LAB METHODS / BIOMARKERS

**SP122**

**COMPARISON OF ATHEROMATOUS DISEASE IN HIGH RISK POPULATIONS REVEALS A DISTINCT ASSOCIATION OF RISK FACTORS AMONG PATIENT POPULATIONS AND A STRIKING RELEVANCE FOR GLYCEMIC CONTROL IN DIABETIC NEPHRITIS**

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**Introduction and Aims:** Patients with Chronic Kidney Disease (CKD) and/or Diabetes are at a high risk for cardiovascular (CV) disease. Improved outcomes require a better understanding of specific risk factors that distinctly modulate the incidence of atheromatous disease. Herein, we compared the distinct and combined impact of CKD and of diabetes (DM) on the development of atheromatous disease, and prevalent risk factors per condition.

**Methods:** Cross sectional study in 2088 asymptomatic patients categorized as: 1. General Population (2 CV risk factors, no DM, estimated glomerular filtration rate (eGFR) > 60 ml/min); 2. CKD, no DM; 3. DM, eGFR=60 ml/min, proteinuria>300 mg/dl; 4. Established diabetic nephropathy (DN). Carotid ultrasound of left and right carotid arteries evaluated intima-media thickness (IMT) in the common, bulb, internal and external carotid. Carotid plaque (CP) was defined as IMT>1.5mm. Multivariate Logistic Regression analysis examined the variables independently associated with the presence of CP, including dysglycaemia Haemoglobin (HbA1c) in diabetic patients.

**Results:** Table 1 shows the percent of patients with CP among the 4 populations of patients categorized by age. Table 2 shows the results of the multivariate analyses. There is a significant association between classical risk factors and CP among the 4 subpopulations of patients. In DN, age and Triglycerides are the only classical risk factors independently associated with CP. Also, eGFR in DN, HbA1c is independently associated with the presence of CP.

**Conclusions:** Our findings confirm the high prevalence of atheromatous disease in asymptomatic high risk CV patients with a distinct association of risks factors among patient populations. Importantly, in diabetic nephropathy, HbA1c emerges as a main risk factor independently associated with the presence of carotid plaques.

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**SP123**

**PREDICTIVE VALUE OF TRADITIONAL AND NOVEL RISK FACTORS FOR CARDIOVASCULAR DISEASE AND END STAGE RENAL DISEASE IN PATIENTS WITH CHRONIC KIDNEY DISEASE**

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**Introduction and Aims:** Up to 25% of mild to moderate chronic kidney disease (CKD) patients die from cardiovascular (CV) disease before entering dialysis, whereas control of CKD progression risk factors remains a bet to be won by nephrologists. The predictive value of traditional and novel risk factors is important because the identification of the best predictor is of obvious importance for risk stratification in CKD patients. Mortality and non-fatal CV events (myocardial ischemia, stroke and peripheral vascular event) along with initiation of dialysis were the major end points.

**Methods:** Two hundred thirty consecutive CKD outpatients of stages 1-4 (52% men) with mean age 65±12 years were prospectively followed up to 3 years. Patients lost of FU (17.5%) were excluded. Estimated glomerular filtration rate (eGFR, MDRD 6 variables) was 52.4±28.7 ml/min at recruitment. Demographic, somatometric, clinical characteristics, routine laboratory parameters and specific inflammatory markers, along with drug therapy were assessed at study entry. Echocardiograms were undertaken and left ventricular mass index (LVMI) was calculated. Cox regression proportional hazard models were used to determine factors that best predicted the occurrence of a CV event/death or initiation of dialysis. Models included traditional and novel risk factors: sex, age, smoking, body mass index, mean BP, diabetes mellitus (DM), CV disease history, eGFR, urine protein (UPR, mg/24h), serum cholesterol, albumin (sAlb), uric acid and phosphorus, Hb, fibrinogen, CRP, IL-6, TNF-α, ICAM-1, VCAM-1 and LVM.

**Results:** During the follow up 31 (16%) CV events and 7 CV deaths (3%) occurred with a mean time to the event of 21±12.5 months. Twenty one (11%) patients started dialysis in a mean time of 20±9 months. The statistically important predictive factors for the CV outcome were: DM (RR: 0.455, 95%CI: 0.22-0.932, p<0.003), sAlb (RR: 0.296, 95%CI: 0.113-0.773, p=0.013), LVM (RR: 1.0, 95% CI: 1.009-1.001, p=0.021) and aMDRD-6 (RR: 1.007, 95% CI: 1.00-1.0013, p=0.026). For the renal outcome significant factors were: eGFR (RR: 0.894, 95%CI: 0.844-0.947, p<0.001), UPR (RR 1.005, 95% CI: 1.0002-1.0007, p<0.001). A limitation of our study was the relatively small number of patients.

**Conclusions:** The predictive value of traditional risk factors resulted to be superior to that of novel risk factors with regards to CV disease and end stage renal disease in long term CKD 1-4 stage patients.

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**SP124**

**CAROTID INTIMA-MEDIA THICKNESS AND PLAQUES ARE INDEPENDENTLY ASSOCIATED WITH RATE OF RENAL FUNDATION DECLINE IN PATIENTS WITH CHRONIC KIDNEY DISEASE**

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**Introduction and Aims:** Increased carotid intima-media thickness (cIMT) and the presence of plaques are surrogate markers of systemic atherosclerosis and closely associated with adverse cardiovascular outcomes. Whether cIMT and plaques are related to renal decline rate and progression to dialysis remains to be determined in chronic kidney disease (CKD) patients.

**Methods:** This longitudinal observational study enrolled 413 CKD stage 3 and 4 patients. All patients performed carotid ultrasonography at their first visit to nephrologist. We classified patients into CKD stage 3a, 3b and 4 based on estimated glomerular filtration rate (eGFR), and the decline of renal function was measured by cEGR slope. The renal endpoint was defined as commencement of dialysis. Models included traditional and novel risk factors: age, sex, smoking, body mass index, mean BP, diabetes mellitus (DM), CV disease history, eGFR, urine protein (UPR, mg/24h), serum cholesterol, albumin (sAlb), uric acid and phosphorus, Hb, fibrinogen, CRP, IL-6, TNF-α, ICAM-1, VCAM-1 and LVM.

**Results:** Mean age was 69.7 years and mean eGFR slope was -1.90±1.08 ml/min/1.73 m²/yr. The cIMT values and plaque prevalence was significantly elevated with increasing severity of CKD stages (p<0.001). During the 2.5-year follow-up, 11.4% started dialysis therapy. Patients with cIMT ≥1.0 mm had a worse dialysis-free survival than those with cIMT <1.0 mm [hazard ratio 2.17, 95% confidence interval (CI) 1.21 to 3.88, p=0.006]. Statistically significant variables associated with more rapid renal progression rate were diabetes mellitus, wide pulse pressure, lower baseline eGFR, lower albumin, greater proteinuria, and increased cIMT and the presence of carotid plaque.

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Introduction and Aims: The biochemical parameters of CKD-MBD such serum phosphorus (P), iPTH (intact parathyroid hormone), and FGF (fibroblast growth factor) -23 have been reported to have strong effects on the mortality of CKD patients. Left ventricular hypertrophy has also been known to be a strong risk factor for the death of CKD patients. Hence we investigated the effects of the parameters of CKD-MBD on the LV geometry in pre-dialysis CKD.

Methods: KNOW-CKD is an on-going, prospective, university hospital based observational cohort study under the sponsorship of the Korean Center for Disease Control and Prevention. Cross-sectional analysis of echocardiography data and other clinical data was performed in 1231 participants of KNOW-CKD. LV mass indexed by body surface area (LVMI) and relative wall thickness were used to define LV hypertrophy (LVH) and LV geometry according to the American Society of Echocardiography. As parameters of CKD-MBD, serum calcium (Ca), P (mg/dl), vitamin D, 25(OH)D, 1,25(OH)2D, vitamin D, and FGF23 were measured.

Results: The number of patients with CKD 1 & 2, CKD 3, and CKD 4 & 5 was 315 (25.8%), 489 (40.7%) and 402 (33.5%) persons respectively and LVMI increased along with progression of CKD (87.5±24.9, 91.2±24.1, and 108.2±27.3±9/m2 in each group, p<0.001). Along with the progression of CKD stage, the frequency of normal LV geometry decreased and those of eccentric and concentric LVH increased (normal; 43.2%, eccentric LVH; 21.7%, concentric remodeling; 13.6%, concentric LVH; 21.4% in CKD 1 & 2, 42.2%, eccentric LVH; 26.8%, concentric remodeling; 10.2%, concentric LVH; 18.6% in CKD 3, and 35.4%, eccentric LVH; 25.5%, concentric remodeling; 15.9%, concentric LVH; 23.2% in CKD 4 & 5). Linear regression models showed that LVMI was positively associated with FGF23 in whole CKD population (β=0.014, p=0.002) and with progression of LVH. There was a pronounced difference in proteinuria ≥0.2 g/day (t=0.025, p=0.001). Multivariable analysis fully adjusted by age, sex, FGF23, and other significant variables in univariate analysis revealed that age, female, systolic blood pressure (SBP), body mass index (BMI), eGFR <30 ml/min/1.73m2 were risk factors for eccentric and concentric LVH, respectively. Among the parameters of CKD-MBD, serum Ca was related to eccentric and concentric LVH.

Conclusions: Along with the progression of CKD stage, LVMI and frequency of eccentric and concentric LVH increased. Although serum FGF23 level was positively related to LVMI in CKD patients, and more prominently in presence of proteinuria, serum FGF23 was not independent risk factor for LVH in our cohort. Serum calcium was related to eccentric and concentric LVH in Korean CKD patients.

Arterial stiffness is a marker of arterial wall remodeling, which is associated with cardiovascular disease and all-cause mortality. The aim of this study was to assess whether arterial stiffness measured by carotid-femoral pulse wave velocity (cPWV) is associated with left ventricular mass (LVM) and arterial remodeling in patients with chronic kidney disease (CKD). We hypothesized that arterial stiffness is associated with left ventricular mass and arterial remodeling in patients with chronic kidney disease.

Methods: We conducted an observational study of 135 patients with chronic kidney disease stage 3-5 (mean age 56±14 years, 57% male). Arterial stiffness was assessed by measuring the carotid-femoral pulse wave velocity (cPWV) and the augmentation index (AI). Left ventricular mass (LVM) was assessed using echocardiography. The association between arterial stiffness and left ventricular mass was assessed using linear regression analysis adjusted for confounders. The association between arterial stiffness and arterial remodeling was assessed using logistic regression analysis adjusted for confounders.

Results: The mean age of the study population was 56±14 years, 57% male. The mean arterial stiffness was 9.4±3.2 m/s, and the mean augmentation index was 63±11%. The mean left ventricular mass was 99.8±39.5 g/m2, and the mean prevalence of LVH was 53%. The mean eGFR was 32.4±30.7 ml/min/1.73m2. Arterial stiffness was associated with left ventricular mass (p=0.001) and arterial remodeling (p=0.001). Arterial stiffness was associated with age, sex, BMI, blood pressure, eGFR, and the prevalence of LVH. The association between arterial stiffness and left ventricular mass was independent of confounders (adjusted R²=0.32, p=0.001).

Conclusions: Arterial stiffness is associated with left ventricular mass and arterial remodeling in patients with chronic kidney disease. These findings support the role of arterial stiffness in the development of cardiovascular disease in patients with chronic kidney disease.
samples (neat or diluted) are added to the microtitre plate followed by the addition of the biotinylated antibody and incubated overnight. The plate is washed and incubated with enzyme labelled avidin before a second wash step and the addition of a chromogenic substrate. The absorbance of the stopped reaction is read at 450-650nm where the colour intensity is directly proportional to the concentrations of dp-ucMGP.

**Results:**
The assay range of the MGP ELISA is 100 to 7000pg/ml with an analytical sensitivity of less than 50pg/ml. The performance of the MGP ELISA kit displays excellent intra-assay precision with samples reading across the assay range showing less than 15% CV. The assay also displays excellent inter-assay precision with samples reading from 127pg/ml to 423pg/ml showing an average precision on 10 replicates of 6.3% to 8.8%. The average recovery of samples spiked with synthetic material is 103%. High serum levels linearly shows excellent recovery when diluted in a low MGP sample across the assay range with an average observed expected value of 108%. The correlation of the newly developed ELISA to a research in house ELISA shows the assay to be fully comparable with a slope of 0.755, intercept of 50.8 and R² of 0.868. The assay shows a positive relationship between increasing dp-ucMGP levels and progressing CKD stage and shows the expected decrease in dp-ucMGP after vitamin K supplementation.

**Conclusions:**
This new and novel MGP ELISA test kit is an accurate device for the detection of dipshospho-ucrobonylated Matrix Gla Protein. The measurement of dp-ucMGP is a useful risk marker for cardiovascular calcification in CKD patients.

**HIGH LEVELS OF SERUM FIBROBLAST GROWTH FACTOR 23 ARE ASSOCIATED WITH CORONARY ARTERY CALCIFICATION AND ADVERSE CLINICAL OUTCOMES IN PATIENTS WITH MODERATE AND ADVANCED STAGE CHRONIC KIDNEY DISEASE**

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**Introduction and Aims:** Fibroblast growth factor 23 (FGF23) is a remarkable regulator of mineral and bone metabolism which was discovered in the early 21st century. A number of studies reported the association of high levels of FGF23 with cardiovascular disease (CVD) and mortality in patients with chronic kidney disease (CKD), however they still have controversies. Thus, we aimed to elucidate the association of FGF23 with the presence of coronary artery calcification and its prognostic value in patients with moderate and advanced stage CKD.

**Methods:** Serum intact FGF23 levels in 150 patients with CKD stage 3 to 5 and 25 age and sex matched controls were measured by using ELISA. We made routine biochemistry and assessed coronary calcification by multi-slice spiral computed tomography (MSCT) within the CKD patients. The relationship between FGF23 and the presence of coronary artery calcification were studied. The occurrence of cardiovascular events and deaths was recorded over 22±3 months.

**Results:** Serum FGF23 levels in CKD patients were significantly higher than those in healthy controls (P<0.01). The concentrations of FGF23 were positively related with duration of dialysis (r=0.288, P=0.007), serum calcium (r=0.377, P<0.001), serum phosphorus (r=0.576, P<0.001), calcium and phosphorus product (r=0.658, P<0.001), PTH (r=0.331, P<0.001) and CRP (r=0.268, P=0.001) levels, and negatively related with hemoglobin (r=-0.213, P=0.004), 25(OH)D (r=-0.207, P=0.007) and 1,25(OH)2D (r=-0.187, P=0.023) levels. Serum FGF23 levels were significantly associated with coronary artery calcification score (CACS) (r=0.177, P=0.034). During the follow-up, 19 cardiovascular events (12.7%) and 9 deaths (6%) were registered. Patients were stratified to two groups by median FGF23 level (738pg/ml). Between the two groups, in survival curves showed that patients with FGF23 levels>738pg/ml had significantly higher cardiovascular event incidence rate (P<0.01) and all-cause mortality (P<0.05) than patients with FGF23 levels below the cut-off. Cox regression analysis showed that FGF23≥785.8pg/ml (HR=1.57±0.4 mmol/l, respectively; P=0.006), higher in the BCP group as compared to the BCG group (43.9% vs 50.9 %; P=0.143). Diabetes mellitus was more prevalent in the BCP group (50.9% vs 43.9 %; P=0.137).

**Conclusions:** Serum FGF23 levels in patients with moderate and advanced stage CKD were significantly higher than normal population. Serum FGF23 levels may be associated with coronary artery calcification and adverse clinical outcomes in patients with moderate and advanced stage CKD.

**NUTRITIONAL EDUCATION FOR MANAGEMENT OF OSTEODYSTROPHY (NEMO) TRIAL: IMPACT ON QUALITY OF LIFE**

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**Introduction and Aims:** Hyperphosphatemia and poor Quality of Life (QOL) are 2 common conditions highly prevalent among hemodialysis (HD) patients. Provision of individualized nutritional counseling has shown to improve these 2 components. The aim of this study is to measure the effect of advanced individualized nutrition education given to HD by renal dietitian on serum phosphorus (P) and QOL. Methods: A randomized controlled trial with a post design. Patients (n=300) were recruited from 6 HD units in Lebanon. Each HD unit was divided to half as per the HD shift and assigned to the 2 study groups: experimental or control. Patients in the experimental group received nutritional education of 2 hours per month for 6 months by dedicated renal dietitian. Both study groups continued to receive the routine dietetic care by hospital dietitian. Outcome Measures: Serum P (mg/dl) and QOL measured by SF-36 questionnaire.

**Results:** Serum P in the experimental group dropped significantly from 5.6±1.55 mg/dl to 5.0±1.51 mg/dl, no significant change was seen in the control group. As for QOL, at baseline, study participants reported to have 48 - 75% of full health. Post intervention only 2 components of QOL changed, they significantly dropped from better to worse: social functioning (experimental: 85.19±27.68 to 58.46±32.26, Control:85.64±28.79 to 57.73±29.96) and bodily pain (experimental: 76.85±29.57 to 56.62±36.65, Control: 77.7±27.44 to 61.2±23.71).

**Conclusions:** The educational intervention proved to be effective in improving serum P in Lebanese HD patients, but it was not effective on QOL parameters. Among the problems we faced in collecting QOL from patients was that most did not receive things that are able to complain about their health, and instead thanked God for their current situation. Our findings suggest the need for developing a culturally sensitive QOL instrument that would be able to detect QOL in religious and oriental cultures.
Conclusions: Our findings show that administration of ACE-I induces dose dependent antiproteinuric effects only after several hours, and no residual effect lasts over the 24 hours. Also, this finding suggests that an antiproteinuric effect lasting 24-hour could be obtained administering the drug in two daily doses and that higher dosage induces higher effect.

SP134 

AGE-RAGE SYSTEM AND TUBULOINTERSTITIAL INJURY IN A MOUSE REMNANT KIDNEY MODEL

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Introduction and Aims: Tubulointerstitial injury is one of the common features of patients with chronic kidney disease (CKD). Advanced glycation end products (AGEs) are elevated in patients with diabetes mellitus and end-stage renal failure (ESRD), whose serum and tissue levels might be strongly associated with mortality in these patients. Further, binding of AGES to receptor for AGES (RAGE) induces reactive oxygen species (ROS) generation and subsequently evokes tubular injury in experimental diabetic model. However, whether and how AGES-RAGE system could be regulated in non-diabetic CKD model such as remnant kidney model has not been elucidated. Therefore, we investigated whether serum AGES and intrarenal RAGE expression were increased and associated with tubulointerstitial injury in a mouse of subtotal nephrectomy (Nx), as a non-diabetic CKD model.

Methods: Ten-week old C57BL/6J mice were assigned to two groups (Nx: n=18 or sham: n=10). 5/6Nx was performed by surgical resection. Four weeks after the Nx, mice were euthanized and sacrificed for analysis. Urinary albumin and neutrophil gelatinase–associated lipocalin (NGAL) excretion and serum levels of AGES were measured. RAGE and type IV collagen expression were evaluated by western blotting and real-time PCR. Tubulointerstitial fibrosis was examined by periodic acid–Schiff (PAS) staining, respectively.

Results: Subtotal nephrectomy significantly increased the levels of blood urea nitrogen and creatinine (Cr), and decreased Cr clearance levels. Circulating CML and renal RAGE expression levels were significantly increased compared with those in sham-operated (Ctrl) mice. (305.60 ± 54.58 vs 529.53 ± 50.31, p=0.003, 1.07 ± 0.11 vs 4.2 ± 2.01, p=0.028, respectively) Urinary albumin and NGAL excretion were significantly higher than Ctrl mice (4.02 ± 0.11 vs 4.83 ± 0.62, p=0.030, 4.07 ± 0.66 vs 5.71 ± 0.31, p=0.017, respectively). Furthermore, type IV collagen mRNA expression was increased and tubulointerstitial fibrosis was exacerbated in the kidney of 5/6 Nx mice compared with Ctrl mice. (1.05 ± 0.01 vs 2.04 ± 0.58, p=0.037).

Conclusions: We demonstrated that induction of renal dysfunction increased circulating AGES levels, increased RAGE expression and tubulointerstitial injury in Nx mice. These observations suggest that AGES-RAGE system and tubulointerstitial injury may be correlated with each other, thereby being involved in the progression of tubulointerstitial fibrosis in CKD.

SP135 

URAL ALPHAL-1 MICROGLOBULIN CORRELATES WITH THE DEGREE OF SECONDARY RENAL TUBULOINTERSTITIAL FIBROSIS

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Introduction and Aims: Non-invasive testing of the kidneys has a limited ability to describe the condition of the renal tissue. It is desirable that we are able to distinguish between patients with chronic, irreversible scarring of the kidneys from those with active and potentially treatable lesions. We tested the ability of urinary alpha 1-microglobulin (Alm) to distinguish among patients with different degree of renal tubulointerstitial fibrosis.

Methods: In this multi-center study, we included patients who underwent diagnostic renal biopsy, whose primary diagnosis was other than acute or chronic tubulointerstitial nephritis, who had proteinuria (protein/creatinine ratio ≥150mg/mmol) and whose Alm/albumin ratio did not exceed 0.5 (to exclude patients who are likely to have a primary tubulointerstitial disease). Urinary levels of Alm, albumin (Alb) and creatinine (creat) were measured and urinary indexes Alm/Alb and Alm/creatin calculated. Tubulointerstitial (TI) fibrosis was graded 1 (0-5%), 2 (5-25%), 3 (25-50%) and 4 (50-100%) in the renal biopsy samples. We tested if Alm/Alb and Alm/creat differentiate among patients with different grades of TI fibrosis. We used non-parametric tests: Mann–Whitney U test and KruskalWallis ANOVA, and we performed ROC analysis to find the discriminating power of parameters.

SP131 

CONCLUSIONS: WITH LOW SG LEVELS, THERE WERE MANY MICROALBUMINURIA (ACR ≥ 0.3 mg/mmol). WITH NEGATIVE RESULTS, ESPECIALLY IF SG LEVELS WERE LOWER, THERE WERE MANY MICROALBUMINURIA (ACR ≥ 0.3 mg/mmol). WHEN SG LEVELS WERE LOWER, THERE WERE MANY MICROALBUMINURIA (ACR ≥ 0.3 mg/mmol). WHEN SG LEVELS WERE LOWER, THERE WERE MANY MICROALBUMINURIA (ACR ≥ 0.3 mg/mmol). WHEN SG LEVELS WERE LOWER, THERE WERE MANY MICROALBUMINURIA (ACR ≥ 0.3 mg/mmol). 

Table 1. Summary of study results

<table>
<thead>
<tr>
<th>Group</th>
<th>SG (mg/dl)</th>
<th>ACR (mg/mmol)</th>
<th>TP (g/dl)</th>
<th>SaO2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>100</td>
<td>0.3</td>
<td>7.2</td>
<td>95</td>
</tr>
<tr>
<td>Case 1</td>
<td>105</td>
<td>0.5</td>
<td>7.5</td>
<td>94</td>
</tr>
<tr>
<td>Case 2</td>
<td>110</td>
<td>0.7</td>
<td>7.8</td>
<td>93</td>
</tr>
</tbody>
</table>

Methods: We collected urine sample data from electronic medical records that were submitted simultaneously for urine chemistry and dipstick test. Urine samples were collected from adult (Age 16-98) patients. Six thousand nine hundred forty one random urine samples were tested for PCR and urine dipstick, and 3,874 samples for ACR and dipstick.

Results: The median values of PCR and UCR were higher in samples of high grade DP and low SG. When DP ≥ (100 mg/dl) and over or 1+ (30 mg/dl) with SG ≤ 0.10 or trace with ≤ 0.05 were used as selection criteria, the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) for detection of proteinuria (PCR ≥ 500 mg/g) were 89.6%, 87.7%, 87.5% and 89.8% respectively. When more than trace was used, the sensitivity, specificity, PPV and NPV for detection of microalbuminuria (ACR ≥ 0.3 mg/mmol) were 60.2%, 86.6%, 85.6% and 62.0% respectively. With negative results, especially if SG levels were lower, there were many microalbuminuria cases.

Conclusions: Combination of DP and SG value is more useful to estimate PCR and to detect overt proteinuria cases than DP only.
null
of the disease are primordial towards an improved disease management. To attain this goal there is a clear need for novel biomarkers. In recent years, the so-called omics approach emerged as a powerful tool for biomarker discovery. The objective of this work was to perform a systematic concept meta-study for CKD.

Methods: Serum samples from CKD patients at stage 3 (n = 20), at stage 5 on hemodialysis (n = 19) and from healthy controls (n = 20) were monitored on a holistic metabolomics platform combining reversed-phase liquid chromatography coupled to high-resolution four-time-of-flight mass spectrometry (LC-Q-TOF MS) in both negative and positive ionization mode and gas chromatography coupled to quadrupole mass spectrometry (GC-MS). The methodological validity was ensured by use of quality control (QC) samples in the analytical setup, and by a thorough data analysis strategy for both the MS and the LC-MS part.

Results: A substantial portion of the serum metabolome was covered. Ninety-six metabolites were identified. Forty-five metabolites were already known in the context of CKD (6 downregulated and 39 upregulated) while 51 metabolites were yet unknown (16 downregulated and 35 upregulated). Of the latter, 5 metabolites were found to be significantly increased (fold change ≥ 5) at CKD stage 3 compared to control. These metabolites were the sulfate and glucuronide conjugate of 3-hydroxyhippuric acid and 2-hydroxyhippuric acid (salicylic acid) (p < 0.001), hydroxyproline (p < 0.00005), urinary marker of glucuronic acid (p < 0.00005) and a hexose based tetrasaccharide (C12H14O13) (p < 0.0005).

Conclusions: Further targeted analysis in an increased study population will be performed to validate and quantify these novel, potential biomarkers across all CKD stages.

SP140 MASS SPECTROMETRY- AND ANTIBODY-BASED PROTEOMICS OF THE HUMAN KIDNEY AND URINE
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Introduction and Aims: Functions of the kidney and nephron segments are obituary known, however, the precise details have not been clarified. Pathophysiological mechanisms of human kidney diseases have also not been disclosed yet. Proteomics is a powerful tool to analyze tissues or urine to understand the functions, protein interactions (pathways) and pathophysiology.

Methods: Normal parts of tissues (cortex, medulla and glomerulus) were obtained from autopsy necropsies due to renal cancers. Urine samples were also collected from healthy volunteers. Proteins were separated by gel electrophoresis and peptides were prepared by in-gel trypsin digestion for mass spectrometry (MS). Sections of nephron segments were taken by laser-microdissection from normal human kidney sections, which were immunostained with anti-AQP1, calbindin and AQP2 antibodies, for identification of each segment (proximal, distal tubules and collecting duct, respectively). Glomerular sections were also collected from kidney biopsy samples of disease patients (membranous nephropathy, IgA nephropathy and others). The peptides were prepared by direct digestion of these sections with trypsin (On-Site Direct Digestion) method for MS. Antibody (Ab)-based analysis of human tissues have been carried out in the Human Protein Atlas (HPA) project and more than a half of human proteins have been localized in the human body and in the kidney by immunohistochemistry (IHC).

Results: MS identified more than a thousand proteins with high confidence in each component of the normal human kidney. The Ab-based proteomics disclosed thousands of proteins in the kidneys. Comparison of the MS-based and Ab-based glomerular proteins revealed approximately 80% of proteins were also identified by MS or Ab, were detected by both MS- and Ab-based methods. About a half of urine proteins identified by MS were also found in human plasma proteins. Urine proteins, which were not plasma proteins, were localized in the kidney and other urinary tract by looking at the HPA IHC images. The localization of urine proteins were summarized in a human urine proteome database. By MS analysis of human glomerular sections of each kidney biopsy samples, approximately a thousand proteins were identified and were further analyzed by bioinformatics to understand pathophysiology of kidney diseases.

Conclusions: Proteomic analyses of human kidney tissues and urine provided function- and disease-related information. These data were combined in a kidney and urine proteome database for public use.

SP141 INFLUENCE OF CYP3A5, CYP2C8 AND ABCB1 POLYMORPHISMS ON TACROLIMUS-INDUCED NEPHROTOXICITY IN LIVER TRANSPLANT RECIPIENTS
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Introduction and Aims: The nephrotoxicity of calcimun inhibitors (CNI) remains the dominant causative factor for kidney failure in nonkidney organ transplant recipients, especially in liver transplant recipients. The possible influence of single nucleotide polymorphisms (SNPs) including cytochrome P450 3A (CYP3A) subfamily, CYP2C8 and P-g (ABC B1) on CNI induced renal injury in liver transplant recipients have recently been indicated as one of the most important factors. The purpose of this study was to explore the association between known ABCB1, CYP3A5 and CYP2C8 polymorphisms and the risk of developing tacrolimus (Tac) associated nephrotoxicity in liver transplant recipients.

Methods: A total of 136 living donor liver transplant recipients (107 men and 29 females) and 150 healthy controls (120 males and 30 females) were enrolled in this study. All the recipients had normal renal function (normal Cystatin C and normal the LC-MS/MS) before transplantation and received Tac-based immunosuppressive regime (Tac+MMF+ prednisone) afterwards. CYP3A5, CYP2C8 and ABCB1 SNPs were assessed by polymerase chain reaction (PCR) and high-resolution melting curve analysis (HRM analysis). The trough concentrations of Tac were measured by enzyme-linked immunosorbent immunoassay technique (ELISA). We also detected serum Cystatin C (Cys-C) and urine microproteins including α1 microalbumin (α1M), microalbumin (MA), transferring (TRU) and IgG (IgG) among 136 alive-liver recipients to evaluate whether they have early renal injury and the probable location of the renal lesion.

Results: We could clearly distinguish three genotypes of CYP3A5*3 and ABCB1, while only two genotypes of CYP2C8 were identified in 136 recipients included. The genotype frequencies of the recipients did not show significant deviation from the Hardy-Weinberg equilibrium (P>0.05). The levels of Cystatin C as well as all the four urine micro-proteins in the recipient group were significantly higher than those in the control group (P<0.05). There was a significant difference in TRU concentration instead of other three microproteins among patients with different CYP3A5 genotypes (P<0.05). The concentrations of α1M and Cys-C in recipients with CYP2C8*3*1 were significantly higher than that in the recipients with CYP2C8*1*1 (all p<0.05). Regarding MDR1 SNPs C3435T and C3435T, no significantdifference was found In Cys-C and urine microproteins among different genotypes.

Conclusions: CYP3A5*3 and CYP2C8*3 may have predictive value on the risk of Tac-induced nephrotoxicity. CYP3A5*3 was associated with the risk of early glomerular injury, while CYP2C8*3*1 was associated with the risk of early tubulointerstitial injury. ABCB1 genotypes (both C3435T and C3435T) were irrelevant to the Tac-induced nephrotoxicity in liver transplant recipients.
BARIATRIC SURGERY IN OBESE PATIENTS IS ASSOCIATED WITH REDUCTION OF ALBUMINURIA AND CARDIOVASCULAR RISK FACTORS

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Introduction and Aims: Obesity is a health problem with epidemiological proportions and has recently been associated with chronic kidney disease and albuminuria. Extreme obesity (body mass index [BMI] > 40 kg/m2) is associated with cardiovascular disease, type 2 diabetes, dyslipidemia, and hypertension. Bariatric surgery (BS) is an effective means of achieving long-term weight loss. Improvement in albuminuria has been also reported. The objective was to evaluate, at a weight control center in a community hospital setting, the effect of weight loss after BS on blood pressure (BP), renal parameters and cardiovascular risk markers.

Methods: We performed a prospective study in 71 obese adults who had undergone gastric bypass surgery. Clinical and laboratorial data were evaluated at baseline and 1, 6 and 12 months after surgery.

Results: Our cohort of 71 patients had a mean age of 46.1±11.4 years, 84.7% female and 76.3% caucasian, with a mean BMI of 44.5±5.3 (33.7-50.3). At baseline 55.6% had BP > 140/90 mmHg, and 45.8% had type 2 diabetes. During the 10.4±5.3 months of follow-up (6 months postoperative), a decrease occurred in BMI (44.2±5.6 kg/m2 to 30.7±12 kg/m2; p<0.0001), excess body weight (113.6±19.5 kg to 78.9±13.5 kg; p<0.0001), systolic BP (134±23.9 to 116±11.5 mm Hg; p=0.01), diastolic BP (81±13.2 to 67±4.9 mm Hg; p<0.0001), total cholesterol (182±39 to 169±36,3 mg/dl; p=0.004), triglycerides (136±66.6 to 97.7±40.9 mg/dl; p<0.0001), proteinuria (3.1±1.3 to 0.4±0.8; p<0.0001), oral antidiabetics (0.9±1.2 to 0.3±0.6; p=0.0001) and dyslipidemic medication (6.0±7.0 to 3.0±5.4; p=0.0001). From five to the twelve patients treated with insulin stopped this medication. The majority (53.3%) of the patients with significant preoperative albuminuria lowered their albumin excretion levels (urinary albumin creatinine ratio [UACR]) from a median of 52.1 mg/g to a median of 12.3 mg/g; p<0.0001). All parameters improved at 12 month after BS. There was no significant difference in UACR reduction between diabetes and non diabetics (pNS). In multivariate analysis (binary regression), there was a significant association between higher percentage of weight reduction (> 18%) and higher UACR reduction at 6 months (p=0.007, Exp(B): 3.0, CI 0.41-7.24, even when adjusted for age, diabetes mellitus and hypertension.

Conclusions: In this study of obese patients submitted to BS there was a significant reduction in UACR during the follow up time. There was also an association between higher percentage of weight reduction (> 18%) and higher UACR reduction at 6 months. Simultaneously, this surgery had a positive impact in major cardiovascular risk factors, such as BP, dyslipidemia and type 2 diabetes.

PREPROTEOGLYCANS AND GLYCOSAMINOGLYCANS TRANSCRIPTOMIC ANALYSIS SHOWED A SPECIFIC PROFILE IN CHRONIC KIDNEY DISEASE PATIENTS

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Introduction and Aims: Chronic kidney disease (CKD) patients, particularly in more advanced stages, bear a higher risk of cardiovascular events compared to the general population. However the systemic machinery associated to this condition and the contribution of microinflammation to this complex event is still not completely defined. Additionally, numerous reports have suggested a link between kidney disease, albuminuria and cardiovascular disease. Here we examined the relationship between increased glycated hemoglobin (HbA1c) and cardiovascular disease markers in CKD patients.

Methods: To identify dysregulated elements possibly involved in this multifactorial process, we measured the expression level of 132 genes involved in glycosaminoglycans/proteoglycans metabolism in peripheral blood mononuclear cells (PBMCs) of 5 healthy subjects (HS), 9 chronic kidney disease II III K/DOQI stage (CKD II-III), 10 peritoneal (PD) and 17 hemodialysis (HD) patients by microarray analysis.

Results: Statistical analysis identified 67 genes discriminating HD/PD patients from HS/CKD II-III subjects (p<0.001, FDR<5%). Thirty-four genes were up-regulated (e.g., VEGFA, HPSE, PCAN, SOD1, CHSY1) and 33 down-regulated (e.g., IDS, HEXA, DMD, SNRB2) in HD/PD compared to HS/CKD II-III. We found only a slight and not significant difference in the transcriptomic profile between HS and CKD II-III (p>0.04). Additionally, 14 genes were up-regulated in CKD II-III compared to HS (p<0.04).

Conclusions: Our results demonstrated an active and highly dynamic PBMCs biological machinery involved in the GAGs/PGs metabolism in CKD and they add new insights towards understanding the systemic molecular link between microinflammation, endothelial dysfunction and chronic kidney disease and it reveals new potential diagnostic bio-markers and targets useful for innovative therapeutic interventions.

RENAI TISSUE OXYGENATION AS MEASURED WITH BOLD-MRI IN PATIENTS WITH CHRONIC KIDNEY DISEASE IN COMPARISON WITH ARTERIAL HYPERTENSION AND HEALTHY CONTROLS

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Introduction and Aims: Animal studies have suggested that renal tissue hypoxia plays an important role in the pathogenesis of chronic kidney disease (CKD), yet data in humans are sparse. We are actually assessing cortical and medullary oxygenation in patients with CKD using blood oxygen level-dependent magnetic resonance imaging (BOLD-MRI).

Methods: Patients with CKD stage 1-5 (all causes except polycystic kidney disease) recruited at our outpatient clinic undergo BOLD-MRI under standardized hydration conditions. Four coronal slices are selected over both kidneys, and a multi gradient echo sequence is used to acquire T2* weighted images. The mean cortical and medullary R2* values (=1/T2*) based on a total of 16 regions of interest placed per kidney. R2* is a reliable T2* measure that reflects renal oxygenation. T2* values are obtained from the renal cortex, medulla and corticomedullary junction at each slice.

Results: We examined 75 CKD patients (69% male), 54 AHT patients (67% male), and 43 controls (48% male) in a total of 55 (mean=35) respectively 57±15, 57±12 and 46±13 years, with eGFR<60, 91±16, and 93±16 ml/min/1.73m2, and urinary sodium excretion of 172±94, 176±96, and 155±74 mmol/24h. Overall, cortical R2* (17.9±15.1, 17.4±12.1 vs 17.3±11.8 sec-1, p ANOVA=0.1) and medullary R2* values (29.3±20.7, 28.7±12.1 vs 28.3±10.9 sec-1, p=0.32) did not vary significantly between CKD, AHT and healthy subjects. In multivariate linear regression, adjusted for age, sex, smoking, hemoglobin level and 24h urinary sodium excretion, cortical and medullary R2* were not associated with eGFR or blood pressure.

Conclusions: In this interim analysis, R2* as a measure of kidney oxygenation is not altered in CKD patients, suggesting that kidney oxygenation is tightly maintained over a broad range of kidney function.

PREDICTION OF DETERIORATION IN RENAL FUNCTION BY MRI AND URINARY MARKERS

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Introduction and Aims: Recent studies have shown that magnetic resonance imaging (MRI) of the kidney can be useful for detecting renal dysfunction as well as morphological abnormalities. However, how functional indices in MRI correlate with glomerular and tubular injuries in the kidney remain unclear. Here we examined the relationship between glomerular filtration rate (GFR), an index in renal MRI and urinary markers in patients with chronic kidney disease (CKD).

Methods: Fifty-seven patients with CKD were consecutively recruited to this study and divided into patients with estimated GFR (eGFR) > 60 ml/min/1.73 m2 (G1-2 group, n=31), patients with eGFR being 30-59 ml/min/1.73 m2 (G3 group, n=12) and non-renal hemodialysis patients with eGFR<30 ml/min/1.73 m2 (G4-5 group, n=14). As urinary markers, we determined urinary protein, urinary N-acetyl-beta-D-glucosaminidase (NAG), urinary alpha-1 microglobulin (A1MC), urinary beta-2 microglobulin (B2M). In MRI study, apparent diffusion coefficient (ADC), which reportedly reflects tubulo-interstitial fibrosis, was calculated according to the method by total water fraction with the ADC code.

Results: In the study subjects, 91% and 18% of patients were hypertensive and diabetic, and the incidences were similar in the G1-2, G3 and G4-5 groups. ADC in the CKD G4-5 group was significantly lower than in the other two groups (1.38±0.18 in G4-5 vs. 1.65±0.17 in G1-2 and 1.53±0.14 in G3, p>0.05). In the cross-sectional analyses using
all study subjects, eGFR was positively correlated with ADC (r=0.55, p<0.05) and negatively correlated with A1MG (r=–0.68, p<0.05). On the other hand, there were no significant correlations between eGFR and levels of NAG, B2MG or urinary protein. ADC was negatively correlated with A1MG (r=–0.34, p<0.05), but not with NAG, B2MG or urinary protein. We could follow up 24 patients for more than 6 months (720 days on average). In the longitudinal analyses of their data, change in eGFR during follow-up period (delta-eGFR, ml/min/1.73 m²) was negatively correlated with urinary protein (r=–0.69) and with A1MG (r=–0.60, p<0.05). However, correlation between delta-eGFR and ADC did not reach statistical significance (r=0.36, p=0.09).

Conclusions: Declined ADC in MBI indicates reduction in GFR. Of urinary markers examined in the present study (NAG, A1MG, B2MG, urinary protein), only A1MG is useful for detection of declining GFR. In prediction of renal prognosis, A1MG and urinary protein levels appear to be better markers than ADC.

### SP147 A SIMPLE SCORING ALGORITHM USING SERUM FREE LIGHT CHAINS FOR THE RISK ASSESSMENT OF PROGRESSION OF CHRONIC KIDNEY DISEASE

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**Introduction and Aims:** There is a major need for accurate risk stratification for patients with stage 4 CKD, as the majority of patients progress to end-stage kidney disease (ESKD) as defined by a requirement for renal replacement therapy (RRT), the majority do not. Here we propose an algorithm utilizing polyclonal combined serum free light chains (cFLC; κ, λ) as a marker of kidney function and adaptive immunity, in combination with routinely measured laboratory data to optimise the identification of those at no risk of progression to ESKD within 12 months.

**Methods:** Baseline sera from 561 stage 4 CKD patients (University Hospital Birmingham [UHB] n=201, Chronic Renal Insufficiency Standards Implementation Study [CRISIS] n=205 and Renal Insufficiency in Secondary Care [RISIC] n=155) had FLC measured using the Freelee1 assay (The Binding Site Group Ltd, UK). Results were used in combination with other laboratory assessments to develop the model (initially in UHB and validated in CRISIS and RISIC).

**Results:** The algorithm comprising cFLC<120μg/mL, cFLC<20μl/min/1.73m², A1MG<30mg/mmol, and phosphate<1.4mmol/L was developed. By 12 months identified 7 risk factors (including cFLC, ACR, phosphate and eGFR) being associated (p<0.001). During this period 60 patients progressed to RRT. Univariate analysis in the UHB population (median follow up 1483 days [range 22-2906]), cFLC in UHB and validated in CRISIS and RIISC).

**Conclusions:** A simple scoring algorithm using serum free light chains is a useful tool in risk stratification of patients with stage 4 CKD. This tool may help identify patients at no risk of progression to ESKD within 12 months.

### SP148 PLASMA PTH LEVELS MEASURED WITH THE 3RD GENERATION 1-84 PTH ASSAY IN PATIENTS WITH DIFFERENT STAGES OF CHRONIC KIDNEY DISEASE

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**Introduction and Aims:** Previous guidelines derived from studies that used the Allegro intact PTH assay, which measures both the full 1-84 PTH molecule as well as the 7-84 PTH inactive fragment, recommended that patients with different chronic kidney disease (CKD) stages (CKD stages 3–5) be managed in order to maintain plasma PTH within a given range, which was fixed between 150 and 300 μg/ml in CKD stage 5 patients. Several methods of intact PTH assay are available and a wide inter-method variability in the PTH results has been shown and opposite therapeutic attitudes may be reached in a single patient depending on the PTH assay used. A new 3rd generation PTH assay, which measures only the full length molecule, is currently available. The aim of the present study was to define PTH ranges using this assay in patients with different stages of CKD.

**Methods:** A series of 141 patients (65 females and 76 males, age 21-89 yr) with CKD stage 3-5 followed in a tertiary care center were enrolled in the study. Patients were classified according to the estimated GFR (eGFR, stage 3: n=46; stage 4: n=42; stage 5: n=53). Plasma PTH was measured using the 3rd generation LIAISON® 1-84 PTH assay (DiaSorin; normal range 5-40 pg/ml). Serum bone specific alkaline phosphatase (BASP; normal range 16-26 μg/ml), serum C-terminal telopeptide (S-CTX; normal range 0.7-1.43 ng/ml) and 25OH vitamin D (25OHD; normal range 4-64 ng/ml) were also measured. Finally, in a subgroup of patients (n=80) plasma intact PTH was measured using the 2nd generation LIAISON® N-tact®PTH (DiaSorin).

**Results:** Plasma 1-84 PTH was increased in the majority (72%) of our patients and there was a significant negative correlation with the eGFR (r=–0.46, P=0.001). Conversely, a significantly positive correlation was found between plasma 1-84 PTH and BSAP (r=0.23, P=0.008) and S-CTx (r=0.31, P=0.001), and a no correlation with 25OHD and age. A significantly high positive correlation was found between plasma 3rd generation 1-84 PTH and intact 2nd generation PTH concentrations (r=0.44, P<0.001). The table summarizes the plasma PTH levels in patients sub-divided according to the different CKD classes. Results are expressed as mean±SD.

**Conclusions:** The plasma PTH levels, measured by the 3rd generation 1-84 PTH assay, nicely segregate patients with different stages of CKD and could provide a reference point for managements of CKD patients across the various stages of CKD.

### SP149 THIRD GENERATION BIO-INTACT PTH ASSAYS PRODUCE RESULTS WHICH ARE BETTER CORRELATED WITH BIOCHEMICAL AND SKELETAL PARAMETERS IN CKD PATIENTS THAN DO SECOND-GENERATION INTACT PTH ASSAYS – NOW IS IT TIME TO MOVE ON AND CHANGE OVER?

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**Introduction and Aims:** As CKD becomes more severe, PTH levels in the blood increase. As well as PTH (1-84), PTH (7-84) – and many other fragments of PTH – accumulate in the bloodstream of patients with severe CKD, particularly those receiving dialysis. Using traditional assays, even 'intact' PTH assays, the presence of PTH (7-84) typically leads to an overestimation of concentrations of biologically active full-length PTH, further compounded by the longer half-life of these fragments. True 'biointact' PTH assays are now available for use. We wanted to compare analytical data from both the second and third generation PTH assays with Roche Elecsys EDTA-plasma intact PTH (1-84) (Roche Diagnostics, Basel) assays using CKD and dialysis cohorts - splitting blood samples to record PTH concentrations in parallel.

**Methods:** Serum calcium, phosphate, creatinine, bone specific alkaline phosphatase (BAP), Tartrate-resistant acid phosphatase-5b (TRACP-5b) were determined in 79 healthy ambulant CKD (stage 2-4) patients. Bone mineral density (BMD) was determined by DXA scan at the fore-arm (FARM), lumbar spine (LS), femoral neck (FN) and total hip (TH). PTH was analysed by both the second and third generation PTH assays. The relationship between the 2 PTH assays with the biochemical parameters and BMD was compared.

**Results:** 79 healthy ambulant CKD (stage 2-4) patients - 41M, 38F, mean±SD age of 53±10 years. Inter and intra- assay CV’s were - 2% for both PTH assays at mean concentrations of 41, 105, 131 pg/ml. The results from the two assays were closely correlated (r=0.958, p<0.001). The intact (second generation) PTH concentration was significantly higher 79[55] pg/ml compared to third generation PTH (68 [49] pg/ml (p<0.001). Bland-Altman plot revealed a significant average bias of -18%. Only the biointact PTH assay showed any significant correlation with serum calcium concentrations (r = 0.26, p < 0.05) and phosphate (r=0.32, p<0.05). BMD was better correlated with intact PTH than with intact PTH, especially at the FARM and LS (z score FARM r = 0.33, p<0.009 cf r = 0.26, z score LS r = 0.34, p=0.006 cf r = 0.29, p=0.02).

**Conclusions:** PTH and calcium concentrations are normally very tightly coupled. The improved correlations between plasma PTH (but only when measured by the biointact assay) and bone mineral density also point to more relevant functional
HbA1c IS AN INDEPENDENT RISK FACTOR FOR MORTALITY BUT NOT FOR END STAGE RENAL DISEASE IN NON DIABETIC CKD PATIENTS

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Introduction and Aims: Glycated hemoglobin (HbA1c) is used as a diagnostic test for diabetes (DM) with an usual threshold of 6.5%. The association between higher HbA1c and progression for end-stage renal disease (ESRD) and mortality has been demonstrated in the diabetic population. The aim of this study was to examine the association between HbA1c and these endpoints in a non diabetic chronic kidney disease (CKD) population.

Methods: In the NephoTest cohort study, we measured glomerular filtration rate (mGFR) by Cr-EDTA clearance and HbA1c in 1162 adult patients with non-dialyse CKD stages 1 to 5 and no DM (HbA1c value< 6.5%, fasting glycemia<7mmol/L, absence of known DM or hypoglycemic treatment). Deaths and ESRD (initiation of serum creatinine on progression of CKD (hazard ratio, 2.852 for AKI episode vs. 1.046 for age vs. 1.043 for baseline GFR).

Results: Even in stable stage 2 and stage 3 ambulatory patients, silent AKI episodes were strongly thought to be a powerful risk factor for progression of CKD. Multi-sided approach to develop tools for prevention, early detection, or stratification should be continued to improve the ultimate prognosis.
Conclusion: In a CKD cohort, HbA1c within normal range in non diabetic patients is associated with ESRD occurrence and mortality. The later persists even after adjustment for known risk factors. Since HbA1c is correlated with insulinemia and osteosclerosis, various hypotheses including metabolic or inflammatory pathway must be explore to better understand these results.

**SP154** EFFECTS OF ZINC SUPPLEMENTATION ON PLASMA HOMOCYSTEINE LEVEL IN ESRD PATIENTS: A DOUBLE BLIND RANDOMIZED CLINICAL TRIAL

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Introduction and Aims: Increased homocysteine (hCys) level is considered as an independent risk factor for cardiovascular complications in end stage renal disease (ESRD) patients. The aim of this study was to determine the effects of Zinc supplementation on serum hCys level in ESRD patients.

Methods: One hundred ESRD patients with Zinc deficiency were enrolled in this prospective, randomized, double blind study. They were randomly subdivided into two groups and supplemented with 50 mg/day Zinc (Zinc treated group) or placebo (placebo treated group) for 6 weeks. Fasting plasma hCys and Zinc levels were measured before treatment, and 43 days after the start of the study. An enzyme immunoassay (EIA) was used to measure total hCys. Serum plasma Zinc level was measured with atomic absorption method. The data were analyzed using the SPSS 15.0 and p < 0.05 was considered significant.

Results: Serum Zinc levels increased significantly in Zinc treated group (56.9±13.9 g/dl versus 120.8±26.9 g/dl; p < 0.0001). There was no significant change in Zinc levels in the placebo-treated group. Serum hCys levels were also significantly reduced in the Zinc treated group (17.1±4.4 μmol/L versus 13.20 ± 3.7 μmol/L; p<0.0001), while no significant change was observed in the placebo group. Mean percentage reduction of hCys was 21.5±18.3 in Zinc treated group compared to 1.2±16.1 in placebo group (p<0.0001). Mean percentage reduction of hCys level positively related with baseline hCys was (r=0.327; P<0.001). Mean percentage reduction of hCys level positively related with baseline hCys was (r=0.327; P<0.001).

Conclusions: Zinc supplementation leads to a reduction in serum hCys levels in ESRD patients with Zinc deficiency.

**SP156** ARE GFR ESTIMATING FORMULAS INACCURATE IN OBESE PATIENTS?

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Introduction and Aims: The increasing prevalence of obesity, especially in the Western world is associated with the risk to develop renal disease or accelerate the progression of renal disease. Adequate estimation of renal function in obese is thus essential. Recently, CKD-EPI formula was recommended as the most reliable method to estimate GFR, but this formula was not validated in patients with extreme variations of weight, and especially in obese patients.In this study, we measured GFR in obese patients and compared the performance of creatinine-derived equations with measured GFR indexed or not to body surface area (BSA) and using either real or ideal body weight (BW).

Methods: A total of 218 obese patients were included (126 men [57.8 %] aged 17 to 87 years). They all had nephropathy of various origins and were selected according to the criteria a body mass index (BMI) ≥ 30 kg/m2. The mean BMI was 34.8 ± 4.6 kg/m2 (30 to 67). Twenty-three patients have a BMI > 40. We determined GFR with creatinine-derived equations, MDRD and CKD-EPI formulas (eGFRMDRD and eGFRCKD-EPI) (enzymatic assay of serum creatinine standardized to IDMS). These formulas were compared to the gold standard method inulin clearance not indexed to BSA (mGFR mL/min) or indexed with BSA either with actual body weight (BW) (mGFRreal mL/min/1.73m2) or ideal BW (mGFRideal mL/min/1.73m2). The ideal weight was determined by Lorentz formula. The BSA was determined by Dubois and Dubois formula.

Results: mGFRreal (51.8 ± 24.2) was significantly lower (p > 0.01) than mGFRideal (61.9 ± 28.3) or mGFR not indexed to BSA (60.2±28.0). eGFRMDRD and eGFRCKD-EPI were respectively 57.7±27 and 60.6±28.0. They were not statistically different. There was no significant difference between creatinine-derived formulas and mGFR not indexed to BSA or mGFRideal. But mGFRreal was significantly lower than the formulas (p < 0.01). Bias and accuracy are shown in the following table.

Conclusions: As nephron mass depends on lean mass rather than fat mass, GFR in obese patients should be indexed to BSA using ideal body weight. Since there was no difference between CKD-EPI formula and mGFRideal measured by inulin clearance and the performance of this formula was better than MDRD in terms of accuracy and bias, we recommend the use of CKD-EPI in obese patients.

**SP157** NUTRITION ASSESSMENT AND RISK PREDICTION IN DIALYSIS PATIENT - A NEW INTEGRATIVE SCORE

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Introduction and Aims: Malnutrition is common in patients with end-stage kidney disease on hemodialysis, and is associated with poor outcome. A number of studies have documented malnutrition as a powerful predictor of morbidity, mortality and an

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**Bias and accuracy**

<table>
<thead>
<tr>
<th>Accuracy30%</th>
<th>Bias (mL/min/1.73m²)</th>
</tr>
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<tbody>
<tr>
<td>mGFRreal</td>
<td>mGFRideal</td>
</tr>
<tr>
<td>MDRD</td>
<td>79.3 %</td>
</tr>
<tr>
<td>CKD-EPI</td>
<td>72%</td>
</tr>
<tr>
<td></td>
<td>+5.9δ</td>
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a = p < 0.01 vs MDRD
b = p < 0.01 vs MDRD
increased hospitalization rate in ESRD. It is recognized that no single alternative objective test is able to determine the overall nutritional status in ESKD patients. Several methods of nutritional risk evaluation are known: the Subjective Global Assessment (SGA), the Malnutrition-Inflammation-Score (MIS), the Objective Score of Nutrition on Dialysis (OSND). We have developed a new score, Integrative Clinical Nutrition Dialysis Score (ICNDS). The score is based solely on biochemical parameters routinely taken monthly from HD patients, as well as their weight change, in order to assess nutritional status and detect deterioration as early as possible, thus preventing further complications.

Methods: In an attempt to develop a simple nutritional status score of HD patients, we used laboratory tests parameters, routinely taken monthly before starting dialysis session: Albumin, Creatinine, Urea, Cholesterol, CRP, K/V and the patient’s weight change. Each of the above parameters was given a scoring value of 1-5. A score of five for each parameter value close to the NKF-K/DOQI Nutrition Guideline Recommendations, and a lower score for sub-optimal values. Scoring results for all parameters were summed each month and a final result, a number between 0-100, was given for each patient. A higher score indicates a tendency towards a good nutritional status, a lower score represents malnutrition.

Results: In 63 patients, score results were significantly correlated with nutrition evaluation by the SGA within the same month (r=0.82, P<0.01). In 179 patients, followed for 31 months, baseline score emerged as a significant inverse predictor of mortality and hospitalization frequency: For every unit increase in baseline score, death odds as well as hospitalization frequency were significantly decreased (mortality: HR=0.929, 95% Cl 0.88-0.974, p=0.002; hospitalization frequency: HR=0.799, 95% Cl 0.726-0.881, p=0.0001). A unit increase of slope of 3 monthscorres at beginning of study significantly reduced mortality and hospitalization risk (mortality:HR=0.485, 95% Cl 0.278-0.847, p=0.011; hospitalization frequency: HR=0.77, 95% Cl 0.726-0.881, p=0.0001). A threshold score level of 75 was found to be a significant outpatient: Score greater or equal to 75 significantly reduced mortality. Worsening nutrition status over time indicated by both score and slope significantly increased death hazard.

Conclusions: We have developed a convenient tool to address the need of a monthly routine follow up of nutrition status and identification of nutritional deterioration at its beginning. The Model provides for a high resolution of various nutritional status and their prognosis.

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**SP158**

**ESTIMATION OF THE PREVALENCE OF CKD IN HEALTHY SUBJECTS BY FOUR DIFFERENT EQUATIONS**

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Introduction and Aims: To calculate the prevalence of CKD in a sample of healthy Spanish individuals, we compared the 24h creatinine clearance rate corrected by body surface area (CCr), Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation, Cockroft-Gault formula corrected by body surface area (CG), the abbreviated Modification of Diet in Renal Disease (MDRDa) equation and the Mayo Quadratic (MQ) formula to determine glomerular filtration rate (GFR) in patients from a nephrology consultation.

Methods: 1067 healthy patients were enrolled in the present study. Patients were carefully instructed about the 24h urine output collection by the same nurse. GFR was estimated using five methods: CCr, CKD-EPI, CG, MDRDa and MQ equations. The statistical analysis was performed using SPSS Statistics 19.

Results: Figure 1 summarizes the % of individuals with GFR <60 ml/min according to the different equations: Figure 2 represents the correlation between Scr, CCr and the eGFR equations. We found a positive correlation (p=0.03) between urinary Na, Mg, P and Ca and GFR measured by all equations, and a negative correlation (p=0.02) between all equations and SCr, serum glucose and age.

Conclusions: The prevalence of CKD in the Spanish population is 6.8%, according to the results of the EPIRCE study. In our sample the percentage of patients classified as CKD varies widely depending on the method of evaluation used. CI-CG provides the highest average eGFR value, probably due to mistakes in the 24h urine recollection, followed by MQ equation, CG-BSA, CKD-EPI and MDRD. These differences are statistically significant (p<0.001). GFR equations are a useful tool in clinical practice, although they should be carefully considered, especially in patients with extreme weights or age. MQ equation seems the most precise equation to assess GFR in healthy patients, although neither method has an accuracy of 100%.

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**SP159**

**NOVEL METABOLITES ASSOCIATE WITH IMPAIRED KIDNEY FUNCTION AND KIDNEY FUNCTION DECLINE IN THE GENERAL POPULATION**

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Introduction and Aims: Small molecules are extensively metabolized and cleared by the kidney and may also play a role in the pathophysiology of chronic kidney disease (CKD).

Methods: Here we applied an untargeted metabolomics approach (GC/MS and LC/MS/MS assays by Metabolon) to measure the concentration of a broad spectrum of more than 400 known and unknown molecules in the general population-based KORA study (maximal n=1735). Metabolites were then related in linear or logistic regression analyses to both eGFR estimated from serum creatinine or cystatin C cross-sectionally, as well as to annual eGFR change based on serum creatinine over a mean of 7 years, all adjusted for known kidney disease risk factors.

Results: Significant cross-sectional associations with both creatinine- and cystatin C-based eGFR were identified for 114 metabolites accounting for multiple testing. Published cross-sectional associations of serum acylcarnitines with lower eGFR were confirmed. Most remarkably, higher serum concentrations of c-glycosyltryptophan were associated cross-sectionally with lower eGFR (P= 8.9 x 10^-9) for creatinine-based eGFR, P= 1.0 x 10^-6 for cystatin C-based eGFR and presence of CKD (eGFR < 60 ml/min/1.73 m², P= 1.1 x 10^-6). It was also associated with longitudinal kidney function decline even after adjustment for baseline kidney disease risk factors and creatinine-based eGFR (P= 8.7 x 10^-6). The pair-wise Pearson correlation between serum c-glycosyltryptophan and creatinine-based and cystatin C-based eGFR was -0.61 and -0.71, respectively. Serum c-glycosyltryptophan has previously been described as associated with insulin clearance in smaller studies of humans and rats.

Conclusions: In the general population, serum c-glycosyltryptophan was associated with kidney function impairment measured by cross-sectional eGFR, as well as
neal dialysis. Further studies are needed to validate the observed associations externally and clarify the identity of all discovered molecules.

**SP160**  NEUTROPHILS ACTIVATION CORRELATES WITH INSULIN RESISTANCE IN END-STAGE RENAL DISEASE (ESRD) PATIENTS

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**Introduction and Aims:**Insulin resistance is often associated with chronic kidney disease, especially in ESRD patients requiring maintenance dialysis. During extracorporeal circulation at the time of hemodialysis procedure, activation of various cells takes place, including chronic activation of neutrophils. In consequence, concentration of human leukocyte elastase/alpha 1 protease inhibitor complex (HLE/alpha1PI) increases in plasma. The endothelial dysfunction related to repeated hemodialysis procedures may additionally exacerbate insulin resistance.

**Methods:**Fasting pre-dialysis blood samples were collected from 68 patients with ESRD, 29 women and 39 men, aged 60 +/- 12 years, treated with maintenance hemodialysis for median period of 60 (IQR: 36-100) months using reprocessed polylysulfon dialyser and low molecular weight heparin as anticoagulant. Patients with diabetes and acute inflammation were excluded. Control samples were collected from 35 healthy sex and age matched subjects. The concentrations of HLE/alpha1PI and insulin was measured by ELISA, CRP by nephelometry and glucose by routine method. Homeostasis model assessment index of insulin resistance (HOMA-IR) was calculated as: (fasting glucose concentration (mmol/l) x fasting insulin concentration (μIU/ml))/22.5.

**Results:**The concentration of HLE/alpha1PI in studied group was 50.81 +/- 16.50 μg/ml and was significantly higher than in controls (37.20 +/- 1.36 μg/ml; p<0.001). HLE/alpha1PI significantly correlated with insulin level (R=0.32; p=0.02) and HOMA-IR (R=-0.35; p=0.009). In multiple models, these correlations were independent of CRP concentration as a marker of inflammation.

**Conclusions:**Chronic neutrophil activation in ESRD is connected with insulin resistance independently on chronic inflammation. The consequence of insulin resistance expressed as increase insulin level and HOMA-IR are glucose metabolism disturbances and the increase of cardiovascular morbidity.
SP164  SURVIVAL ON LOW-PROTEIN DIETS: RESULTS OF A MULTIPLE CHOICE APPROACH

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Introduction and Aims: Concerns on the long-term safety of low-protein diets limit their use in Nephrology. In the discussion on the “low-protein moment” to start dialysis, attention switched from slowing of the kidney function decline to the effects of delaying dialysis on survival. The aim of the study was to analyse survival in a cohort of patients treated by low-protein diets, followed in the same setting in December 2007–September 2012, with regard to baseline clinical conditions and low-protein diet chosen.

Methods: Two main diets were offered, both at 0.6 g/Kg/day of proteins: a simplified low-protein supplemented diet (LPD-KA supplementation: Kesterson 1/10 Kg) and a low-protein diet employing “apatric” commercial food (LPD-ACP). Survival analysis was performed according to Kaplan Meier; multivariate analysis employed Cox model. The analysis took into consideration the period for which diet (up to dialysis start), or alternatively 1 year after the start of dialysis or the discontinuation of follow-up.

Results: 285 patients started a LPD (167 LPD-KA and 118 LPD-ACP); the two groups were non homogenous for age (median age LPD-KA: 68, LPD-ACP: 74 years (p=0.0001)) and GFR at start (LPD-KA: 18.8, LPD-ACP: 22.9 mL/min; p=0.0008); prevalence of comorbidity was high in both (68%, 94%) in line with the European population starting dialysis. No significant difference in patient survival was observed according to the diet (607 patient years (351 LPD-KA and 256 on LPD-ACP)); patient survival was significantly influenced by age and comorbidity, not by gender or baseline GFR. Survival equivalence was confirmed prolonging follow-up up to one year after dialysis start or discontinuation. As for “renal survival” a significant advantage of LPD-ACP was found in univariate analysis; the effect is lost if the combined outcome of death-start of dialysis is analysed, underlining the differences between the two populations and suggesting a substantial equivalence between the two diets. Mortality rates were 4 per 100 patient years on LPD-KA and 7 per 100 patient years on LPD-ACP, without differences after adjustment for age. The data compare favourably with mortality on dialysis, as reported on 3 Registries (Italy, France, USSDHS), both comparing the age-adjusted rates and considering only the follow-up of cases with GFR<15mL/min.

Conclusions: Our data support the safety of LPD, suggesting that the patients do not have a survival disadvantage as compared to dialysis, or may have on the contrary an advantage. The substantial equivalence between treatments supports the policy of allowing patients choosing the preferred diet option.

SP165  ENDOTHELIAL DYSFUNCTION IN CARDIARENAL SYNDROME

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Introduction and Aims: In cardiorenal syndrome endothelial dysfunction (ED) promotes the pathological processes and influences its course. This study investigates the features of the development of ED in cardiorenal syndrome.

Methods: We observed 48 patients (27 female and 21 male) aged 42-68 years (average age 54 ± 7.3 years). The cause of chronic kidney disease (CKD) in 18 cases was diabetic nephropathy, in 12 chronic glomerulonephritis, in 8 - ischemic renal disease, in 7 - chronic interstitial nephritis, in 3 - lupus nephritis, and in 2 - polycystic kidney disease. In 14 cases was determined the 2nd stage of CKD, in 16 - 3rd and in 18 - the 4th stage of CKD. All patients had 1-3 stages of heart failure (according to the NYHA). Functional state of endothelium was determined by the method of D.Celermajer (1992) by determining the change in brachial artery diameter after nitroglycerin and reactive hyperemia. Discovered disorders were more pronounced in patients with cardiorenal syndrome compared to those without it. With increasing stage of CKD, increases the degree of endothelial dysfunction, which can be explained by the increase of arterial hypertension, dyslipidemia, conducive to the development of atherosclerosis.

Results: Along with the clinical picture of renal and heart failure, hypertension, we observed hypoalbuminemia, hyperuricemia, dyslipidemia. The diameter of the brachial artery in patients with CKD was 4.41 ± 0.76 mm, which did not differ much from that observed in healthy people (4.73 ± 0.78 mm). In healthy people, after the application of nitroglycerin the artery diameter increased by 10.23%, and the measurements were not significantly different from those obtained from patients (an increase by 10.21%). Along with this, endothelium dependent vasodilation in healthy people increased by 13.4 ± 0.9%, while the increase in examined patients was only 6.7 ± 0.6%. Discovered dysfunctions were more pronounced in patients with cardiorenal syndrome compared to those without it. With the increase of CKD stage, we noted an increase in the degree of endothelial dysfunction, which can be explained by the increase of arterial hypertension, dyslipidemia, contributing to the development of atherosclerosis and impaired calcium-phosphate metabolism.

Conclusions: In CKD in the occurrence of complications in the cardiovascular system, the primary pathogenic role belongs to the endothelial dysfunction that may occur due to metabolic disorders. On the other hand, the decrease in the level of relaxing, and the increase in the concentration of pressor agents in the body and decrease in sensitivity to vasodilator stimuli also contribute to endothelial dysfunction. Endothelial dysfunction can be considered the main pathogenetic mechanism for the development of cardiorenal syndrome.

SP166  CIRCULATING ANGIOTENSIN-CONVERTING ENZYME 2 IN CHRONIC KIDNEY DISEASE PATIENTS WITHOUT HISTORY OF CARDIOVASCULAR DISEASE

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Introduction and Aims: Circulating ACE2 activity is increased in patients with cardiovascular (CV) disease and in experimental models of diabetes mellitus (DM). However, it has not been previously studied in patients with Chronic Kidney Disease (CKD) without history of CV disease.

Methods: A total population of 834 patients without history of CV disease from the NEFRONA study was analyzed. Patients were distributed into two groups: non-dialysis CKD stage 3-5 patients (CKD3-5;n=288) and patients on dialysis (CKD5D;n=546) (hemodialysis or peritoneal dialysis). Variables analyzed were: gender, age, DM, dyslipidemia, hypertension, glycemic, renal, nutritional and anemia profiles, phosphorous-calcium metabolism and treatment with ACE inhibitors or angiotensin II receptor blockers (ARBs). Circulating ACE2 activity was measured using a modified fluorimetric assay for plasma samples.

Results: Patients on dialysis had higher levels of ACE2 activity compared to CKD3-5 patients (38.46±1.63IU/l/hour vs 28.22±1.13,p<0.05). Similar differences were observed when patients treated with ACE inhibitors were removed from the analysis. Assessing only CKD3-5, an increased ACE2 activity was observed in men compared to women (31.86±1.58 vs 22.82±1.41,(p<0.05), DM patients (33.49±2.41 vs 26.32±1.25, p<0.05) and dyslipidemic patients (29.01±2.32 vs 26.31±2.19,p<0.05). A direct correlation between age and ACE2 activity (p<0.05) was found in both CKD3-5 and CKD5D patients, but only in CKD3-5 patients HbA1c directly correlated with ACE2 activity (p<0.05).By multiple regression analysis, male gender, advanced age and DM were independent predictors of circulating ACE2 activity in CKD3-5 patients. Predictors in CKD5D patients were male gender, and ARBs treatment, but not DM (Table). When all patients were included in the model, male gender, older age, ARBs treatment and CKD5D were predictors of elevated circulating ACE2.

Conclusions: In CKD patients without history of CV disease, old age and male gender are significant predictors for elevated circulating ACE2 activity. Independent additional predictors are DM in CKD stages 3-5 and treatment with ARBs in CKD5D. Increased circulating ACE2 activity in CKD might indicate the CKD patients at risk for developing CV disease.

SP167  PSYCHOLOGICAL EVALUATION OF CKD PATIENTS. ASSOCIATION OF DEPRESSION AND STRESS WITH RENAL FUNCTION

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Introduction and Aims: Depression and psychological stress are both associated with adverse health outcomes, like hypertension and cardiovascular disease. Prevalence of depression in CKD reaches 20% of patients, even before initiation of dialysis. Increased...
psychosocial stressors have been linked with an augmented rate of renal function decline. However, the direct impact of psychological stress and depression on renal function has not yet been investigated.

**Methods:** 41 patients (23 M and 18 F) with CKD stage 2-4 mean age 73.6 years, were enrolled in the study. Participants were receiving optimal therapy and had controlled levels of blood pressure and plasma glucose concentration. Hospital Anxiety Depression Scale (HADS) was used to evaluate stress and depression. Estimated GFR was calculated using MDRD formula, at the time of the psychological evaluation (eGFR2) and 12 months before (eGFR1).

**Results:** Psychological evaluation was normal in 16 (40%) individuals. Psychological disorder was present in 25 (60%) participants. 15 suffered from both depression and stress, while 5 experienced either stress or depression. A major chronic stressor, such as loss of a child, was present in 20 patients. Participants with normal HADS measurement for stress improved their renal function, compared to the stressed ones (eGFR1=42.8 ± 18 vs eGFR2=48.3 ± 17, p<0.000). Absence of depression, using HADS scale, led to similar results (eGFR1=40.6 ± 16 vs eGFR2=45.8 ± 17, p=0.01). Patients suffering from both stress and depression had a significant eGFR decline (eGFR1=43 ± 18 vs eGFR2=39.9 ± 15, p<0.01). HADS measurements for stress and depression were positively correlated with the rate of CKD progression (HADS stress: r=0.5, p=0.001, depression: r=0.4, p=0.01).

**Conclusions:** Psychological disorders seem to be a common, though under diagnosed problem in CKD patients. In the present study, normal values for stress and depression in HADS scale were associated with eGFR increase, while affected individuals presented an augmented rate of renal function decline. These results suggest a possible relationship between psychological disorders and CKD progression. Further investigation is warranted into factors that mediate this relationship and its potential clinical consequences.

**SP168 WHAT ARE THE MAJOR FACTORS TO DETERMINE SERUM CREATININE IN HEALTHY POPULATION?**

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**Introduction and Aims:** Measurement of serum creatinine (Cr_S) concentration is essential to estimate glomerular filtration rate (GFR) as in GFR-Epi. Understanding the factors which influence the concentration of Cr_S is important to reduce error in estimating GFR. The aim of the study was to investigate relationship of Cr_S and body composition measured using whole body bioimpedance method in a healthy population.

**Methods:** A group of healthy subjects with absence of hypertension and renal disease were studied. Body weight, blood pressure, serum and urine creatinine were measured. Whole body bioimpedance (Hydra200, Xitron Technologies) measurement was performed with a supine position. Extracellular and intracellular resistances were calculated by a program based on the Cole model. Whole body extracellular (wECV) and intracellular (wICV) fluid volume were estimated using a Xitron program. Linear regression analysis was performed to find correlations of Cr_S to wECV, and wICV. A multiple linear regression model (Cr model) was used to analyze relationship between Cr_S and wICV, wECV, and age.

**Results:** Forty seven subjects (Age 53.9±5.8 years, weight 76.1±14 kg. Sex 19 male, race 15 AA) were measured. Systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), weECV and weICV were 123.7±19 mmHg, 75.7±9.2 mmHg and 68±11 beats/min, 16.3±3 L and 21.9±5 L, respectively. Cr_U and Cr_S were 165.7±104 mg/dl and 0.97±0.22 mg/dl respectively. Fig.1 show the correlation of Cr_S to weECV (R²=0.35, p<0.0001), weICV(R²=0.25, p<0.001), and Cr model (Cr_S=0.041*weICV+0.033*ECV+0.009*Age+0.001*Cr_U, R²=0.5, p<0.0001). Fig 1 also shows a high correlation between weECV and weICV.

**Conclusions:** Since weECV represents whole body muscle mass, the correlation between Cr_S and weECV confirm that amount of muscle mass is the major source to produce serum creatinine with normal kidney function. Since weECV correlated with weICV, Cr_S also correlated with ECV. In addition, Cr_S might also relate to amount of fluid volume independently from the relationship of ECV/ICV for example with excessive salt and fluid intake. Age related decrease in kidney function in absence of kidney disease may also affect serum creatinine concentration. In summary, the major factors determining the value of concentration of Cr_S are muscle mass content, extracellular fluid volume and age in subjects with apparently normal renal function.

**SP167 HYPEROXALURIA MEDIATED RENAL INJURY IN WOMEN WITH RECURRENT PYELONEPHRITIS**

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**Introduction and Aims:** Urinary oxalate excretion in healthy individuals ranges from 28 mg/day to 43 mg/dl; values over 43 mg/d generally are classified as clinical hyperoxaluria. Hyperoxaluria often associates with recurrent pyelonephritis, which may be caused by destruction of the Oxalobacter formigenes colonies in the intestine. Recent studies have suggested that oxalate and CaOx crystals may injure renal tubular cells. Many clinical studies have demonstrated that neutrophil gelatinase associated lipocalin (NGAL) is a specific, sensitive, early predictor of kidney injury. The present study was performed to evaluate the effect of hyperoxaluria on kidney injury in female with recurrent pyelonephritis.

**Methods:** Recurrent pyelonephritis was defined as 2 urinary tract infections episodes within 6 months or 3 or more episodes during the previous 12 months. We evaluated serum NGAL, creatinine, and estimated glomerular filtration rate (eGFR) in 44 white adult women, age 18-62 yrs (mean 32.9±11.7) with recurrent pyelonephritis. 31 of examined patients had hyperoxaluria (>3 mg in 24 hours). The average of urinary oxalate excretion in this group was 91.9±22.7 mg/d. Moreover, we determined the level of interleukins IL-17 and IL-23 as biomarkers of disease activity, given their important role in inflammation and immune response. Renal scarring was documented by dimercapsuccinic acid (DMSA) scintigraphy scan. The GFR level was calculated using the MDRD formula. The serum levels of NGAL and IL-17, -23 were measured using an ELISA kit. For statistical analysis we used the Student’s t test for independent samples and Pearson’s rank correlation.

**Results:** We identified a positive strong correlation between the levels of the urinary oxalate excretion and serum NGAL (R=0.91, P<0.001), the presence of renal scars (R=0.87, P=0.005) and the serum levels of IL-17 (R=0.77, P<0.02). In contrast, we detect inverse correlation between hyperoxaluria and serum concentration of IL-23 (R=0.95, P<0.001). GFR was also significantly lower in patients with hyperoxaluria: 75.4±12 vs 88.1±16 ml/min/1.73 m² (P<0.004).

**Conclusions:** Hyperoxaluria in female with recurrent pyelonephritis is associated with elevated levels of serum NGAL and IL-17 as well deterioration of IL-23. Further studies are needed to determine the role of pro-inflammatory cytokines in the pathogenesis of oxalate-induced renal damage.
copper for the successive determination in the solid phase by using visual test technique. The interface interaction has been investigated. The modified silica demonstrates significant color change from bright orange to dark purple due to interaction with Cu(II) ions. The standard color scale range is 0.50-7.50 μg per sample Cu(II), sample volume of 4.0 mL, time of analysis is 5 min. Blood collection from 39 patients with end stage renal failure was carried out before the first HD session of the week.

Results: The data was compared to the results obtained using standard atomic-absorption spectroscopy technique (AAS). The data obtained are listed in Table. Average concentration of Cu(II) in serum of HD patients (n=39, P<0.05) Data obtained follows normal distribution. Paired t-test showed no significant (α=0.05) difference between results obtained by two methods (texp=1.476, tcrit(α/2=0.025, f=37)=2.026. Accuracy and precision of the results are satisfactory.

Conclusions: Due to its simplicity and reliability, the visual test technique on the base of modified silica can be used for the analysis of multiple biological samples providing valuable analytical information. The developed visual test technique can be recommended for the rapid Cu(II) determination in serum in the clinic laboratories.

SP171

EXPRESSION PATTERN OF CALPONIN IN THE CAPSULAR EPITHELIUM AND PERIGLOMERULAR AREA OF HUMAN KIDNEY IS RELATED TO THE DEVELOPMENT OF GLomerulosclerosis

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Introduction and Aims: Progressive glomerulosclerosis lead to a common histological and functional end point referred to as end-stage renal disease. We previously have reported that periglomerular calponin expression in two chronic nephropathy rat models, puromycin aminonucleoside nephropathy and subtotal nephrectomy. In present study, we examined correlation between calponin immunoreactivity in the periglomerular area and development of glomerulosclerosis in specimens obtained (KT, n=9) from the recipients at the time of kidney transplantation, and normal specimens (NS, n=4) from normal portions of kidney segments from patients undergoing nephrectomy for a renal tumor.

Methods: Analysis was performed on two serial 5-μm paraffin sections stained with periodic acid-Schiff (PAS) and calponin-specific antibody respectively. The degree of glomerulosclerosis was assessed on a blinded basis by determining the sclerotic damage to the glomerulus; G0+, no calponin-positivity in periglomerular area, G1+, <30%, G2+, 25%-50%; G3+, 50%-75%; and G4+, 75%-100% damage. Data were represented as percentage of damaged glomeruli showing any level of injury (scale G0 to G4+). Periglomerular damage with calponin-positivity were graded as follows: C0+, no calponin-positivity in periglomerular area, C1+, <30%, C2+, 30% -80%, C3+, >80%. All the periglomerular calponin was detected in myofibroblast and glomerular parietal epithelium.

Results: In NS, most glomeruli (>95%; G0) showed no sclerotic damage, calponin-positivity at its periglomerular area (>97%; C0). In KT, results was as follows: glomerulosclerotic index; G0+ (14%), G1+ (49%), G2+ (24%), G3+ (9%), and G4+ (4%); calponin index; C0+ (57%), C1+ (24%), C2+ (10%), and C3+ (9%).

Conclusions: These results suggested that calponin-positivity are closely related to the development of glomerulosclerosis. (This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education, Science and Technology(20120002683).

SP172

Advances in Kidney Focal Lesions-use of Contrast Enhanced Ultrasoundography

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Introduction and Aims: Kidney focal lesions are frequent. Although CT scan and MRI are widely used, ultrasonography is noninvasive and repeatable, but can be improved using contrast-enhanced ultrasoundography (CEUS). It has few side effects and can be safely used in chronic kidney disease.

Methods: We used CEUS in ten patients with different kidney focal lesions: three atypical cysts, three benign lesions and four malignant lesions, one of them for monitoring the treatment. Patients were examined with an ultrasound device with contrast soft application. 2.6 ml of contrast agent SonoVue was injected intravenously in bolus. The vascular pattern within the kidney lesion was recorded immediately after injection for three minutes.

Results: From all lesions, six appeared benign in standard, Doppler and CT scan examination before contrast: three cysts and three angiomas. After contrast US the diagnosis was confirmed in all ten cases, and the results were confirmed by histopathology. All three cysts showed fine echoic signal of the wall that appeared highly vascular in CEUS and RRC was confirmed. The histology of kidney tumors was renal cell carcinoma (RCC). CEUS had a specificity of 100% and sensibility of 100%, with a PPV of 100. RRC are vascular tumors and can be easily detected by CEUS, in cases when color Doppler has lower sensibility. In the atypical cysts there was a vascular signal inside the cyst and the histopathology revealed malignancy. The benign lesions were angiomas and they were confirmed by the similar pattern of vascularization as the normal kidney cortical parenchyma. The three malign lesions were characterized by the rapid wash-out phenomena. One malignant lesion was a metastasis from renal cell carcinoma and it was monitored after 6 months of treatment.

Conclusions: CEUS is a noninvasive, harmless, high tech investigation of kidney focal lesions, with an excellent positive predictive value and can be performed also in kidney failure.

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SODIUM BICARBONATE THERAPY OF THE METABOLIC ACIDOSIS OF CHRONIC KIDNEY DISEASE

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Introduction and Aims: The prevalence of metabolic acidosis increases with declining renal function. The authors in this study investigated correcting metabolic acidosis in chronic kidney disease (CKD) patients may preserve renal function and improve nutritional parameters.

Methods: We assigned 49 adult patients with creatinine clearance (CrCl) 15-60 ml/min and serum bicarbonate 16-20 mmol/L to either supplementation with oral sodium bicarbonate (the bicarbonate group, n=25) or standard care (the control group, n=24) for 12 months. At the primary end points CrCl, proteinuria, and serum creatinine
showed changed, and at the secondary end points body weight, lean body mass (LBM), mid-arm muscle circumference (MAMC) and serum albumin showed changed.

**Results:** Compared to the control group, the bicarbonate group was improved in CCr (7.19 vs. 3.47ml/min/yr, p<0.05) [Figure 1], nutritional parameters, body weight (+3.0 vs -1.0kg, p<0.05), LBM (+1.0 vs -2.8kg, p<0.05), and MAMC (+1.1 vs -0.34cm, p<0.05).

**Conclusions:** Correcting metabolic acidosis (via bicarbonate supplementation) may preserve renal function and improve nutritional parameters in CKD patients.

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**Abstracts**

**SP173**

**URINE PROTEIN-TO-CREATININE RATIO CORRELATES WITH 24-H URINE TOTAL PROTEIN EXCRETION BUT POORLY IN NEPHROTIC RANGE PROTEINURIA**

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**Introduction and Aims:** Measurement of the protein content of a timed 24 h urine collection is the definitive method of establishing the presence of abnormal proteinuria, however, the urine collection is cumbersome. The spot urine protein to creatinine (p/c) ratio seems to be a reliable diagnostic tool for urine protein measurement. Our aim is to evaluate the spot urine p/c ratio compared to 24 h urine total protein excretion in different proteinuria ranges.

**Methods:** Observational, cross-sectional study of 1179 consecutive paired determinations of 24-h urine total protein excretion and the spot urine p/c ratio in renal patients. The strength of the correlation was determined by calculating the intraclass correlation coefficient (ICC) and the Spearman correlation coefficient (SCC).

**Results:** Among all groups, the ICC was 0.749 (CI 95% 0.660-0.809) and the SCC was r=0.8 (p<0.01). As shown in the table, there is an excellent significant correlation between the spot urine p/c ratio and 24-h urine total protein excretion when proteinuria was more than 300 mg/24 hours. This correlation decreased when it was more than 3500 mg. When patients were stratified according to eGFR, the correlations between the spot urine p/c ratio compared to 24-h urine total protein excretion were similar between groups.

**Conclusions:** In summary, a strong correlation is observed between spot urine p/c ratio and 24-h urine total protein excretion when the level of proteinuria is less than 3500 mg/day. In our experience, there is not enough correlation between spot urine p/c ratio and 24-h urine total protein excretion in nephrotic range proteinuria.

**SP174**

**URINARY SYNaptopodin EXCRETION AS A PREDICTOR OF GLOMERULAR DISEASE PROGRESSION**

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**Introduction and Aims:** Podocytes play an important role in maintaining glomerular filtration barrier, and make slit diaphragm that is essential for preventing albumin loss and filtering water and solutes. Diabetic kidney disease is progressive kidney failure caused by intraglomerular hypertension showing heavy proteinuria. Urinary podocyte loss is associated with diabetic kidney disease progression, but it is not clear that the amount of podocyte or podocyte slit diaphragm protein can reflect clinical significance of glomerular damage. We investigated the correlation between the amount of urinary slit diaphragm proteins and renal function and albuminuria.

**Methods:** Total 40 patients with diabetic chronic kidney disease and glomerular disease patients were enrolled, and the amount of urinary podocyte and slit diaphragm proteins were measured by Western blot analysis. Amount of urinary nephrin, podocalyxin, podocin and beta actin were measured by Western blot analysis. Amount of urinary nephrin, podocalyxin, podocin, synaptopodin and beta actin were measured by Western blot analysis.

**Results:** Amount of urinary nephrin, podocalyxin, podocin, synaptopodin and beta actin were measured by Western blot analysis. Amount of urinary nephrin, podocalyxin, podocin and beta actin were measured by Western blot analysis. Amount of urinary nephrin, podocalyxin, podocin, synaptopodin and beta actin were measured by Western blot analysis.

**Conclusions:** Correcting metabolic acidosis (via bicarbonate supplementation) may preserve renal function and improve nutritional parameters in CKD patients.

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**SP175**

**WHAT ABOUT THE CHILDREN BORN TO MOTHERS ON VEGAN LOW-PROTEIN SUPPLEMENTED DIETS IN PREGNANCY?**

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**Introduction and Aims:** Women with CKD increasingly choose to undergo the challenges of pregnancy, but very few tools are available to counteract the effects of the hyperfiltration of pregnancy; experience with low protein diets in CKD in pregnancy is limited. Hence, we report the results obtained in pregnant women with severe CKD treated by supplemented vegan low protein diets, focusing on intrauterine fetal development and on subsequent children growth.

**Methods:** Diet group: CKD stages 3b and 4, or stage 3a in the presence of kidney transplant, type 1 diabetes, collagen disease and/or proteinuria >1 g in the first trimester, or nephrotic later on. Controls: CKD stage 3a not included either for stable, less severe disease, or for late referral, cultural or linguistic barriers, other low protein diets, eating disorders, patient’s choice. Diet: vegan, low-protein (0.6-0.7 g/kg/day) with amino and chetosacid supplementation, 1-3 free meals/week. Compliance, side effects, biochemical data recorded at least twice monthly. All mothers delivered in the same
Center. Small for gestational age (SGA) babies were defined as gestational-age adjusted <10 percentile.

Results: Out of over 350 CKD pregnancies referred between 2000 and 2012, 21 cases were treated by the diet (median age 33 yrs (26-40), SCR 1.3 mg/dL (0.5-3.2), GFR 70 (20-135), proteinuria 2.5 g/24h (0.2-6.3) 8/21 diabetes-3/21 kidney graft-2/21 interstitial-8/21 glomerular diseases). We identified 14 controls (median age 31 yrs (22-39), SCR 1.4 mg/dL (1.1-2.9), GFR 51 ml/min (24-60), proteinuria 0.6 g/24h (0.1-2) 1/14 kidney graft-3/14 glomerular diseases 10/14 intestinal or malformative).

In the diet group, 1 pregnancy was terminated (patient’s choice); i was a twin pregnancy; 19 singletons babies were delivered. 1 twin child, affected by great vessel coarctation, was delivered. In the control group 14 singletons were delivered. In the diet group, in spite of pre-term delivery in 20/21 cases, 4/19 singletons were SGA (2 <5th centile, 2 5-10th centile). Conversely in the control group, with pre-term deliveries 9/14 cases, SGA was recorded in 7/14 (2<5th centile, 5 5-10th centile). Mean follow up of the children born from mothers in the diet group was of 33 months (1-120); at the end of each observation period, none of the children had major developmental problems, all attaining normal developmental targets for their age.

Conclusions: Our report suggests considering vegetarian supplemented diets as an additional and safe tool in the management of selected pregnant CKD patients, with a risk of SGA at least comparable (and potentially lower) than controls, and a good auxologic profile in the long term.

## DISREGULATION OF HEPATIC FATTY ACID METABOLISM IN CHRONIC KIDNEY DISEASE: EFFECT OF NIACIN SUPPLEMENTATION

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Introduction and Aims: Chronic kidney disease (CKD) results in hypertriglyceridemia which is largely due to impaired clearance of triglyceride-rich lipoproteins occasioned by down-regulation of lipoprotein lipase and VLDL receptor in the skeletal muscle and adipose tissue and of hepatic lipase and LDL receptor-related protein (LRP) in the liver. However information on the effects of CKD and niacin administration on fatty acid metabolism in the liver is limited and was investigated here.

Methods: Expression of molecules involved in fatty acid metabolism in the liver were determined in untreated CKD (5/6 nephrectomized), niacin-treated CKD (50 mg/Kg/day in drinking water for 12 weeks) and control rats.

Results: The CKD rats exhibited hypertension, proteinuria, hypertriglyceridemia, β-oxidation of fatty acids and down-regulation of the key enzymes involved fatty acid catabolism in the liver. Niacin administration attenuated these abnormalities and improves plasma lipid profile in the CKD animals.

Conclusions: Advanced CKD results in carbohydrate responsive element binding protein driven upregulation of key enzymes involved in fatty acid synthesis and down-regulation of the key enzymes involved fatty acid catabolism in the liver. Niacin administration attenuates these abnormalities and improves plasma lipid profile in the CKD animals.

## EVALUATION OF RENAL FUNCTION RESERVE IN HEALTHY VOLUNTEERS AND CKD PATIENTS BY DOPAMINE INFUSION

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Introduction and Aims: It is generally accepted to use amino acid solutions or protein load to establish renal function reserve (RFR). Oral meat production could have different amount of protein and electrolytes and give different response type; moreover sodium could increase tubular-glomerular feedback mechanism. Thus, protein loading methods not only expensive, but may give false results. It is known, that other vasoconstricting factors could be used for RFR investigation, one of them is dopamine. The aim of the study: to establish accuracy and safety of RFR definition after low dose dopamine load.

Methods: Two groups of subjects were studied: 41 healthy volunteers (26,8±6,7 years old, BMI 21,5±2,9 kg/m2, GFR 109±2,7 ml/min/1,73m2) and 20 patients with hypertension and gout with GFR 3-4 stage (40,7±9,9 years old, BMI 26,3±4,6 kg/m2, GFR 48,9±1,4 ml/min/1,73m2). To establish RFR we assessed baseline serum creatinine and patients were asked to urinate. Than patients collected urine during two 1-hour periods. In first period patients drink 200 ml of water, during second period they infused dopamine 3 mg/kg/min with same water amount. Creatinine clearance (CrCl) was calculated during both periods. RFR was calculated from usual formula: RFR(%)=CrCl2 - CrCl1 x 100/ CrCl1.

Results: Dopamine load didn’t show side effects in patients, but nausea in some volunteers with low arterial blood pressure. After dopamine load in healthy people minute diuresis grow from 3,98±3,61 to 6,13±4,4 ml/min, GFR increased from 109±2,7 to 305±172 ml/min/1,73m2; accordingly RFR was 43±6 % (95% CI 22,6 - 64,6) In CKD patients RFR didn’t increase, contrary decreased in most cases -19,8±2,7 % (95%CI (31,9 - 7,8)). To establish normal value of RFR we have compared different normal values of RFR, 5, 10 and 15%. Statistical analysis has showed, that in any of this normal values odds ratio to have normal RFR more large in healthy persons (p = 0,001), but the 10% value is best one.

Conclusions: Dopamine infusion test is harmless. Test has showed positive result in healthy volunteers and significantly lower result in patients with renal insufficiency. Low dose dopamine load test could be advised to evaluate RFR.
ASSOCIATION OF SERUM CYTOKINE PROFILES WITH TACROLIMUS-INDUCED CHRONIC NEPHROTOXICITY IN CHINESE LIVER TRANSPLANT RECIPIENTS

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Introduction and Aims: Cytokinin inhibitors (CNI) associated chronic nephrotoxicity has been a serious problem which threatens the problem of liver transplant recipients. This study was aimed to find out the relationship between serum cytokines, chemokines and chronic tacrolimus (Tac) induced nephrotoxicity. We detected the post transplant serum inflammatory cytokines and chemokines levels in liver transplant recipients to illuminate the correlations of inflammatory cytokines or chemokines with the chronic renal injury.

Methods: A total of 136 living donor liver transplant recipients (107 males and 29 females) and 150 healthy controls (120 males and 30 females) were enrolled in this study. All the recipients had normal Cystatin C (Cys-C) and normal urine microalbumin before transplantation and received Tac-based immunosuppressive regime (Tac-MMF+ prednisone) afterwards. A human 10-plex antibody bead kit (BioSource, Camarillo, CA) was used to measure the levels of 10 cytokines and chemokines in 50 ml of serum from each transplant patient and controls. After transplantation, Tac, CyC and urine microalbumin were measured at 1 month, 3 months, 6 months, 1 year, and 3 years from transplantation.

Results: The levels of IL-6>10, IFN-γ>10 and MCP-1 in the recipients’ group were significantly higher than those in the control group (P<0.05), while the levels of IL-8 was onthologic (P<0.05). In early renal damage group (CyC>1mg/L), the concentration of IFN-10 was much higher compared to the group with normal renal function (CyC<1mg/L), whereas the concentration of MCP-1 in early renal damage group was lower than the group with normal renal function. The concentration of IFN-10 in the group with tubulointerstitial injury (eGFR<12.5 mg/L) was much higher compared with the group without such injury (eGFR>12.5 mg/L).

Conclusions: IFN-10 may be the important cytokine leading to chronic CNI-induced nephrotoxicity, especially the tubulointerstitial injury. Allo-liver recipients with high serum IFN-10 posttransplant levels might develop chronic CNI-induced nephrotoxicity due to increased immune activation.

HIGH SENSITIVITY TROPONIN T IN CHRONIC KIDNEY DISEASE

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Introduction and Aims: Chronic kidney disease (CKD) is an independent risk factor for developing coronary heart disease (CHD). The cardiac troponins are structural proteins predictors of CKD. It has been demonstrated that high sensitivity Troponin T (hs-TnT) has greater predictive value than conventional Troponin T in the development of CHD in the general population. However, its usefulness in patients with CKD is unclear.

Objectives: To study the influence that the degree of renal function has on levels of hs-TnT and its possible association with other cardiovascular risk factors.

Methods: We conducted a prospective study including 563 patients: 58% male, 32.5% diabetics, aged 64 ± 17 years, at different stages of CKD. We collected clinical history, routine laboratory parameters and hs-TnT. 20% had CHD history and 9.2% of acute myocardial infarctions (AMI). Glomerular filtration rate was 50 ± 29 ml/min/1.73m2 (MDRD-4) and 51 ± 29 ml/min/m2 (CKD-EPI). In 408 patients an echocardiogram was performed simultaneously.

Results: The mean hs-TnT was 18.5 ng/ml. Plasma concentrations of as-TnT were directly relate to age (r = 0.643, p <0.001) and inversely with the MDRD 4 (r = -0.674 p <0.001). The hs -TnT is higher in men than in women (20.4 vs 15.9 ng / ml, p <0.01), is significantly higher in patients with history of CHD (p = 0.032) and especially in patients with a history of myocardial infarction ( p <0.01). The mean hs-TnT according to stages of CKD was: Stage 1: 3.97 ng / ml, stage 2: 6.03 ng/ml, stage 3: 18.94 ng/ml, stage 4: 30.93 ng/ml; stage 5: 45.56 ng/ml, with a statistically significant difference in the variance analysis (p <0.01). When we divided the patients with and without history of CHD, the differences remained significant (p <0.01 and p <0.001 respectively), although the values were significantly higher in those with a history. 19.1% of patients had left ventricular hypertrophy in this group, the values of hs-TnT were higher (40.4 vs 13.8 ng / ml, p <0.001). In a multivariable model, remain as predictors of high hs-TnT values the loss of renal function, history of CHD and LVH.

Conclusions: hs-TnT levels increased as the severity of CKD, even without evidence of acute myocardial damage, so the value of this marker must be adjust according to the degree of renal function. hs-TnT concentrations are higher as in men, patients with history of CHD and those with LVH.

HOW THE PATIENT KINETICS HAS ALTERED AFTER THE IMPLEMENTATION OF eGFR IN A NEPHROLOGY OUTPATIENT CLINIC

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Introduction and Aims: Implementation of estimated GFR (eGFR) in the general medicine has massively changed the renal clinics. Those changes might include not only the expansion of the renal patient numbers but also an increase in number of patients sent back to general practitioners. This study was done in order to clarify whether the patient kinetics had been changed according to their renal function, before and after the eGFR measurement implementation.

Methods: Two 6-month periods (from Jan 1 to Jun 30, in years 2005 and 2010, i.e. before and after the nationwide implementation of eGFR, were chosen for the analysis. All the new visits to a certified nephrologist in the Hospital were included and the medical charts were reviewed to find out the background clinical status and the disposition of each patient 2 years after the initial visit. Patients already on maintenance dialysis due to ESRD at the initial visit or those with no renal disease were excluded from the analysis.

Results: In 2005 and 2010, 115 and 117 new patients were included in the analysis, respectively. Although the total number of new visits appeared close, the details in 2010 differed from those in 2005 in many aspects. New patients with eGFR between 15 and 45 mL/min/1.73m2 nearly doubled (35.2% in 2005 vs 64.8% in 2010, P<0.0001). After the nephrologist’s initial evaluation, more patient were asked to be followed in the original non-nephrology clinic (9.6% vs 28.2%, P<0.001). The patients who continued to be followed in the renal clinic had significantly lower eGFR (median, 56.7 vs 38.8 mL/min/1.73m2, P=0.016, Mann-Whitney); within 2 years, those with baseline eGFR between 15 and 45 mL/min/1.73m2 were more likely to be sent back to non-nephrologists (9.6 vs 29.8% of all the followed patients, P<0.001), due to the overwhelming renal clinic. Dropout patients (14.4% in 2005 and 26.2% in 2010) had significantly lower eGFR in 2010 (median, 79.0 vs 35.0 mL/min/1.73m2, P=0.015, Mann-Whitney).

BODY COMPOSITION IN HEALTHY SUBJECTS AND PATIENTS IN EARLY STAGES OF CHRONIC KIDNEY DISEASE

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Introduction and Aims: Fluid balance and body composition are maintained in patients with chronic kidney disease (CKD) until glomerular filtration rate (GFR) falls below 15 ml/min. The aim of this study was to evaluate whether body composition differs in healthy subjects and patients with moderate loss of kidney function.
Methods: Healthy subjects older than 40 years without previous diagnosis of diabetes, cardiovascular and chronic kidney disease were selected. Calf, segmental and whole body bioimpedance spectroscopy (BIS) were performed using Hydra 4200. Extracellular (ECV), intracellular (ICV) fluid volume, total body water (TBW=ECV+ICV), and skinfold thickness were measured in 152 patients (82 men; mean age 61.6 years) with 28 patients in stage 1, 30 in stage 2, 44 in stage 3, 37 in stage 4, and 46 in stage 5. We used the Body Composition Monitor® (from Fresenius Medical Care Germany Inc.), based on multifrequency (50 measurements from 5 to 1000 kHz) single-frequency BIA analyzers, a Body Composition Monitor-BCM (Fresenius Medicine, Akdeniz University Antalya Turkey, 3Department of Nephrology School of Medicine, Akdeniz University Antalya Turkey). Total body water (TBW), extracellular water (ECW), intracellular water (ICW), and BCM were compared. Thirty six patients with chronic kidney disease (stage III-V) with mean age 45.8±8.1, men and 17 women, who had a wide range of BMI (17.3–45 kg/m²) were studied in this study.

Results: In general measurement of ICW and BCM were similar (19 vs 18.6, p=0.87, and 24.8 vs 20.7 kg, p=0.08) in two devices. The Akren device gives higher mean estimates of TBW and ECW compared to the Fresenius device (41 vs 35.8 kg, p<0.04 and 22 vs 17.2 kg, p=0.001 respectively). A comparison of results from patients with BMI >25 vs ≤25 revealed significant discrepancy measurement between both BIA devices. Namely in group with BMI >25 (n=16) acceptable correlations were obtained in TBW (r=0.99, p<0.01), ICW (0.95; p<0.01), BCM (0.84; p<0.01), ECW (0.81 p<0.05), but in group with BMI ≥25 (n=20) huge discrepancy (poor correlations) in TBW (r=0.54; p<0.05), ICW (0.32; p=ns), BCM (0.15; p=ns), ECW (0.81; p<0.01) were found. In those patients (BMI>25) the Akren device gives significantly higher mean estimates of TBW (45.9 vs 40.1; p=0.03), ECW (24 vs 19.2; p=0.01) and BCM (28.7 vs 23 p<0.05) than Fresenius device.

Conclusions: Since estimates of TBW, ICW BCM by the present BIA devices do not differ in patients with BMI >25, they might be interchangeable. This does not hold true for overweight/obese renal patients. Because both BIA devices could over/under estimate BCM in obese patients an effort to reduce the bias (electrodes repositioning?) and finally comparison to gold standard should be undertaken.

**APPlicability of a different estimation equation of gLomerular filtration rate in turkey**

**Introduction and aims:** We aimed to investigate the performance of various creatinine based glomerular filtration rate estimation equations that were widely used in clinical practice in Turkey and calculate a correction coefficient to obtain a better estimate of GFR in Turkish patients.

**Methods:** One hundred and sixty-two patients (82 men; mean age 61 years) with a wide range of BMI (17.3–45 kg/m²) were studied in this study.

**Results:** In general measurement of ICW and BCM were similar (19 vs 18.6, p=0.87, and 24.8 vs 20.7 kg, p=0.08) in two devices. The Akren device gives higher mean estimates of TBW and ECW compared to the Fresenius device (41 vs 35.8 kg, p<0.04 and 22 vs 17.2 kg, p=0.001 respectively). A comparison of results from patients with BMI >25 vs ≤25 revealed significant discrepancy measurement between both BIA devices. Namely in group with BMI >25 (n=16) acceptable correlations were obtained in TBW (r=0.99, p<0.01), ICW (0.95; p<0.01), BCM (0.84; p<0.01), ECW (0.81 p<0.05), but in group with BMI ≥25 (n=20) huge discrepancy (poor correlations) in TBW (r=0.54; p<0.05), ICW (0.32; p=ns), BCM (0.15; p=ns), ECW (0.81; p<0.01) were found. In those patients (BMI>25) the Akren device gives significantly higher mean estimates of TBW (45.9 vs 40.1; p=0.03), ECW (24 vs 19.2; p=0.01) and BCM (28.7 vs 23 p<0.05) than Fresenius device.

**Conclusions:** Since estimates of TBW, ICW BCM by the present BIA devices do not differ in patients with BMI >25, they might be interchangeable. This does not hold true for overweight/obese renal patients. Because both BIA devices could over/under estimate BCM in obese patients an effort to reduce the bias (electrodes repositioning?) and finally comparison to gold standard should be undertaken.

**APPLICABILITY OF A DIFFERENT ESTIMATION EQUATION OF GLOMERULAR FILTRATION RATE IN TURKEY**

**Introduction and aims:** We aimed to investigate the performance of various creatinine based glomerular filtration rate estimation equations that were widely used in clinical practice in Turkey and calculate a correction coefficient to obtain a better estimate of GFR in Turkish patients.
MDRD 2 formula. Bias and random error for the IDMS-traceable MDRD equation formulae, respectively. The best precision and accuracy was also obtained with the smallest bias and random errors were recorded with the Mawer and MDRD 2 treatment.

Those aged 50-75 years (p=0.0001). There were no statistical significant differences in the frequency of episodes before the beginning of treatment (p=0.0001). Out of those with catheters à demeure, 59% (p=0.0001) didn’t use them anymore. The number of pyelonephritis episodes was lower in patients aged between 20 and 70. Those patients underwent every 3 months, for 1 year, electrotherapy with medium frequency current (nemectron) lombosuprapubian applied with variable frequency (0-100 hz), 20 minutes, 1 session/month, for 1 year, electrotherapy with medium frequency current (nemectron)

The use of creatinine in a combined equation with cystatin C can improve the accuracy of eGFR in patients with high GFR (stage 1) and served as a confirmatory test in patient monitoring.

**SP187**

**CKD PREVENTION IN PATIENTS WITH CAUDA EQUINA SYNDROME, USING ALTERNATIVE THERAPEUTIC METHODS**

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**Introduction and Aims:** Cauda equina syndrome (CES) is a severe complication of lumbar spinal disorders. It is known that CES represents one of the most important causes of repeated acute pyelonephritis that cause chronic pyelonephritis, and then CKD. The aim of this study was to evaluate if electrotherapy and hydrothermal therapy with natural factors (mud) help in reducing acute pyelonephritis episodes in these patients.

**Methods:** We conducted a prospective study on 48 patients with CES and repeated acute pyelonephritis. 30 of the patients had catheters à demeure. The age of the patients considered for the study was between 20 and 70. Those patients underwent every 3 months, for 1 year, electrotherapy with medium frequency current (nemectron) lombosuprapubian applied with variable frequency (0-100 hz), 20 minutes, 1 session/day, 20 days and overall mud bath at 37 degrees Celsius for 20 minutes, 1 session/day/ 20 days.

**Results:** In 65% of patients that underwent this recovery plan, the number of acute pyelonephritis episodes decreased during the follow up period, compared to the frequency of episodes before the beginning of treatment (p=0.0001). Out of those with catheters à demeure, 59% (p=0.0001) didn’t use them anymore. The number of pyelonephritis episodes was lower in patients aged between 20 and 50, compared to those aged 50-75 years (p=0.0001). There were no statistical significant differences between male and female sex in regards to the number of pyelonephritis episodes after treatment.

**Conclusions:** Applying alternative methods of treatment in the CES seems to have an effect in reducing the number of acute pyelonephritis episodes, as well as in preventing the permanent bladder catheterisation. Patients younger than 50 years seem to have a better response to treatment than those over 50 years. By reducing acute pyelonephritis episodes in these patients we help preventing chronic pyelonephritis and chronic kidney disease.

**SP189**

**THE CREATININE AND CYSTATIN C BASED CKD-EPI EQUATION IMPROVES RISK PREDICTION OF RENAL OUTCOME IN CKD PATIENTS**

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**Introduction and Aims:** Plasma creatinine and cystatin C are markers used to estimate glomerular filtration rate (GFR). Cystatin C is less influenced by muscle mass or diet than creatinine. Recently, the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) validated an equation which integrates creatinine and cystatin C to estimate GFR (i.e. the CKD-EPIcreatinine-cystatin C equation). We present the first comparison of the CKD-EPIcreatinine-cystatin C equation with the more established MDRD equation for prediction of renal outcome.

**Methods:** We recruited 420 CKD patients from our ongoing CARE FOR HOME study for the present subanalysis. Baseline creatinine and cystatin C were measured and then GFR estimated by the MDRD 4 and CKD-EPIcreatinine-cystatin C equations. Patients were classified to 2013 KDIGO CKD stages (stage 2: eGFR 60-90 mL/min/1.73 m²; stage 3a: eGFR 45-60 mL/min/1.73 m²; stage 3b: 30-45 mL/min/1.73 m²; stage 4: 15-30 mL/min/1.73 m²) by the MDRD equation and then re-classified by CKD-EPIcreatinine-cystatin C. Annual follow-ups were performed. The predefined renal outcome was either a 50% decrease in eGFR, or initiation of renal replacement therapy, or death from any cause.

**Results:** Out of 420 patients, CKD-EPIcreatinine-cystatin C re-classified 49 to a less advanced CKD stage than MDRD, 59 to a more advanced CKD stage, and 312 to the same stage. During a mean follow up of 2.4 ± 0.8 years 54 patients suffered a renal outcome event of whom 13 (24%) had been re-classified; 12 to a more advanced CKD stage and only 1 to a less advanced CKD stage. Among the remaining 366 patients not suffering an event, 47 had been re-classified to a more advance and 48 to a less advanced CKD stage. The net re-classification improvement was 20.4% (95% Confidence interval: 9.1% to 34.3%) for patients with the subsequent outcome event, and 0.3% (-4.9% to 5.5%) for patients without the event.

**Conclusions:** Compared to the established MDRD 4 equation, the new CKD-EPIcreatinine-cystatin C equation allows better stratification of CKD patients for prediction of renal outcome. This finding is consistent with recent the 2013 KDIGO recommendation to use CKD-EPI to estimate GFR.

**SP190**

**VALIDATION OF A NEW STANDARDIZED CYSTATIN C TURBIDIMETRIC ASSAY: EVALUATION OF THE THREE NOVEL CKD-EPI EQUATIONS IN HYPERTENSIVE PATIENTS**

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**Introduction and Aims:** The aim of this study was first to evaluate the analytical performances of a new standardized automated turbidimetric cystatin C assay using Diasys reagents (DiaSys Diagnostic Systems GmbH, Holzheim, Germany) on Olympus AU2700® analyzer (Olympus, Rungis, France). Furthermore, the clinical relevance of renal function markers (enzymatic IDMS-traceable creatinine and standardized cystatin C) was assessed by comparison of estimated GFR (eGFR) equations with the GFR measured (mGFR) by a reference isotope method (125I-Tc-DTPA) in a population of hypertensive patients.

**Methods:** We have studied imprecision, linearity, limit of detection and limit of quantification of this new immunoassay. Method comparison was assessed by comparing with results generated by the standardized Siemens- particle-enhanced nephelometric immunoassay. In order to evaluate the clinical relevance of this assay, estimated glomerular filtration rate (GFR) was calculated using MDRD, CKD-EPI creatinine, CKD-EPI creatinin-cystatin C 2012 and CKD-EPI creatinine-cystatin C 2012 and compared to GFR measured using urinary clearance of 125I-Tc-DTPA in 100 hypertensive patients.

**Results:** Cystatin C measurements using Diasys reagents have reliable analytical performances and is comparable to the standardized Siemens-PENIA method (bias of 0.01 mg/L). The mean measured GFR was 90.0 ± 29.7 mL/min/1.73 m². Bias and accuracy of the three CKD-EPI equations were better than the MDRD. Both CKD-EPI creatinine-based and cystatin C-based formulae had similar bias, precision and accuracy. The combined creatinine-cystatin C equation was significantly more accurate and precise than the CKD-EPI creatinine equation, in particular for early stages of chronic kidney disease.

**Conclusions:** The use of creatinine C in a combined equation with creatinine could improve the accuracy of eGFR in patients with high GFR (stage 1) and served as a confirmatory test in patient monitoring.
**Introduction and Aims:** Cystatin C elevation may reflect the wide spectrum of abnormalities including predisposition to cardiovascular disease (CVD), accompanied by renal dysfunction. Clinical significance of estimated glomerular filtration rate based on serum cystatin level (eGFRcy) in predicting adverse outcomes has not been tested in HIV subjects, comparing with eGFR based on serum creatinine (eGFRcr).

**Methods:** A 3.5-year prospective cohort study was conducted in 661 HIV-infected individuals (mean age, 46.4 ± 11.6 years old) to compare the ability to predict adverse outcomes between eGFRcy and eGFRcr. Adverse outcomes included all-cause mortality, CVD and a decrease in eGFR over 25% from baseline. The ability to predict incidence of adverse outcomes was evaluated using the area under the receiver operating characteristic curves (Au ROC).

**Results:** All patients completed the follow-up. CD4 cell count was 411 ± 204 /μL and 81.7% had undetectable HIV RNA level. Prevalence of eGFRcr and eGFRcy <60 ml/min/1.73 m² was 8.6% and 3.5%, respectively. Au ROC for eGFRcy (0.604) was moderate yet significant (P = 0.0003), whereas one for eGFRcr (0.564) was not statistically significant (P = 0.0950).

**Conclusions:** The frequency of HIV individuals affected with renal dysfunction manifested a nearly 2.5-fold decrease, if it was assessed by eGFRcy, instead of eGFRcr. Furthermore, eGFRcy is likely superior to eGFRcr in predicting composite adverse outcomes among HIV-infected individuals.

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**SP192 MDRD VERSUS CKD-EPI EQUATIONS TO ESTIMATE GLOMERULAR FILTRATION RATE IN OBESE PATIENTS**

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**Introduction and Aims:** Obesity is recognized as a risk factor both for the development and progression of chronic kidney disease (CKD). Estimating glomerular filtration rate (GFR) is thus especially important to follow these patients. We have tested the performances of two creatinine-based equations, namely the MDRD and CKD-EPI equations, in an obese population.

**Methods:** Patients with body mass index (BMI) higher than 30 kg/m² were included. The reference method for GFR measurement was ‘Cr-EDTA (single injection method, two blood samples at 120 and 240 minutes)’. Serum creatinine was measured using the IDMS traceable compensated Jaffé method. When obese patients are considered, one important issue is the question of BSA indexation. In this work, we will present the result with non-indexed GFR. We calculated bias (defined as the mean difference between measured and estimated GFR), precision (defined as the SD around the bias) and accuracy 30% (defined as the percentage of estimations which are between ± 30% result with non-indexed GFR). We calculated bias (defined as the mean difference between measured and estimated GFR), precision (defined as the SD around the bias) and accuracy 30% (defined as the percentage of estimations which are between ± 30% result with non-indexed GFR).

**Results:** The population included 93 patients (Liège, Belgium), 62 women and 31 males. Mean age was 51 ± 14 years and mean BMI was 41 ± 9 kg/m². Mean measured GFR was 94 ± 30 ml/min (11 patients had a GFR lower than 60 ml/min). In the global population, the bias was -11 and -6 ml/min for the MDRD and CKD-EPI equations respectively. Precision was 19 ml/min for both equations. Accuracy 30% was 80% for the MDRD and CKD-EPI equations, respectively (no significant difference). In patients with measured GFR higher than 60 ml/min, bias, precision and accuracy for the MDRD and CKD-EPI equations were: -12 and -6 ml/min, 20 and 20 ml/min, and 90 and 84%.

**Conclusions:** Both in the global and subgroup analyses, the CKD-EPI equation did not outperform the MDRD study equation. The performances of both equations were worse in CKD patients. These two conclusions were still valid if indexed GFR was considered.

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**SP193 SHORT-TERM EFFECTS OF TOLVAPTAN ADDED TO FUROSEMIDE IN PATIENTS WITH CONGESTIVE HEART FAILURE AND ADVANCED STAGES OF CHRONIC KIDNEY DISEASE**

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**Introduction and Aims:** Increasing dose of furosemide (Furo) often leads to worsening renal function (WRF) in patients with Furo-resistant congestive heart failure (CHF), especially when complicated with advanced chronic kidney disease (CKD). Add-on use of tolvaptan (Tol), a novel V2 receptor antagonist, may give better control of excessive body fluid in CHF patients without increasing dose of Furo and WRF, however, it has been unclear whether it may give similar effect in advanced stages of CKD patients. This study aimed to clarify the efficacy of add-on Tol in patients with CHF and advanced stages of CKD.

**Methods:** 23 patients with CHF and CKD stage G3b-5 who showed insufficient control of excessive body fluid using 40-200 mg of oral Furo daily were included in this study. We assessed the changes of hemodynamic and renal functional parameters in 23 patients given fixed doses of Furo with add-on Tol (15 mg daily) for 1 week.

**Results:** Compared with the baseline, increasing of urine volume(UV, ml/d) in stages G3b, G4 and G5 were 696±1250(P=0.19), –381±736(P=0.87) and 678±474(P=0.05), respectively, which showed significant increment of UV in CKD stage 5 at the end of the study. Increment of serum creatinine levels(ΔScr, mg/dL) in each were 0.01±0.79, 0.48±0.74 (P=0.05) and 0.11±0.44(P=0.53), respectively, showing no significant WRF except in stage 4. Changes in blood pressure(ΔBP, mmHg) were not statistically significant, and status of excessive body fluid improved clinically in each stage.

**Conclusions:** Without WRF and decreasing BP, add-on use of Tol not only showed apparent increase of UV, but improved clinical symptoms associated with excessive body fluid status in patients with Furo-resistant CHF and advanced stages of CKD.

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**THE EFFICACY OF COLCHICINE TREATMENT IN RENAL AMYLOIDOSIS IN THE FRAMES OF FAMILIAL MEDITERRANEAN FEVER**

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**Introduction and Aims:** The main objective of the study was to assess the results of colchicine treatment in renal amyloidosis in the frames of Familial Mediterranean Fever (FMF) depending on colchicine daily dose and the stage of nephropathy on admission.

**Methods:** We studied 41 FMF patients with amyloid nephropathy. All patients were taking colchicine: 18 patients began the treatment in proteinuric stage (I subgroup), 15 – in the stage of nephrotic syndrome /NS/ (II subgroup), and 8 – in the stage of initial proteinuria /I subgroup/. The preparation dosage was adequate (1.8–2.0 mg/day) only in 11 of 41 investigated patients (26,8%). The essential inclusion criterion for the participation in the study was the duration of colchicine treatment not less than 2 consequent years.

**Results:** In I subgroup colchicine efficacy, i.e. disappearance or decrease in intensity of proteinuria, was detected only in 3 adequately treated patients. In the rest 15 inadequately treated patients we detected persistence of proteinuria with increase tendency – in 12, and increase in creatinine level – in 3 patients. 5 patients in II subgroup were treated adequately. In 3 of them colchicine was efficient, however the rest 2 patient developed RF. In the majority (7) of inadequately treated patients in this subgroup (10 patients) colchicine was not efficient, and 6 patients developed RF. Only in 3 of 10 inadequately treated patients we detected decrease in intensity of proteinuria. There were no cases of colchicine efficacy in III subgroup regardless of preparation dosage.

**Conclusions:** Our investigation has shown that colchicine in the most efficient in the terms of early prescription (proteinuric stage of amyloid nephropathy) and in adequate dose. The efficacy of colchicine tends to decrease in NS, and even full colchicine dose is not able to prevent the progression of amyloidosis. In the stage of RF colchicine treatment has no influence on the course of disease.
Increased plasma fibulin-1 levels were associated with impaired kidney function and diabetes. Fibulin-1 levels were also associated with hemodynamic and arterial stiffness indices.

Results: We observed a positive correlation of fibulin-1 levels with age (r=0.38; p=0.033), glycated hemoglobin (r=0.80; p=0.003), creatinine (r=0.35; p=0.045), and fibrinogen (r=0.39; p=0.027). Glomerular filtration rate and fibulin-1 were inversely correlated (r=-0.57; p=0.022). There was a positive correlation between fibulin-1 and central pulse pressure (r=0.44; p=0.011) and central augmentation pressure (r=0.55; p=0.033). We observed a positive correlation of fibulin-1 levels with age (r=0.38; p=0.033), glycated hemoglobin (r=0.80; p=0.003), creatinine (r=0.35; p=0.045), and fibrinogen (r=0.39; p=0.027). Glomerular filtration rate and fibulin-1 were inversely correlated (r=-0.57; p=0.022). There was a positive correlation between fibulin-1 and central pulse pressure (r=0.44; p=0.011) and central augmentation pressure (r=0.55; p=0.033). In a multivariable regression model, diabetes, creatinine, fibrinogen and central augmentation pressure were independent predictors of plasma fibulin-1.

Conclusions: Plasma fibulin-1 levels were associated with impaired cardiovascular disease in patients with chronic kidney disease.

Introduction and Aims: Fibulin-1 is one of the few extracellular matrix proteins present in blood in high concentrations. We aimed to define the relationship between plasma fibulin-1 levels and risk markers of cardiovascular disease in patients with chronic kidney disease.

Methods: Plasma fibulin-1 was determined in patients with chronic kidney disease (n=32; median age, 63 years; inter-quartile range, 51 to 73 years). Serological biomarkers related to cardiovascular disease (fibrinogen, interleukin 6, C-reactive protein) were measured. Arterial application tonometry was used to determine central hemodynamic and arterial stiffness indices.

Results: We observed a positive correlation of fibulin-1 levels with age (r=0.38; p=0.033), glycated hemoglobin (r=0.80; p=0.003), creatinine (r=0.35; p=0.045), and fibrinogen (r=0.39; p=0.027). Glomerular filtration rate and fibulin-1 were inversely correlated (r=-0.57; p=0.022). There was a positive correlation between fibulin-1 and central pulse pressure (r=0.44; p=0.011) and central augmentation pressure (r=0.55; p=0.033). In a multivariable regression model, diabetes, creatinine, fibrinogen and central augmentation pressure were independent predictors of plasma fibulin-1.

Conclusions: Increased plasma fibulin-1 levels were associated with impaired kidney function and diabetes. Fibulin-1 levels were also associated with hemodynamic cardiovascular risk markers. We conclude that fibulin-1 is involved in the pathogenesis of cardiovascular disease observed in chronic kidney disease.
Introduction and Aims: As the prevalence of renal stone is different in males and females, some studies have focused on the possible roles of hormones including sex types and their receptors in renal calcium stone diseases. Environmental as well patient history, habits and habits may also influence the formation of stones, ions metabolism and consequently urinary tract infections. The present study is an attempt to correlate between the relevant parameters including environmental as well patients criteria in relation to formation of renal stones, serum ion balances, hormones and possible urinary tract infections.

Methods: This study was conducted in Tikrit Teaching Hospital on 160 patients with post-shockwave lithotripsy during 2012. The causative agents of urinary tract infections were identified. One hundred stones were collected and analyzed. Blood samples were collected from patients for serum analysis of vitamin D, parathyroid and sex hormones, calcium, phosphorus, uric acid and magnesium. Types of diet, occupation, residence, drinking water, education and family history were recorded.

Results: Eighty-four percent of the patients were infected with Gram-negative bacteria. The male to female ratio of infection was 2:1. Ca-oxalate was the predominant (85%). Vitamin D, parathyroid and sex hormones were highly interrelated. Hypercalcemia related to hyperparathyroidism was recorded. Most of the patients used raw drinking waters without food restrictions. Almost 37% of the patients tested were having a history of renal stone.

Conclusions: Increased incidence of renal stones among males was attributed to increased dietary protein intake which increases urinary excretion of phosphates and magnesium and reduced urinary citrate concentration. The recurrence rate among urolithiasis patients was almost 37% which indicates insufficient treatment of the underlying causes. Vitamin D, parathyroid and sex hormones were highly interrelated with ions metabolism, stone formation and urinary tract infections.

Introduction and Aims: It is known, that patients with nephrolithiasis have the increased risk of development of the chronic kidney disease (CKD). Among risk factors of development of CKD in nephrolithiasis, it is possible to allocate the repeated operative interventions, accompanied by transient disturbances of microcirculation to the development of tubulointerstitial damage and endothelial dysfunction in nephrofibrosis outcome. Mediators of tubulointerstitial damage and nephrofibrosis participating in the cellular response can be used to predict the outcome of kidney damage in the surgical treatment of nephrolithiasis.

Methods: Examined 340 patients of nephrolithiasis. All patients underwent assessment of renal function by the formula MDRD; preoperative and 3 months after surgery using ELISA determined levels of some profibrotic cytokines (uIL-6, uIL-8, uMCP-1, uTGF-β) and mediators of endothelial dysfunction (VEGF, NO and ET-1) in urine and blood serum. The age of patients, body weight, anamnesis duration, salt composition of the stone, GFR, urea, serum creatinine also underwent the analysis.

Results: Based on the results of 57 intraoperative nephrobiopsy received during PCNL and open surgical treatment, revealed changes tubulointerstitial tissues of varying severity. The nonparametric correlation analysis on Spearman’s method showed a strong correlation (r ≥ 0.5) between of laboratory and morphometric parameters in patients with nephrolithiasis (p ≤ 0.05). Diameter of tubules correlated with concentration of IL-1 and IL-6 in urine (r=0.77; p=0.04), and also back correlated with the ET-1 level in blood serum (r=−0.78; p=0.006). Indicators such as uTGF-β1 (r = −0.75; p = 0.026), uIL-6 (r = 0.77; p = 0.04) and VEGF (r = −0.77 p = 0.036) is directly depends on elevation changes tubular epithelial cells (p ≤ 0.05). Infiltration of the renal parenchyma of the brain substance was correlated with the levels of TGF-β (r = 0.76; p = 0.02) and MCP-1 (r = 0.86; p = 0.02) in the urine, the concentration of NO in blood serum (r = 0.77; p = 0.036).

Conclusions: Use of mediators nephrofibrosis as quantitative prognostic criteria risk of decreased kidney function after surgery in patients with nephrolithiasis can identify risk patients with a high probability of progression of CKD in the postoperative period, to choose the best algorithm for diagnostic and treatment interventions in these patients and to determine the appropriate target for renal protection therapy.