were similar for DCD-OLT (84.6 and 80.4%), and DBD-OLT (86.3 and 80.8%) ($P = 0.763$). Graft survival at 1 and 3 years were not different after DCD-OLT (74.0 and 67.9%) and DBD-OLT (80.5 and 74.7%) ($P = 0.212$). The three-year cumulative hazard of non-

anastomotic biliary strictures was 31.3% after DCD-OLT and 9.7% after DBD-OLT ($P < 0.001$). Re-OLT rate after DCD-OLT and DBD-OLT was 18.2 and 10.3% ($P = 0.081$), re-OLT rate for biliary strictures was higher in DCD than in DBD ($P < 0.001$) Risk factors for one-year graft loss after DBD were transplant center, recipient warm ischemia time and donor with severe head trauma. After DCD-OLT these risk factors were: transplant center, donor warm and cold-ischemia time. DCD graft was a risk factor for non-anastomotic biliary strictures.
Conclusion: OLT using controlled DCD grafts and restrictive acceptance criteria can result in patient- and graft survival rates similar to DBD-OLT, despite biliary structuring.

PP25 RAPAMYCIN AS RESCUE THERAPY FOR RAPID PROGRESSIVE HEPATITS C AFTER LIVER TRANSPLANTATION

Vera Maravic-Stojkovic[1], Dana Hajdukovic[2], Ivana Urosevic[2], Milotka Fabri[2], Branko Calija[1], Svetlana Erdeljan[2], Zoran Milosevic[2]; [1]Department Immunology lab, Dedinje Cardiovascular Institute, Belgrade, Sao Tome & Principe; [2]Department ICU, Clinical Centre of Vojvodina, Novi Sad, Serbia & Montenegro

The aim of this study was to report idiosyncrasy on calcineurin inhibitors (CNIs) in a liver transplant (LTx) recipient, and early onset of C-virus (HCV) reinfection. A 56-year-old man, previously suffered from autoimmune hepatitis and HCV cirrhosis, underwent LTx on 11/2009. Patient received standardized perioperative management: initial immunosuppression included Zenapax, Tacrolimus (Tac) and corticosteroids (CS). During postoperative course tacrolimus-associated eosinophylia developed (Eo > 12%), required switch from Tac to cyclosporine A (CsA). The liver enzymes aspartate (AST) and alanine transaminase (ALT) increased to a maximum of 554 and 525 U/L, and decreased to normal values within 10 postoperative days (POD). Total/direct bilirubin reached a maximum of 134/81 μmol/L and declined to 50/20 μmol/L on 8-POD. The episode of acute rejection (AR) was treated by ATG and CS on 12-POD. The patient developed hemolytic anemia and CsA was withheld. The ALT/AST increased to 220/387 U/L, bilirubin to 310/159 μmol/L, respectively. Hepatitis C virus reinfection was diagnosed on the basis of HCV-RNA detection. Recurrence of HCV is universal leading to poor survival results. The differentiation between AR and recurrent hepatitis C is crucial as rejection treatments aggravate HCV recurrence. Early progression to cirrhosis following LTx for hepatitis C has been described (Wietke-Boaun, 2004) even started by 9-POD (Takeishi, 2004). In the case of our patient ''calcineurin holiday'' was performed two times, resulting by AR and needs to eliminate CNIs. The clinical status and incidence of adverse events elicited severe neurologic and hematological disorders. Paradox was that steroids were the only choice, although CS increased HCV replication *in situ* and *in vivo* (Watt, 2009). Rapamycin is not approved in *de novo* LTx but we introduced sirolimus on 26-POD. Two month latter ALT, AST, bilirubin and other lab findings returned to normal.

PP26 LIVER TRANSPLANTATION OUTCOMES FROM NON-HEART BEATING DONORS: INITIAL EXPERIENCE AND LESSONS LEARNED

Viniyendra Pamecha, Brian Davidson, Dinesh Sharma, Keith Rolles, James O'Beirne, Bimbi Fernando; Department of Liver Transplantation, Royal Free Hospital, London, United Kingdom

Background: Liver transplantation from non-heart beating donors (NHBD) is expanding despite inferior results than with heart beating donation (HBD). Improved selection of donor and recipients and organ preservation is required. We present our initial experience of liver transplantation from NHBD with identifying areas of improvement.
Methods: Twenty one NHBD liver transplantation were performed from the start of programme in January 2006 until October 2009. This was divided into two phases. The initial 12 transplants were performed between January 2006–October 2008 (group A) using a standard protocol. The results from this group were reviewed and factors leading to poor outcome were identified and protocol modified. The subsequent group of 9 transplants were performed between October 2008 and October 2009 (group B). The results were compared.
Results: The rate of PNF (group A–4, group B–0), biliary complications (group A–2, group B–1), graft survival (group A–58.3%, B–77.7%) and patient survival (group A–83.3%, B–100%) were inferior in group A. The main factors identified were prolonged primary warm ischemia time (group A – 21 min (3–25), B–14 min (12–20), cold ischemia time (group A–415 min (219–720), B –329 min (180–404), and inotropes requirements (group A–9, B–4). The overall graft survival from NHBD ($n = 21$, 71.4%) was significantly inferior to HBD ($n = 214$, 90%) $P = 0.02$, although patient survival remains comparable (NHBD – 95%, HBD – 94%, $P = 0.78$).
Conclusion: Although outcomes with NHBD remain inferior to HBD, adherence to optimisation protocol can greatly improve results.

PP27 EVIDENCE FOR INCREASED CLOTTING DYSFUNCTION IN NON HEART BEATING LIVER TRANSPLANTS

Sanjiv Patel[1], Robert Broomhead[1], Tara Butt[1], James O'Beirne[2], Sue Mallet[1]; [1]Anaesthesia, Royal Free Hospital, London, United Kingdom; [2]Hepatology, Royal Free Hospital, London, United Kingdom

Introduction: Coagulation abnormalities during liver transplantation (LT) result in major peri-operative challenges as both bleeding and thrombotic events may be precipitated.

Large studies suggest that Non-Heart Beating (NHB) grafts have equivalent outcomes to Heart Beating (HB) grafts. We postulate that in the peri-operative period, the clotting function in patients receiving NHB grafts is increasingly deranged resulting in an increased use of clotting products post operatively.
Methods: Transplant patients receiving NHB and HB grafts were compared over a 2-year period. Patients were matched for age, disease severity and indication. Coagulation variables were assessed using thromboelastography (TEG). Samples were taken for native and native heparinase TEGs, in order to quantify the prevalence of a Heparin Like Effect (HLE).
Results: Sixteen NHB recipients were matched to 16 HB recipients. Table comparing values for LY 30 (% lysis of clot after 30 min) ($n = 16$) NHB median (IQR) HB median (IQR) p value Baseline 0 (0–0) 0 (0–0) 0.78 Reperfusion 12.5 (4.4–52.38) 0 (0–0.875) 0.0002 Table showing no cases with a positive heparin effect at end of case ($n = 16$) NHB ($n = 16$) HB ($n = 16$) p value Baseline 0 0 Non Significant Reperfusion 13 6 0.01 Table show no. clotting products use in first 24 h post operative ($n = 16$) NHB median (IQR) HB median (IQR) p value No. products 1 (0–3.75) 0 (0–1) 0.042.
Conclusion: The use of NHB grafts results in an increased need for clotting products, due to an increased abnormality in coagulation, compared with the use of HB grafts. The reasons for this may be due to reduced graft function, suggested by increased fibrinolysis and a persistent HLE postreperfusion as demonstrated by TEG; both known to be part of the coagulopathy seen after transplantation. Causes for reduced graft competence need to be investigated further.

PP28 DCD LIVER TRANSPLANTATION IN HCV POSITIVE RECIPIENTS

Puoni Puneet, Laura Tariciotti, Chiara Rocha, John Buckels, Paolo Muiesan; Liver Unit, Queen Elizabeth Hospital, Birmingham, United Kingdom

Introduction: Cirrhosis secondary to Chronic Hepatitis C virus (HCV) infection is now the most common indication for LT in Western Europe and the United States. However the discrepancy between the number of patients requiring liver transplant (LT) and the number of available organs continues to broaden. This has led to an increase in marginal liver grafts, including those procured from Non-Heart Beating Donors (NHBD). There are several reports of decreasing graft survival in patients undergoing LT for this indication which in part has been attributed to increased use of marginal grafts, especially from older patients.
Aim: The aim of this retrospective study was to investigate whether patients transplanted for cirrhosis secondary to HCV infection with a NHBD had a worse outcome than those transplanted with grafts from brain-stem death donors.
Methods: A retrospective analysis of 52 patients transplanted with NHBD livers at our centre from 2005–2009 was performed, with particular reference for recipients with cirrhosis secondary to HCV infection.
Results: Thirteen (25%) patients with HCV were transplanted with NHBD livers in the study period. Thirty-nine (75%) patients were transplanted for non HCV indications. The age and sex distribution of the two groups were similar. MELD and UKELD scores at time of transplant were similar in both groups (14.1 and 51.3 HCV + group, 14.3 and 53.8 HCV- group). The most common genotype in HCV + group was 3a. Of 4 HCV + recipients who had a liver biopsy post transplant for graft dysfunction, three were diagnosed with HCV recurrence in the graft. One patient in the HCV+ group died of a cerebrovascular accident. Two patients lost their grafts (primary non function and hepatic artery thrombosis) and five died with functioning grafts (three sepsis, one haemorrhage, one cardiac failure) in the HCV- group in the follow up period. One-year graft and patient survival were 92.3 and 92.3% in the HCV+ group and 82.1% and 87.2% respectively in the HCV- group.
Conclusions: Our data suggests that there is no difference in one-year graft and patient survival in HCV+ and HCV-patients transplanted with NHBD grafts. Transplantation with NHBD grafts seems to be a viable option in this group of patients in the short-medium term follow-up.

PP29 SUCCESSFUL TRANSPLANTATION OF LIVER AND KIDNEYS FROM A NON-HEART BEATING DONOR ON AN INTRA-AORTIC BALLOON PUMP

Ricardo Rossi[1], John Buckels[2], Paolo Muiesan[2]; [1]Surgery, Clinica Alemana, Santiago, Chile; [2]Liver and Hepatobiliary Unit, Queen Elizabeth Hospital, Birmingham, United Kingdom

Introduction: Organ transplantation from NHBD supported with an intra-aortic balloon pump (IABP) has not been reported. We present the first case of a NHBD on an IABP whose liver and kidneys were successfully transplanted. Case Report: A 54-year old female collapsed at home due to a myocardial infarct, with prompt resuscitation and successful coronary angioplasty and IABP placement at Queen Elizabeth Hospital. Adequate MAP, O2 sat, and UO were maintained. On discontinuation of sedation, a GCS of three persisted. EEG demonstrated severe cerebral dysfunction; head CT revealed diffuse cerebral oedema. Withdrawal of treatment (WOT) was discussed with the family. Consent as a potential NHBD was obtained. AST was 98 U/L, alkaline phosphatase, bilirubin, sodium and creatinines were normal. Asystole occurred 9 min after WOT.A modified super rapid technique was used for organ retrieval, with aortic and portal perfusion. Warm ischaemia time was 19 min.

The liver was transplanted into a 56-year old female with ALD complicated by encephalopathy, MELD and UKELD scores of 8 and 54, respectively. Cold ischemia time (CIT) was 8 h 22 min. AST reached a maximum of 2436 U/L on day 0, normalising on day 5. She was discharged on day 11.Liver function tests remain normal at 2 months follow-up. The kidneys were transplanted into two males with ESRF, ages 65 and 43, on haemodialysis for 8 year and peritoneal dialysis for 4 year, respectively. CIT was 17 h 20 min and 20 h, both presented initial graft dysfunction, requiring three haemodialysis sessions in the former, discharged at days 8 and 10, respectively. At 2 month follow-up creatinine levels are 143 and 127 μmol/L, respectively.

Discussion: The patient had acceptable clinical and laboratory parameters for organ donation. We evaluated potential IABP-related complications that could compromise organs, such as aortic dissection, hepatic and renal artery occlusion, microembolisation and sepsis. The initial outcome of the three transplanted patients has been favourable.

Conclusions: An IABP should not deter consideration of a potential NHBD. Transplantation of suitable organs from NHBD on an IABP can be performed safely.

PERFUSION TECHNIQUES

PP30 BETTER RECOVERY OF LIVERS FROM NON-HEART BEATING DONORS AFTER PRESERVATION BY MACHINE PERFUSION AT 20° C THAN COLD STORAGE

Andrea Ferrigno[1], Vittoria Rizzo[2], Eleonora Boncompagni[3], Alberto Bianchi[1], Enrico Gringeri[4], Daniele Neri[4], Plinio Richelmi[1], Juan Roselló-Catafau[5], Isabel Freitas[3], Umberto Cillo[4], Mariapia Vairetti1; [1]Department of Internal Medicine and Therapeutics, University of Pavia, Pavia, Italy; [2]Department of Biochemistry, IRCCS Policlinico San Matteo, Pavia, Italy; [3]Department of Animal Biology and IGM-CNR, Histochemistry and Cytometry Section, University of Pavia, Pavia, Italy; [4]Department of General Surgery and Organ Transplantation, University of Padua, Padua, Italy; [5]Department Experimental Hepatic Ischemia-Reperfusion Unit, Institut d'Investigacions Biomediques de Barcelona, Barcelona, Spain

Background and aim: We previously reported that machine perfusion (MP) performed at 20° C greatly enhanced the preservation of steatotic rat livers. Here, we tested whether rat livers retrieved 30 min after cardiac arrest (NHBDs) were better protected by MP at 20° C than by MP at 4° C or cold storage. We also compared the recovery of livers from NHBDs with organs obtained from heart beating donors (HBDs) preserved by cold storage. Materials and methods: MP technique: livers were perfused for 6 hours with UW-G modified at 20° C or 4° C. Cold storage: livers were flushed in situ and preserved with UW solution at 4° C for 6 h. Both MP and cold storage preserved livers were reperfused with Krebs-Heinselet buffer (2 h at 37° C). AST and LDH release and mitochondrial glutamate dehydrogenase (GDH) levels were evaluated. Parameters assessed included: bile production and biliary enzymes; tissue ATP; reduced and oxidized glutathione (GSH/GSSG); protein−SH group concentration.

Results: Livers preserved by MP at 20° C showed significantly lower hepatic damage at the end of reperfusion compared with MP at 4° C and cold storage. GDH release was significantly reduced and bile production, ATP levels, GSH/GSSG and protein−SH groups were higher in livers preserved by MP at 20° C than with MP at 4° C and cold storage. The best preserved morphology and high glycogen content was obtained with livers submitted to MP at 20° C. Liver recovery using MP at 20° C was comparable to recovery observed with HBDs.

Conclusions: MP at 20° C improves cell survival and gives a better-quality of preservation for livers obtained from NHBDs and may provide a new method for the successful utilization of marginal livers.

PP31 THROMBIN INHIBITION DURING MACHINE PERFUSION IMPROVES GRAFT OUTCOME IN A PORCINE DEATH AFTER CARDIAC ARREST DONOR MODEL

Raphael Thuillier[1,2,3], Frederic Favreau[1,2,3], Jerome Cau[1,3], Sandrine Joffrion[1,2], Michel Eugene[1,3], Benoit Barrou[1,3], Thierry Hauet[1,2,3]; [1]Inserm U927, Université de Poitiers, Faculté de Médecine et de Pharmacie, Poitiers, France; [2]CHU de Poitiers, Laboratoire de Biochimie, Poitiers, France; [3]FLIRT (Federation pour L'étude de l'Ischémie Reperfusion en Transplantation), France

Purpose: Machine perfusion (MP) is the recommended preservation protocol for marginal organs such as deceased after cardiac death donors (DCD) grafts. We previously used a renal transplantation model mimicking DCD conditions to show that supplementing the preservation solution with a thrombin inhibitor improves graft quality and outcome. In the present study, we evaluated the impact of thrombin inhibitor supplementation in a MP preservation protocol.

Methods: We used a renal auto-transplanted pig model mimicking DCD conditions. Kidneys were subjected to 60 min of warm ischemia, and then preserved for 24 h by MP using the ORS system. Follow up lasted 3 months. Melagatran®, a direct thrombin inhibitor, was added to the KPS solution (MP-M group) or omitted (MP group).

Results: There was no significant difference in early recovery function between groups. However, after 3 month, MP-M group grafts displayed a significantly improved kidney function estimated by plasma creatinine (80.4 ± 2.4 vs. 137.4 ± 4.6 μmol/L, $P < 0.001$) and proteinuria (0.12 ± 0.03 vs. 0.29 ± 0.01 g/24 h, $P < 0.001$). Further western blot analysis revealed that expression of pro-fibrotic markers such as TGFβ and PAI-1 was higher in MP compared to MP-M grafts. Real time PCR analysis showed that expression of ECM-degrading metalloproteinase: MMP9 was increased in MP-M group (13.4 ± 6.5 vs. 1.7 ± 0.7).

Conclusions: As we already reported in static condition, thrombin inhibition provides high protection against preservation-related ischemia reperfusion injury, allowing better graft function and reduction of chronic pro-fibrotic milieu found in organs from DCD conditions. Machine perfusion of these grafts is clinically recognized to improve recovery function; however additive therapy such as thrombin inhibition could guarantee a higher graft quality, and furthermore a better patient's quality of life.

MISCELLANEOUS

PP32 DE NOVO USE OF MTOR INHIBITOR EVEROLIMUS (ELR) IN COMBINATION WITH MYCOPHANOLATE SODIUM (MPS) IN PATIENTS UNDERGONE ORTHOTOPIC LIVER TRANSPLANTATION (OLTX) FOR HEPATOCELLULAR CARCINOMA (HCC) AND EPITHELIOID HAEMANGIOENDOTHELIOMA (EHE)

Efstathios Antoniou[1], Dimitrios Dimitroulis[1], Dimitrios Mantas[1], Aikaterini Labathariou[2], Dimitrios Karoussos[1], Nikos Nikitakis[1], Panorea Paraskeva[1], Anastasios Smyrnis[1], Stylianos Kykalos[1], Evanthia Svolou[1], Nikos Karydis[1], Paul Vernicos[1], Kaliopi Tsinari[2], Ioannis Floros[1], Alkiviadis Kostakis[1]; [1]2nd Propedeutic Surgical Department, University of Athens, "Laikon" Hospital, Athens, Greece; [2]Anaesthetic Department, "Laikon" Hospital, Athens, Greece

Introduction: mTOR is central regulator of cell growth and angiogenesis; its pathway is activated in 40-50% of HCC patients. We present patients survival after OLTx for either HCC or EHE who had a de novo ELR and MPS combination anti-rejection treatment.

Methods: Ten patients underwent OLTx for HCC or EHE; two patients had HBV + HCC, five HCV + HCC, one PBC + HCC and two EHE. All HCC patients were within UCSF criteria. All received de novo (day 1) anti-rejection treatment with ELR (1.5−2 mg bid), MPS (720 mg bid) and prednisolone (10 mg bid).

Results: All patients had an improving liver function by the end of the first week. 8/10 patients (80%) survived two years and six of them are still extremely well. None have presented any tumour recurrence. One HBV + HCC patient presented HCC metastases to lungs and brain, died two years after OLTx. One HCV + HCC patient died on 8th POD, due to massive brain haemorrhage and another one from sepsis two years later. One EHE patient died on the 14th POD-cardiac arrest. PBC + HCC patient is extremely well. About 3/10 patients had moderate acute rejection, treated with high dose of steroids and increase ELR dose. None presented particular side effect. Survival range between 10−43 months. ELR blood levels have been between 4.5 to 7.1 ng/ml.

Conclusion: ELR combination with MPS used, since few patients had some degree of renal impairment and for the potential benefit of the mTOR inhibitors against HCC. These results show that the above immunosuppression combination can safely be used in OLTx patients as de anti-rejection treatment, especially in those with malignancy and/or renal impairment.

PP33 LIVER TRANSPLANTATION IN HIV/HCV COINFECTED VS HCV MONINFECTED PATIENTS

Umberto Baccarani, Marcello Tavio, Gian Luigi Adani, Angela Londero, Anna Rossetto, Chiara Comuzzi, Francesco Bragantini, Claudio Avellini, Vittorio Bresadola, Pierluigi Toniutto, Fabrizio Bresadola, Pierluigi Viale; Department Transplantation, University of Udine, Udine, Italy

HIV/HCV coinfection is predictive of worst long-term outcome after liver transplantation (LT). Aim of this study is to compare LT in HIV/HCV vs HCV patients. From 2004 to 2009, 15 HIV/HCV were compared to 16 HCV.

Results: HIV/HCV were younger 47 (40−53) vs. 52 (37−68) ($P = 0.003$). MELD was lower ($P = 0.008$) for HIV/HCV 10 (7−19) vs. 17 (8−30) for HCV. Donor age was 42 (21−61) vs. 46 (14−78) ($P = 0.69$) with no difference in sex ($P = 0.93$) and macrosteatosis >25% (27% vs. 31% $P = 0.77$). Cold ischemia time were 455 ± 139 vs. 506 ± 112 min ($P = 0.27$). Median follow-up was 24 (2−61) for HIV/HCV vs. 29 (5−60) months for HCV ($P = 0.71$). All patients were biopsied yearly after transplantation. The median grading and staging score were 3 (2−6) vs. 4 (1−7) ($P = 0.35$) and 2 (0−5) vs. 2 (0-5) ($P = 0.80$) for HIV/HCV vs. HCV. ALT were higher at the latest control for HCV vs. HIV/HCV (112 ± 101 vs. 50 ± 48 $P = 0.03$). HCV genotype was 1 respectively in 73% and 75%, 3 in 20% and 12.5%; 1 genotype 4 in HIV/HCV and 2 genotype 2 in HCV. HCV therapy was performed in 73% vs 56% of patients ($P = 0.32$); response was complete in 1 vs. 0 ($P = 0.29$), partial in 7 vs. 5 ($P = 0.37$), none in 1 vs. 2 cases ($P = 0−58$) in HIV/HCV vs HCV patients; 2 patients in each group had suspension for intolerance ($P = 0.94$). Graf loss due to HCV recurrence occurred in 1 case in HIV/HCV vs. 3 cases in HCV ($P = 0.31$). The estimated 1, 3 and 5 years patients survival were 93%, 84% and 84% for HIV/HCV vs. 90%, 70% and 60% for HCV ($P = 0.64$). HIV/HCV coinfection does not seem to impact medium long term survival after LT, one possible explanation might be the younger age and lower MELD of HIV/HCV co-infected patients.

PP34 LOW INCIDENCE OF DELAYED GRAFT FUNCTION IN 104 CONSECUTIVE RENAL TRANSPLANT RECIPIENTS

Mirza Anzar Baig, Taqi Toufeeq Khan, Dujana Mousa; Department Renal Transplant, Riyadh Military Hospital, Riyadh, Saudi Arabia

Objective: Delayed graft function (DGF), defined as dialysis done within the first week after renal transplant is a major complication and its reported incidence varies from 7.7% to 21%. The aim of this study was to detect incidence of DGF and evaluate its risk factors in our centre.
Material and Methods: Retrospective analysis of all living donor (LD) and deceased donor (DD) renal transplants performed from June 2008 to December 2009 was carried out. Data were collected regarding patient demographics, procedure details and outcome. In DD group, a graft allocation policy was followed based on admitting creatinine and allograft biopsies.
Results: Among 104 renal transplants, 71 (68%) were LD and 33 (32%) were DD. Only five patients (4.8%) were labeled DGF, one of which was a LD kidney (20%) with an unusually long warm ischemia time (56 min). Mean cold ischemia time in DD kidneys was 9.8 h (5–19 h) and in case of LD kidneys was 29 min. None of our DGF cases had multiple renal arteries.
Conclusion: Every effort should be made to keep the ischemia times to their minimum in order to achieve optimal immediate graft function. Deceased donor allograft biopsy is an important adjunct in recipient selection thereby reducing the incidence of DGF.

PP35 PSYCHOEDUCATIONAL INTERVENTION TO IMPROVE PATIENT ADHERENCE AFTER LIVER TRANSPLANTATION

Valentina Borella[1], Giacomo Germani[1], Silvia Lazzaro[1], Francesca Gnoato[2], Gianpietro Rupolo[3], Umberto Cillo[4], Alessandro Martin[5], Giacomo Carlo Sturniolo[1], Patrizia Burra[1]; [1]Department Gastroenterology, Department of Surgical and Gastroenterological Sciences, Padova University Hospital, Padova, Italy; [2]Department of General Psychology, University of Padova, Padova, Italy; [3]Institution Regional Transplantation Centre, Regione Veneto, Italy; [4]Surgical Unit, Department of Surgical and Gastroenterological Sciences, Padova University Hospital, Padova, Italy; [5]Faculty of Education, University of Padova; Padova, Italy

Background: In patients undergoing liver transplantation (LT), adherence to medical regimen is crucial to avoid medical complications, negatively influencing graft function and patient survival.
Materials and Methods: Liver transplantation patients attending the outpatient clinics of the Multivisceral Transplant Unit, Padua University Hospital (March 2008–June 2009) were enrolled in the study. All patients underwent an anonimous questionnaire evaluating adherence to immunosuppression therapy (IS) and to adequate lifestyle. Patients who reported non-adherence underwent educational interventions (EIs) provided at the Psychoeducational Service of our Unit and were re-assessed 6 months after the EIs.
Results: One hundred and three liver transplanted patients were included; 76 male, 27 female; mean ± SD age 56 ± 11.5 years and mean ± SD time from transplantation 85.9 ± 55.4 months. 44.5% of patients underwent LT for virus-related liver cirrhosis (32% HCV, 7.7% HBV, 4.8% HBV/HCV), 9.7% for alcohol-related, 45.8% for other etiologies. All participants underwent a questionnaire to assess adherence. Overall, non adherence to IS was found in 47% of patients (26% delayed intake, 18% no intake, 3% modified drug dose). Non adherence to adequate lifestyle was found in 45% of patients (25% smoking and 20% alcohol consumption). Two hundred and sixty-nine EIs have been provided: 103 for inadequate drug intake and non steroidal anti-inflammatory drugs (NSAIDS) intake, 16 for alcohol intake and 20 smoking habits. Six months after EIs, adherence to IS and adequate lifestyle were re-assessed in 24 patients, reporting a 10% reduction of non-adherent behaviour in each domain.
Conclusions: Non-adherence to medical regimen and to adequate lifestyle have been reported in nearly 50% of liver transplanted patients. Educational interventions improved adherence only in a minority of patients within 6 months, meaning that educational programs should be offered before and continued after liver transplantation.

PP36 ANTIVIRAL TREATMENT (AT) FOR HCV RECURRENCE FOLLOWING LIVER TRANSPLANTATION (LT): IMPACT ON LIVER HISTOLOGY IN NON RESPONDERS, AN ITALIAN MULTICENTER RETROSPECTIVE STUDY

Eleonora De Martin; Institution Gastroenterology, Padua, Italy

Background and Aim: The effect of AT for HCV recurrence after LT, on liver histology is still controversial, and few data are available on non responders. The aim of this study was to assess histological fibrosis progression due to HCV recurrence after LT in patients non responder to AT. Methods A multicenter Italian retrospective study was performed in HCV + recipients who underwent AT (IFN or Peg-IFN/Ribavirin (RBV);1999–2007) after LT. Liver biopsies (LB) were performed before, at the end, and 12 months after AT discontinuation. According to Ishak's score, fibrosis was defined as improved if the stage score was at least <1 point, worsened if at least >1 point and stable if there was no change.
Results: 130 non responders (89 male, 41 female, mean age ± SD 54.5 ± 8.9 years) were included. HCV genotype: 1b/1a was reported in 105 patients, 2a in 7, 3a in 1, 4a/d in 4 and was not available in 13 patients. Mean donor age ± SD was 49 ± 19 years. AT was started at 17 ± 22 months from LT (mean ± SD), mean AT duration was 46.5 weeks (range 20–247, median 45). Among the 130 non responders, 34 patients have paired biopsies: fibrosis stage was stable in 8 (23.5%), improved in 4 (11.5%), worsened in 22 (65%) patients. At the multivariate analysis only male gender was significantly ($P = .05$) associated with fibrosis stabilization/improvement. Baseline fibrosis 1–2 was seen in 7/12 patients with no fibrosis progression, and in 19/22 patients with worsened fibrosis.
Conclusion: In one third of patients non responder to AT, with histologic evaluation after AT discontinuation, there was a stabilization or improvement in fibrosis stage, independently of baseline fibrosis. Male gender seems to be significantly associated with fibrosis stabilization/improvement.

PP37 WHEN A NHBD IS A DONOR-AFTER BRAIN-DEATH. A NEW CLASSIFICATION FOR ORGAN DONORS

Paolo Geraci[1], Francesco Procaccio[2], Giampaolo Azzoni[5], Massimo Abelli[3], Antonio Dal Canton[4], Marco Sacchi[1], Elena Ticozzelli[3]; [1]Transplant Coordination Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [2]Neuro ICU, University City Hospital, Verona, Italy; [3]Kidney Transplantation Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [4]Nephrology Dialysis Transplantation Unit, Fondazione IRCCS Policlinico San Matteo, Pavia, Italy; [5]Department of Roman Law, History and Philosophy of Law, University of Pavia, Pavia, Italy

The recovery of kidneys from non-heart-beating-donors (NHBD) has been carried out at the Fondazione-IRCCS-Policlinico San Matteo di Pavia since 2008. Our experience suggests that the terms that proceed from the ethical rule that organ recovery must not be the cause of death - deceased donors after brain death (DBD) and deceased donors after cardiac death (DCD) - fail to cover the complex scenarios that precede a legal declaration of death and that have a significant influence on organ perfusion. Advanced resuscitation with extracorporeal membrane oxygenation (ECMO) may not prevent cerebral death in severe cardiorespiratory failure patients, with cardiac cessation ensuing during ECMO. Here the deceased patient can be ascertained as a donor after cardiac death (DCD). Nevertheless, because circulation was actually maintained, even if artificially, one criterion for the determination of cardiac death – cessation of circulation – is not fully met. By Italian law, cardiac death must be ascertained by 20 min of monitoring by electrocardiogram. However, some physicians feel this provides insufficient evidence of death in these patients, and they suggest ascertaining death by the neurological criterion, which requires monitoring for six hours in Italy. Donors are then termed deceased after brain death (DBD). These DBDs, therefore, are non-heart-beating donors – although ECMO is maintained during monitoring – as would be expected for a "straightforward" DBD where the heart continues to beat after brain death (Heart-beating-donors). We thus propose a new classification system for deceased donors that is not based on the criterion by which death is determined, but on the type of organ perfusion before harvesting: deceased donors with natural perfusion (DDNP) and deceased donors with absent or artificial perfusion (DDAP). This would improve the value of the terminology for organ harvesting purposes.

PP38 ASSESSMENT OF ADHERENCE TO MEDICAL REGIMEN AFTER SOLID ORGAN TRANSPLANTATION: THE EXPERIENCE OF PADOVA UNIVERSITY HOSPITAL

Silvia Lazzaro Professional Educator[1], Giacomo Germani[1], Valentina Borella[1], Francesca Gnoato[2], Gianpietro Rupolo[3], Umberto Cillo[4], Paolo Rigotti[5], Giuseppe Feltrin[6], Alessandro Martin[1], Giacomo Carlo Sturniolo[1], Patrizia Burra[1]; [1]Gastroenterology, Department of Surgical and Gastroenterological Sciences, Padova University Hospital, Padova, Italy; [2]Department of General Psychology, University of Padova, Padova, Italy; [3]Institution Regional Transplantation Centre, Padova, Italy; [4]Surgical Unit, Department of Surgical and Gastroenterological Sciences, Padova University Hospital, Padova, Italy; [5]Surgical Unit I, Padova University Hospital, Padova, Italy; [6]Heart Surgery, Padova University Hospital, Padova, Italy

Background and Aims: In transplanted patients, adherence to immunosuppression (IS) is crucial to ensure patient and graft longterm survival. The aim of this study was to assess, among organ transplantated patients, adherence to medical regimen.
Materials and Methods: Organ transplanted patients at Padua University Hospital (March 2008–June 2009) were included. All participants underwent a questionnaire to assess non-adherence. Results: 218 organ transplanted patients [103 liver (LT), 50 kidney (KT), 52 heart (HT) and 13 lung (LuT)] have been included: 152 men, mean ± SD age 54 ± 2.4 years and mean ± SD time from transplantation 84.5 ± 10 months. Overall, non-adherence to IS has been reported in 38% of patients (24% delayed intake, 14% no intake, 2% modified drug dose) and to adequate lifestyle in 38.5% of patients (15% alcohol consumption and 31% smoking). Considering non-adherence to IS for each transplanted organ the rates were 47% for LT, 22% for KT, 40% for HT, and 39% for LuT. With regard to non-adherence to adequate lifestyle non adherent rates for each transplanted organ were 45% for LT, 18% for KT, 27% for HT, and 31% for LuT. Non adherent rates to medical prescriptions for each transplanted organ were 13% for LT, 4% for KT, 12 % for HT, and 23% for LuT. Non adherence to IS and to medical prescription was significantly less among KT patients vs. other transplanted patients

($P < 0.01$ and $P < 0.0001$ respectively). LT patients with non adherence to adequate lifestyle were significantly more vs. other transplanted patients ($P < 0.0001$)

Conclusions: About 40% of organ transplanted patients reported non adherence to IS. Liver transplant recipients are more non adherent to adequate lifestyle compared to other patients. Psycho-educational interventions for transplanted are badly needed in order to improve adherence.

PP39 THE ADIPONECTIN AND PROINSULIN METABOLISM AFTER LIVING DONOR LIVER TRANSPLANTATION

Maciej Malinowski[1], Thomas Konrad[2], Sabine Nolting[1], Diana Hünerbein[1], Helena Döbling[1], Steinmüller Thomas[1], Andreas Pfützner[3], Johan Lock[1], Peter Neuhaus[1], Stockmann Martin[1]; [1]Department of General, Visceral, and Transplantation Surgery, University Hospital Charité, Campus Virchow Klinikum, Berlin, Germany; [2]Institute for Metabolic Research, Frankfurt, Germany; [3]Institute for Clinical Research and Development, Mainz, Germany

Introduction: The adiponektin (APO) serum levels correlate negatively with the insulin resistance and the risk of cardiac death by the individuals with normal liver function. Proinsulin (P-INS) is a surrogate parameter of the ß-cell function and its level increase while insulin resistance takes place. The influence of the liver function on the APO and P-INS metabolism alteration remains unclear. In this study the influence of cirrhosis, and liver transplantation on the APO and P-INS metabolism was analyzed.

Methods: Eighteen recipients and donors who undergone living donor liver transplantation were analyzed. Routine laboratory and clinical parameters, insulin resistance (i.v. GTT), APO, and P-INS serum levels were measured at the point of evaluation, 10th, 180th, and 365th day after transplantation.

Results: APO level at the point of evaluation was low in the donor and high in the recipient group. In the donors APO levels increased at day 10th ($P = .002$) and did not changed significantly till the 365 day. In the recipient group the level improved already at the 10th day and increased slightly till POD 365 ($P = 0.009$). P-INS level in the recipient group was also high before transplantation and improved already at the day 10. It falls continuously till the day 180 and rise slightly till the day 365 ($P < .005$). P-INS level in the donor group remained constant regardless the postoperative acute insulin resistance.

Conclusions: Liver cirrhosis grade and liver dysfunction serum parameters correlate significantly positive with the APO serum level. In patients with liver cirrhosis contrariwise to the individuals with sufficient liver function hyperinsulinemia and insulin resistance do not cause APO down regulation. In the patients with liver cirrhosis P-INS levels cannot be used for the insulin resistance monitoring due to the influence of the liver function on its clearance.

PP40 DE NOVO TUMORS AFTER LIVER TRANSPLANTATION: RESULTS FROM A MULTICENTRIC STUDY, ITALY 1990–2008

Pierluça Piselli[1], Patrizia Burra[2], Giacomo Zanus[2], Antonio Pinna[3], Augusto Lauro[3], Gianluigi Adani [4], Umberto Baccarani[4], Giuseppe Ettorre[5], Giovanni Vennarecci[5], Alfredo Di Leo[5], Maria Rendina[5], Claudia Cimaglia[1], Alessandro Agresta[1], Andrea Buda[2], Martina Gambato[2], Chiara Zanfi[3], Paolo Di Gioia[3], Vittorio Bresadola[4], Roberto Santoro[5], Lucia Miglioresi[5], Enrico Girardi[1], Vincenzo Puro[1], Giuseppe Ippolito[1], Diego Serraino[1]; [1]NMI "L. Spallanzani" IRCCS, Rome, Italy; [2]Policlinico Universitario, Padua, Italy; [3]Policlinico "S. Orsola-Malpighi", Bologna,Italy; [4]Policlinico Universitario, Udine, Italy; [5]Polo Ospedaliero Interaziendale Trapianti (POIT) "San Camillo-Forlanini"-INMI "L. Spallanzani", Rome, Italy

Objective: To quantify incidence rate (IR) and the excess risk of de novo-tumors (except non-melanoma skin cancers) in patients after liver transplant (OLT) in Italy.

Methods: We collected data on 1388 patients (74.6% males) who underwent OLT in five Italian transplantation-centers (1990–2008). Period at risk of cancer (person-years, PY) was computed from OLT to date of cancer, death, or last follow-up.

Observed cases were compared through sex- and age-standardized IR (SIRs) and 95% confidence intervals (CIs) using Italian Cancer Registries data. Incidence rate ratio (IRR) were computed to identify risk factors (adjusting for sex, age, period, time from OLT, alcohol and cancer history).

Results: In 7,521 PYs (median follow-up 4.0 years). 87 patients (6.3% of the total) developed a confirmed de novo-malignancy (92 total diagnoses), among these 14 Non Hodgkin Lymphoma-NHL, 10 Kaposi's Sarcoma-KS, and 64 solid tumors including 14 Head and Neck (H&N) cancers, 8 lung, 6 esophagus and 4 Invasive Carcinoma of the Cervix (ICC). Overall incidence was 12.7 cases/103 PYs with a 1.7 significant increased SIR (95% CI: 1.3–2.0), higher in females (2.1 vs. 1.6). Increased SIRs were found for KS (74.5), NHL (6.6); considering all solid tumors overall risk was not significantly increase (SIR = 1.1) bu significant augment risks were found for ICC (14.7), esophagus (8.6) and H&N (3.8) cancers; 7/8 lung cancers were observed in pts <60 years of age (SIR = 40.1). Preliminary analysis has shown a significative increased incidence of all and solid tumors in patients with alcohol abuse (IRR = 1.9 and 2.8 respectively) and a decreasing incidence of KS 2 years after OLT (IRR = 0.2).

Conclusions: OLT patients are at higher risk for cancer, mainly malignancies virus-associated or those related to preexistingrisk factors (e.g. alcohol), pointing out the importance of cancer surveillance after OLT.

PP41 BRAIN DEATH - MANAGEMENT OF ENDOCRINE ABNORMALITIES

Rodica Daniela Gilau, Carmen Pantis; Department Anesthesia and Intensive Care, Clinical County Hospital Bihor, Oradea, Romania

Brain death leads to rapid disturbances that affect the hypothalamus-pituitary axis. Usually vasopressin secretion is decreased, resulting in diabetes insipidus, which leads to polyuria, dehydration, hypernatremia, a hyperosmolar state, hypocalcemia, hypophosphatemia, hypokalemia, and hypomagnesemia. Brain death also affects the hypothalamus-pituitary-thyroid axis; this endocrine abnormality is characteristic of the "euthyroid sick syndrome" that is unusually associated with acute major stress than actual hypothyroidism. The depression of corticoid function may also occur during brain death. Many brain-dead patients become poikilothermic (core temperature drifts toward ambient temperature as a result of interruption of the temperature regulating center in the hypothalamus) due to the lack of hypothalamic regulation of temperature and as a result become hypothermic with myocardial depression, low cardiac output and dysrhythmia. The early correction of endocrine abnormalities may lower the incidence of diselectrolithemia, metabolic abnormalities, hypotension, dysrhythmia and ventilatory problems.

PP42 NON HEART-BEATING DONORS IN ENGLAND

Mateus Rozalem Aranha, Eleazar Chaib, Felipe Duarte Silva, Lucas Chen, Isabela Siqueira, Leonardo Marinucci, Marcelo Maruyama, Luiz Augusto Carneiro D'Albuquerque; Liver Surgery and Transplantation Department, São Paulo University Medical School, São Paulo, Brazil

Objectives: The aim of this study is to examine clinical outcomes of Non-heart beating donors (NHBD) in the past 10 years in the UK as an way of decreasing pressure in the huge waiting list for organs transplantation. Material and Methods: A literature review was performed based on a Medline (Pubmed from 1997 to 2006) search to identify articles on clinical NHBDs in the UK. Information on the rates of primary non-function (PNF), delayed graft function, acute rejection, graft and patient perfusion were registered.

Results: We found out that NHBDs were used mainly for kidney transplantation in four centres in the UK. Comparing NHBDs with Heart Beating Donors (HBDs), concerning PNF, only 3 of 24 articles have shown significant differences. As far as DGF is concerned 8 of 24 articles have shown significant differences. Acute rejection was reported in only 1 out of 24 articles. Graft survival was equal for 1, 2, 3 and 5 years when comparing NHBD with HBD except in 1 article that has shown significant differences in 3 in 5 years time. Patient survival was equal in 1, 3 and 5 years when comparing NHBD and HBD.

Conclusion: Non heart-beating donor's kidney transplants are associated with allograft dysfunction as PNF and DGF which is related to primary warm ischaemic injury. This warm ischemia is more deleterious in uncontrolled than in controlled NHBDs. Kidney transplant from NHBDs can be performed successfully. The significant degree of warm ischemic injury suffered by NHBD kidneys leads to a high incidence of DGF but the data available so far suggest that this does not adversely influence long-term graft survival.

PP43 ESTABLISHING A NHBD-MODEL IN PIGS

Michael Sereinigg[1], Philipp Stiegler[1], Martin Schweiger[1], Andreas Puntschart[1], Thomas Seifert-Held[2], Gerda Zmugg[2], Iris Wiederstein[3], Michael Zink[4], Karl-Heinz Tscheliessnigg[1]; [1]Department of Surgery, Division of Transplant Surgery, Medical University Graz, Graz, Austria; [2]Department of Neurology, Medical University Graz, Graz, Austria; [3]Department Institut for Biomedical Research, Medical University Graz, Graz, Austria; [4]Institution KH BHB St.Veit, St. Veit, Austria

Introduction: Due to the lack of human donor organs, several strategies to expand the organ donor pool are under investigation. During the last years a lot effort has been emphasized on the characterisation of non-heart beating donors (NHBD). In order to be able to evaluate organ quality in terms of cell viability, histological and immunohistochemical changes and the occurrence of oxidative stress that is known to negatively impact on graft survival after transplantation, a large animal model would be useful. Therefore, we aimed to establish a NHBD animal model in pigs in our laboratory.

Methods: We simulated non-heart beating donation Maastricht II and III in 24 pigs. Cardiac fibrillation is induced by using 9 V direct current. After different time-spans (1 min – 15 min) of ventricular fibrillation with no cardiac output mechanical and medicamentous reanimation is performed according to the protocols for 30 min prior to multi-organ donation. A neurological status is performed. Blood samples are taken at defined time points, tissue samples are stored in liquid nitrogen and embedded in paraffin and treated for further analysis. Oxidative stress is monitored determining CP and MPO using ELISA. Tissue quality is assessed by ATP measurement and routine histological and immunohistochemical analysis is performed.

Results: We succeeded in establishing a NHBD pig model in our laboratory by inducing cardiac fibrillation. Up to now, only NHBD donation according to the Maastricht criteria II and III is performed, but establishing of all Maastricht criteria NHBDs seems to be feasible.

Discussion: Using a NHBD model in pigs will enable us to characterize NHBD donor organ quality more precisely and means for amelioration of storage condition and donor treatment can be evaluated more detailed in a large animal model.

PP44 AN ALTERNATIVE METHOD OF RECONSTRUCTION OF HEPATIC VENOUS OUTFLOW IN DOMINO LIVER TRANSPLANTATION

Miguel Angel Suarez Muñoz, José Luis Fernández Aguilar, Belinda Sánchez Pérez, José Antonio Pérez Daga, José Manuel Aranda Narváez, César Pablo Ramírez Plaza, Rosa Mª Becerra Ortiz, Julio Santoyo Santoyo; General & Digestive Surgery Service - Liver Transplant Unit, Universitary Hospital Carlos Haya, Malaga, Spain

We describe a method to reconstruct the hepatic venous outflow in domino liver transplantation in a case, in which, due to an accident in the cadaveric donor during the harvesting procedure, we couldn't retrieve the lower portion of the IVC in continuity with both common iliac veins. In such condition, we reconstructed the hepatic outflow tract in two steps. First, on the back table, the right hepatic vein and the common trunk of the left and middle hepatic veins were anastomosed using 5−0 prolene (V-septoplasty). Afterward, we performed a neocaval segment using both common iliac veins of the donor, which had been longitudinally opened and superimposed. Both short sides of the vein patch were anastomosed using a running suture of 5−0 prolene. It is also possible to use a vascular device for this purpose. The other two edges of the venous graft (long sides) were used to perform the anastomosis to the venous cuff of the recipient (obtained at the junction of all three hepatic veins) with septoplasty of the domino liver. The postoperative course was uneventful for both patients, who were discharged on the eighth (domino donor) and tenth (cirrhotic recipient) postoperative days.

PP45 EXTENDED CRITERIA LIVER DONATION AND TRANSPLANT RECIPIENT CONSENT: THE EUROPEAN EXPERIENCE

Paolo Bruzzone, Magi Sque, D Giannarelli; Stefanini, La Sapienza University, Rome, Italy

ELPAT1 coordinated the distribution of an electronic questionnaire. Completed questionnaires were received from 30 centres in 13 countries. Twenty-eight centres accepted ECD (Extended criteria liver donors). The percent estimate of ECD livers was 32%. The criteria for defining a liver donor as ECD were: steatosis in 24 centres (85%), age up to 80 years in 23 centres (82%), serum sodium >165 mmol/l in 17 centres (60%), intensive care unit (ICU) stay with ventilation >7 days in 16 centres (57%), SGOT [[AUTHOR: Please define the following 'SGOT']] >90 U/l in 12 centres (42%), body mass index (BMI) > 30 in 10 centres (35%), SGPT [[AUTHOR: Please define the following 'SGPT']] > 105 U/l in 10 centres (35%), serum bilirubin > 3 mg/dl in 10 centres (35%) and other criteria in 13 centres (46%).23 centres informed the transplant candidate of the ECD status of the donor: 10 centres (43%) when the patient registered for transplantation, three centres (14%) when an ECD liver became available and 10 centres (43%) on both occasions above.10centres required the liver transplant candidate to sign a special consent form. Ten centres informed the potential recipient of the donor's serology. Only three centres informed the potential recipient of any 'high risk' behaviour of the donor. Potential recipients of ECD livers were: patients with previous cancer (21 centres), HBV + patients(14 centres), HCV + patients (12 centres), HIV + patients (10 centres), critically ill patients (10 centres), patients > 65 years of age (7 centres), patients performing high risk sex practices (7 centres), drug users (5 centres), and patients <65 years of age (1 centre).The majority of centres discussed with potential recipients that they may/will receive an ECD liver, usually when they were registered for transplant and were required to sign a special informed consent form. Some centres also informed the transplant candidate when an ECD liver became available.