Blood Purification

Blood Purif 2007;25:337–361
DOI: 10.1159/000107441

Published online: September 10, 2007

25th Annual Meeting of the International Society of Blood Purification (ISBP)

September 15–17, 2007, Prague, Czech Republic

Abstracts

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Oral Presentations

O1

Telomere Shortening, a New Mortality Risk Factor in Dialysis Patients. Associations with Inflammatory Markers and Fetuin-A Levels

J.J. Carrero[1] (presenting), P. Stenvinkel[1], B. Fellström[2], A.R. Qureshi[1], K. Lamb[3], O. Heimbürger[1], P. Barany[1], K. Radhakrishnan[3], B. Lindholm[1], I. Sovery[2], L. Nordfors[1], P.G. Shiels[3]

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Background: Chronic kidney disease (CKD) predisposes to a 10–20 fold increased cardiovascular (CVD) risk. Patients are subjected to accelerated atherogenesis and vascular aging. The length of the telomeres is a marker of cell senescense that has been related to CVD mortality in the general population. We investigated whether telomere attrition also contributes to increased mortality risk in CKD patients. **Methods:** Cross-sectional study in prevalent patients undergoing hemodialysis (n = 175; 98 males; average ± SD age: 63 ± 14 y). Biochemical markers of oxidative stress and inflammatory status were measured in relation to the patients leukocyte telomere length. Overall mortality was assessed after a median of 31 (range 2–42) months. **Results:** Telomere length was shorter in the male patients, despite the women being older (6.31 ± 1.05 vs. 6.81 ± 1.27 kb, $p = 0.002$). Telomere length was associated to age (rho = −0.18; $p = 0.01$), fetuin-A (rho = 0.26; $p = 0.0004$), hs-CRP (rho = −0.21; $p = 0.005$) and IL-6 (rho = −0.17; $p = 0.02$). In a multivariate logistic regression (pseudo $r^2 = 0.14$), shorter telomere length was associated to age >65 y (odds ratio: 2.11; 95% CI: 1.10, 4.06), male sex (2.01; 1.05, 3.86), fetuin-A (1.85; 0.97, 3.50), and white blood cell count (2.04; 1.02, 4.09). Receiving operator characteristic curves identified a telomere length <6.28 kb in this cohort as a fair predictor of mortality. Finally, reduced telomere length was associated to increased mortality independently of age, gender and inflammation (Likelihood Ratio 41.6; $p < 0.0001$), but dependently of fetuin-A levels. **Conclusion:** Age, male gender and inflammation were important contributors to reduced telomere length in these patients. Reduced telomere length contributes to increased mortality risk of CKD patients through pathways that could involve circulating levels of fetuin-A.

O2

Vertebral Bone Mineral Density (BMD) Correlates with Coronary Artery Calcifications (CAC) in Hemodialysis (HD) Patients

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Objectives: Several studies have shown a correlation between bone demineralization and vascular (aortic) calcifications in general population, mainly post-menopausal women. Both disorders are very common in renal failure. The aim of this trial was to ascertain potential analogous relationship between BMD and CAC in HD patients. **Methods:** 72 patients (44 women) at the age of 67 (40–92) years, treated with regular HD for 978 (175–5,472) days, were examined with computed tomography at start and 53 of them re-examined after 1 year follow-up. The extent of CAC was determined and Agatston scores [AU] calculated. BMD of lumbar spine was established separately in cortical and trabecular bone. Traditional metabolic risk factors of bone disease and atherosclerosis were monitored during the observation period. Data are given as medians (quartiles), statistical significance was confirmed by rank sum test, rank order correlation and multiple linear regression. **Results:** In a regression model, baseline CAC depended ($r = 0.56$) on total duration of HD (beta = 0.45, $p < 0.001$) and cortical BMD (beta = 0.4, $p < 0.001$). During one year CAC increased from 740 AU (140, 1,469) to 838 AU (261, 2,535), $p < 0.001$ in women and from 1,410 AU (525, 2,945) to 2,531 AU (643, 3,761), $p < 0.001$ in men. The proportional increase was significantly higher in females: 80% (40, 112) vs. 37% (18, 84), $p < 0.05$. At the same time a significant decrease of cortical BMD was detected in females: −12% (−22, −5), $p < 0.005$ but not in males. In men the increase in CAC correlated positively with the variation of cortical ($r = 0.41$, $p < 0.05$) and trabecular ($r = 0.4$, $p < 0.05$) BMD. In a regression model just proportional change of trabecular BMD ($r = 0.72$, $p < 0.001$) was identified as an independent predictor. Contrariwise, in women the increment of CAC was associated with a decline of trabecular BMD: $r = -0.43$, $p < 0.05$. **Conclusion:** In male HD patients a growth of coronary calcifications is connected with increasing bone mineral content of lumbar spine in contrast with post-menopausal female HD patients.

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O3

Serum Beta2-Microglobulin Level Is a Significant Predictor of Mortality in Hemodialysis Patients

S. Okuno[1] (presenting), E. Ishimura[2], Y. Maeno[1], K. Kohno[1], K. Nagasue[1], N. Tsuboniwa[1], K. Maekawa[1], T. Yamakawa[1], M. Inaba[3], Y. Nishizawa[3]

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Objectives: Beta2-microglobulin (beta2M) is a low molecular weight protein that accumulates in the serum of hemodialysis patients. Beta2M is recognized as a uremic toxin and a key component in the genesis and development of dialysis-associated amyloidosis. Little is known, however, about the prognostic implication of serum beta2M levels for the survival of hemodialysis patients. **Methods:** In the present study, we investigated the prognostic significance of serum beta2M in 500 hemodialysis patients (294 males and 206 females; 25% diabetics). The mean age and hemodialysis duration of the patients were 61 years (range 25–88 years) and 7.3 years (range 0–26.5 years), respectively. The patients were divided into two groups according to their serum beta2M levels; group Lo ($n = 250$) with serum beta2M less than 32.2 mg/l (the median serum beta2M levels of the 500 patients) and group Hi ($n = 250$) with those equal to or more than 32.2 mg/l. **Results:** There were no significant differences in age, gender, or prevalence of diabetes between the two groups. Hemodialysis duration was significantly longer in group Lo than in group Hi (7.9 ± 7.1 vs. 6.7 ± 5.4 years, $p < 0.05$). Serum albumin level was significantly higher in group Lo than in group Hi (4.1 ± 0.3 vs. 4.0 ± 0.4 years, $p < 0.001$) and serum C-reactive protein (CRP) was significantly lower in group Lo than in group Hi ($p < 0.01$). During the follow-up period of 40 ± 15 (mean $\pm$ SD) months, there were 93 all-cause deaths, and out of them, 36 from cardiovascular diseases. Kaplan-Meier analysis revealed that all-cause, cardiovascular, and non-cardiovascular mortality in group Hi was significantly higher compared to those in group Lo ($p < 0.001$, $p < 0.05$, $p < 0.01$, respectively). Multivariable Cox proportional hazard analyses showed that serum beta2M level was a significant predictor for increased all-cause mortality (hazard ratio, 1.04; 95% CI, 1.01–1.08; $p < 0.01$), and for non-cardiovascular mortality (hazard ratio, 1.05; 95% CI, 1.01–1.09; $p < 0.05$), after adjustment of age, gender, hemodialysis duration, presence of diabetes, serum albumin, and serum CRP. **Conclusion:** These results demonstrate that the serum beta2M level is a significant predictor of mortality in hemodialysis patients, independent of diabetes, malnutrition and microinflammation, suggesting clinical importance of lowering serum beta2M in these patients.

O4

Asymmetric Dimethylarginine in Plasma and Dialysate in Patients on Hemodialysis, Hemodiafiltration, and Peritoneal Dialysis

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Objectives: Increased plasma asymmetric dimethylarginine (ADMA) levels are a potential risk factor for cardiovascular mortality in patients with end-stage renal disease. The impact of different dialysis strategies on ADMA is still unclear. We determined the effects hemodialysis (HD), hemodiafiltration (HDF) and peritoneal dialysis (PD) on plasma ADMA levels and ADMA removal into dialysate. **Methods:** A total of 16 HD and 19 PD patients and 20 controls with normal renal function were studied. HD patients had lower residual renal function than PD (median glomerular filtration rates of 0.01 ml/s [HD] and 0.11 ml/s [PD]; $p < 0.01$). HD patients were treated, in a randomized order, for 8 weeks using HD and HDF. Plasma ADMA levels were measured before and after the last HD/HDF. A representative sample of the dialysate was continuously collected throughout the last HD/HDF. In PD patients, plasma ADMA and dialysate ADMA were examined. **Results:** The daily rates of ADMA removal into dialysate were higher in HD/HDF than in PD. However, the plasma ADMA levels of PD patients and controls were lower than those of HD/HDF patients. Data in the table are medians (interquartile ranges), Wilcoxon test was used. **Conclusion:** Plasma ADMA levels were higher in both HD and HDF patients than in PD patients and controls. Predialysis ADMA levels were not substantially affected by the more effective removal of ADMA during HD/HDF as compared to PD. The more effective metabolic degradation of ADMA by residual renal tissue in PD patients is probably more important than the purification potential of renal replacement therapy.

Table for Abstract O4

	Before HD	After HD	Before HDF	After HDF	PD	Controls
Plasma ADMA (μmol/l)	1.25** (0.97–1.33)	0.66*** (0.57–0.73)	1.26** (0.98–1.39)	0.64*** (0.54–0.80)	0.96 (0.88–1.28)	0.89 (0.77–0.98)
Dialysate ADMA (μmol/l)	–	0.13** (0.10–0.15)	–	0.13** (0.87–0.14)	0.33 (0.24–0.41)	–
ADMA removal (μmol/day)	–	7.4*** (6.1–8.8)	–	7.4*** (4.9–8.2)	2.1 (1.2–2.2)	–

** = $p < 0.01$, *** = $p < 0.001$, significantly different from PD and controls.

O5

The Pentraxins C-Reactive Protein (CRP) and Pentraxin3 (PTX3) Augment Calcification of Human Vascular Smooth Muscle Cells (SMC) in vitro

D. Zickler, O. Boenisch, N. Otto, R. Schindler (presenting)

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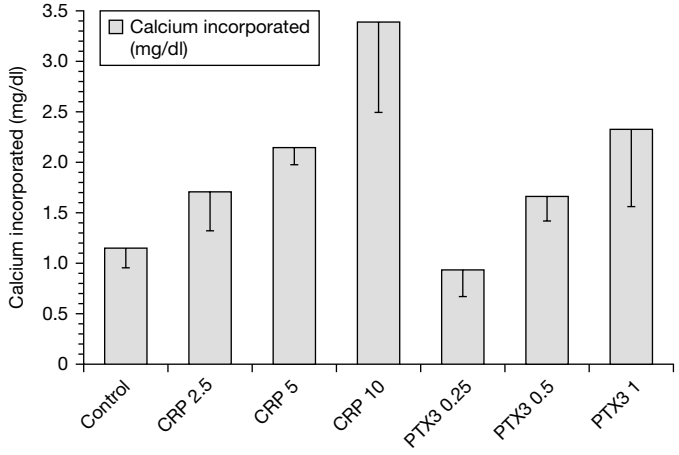
Cardiovascular mortality is greatly increased in patients suffering from end stage renal disease (ESRD). Both proteins are elevated in plasma of patients with chronic inflammatory conditions such as ESRD. In addition, plasma levels of CRP and PTX3 are associated with future cardiovascular events and are markedly expressed in atherosclerotic plaques. We investigated whether recombinant, endotoxin-free CRP and PTX3 have direct effects on calcification of SMC in vitro. In addition, cytokine induction in PBMC by pentraxins was also investigated. Methodology Human SMC were isolated from umbilical veins, cultured and used for experiments in their 4th passage. Confluent cells were incubated for 48 h with a calcification-inducing medium (2 mM Calcium and 2 mM phosphate) containing either PTX3 or CRP (both R&D systems). After incubation, intracellular calcium content was determined via the o-cresolphthalein-complex method (Wako) and the von Kossa method. Expression of the calcification inhibitor Matrix G protein (MGP Ia) was investigated via RT-PCR. Furthermore, PBMC of healthy individuals were isolated and incubated with CRP, PTX3 or endotoxin for 24 h. Induction of interleukins IL-1, IL-6 and TNF alpha was determined by ELISA. Endotoxin was measured by chromogenic Limulus-test (BioWhittaker, sensitivity 0.03 U/ml). Results After incubation with CRP or PTX3 SMC incorporated significantly greater amounts of calcium compared to controls (figure). Similar findings were observed microscopically using the von Kossa stain. mRNA expression of MGP Ia in SMC decreased after incubation with CRP. In PBMC PTX3 and CRP dose-dependently induced production of all studied cytokines. The concentration of endotoxin in CRP and PTX preparations were always below the threshold for cytokine induction. Conclusion The pentraxins PTX and CRP augment calcification of SMC in vitro. This effect appears not to be related to endotoxin contamination. The clinical association between cardiovascular risk and pentraxin plasma concentration might reflect activation of PBMC and augmentation of calcification in SMC by pentraxins that appear as possible mediators in the pathogenesis of atherosclerosis. Our results support the link between inflammation and atherosclerosis.



O6

Different Behavior of Polymers Crossing the Kidney Glomerulus and the Peritoneal Barrier

D. Venturoli (presenting), D. Asgeirsson, J. Axelsson, C. Rippe, B. Rippe

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Objectives: The sieving properties of artificial membranes are usually experimentally characterized by polymers like dextran, and these polysaccharides have also gained widespread popularity to investigate the properties of biological membranes. In the kidney, however, they have shown to be more permeable than globular proteins. We aimed at gathering some insight on the causes of this phenomenon. **Methods:** We assessed the sieving coefficient (S) for a mixture of Ficoll 70/400 molecules crossing either the glomerular membrane or the peritoneal barrier in rat. The peritoneum is normally used to replace the impaired renal function in peritoneal dialysis. **Results:** The results show that S for Ficoll in the kidney glomerulus is almost two orders of magnitude higher than the corresponding value for proteins of the same Stokes-Einstein radius ($S = 0.111 \pm 0.009$ for Ficoll 26Å vs. $S = 0.0060 \pm 0.0004$ for neutralized human serum albumin). However, this difference vanishes when the molecules are crossing the peritoneal barrier ($S = 0.332 \pm 0.022$ for Ficoll 36Å vs. $S = 0.332 \pm 0.022$ for native human serum albumin). Similar values are obtained when S in the peritoneum is determined for a different polysaccharide, pullulan ($S = 0.335 \pm 0.017$ for pullulan 36Å). **Conclusion:** The differences in the sieving properties between the tight glomerular barrier and the more open peritoneal membrane can be explained by a larger radius of the equivalent pores (46 vs. 37Å) or by an area over diffusion distance (A0/Dx) about two orders of magnitude lower (about 10^4 and 10^6 cm, respectively). The possible reasons for the observed phenomenon could then be a deformability of Ficoll molecules less important for larger pores or an anomalous diffusion of polysaccharides evidenced in the glomerulus by the enormous A0/Dx. Further experiments will be needed to clarify this point, but our results already show that the measurements of S for the glomerular barrier obtained in vivo with polysaccharides should be regarded cautiously.

O7

Long-Term Outcome of Patients with Severe Renal ANCA-Associated Vasculitis Treated with Plasma Exchange

Z. Vankova[1,2] (presenting), Z. Rihova[1], R. Rysava[1], E. Jancova[1], P. Koupilkova[1], M. Mokrejsova[1], J. Lachmanova[1], M. Merta[1], H. Mareckova[2], V. Tesar[1]

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Objectives: In patients with systemic ANCA (Anti-Neutrophil Cytoplasmic Antibodies) – associated vasculitis (AAV), renal failure at presentation is known to be connected with an increased risk of end-stage renal disease and death. A large international randomized study (MEPEX) has recently shown the benefit of plasma exchange (PE) in these patients. The aim of this retrospective analysis was to assess the long-term outcome of patients with severe renal vasculitis treated with PE in a single centre. **Patients and Methods:** From 2001 to May 2006, 33 patients (15 women, 18 men, median age 58 years, 11x pANCA and 22x cANCA positive) with severe renal AAV (i.e. with serum creatinine levels more than 500 umol/l) were treated with PE in our centre. In 10 patients, intra-alveolar haemorrhage was also present. All patients received cyclophosphamide (CPA) and corticosteroids. **Results:** The mean time of follow-up of our patients was 32 months (range 12–66 months). At three months after PE, 22 patients (66.7%) were alive and not dependent on dialysis. Patient survival rate at one year was 81.8% and renal survival rate at one year was 63.6%. At the end of follow-up, 26 patients (78.8%) were alive and 20 of them dialysis independent, with median serum creatinine levels of 190 umol/l. The total renal survival rate at the end of follow-up was 60.6%. These numbers are similar to the results of patients treated with PE within MEPEX trial. In comparison with MEPEX patients treated without addition of PE, the rate of renal recovery is significantly higher. Adverse events of PE were rare and did not lead to treatment termination. **Conclusion:** Addition of plasma exchange to standard immunosuppressive treatment helps to improve the long-term prognosis of patients with severe renal vasculitis and to increase the rate of renal recovery.

O8

Endothelial Progenitor Cells in Hemodialysis Patients, Patients with ANCA-Associated Vasculitis and Atherosclerotic Disease

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Objectives: Endothelial progenitor cells (EPCs) are believed to support the integrity of the vascular endothelium and the levels of EPCs are an important surrogate marker of vascular function. We have conducted a cross-sectional study to determine the numbers of EPCs in patients withh different type of vascular injury. **Methods:** We assessed circulating endothelial progenitor cells by the two-step preplating cultivation method in 41 patients with ANCA-associated vasculits (AAV), 15 hemodialysis patients (without vasculitis), 13 patients with peripheral arterial occlusive disease (PAOD) and 25 healthy volunteers. **Results:** Patients with AAV had significantly lower numbers of circulating EPCs than healthy subjects (median, 0.5 vs. 12.3 EPC-CFU/ml blood, $p < 0.0001$). The numbers of EPCs were not significantly different between patients examined at diagnosis, after starting immunosuppressive treatment or at remission of the disease (median 1.5 CFU-EC/ml in newly diagnosed patients, 0.5 in patients on treatment, and 0.15 in patients in remission, $p = 0.6$). We observed no significant correlation between the number of EPCs and the markers of activity (BVAS, CRP, titer of ANCA) or the number of involved organs. AAV patients with glomerular filtration rate <15 ml/min/1.73 m^2 had lower numbers of circulating EPCs than patients with better preserved renal function (median 0.05 vs. 1.2 EPC-CFU/ml, $p = 0.015$). AAV patients with anti-PR3 antibodies had significantly lower numbers of EPCs than those with anti-MPO positivity (median 0.18 vs. 2.64 EPC-CFU/ml, $p = 0.03$). We found no significant differences between the numbers of EPCs in patients with AAV, hemodialysis patients, and PAOD patients. **Conclusion:** Low numbers of EPCs in patients with different type of vascular injury (vasculitis, uremia, atherosclerosis) could reflect and perhaps underlie the impaired mechanism of vascular repair.

O9

Vitamin D Receptor Activator (VDRA) Therapy Is Associated with Decrease Inflammation and Vascular Calcifications (VC) in Prevalent Haemodialysis (HD) Patients (pts)

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VDRA seem to have antiproliferative and immunomodulating effects which may improve the chronic inflammatory status and reduce VC and morbid-mortality in HD pts. **Objectives:** A cross sectional study to evaluate the relationship between hydroxyvitamin D_3 ($25(OH)D_3$) and 1.25- dihydroxyvitamin D_3 ($1.25(OH)_2D_3$) serum levels and serum markers of inflammation, malnutrition, anaemia and presence of VC in chronic HD pts treated according to K-DOQI guidelines. **Methods:** Clinical data included aetiology of renal failure, quantification of VC (calcification score (CS) in hands and pelvic radiographies) and therapy with VDRA. Laboratorial data included C-reactive protein (CRP), ferritin, albumin (alb), haemoglobin (Hb), $25(OH)D_3$ and $1.25(OH)_2D_3$. We evaluated 198 prevalent HD pts, mean age ($\pm$SD) of 62.5 $\pm$ 15.3 years, 51.5% males, 27% diabetic, mean HD time of 43.2 $\pm$ 39.3 months, all dialysed with high flux helixone filters, ultrapure water dialysate and on-line haemodiafiltration. 49.5% pts were on VDRA therapy: 14% with a non-selective VDRA, oral calcitriol, (mean dose 1.1 $\pm$ 0.5 μg/week) and 86% with a selective VDRA, iv paricalcitol, (mean dose of 7.3 $\pm$ 4.3 μg/week). Uni and multivariate analysis were performed and a $p < 0.05$ was considered significant. **Results:** $25(OH)D_3$ mean level was 22.56 $\pm$ 15.96 ng/ml (only 17.7% were in the normal range >30 ng/ml)

and $1.25(OH)_2D_3$ mean level was 6.35 ± 7.63 pg/ml (91.4% had deficiency, <20 pg/ml). In univariate analysis, $25(OH)D_3$ was negatively correlated with CRP ($r = -0.22$; $p = 0.002$) and positively with alb ($r = 0.24$, $p = 0.001$) and with Hb ($r = 0.15$, $p = 0.04$). CS was negatively correlated with 25(OH)D3 ($r = -0.44$, $p = 0.04$). In multivariate analysis, $25(OH)D_3$ serum levels were positively correlated with alb ($p = 0.01$) and Hb ($p = 0.02$) and were negatively correlated with CRP ($p = 0.04$). $25(OH)D_3$ was a negative predictor of high CS (on univariate analysis $r = -0.44$, $p = 0.04$; on multivariate analysis $p = 0.004$). On the opposite these serum markers didn't correlate with $1.25(OH)_2D_3$. **Conclusion:** These results suggest that $25(OH)D_3$ insufficiency or deficiency may play a role in increased inflammation and VC observed in HD pts and that VDRA therapy seem to be underused in this pts.

O10

Interstitium as an Osmotic Barrier for Glucose: A Theoretical Evaluation of Osmosis During Peritoneal Dialysis

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Objectives: The role of tissue reflection coefficient (sigmaTG) is neglected in most models of peritoneal transport. The purpose of this study was to verify whether the impact of sigmaTG for glucose is significant for fluid transport in glucose induced osmotic fluid flow. **Methods:** The distributed model of fluid and glucose transport was applied for tissue layer of the abdominal wall of 1 cm width and for intraperitoneal pressure 12 mmHg. The transport through the blood capillary wall, caused by the osmotic pressure difference, was evaluated assuming porous structure of the capillary wall. Transport through the tissue was evaluated using extended Darcy's low for hydrostatic and osmotic pressure gradients as the major forces. **Results:** Numerical simulations mimicking the beginning of peritoneal dwell with glucose 3.86% showed that the values of interstitial hydrostatic pressure (P) in the deep tissue layers were sensitive mostly to sigmaTG. In our simulations for sigmaTG = 0 the value of P close to the skin surface was higher than 15 mmHg, whereas for sigmaTG = 0.005, this value of P about zero (as measured experimentally; Flessner, 1994), with the other model parameters remaining the same. Moreover, the time needed for stabilization of interstitial pressure profile and water flow increased over 40 times for sigmaTG = 0. The corresponding total ultrafiltration rate was 18 ml/min for both values of sigmaTG (as measured in clinical studies). **Conclusion:** Interstitium should be a weak but important osmotic barrier for glucose (sigmaTG slightly higher then zero) to prevent the penetration of water into the deep layer of tissue and the increase of hydrostatic pressure at the skin surface.

O11

Ghrelin Variant Influence Development of Plasma Levels of Total Cholesterol and BMI in Dialyzed Patients

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Introduction: Ghrelin is an endogenous peptide hormone, expressed predominantly in the stomach, pituitary gland, and hypothalamus. Ghrelin controls growth hormone secretion and also affects the sleep pattern, eating habits, amount of food ingested, and the body's energy balance. We have analyzed association of ghrelin variants with BMI, albumin like a marker of malnutrition and plasma lipids like risk factors of atherosclerosis, in dialyzed patients where malnutrition and accelerated atherosclerosis are common complications. **Methods:** Variants were analyzed in two hundred ten dialyzed patients, prospectively followed up for 15 months. Development of body mass index, triglycerides, total cholesterol and albumin in time (after 3, 6, 9 and 12 months of dialysis) were analyzed in subgroups divided according the ghrelin genotypes. Ghrelin genotypes Arg51 > Gln and Leu72 > Met were analyzed by PCR-RFLP. ANOVA was used for statistical analysis. **Results:** Carriers of the Gln51 allele and/or Met73 allele lost body weight more quickly than common Arg51Arg/Leu72Leu homozygotes ($p < 0.01$). Additionally, carriers of the Gln51 allele were at higher risk of development of high cholesterol levels ($p < 0.01$). **Conclusions:** Common variants in ghrelin may have an effect on changes of plasma lipids and BMI in dialyzed patients in time. These variants could be in future used for individualized therapy development.

The work was supported by grant No. NR 7958-5 from Ministry of Health, Czech Republic.

O12

Application of the Stewart-Fencl Principle (SF) for Acid-Base Balance (AB) Evaluation in Patients Treated with Peritoneal Dialysis (PD)

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Objectives: Evaluation of AB disorders using SF is based on assessment of independent factors: strong ion difference (SID) and the concentration of non-volatile weak acids ($Atot^-$). This approach allows for a more detailed evaluation of the cause of AB imbalance than the conventional based on the Henderson-Hasselbach formula (HH). The aim of our study was to assess AB in PD patients using SF and HH. **Methods:** A total of 22 patients with chronic renal failure (14 men),

with a mean age of 58.7 years, treated by PD for 23.7 months were examined. Patients were treated with a solution containing bicarbonate (25 mmol/l) and lactate (15 mmol/l) as buffers (Physioneal®); 11 of them used a solution with icodextrin containing lactate at a concentration of 40 mmol/l (Extraneal®). Lactate was determined in addition to routine biochemistry. The results were used to calculate AB parameters: (1) $SID = Na^+ + K^+ + 2Ca^{2+} + 2Mg^{2+} - Cl^- - UA^-$, where the UA^- is the concentration of undetermined anions. For practical calculation of SID, the equation $SID = HCO_3^- + Alb^- + P_i^-$ was used, where the HCO_3^- is the concentration of plasma bicarbonate, and the Alb^- and P_i^- the charges carried by albumin and phosphates. (2) $Atot^- = Alb^- + P_i^-$. **Results:** The capillary blood pH in our group was 7.41 (7.27–7.51), HCO_3^- levels 22.6 (15.7–30.5) mmol/l, SID 35.6 (28.8–43.0) mmol/l, $Atot^-$ 13.6 (11.4–15.9) mmol/l, Pi 1.71 (0.76– 2.57) mmol/l, and Alb 38 (28.8–45.7) g/l (mean, min-max). A significant correlation was demonstrated between SID and HCO_3^- ($r = 0.87$; $p < 0.0001$), the Na^+/Cl^- difference ($r = 0.68$; $p < 0.0001$) and pH ($r = 0.65$; $p < 0.0001$). Stepwise regression analysis revealed SID is best predicted by HCO_3^- ($p < 0.0001$, partial correlation 0.93). **Conclusion:** A significant positive correlation between SID, HCO_3^-, the Na^+/Cl^- difference and pH was demonstrated. The decrease in the Na^+/Cl^- difference, which may occur despite the levels of these ions being within the physiological range, seems to be a significant cause of metabolic acidosis in PD patients. The Na^+/Cl^- difference of both PD solutions used is physiological.

O13

Mixed Post-Predilution On-line Haemodiafiltration

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Introduction: On-line HDF has been associated with less mortality risk than HD. Postdilution, the most efficient mode for HDF, limits UF for hemoconcentration, and predilution reduces small solutes concentration, thus their diffusion. A possible improvement of on-line HDF efficiency was studied by combining pre-postdilution. **Methodology:** Nine pts underwent 2 post, pre and combined pre-post dilutional HDF sessions (Post HDF, Pre HDF, Mixed HDF). Mixed HDF was performed in 3 different percentage of preinfused volume (10%, 20%, 50% of the total infusion). In all cases the technique was: monitor AK200 ULTRA (®Gambro), high-flux 2.1 m^2 Polyamide, session time 240 min, QB 350, QD 500 ml/min, maximum UF allowed. Clearances of BUN, Cr, Pi were determined by using Van Geelen formula, B2M Clearance by Leypoldt's; pre-postdialysis Hb, BUN, sCr, sPi, and sB2M were measured by standard methods. The mean value of each parameter on each technique was compared with that of the other techniques by Student's t-test for paired data. **Results:** Predialytic values of Hb (range 11.6 ± 1.3–11.9 ± 1.2 g/dl), BUN (107 ± 31–113 ± 32 mg/dl), sCr (8.2 ± 1.6–8.4 ± 1.4 mg/dl), sPi (5.2 ± 1.2–5.7 ± 1.1 mg/dl), and sB2M (24 ± 3–26 ± 3 mg/l) were similar in the 5 techniques. Clearances and UF are reported in the table.

	UrCl	CrCl	PiCl	B2MCl	UF
Post HDF	283 ± 16	197 ± 19	171 ± 23	19 ± 1	64 ± 14
Pre HDF	258 ± 12	174 ± 11	148 ± 14	18 ± 2	119 ± 23
50% HDF	273 ± 11	186 ± 10	160 ± 12	19 ± 2	111 ± 5
20% HDF	273 ± 33	183 ± 23	171 ± 32	24 ± 2	99 ± 9
10% HDF	257 ± 25	174 ± 24	160 ± 31	21 ± 2	92 ± 11

UrCl was higher on Post HDF than on Pre HDF and 10% Mixed HDF ($p < 0.005$). CrCl was higher on Post HDF than on the other techniques ($p < 0.003$–0.0002). PiCl was higher on Post HDF than on Pre HDF ($p < 0.01$). B2MCl was higher on 20% HDF than on the other techniques ($p < 0.000$). **Conclusions:** The performed mixed HDF did not improve solutes removal compared to Post HDF, however it can guarantee better rheologic conditions and thus be a reasonable alternative to Post HDF.

O14

Prevalence and Risk of Hypertension in Renal Disease – Data from The Czech Registry of Renal Biopsies

E. Jancova[1] (presenting), Z. Vaňková[1], E. Honsová[2], V. Lánská[3], R. Ryšavá[1], M. Merta[1], I. Rychlík[4], O. Viklický[5], J. Zadražil[6], M. Hertlová[7], D. Sobotová[8], R. Cífková[9], V. Tesař[1], Czech Registry of Renal Biopsies[1]

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Objectives: Appropriate evaluation and management of hypertension in chronic kidney disease are essential for preventing both cardiovascular disease and a more rapid decline in renal function. In this study, we compared the risk and prevalence of hypertension in patients undergoing renal biopsy with those of the general population and investigated the possible effects of various independent factors (age, sex, and degree of renal insufficiency) on the prevalence of hypertension. **Methods:** Clinical, laboratory and histological data obtained within the Czech Registry of Renal iopsies over an eight-year period (1995–2002) were statistically evaluated and compared with those of the general population obtained within the Post-MONICA Study conducted in 2000/2001. **Results:** Hypertension was present in 1,970 renal patients out of a total of 4,745 (41.5%). The risk of hypertension in patients with renal disease was increased in all age groups compared with the general population. The prevalence of hypertension increased significantly with age, serum creatinine, and proteinuria. Male sex and erythrocyturia were identified as independent

risk factors for the presence of hypertension. Sex, age and filtration rate were shown to be more important determinants of the risk of hypertension in our group of patients with renal disease than the underlying biopsy-proven diagnosis itself. **Conclusions:** Hypertension occurs as a common complication of renal disease, even in its early stages. The Czech Registry of Renal Biopsies has provided unique data on the epidemiology of hypertension in renal disease in the Czech population.

O15

Low Cholesterol Alongside Inflammation Predicts Morbidity and Mortality in Hemodialysis Patients

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Objectives: Low and not high cholesterol seems to predict high mortality in hemodialysis (HD) patients. The confirmation of this reverse epidemiology as well as its possible interconnection with the increased inflammatory activity observed in this population is being explored in the present study. **Methods:** A group of 136 HD patients was prospectively studied for 2 years and cardiovascular disease (CVD) as well as all-cause mortality and morbidity were recorded. Baseline lipid profile, inflammatory status and patients' characteristics were studied as potential survival and hospitalization predictors. **Results:** During the 24 month follow-up, 21 deaths (52.4% due to CVD) and 38 hospitalizations (55.3% due to CVD) were recorded. In multivariate Cox regression analysis, decreased Interleukin-10 (IL-10) and decreased Total cholesterol (TChol) were the only independent predictors for CVD mortality while C-reactive protein (CRP) and decreased TChol predicted all-cause mortality. Interleukin-10 at baseline was 11.29 ± 21.49 vs. 5.51 ± 4.57 pg/ml ($p < 0.018$) and TChol 167.37 ± 47.84 vs. 122.04 ± 26.48 mg/dl ($p < 0.000$) in survivors vs. non-survivors from CVD, while CRP at baseline was 9.37 ± 11.54 vs. 23.15 ± 18.76 mg/l ($p < 0.000$) and TChol 169.26 ± 46.42 vs. 133.26 ± 46.33 mg/dl ($p < 0.003$) in survivors vs. non-survivors from any cause of death. Using the same method of statistical analysis, Interleukin-6 (IL-6) and decreased soluble gp130 (sgp130) – an antagonist of IL-6 action – were found to be the only independent prognostic factors for hospitalization due to CVD while decreased sgp130 remained as the lone predictor for hospitalization due to any cause. **Conclusions:** Reverse epidemiology regarding cholesterol is confirmed in the present study. Furthermore, inflammatory activity predicts also independently or in conjunction with low cholesterol CVD and all cause morbidity and mortality in HD patients.

O16

Ultrafiltration (UF) Linked Peripheral Blood Flow Changes are Related to Malnutrition, Inflammation, Atherosclerosis and Calcification (MIAC) Syndrome in Chronic Hemodialysis (HD) Patients

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Objectives: Non healing skin defects are frequent complications in end stage renal disease patients (ESRD). In spite of the fact that blood pressure is monitored during HD, the information about changes in peripheral microcirculation is missing. The aim of the present study was to determine the changes in peripheral blood flow during HD with UF. **Methods:** Skin blood flow was measured in 10 different areas in each hand of 36 patients (14 f and 22 m, 36–79 y, BMI = 28.2 ± 4.9) using Laser Doppler Line Scanner (LDLS). The changes in skin blood flow related to UF (1,147 ± 745 ml) during HD were compared with UF volume, albumin, total iron binding capacity (TIBC), C-reactive protein, calcium phosphate product (Ca × P) and low density lipoprotein (LDL) levels in plasma. Possible correlations were evaluated by Spearman correlation coefficient. **Results:** Decreased blood flow was apparent in 61% of evaluated areas. The blood flow changes on dorsal parts of hands were related to UF. However, the changes measured in fingers were dependent on components of MIAC syndrome.

Spearman rank order correlation of blood flow changes

	S-Alb (g/l)	TIBC (umol/l)	CRP (mg/l)	Ca × P ($mmol^2/l^2$)	LDL (mmol/l)	UF (ml)	% BW
Fingers	r = 0.5	0.4	−0.3	−0.4	−0.4	ns	ns
	p < 0.01	0.04	0.04	0.02	0.02		
Dorsum	0.3	ns	ns	ns	−0.3	−0.3	−0.3
	0.08				0.06	0.08	0.05

% BW = Change in % of body weight induced by UF.

Conclusions: Laser Doppler Line Scanner demonstrated skin blood flow changes during HD. Skin blood flow change at dorsum of the hand depends on UF, while on fingers on the parameters of MIAC syndrome.

Acknowledgements

This study was supported by: MSM 0021620819, MSM 0021620820.

O17

Efficient Removal of Immunoglobulin Free Light Chains by Hemodialysis Using a Novel High Cut-off Membrane

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Objectives: Elevated serum concentrations of monoclonal free light chains (FLCs), in patients with multiple myeloma, can result in irreversible renal failure secondary to cast nephropathy. Because, elimination of these middle molecular weight compounds is limited by conventional dialysis membranes we have investigated the removal of FLC using a novel high cut-off membrane. This membrane is characterized by an increased effective pore size compared with conventional dialysis membranes. **Methods:** Kappa and lambda FLC sieving coefficient and clearance were studied in-vitro in hemodialysis and hemodiafiltration mode. The ability of the membrane to reduce serum free light chain levels in vivo was investigated in a clinical pilot study with patients who presented with dialysis dependent renal failure and multiple myeloma. **Results:** With a kappa FLC sieving coefficient of 0.9 measured in human plasma the high cut-off membrane is effective in eliminating FLCs. Clearance rates of both FLCs were many times higher using the high cut-off membrane compared with a conventional polyethersulfone highflux membrane. In patients with multiple myeloma very large quantities of FLCs were removed with high cut-off dialysis. This resulted in post treatment reductions in serum FLC concentrations of between 45 and 81%. Patients who achieved a sustained reduction in serum FLCs of greater than 65% became dialysis-independent following a mean treatment period of 21 days. **Conclusion:** High cut-off membranes exhibit a significant permeability for nephrotoxic free light chain proteins. High cut-off hemodialysis treatments allowed a rapid reduction of serum FLC concentrations in patients with multiple myeloma and dialysis dependent renal failure. Preliminary clinical data suggests that this treatment modality can improve renal outcomes in these patients.

O18

Physiological Variability of Blood Flow Through Vascular Access for Hemodialysis

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Regular vascular access blood flow (QVA) measurement is currently being recommended as the best method for vascular access quality monitoring. According to the EBPG guidelines, fistulography is recommended when vascular access flow decreases by 20% per month. However, physiological variability of QVA is not taken into account in this recommendation. The aim of this study was to assess variability of blood flow through a native arteriovenous fistula (AVF) in long-term and to determine the QVA reduction at which the intervention is appropriate. **Patients and Methods:** The study was performed in a group of chronic hemodialysis patients (n = 34; 20 M, 14 F; mean age 63.1 years) dialyzed for at least 24 months (median 56) through a native fistula with no history of a radiological or surgical intervention. Fistula blood flow was measured at 1–3 month's intervals using the thermodilution method (BTM, Fresenius, Germany). Median follow-up was 41 months and the number of QVA measurements in each patient varied from 8 to 30 (median 15). From these individual measurements, the coefficient of variation (CV) of fistula blood flow was calculated in each patient. **Results:** Mean QVA during the follow-up period was 885 ± 333 ml/min (median 837 ml/min). The mean CV in all studied patients was 21.6 ± 11.7% (range 3.7–62.7%). Coefficient of variation of the thermodilution method using BTM is 6%. That means that the resultant CV of QVA itself is 20.7%. **Conclusion:** The results show that blood flow through the well functioning native AV fistula oscillates during a long-term follow-up period. The QVA decrease by 20% could be, according to the long-term QVA variability, still within physiological limits. To distinguish a stenosis-related QVA drop from the physiological QVA fluctuation, it is desirable to shorten the QVA measurement interval and when the declining trend is established, fistulography should be performed, combined with an intervention if needed.

O19

Effect of Dilution Mode and Blood Flow Rate on Small Solute Clearance in CVVH

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The landmark CVVH dose study (Ronco et al., Lancet 2000) was performed in the post-dilution mode, which is not used commonly in most of the world. As such, the extrapolation of data from the Ronco study to other modalities may be difficult. The purpose of this laboratory study is to compare small solute (urea: U; creatinine: C) clearances achieved in three different CVVH modes: post-dilution (POST); standard (pre-filter) pre-dilution (PRE); and pre-dilution with replacement fluid (RF) infusion prior to the blood pump (PBP). Isovolemic CVVH was performed with the Prismaflex® system and a set containing a 1.4 m^2 filter (Gambro). In this system, prescribed blood flow rate (Q_B) is maintained despite a pre-blood pump infusion by automatic blood pump speed compensation. For each mode above (corresponding to doses of 22, 35, and 47 ml/kg/h for an 85 kg patient), Q_B (ml/min)/RF rate (L/h) under conditions #1, #2, and #3 were 190/2.0, 290/3.0, and 380/4.0, respectively. Q_B in each condition was dictated by a POST maximum filtration fraction (FF) of 25%. [table 1] Although clearances in POST were significantly higher than in PRE and PBP, clearances in the latter two modes were not different. Clearances of U and C were not different in any condition/mode. These data confirm POST provides the highest small solute clearances,

Table 1. for Abstract O19. Small solute clearances (ml/min; mean SD; n = 3)

	Urea			Creatinine		
	POST[a]	PRE[b]	PBP[c]	POST[d]	PRE[e]	PBP[f]
Condition #1	35.9 ± 1.3	29.6 ± 0.8	29.1 ± 1.1	36.7 ± 0.8	30.5 ± 1.1	28.2 ± 0.8
Condition #2	54.7 ± 1.2	39.2 ± 0.8	39.4 ± 0.8	56.1 ± 1.6	39.4 ± 0.4	39.9 ± 1.9
Condition #3	71.5 ± 1.3	56.6 ± 2.2	53.6 ± 6.7	72.7 ± 1.7	56.5 ± 0.5	58.2 ± 4.2

[a] = $p < 1.4E-07$; [b] = $p < 1.2E-06$; [c] = $p < 0.0008$; [d] = $p < 2E-07$; [e] = $p < 3.4E-08$; [f] = $p < 3E-05$ (ANOVA).

as long as FF is acceptably low. For pre-dilution, PBP is equivalent to traditional PRE and may provide clinical advantages in certain situations.

O20

Weekly Determination of C-Reactive Protein in ESRD Patients: Inter- and Intraindividual Variability and the Influence of High-Flux Hemodialysis

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C-reactive protein (CRP) is an established marker of inflammation and elevated CRP plasma levels are associated with increased mortality in ESRD patients. In an observational study we included 32 patients on chronic intermittend hemodialysis for at least 2 months using low-flux synthetic dialyzer membranes (Polyflux®) and ultrafiltered bicarbonate-buffered dialysis fluid and measured CRP plasma levels every week before start of the first dialysis session of the week. After 6 months, all patients switched to high-flux hemodialysis using high-flux Polyflux® dialyzers with a similar surface area. We continued to determine CRP levels on a weekly basis for 6 months. **Results:** Mean CRP levels per period were

Mean CRP (mg/l)	<2 mg/l	2 – <5 mg/l	5 – <10 mg/l	10 – <40 mg/l
Low-flux	n = 7	n = 8	n = 9	n = 8
High-flux	n = 8	n = 11	n = 8	n = 5

The intraindividual variance of CRP levels was very variable. In most cases, a rise of CRP of more than 200% above basic levels was associated with infectious complications (bronchitis, diverticulitis, urinary tract infections, infected diabetic ulcera). The over all mean CRP value per period was (mean +/− SD) 8.1 +/− 5.78 mg/l under low-flux HD and 6.75 +/− 4.41 mg/l under high-flux HD ($p < 0.05$). **Conclusion:** weekly determination of CRP is a valuable tool to detect and monitor infectious complications in chronic ESRD patients. Using ultrafiltered bicarbonate-buffered dialysis fluid (no bacterial growth, no detectable endotoxin) and synthetic dialyzer membranes, high-flux dialysis reduces CRP leves in ESRD patients.

O21

The Time-Course of Peritoneal Transport Determinants in View of the Three-Pore Model Theory

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The capillary wall and the surrounding interstitial tissue are the major determinants of the peritoneal permeability. Solute and fluid transport is generally assumed to be size-selective and to occur through a system of pores in the peritoneal vessels. **Objective:** To investigate a trend of transport determinants over the time on peritoneal dialysis. **Methods:** The 4 h standard peritoneal permeability analyses (SPA) of 24 stable PD patients without UFF in whom 3 tests were available were analysed longitudinally. The large- (LP) and small pore (SP) radii were assessed using computer simulations. The reflection coefficient for glucose (σ_{LP}, σ_{SP}) was calculated for each type of pore separately and overall sigma (σ) was computed. Furthermore, the restriction- (RC) and ultrafiltration coefficient (LpA) was assessed. The osmotic conductance to glucose (OC) was calculated as the product of LpA and sigma. The linear mixed model procedure was used to test whether a general model for a time course of the determinant exists. **Results:** The significant model was found for the LP radius and σ_{LP} ($p < 0.01$). LP radius increased over the time whereas σ_{LP} showed a decrease. No trend was found for RC, SP radius, σ_{SP}, overall sigma, LpA, OC, or for protein clearances (NS). Furthermore, the negative relationship was found between LP radius and RC ($p < 0.01$) and positive correlation between LP radius and protein clearance ($p < 0.01$). **Conclusion:** The larger LP, the lower RC and higher intrinsic permeability resulting in higher protein clearance. An increase in the LP radius over the time on peritoneal dialysis accompanied with the unchanged RC and protein clearances in patients without UFF suggests that the role of interstitium as the transport barrier increases with the time on PD.

Poster Presentations

P22

A New Monitoring System of Urea in a Waste Dialysate for Hemodialysis

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Objectives: We propose a new monitoring system of urea in a waste dialysate by detecting chemiluminescence (CL). Urea in blood is a kind of waste matter filtered by the kidney. Thus, the renal failure patients need to receive the hemodialysis treatment. During the hemodialysis therapy, urea in blood diffused to the dialysate across the follow fibers. Therefore, it may possible to obtain an index of BUN by real-time measuring of UN in the waste dialysate. **Method:** Our sensor consists of electrolytic cell of sodium bromide, Pt and Ag electrodes, tubing pump for injection of sample solution, and photomultiplier for CL detection (fig. 1(a) and (b)). At first, NaBr solution and sample solution containing urea were led inside the cell. When a constant current of 700 mA was applied through Pt and Ag electrodes, hypobromite ions were produced by electrolysis of NaBr. CL caused by urea and hypobromite ions was also observed during the electrolysis. CL intensity was measured by a photomultiplier for 20 s. We determined the urea concentration as a function of CL intensity. **Results:** By using urea solution, we could measure UN from 2 to 100 mg/dl with 0.9 of slope in log-log scale (fig. 1(c)). For the sample solution of urea dissolved in a dialysate, the linear dependence of CL on UN was obtained in the range of 1–100 mg/dl for UN. For the waste dialysates from the patients, we observed two different CL originated from urea and unknown. Although the origin of another CL is not clarified, it may be due to the large amount of proteins in the waste dialysate. **Conclusion:** Our urea sensor system obtained to measure urea concentration ranging from 1–100 mg/dl of UN at short times of 20 s. This technology using the waste dialysate will contribute to determine the index of BUN during the hemodialysis therapy.

P23

Successful Needling Method of the Central Venous Catheter Using Special Adapter of Ultrasound

T. Tokumoto[1] (presenting), K. Masumoto[1], K. Tsunoyama[1], J. Iizuka[1], Y. Kawashima[2], T. Akiba[1]

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Background: Recently we often approached for the needling method of the central venous catheter in medical treatment if necessary. However, the serious complication such as massive bleeding by arterial puncture sometimes occurs with this catheter approach because this approach is the blind method. Therefore we were approaching for the needling method of the central venous catheter while monitoring a blood vessel and needle by the ultrasound with a special adapter. We studied about the needling success rate, the safety and the complication under this needling method using special adapter of ultrasound. **Materials and Methods:** Fifty patients that underwent this needling method at the department of urology in Toda central general hospital were enrolled in this study. 28 cases were males and 22 cases were females. The purpose of needling was for blood access of hemodialysis in 14 cases, cancer chemotherapy in 17 cases, monitoring at the operation in 13 cases and hyperalimentation in 6 cases. The central venous catheter was approached in internal jugular vein with the ultrasound using special adapter for needling (Aloka Co., Ltd.)

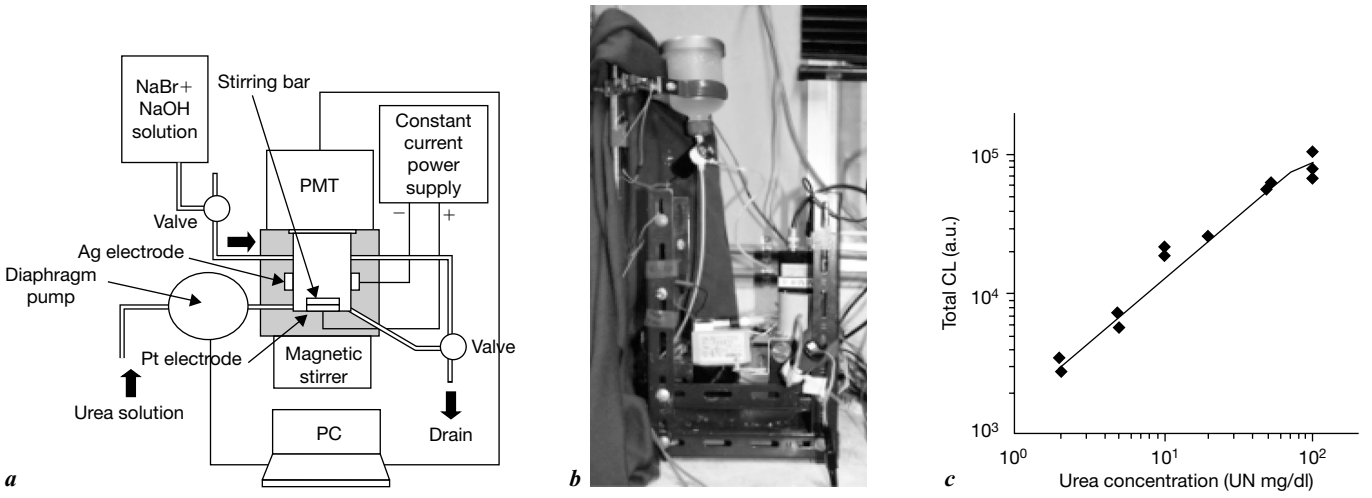

Fig. 1 for Abstract P22. ***a*** Schematic illustration and ***b*** photograph of the experimental setup. ***c*** Concentration dependence of urea solution.

and a needling kit (Nippon Sherwood Medical Industries Co., Ltd.). This method performed after having obtained approval of Ethical Review Board in Toda central general hospital. We performed total 75 times of needling in 50 cases. **Results:** We were able to do needling in internal jugular vein once in all cases. Despite of success of needling, in one case we could not advance the guide wire forward the bifurcation of the right internal jugular vein and subclavian vein because of the severe stenosis of this vein. Then we immediately selected another left internal jugular vein in this case. In addition, in another case we performed needling in the left internal jugular vein from the beginning without puncturing the right internal jugular vein because of the severe stenosis of this vein by an echo before needling. We did not have any complications, such as hematoma with needling in all cases. **Conclusions:** We considered that the needling method of the central venous catheter using special adapter of ultrasound was very safety, precisely and much useful.

P24

Change of Pathological Bone Lesion in Recipients with Renal Osteopathy after Renal Transplantation

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Introduction: Bone lesion in hemodialysis (HD) patients with renal osteopathy is important as one of the serious complications of chronic renal failure (CRF). Conventionally, We expect if CRF is improved after renal transplantation (RTx), dialysis osteopathy is also recover to normal in bone lesion. Nevertheless, it is controversial whether bone lesion is really improved after RTx. **Objectives:** In this study, we evaluated whether dialysis osteopathy was pathologically improved after RTx. **Materials and Methods:** Thirty-one cases that underwent living related RTx at Toda central general hospital from January, 2004 were enrolled in this study. Bone biopsy was also performed in all cases at RTx. Mean age was 43.2 years old, with 21 males and 10 females. The periods of HD were an average of 40.2 months. The parameter of Ca, P, whole PTH (w-PTH) and metabolic bone marker and bone density (DXA) were examined with relation to dialysis osteopathy in before RTx, and 1 year after RTx. Bone density (DXA) was measured in before RTx, 6, 12 months. In addition, bone biopsy was performed after having made osteal labeling twice in principle before bone biopsy. **Results:** All cases are survival and the renal grafts are functioning well in all cases. The mean level of Ca and P before RTx were 9.4 mg/ml and 5.5 mg/dl, respectively. The mean level of w-PTH was 73.4 pg/ml before RTx. The total density and percentage match of DXA before RTx were an average of 380.1 mg/ccm and 88.7%, respectively. However, The total density and percentage match of DXA after 1 year decreased to average 354.6 mg/ccm and an average of 82.8%, respectively. Out of 31 cases, 22 cases (71.0%) were pathologically diagnosed as renal osteodystrophy, 6 cases (19.4%) were aplastic osteopathy, 2 cases (6.5%) were renal osteodystrophy or aplastic osteopathy, and one case (3.2%) was osteomalacia by bone biopsy at RTx. Six cases were already underwent the bone biopsy at 1 year after RTx. Out of these cases, 3 cases were renal osteodystrophy, 2 cases were aplastic osteopathy, and one case was renal osteodystrophy or aplastic osteopathy at RTx. Of 6 cases, 2 cases were pathologically diagnosed as renal osteodystrophy, 2 cases were mixed type, and 2 cases were osteomalacia at 1 year after RTx. **Conclusion:** Bone lesion in recipients with renal osteopathy did not seem to be recover pathologically at one year after RTx. However, metabolic bone marker seemed to be improved. The further examination by metabolic bone marker and bone biopsy will be needed in future.

P25

Continuous Venovenous Hemofiltration in Patients with Several Acute Renal Failure after Acute Miocard Infarct

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Objectives: Continuous venovenous hemofiltration (CVVHF) currently represents standart renal replacement therapy in criticall ill patients. CVVHF has been shown to be equally effective to intermittent hemodialysis the standart blood purification method for decades, concerning the elimination of uremic toxins; it produces better cardiovascular stability during treatments patients after acute miocard infarct (AMI). **Methods:** Patients treated with CVVHF for severe acute renal failure (ARF) after AMI were identified using a prospective by collected intensive care unit database. The medical records of these patients were obtained and data were retrospectively recorded with focus on demographic features, hemodynamic, duration of intensive care unit stay, survival to intensive care unit discharge and survival to hospital discharge. The technique of CVVHF consists of a double lumen catheter that is used pump blood through a module. Replacement fluid is administered prefilter at a dynamically adjusted rate chosen to achieve the desired fluid therapy goals. Anticoagulation with prefilter heparin of the circuit is carried out according to clinical judgment and circuit duration. The blood flow rate is kept at 100–200 ml/min. Ultrafiltration pump controllded at 1.5–4 l/h. **Results:** We performed a retrospective analysis of 8 patients with ARF after AMI and CVVHF during 2005 september–2007 march. Their demographic and clinical characteristics are: age 62.1 (41–92) years, gender M 5/F 3, oliguria 6 (75%), peak urea (mmol/l) 27.4 (14.4–47.4), peak creatinine (μmol/l) 304 (209–420), mechanical ventilation 7 (87.5%), inotrope therapy 7 (87.5%), intraaortic ballon pulsation 6 (75%), duration of CVVHF (h) 44.3 (4–70), duration of CVVHF among 2 survived patients 52 h, hospital mortality among CVVHF patients 6 (75%). **Conclusions:** Application of CVVHF was associated with a better than predicted outcome, which is the best reported so far in the literature. These results are encouraging and support our approach.

P26

Survey on the Effect of Ultrafiltration Crease on Middle Molecules' Clearance in Low-Flux Hemodyalisis

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Objectives: There are almost 1.1 milion dialysis patients in the world that reaches up to 2 milion until 2010.80 percent of them are hemodialysis. Small molecules such as Urea, creatinin, phosphorous are removed in conventional hemodialysis but the accumulation of middle molecules specially B2-microglobulin leads to some complications such as Amiloidosis. Considering the importance of removal of those solutes in chronic renal failure patients, this article was carried out to evaluate the effect of increasing ultrafiltration on clearance of middle molecules in low-flux hemodialysis in kashan, 2005. **Methods:** This clinical trial is a before-after study. 21 hemodialysis persons (11 women & 10 men) participated in this study. At the first stage, the members were dialyzed with ultrafiltration equal to the difference of their present weight and their dry weight and at 2nd stage the ultrafiltration increased 2 l and clearance of each solute was calculated in both stage. The datae were analyzed with SPSS program and couple T test. **Results:** In 2nd stage in contrast to 1st one, there were a significant differences in clearances of β2-microglobulin and vitamin B12 ($p < 0.03$, $p < 0.001$) while there was no significant differences in clearance of small molecules P, BUN, Cr ($p = 0.97$, $r = 0.24$, $p = 0.36$). In first hemodialysis, KT/V was 1.12 and in second one was 1.22. **Conclusion:** The findings indicate that in low-flux hemodialysis the increase of ultrafiltation, grows up the clearance of middle molecules (β2-microglobulin, vit B12). Also ultrafiltration increase the adequacy of hemodialysis (kt/v) but it doesn't affect on the removal of small molecules. **Key words:** Hemodialysis, Ultrafiltration, Middle molecules, Low-flux filters, Small molecules, Hemodialysis adequacy.

P27

Double Filtration Plasmapheresis in the Treatment of Leg Ulcers in the Course of Type I HCV-Positive Cryoglobulinemia

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Background: Hepatitis C virus (HCV) is the major cause of C mixed cryoglobulinemia, an immune complex-mediated systemic vasculitis. Skin lesions are very frequent and can benefit from the removal of cryoglobulins by therapeutic apheresis. **Method:** we describe a case of HCV-positive type I C (Ig G λ) with severe leg ulcers (LU), not responsive to antiviral and immunosoppressive treatment. Thirty sessions of DFPP were performed on 3,000 ml of plasma, over a period of 6 months, with no other associated treatment. Before and immediately after each session were assessed: immunoglobulins, complement (C3,C4,C1q), cryocrit (Cryo), fibrinogen (Fb), ESR, reactive Protein C (RPC). During the first session each month the HCV viral charge was determined. The LU were photographed. **Results:** The mean values of each parameter before and after apheresis were: IgG 2,096 ± 342 vs. 1,370 ± 207 mg/dl; IgM 32 ± 7 vs. 19 ± 3; IgA 136 ± 28 vs. 96 ± 27; C_3 103 ± 11 vs. 73 ± 9 mg/dl; C_4 7.1 ± 2.1 vs. 4.3 ± 8; C1q 33.5 ± 2.7 vs. 23.5 ± 2.2; Cryo 6.8 ± 1.4 vs. 4.8 ± 1.3; Fb 287 ± 41 vs. 172 ± 133 mg/dl; ESR 29 ± 16 vs. 6 ± 4; RPC 0.49 ± 0.2 vs. 0.34 ± 0.1. All these variations were statistically significant. The difference between the viral charge pre- and post-apheresis was not significant, while in the filtrate there was a mean viral charge of 36,448 U/ml. The LU improved during apheresis and had completely regressed by the end of the cycle. The pain in the lower limbs also completely disappeared. **Conclusions:** DFPP brought about a resolution of the clinical picture, associated with a significant reduction in Cryo and Ig, as well as the inflammation parameters (ESR, RPC, Fb and complement). There were no changes in viremia, that appeared not to be linked to the clinical effect. DFPP has been found efficacious in the treatment of the LU that can present in the course of C.

P28

Double Filtration Plasmapheresis in an Acute Episode of Multiple Sclerosis

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Background: Plasma exchange has been proposed as support therapy in both acute and chronic forms of multiple sclerosis (MS). For the first time, we aimed to verify whether double filtration plasmapheresis (DFPP) is clinically efficacious. **Method:** We describe the case of a patient affected by MS who developed a severe crisis refractory to conventional steroids, immunosuppressive and immunomodulating therapy. The patient underwent 12 sessions of DFPP. In each session 3,000 ml of plasma were treated. Before and immediately after each session, the normal laboratory parameters were assessed. Before the apheresis cycle and one month after the end of treatment, encephalic magnetic resonance imaging (MRI) was performed. A neurological examination, and assessment of the extended disability status scale (EDSS), was made once a week from the beginning of treatment until one month after the end of the cycle. No therapy was administered during the course of apheresis, with the exception of a scaled dose of steroids, that was completely withdrawn half way through the cycle. **Results:** The IgG, IgA and IgM values declined from 465 ± 104 mg/dl, 69 ± 18 mg/dl, 34 ± 16 mg/dl pre-apheresis to 331 ± 76, 42 ± 5, 15 ± 6 post-apheresis; C_3 and C_4 from 105 ± 27 mg/dl and 21 ± 5 mg/dl to 75 ± 9 and 15 ± 4; fibrinogen from 228 ± 72 to 128 ± 28 mg/dl. EDSS went from a value of 6 before the cycle to 5.5 one month after the end of the treatment. As compared with the pre-treatment conditions, after apheresis MRI showed stabilization of the lesions already present, the reduction of one lesion and a complete absence of enhancement of all the lesions.

Conclusions: DFPP, adopted for the first time in MS, seems to foster a short term improvement of both the clinical and the instrumental pictures during an acute MS episode.

P29

Coronary Artery Disease in Patients of the Third Age with Diabetes Nephropathy (DN) and Incipient Renal Deficiency (InRD)

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There is a tendency of a continual increase of the third age population which is accompanied by an increase in their life expectancy. DN is the prevailing cause for initiating a chronic program dialysis. Our Aim is to report the coronary artery disease (CAD) of patients in the third age (>65 years old) with DN and incipient renal deficiency. **Method – Patients:** We compared patients >65 years old with DN and InRD which are monitored in the Nephrology clinic (total 31: 21 males and 8 females), with the same population without DN (total 77: 46 males and 31 females, AVG = 78 ± 0.8). We registered the age, the effect of CAD, heart failure (HF), hypertension, anemia (Hb < 11 g/dl) and the heaviness of symptoms. As incipient renal deficiency we defined the Creatinine levels >1.5–3.0 mg/dl. Into the CAD we included the stenocardia and the acute heart attack. The diagnosis of the diabetic nephropathy was made with the finding of diabetic retinopathy and albuminuria. **Results:**

	Aged with DN, total 31	%	Aged without DN, total 77	%
Males	23	74.20	46	59.74
Females	8	25.80	31	40.26
Average age	70 ± 1.6		78 ± 3.5	
CAD:	13	41.94	19	24.67
By pass	6 of 13	46.15	4 of 19	21.05
HF	6		7	
PE episode	3 of 6	50.00	0	0.00
Anemia under rHuEPO therapy	7 of 13	53.85	6 of 19	31.58
Hypertension	31	100.00	57	74.03

rHuEPO = Recombinant human erythropoietin; PE = pulmonary edema.

Conclusively aged patients with diabetes mellitus compared to non-diabetics with InRD are younger in age and have higher affectivity up to 50% from coronary artery disease. The DN appears with a heavier image (PE in 50% of cases). Anemia surcharges DN and the progress of renal damage. In order to protect the quality of life of patients in the third age with SD which are in early renal deficiency state, besides the close glycemic control, their cardiovascular statuses has to be monitored closely, because it is surcharged by the renal deficiency.

P30

Bioelectricac Impedance Analysis (B.I.A.) and Chronic Renal Failure

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Frequently the patients with Chronic Renal Failure (CRF) show malnutrition. It is caused by several factors: scarce nourishment, gastrointestinal pathology, ipercatabolic state, uremic toxicity. The control of the Body Composition has a considerable importance for the CRF patients. For this study we utilized the Bioelectrical Impedance Assay (B.I.A.). Aim of this work is the study of importance of control of the body composition, valued through Bioelectrical Impedance. We studied 40 CRF patients (mean age 72 ± 9 years). The patients are studied with Bioelectrical Impedance Analysis (B.I.A.) and they are evaluated the renal function with the dosage of serum creatinine (Crs) and urea, we assayed the haematocrit (Ht) and haemoglobin (Hb). Through B.I.A. 109 Akern we evaluated the Body Composition (Percentage of Fat Mass, Free Fat Mass and Water), the percentage of the Cellular Mass and of the Extracells Water, and in particular two important parameters: the Reactance (R) and the Phase Angle (PA). The value of R and PA showed the good state of the cellular function. The patients are divided into two groups: Crs <4 mg% and >4 mg%. The patients with Crs >4 mg% showed statistical direct correlation of PA with Hb and Ht, statistical inverse correlation of Crs with R and PA. The obtained data emphasized the importance of the B.I.A. It is very important the monitoring of the R and PA for the patients with serious CRF, also the adeguate correction of the anemia improves the B.I.A. values. The BIA appears a simple and useful method of monitoring of the 'good state' CRF patients.

P31

Ochrobactrum Anthropi Peritonitis in a CAPD Patient

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Introduction: Despite significant progress in its prevention, peritonitis remains the main source of morbidity and treatment failure in patients on CAPD. Whereas the more frequently involved Gram-positive bacteria cause a generally mild illness, Gram-negative species usually elicit a severe peritonitis. We report here a very rare case of CAPD-associated peritonitis induces by *Ochrobactrum anthropi*, a Gram-negative, non-fermenting, oxidase-positive bacterium. **Case report:** The patient, a 51-year-old man from Congo, was admitted in July 2006. He was on CAPD since November 2005 because of terminal renal insufficiency of unknown origin. His past medical history included arterial hypertension since 1985 treated with amlodipine and ramipril and three episodes of culture-negative peritonitis treated with empirical therapy. The dose of dialysis as well as other treatment varied considerably according to the means of the patient. He decided to come to Belgium because of growing abdominal pain, vomiting and cloudy dialysate fluid. The injection and drainage of the

dialysate was poor with gases coming from the catheter. The peritoneal effluent was noted to be markedly cloudy, and samples were obtained for cell count, gram stain, and bacterial culture. The white blood cell revealed 12,640 cells/mm^3 with 79% polymorphonuclear leukocytes. Laboratory studies revealed CRP 13.2 mg/dl, BUN 217 mg/dl, creatinine 23.2 mg/dl, albumin 2.6 g/dl. An intestinal perforation with peritonitis was immediately suspected. An explorative laparoscopy was performed and no perforation of the digestive tract found. Subsequently the initial dialysate was reported to show Gram-negative rods, later identified as *O. anthropi*. The antimicrobial susceptibility was determined and the patient was succesfully treated with with meropenem and amikacin. His Tenckhoff catheter could be saved. The emission of gases was attributed to mishandling and the patient was reeducated. **Discussion:** To our best knowledge, this is the third case of *O. anthropi* peritonitis reported so far. *O. anthropi* is generally considered to be of low virulence and only a limited number of human infections due to *O. anthropi* have been reported, mostly in immunocompromised patients with permanent catheters. Contrary to our case, it was usually necessary to remove the catheters in order to control infection. **Conclusion:** Our report clearly demonstrates that colonization of the catheter with *O. anthropi* can lead to a severe peritonitis in not severly immunocompromised CAPD patients.

P32

Highly Biocompatible Plasma Separation Membrane

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Objectives: Plasma separation from whole blood is carried out routinely for therapeutic purposes. During the last 20 years, there has been clinical success with plasma separation for the treatment of various immunologic and metabolic disorders. Today, very selective plasma therapies have been developed, i.e. adsorber systems, which allow re-infusion of the purified plasma together with the cellular fraction. The separation characteristics of the membrane as well as the membrane – blood interaction are of utmost importance, i.e., in case of cascade techniques and re-infusion. However, most of the commercial plasma separation membranes are developed decades ago. Currently, new generations of plasma separation membranes are under development. **Results:** We will demonstrate the characteristics of a new class of tailor made hydrophilic plasma separation membranes prepared from high-T_g polymers. Design parameter for modern plasma separation membranes and devices will be discussed in detail. Product improvements are observed with this modern plasma separation membrane generation e.g. enhanced biocompatibility, low thrombogenicity, low haemolysis risk and stable operational condition (filtration rate and sieving characteristics). The in-vitro separation results of this new class of tailor made size exclusion membranes will be shown. Analytical results describing the hemocompatibility of this new and other commercial plasma separation membrane will be discussed in detail. **Conclusions:** The characterization data presented for this new plasma filter generation will form a detailed profile for existing and future therapeutic applications.

P33

The Bloodletting as an Early Blood Purification

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The bloodletting is an operation with a 3,000-year history and was used for purification the patients from poisons and 'bad spirits', that believed ancient that they had infiltrated in the organism of patients. It is a procedure that was performed to help alleviate the ills of mankind. A small bloodletting instrument resembling a crossbow was once used in Greece and Malta. Wall paintings dating from 1400 BC depict the use of leeches for drawing blood from human beings. **Aim:** To investigate the bloodletting as an early form of a kind of blood purification, further of ancient therapists. **Material:** Hippocrates (460–377 BC) developed the concept of body humors. The four fluid substances of the body were blood, phlegm, yellow bile, and black bile. Health depended on the proper balance of these humors. Bloodletting was a method used for adjusting on of the four body humors. Erasistratus (310–250 BC) the father of physiology from the Alexandria's faculty, believed that the excess blood causes illnesses. Celsus (25 BC–50) was also a great friend to bloodletting. Aretaeus (50–150 AD) was very friendly to bloodletting, but he preferred small and repeated bleedings to large ones, which he considered to be dangerous. Galen (129–199) attached himself chiefly to Hippocrates as his guide, whose system he laboured to re-establish and bring to perfection. Galen appears to be the first that mentioned the absolute quantity of blood necessary to be taken on different occasions: neither Hippocrates, neither Celsus, nor any preceding writer, taking any notice of this. In ordinary cases, the largest quantity mentioned by Galen did not exceed 750 g: the smallest – 220 g. **Conclusion:** Needed a lot of centuries before is prohibited bloodletting (in 1883 were imported in France 40 millions medical leaches) and becomes the first transfusion of blood from the Richard Lower (1631–1691) in 1667.

P34

Patterns in the Prevalence of Hepatitis C Virus Infection at the Start of Hemodialysis in Japan

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Objectives: Although hepatitis C virus (HCV) infection is a persistent public health concern in hemodialysis patients, there seem to have been only a few reports on the prevalence of HCV at the start of hemodialysis. In this study we investigated whether patients starting on hemodialysis therapy are positive for anti-HCV antibody or not. **Methods:** The 344 patients who began regular hemodialysis between 2002 and 2006 were enrolled in this study. Clinical data such as age, anti-HCV antibody and primary cause of end-stage kidney disease (ESKD) were examined. As healthy controls we used 70,717 healthy blood donors in 2005 whose data were obtained from Tokyo Metropolitan Red Cross Blood Center. Anti-HCV antibody was used

as an indicator of HCV infection. Since the prevalence of HCV infection is affected by age in Japan, we classified the patients by age group. **Results:** The HCV prevalence rate among the patients new to hemodialysis was 6.7%, as opposed to 0.15% in the healthy volunteers. The prevalence of HCV in the 31–40, 41–50, 51–60, and 61< year old groups was significantly higher in the hemodialysis patients than in the healthy volunteers ($p = 0.005$, 0.023, 0.031, <0.001, respectively). The anti-HCV antibody positive patients were significantly older than the anti-HCV antibody negative patients (67.0 ± 15.0 years versus 58.9 ± 16.8 years; $p = 0.026$). Diabetic nephropathy tended to be more frequent causes of ESKD in the anti-HCV antibody positive group (30.4%) than in the anti-HCV antibody negative group (19.9%). Of the 23 patients who were positive for anti-HCV antibody, 14 (60.9%) turned out to have received a blood transfusion. **Conclusion:** The results showed a much higher rate of anti-HCV antibody positivity in patients new to hemodialysis than in healthy volunteers. Older age and blood transfusion seemed to be risk factors for anti-HCV antibody positivity in Japan.

P35

Association Between Muscle Mass and Hemodialysis Duration in Females

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Background: Female HD patients have hormonal disturbance, and they tend to early menopause. The loss of estrogen at menopause plays a role in muscle loss, and estrogen has an effect of increases fat mass, therefore postmenopausal females change body composition. We postulated that muscle mass of long-term HD patients in female has been decreased because of rack of estrogen early. The aim of this study was to examine of association muscle mass and HD duration (vintage) in females. **Method:** 115 patients (M/F: 69/46, mean age: 57.0 ± 14.4 years, mean HD duration: 14.8 ± 9.8 years) enrolled in this study. The analysis were separately done by sex and each group was classified into two groups by female vintage median: Group A $\geq$ 20 yrs and Group B $<$ 20 yrs. Body mass index (BMI), fat mass (FM) and arm-muscle circumference (AMC) were measured by performing a multifrequency bioelectrical impedance analysis. Arm-muscle area (AMA) were calculated by square AMC (cm^2) divid by 4π. **Results:** In female, BMI (19.3 ± 2.9 vs. 21.7 ± 5.0; $p < 0.05$) and AMA (27.5 ± 4.5 vs. 31.4 ± 6.5; $p = 0.02$) were significantly lower in Group A than Group B. However, there were no differences between the two groups in the age (57.8 ± 13.5 vs. 55.0 ± 15.1; $p = 0.50$) and FM (11.4 ± 4.7 vs. 15.0 ± 9.0; $p = 0.10$). Contrary to the female, we can not find any differences between the two male groups in the age, BMI, FM and AMA. **Conclusions:** No significant correlations were found between the measures of male. However, BMI and AMA were significantly lower in longer female HD patients. The study suggests that longer survivors do not necessarily maintain body compositions. Additionaly, it may be necessary to add the assessment concerning estrogen.

P36

New Steam Sterilized Highly Biocompatible Plasma Separation Membrane

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Objectives: Plasma separation from whole blood is carried out routinely for therapeutic purposes. Plasma separation has been successfully applied clinically for the treatment of various immunologic and metabolic disorders. Separation characteristics as well as membrane – blood interaction are of importance in therapeutic plasma exchange and in cascade techniques involving plasma re-infusion. Most of the plasma separation membranes have been developed decades ago and are still ETO-sterilised. Currently, highly biocompatible steam sterilized plasma separation membranes are under development and clinical testing. **Results:** We demonstrate the characteristics (in-vitro and in-vivo) of a new class of tailor made hydrophilic plasma separation membranes prepared from engineering polymers. Both membrane characteristics allow to tailor biocompatibility and plasma filtration performance. The novel steam sterilizable membrane combines a smooth blood contacting surface with a high degree of protein permeability. First data will be reported on a clinical study comparing the new device with a conventional plasma filter to show (i) safety and efficacy, (ii) function (filtration rate and trans membrane pressure over time), (iii) performance (sieving coefficients of different high molecular species), and (iv) biocompatibility (thrombogenicity and complement activation). The in-vitro performance and biocompatibility data of the membrane will be linked to the data generated during the clinical study. **Conclusions:** The unique morphology of the membrane combines high performance and biocompatibility in vitro and in the clinical application. Finally, the material selection allows to steam sterilize the product.

P37

Successful Management of Sclerosing Peritonitis

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Sclerosing peritonitis (SP) is a serious complication of long-term continuous ambulatory peritoneal dialysis (CAPD). In encapsulating peritoneal sclerosis (EPS), the most severe form of the disease, the intestine is entrapped in a fibrous tissue, causing intestinal obstruction. A mortality rate of up to 73% has been reported and there are no established medical guidelines. We present two cases that were successfully treated, with intestinal function recovered. Case 1: A 43-year-old patient with end-stage renal failure (ESRF) was managed with CAPD for 8 years with glucose-containing lactate-buffered solutions. She had 3 episodes of bacterial peritonitis. Peritoneal equilibration test (PET) was performed regularly and always fell into high average transport categories. A year after the patient was transferred

to hemodialysis (HD) due to ultrafiltration failure her Tenckhoff catheter was removed. A week later she developed symptoms of bowel obstruction with fever and hemorrhagic ascites. The diagnosis of EPS was confirmed by abdominal CT. The patient was given methylprednisolone (MP) 16 mg/kg and tamoxifen 20 mg/day. Azathioprine was added later but the patient did not improve and remained severely cachectic. Therefore, an extensive adhesiolysis was performed and the capsule enclosing the intestinal loops removed. Subsequently, the patient completely recovered. Case 2: A 66-year-old patient with ESRF secondary to HIV-associated nephropathy was treated with CAPD glucose-containing lactate-buffered solutions for 125 months. He underwent PETs at regular intervals and was classified as high average and later high. He had 3 episodes of bacterial peritonitis, the last of which necessitated catheter removal and transfer to HD. However, his symptoms of abdominal pain and vomiting and inflammatory syndrome persisted. A CT was performed and was compatible with the diagnosis of SP. The patient was started on 40 mg of tamoxifen and 16 mg of MP and fully recovered. In conclusion, both patients were characterized by long duration of CAPD rather than multiple episodes of peritonitis. The first case shows that the symptoms may develop even a year after a shift to HD. The second illustrates that a fulminant variant of SP can occur as a second phase phenomenon following treatment of bacterial peritonitis, a setting in which the diagnosis may be masked and aggressive immunosuppression considered hazardous. Response to treatment is more likely to occur in the early inflammatory stage. Therefore, an early diagnosis is essential if progressive encapsulation of the abdominal viscera is to be prevented. In advanced cases, elective surgery with the aim of freeing the adhesions and extirpating of the capsule may be inevitable.

P38

Control of Body Core Temperature and Blood Pressure Stability During Hemodialysis

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Introduction and Aim: Prescription of cool dialysis may ameliorate intra-dialytic hypotension (IDH). However, it is not known whether it is sufficient to prevent an increase in body core temperature (CT) during HD or whether a mild decline in CT yields superior results. The aim of the study was to compare both these approaches with regard to intradialytic blood pressure stability. **Material and Methods:** Fourteen maintenance HD patients (9 M and 5 F, aged 60.9 ± 10.4 years) with a history of IDH (drop in mean or systolic blood pressure >25 mmHg in >75% HD sessions within preceding 6 months) were studied. During three mid-week dialysis sessions arterial temperature (Tart) was set to decrease by 0.5°C (*cooling*), or to remain unchanged at the individual patient's baseline level (*isothermic*), respectively (Fresenius BTM). *Thermoneutral* dialysis (during which no energy is added to or removed from the patient) was used as control modality. Blood pressure was recorded every 10 min and relative blood volume (RBV) (Fresenius BVM) was registered every minute throughout the treatments. Detailed hemodynamics were assessed with the saline dilution technique (Transonic HD01). Patients were monitored for occurrence of any discomfortable sensation of cold. **Results:** Arterial blood temperature increased during the *thermoneutral* (0.28 ± 0.24°C), and remained respectively stable and decreased during the respective *isothermic* (+0.00 ± 0.10°C) and *cooling* (−0.37 ± 0.15°C) modalities ($p < 0.001$). Lower SBP levels were recorded during the *isothermic* (98 ± 27) and *thermoneutral* modalities (104 ± 27) compared to the *cooling* approach (113 ± 30 mmHg; $p < 0.05$ between treatments). Central blood volume tended to be better maintained during the cooling approach (0.91 ± 0.30) compared to the isothermic (0.88 ± 0.30) and thermoneutral treatments (0.83 ± 0.21 l) but differences were not significant. Changes in RBV were not different. Only 3 patients complained of shivering during the *cooling* modality. **Conclusion:** Intradialytic hemodynamic stability appears to be improved when a slight decline in body core temperature is prescribed compared to the isothermic approach, which may be related to increased venoconstriction leading to improved maintenance of central blood volume. The beneficial effects of mild blood cooling on hemodynamic stability should be outweighed against the potentially higher risk of discomfort with regard to cold sensations.

P39

Extracorporeal Elimination of Low Density Lipoprotein (LDL)-Cholesterol by Adsorber Lipocollect 300

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Objectives: Extracorporeal LDL-cholesterol elimination is an effective treatment of familial hypercholesterolaemia (FH) even if diet, medication and life style change failed. Animal antibodies used in binding LDL in present reusable LDL adsorbers are potentially immunizing. We tested the first reusable LDL adsorber based exclusively on non-biologic substances for its safety and efficiency. **Methods:** Lipocollect 300 (Medicollect, Germany) was used in 20 procedures in patient with homozygous FH. In Lipocollect 300, spherical, macroporous silica gel as carrier is coated by synthetic organic polyanionic molecules that with its negative charge captures LDL and VLDL cholesterol and is easily removed with 1 molar NaCl solution. Plasma levels of total cholesterol (T-chol), low density lipoprotein (LDL), high density lipoprotein (HDL), lipoprotein (a) (Lp(a)) and Apolipoprotein B (Apo B) were measured before and after the intervention. Paired t-test was used for data analysis. **Results:** Mean change in plasma lipoproteins in last 5 procedures (mean ± SD):

	Before	After intervention	p value
T-chol (mmol/l)	6.9 ± 0.8	2.4 ± 0.3	<0.001
LDL (mmol/l)	5.2 ± 0.7	1.3 ± 0.3	<0.001
Lp(a) (mmol/l)	0.1 ± 0.02	0.03 ± 0.03	0.007
Apo B (g/l)	1.2 ± 0.1	0.3 ± 0.07	0.001
AI	6.0 ± 0.7	2.4 ± 0.3	<0.001

AI = Atherogenic index (T-chol/HDL).

Plasma levels of T-Chol, LDL and Lp(a) decreased significantly after the procedure. No side effects were observed during therapeutic procedures which were well tolerated by the patient. No important clinical changes occured in basic biochemical parameters. **Conclusion:** We have found Lipocollect 300 to be as effective, safe and cheap than the columns containing animal antibodies.

Supported by grant IGA MH CR NR/9103-4.

P40

Registration of Therapeutic Aphereses in Registry of World Apheresis Association (WAA)

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Objectives: Therapeutic apheretic procedures belong to relatively complex extracorporeal elimination procedures. World apheresis registry was established in 2003. It is operated by headquarters in Sweden. The purpose of the register is to record important data about apheretic procedure, to provide a possibility of information exchange between the apheretic centers, to evaluate results of procedures and compare them with other centers. **Methods:** The apheresis center in Hradec Kralove entered the register in 2006. Each patient is coded. Patient and procedure data (e.g. type of procedure, type of device, used anticoagulation, substitute solution, undesirable effects etc.) are being sent to the central register in Sweden. Once a year, central register provides cumulative report of the past year. There is also possibility of early evaluation and comparison. **Results:** By now, we registered 635 procedures in 116 patients. Registration following the procedure has shown itself as less time consuming. The connection with the central headquarters is without any problem. Exchanging results and techniques of less common procedures has showed itself essential in improving care for patients with rare diseases. **Conclusion:** The registration in world apheresis registry was commenced and is performed without any problems. This registry has proven itself as simple and reliable tool of easy and cost free evaluation of our own results and comparing them with others on the basis of recent knowledge.

Supported by grants: IGA MH No NR/9103-4.

P41

Effect of Hemodiafiltration on Myeloperoxidase

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Background: Cardiovascular risk in hemodialysis (HD) patients is several fold higher than in general population. Apart from traditional risk factors, non-traditional mechanisms including inflammation and oxidative stress are of importance. Myeloperoxidase (MPO) is a marker of leukocyte activation and oxidative stress and is related to mortality of HD patients. The aim of this study was to describe whether hemodiafiltration (HDF) has any advantage concerning changes of MPO during the session in comparison with HD. **Methods:** The studied group consisted of 20 chronic HD patients. In each patient, MPO was determined in heparin plasma by ELISA method both during a single online HDF session (high flux polysulfone membrane HF80, postdilution) and during a single HD session (low flux polysulfone membrane F6, F7) at time 0 (start), 15 min, 120 min and 240 min (end) of the session. **Results:** MPO changes significantly both during HDF and HD (mean levels during HDF 38.7 − 211.1 − 147.2 − 126.5 ng/ml, $p < 0.0001$, and during HD 77.6 − 273.6 − 194.1 − 199.9 ng/ml, $p < 0.0001$). At the beginning, MPO increases in both sessions, however, than it significantly decreases only during HDF ($p < 0.05$ time 120 and 240 vs. time 15). **Conclusion:** Myeloperoxidase increases at the beginning of both hemodialysis and hemodiafiltration and than significantly decreases only during HDF. Our results thus support the hypothesis that HDF is better for cardiovascular status, however, studies aimed at long-term effect of both procedures would still be needed.

P42

Increased TNF Alpha Levels in Patients with Chronic Kidney Disease are Associated with an Increased Prevalence of Atherosclerotic Complications

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Objectives: Chronic inflammation is a widely accepted pathophysiological factor of development and progression of

atherosclerosis. In patients with chronic kidney disease (CKD), chronic inflammation is believed to play a role in the increased risk of cardiovascular morbidity and mortality. The aim of this study was to evaluate the relationship between inflammatory markers and manifest atherosclerotic complications in patients with CKD. **Methods:** We enrolled 20 patients with chronic kidney disease caused by 'non-immunological' conditions with GFR < 60 ml/min (stage 3 or higher according to the NKF classification) and 28 age-matched healthy subjects as controls (HC). The presence of manifest atherosclerotic complications was noted. Beside basic biochemical parameters, intracellular cytokine production of interferon gamma (IFNg), tumour necrosis factor alpha (TNFa), interleukin 2 and interleukin 4 in CD3+ T cells and interleukin 10 and interleukin 12 in monocytes were measured by flow cytometry. **Results:** Patients with CKD (both with and without manifest atherosclerotic complications) had significantly higher C-reactive protein levels (21.3 vs. 4 mg/l) and TNFa levels than HC ($p < 0.005$). In patients with CKD and manifest atherosclerotic complications ($n = 12$), TNFa production was significantly increased when compared to patients with CKD without atherosclerotic manifestations ($n = 8$, $p < 0.01$). The production of other intracellular cytokines in CKD patients did not significantly differ from HC. **Conclusion:** TNFa production is significantly increased in patients with chronic renal insufficiency and is associated with increased prevalence of atherosclerotic complications.

Supported by MSM0021620807.

P43

Is α2-Heremans-Schmid Glycoprotein/ Fetuin-A Associated with Aspects of the Metabolic Syndrome in Patients with Chronic Kidney Disease (CKD)?

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Introduction: Components of the metabolic syndrome are highly prevalent in CKD patients – some of which paradoxically appear to predict an improved outcome in this population. We hypothesized that the circulating calcification inhibitor AHSG/fetuin-A, which is also a natural inhibitor of the tyrosine kinase insulin receptor, could be one factor explaining the conflicting results regarding traditional and non-traditional risk factors associated with CVD in CKD. **Patients and Methods:** In a cross-sectional study, we evaluated 198 CKD stage 5 patients (GFR 6.8 ± 0.2 ml/min; 62% males, mean age 52 ± 1 years) close to the start of renal replacement therapy. We studied circulating AHSG (ELISA) and two common functional AHSG gene polymorphisms (at aminoacids Thr248Met (C-T) and Thr256Ser (C-G) using Pyrosequencing®) and related these to multiple components of the metabolic syndrome. **Results:** Median circulating AHSG was lower (p10 mg/l), and AHSG genotype. **Conclusions:** The present study supports a physiological link between AHSG and body fat mass. As we observed an association between higher fat mass and elevated AHSG levels, it could be speculated that this may be one reason why obesity has been reported to constitute a survival advantage in CKD.

P44

A Three-Compartment Mathematical Model Comparing Solute Kinetics in Low and High BMI Hemodialysis Patients

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Several hypotheses have been advanced to explain the well documented finding that smaller patients on maintenance dialysis have a higher mortality risk than do larger patients. Modeling of uremic toxin kinetics may provide a useful tool to test different hypotheses advanced to explain this counterintuitive finding. We report here development of a three pool pharmacokinetic model (visceral organ mass, extracellular fluid, fat and muscle associated fluid) and its use to predict the time course of large solute concentrations as a function of time and inter-compartmental mass transfer coefficients (MTC). In this model the visceral organ mass was considered as the sole source of uremic toxin generation. Pool sizes were taken from empirical studies. Analytic solutions were obtained using computational software and broad ranges of MTC and toxin generation rates were simulated. Predicted time average concentrations (TAC; expressed in U/dl) suggest that solutes with low MTCs (<1 ml/min) may be sequestered in fluid associated with fat and muscle during dialysis and then gradually leach out from this reservoir during the intra-dialytic interval.These results quantify the kinetic parameters required to support the hypothesis that higher mortality for smaller dialysis patients is mediated by higher TAC for solutes with very low MTCs. Such patients would benefit from therapy formats with shorter inter-dialytic intervals.

P45

Relationship Between Operating Conditions and Filter Performance in High-Dose CVVH

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The relationship between transmembrane pressure (TMP) and filter performance is unknown in high-dose CVVH. The purpose of this experimental study is to measure the temporal profile of middle molecule (vancomycin: V; inulin: I) sieving coefficient (SC) and TMP during isovolemic CVVH performed in 3 different modes with the Prismaflex® system (Gambro): post-dilution (POST); standard (pre-filter) pre-dilution (PRE); and pre-dilution with replacement fluid (RF) infusion prior to the blood pump (PBP). Blood/replacement flow rates (ml/min)/(L/h) for conditions #1, #2, and #3 were 190/2.0, 290/3.0, and 380/4.0, respectively [table 1]. Although TMP did not change significantly, SC decreased for both V and I (data shown only for I) as a function of time, with the largest change in POST. In conclusion, TMP is not an adequate indicator of filter performance in CVVH.

Table 1. for Abstract P45. TMP and inulin SC in different CVVH regimes

Mode	Condition	TMP (mm Hg)*	SC (t = 0 min)	SC (t = 120 min)	SC (t = 240 min)	p value
POST	#1	116	0.93 ± 0.02	0.78 ± 0.02	0.47 ± 0.01	3.5E − 11
	#2	137	0.91 ± 0.00	0.68 ± 0.05	0.38 ± 0.03	6.5E − 09
	#3	156	0.93 ± 0.02	0.67 ± 0.05	0.32 ± 0.06	2.0E − 09
PRE	#1	74	0.87 ± 0.03	0.78 ± 0.01	0.73 ± 0.04	2.4E − 04
	#2	85	0.92 ± 0.01	0.80 ± 0.03	0.70 ± 0.07	9.8E − 04
	#3	96	0.86 ± 0.01	0.73 ± 0.06	0.69 ± 0.01	1.4E − 04
PBP	#1	66	0.86 ± 0.04	0.78 ± 0.04	0.77 ± 0.01	1.2E − 05
	#2	84	0.89 ± 0.01	0.77 ± 0.05	0.77 ± 0.02	4.1E − 04
	#3	101	0.91 ± 0.01	0.75 ± 0.08	0.71 ± 0.01	8.7E − 04

* = Mean value over 240 min.

P46

The Dialysate Sodium Concentration is Too High in Maintenance Dialysis to Day

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Given the observation that the majority of anuric patients are thirsty at the end of dialysis and their interdialytic weight gain is in excess of 2.5% of their body weight, it is reasonable to conclude that the dialysis treatment may have led to an accumulation of salt in the patient. Salt intake may have been accumulated by two further effects, either by sodium intake through a dialysis fluid with high sodium content and/or by the patient's salt intake in the interdialytic period. As a consequence, kidney patients experience a poorly controlled hypertension associated with an increased mortality from cardiovascular diseases. Long term clinical experience, mainly in the dialysis centres of Tassin/France and Izmir/Turkey, have shown an advantageous response to a reduced sodium intake leading to a negative salt balance. As a consequence, blood pressure normalized and long term survival of dialysis patients improved in these centres. Early observations from 1964 have shown that blood pressure normalisation is delayed by several months (lag phenomenon) after reduction of salt intake. This phenomenon may now be explained by a reduced Na-mobilisation from non-osmotically active Na-stores. Recent analyses and investigations have shown that Na is partially stored by non-osmotically active sites in skin, tissue and muscle via glucose-aminoglycans (GAG's). This finding may explain the lag-phenomenon and leads to the possibility that the concept of 'dry body weight' as an index of Na-balance is erroneous. Further evidence that an increased salt consumption has deleterious effects originates from the finding that high sodium levels stimulate the activation of the MAPK-gene. Via this pathway inflammatory stimuli may be triggered in dialysis patient and thus explain a major neglected cause of the inflammatory syndrome. It is still surprising that the concept of a low salt diet for dialysis patients is not generally applied following the overwhelming evidence of deleterious effects of high salt consumption.

P47

The Effect of High Fiber Density Ratio Polysulfone Dialyzer on Protein Removal

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Object: A prototype for a dialyzer (APS-EX) with a smaller cylinder diameter and therefore a higher hollow fiber density ratio was manufactured using the highest performance polysulfone hollow fiber membrane (APS-E) from Asahi Kasei Medical. **Methods:** We compared the performance of this device in comparison with conventional HD (APS-S) and HDF conditions (APS-S, 10L post HDF) to evaluate its merit as an internal filtration-enhanced dialyzer. **Results:** (1) With low molecular weight proteins, APS-EX had a removal rate of 74.3% for β2-MG, 66.6% for PRL, and 31.0% for α1-MG. The higher the molecular weight, the greater the difference was between APS-EX and APS-S (HD)/APS-S (HDF). With α1-MG, APS-EX had a significantly higher removal rate even in comparison with APS-S (HDF). (2) With APS-EX, the removal amount was 202.3 mg for β2-MG and 137.5 mg for α1-MG. APS-EX had a slightly higher removal amount of β2-MG compared to APS-S (HDF). APS-EX had a significantly higher removal amount of α1-MG compared to APS-S (HDF). Statistically significant differences were seen in loss of albumin, which was 4.0 ± 0.9 g for APS-EX, 3.0 ± 1.1 g for APS-S (HDF), and 0.9 ± 0.4 g for APS-S (HD). Interpatient variation of albumin loss with APS-EX was 2–6 g. (3) Changes in blood pressure during use, and treatment implementation procedures, were the same for APS-EX as for conventional APS-S (HD). There were no incidents of adverse effects during use. Even when used in HD mode, APS-EX demonstrated a performance which was more than equivalent to approx. 10L post-dilution HDF. **Conclusion:** This indicates the potential for treatment on a par with HDF. However, our results suggested the tendency for greater variation in albumin loss influenced

by patient-related factors. In our present study we did not find fluctuations in patient serum CRP. None of our patients developed a fever. The results suggested the possibility that hemodiafiltration can be performed safely with the use of ultrapure dialysate even when using APS-EX, with which internal filtration is assumed to occur.

P48

Effects of Dialysis Membrane Nature on Intradialytic Phagocytizing Activity and Oxidative Burst

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Objective: Patients with chronic renal failure have increased susceptibility to various pathogens. This has been related to disturbances of polymorphonuclear leukocytes (PMN) and monocytes (MO). During ingestion of microorganisms, PMN generate highly reactive oxygen species with increased oxygen consumption, the so-called 'respiratory burst'. The present study was aimed at examining the effects of blood-membrane contact on PMN and MO, with two dialysis membrane groups. In particular, we studied phagocytosis activation due to contact with the dialysis membrane during extracorporeal sessions. We also evaluated respiratory burst both in PMN and MO. **Methods:** In 30 stable haemodialysis (HD) patients, phagocytosis and respiratory burst were assessed using flow cytometry. Patients with diabetes, systemic vasculitis, or those showing evidence of infectious complications or malignancy as well as patients taking immunosuppressive medications were excluded from the study. Cells from this study population were analysed before the start, 15 min thereafter and 3 h from the beginning of HD session, using 2 different dialyzers: haemophan and acrylonitrile and sodium methallylsulfonate polymer (AN69). **Results:** During the session with haemophan, phagocytosis of MO increased significantly after 180 min ($p < 0.05$), but phagocytosis of PMN and respiratory burst of MO did not change significantly during the session. On the contrary, burst test of PMN increased significantly after 15 min ($p < 0.05$) and after 180 min ($p < 0.05$). During the session with AN69 phagocyte metabolic activity was well maintained. On the other hand, respiratory burst of PMN and MO increased significantly after 15 min ($p < 0.05$) and after 180 min ($p < 0.05$). In general there were no significant differences between the dialyzers under study. **Conclusions:** Phagocytosis and oxidative burst activation could indeed have some role as a membrane biocompatibility test and as a possible link between nature of the dialysis membrane and risk of infection in HD patients.

P49

Efficacy and Usability of a New High-Performance Dialyzer

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Objectives: The HD-C4 is a new dialyzer with modified membrane dimensions (reduced internal diameter, wall thickness, and length of fiber) and increased packaging density that provides an in vitro performance comparable to the Polyflux 210H, but with considerably less membrane material and smaller blood contacting surface (1.8 m^2 vs. 2.1 m^2). Efficacy and user satisfaction of these devices were compared during routine clinical hemodialysis at three centers. **Methods:** 45 hemodialysis patients (33 men, 12 women) were randomly assigned to 3 consecutive treatments with HD-C4 or Polyflux 210H dialyzers followed by 3 consecutive treatments with the other dialyzer. Patients at two centers ($n = 30$) had 3 additional HD-C4 treatments using a modified priming procedure. There was no change in treatment prescription during the study and no dialyzer reuse. Urea reduction rate (URR), single-pool Kt/V (spKt/V) and equilibrated Kt/V (eKt/V) were determined. Priming and rinse-back efficacy were scored by visual examination. Continuous variables were analyzed using t-test and categorical ordinal variables were analyzed using one-way ANOVA. **Results:** For comparable treatments (blood flow, dialysate flow, treatment time) there were no statistically significant differences in delivered dialysis dose with a mean URR of 73 $\pm$ 6% for Polyflux 210H and 74 $\pm$ 6% for HD-C4 and a spKt/V of 1.6 $\pm$ 0.3 and eKt/V of 1.4 $\pm$ 0.2 for both dialyzers independent of priming procedure. Using the modified procedure blood and dialysate side priming of HD-C4 was perceived to be not as good as standard priming of Polyflux 210H; however, it was graded better than acceptable. With standard priming, rinse-back of HD-C4 was graded slightly better than for Polyflux 210H. **Conclusion:** Despite a significantly reduced size HD-C4 dialyzers provide equal urea removal rates and Kt/V as Polyflux 210H during comparable clinical treatments with as good or greater user satisfaction.

P50

Genetic Basis of MIA Syndrome in Haemodialyzed Patients

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Background: Despite advancements in renal replacement therapy (RRT), the fixed prevalence of cardiovascular diseases and chronic inflammation remains a major cause of morbidity and mortality in haemodialyzed patients. MIA syndrome- malnutrition, inflammation and accelerated atherosclerosis, is recently known to be linked with a

poor prognosis. Regarding the obscurity of MIA syndrome development, some genetic disposal might be supposed. Related to MIA syndrome symptoms, we have analyzed some candidate genes in chosen haemodialyzed patients. **Methods and Study design:** 1,014 patients ('MIA' population) were included in the study and followed by means of specially created electronic questionnaire for 18 months. The control population 'MONICA' consists of 2,559 unrelated Caucasians. DNA was isolated by standard salting-out method and the molecular-genetic analysis of selected gene polymorphisms was made. All the data were statistically analysed and correlation among genotypes, clinical and laboratory parameters was performed. **Results:** The main causes of chronic renal failure are diabetic, tubulointerstitial nephropathy and hypertensive nephrosclerosis. We have not found any gender differences in entrance clinical and laboratory parameters. Concerned to analyzed gene polymorphisms, we have observed distinct differences between populations (Ghrelin gene: Leu72Met- Met/Met: MIA men vs. women vs. MONICA men vs. women: 1.1% vs. 0.2% vs. 0.3% vs. 0.5%; Gln90Leu- Leu/Leu: MIA women vs. men vs. MONICA men vs. women: 1.4% vs. 0.2% vs. 0.5% vs. 0.5%; LBP gene: Pro436Leu- Pro/Pro: MIA women vs. men vs. MONICA men vs. women: 0.7% vs. 1.3% vs. 1.1% vs. 1.2%; HFE gene: His63Asp- His/His: MIA men vs. women vs. MONICA men vs. women: 4.7% vs. 2.5% vs. 2.1% vs. 1.9%; MTHFR gene: C667T-TT: MIA men vs. women vs. MONICA men vs. women: 7.6% vs. 9.4% vs. 12.5% vs. 11.8%). **Conclusion:** The presented results are pivotal and the correlations of analyzed genotypes with laboratory and clinical data will be still determined.

P51

Blood Purification at the Time of the Sequential Liver-Kidney Transplantation for Primary Hyperoxaluria Type 1 in Our Center

T. Iwasaki[1] (presenting), N. Kimata[1], S. Fuchinoue[2], K. Kikuchi[1], N. Miwa[1], H. Chikamoto[3], T. Tojimbara[2], I. Nakajima[2], Y. Akioka[3], M. Hattori[3], S. Teraoka[2], T. Akiba[1]

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Background: Primary hyperoxaluria type 1 (PH1) is a rare autosomal recessive hereditary disease. 59 patients with PH1 were reported in the published literature from 1962 to 2003 in Japan. We experienced five cases from 1996 to 2007 and focused on their dialysis. Their specific attractions will be discussed. **Method:** Cases include three childrens (M/F: 2/1, mean age: 3.3 ± 3.3 years, mean vintage: 7.3 ± 3.86 months), and two adults (M/F: 1/1, mean age: 43.5 ± 2.5 years, mean vintage: 7.0 ± 0.92 years), from 1996 to 2007. In addition, sequential L/KTx was selected, i.e., preemptive liver transplantation (LTx) was done for the purpose of correcting the enzyme defect, and several months later, kidney was transplanted. **Result:** Conventional HD or CAPD were selected before LTx. Daily haemodiafiltration (Qb 150–200 ml/min, Qf 33 ml/min, 4 h, 6 time/wk) were chosen first week after LTx, and all patients had high-flux conventional HD until Ktx. The average duration between LTx and KTx was 5.8 months, and the mean serum oxalate level was decreased from 90.2 to 67.7 μmol/l. All patients were able to quit hemodialysis therapy after KTx. **Conclusion:** Theoretically, preemptive LTx might be preferable treatment that could restraint a new accumulation of oxalic salt. Furthermore, removal of oxalate with longer HD duration will be useful for the kidney graft function.

P52

Bacteriological Water Quality of Dialysis Fluid in Japan

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Patient Registration Committee of Japanese Society of Dialysis Therapy, Tokyo, Japan

Japanese Society of Dialysis Therapy (JSDT) surveyed all dialysis facilities about the present status of water quality and quality control for dialysis fluid. JSDT has collected exact data about the dialysis facilities and the patients with ESRD at the end of each year science 1966. This data system is one of the biggest patient registration systems in the world and average recovery rates of questionnaires have been over 95%. At the end of 2006, JSDT collected the data from 3,488 dialysis facilities about water quality and quality control for dialysis fluid such as endotoxin (ET) levels, viable bacterial cell counts and usage of ET retentive filter (ETRF). Each response rates for the questions are 87.5% for ET measurements, 81.0% bacterial examination and 88.6% for ETRF. ET measurements were performed in 2,873 facilities (82.4%). The JSDT recommendation for ET level in dialysis fluid (<0.05 EU/ml) was achieved in 89.0%, and ET free dialysis fluid was achieved in 29.8%. Bacterial cultures were performed in 1,197 facilities (37.1%). The JSDT recommendation for bacterial cell counts in dialysis fluid (<100 cfu/ml) was achieved in 96.9%, and ultra-pure dialysis fluid was achieved in 48.4%. R2A (67.5%), nutrient agar medium (15.4%), TGEA (3.3%) were used for bacterial culture. ETRF were installed in 78.5% of total facilities and 53.4% of total dialysis machines. In Japan over 250,000 ESRD patients are treated with hemodialysis using central dialysis fluid delivery system (CDS). CDS is a unique system developed in Japan which has easy handling for daily maintenance of delivery systems and great economical advantage compared with personal dialysis machine. However, it has been pointed out that CDS has a weak point for the protection of biofilms. Bacterial water quality is one of the most important issues of CDS. **Conclusion:** Bacteriological water qualities of dialysis fluid are extremely high in most Japanese dialysis facilities.

P53

Dialysate Cancer Antigen 125 Concentration in Peritoneal Dialysis and its Clinical Importance

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Ca 125, is a high molecular weight glycoprotein, produced by mesothelial cells. Longitudinal follow up has shown a decrease in dialysate Ca 125, indicating loss of mesothelial cell mass. The aim of our study was to evaluate the relationship between serum and dialysate concentration and also the relationship between dialysate Ca 125 and transport characteristics, and dialysis duration. Ca 125 was measured in 65 stable patients treated with CAPD using the CLIA method Centaur Bayer in IU/l. The mean serum Ca 125 values was 13.44 ± 7.3, and the mean dialysate concentration was higher 26.83 ± 14.6 ($p \leq 0.01$). No correlation between serum and dialysate CA 125 concentration was present. The interindividual differences in Ca 125 dialysate concentrations was wide. The Ca 125 dialysate concentration was significantly higher 41.2 ± 12.3 in patients with high and high average transport characteristic parameters compared to Ca 125 concentration in low (19.47 ± 8.1) and low average (28.3 ± 15.7) patients ($p \leq 0.01$). The negative correlation between Ca 125 dialysate concentration and duration of PD treatement was found in long term PD patients ($r = -43$, $p \leq 0.001$). **Conclusions:** The dialysate Ca125 showed wide interindividual differences. The measured Ca 125 dialysate values had not correlated with serum Ca 125 concentration.

P54

Development of a Novel Skin Penetrating Pad Preventing Exit Site Infection in CAPD

M. Aoyama[1], Y. Takemoto[2] (presenting), E. Tatsumi[1], T. Mizuno[1], T. Tsukiya[1], T. Nishinaka[1], A. Honnma[1], Y. Taenaka[1]

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Recently, clinical application of continuous ambulatory peritoneal dialysis has been proposed for many patients with serious renal failure. However, the present measures are not sufficient to protect these patients from infectious complications which originate at the exit site of the catheter. In this study, we developed a novel skin penetrating pad which uses a new biocompatible material consisting of segmented polyurethane, and conducted a long-term evaluation with animal experiments. The new skin penetrating pad is shaped in 3 elliptical layers with a flange form using the developed biocompatible material, and was installed surgically under the skin around the exit site of the catheter. The lowest layer, which consisted of porous material with large-diameter pores, was designed to promote tissue ingrowth into the material, and unified to the epidermis without obstruction of the blood supply. The purpose of the center layer was to prevent epidermal down-growth, and the topmost layer, which consisted of a non-porous pad, was designed to protect the surgical wound. Using this structure, we were able to prevent infectious complications at the exit site of the catheter. In long-term animal experiments, 5 trial manufacturing models were implanted surgically on the epidermis of an adult goat. The models did not disinfect or dressing completely. We extracted the trial models at six months after operation, and carried out a pathological examination. Neither of the 5 models showed any sign of local infection during the experimental period. With respect to loading external force to the catheter, nothing during the experimental period dislodged it from the skin. With regard to pathological observation, mature granulomatous tissue and sufficient vasucularization were infiltrated into the flange under the epidermis. Therefore, the present study demonstrates that our novel skin penetrating pad is a useful and safe tool for maintaining the catheter without risk of infectious complications.

P55

Peritoneal Membrane Characteristics and Dialytic ALlkali Gain From Bicarbonate, Lactate Based Peritoneal Dialysis Fluid (PDF)

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Objectives: It has been found in studies with lactate-based single buffer PDF that peritoneal transport characteristics affect buffer balance.The objective of this study was to determine (1) whether peritoneal transport characteristics as defined by dialysate-to-plasma creatinine ratio (D/Pcr) and Mass Transfer Area Coefficient of creatinin (MTACcr) have an impact on alkali gain if mixed-buffer PDF [(bicarbonate (BIC) = 25 mmol/l and lactate (LAC) = 15 mmol/l], (Physioneal®, Baxter, Castlebar, Ireland) is used and (2)whether the alkali gain differs between patients using icodextrin (ICO) or glucose PDF for overnight dwell. **Methods:** A total of 22 ESRD patients (14 men), aged 58.7 years, treated by PD for a mean of 22.7 (1–147) months were examined. During a standard 4 h peritoneal equilibration test (PET), additional PDF samples at time 0, 2 and 4 h were obtained for determination of LAC and (under anaerobic conditions) for BIC as well. Besides routine plasma biochemical analysis, plasma LAC and acidbase balance was determined. Dialytic alkali gain was calculated as follows: [(volume in × buffer concentration) − (drained volume × buffer concentration)]. **Results:** Neither D/Pcr nor MTACcr correlated with 4 h dialytic BIC, LAC or (BIC + LAC) gain. Significant negative correlation was found between 4 h ultrafiltration and BIC gain ($r = -0.48$, $p < 0.05$); and BIC + LAC gain ($r = -0.57$, $p < 0.01$). Significant positive correlation was demonstrated between plasma and dialysate BIC concentration both at time 2 h ($r = 0.93$, $p < 0.001$) and 4 h ($r = 0.93$, $p < 0.001$) of PET; (Spearman's test). The preceding ICO dwell had no effect on the 4 h BIC, LAC or BIC + LAC gain. **Conclusion:** Unlike in studies with single-buffer lactate-PDF, with mixed-buffer PDF (BIC + LAC) no correlation between dialytic alkali gain and peritoneal transport characteristics was demonstrated. BIC dialytic gain negatively correlated with ultrafiltration rate.

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