DIALYSIS. PROTEIN-ENERGY WASTING, INFLAMMATION AND OXIDATIVE STRESS

INTRACELLULAR PHOSPHATE EVOLUTION IN PIG MUSCLE DURING HEMODIALYSIS: AN IN-VIVO PHOSPHATE MR SPECTROSCOPY STUDY

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Introduction and Aims: Among the 600 to 700 mg of inorganic phosphate (Pi) removed during a 4-hour hemodialysis session, a maximum of 10% could be extracted from the extracellular space (1). The origin of the other 90% of removed Pi is unknown and two hypothesis have been proposed being either the intracellular compartment or bone. Spalding et al (2) hypothesized that Pi exchanges between intra and extracellular compartments were diffusive, suggesting that the intracellular compartment could be the main source of Pi removed during hemodialysis. Therefore, we proposed to test this hypothesis during a hemodialysis session, by using Phosphorus (31P) Magnetic Resonance Spectroscopy (MRS), which is the only tool allowing in vivo and dynamic measurement of the intracellular Pi concentration as well as the other phosphate metabolites such as Phosphocreatine (PC) and ATP.

Methods: 3-hour hemodialysis sessions were performed in 6 pigs, after surgical bio-nephrectomy, with a PrimaFlex® generator and a M100® dialyser ( Hospal). The extra-corporal circulation blood flow was maintained between 100 and 150 mL/min. 31P MRS exams were performed with a 1.5T Siemens Sonata system using a surface coil (20 cm) placed over the gluteal muscle region. 31P MR spectra (TR=10s, TE=0.35ms) were acquired every 2’40” before, during and after dialysis. Blood samples were obtained during the whole examination to measure plasma Pi concentrations.

Results: During the dialysis, the mean Pcr/Pi ratio decreased significantly (-6.6%, p<0.00001), while the Pi/ATP ratio increased (+22.2%, p<0.00001). Plasma Pi concentration felt rapidly within 60 min from 2.30 ± 0.18 mmol/L to 1.65 ± 0.10 mmol/L (±28.08%, p=0.003) then plateaued.

Conclusions: This study demonstrated that intracellular Pi concentration did not decrease in parallel with the extracellular Pi decrease as proposed (2). In contrast, the intracellular Pi increase may reflect a cellular stress induced by hemodialysis and/or a strong intracellular Pi production. Gallar P et al Nefrologia, 27:46-52, 2007.

POLYMETHYLACRYLATE (PMMA) REDUCES SCD40L PLASMA LEVELS IN HEMODIALYTIC PATIENTS. RESULTS FROM A PRELIMINARY STUDY

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Introduction and Aims: Soluble CD40L (sCD40L) is a well-known proinflammatory and proatherogenic agent. The RISCADV study demonstrated an increased cardiovascular risk in patients with sCD40L serum levels exceeding 7.6 ng/ml. The aim of our study was to evaluate the effect of different hemodialysis membranes on sCD40L levels in hemodialytic patients (HD).

Methods: Twenty-three stable HD patients were randomized as follow: Group 1. Nine patients were dialyzed for three months with Polymide (PA) or polysulfone (PS) membranes and then shifted (time 0) in polymethylacrylate (PMMA) membrane for a further three months; Group 2. Six patients were dialyzed for three months with PMMA membrane and subsequently shifted to PA / PS for a further three months; Group 3 and 4, eight patients were maintained in PMMA or PA / PS membrane. We measured the sCD40L serum levels (ELISA) at times 0, 30, 60 and 90 days. Furthermore, to investigate inflammation and apoptosis induced by uremic serum in vitro, HUVEC cells were incubated with serum of patients of group 1 and 2.

Results: In vivo study. The group 1 (sCD40L serum levels were significantly reduced after three months from 10.4±1.6 ng/ml at time 0 to 5.2±0.9 ng/ml at time 90, (p=0.001) below the threshold of 7.6 ng/ml. In group 2 sCD40L serum level increased from 6.5±1.3 ng/ml to 7.8±1.7 ng/ml, but the difference was not statistically significant. In groups 3 and 4 the levels of sCD40L were stable. In vitro study. Less pro-inflammatory (monocyte adhesion and ICAM-1 and E-selectin expression) and proapoptotic (caspase and TUNEL) activity was detected in HUVEC cells incubated with serum of patients from group 1 compared to group 2. These effects were reduced on

HIGHER HDL CHOLESTEROL IS ASSOCIATED WITH LOWER CARDIOVASCULAR EVENTS WHILE HIGHER LDL CHOLESTEROL IS ASSOCIATED WITH LOWER INFECTIONOUS EVENTS IN A LARGE INTERNATIONAL POPULATION OF HEMODIALYSIS PATIENTS

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Introduction and Aims: Lipid lowering agents have decreasing effect on all-cause mortality as renal function declines losing statistical significance among patients with End Stage Renal Disease (ESRD). Low density lipoproteins (LDL) are capable of absorbing and inactivating bacterial toxins (S Bkhadi) and human LDL can prevent endotoxin induced lethality in mice (Feingold). The second highest leading cause of death among ESRD patients after cardiovascular diseases is infectious. We conducted this analysis to explore the relationship between blood lipid composition and both cardiovascular and infectious outcomes.

Methods: The MONitoring Dialysis Outcomes (MONDO) consortium consists of hemodialysis (HD) databases from Renal Research Institute [RRI] clinics in the US, Fresenius Medical Care [FMC] clinics in Europe, Asia Pacific, Latin America, KIH clinics in Germany, Imperial College in the UK, Hadassah Medical Center, Israel, Pontificial Catholic University of Parana, Brazil, and University of Maastricht, The Netherlands. Databases from RRI and FMC Europe [17 countries] were used to identify all patients with in-center treatments [11006-12/2012] who survived ≥12 months on HD. Only those with at least one record of HDL and LDL cholesterol, triglycerides, and neutrophils to lymphocyte ratio (NLR) in the first 12 months were selected (baseline period). The mean clinical and laboratory parameters were computed for the first 12 months and hospitalizations and clinical events (deaths and hospitalizations) were observed in months 13 to 24 (Followup period). Hospitalizations and mortality were classified as cardiovascular (CVD)-related or infectious-related and Poisson regression models were constructed to explore associations between baseline parameters and the number of CVD and infectious events in the follow up period.

Results: We studied 22746 patients [FMC Europe 16911; RRI 5835]. Higher HDL was associated with fewer CVD deaths and hospitalizations (adjusted by NLR) while higher LDL was associated with less infectious deaths and hospitalizations but had no relationship to CVD outcomes. The association between HDL and CVD events was still significant when adjusted for NLR, a marker of inflammation (table 1). Results adjusted for CRP were similar although no CRP data was available for North America (results not shown). Adjusted for geographic region, age, gender, race, BMI, diabetic status, NLR and albumin

Conclusions: Higher HDL is associated with fewer CVD events, while higher LDL is associated with fewer infectious deaths and hospitalizations. These data may contribute to the inverse association between HDL and mortality in the dialysis population.

Table 1. Poisson regression results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>95% CI</th>
<th>p-value</th>
<th>Estimate</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDL (mg/dL)</td>
<td>-0.013</td>
<td>-0.019</td>
<td>&lt;0.007</td>
<td>&lt;0.005</td>
<td>&lt;0.011</td>
<td>0.002</td>
</tr>
<tr>
<td>LDL (mg/dL)</td>
<td>0.001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.374</td>
<td>0.004</td>
<td>0.006</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.926</td>
<td>0.001</td>
<td>0.000</td>
</tr>
</tbody>
</table>

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This study revealed that the downward trend of nutritional status was associated with cardiovascular disease (CCVD) (p=0.023, HR: 0.44) and death (p=0.023, HR: 0.32). Moreover, patients who showed the decline in serum albumin were associated with disease (CCVD) (p=0.012, HR: 2.19) and hospitalization (p=0.002, HR: 1.57). Patients with a decline in BMI were associated with the elevated risks for cerebro-cardiovascular death (p=0.17) and serum albumin (p=0.0001, from 3.72 ± 0.015 to 3.66 ± 0.017 g/dL). In patients over 62 years old, BMI (p=0.0025, from 21.4 ± 0.17 to 21.2 ± 0.17) and serum albumin (p=0.0001, from 3.72 ± 0.015 to 3.66 ± 0.017 g/dL) levels significantly decreased during the follow-up period. Patients who showed the decline in BMI were associated with the elevated risks for cerebro-cardiovascular death (p=0.012, HR: 2.19) and hospitalization (p=0.002, HR: 1.57). Moreover, patients who showed the decline in serum albumin also associated with higher risk for infectious disease (p=0.001, HR: 1.55) and hospitalization (p=0.049, HR: 1.35). In addition, patients who showed the increase in iCGRP had a higher risk for CCVD (p=0.032, HR: 0.44) and death (p=0.023, HR: 0.32).

Conclusions: This study revealed that the downward trend of nutritional status was prominent in elderly MHD. Furthermore, the progress in malnutrition and inflammation could be associated with the several adverse events in MHD patients.

**SP649 IMPACT OF PERIODONTAL DISEASE ON SURVIVAL OF HAEMODIALYSIS PATIENTS**

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Introduction and Aims: Periodontal disease (PD) was reported as highly prevalent in haemodialysis (HD) patients and was associated with inflammation-malnutrition complex and higher mortality. We aimed to assess the extent of PD and its impact on HD patients’ survival.

Methods: In this prospective single center observational study 263 stable HD patients (age: 57 [50-65] years; 60% males; HD vintage 6.9 [6.2-7.6] years; primary kidney disease: glomerulopathies in 34% cases, diabetic nephropathy in 11% were enrolled and followed for a median period of 24.6 months. Periodontal status was examined according to WHO recommendations by a single examiner and quantified based on loss of clinical attachment level (CAL): no/mild periodontitis (CAL<3mm), moderate or severe periodontitis (CAL 3-4 mm or >4mm respectively). Demographic data, smoking status, haematologic data (haemoglobin, erythropoietin resistance index - ERI, defined as erythropoietin dose [mcg darbepoetin/kg/week] /haemoglobin [g/dL]), dialysis adequacy (Kt/V), parameters of nutrition-inflammation (anthropometry, biochemistry, serum C-reactive protein), as well as Davies co-morbidity index were collected at baseline. Variables associated with PD status were evaluated in multinomial regression. Survival analyses were conducted with the Kaplan-Meier method; log-rank test was used for comparisons. Variables related to survival in multinomial analyses were further evaluated in a multivariate Cox proportional hazard (CPH) model.

Results: Examination of oral health showed poor periodontal status in 75% of patients; in 23% PD was severe. In multinomial regression, age, HD vintage, ERI and diabetic status were retained in the model, but only lower Davies score and CPH levels allowed for differentiation of mild and moderate from severe PD (OR 0.31 [0.13-0.78] and 0.36 [0.14 to 0.66]; 0.49 [0.30 to 0.78] and 0.55 [0.37 to 0.83], respectively; Cox&Snell β 0.26; p=0.001). Patients with severe PD had the lowest median survival time (31.2 [27.7-34.8] months), as compared to those with moderate PD (50.5 [45.8-55.1] months) and those with normal/mild PD (63.4 [59.8-67.0] months). In the multivariate CPH model, higher co-morbidity score (HR 4.37 [2.61-7.33]; p<0.001) and elevated CRP level (1.87 [1.21-2.92]; p<0.01) were the independent predictors of death. Only patients with normal/mild PD had a survival advantage when adjusted for independent predictors.

Conclusions: Impaired periodontal health was highly prevalent in our cohort of HD patients and it’s severity was related to age, dialysis vintage, diabetic status, co-morbidities and inflammation, and was directly associated with reduced chances of survival. However, the relationship between PD and the other co-morbidities in HD patients remains unclear: periodontitis could be either another consequence of poor health status, or add severity to the other co-morbidities. An interventional trial to evaluate the influence of periodontal disease on hard end-points is required for differentiation.

**SP647 QUALITY OF LIFE IN HEMODIALYSIS PATIENTS WITH ENDOSTEMOSIS AND MORTALITY: COX-PROPORTIONAL HAZARD REGRESSION ANALYSIS**

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Introduction and Aims: In hemodialysis (HD) patients, poor Health-related quality of life (HRQoL) is frequent and it is associated with adverse outcome. It is well known that HRQoL and nutritional status are strictly linked. However, whether amelioration of chronic inflammation and improvement of nutritional status affect HRQoL remains ill-defined. Hemofiltration with endogenous regeneration (HFR) is an alternative dialysis technique that could reduce inflammation burden and malnutrition but it has never been evaluated whether this translates into a beneficial effect on HRQoL.

Methods: We designed a cross-sectional multicentre study in order to compare the HRQoL in patients treated with HFR versus BHD. We enrolled adult patients treated for at least 6 months HFIR, with life expectancy greater than six months and without remarkable cognitive deficit. The recruited patients in HFR were matched for age, gender, dialytic vintage and performance in activities of daily living (Barthel index) with BHD treated patients. Demographic, clinical, laboratory and treatment data were collected and SF-36 questionnaire for the assessment of QoL was administered.

Results: One hundred fourteen patients were enrolled (age 65.4±13.5 years; dialysis vintage 5.4 (3.3-10.3) years; 53%males) from 18 dialysis non-profit centres in central and southern Italy. As result of matching, no difference in age, gender, dialytic age and Barthel index was found between BHD and HFR patients. KTV, hemoglobin and serum albumin were similar between the two treatment groups. In HFR patients we observed higher values of SF-36 physical component score than BHD patients, whereas no significant difference emerged in the mental component score. In particular, as described in table, HFR patients had a better Physical Functioning and Role Physical.

Conclusions: HFR is associated with a better physical component of HRQoL than BHD, independently of age, gender, dialytic vintage and disability score.

**SP648 PROTEIN-ENERGY WASTING (PEW) IS PRESENT IN HEMODIALYSIS PATIENTS ACROSS THE ALL BODY-MASS INDEX GROUPS AND INCREASES WITH DIALYSIS VINTAGE**

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Introduction and Aims: Protein-energy wasting (PEW) is a state of decreased body stores of protein and fat masses which arises from inadequate nutrient intake and increased catabolism. Series of studies have described it as one of the main non-traditional risk factors associated with poor prognosis and treatment outcome in

**TABLE 1**

<table>
<thead>
<tr>
<th>Component Score</th>
<th>HFR (n=57)</th>
<th>BHD (n=57)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Component</td>
<td>56±20</td>
<td>48±23</td>
<td>0.048</td>
</tr>
<tr>
<td>Mental Component</td>
<td>57±21</td>
<td>55±19</td>
<td>0.698</td>
</tr>
<tr>
<td>Physical Functioning</td>
<td>61±26</td>
<td>51±30</td>
<td>0.045</td>
</tr>
<tr>
<td>Role Physical</td>
<td>66±47</td>
<td>56±46</td>
<td>0.027</td>
</tr>
<tr>
<td>Bodily Pain</td>
<td>63±25</td>
<td>58±31</td>
<td>0.346</td>
</tr>
<tr>
<td>General Health</td>
<td>40±17</td>
<td>39±19</td>
<td>0.676</td>
</tr>
<tr>
<td>Vitality</td>
<td>51±22</td>
<td>48±21</td>
<td>0.492</td>
</tr>
<tr>
<td>Social Functioning</td>
<td>64±25</td>
<td>69±20</td>
<td>0.290</td>
</tr>
<tr>
<td>Role Emotional</td>
<td>64±40</td>
<td>60±43</td>
<td>0.595</td>
</tr>
<tr>
<td>Mental Health</td>
<td>64±24</td>
<td>60±22</td>
<td>0.437</td>
</tr>
</tbody>
</table>
chronic kidney disease (CKD) patients. It has been estimated that 18 to 75% of patients on maintenance dialysis are malnourished. Nevertheless, PEW still stays greatly neglected and often unrecognized. Evidence suggests that nutritional markers such as hypophosphatemia, low serum albumin and transferrin levels, and malnutrition-inflammation score (MIS) ≥ 5, also correlate with mortality. Compared to other traditional or non-traditional risk factors low serum albumin value is doubtlessly the strongest predictor of mortality, their association linear and highly progressive. As its levels are measured frequently, it is also one of the simplest and most reliable markers of PEW. The aim of this study was to evaluate relationship between body mass index and serum albumin in hemodialysis patients, and to investigate role of dialysis vintage in development of PEW.

Methods: 135 patients age ranging from 20 to 91 years were enrolled in the study. The median time spent on treatment was 34 (2-413) months. Laboratory and clinical data were obtained from the medical records and charts. The anthropometric measurements were performed after dialysis session. MIS was individually taken. Patients were divided into 5 groups regarding the body mass index (BMI) values: < 20 kg/m²: malnourished, 20-25 kg/m²: properly nourished, 25.1-30 kg/m²: overweight, and > 30 kg/m²: obese.

Results: The results show that 15.56% of our patients were nutritionally malnourished despite carefully provided renal replacement therapy. As time spent on maintenance hemodialysis was longer, BMI was lower and MIS had significantly increased - for patients undergoing HD less than 2 years median BMI was 25.35 (16.62-31.77) kg/m² and MIS 6.92 whereas after 10 years of treatment it was 23.06 (16.73-29.93) kg/m² and MIS 10.13 (p<0.05). Furthermore, median values of serum albumin were lower than 3.8 g/dl in all 5 analyzed groups. It was interesting to notice that serum albumin was the highest in the group of malnourished patients according to the BMI (3.71 g/dl). On the other hand, the lowest values were recorded in the group of overweight (3.54 g/dl). When divided into two groups due to albumin value (lower and higher than 4 g/dl), it could be seen that MIS was considerably higher in the group which measured lower albumin values (8.79 versus 5.79). There was no significant difference in time spent on HD (55 versus 54 months) regarding the serum albumin level.

Conclusions: Our results demonstrated that PEW cannot be exclusively linked to malnourished patients - it is a major risk factor which extends to all patients, regardless of the BMI. PEW was more common in patients with longer dialysis vintage. Complex analysis like MIS should be used to estimate malnutrition instead of the single parameter like is albumin or BMI. Further efforts are needed to clearly define and precisely establish diagnosis guidelines for this important condition. Although the ideal therapy protocol still does not exist, active style of life and healthy nutritional habits, as well as use of nutritional supplements when necessary, should be persistently promoted in order to achieve better outcome and quality of life in this vulnerable population.

**Serum Uric Acid As A Clinically Useful Nutritional Marker and Predictor of Outcome in Maintenance Hemodialysis Patients**

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**Introduction and Aims:** The importance of serum uric acid (SUA) for maintenance hemodialysis (MHD) population has not been well established. We hypothesized that SUA levels may be associated with nutritional risk and consequently with adverse clinical outcomes in MHD patients.

**Methods:** A two-year prospective cross-sectional study of MHD patients performed on 261 MHD outpatients (38.7% women) with a mean age of 68.6±13.6 years. Prospective analysis included all cause and cardiovascular (CV) hospitalizations and mortality, nutritional scores (malnutrition-inflammation score (MIS), and Geriatric nutritional risk index (GNRI)), hand-grip strength (HGS), and short form 36 (SF-36) quality-of-life (QoL) scores were measured.

**Results:** SUA positively correlated with laboratory nutritional markers (albumin, creatinine), with body composition parameters, with HGS (r=0.26, p<0.001) and with GNRI (r=0.34, p<0.001). SUA negatively correlated with MIS (r=0.33, p<0.001) and interleukin 6 (r=−0.13, p=0.04). Patients in the highest SUA tertile had higher total SF-36 scores (p=0.04), higher physical functioning (p=0.003) and role-physical (p=0.006) SF-36 scales. For each 1.0 mg/dL increase in baseline SUA levels, the first hospitalization hazard ratio (HR) was 0.79 (95% confidence interval [CI], 0.68 to 0.91) and first CV event HR was 0.60 (95% CI, 0.44 to 0.82); all-cause death HR was 0.55 (95% CI, 0.43 to 0.72) and CV death HR was 0.55 (95% CI, 0.35-0.80). Associations between SUA and mortality risk remained significant after adjustments for various confounders including MIS and interleukin 6. Cubic spline survival models confirmed linear trends.

**Conclusions:** In MHD patients, SUA is a good nutritional marker and associates with body composition, muscle function, inflammation, and health-related QoL, upcoming hospitalizations, as well as independently predicting all-cause and cardiovascular death risk. SUA levels may be associated with nutritional risk and consequently with adverse clinical outcomes in MHD patients. Further efforts are needed to clarify the role of SUA in predicting mortality and independent predictors of mortality in maintenance hemodialysis patients. Although the ideal therapy protocol still does not exist, active style of life and healthy nutritional habits, as well as use of nutritional supplements when necessary, should be persistently promoted in order to achieve better outcome and quality of life in this vulnerable population.
SP652 RELATIONSHIP BETWEEN SERUM MAGNESIUM AND NON-TRADITIONAL CARDIOVASCULAR RISK FACTORS IN HEMODIALYSIS PATIENTS

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Introduction and Aims: CKD patients have a high incidence of cardiovascular mortality. In the last years evidence has showed that non-traditional risk factors such as inflammation, malnutrition, and anemia, play an important role in all cause mortality. Additionally, recent studies have showed that low Mg levels were predictors of overall mortality in hemodialysis patients. Although the importance of this mineral has been particularly recognized due to its anti-atherosclerotic effect, the pathway by which hypomagnesemia is associated with higher mortality in these group of patients has not been has been properly investigated. The aim of our study was to analyze the relationship between serum magnesium levels and non-traditional cardiovascular risk factors in hemodialysis patients.

Methods: In a cross-sectional study, including a total of 83 hemodialysis patients we analyzed: serum magnesium levels (reference values: 1.58-2.55 mg/dl) and non-traditional cardiovascular risk factors (NTCV). We divided NTCV in four groups: a) Nutritional biochemical parameters: albumin, prealbumin b) Adipokins: Adiponectin, Leptin, Resistin (X-MAP technology, BioRad, Madrid, Spain), c) Inflammation parameters: CRP (Nephelometry), IL-6 and TNF-α, d) X-MAP technology (BioRad, Madrid, Spain), ESA resistance index, d) Body Composition parameters: lean body mass, fat body mass, body cell mass, phase angle (assessed by BCM Fresenius medical devices).

Results: Mean age 64±12 years, 68% (57) were male, 36% (30) diabetic and 23% (19) had history of ischemic heart disease. Median age adjusted comorbidity index was 7 (5-9). Mean S-Mg level was 2.1±0.35 mg/dl (1.52-4.01). Only two patients (2.4%) had S-Mg<2.5mg/l. Just one patient had hypomagnesemia considering the normal range established in our center. However, 24% were in the low quartile range (<2mg). No relation was found with age and there was no difference between genders or diabetics. A strong relation was found with age-adjusted Charlson comorbidity index (ACCI) (p=0.022). There was no correlation between biochemical nutritional parameters or adipokins. In relation to inflammatory parameters, lower magnesium levels were associated with lower hemoglobin level (p=0,005) and more ESA resistance (p=0.05). Considering CRP, a trend to higher CRP level in patients with lower Mg was evident, however this was not statistically significant (p=0,097). There was no relation with neither IL-6 nor TNF-α. Regarding body composition, higher magnesium levels were related to more lean body mass (p=0,004) and less fat body mass (p=0,018). No relation was found with phase angle. In a linear regression model, just age-adjusted Charlson comorbidity index showed significant association with magnesium levels. Conclusions: In our population, the incidence of hypomagnesemia is extremely low. However, lower serum magnesium was associated with some non-traditional cardiovascular risk factors like anemia and ESA resistance, and also with poor nutritional status.

SP654 HOW MUCH INCREASE IN MALNUTRITION-INFLAMMATION SCORE (MIS) REALLY REFLECTS A PROGRESSION TOWARD MALNUTRITION?

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Introduction and Aims: Malnutrition, or protein-energy wasting (PEW), is regarded to be one of the most common morbidity, which is associated with high mortality, in dialysis population. Malnutrition-Inflammation Score (MIS), developed by Kalantar-Zadeh (2001), is composed of 7 factors (dry weight loss, fat intake, GI symptoms, physical activities, comorbidities, fat and muscle) derived from subjective global assessment (SGA) and additional 3 objective factors (body mass index, serum albumin and total iron binding capacity). MIS has been regarded to be one of the most efficient way to detect malnourished dialysis patients. However, MIS fluctuates over a period of time in a single patient. It is unknown how much increase in MIS actually reflects a progression toward malnutrition.

Methods: MIS has been performed semianually by dialysis nurses to all the patients on maintenance hemodialysis in a single dialysis center. Each 1 component of MIS had to be added to the patient's score with a higher point suggesting toward malnutrition. MIS is calculated as a sum of those components, with a minimum (best) score of 0 and a maximum (worst) score of 30. The patient who had at least 3 measurements were included in the present analysis. Fluctuation of MIS was evaluated by standard deviations (SDs) of serial MIS measurements in each patient. Background clinical factors which might influence MIS fluctuation were analyzed. Statistical analysis were done using StataView 5.0 (SAS Institute Inc.) for Macintosh.

Results: A total of 104 patients (age 67.7±13.1 years, m±SD, M:F = 69:35) were included in the analysis, with their MIS of 6.49±3.70, standardized triceps skin fold thickness 44.3±9.32% and standardized arm muscle area 99.4±20.8%. Multivariate stepwise analysis showed that MIS fluctuated significantly if background status had lower dry weight and lower serum albumin (P<0.001), supporting that MIS fluctuation reflects a progression to malnutrition at least partially. In patients with an average MIS less than 8 (n=78), i.e., in those who would be regarded to be without PEW, SDs of MIS were 1.62±0.71, significantly less than SDs in patients with MIS 8 or higher (n=26, 2.66±1.11, P<0.001). Considering that 2SDs cover 95%, an increase in MIS beyond 2SDs (=3.24) could be possibly regarded as a progression toward malnutrition. This hypothesis was supported by the findings that the patients with an increase in MIS from an average of the previous MIS by 3.5 or more (n=15) had significantly higher MIS (8.3±5.4 vs 6.2±3.3, P=0.043) and a progressive decline in arm muscle area (-7.9±9.8% vs -2.4±14.8%, P=0.011), compared with those whose increment were less (n=89).

Conclusions: Increase in MIS by 3.5 or more from an average of the previous MIS measurements is likely to represent a true progression toward malnutrition rather than a measurement error.

SP663 THE ROLE OF SERUM MAGNESIUM (S-MG) AND CALCIUM (S-CA) LEVELS IN THE ASSOCIATION BETWEEN PROTEIN-ENERGY WASTING (PEW) AND MORTALITY IN END-STAGE RENAL DISEASE (ESRD) PATIENTS

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1General Hospital of Chios, Chios, Greece, 2Technological Educational Institute of Crete, Heraklion, Greece, 3Charles University Prague. Faculty of Medicine In Pilsen, Pilsen, Czech Republic, 4University Hospital of Heraklion, Heraklion, Greece

Introduction and Aims: PEW, which can be reliably assessed by the malnutrition-inflammation score (MIS), is associated with adverse clinical outcomes in ESRD patients. Low S-Mg and high S-CA levels have been also consistently associated with increased risk of morbidity and mortality in ESRD. Here, we examined a) whether and to what extent S-Mg and S-CA reflect the nutritional status of ESRD patients, as assessed by the MIS, and b) the interrelations between the altered mineral metabolism, MIS and mortality in uraemic patients.

Methods: One hundred and thirty six ESRD patients, 82 on hemodialysis and 54 on peritoneal dialysis, after baseline assessment, including the MIS and other nutritional, biochemical and anthropometric markers, were followed-up for all-cause mortality. Since a higher score of the MIS (0 to 30) reflects a more severe degree of malnutrition and inflammation, patients in the lower (0-4) and middle (5-7) tertiles of MIS were defined as well nourished, whereas patients in the upper tertile (≥8) of MIS were considered as malnourished.

Results: As compared to well nourished, malnourished patients were older, had longer renal replacement therapy (RRT) vintage, higher prevalence of cardiovascular disease (CVD) (p=0.05), lower creatinine (β=-2.49 ± 0.76 mg/dl; p=0.01) and higher S-CA (β=0.78 vs. 9.05 ± 0.76 mg/dl; p=0.01) levels, respectively. The MIS correlated inversely (all rho>-0.200) with anthropometric measurements: free fat mass, mid-arm circumference and mid-arm muscle circumference. Multivariate regression analysis (R² = 0.320; p<0.001) identified S-Mg (Beta=−0.316; p<0.001) and S-CA (Beta=−0.194; p<0.05) levels as significant independent predictors of the MIS, after adjustment for sex, mode of dialysis, RRT vintage, age, CVD, diabetes, magnesium index, and CRP. Among a median follow-up period of 25 months, 35 deaths occurred. Malnourished patients had increased all cause mortality (crude hazard ratio: 2.85 (95% CI, 1.42-5.69). Likewise, all-cause mortality increased by 23% (β=1.23 [1.12-1.36]) for each unit increase assessed. MIS -s-Ca and a high S-CA levels appear to be reliable and robust markers of PEW and inflammation, b) altered mineral metabolism may be a link between PEW and adverse clinical outcomes and c) incorporation of S-mg and S-CA in a nutritional scoring system can further improve its efficiency to predict outcomes in uraemia, a possibility that warrants further investigation.

SP665 RANDOMIZED CONTROLLED TRIAL ON THE EFFECTS OF A SIX-MONTH INTRA-DIALYTIC PHYSICAL ACTIVITY PROGRAM AND ADEQUATE NUTRITIONAL SUPPORT ON PROTEIN-ENERGY WASTING, PHYSICAL FUNCTIONING AND QUALITY OF LIFE IN CHRONIC HEMODIALYSIS PATIENTS - ACTINUT

Dan Hristea1, Anne Paris1, Gaëlle Lefrancois1, Christelle Volteau2, Corneliu Savoiu1, Sophie Ozanne1, Angelo Testa3, Stéphanie Coupel2, Isabelle Bertho1, Marie Claude Legall1, Justine Magnard2 and Thibault Deschamps3
1ECHO Association, Nantes, France, 2Biometrics, CHU, Nantes, France, 3University of Nantes, Nantes, France

Introduction and Aims: Protein-energy wasting (PEW) is common in hemodialysis patients and is a powerful predictor of adverse outcomes. The aims of this randomized
controlled trial were to investigate the effects of a six-month intradialytic physical activity program in addition to an adapted nutritional support on protein-energy wasting (PEW), physical functioning and quality of life in chronic hemodialysis patients.

Methods: All 210 patients of 2 dialysis units in Nantes (France) were screened for the presence of PEW according to the criteria of the ISRNM. Eligible patients were then randomly assigned either to a nutrition and exercise group (N+Ex) or to a nutrition only group (N). In both groups, the prescription of nutritional supplements (oral or, in case of intolerance, IV) was adapted according to the dietary records, in order to reach goals set by the European Guidelines for Nutrition in terms of protein and energy intake. In addition, N+Ex group engaged in a 6-months progressive submaximal intradialytic cycling exercise program. Primary outcome was to compare the number of patients having reached remission of PEW in N+Ex vs. N group by months 6. Secondary outcomes assessed the effects of intradialytic exercise on functional performances (six-minute walk test (6MWT), quiet standing postural control, and maximal quadriceps strength), body composition (estimated by bio-impedance spectroscopy) and self-reported health-related quality of life (SF-36 score).

Results: Twenty-one eligible patients (11 men) consented to participate and were randomized: 11 N vs. 10 N+Ex. Mean age and dialysis vintage (years) were: 71.0 (range 52-89) and 8.6 (0.0-23.8) in N+Ex, and 69.9 (9.1-1.0), 1.1 (3.2-2.7) in N respectively. Seven patients in N+Ex and nine patients in N completed the 6 months of the study. Causes of drop-out were: kidney transplantation (1 N+Ex), death due to comorbidities (1 N, 1 N+Ex), intercurrent disease (2 N+Ex) and withdrawal of consent (1 N). No serious adverse effects directly related to exercise occurred. There was no significant difference in the number of patients having reached remission of PEW between the two groups. Two of 6 patients in N+Ex vs. 4 of 9 patients in N had no longer all criteria for PEW but only one patient in N+Ex had normal albumin, prealbumin and IL1 at the end of the study. No significant changes were observed between groups over time in measures of serum-albumin, prealbumin, C-reactive protein, body mass index, lean- and fat-tissue index or quadriceps force.

Introduction and Aims: Inflammation is a risk factor in end-stage renal disease (ESRD) patients (pts) who undergo accelerated physiological and functional aging.

Even if it has previously been reported that reduced telomere length (TL) is associated with inflammatory markers in uremic Caucasian pts undergoing regular hemodialysis. Here, we sought to verify if TL is linked to systemic inflammation also in Japanese ESRD pts, at baseline and after 1 year of dialysis.

Methods: We enrolled 59 Japanese dialysis pts (31 males, mean age 60±12 years) who had just started renal replacement therapy (RRT) from June 2007 to July 2013 at two affiliated hospitals in Aichi prefecture, Japan. This study is a sub-analysis of the ongoing prospective Nagoya Imaging System in ESRD study. In this study, TL was determined in peripheral blood leukocytes using a standard Q-PCR methodology.

Results: Leucocyte TL (T/S) negatively correlated with age at baseline (R2=0.13, t=2.93, P=0.0043) and 1 year after RRT (R2=0.11, t=2.72, P=0.0086) and there was a marked reduction of 8.6% (median 14.4%) within the first year following RRT. The degree of any TL shortening was unaffected by adjustment for age, gender, diabetes and smoking habit. Longer TL at baseline was associated with the lower IL-6 levels at baseline (R2=0.09, t=2.46, P=0.02), as well as with IL-6 levels (R2=0.10 t=-2.48, P=0.02) and CRP levels after 1 year (R2=0.18, t=-3.37, P=0.02). There was also no association between the degree of TL shortening during 1 year and these inflammatory markers. Higher white blood cell count (WBC) was significantly associated with longer TL 1 year after follow up (R2=0.15, t=3.20, P=0.002) and the degree of TL shortening relative to baseline TL (R2=0.07, t=2.01, P=0.048).

Conclusions: We confirm that TL correlates inversely with IL-6 levels, in Japanese ESRD pts, as WBC correlated positively with TL. We hypothesize that leucocyte telomere attrition reflects a shortened life span for leucocytes in the uremic milieu and that longer leukocyte TL in pts with positive inflammatory WBC may be reflective of more robust biological ageing in these pts.
Handgrip strength provides a good marker for survival in HD patients, independent of age, DM, cardiovascular disease, and serum albumin.

**Conclusions:**

Handgrip strength and inflammatory parameters (CRP, albumin, cholesterol, haemoglobin levels) did not differ between the groups. Only pre-transplant serum uric acid concentration was significantly lower in female (19.6±6.3 vs. 28.4±10.4kg [male], p<0.001) and diabetic [16], p=0.006) and cardiovascular disease (41% [63] vs. 62% [21], p=0.036). Cox regression analysis identified higher HGS (HR 0.891, 95% CI 0.838-0.948; p<0.001) and Kt/V (HR 0.886, 95% CI 0.818-0.921; p=0.002) as the only two significant independent predictors of survival in hemodialysis patients. HGS was significantly lower in female (19.6±6.3 vs. 28.4±10.4kg [male], p=0.001) and diabetic (19.3±8.0 vs. 24.1±9.2kg [non-diabetic], p=0.007) patients. For female patients, a HGS less than 17kg had a positive predictive value (PPV) of 39% and negative predictive value (NPV) of 96% for predicting mortality. For male patients, a HGS less than 26kg had a PPV 29% and NPV 84% for predicting mortality.

**Methods:**

188 stable HD patients (78 males) were enrolled in the study from January to December 2009. For each patient, baseline HGS was measured by grip dynamometer, and mid-arm muscle circumference (MAMC) and triceps skinfold thickness (TST) were measured with standard plastic tape and Lange Skinfold Caliper. Baseline biochemical data as well as demographic features were reviewed and collected.

**Results:**

Average patient age was 60.1±11 year-old. 27% had diabetes and 24% had cardiovascular disease. During the mean follow-up period of 47 months, 34 (17 males) out of 188 patients died. Univariate analysis showed that survivors had significantly higher HGS, serum albumin, Kt/V, nPCR, and lower waist circumference, IL-6, hsCRP. The two groups did not differ significantly in age, HD vintage, hemoglobin, serum phosphate, BMI, MAMC and TST. Survivors also had less diabetes (23% [35] vs. 47% [16], p=0.006) and cardiovascular disease (41% [63] vs. 62% [21], p=0.036). Cox regression analysis identified higher HGS (HR 0.891, 95% CI 0.838-0.948; p<0.001) and Kt/V (HR 0.886, 95% CI 0.818-0.921; p=0.002) as the only two significant independent predictors of survival in hemodialysis patients. HGS was significantly lower in female (19.6±6.3 vs. 28.4±10.4kg [male], p=0.001) and diabetic (19.3±8.0 vs. 24.1±9.2kg [non-diabetic], p=0.007) patients. For female patients, a HGS less than 17kg had a positive predictive value (PPV) of 39% and negative predictive value (NPV) of 96% for predicting mortality. For male patients, a HGS less than 26kg had a PPV 29% and NPV 84% for predicting mortality.

**Conclusions:**

Handgrip strength provides a good marker for survival in HD patients, independent of age, DM, cardiovascular disease, and serum albumin.

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**Type of Renal Replacement Therapy (Hemodialysis vs. Peritoneal Dialysis) Does Not Affect Cytokine Gene Expression and Clinical Parameters of Renal Transplant Candidates**

**Introduction and Aims:**

Patients with end-stage renal disease suffer from immune disturbances, caused by uremic toxins and influenced by dialysis treatment. It is not clear whether type of renal replacement therapy (RRT) affects gene profiles in patients on active transplant waiting list. The aim of the study was to investigate pre-transplant blood cytokine and apoptosis related gene expression in patients on hemodialysis (HD) and peritoneal dialysis (PD).

**Methods:**

87 renal transplant candidates (aged 16-72y., mean 47y., 34F/53M) were included in the study. Among them 66 patients were treated with hemodialysis and 21 patients with peritoneal dialysis. They were on RRT from 1 to 192 mth, mean 25 mth. The peripheral blood samples were obtained with PAXgene blood RNA tubes, RNA was isolated with PAXgene Blood RNA kit (PreAnalytics) and reversely transcribed with high capacity RNA to cDNA kit (Applied Biosystems). The peripheral blood gene expression of caspase-3, Fas, p53, FoxP3, IFN-gamma, IL-2, IL-6, IL-8, IL-10, IL-18, TGF-beta, and TNF-alpha were assessed just before transplantation with the real-time PCR on custom-designed low density arrays (Taqman).

**Results:**

The mean serum expression of examined genes showed no significant differences between the PD and HD with the exception of FAS, which expression was increased 1.3x in PD patients compared to HD group (p<0.05). There was a trend to increased level of pro-inflammatory cytokines expression in PD group. The clinical inflammatory parameters (CRP, albumin, cholesterol, haemoglobin levels) did not differ between the groups. Only pre-transplant serum uric acid concentration was significantly higher in PD group (6.8 vs 5.4 mg/dL, p<0.05).

**Conclusions:**

Type of the renal replacement therapy exert no effect on cytokine expression as well as inflammatory clinical parameters.

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**Usefulness of Bioelectrical Impedance Analysis for Assessing Nutritional Status in Hemodialysis Patients**

**Introduction and Aims:**

Reduced protein intake and imbalance between protein synthesis and degradation during maintenance hemodialysis treatment are causes of protein-energy wasting, and predicts morbidity and mortality. The aim of this intervention study is to achieve adequate protein- and energy intake on days of dialysis treatment.

**Methods:**

Adult hemodialysis patients in a university hospital, receiving three times per week dialysis treatment, were offered a choice out of seven different in-between-meals (± 15 g protein, 240 kcal) during a six week intervention, combined with education focused on adequate protein energy intake. Indirect calorimetry and physical activity level were measured to provide daily energy needs. 24 hour recall was completed for two dialysis days both before and after intervention.

**Results:**

23 patients (11 men) were enrolled. Age: 55±12.7 years (mean ± SD), BMI: 24.5±4.5 kg/m². Before intervention the protein intake was 1.0g/kg bodyweight (82±37% of protein requirements) and the energy intake 25±10 kcal/kg bodyweight (85±26% of energy requirements). Both protein and energy intake were significantly below requirements (p<0.01). 35% of the patients achieved their protein goal, 39% of the patients achieved their energy goal. After intervention the protein intake significantly improved to 1.2±0.5 g/kg bodyweight (p<0.002) and the energy intake significantly improved to 29±10 kcal/kg bodyweight (p<0.005). 61% of the patients achieved their protein goal, 67% of the patients their energy goal. Patients preferred in-between meals of regular foods instead of protein enriched in-between meals.

**Conclusions:**

Protein- and energy intake on days of dialysis treatment is insufficient in two out of three hemodialysis patients. This significantly improves by providing an in-between meal with education combined during dialysis treatment.
Introduction and Aims: Nutritional status in dialysis patients should be evaluated comprehensively through a variety of indicators as body mass index (BMI), muscle mass, protein intake, edema and body function. However, assessment of body composition and muscle mass is not being practically because of the hassle of measure and high cost. Bioelectrical impedance analysis (BIA) is a non-invasive and low cost method which easily able to evaluate body composition. The aim of this study is to evaluate the relationship between various indicators by BIA and nutritional status in hemodialysis (HD) patients.

Methods: We prospectively enrolled 61 HD (male 35, mean age 60±12 years, 30 of them diabetic) patients. In 60 patients of them, we measured various data; anthropometric data such as BMI, triceps skinfold (TSF), mid-arm circumference (MAC), mid-arm muscle circumference (MAMC), handgrip strength; laboratory data such as total protein, albumin, total iron-binding capacity (TIBC), hemoglobin, total cholesterol, blood urea nitrogen (BUN), creatinine, high sensitivity C-reactive protein (hsCRP); BIA data such as phase angle (PhA), fat free mass (FFM), body cell mass (BCM), total body water (TBW), extra cellular water (ECW)/total body water (TBW) ratio; and traditional nutritional assessment method for dialysis patients like malnutrition-inflammation score (MIS).

Results: In men, the MAC, MAMC, handgrip strength, BUN, creatinine, MIS, PhA, FFM, BCM, TBW was higher, and total cholesterol and ECW/TBW ratio was lower than those of woman. In correlation analysis between PhA, which is one of BIA markers, and various nutritional markers, PhA was positively associated with BMI, MAC, MAMC, handgrip strength, BUN, creatinine, albumin and TIBC (p<0.05). But, PhA was not related to MIS (p=0.10). The FFM, BCM, and TBW measured by BIA were positively associated with BMI, MAC, MAMC, handgrip strength, and negatively associated with hsCRP and MIS (p<0.01). ECW/TBW ratio was negatively associated with MAC, MAMC, handgrip strength, TIBC, BUN, and creatinine. In univariate analysis, MAC, MAMC, handgrip strength, PhA, ECM/TBW, hsCRP and MIS were associated with serum albumin, which is a traditional nutritional marker (p<0.05). In multivariate analysis, PhA and hsCRP were independently associated with serum albumin level.

Conclusions: The PhA, FFM, BCM, TBW and ECW/TBW ratio measured by BIA were highly associated with traditional markers of nutritional status in HD patients. Among them, PhA well reflected nutritional status in hemodialysis patients. Therefore, our results indicated that the measurements of BIA might be a clinically useful method for assessing nutritional status in HD patients.

SP664

YKL-40: A NEW URAEMIC TOXIN?

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Introduction and Aims: In the last few years there has been a growing number of publications concerning YKL-40, a 40 Kd glycoprotein mainly produced by inflammatory and cancer cells. YKL-40 regulates vascular endothelial growth factor and has a role in inflammation, angiogenesis, cell proliferation and differentiation. Recently has been established that serum YKL-40 has a prognostic impact on all-cause mortality in patients with heart failure and has been introduced as a marker of inflammation in different clinical situations, also in chronic kidney disease. The aim of this study was to investigate serum YKL-40 concentrations in chronic renal failure patients (CKD5) in conservative therapy and in dialysis therapy compared to healthy subjects and to explore its relationships with interleukin-6 (IL-6), C-reactive protein (CRP), and Hepcidin (HEP). Furthermore we investigated if YKL-40 serum levels are influenced by different dialysis techniques.

Methods: The study population included low inflamed hemodialytic patients (N=13), CKD5 patients not receiving dialysis (N=6) and healthy subjects (N= 6). HD patients were treated in bicarbonate hemodialysis (BHD) with low flux polysulfone (PS) membrane group for six months. At the end they were shifted in On-line hemodiafiltration (OL-HDF) group with high flux PS membranes and exchange volume > 20 litres. Serum was collected at the end of each treatment period. Routine laboratory analysis, IL-6 and CRP levels were determined by local Laboratory, instead hepcidin (HEP) and YKL-40 serum concentration was centrally determined by ELISA kit (DRG Instruments GmbH, Germany and Quidel Corporation San Diego, USA, respectively). Resistance to EPO was determined as ERI (weekly ESA dose/Kg Hemoglobin). Data were analyzed using SPSS 17.0 Mann Whitney test and Spearman’s correlation coefficient. The null hypothesis was rejected when p<0.05.

Results: YKL-40 serum levels were significantly higher in CKD5 and HD patients respect to healthy controls (437.6±83 ng/ml and 389.48±110.3 vs 72.7±8.3 ng/ml, p<0.01). Difference between CKDS and HD was not statistically significant. Moreover, YKL-40 levels were lower in OL-HDF (374.2±112.6 ng/ml) than in BHD (404.7±110.23 ng/ml) but the difference was not statistically significant (p=0.20). In HD patients YKL-40 was significantly related (p=0.036) with ERI but not with CRP, IL-6, and HEP.

Conclusions: YKL-40 serum levels were increased in patients affected by chronic renal failure. In low inflamed HD patients YKL-40 was not related to CRP and IL-6, but demonstrated a positive relation with ERI. This data suggest that YKL-40 in HD was enhanced also by a mechanism independent by inflammation and may act as an uremic toxin.
Introduction and Aims: Hemodialysis patients frequently experience loss of appetite (anorexia), which increases in severity during the dialysis treatment and may lead to protein-energy wasting. Appetite in patients on chronic hemodialysis (HD) may be depressed constantly or may fluctuate up and down over time. When constantly poor, appetite has been shown to be associated with older age, more comorbidities, and more hospitalizations and might be predicts survival. The aim of the study was to determine the appetite in patients on chronic HD and the correlation between appetite and the other parameters of nutritional status.

Methods: 89 HD patients (mean age 64.8±13.6) were evaluated for the appetite and the nutritional status. Appetite was assessed by SNAQ (Short Nutritional Assessment Questionnaire). The nutritional status was determined by a Subjective Global Assessment (SGA) method, serum albumin concentrations and anthropometric measurements. The adequacy of dialysis treatment was assessed by Kt/V.

Results: Appetite was decreased (very poor, poor or average) in 37.1% of patients. 28.1% patients declared bad food taste and 7.8% eating normally less than three meals a day. SGA indicated that 44.9% of patients were mild malnourished, 33.3% were severe malnourished. Low s-albumin level was observed in 46.6%. No correlation between appetite and SGA and s-albumin was noticed. The multifactorial regression analysis indicated that age of patients was factor significantly influenced on appetite in studied group.

Conclusions: Decreased appetite and abnormal taste are important problems in hemodialysis patients increases with age of patients. SNAQ may be useful in practice for quickly estimation of appetite and risk of malnutrition. HD patients need thorough nutritional/appetite evaluation to prevent of protein-energy wasting.

Oxidative stress was detected in each of the three groups. The MDA level was significantly lower in HD versus CAPD patients (P<0.001). The oxidative stress degree in three groups of patients using different dialysis modalities. The objective of our investigation was to compare the oxidative stress degree in three groups of patients using different dialysis methods: a continuous ambulatory peritoneal dialysis (CAPD), b hemodialysis (HD) three times / week, and c hemodiafiltration (HDF) three times / week.

Methods: We examined several serum markers of oxidative stress as follows: malondialdehyde (MDA), ceruloplasmin (CP) and transferrin (TF) in 47 dialysis patients (18 CAPD patients, 15 HD patients, and 14 HDF patients), aged 31 to 70 years (mean 49.3±12.7 years). There were two diabetics in each group. All patients were examined before a dialysis session. Patients received dialysis treatment more than 12 months. The statistical analysis was performed using MedCalc.

Results: Oxidative stress was detected in each of the three groups. The MDA level was the highest in HD patients in compared with HDF patients (P=0.08) and patients of CAPD group (P=0.03) (Table). Antioxidant proteins CP and TF did not differ significantly between HD and HDF groups (P=0.9 and P=0.5, respectively). But, the patients of CAPD group showed the highest level of TF (P=0.03 in compared with HD patients). The CP concentration was significantly higher in patients on HDF compared with CP (P<0.001).

Conclusions: In CKD 5D patients we identified the different type of lipid peroxidation and antioxidant defenses. However, the oxidative stress is a common event in end renal diseases, regardless of the kind of dialysis technique.

Mean Values of Oxidative Stress Markers in CKD 5D Patients (* P<0.05 for CAPD versus HD)

<table>
<thead>
<tr>
<th>Markers of oxidative stress</th>
<th>HD (M±SD)</th>
<th>HDF (M±SD)</th>
<th>CAPD (M±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDA (mcmol/l)</td>
<td>474.5±131</td>
<td>467.6±131</td>
<td>740.1±104*</td>
</tr>
<tr>
<td>CP (g/l)</td>
<td>15.8±4.4</td>
<td>17.4±5.1</td>
<td>8.4±2.1*</td>
</tr>
<tr>
<td>TF (g/l)</td>
<td>3.0±1.2</td>
<td>2.9±1.6</td>
<td>5.2±1.7*</td>
</tr>
</tbody>
</table>

Introduction and Aims: In recent years, the number of elderly patients on long-term dialysis has increased, resulting in a higher incidence of malnutrition in these patients. This study investigated whether the continuous ingestion of food containing Branched Chain Amino Acid (BCAA; valine, leucine, isoleucine) can improve the nutritional state of elderly patients on dialysis suffering from malnutrition.

Methods: 26 hemodialysis patients (12 men, 14 women) were chosen from a total of 57 people subjected to dietary management in our hospital and nursing home. They were not undergoing tube feeding, and their Alb was under 3.5 g/dl. The patients were divided into two groups: those who were able to continue consuming guaite-like food containing BCAA (4000 mg/potential 9 months) and Group C (MIA) syndrome developing in subjects undergoing maintenance HD. Moreover, OH has an impact on the incidence rate of CV complications, which are the most common cause of death in this group of patients.
NEUTROPHIL TO LYMPHOCYTE AND PLATELET TO LYMPHOCYTE RATIO: A NOVEL MARKERS OF INFLAMMATION IN CHRONIC HAEMODIALYSIS PATIENTS

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Introduction and Aims: Neutrophil-to-Lymphocyte Ratio (NLR) and Platelet-to-Lymphocyte Ratio (PLR) are new potential markers to determine inflammation in end-stage renal disease (ESRD) patients. The association between malnutrition, inflammation and appetite with PLR and NLR is lacking in hemodialysis (HD). Hence, we aimed to determine the relationship between PLR and NLR with malnutrition, inflammation and appetite in ESRD patients.

Methods: One-hundred and nineteen patients receiving HD for ≥2 months in the dialysis unit of Sisli Etfal Educational and Research Hospital were enrolled in this cross-sectional study. Patients with hospitalization, major surgery, obvious infections, inflammatory disease, end stage liver disease, metastatic malignancies and malabsorbsion syndromes were excluded. To determine malnutrition and inflammation status, malnutrition inflammation score, hs-CRP and TNF-α levels were obtained from all patients.

Results: Mean age of 100 patients (Male/Female: 52/48) were 52.3±17.4 years. Group 1 (MIS ≤ 2), group 2 (MIS: 2-8) and group 3 (MIS > 8) consisted of 9, 64, 27 patients, respectively. Mean duration on time HD were less in group 1 (p=0.035).

Table 1. Demographic, clinical, laboratory data of patients.

<table>
<thead>
<tr>
<th>MIS 1 (≤2)</th>
<th>MIS 2 (2-8)</th>
<th>MIS 3 (&gt;8)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>44.66±12.5</td>
<td>51.91±16.9</td>
<td>55.91±17.5</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>63/37</td>
<td>30/72</td>
<td>40/60</td>
</tr>
<tr>
<td>Duration on HD (months)</td>
<td>24.32±9.9</td>
<td>79.27±3.7</td>
<td>63.96±3.6</td>
</tr>
<tr>
<td>Dry weight (kg)</td>
<td>78.42±6.2</td>
<td>63.81±3.8</td>
<td>65.43±2.1</td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td>25.4±4.5</td>
<td>25.6±4.8</td>
<td>25.7±4.3</td>
</tr>
</tbody>
</table>

| Platelet-to-Lymphocyte Ratio (PLR) | 8  | 8  | 8  | NS |
| Neutrophil-to-Lymphocyte Ratio (NLR) | 6  | 6  | 6  | NS |

Relevant data of patients

<table>
<thead>
<tr>
<th>p≤0.05</th>
<th>p&lt;0.01</th>
<th>p&lt;0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troponin (ng/dL)</td>
<td>0.56±0.48</td>
<td>1.59±0.39</td>
</tr>
<tr>
<td>hs-CRP (mg/ml)</td>
<td>4.3±1.2</td>
<td>7.4±0.8</td>
</tr>
<tr>
<td>CRP (mg/dL)</td>
<td>4.3±1.2</td>
<td>7.4±0.8</td>
</tr>
<tr>
<td>TNF-α (pg/mL)</td>
<td>408±62</td>
<td>408±62</td>
</tr>
</tbody>
</table>

NLR and PLR seems to be positively correlated with inflammation parameters in chronic HD population. PLR but not NLR were significantly high in malnourished group with MIS ≥ 8.
Table 2. Nutrition, appetite and inflammation parameters of groups.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MS2-2</th>
<th>MS2-4</th>
<th>MS2-4</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin (g/L)</td>
<td>4.10±0.3</td>
<td>3.90±0.2</td>
<td>3.50±0.5</td>
<td>0.60</td>
</tr>
<tr>
<td>PctHb (g/dL)</td>
<td>11.4±2.1</td>
<td>10.9±2.4</td>
<td>12.4±2.5</td>
<td>0.50</td>
</tr>
<tr>
<td>TIBC (g/L)</td>
<td>244.1±37.8</td>
<td>231.1±49</td>
<td>199.6±34</td>
<td>0.49</td>
</tr>
<tr>
<td>Leptin (ng/mL)</td>
<td>11.8±4.6</td>
<td>11.6±3.5</td>
<td>7.5±3.9</td>
<td>NS</td>
</tr>
<tr>
<td>Corrected Leptin (Leptin/BMI)</td>
<td>0.05±0.09</td>
<td>0.04±0.05</td>
<td>0.03±0.09</td>
<td>NS</td>
</tr>
</tbody>
</table>

Table 3. Correlation analysis of NLR and PLR.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>NLR</th>
<th>PLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Age (years)</td>
<td>+0.137</td>
<td>+0.192</td>
</tr>
<tr>
<td>Duration on HD (months)</td>
<td>-0.131</td>
<td>-0.049</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>-0.010</td>
<td>+0.110</td>
</tr>
<tr>
<td>sPkt/V</td>
<td>-0.098</td>
<td>-0.092</td>
</tr>
<tr>
<td>Albumin</td>
<td>-0.155</td>
<td>-0.181</td>
</tr>
<tr>
<td>Prealbumin</td>
<td>-0.170</td>
<td>-0.159</td>
</tr>
<tr>
<td>MIS</td>
<td>+0.106</td>
<td>+0.043</td>
</tr>
<tr>
<td>InsCtRF (mg/L)</td>
<td>+0.001</td>
<td>+0.333</td>
</tr>
<tr>
<td>TNF-alfa (pg/mL)</td>
<td>+0.023</td>
<td>+0.072</td>
</tr>
<tr>
<td>Transform saturation (%)</td>
<td>-0.001</td>
<td>-0.418</td>
</tr>
<tr>
<td>Ferritin (ng/mL)</td>
<td>-0.082</td>
<td>-0.046</td>
</tr>
</tbody>
</table>

**Introduction and Aims:** Chronic hemodialysis patients suffer from enhanced cardiovascular morbidity and mortality, part of which may be caused by systemic inflammation. It is hypothesized that inflammation is promoted by the lack of clearance for immunoactive proteins within the molecular weight range of 15-45 kD, substances that are effectively cleared by the kidneys in healthy individuals. High cut-off (HCO) dialyzer membranes have an enhanced clearance for these molecules, however, their chronic use may be limited by albumin losses. Short pilot studies have suggested that treatment for three weeks may be tolerable and effective regarding the reduction of inflammation. **Methods:** The "Permeability Enhancement to Reduce Chronic Inflammation (PERCI)" Study I is a prospective bi-centric randomized open-label cross-over trial comparing a combination of the high cut-off dialyzer HCO1100 and the low-flux dialyzer PF210H (HCO/1F) with a PF210H high-flux membrane (HF) for treatment of chronic hemodialysis patients. The HCO and LF dialyzer were applied in series to achieve adequate urea clearance. Patients were treated for three weeks (9 dialysis sessions). After a subsequent two week wash-out period patients were switched from study treatment to comparator or vice versa. Blood was sampled at adequate time points pre- and post dialysis to detect a broad panel of plasma cytokine concentrations. Primary end-point was the quantity of CD162 expression on circulating monocytes indicating inflammatory activation. Further, transcriptional immunomodulation assessed by qPCR in leukocytes. This work was supported by the German Federal Ministry of Education and Research (BMBF, FKZ 13N11796-99). **Results:** Treatment with HCO/1F was well tolerated for three weeks. A preliminary online hemodiafiltration (OL-HDF). We aimed to evaluate how aging could influence the perception of health related quality of life, dialysis adequacy, iron status, inflammation and infection markers in end stage renal disease patients undergoing online hemodiafiltration. **Introduction and Aims:** A high proportion of dialysis patients are older, raising a major challenge to health care systems, as they often show several comorbidities, poor functional status, depression and they often avoid personal and social involvement. There is a lack of information about the effect of aging in patients‘ perception of health quality of life (HQQOL), and in clinical and analytical characteristics of dialysis patients, particularly in end-stage renal disease (ESRD) patients under online-hemodiafiltration (OL-HDF). We aimed to evaluate how aging could influence patients‘ perception of HQQOL, as well as the effect of aging on dialysis adequacy and in hematological, iron status, inflammatory and nutritional markers. **Methods:** In this transversal study were enrolled 322 ESRD patients under OL-HDF (59.63% males; 64.9 ± 14.3 years old). Data about comorbidities, hematological data, iron status, dialysis adequacy, nutritional and inflammatory markers were collected.
from patient’s records. Moreover, HRQOL score, by using the Kidney Disease Quality of Life-Short Form (KDQOL-SF), were assessed.

Results: Analyzing the results according to quantities of age, significant differences were found for some patients. It was evaluated by the KDQOL-SF instrument, for work status, physical functioning and role-physical, which decreased with increasing age. We also found a higher proportion of diabetic patients, a decrease in creatinine, iron, albumin serum levels, transferrin saturation and NPCR, with increasing age. Moreover, significant negative correlations were found between age and MCHC (r = -0.196, p < 0.001), iron (r = -0.207; p < 0.001), transferrin saturation (r = -0.166; p = 0.004), albumin (r = -0.190; p < 0.001), NPCR (r = -0.191; r = 0.001), work status (r = -0.195; p < 0.001), physical functioning (r = -0.323; p < 0.001) and role-physical (r = -0.182; p < 0.001).

Conclusions: In conclusion, our results showed that aging is associated with a decreased work status, physical functioning and role-physical, with a decreased dialysis adequacy, iron availability and nutritional status, and with diabetes and with the use of central venous catheter, as the vascular access. The knowledge of these changes associated with aging, which have impact in the quality of life of the patients, could be useful in their management.

Introduction and Aims: Tissue edema is one of the most important symptoms of inflammation. It depends on degree of inflammation and plasma proinflammatory cytokines concentrations. The aim of this study was to assess the relationships between total body water (TBW), extracellular body water (ECW) and volume excess (VE), and plasma vascular endothelial growth factor (VEGF), tumour necrosis factor alpha (TNFα), histamine and interleukin 1β, 6, 17α and 23 and capillary leak index (CLI) in critically ill patients.

Methods: Adult critically ill patients with acute kidney injury (AKI) were studied. Patients were divided into three groups: treated with continuous peritoneal dialysis (HPD 50; CAPD 20 group) and treated with continuous veno-venous haemofiltration (CVVH group). VE, TBW and ECW were measured using whole body bioimpedance. CLI was calculated as CRP/plasma albumin All parameters were measured at three consecutive days: the day of admission into Critical Care Unit (ICU), 24 and 48 hours after the admission into ICU.

Results: Forty patients were studied. 23 were treated with furosamide infusion and 17 with CVVH. In furosamide group: VE correlated with IL-17α (p < 0.001, r = 0.43) and CLI (p < 0.001, r = 0.43) and ECW correlated with VEGF (p < 0.001, r = 0.43) and IL-17α (p < 0.001, r = 0.43) and CLI (p < 0.001, r = 0.43) and ECW correlated with VEGF (p < 0.001, r = 0.43) and CLI (p < 0.001, r = 0.43). In CVVH group: VE correlated with TNFα (p < 0.001, r = 0.16), TBW correlated with VEGF (p < 0.001, r = 0.43) and ECW correlated with VEGF (p < 0.001, r = 0.16) and TNFα (p < 0.001, r = 0.16). In both groups, changes in VE, TBW and ECW didn’t correlate with fluid balance.

Conclusions: Changes in TBW, ECW and VE correspond with plasma VEGF and pro-inflammatory cytokines concentration in critically ill patients.
conditions of the patients such as age, type of dialysis, presence of urine output, BMI, albumin, haemoglobin, CRP, total cholesterol, HDL, LDL, and triglycerides. Finally, we evaluated the pharmacological treatment such as statins, insulin, and oral hypoglycaemic agents. All continuous variables were reported as the median values and interquartile range (IQR). All categorical variables were reported as percentage. Kruskal Wallis test and Pearson’s chi-square test were used to compare continuous and categorical variables, as appropriate. All reported p-values were two sided, and statistical significance was set at p < 0.05. Statistical analysis was performed with SPSS version 20.

**Results:** We analysed 212 patients: 44.3% in haemodialysis and 55.7% in peritoneal dialysis. 57.6% were male. About 20% were diabetic; we observed a non-significant difference between the two groups (PD 24.6% versus HD 19.2 p=0.09). On the other hand we observed a significant difference between the urine output in PD patients (PD 77.1% versus HD 28.7% p=0.001). We found a statistically significant difference for all markers of malnutrition; specifically BMI, cholesterol, triglycerides and haemoglobin were higher in peritoneal dialysis patients, while albumin, and CRP were higher in HD patients. Finally, treatment with statins and insulin was different in the two groups. All details reported in following table.

**Conclusions:** HD and PD had a different nutritional pattern. No clear advantage or disadvantage was related with dialysis modalities in our dialysis population.

**Introduction and Aims:** In contrast to the general population, obesity has generally been associated with improved survival among chronic hemodialysis patients. We still don’t know which component of body composition (fat or lean) is more associated with decreased survival in chronic hemodialysis patients. The study group consisted of 217 patients on maintenance hemodialysis. The study duration was 5 years (range 2-10 years). The causes of ESRD were chronic glomerulonephritis in 43.7%, diabetic nephropathy in 31.9%, hypertension in 19.4%, primary aldosteronism in 1.4%, and other causes in 1.7%. Among patients, 24.6% were diabetic. All patients were treated with routine hemodialysis 3 times weekly for 4 hours. The dialysis modality was chosen on the basis of the medical status and preference of the patient. We performed a prospective study to analyze the effect of BMI on survival in HD patients.

**Methods:** A total of 217 patients were enrolled in the prospective study. The patients were divided into two groups based on the BMI values: group 1 (BMI ≥ 20.0) and group 2 (BMI < 20.0). The statistical analysis was performed using SPSS version 20.0. The p-values were calculated using the chi-square test. The survival analysis was performed using the Kaplan-Meier method and the log-rank test. The Cox proportional hazards model was used to estimate the hazard ratios and 95% confidence intervals (CIs).

**Results:** Among the 217 patients, 105 were included in group 1 (BMI ≥ 20.0) and 112 were included in group 2 (BMI < 20.0). The median follow-up time was 5 years (range 2-10 years). The median BMI in group 1 was 24.1 (range 18.0-30.0) and in group 2 was 19.6 (range 16.0-26.0). The median serum creatinine level at presentation was 7.2 mg/dL (range 3.0-15.0) in group 1 and 6.8 mg/dL (range 3.0-12.0) in group 2. The median duration of hemodialysis therapy was 3 years (range 1-10 years) in group 1 and 4 years (range 2-10 years) in group 2. The median blood pressure at presentation was 140/80 mmHg (range 110/70-170/100) in group 1 and 135/85 mmHg (range 110/70-160/100) in group 2. The median hemoglobin level at presentation was 11.0 g/dL (range 9.0-13.0) in group 1 and 11.2 g/dL (range 9.0-13.0) in group 2. The median plasma albumin level at presentation was 3.8 g/L (range 3.0-4.5) in group 1 and 3.7 g/L (range 3.0-4.0) in group 2.

**Conclusions:** The results of this study suggest that a higher BMI is associated with a higher risk of mortality in HD patients. The findings of this study are in line with previous studies that have reported a higher mortality rate in HD patients with a lower BMI. This study highlights the importance of considering BMI as a prognostic factor in HD patients, especially those with severe malnutrition. Further studies are needed to explore the underlying mechanisms behind the association between BMI and mortality in HD patients.
Introduction and Aims: Protein-energy wasting (PEW) has been linked to impaired immune function in both peritoneal dialysis (PD) and haemodialysis (HD) patients. In general, PD patients carry a higher baseline risk of infections compared with HD patients. It is however unknown whether nutritional status may influence this infection risk. The objective of our study was to investigate the association between nutritional status and risk of infectious complications in both HD and PD patients. We hypothesized that PEW is more common in HD patients, but stronger associated with infections in PD patients.

Methods: In a prospective multi-center cohort study of incident dialysis patients (NECODAD), the 7-point Subjective Global Assessment of nutritional status (SGA) was assessed every six months following up. From this cohort, detailed information on infectious complications was retrospectively collected in 5 hospitals from the start of dialysis until modality switch, transplantation, death, or to follow up until 3 years of follow up. PEW was defined as an SGA of 1-5. Incidence rate ratios (IRR) of infection associated with PEW at baseline were calculated using Poisson regression considering all infections in 3 years of follow up. In addition, time-dependent Cox regression was used to estimate short-term risks of a first infection associated with PEW within 6 months, using HD patients with a normal nutritional status as reference. Models were adjusted for age, sex, ethnicity, primary kidney disease, smoking and comorbidity.

Results: This analysis included 452 patients with complete medical records, of whom 285 initially started on HD and 167 on PD. Thirty-four percent of HD patients and 17% of PD patients suffered from PEW at the start of dialysis. In 3 years of follow up the incidence rate of infection was 0.46/ HD year and 0.68/ PD year. Both HD (Adjusted IRR: 1.37; 95% CI: 0.98, 1.91) and PD patients (1.35; 1.00, 1.81) suffering from PEW showed an increased risk of infection compared with patients with a normal nutritional status. Compared with HD patients with a normal nutritional status (reference group), short-term adjusted hazard ratios of infection were 1.48 (95% CI: 1.08, 2.04) for PD patients with a normal nutritional status, 1.79 (1.27, 2.51) for HD patients with PEW, and 2.80 (1.80, 4.36) for PD patients with PEW.

Conclusions: Protein energy wasting was associated with an increased risk of infection in both HD and PD patients. Routine screening of nutritional status is important in all dialysis patients.
SP686  HIGHER aspartate aminotransferase LEVELS ARE ASSOCIATED WITH HIGHER ALL-CAUSE MORTALITY in MAINTENANCE HEMODIALYSIS Patients
Elani Streja1, Sepideh Rezakhani1, Connie M Rhee1 and Kam Kalantar-Zadeh1
1UC Irvine Medical Center, Orange, CA.

Introduction and Aims: In Maintenance Hemodialysis (MHD) patients, liver disease is a comorbidity that may be associated to poor survival. Some studies have observed positive association between elevated liver enzymes and mortality risk in MHD patients but to date, the relationship between Aspartate Aminotransferase (AST) and all-cause mortality risk in MHD patients has not been well studied. We hypothesized that higher levels of AST would be associated with increased all-cause mortality in MHD patients.

Methods: In this study we analyzed a database of 114,267 DaVita MHD patients followed up to 8 years (2001-2009) to examine the association of AST with all-cause mortality. We used baseline AST levels in fractional polynomial models with adjusted for case mix covariates plus surrogates of malnutrition and inflammation (MICS) covariates. In fully adjusted models, AST levels ≥ 80 U/L are associated with highest risk of mortality with a Hazard Ratio of 1.70 (95% confidence interval 1.56 to 1.85; P <0.0001)

Conclusions: In MHD patients, increasing levels of serum AST above 20 U/L are associated with a linear increased risk of all-cause mortality even after adjustment for MICS markers. Further studies are needed to confirm findings and determine mechanistic pathways of the AST—mortality association.

SP687  EFFECT OF ALBUMIN ON ASSOCIATION OF SERUM CHOLESTEROL AND MORTALITY IN HEMODIALYSIS PATIENTS
Elani Streja1, Megha Doshi1, Connie Rhee1, Csaba Kovessy1, Hamid Moradi1 and Kam Kalantar-Zadeh1
1UC Irvine Medical Center, Orange, CA, 2Memphis VA Medical Center, Memphis, TN

Introduction and Aims: In contrast to the general population, studies have found an inverse or non-significant association of serum total cholesterol and mortality in chronic hemodialysis (HD) patients, also known as a “lipid paradox”. We hypothesize that the association between cholesterol and mortality in HD patients may be modified by serum albumin levels.

Methods: Across 4 categories of serum albumin (ALB) levels (4.0 g/dL), we examined the associations of cholesterol with 6-yr (2001-2007) all-cause mortality among 53,041 adult HD patients. We used continuous time-dependent cholesterol in restricted cubic spline models adjusted for case mix and markers of the malnutrition-inflammation complex (MICS).

Results: There were 62% males aged 66 years and 31% blacks, 55% diabetics. There were 12,505 patients ALB < 4.0 g/dL. Using restricted cubic splines with 2 degrees of freedom, we found no significant associations between both lower and higher levels of cholesterol with all-cause mortality in HD patients in any strata of ALB ≥ 4.0 g/dL.

Conclusions: Hence, HD patients with better nutritional status, or serum albumin level ≥ 4.0 g/dL demonstrate an exception to the lipid paradox where higher levels cholesterol appear associated with increased all-cause mortality.
Introduction and Aims: Many patients with end-stage renal disease are malnourished, and cross-sectional studies have shown that markers of malnutrition may predict death. In this study, we investigated the association of Subjective Global Nutritional Assessment (SGA) and serum albumin with mortality in a single hemodialysis center.

Methods: In our study 39 out of 183 hemodialysis patients (21.3%) showed results of malnutrition. Nutritional intervention and observation were started in the malnourished group. We observed patient survival rate in the next 50 months. Classical parameters for evaluation of nutritional status such as SGA, body weight, and routine biochemical parameters were analyzed. SGA values less than 21 and serum albumin less than 30 g/l are critical for prognosis of malnourished patients.

Results: In a 50-month follow-up study of 39 malnourished patients, 25 patients (64%) died despite nutritional intervention and intensive therapy. The causes of death were cardiovascular event in 9 pts (36%), sepsis in 7 pts (28%) cachexia in 5 pts (20%), and cancer in 4 pts (16%). Only 10 pts had SGA value 21 and 24% in patients with SGA < 21 (p = 0.05). In 13 pts with albumin 30 g/l (56%; p = 0.009).

Conclusions: SGA value less than 21 and serum albumin less than 30 g/l are good predictors of death in malnourished hemodialysis patients. This assessment tool is beneficial for hemodialysis patients who are at an increased risk of malnutrition-associated mortality. Early diagnosis, nutritional intervention and therapy of basic illness are very important for improving nutritional status and survival in malnourished dialysis pts.

![Z-score graph of the mean vectors with 95% confidence ellipsoids pre and post dialysis for the SGA group (SGA-A, SGA-B and SGA-C). The slope of the mean vectors identifies the variable “slope”.

![The cumulative survival curves for the variable slope (median 0.57) indicate an apparent worsening of the prognosis in group B, with values less than or equal to the slope of the median (P = 0.001). The survival rate at 24 months is 52.3% in SGA-C versus 79.7% in SGA-A.](https://academic.oup.com/ndt/article-abstract/29/suppl_3/iii287/1882291)
The mean vector migration of SGA-C group showed reduced gradient (slope) and little migration during the dialysis session. The survival analysis showed that the SGA classification was associated with mortality: patients in the SGA-C group, severely malnourished, in fact, have a poorer prognosis compared to groups A and B with 24-month survival of 35% (P <0.001). In addition, the analysis of the survival curves showed that values of Z (Xdi 1/ H) less than -1.2 and slope values of less than 0.57, indicating sarcopenia, are associated with a significantly worse prognosis, with survival at 24 months, respectively to 67% and 25% (P <0.002 and P = 0.002) (Fig 2).  

Conclusions: This study has been demonstrated that BIVA allowed to find sarcopenic patients, showing worse prognosis, by observing impedance vector migration slope.

**SP691** A SURVEY ON PROTEIN ENERGY WASTING DIALYSIS PATIENTS

Ferruccio Conte1, Marco Righetti1, Aurelio Limido2 and society Of Nephrology On Behalf Of The Lombardy Section Of The Italian S
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Introduction and Aims: Protein energy wasting (PEW) dialysis patients are frequently diagnosed. Malnutrition is strictly related to morbidity and mortality of dialysis patients. The nutritional status assessment and the clinical approach to PEW dialysis patients are important steps in our clinical practice. International guidelines on nutrition may be a useful instrument for everyday clinical practice. So, we performed a survey with the aim to detect the most used diagnostic criteria and treatments of PEW dialysis patients.

Methods: We performed a simple test comprising 16 multiple answer questions. 72% of Dialysis Units of our Region, exactly 34 of 47 Units, answered to the questionnaire. A total of 539 dialysis patients were analysed.

Results: International guidelines for nutritional assessment are rarely used in our Dialysis Units. Nephrologists prefer a simple evaluation because of lacking time. Malnutrition is frequently detected: dialysis patients with serum albumin levels below 3.5 g/dl were 69% (21.5%), 22% (14.6%), and 317 (32.6%), respectively for hospital hemodialysis patients, limited care hemodialysis patients and peritoneal dialysis patients. PEW hemodialysis patients are frequently switched from bicarbonate dialysis to hemodiafiltration, submitted to multimivitamin B supplementation, and treated with oral nutritional supplements and IDPN. A large part of Dialysis Units (68%) submitted at least 1 patient to intradialytic parenteral nutrition (IDPN) and, moreover, 100 of 913 (11%) PEW hemodialysis patients have been submitted to IDPN in the last year. The mean number of treated patients in every single Dialysis Unit was equal to 4.3 and at least 10 patients were treated in three Dialysis Units.

Conclusions: PEW is an important, rising syndrome. Nephrologists and nurses have unfortunately a few time to spend for it. International guidelines are too much complex and unfortunately a few time to spend for it. International guidelines are too much complex.

**SP692** THE IMPACT OF ALBUMIN LOOSING TREATMENT ON SURVIVAL OF HAEMODIALYSIS PATIENTS

Kenji Tsuda1, Hiroki-Michi Iwakura1, Jun Minakuchi1, Shu Kawashima1 and Tadashi Tomo2
1Kawashima Hospital, Tokushima City, Japan, 2Oita University, Oita City, Japan

Introduction and Aims: Protein-bound uraemic toxins play an important role in uraemic complication. But haemodialysis (HD) cannot efficiently remove the protein-bound uraemic toxins because of their high albumin-binding property. The uraemic complication. This supports the hypothesis that the albumin losing HD treatment plays an important role in the outcome of chronic HD patients.

**SP693** HIGH PROTEIN DIET ALTERS THE METABOLIC STATUS OF MICE COMPAREABLE TO CHANGES IN UREMIC TOXIN LEVELS OBSERVED IN REINAL FAILURE PATIENTS

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1Readboudumc, Nijmegen, The Netherlands

Introduction and Aims: Many of the well-studied uraemic toxins originate from the diet and are generated in the colon due to protein fermentation by intestinal bacteria. Breakdown of tyrosine and phenylalanine results in the formation of phenylacetic acid, phenol and p-cresol, which is subsequently metabolized into p-cresyl sulfate and p-cresyl glucuronide. On the other hand, bacterial metabolism of tryptophan results in the formation of indole which can give rise to diverse indolic uraemic solutes, including indoxyl sulfate and indole-3-acetic acid. Here, we examined the impact of a high protein diet on the plasma concentration of a variety of uraemic toxins to obtain insight into the interplay between dietary protein and uraemic solutes.

Methods: Wild type (WT) Friend leukemia virus (FLV) mice were provided either a control (21% crude protein; n=10) diet or a high protein (HP; 45% crude protein; n=10) diet for 21 days, after which the uraemic toxins were measured by liquid chromatography-tandem mass spectrometry.

Results: Mice fed the HP diet showed higher plasma levels of the phenol-derived metabolites phenylacetic acid (1.9 ± 0.3 μM, p=0.001), phenol sulfate (3.9 ± 0.8 μM, p=0.0002), p-cresyl glucuronide (1.6 ± 0.3 μM, p=0.0093) and hippuric acid (1.0 ± 0.1 μM, p=0.0002) compared to mice provided with control diet (1.1 ± 0.1 μM, 1.4 ± 0.3 μM, 0.3 ± 0.07 μM, 0.7 ± 0.1 μM and 0.04 ± 0.08 μM, respectively). In contrast, p-cresyl-sulfate and kynurenic acid levels remained unaltered, and kynurenine and indole-3-acetic acid concentrations diminished. In addition, mice on the HP diet developed significant polyuria (HP: 0.8 ± 0.2 mL/18 h vs. control: 0.3 ± 0.04 mL/18 h; p=0.025), implying the presence of renal failure.

Conclusions: A HP diet alters the metabolic status of mice comparable to changes observed in chronic kidney disease patients. This supports the hypothesis that managing the levels of dietary protein intake in patients may be of key importance since high protein intake will augment uraemic toxin levels, whereas a restriction in dietary protein might cause protein-energy wasting.

**SP694** DIETARY PATTERN ANALYSIS IN A RESIDENT POPULATION AS A KEY TO TAILORING THE APPROACH TO LOW-PROTEIN DIETS IN CKD PATIENTS

Roberta Ciarì1, Elena Mongiardi1, Federica Nevge Vorti1, Stefania Scoagnamiglio1, Valentina Consiglio1, Marta Nazina1, Paolo Avagnina1 and Giorgina Piccoli2
1University of Torino, Torino, Italy

Introduction and Aims: Even if low-protein diets are commonly cited as milestones in the treatment of CKD, for delaying progression of chronic renal diseases and for postponing dialysis, their use varies widely across the world. A common idea is that this variability is mainly due to the different baseline dietary patterns, which favors the diet in the Mediterranean Countries, as compared with the Northern ones; furthermore, the increasing use of canned, processed and pre-cooked food may further impair the application of such diets. In spite of the tenet that the diet result diets in CKD are linked with the baseline diet patterns of the overall population, few studies assessed the baseline dietary habits as a tool for understanding and improving compliance on low-protein diets in CKD patients. Aim of the study was to assess the main dietary patterns of the families patients attending the Nephrology Unit of a Northern Italian University Hospital, in the neighborhood of a one million inhabitants city.

Methods: Semi-structured questionnaires (30 items) were built, tested, and given for three months to the patients attending the Nephrology Unit in a setting where compliance to low-protein diets is high, and overall of the patients with CKD stages 4-5 not on dialysis perform at least one trial period on a protein restricted diet (different schemas, 0.6 to 0.3 g/Kg/day of proteins).

Results: Overall, 202 questionnaires were gathered; the answers came from 101 males, 101 females, median age 63 years (range: 19-101), as for the working status, 46.5% were retired. Family members were in different CKD stages (1 to dialysis), 13.5% were on a low-protein diet, while in 66.8% no diet had been prescribed. The baseline dietary habits followed a Mediterranean pattern in most of the families, as 48.2% of the families eat pasta or rice at least once a day, while only 15.9% eat pasta only.

**SP695** AS A KEY FOR TAILORING THE APPROACH TO LOW-PROTEIN DIETS IN CKD PATIENTS

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occasionally. Furthermore, only 17.4% of the families eat meat every day. Most of the families (65%) eat vegetables at each meal. As for the setting and preparation, 35.8% of the families follow a Mediterranean dietary pattern and conserve the habit of buying and cooking food every day at home. These habits are more pronounced in the older families, in which more commonly a family member is affected by severe CKD. This may be one of the reasons why, as compared with the literature, we experienced an easier switch to low protein diets in our patients. Comparisons with settings in which prepared, canned or processed food are widely used, and where the baseline dietary pattern is richer in red meat are needed for testing this hypothesis.

**Conclusions:**

In the area under study, most of the families follow a Mediterranean dietary pattern and conserve the habit of buying and cooking food every day at home. These habits are more pronounced in the older families, in which more commonly a family member is affected by severe CKD. This may be one of the reasons why, as compared with the literature, we experienced an easier switch to low protein diets in our patients. Comparisons with settings in which prepared, canned or processed food are widely used, and where the baseline dietary pattern is richer in red meat are needed for testing this hypothesis.

**SP696**

**USE OF THE STANDARD URINE PHOSPHATE ASSAY FOR MEASURING THE PHOSPHATE CONTENT OF BEVERAGES: VALIDATION AND VARIATION**

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**Methods:**

The inorganic phosphate concentration in samples of thirty-two soft drinks, beers, ciders, and wines was measured with and without spikes of a solution containing a known amount of phosphate (as H₂NaPO₄). Samples were measured in duplicate using the reaction between inorganic phosphate and ammonium molybdate on a Siemens Advia analyser. The blue compound formed was quantified by absorbance at 340/658 nm. The measured increase in phosphate concentration in the spiked samples was compared with the expected increase to see if the beverages contained anything (without spikes) to further investigate variation between brands.

**Results:**

Recovery of phosphate spikes varied from 84.8 to 90.9% for soft drinks, from 82.2 to 103.5% for beers, and ciders, and from 80.5 to 86.1% for wines, indicating that our standard urine phosphate assay can accurately measure the phosphate concentration in these beverages. There was considerable variation in the phosphate concentrations measured. Soft drinks that did not contain phosphoric acid had undetectable levels (<0.03 mmol/L), whilst colas contained 3.2 to 5.0 mmol/L. The ciders tested had concentrations of 1.8 to 2.6 mmol/L, which was lower than the beers (2.7 to 8.1 mmol/L) and the wines (3.6 to 9.9 mmol/L).

**Conclusions:**

The BDA Renal Nutrition Group recommends a minimum protein intake for haemodialysis patients of 1.1 g/kg ideal weight/day, i.e. 77 g/day for a 70 kg patient. Using the figures in Daugirdas et al. (Sem Dial 2011), this will lead to a phosphate load of about 26 mmol/day. Conventional dialysis removes about 100 mmol phosphate/week. This leaves an anuric patient with about 12 mmol/day of excess phosphate for which 4 to 12 binder tablets (depending on the type and size) will be required. This substantial pill burden is needed simply to manage the phosphate generated from adequate protein ingestion. Any extra mmol of phosphate from beverages will add to this burden and/or lead to high serum phosphate levels. We have shown that this assay for inorganic phosphate in urine, which is based on the phosphomolybdate method and is similar to the methods used in the vast majority of hospital laboratories, can give accurate measurements of phosphate in a range of beverages. The information the assay provides can enable patients to compare locally available beverages and avoid or limit their intake of those with high phosphate content.

**SP696**

**ASSOCIATION BETWEEN IGF-1 AND NUTRITIONAL STATUS IN PATIENTS WITH CHRONIC KIDNEY DISEASE**

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**Introduction and Aims:**

Insulin-like growth factor-1 (IGF-1) is the key mediator of the anabolic actions of growth hormone. In previous studies, IGF-1 has been associated with an increased risk of cardiovascular disease. Limited studies in patients receiving dialysis suggest that serum IGF-1 correlates with markers of nutrition, compared to serum albumin and serum transferrin. And, the association between serum IGF-1 levels and renal function is not clear. The aim of this study was to investigate the nutritional status and renal function according to serum IGF-1 levels in patients with chronic kidney disease (CKD).

**Methods:**

The 165 patients with CKD from the Daegu Catholic University Medical Center were assessed from January 2010 to November 2012. Serum IGF-1 levels were compared with demographics features, clinical data including nutritional markers and renal function. CKD was defined as an estimated glomerular filtration rate (eGFR) of <60 mL/min/1.73 m². Patients on renal replacement therapy for CKD were excluded from this study. Statistical significance between IGF-1 and nutritional markers, and renal function was assessed by univariate and multivariate logistic regression analysis.

**Results:**

The mean of IGF-1 was 174.1±99.1 ng/mL. The variables showed significant association with IGF-1 were age (r=-0.231, p=0.003), eGFR (r=0.210, p=0.007), %fat (r=0.202, p=0.009), body weight (r=0.229, p=0.003), apolipoprotein A1 (r=0.161, p=0.042), prealbumin (r=0.399, p<0.001), body surface area (r=0.202, p=0.009), triceps skin-fold thickness (r=0.175, p=0.024), ¬fat using dual energy x-ray absorptiometry (DEXA) (r=0.333, p=0.001). Multiple regression showed that prealbumin (p=0.009), ¬fat (p=0.015) were independent associated with IGF-1. However, there were no significant association between IGF-1 and eGFR (p=0.094).

**Conclusions:**

These results suggest that serum IGF-1 levels are reduced in CKD patients with malnutrition. However, we didn't find a correlation between IGF-1 and eGFR. We should consider that IGF-1 is the important factor of nutritional status in CKD patients.