DIALYSIS. PATHOPHYSIOLOGY AND CLINICAL STUDIES

ULTRAFILTRATION VOLUME AND FIBROBLAST GROWTH FACTOR 23: A POSSIBLE LINK BETWEEN VOLUME HOMEOSTASIS AND PHOSPHATE METABOLISM IN HEMODIALYSIS PATIENTS

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Introduction and Aims: A high level of fibroblast growth factor 23 (FGF23) is a risk factor for mortality, and recent studies have linked FGF23 to parameters of volume homeostasis and an increased risk of heart failure. In hemodialysis (HD), a large ultrafiltration volume (UFV) is also associated with an increased mortality risk. We aimed to investigate whether circulating FGF23 levels and ultrafiltration volume are related in a cohort of stable HD patients.

Methods: Post-hoc analysis on a prospective cohort study of 104 HD patients, median age 66 (interquartile range 51-75) years, dialysis vintage 25.0 (8.5-51.2) months, who underwent a standard four-hour HD session at the first session of the week. Blood samples were drawn at onset of HD. Plasma C-terminal FGF23 was determined by ELISA. Residual renal function (RRF) and Kt/V were extracted from patient records. We used uni- and multivariate linear regression to assess the association between UFV and FGF23. Natural log (Ln)-transformation was applied when appropriate.

Results: At start of the HD session the median FGF23 level was 7535 [interquartile range 3276-13433] RU/mL. Mean UFV throughout the HD session was 2561 (standard deviation ±771) mL. In univariate analysis, natural log-transformed (Ln) FGF23 levels correlated with UFV (Figure 1), and also with serum phosphate (R=0.387, P<0.001), age (R= -0.384 P<0.001), and Ln Kt/V (R= -0.252 P=0.01), but not significantly with calcium (R= 0.167 P=0.09). Multivariate linear regression analysis revealed a consistent strong association between Ln FGF23 AND UFV (St. β 0.385, P<0.001), in a model adjusted for serum phosphate (Standardized β 0.451, P<0.001) and serum calcium (St. β 0.222, P=0.002; model R2 52%). Age, gender, dialysis vintage, Kt/V, systolic and diastolic blood pressure did not contribute to this model. The association between FGF23 and UFV was independent of serum phosphate (Figures 1, 2). Patients with relevant residual renal function had a trend for lower FGF23 levels (Mann-Whitney P=0.04, Spearman’s Rho -0.230 P=0.04), however RRF was no correlate of FGF23 in multivariate analysis (St. β -0.111, P=0.16).
Conclusions: In a cohort of stable HD patients we found an association between FGF23 and UVF, independent of serum phosphate. Our findings are in line with the role of exaggerated sympathetic nerve activation in patients with large UVF, as it was recently reported that sympathetic stimulation reduces the FGF23 secretion by the bone (Kawi et al) (J Biol Chem 2014). Further research on this novel connection between deranged volume and phosphate homeostasis in HD patients are urgently needed and may provide clues to better integrated management of these high risk patients.

Introduction and Aims: Advanced glycation end products (AGEs), in addition to being a complication of diabetes, are known to be associated with cardiovascular complications in renal failure patients, especially those undergoing dialysis, and malnutrition. Home hemodialysis (HHD) patients tend to have longer dialysis duration and more frequent dialysis than center hemodialysis (CHD) patients. We report plasma pentosidine (Pent) levels in an HHD group that worked during the day and a CHD group that worked during the day and received HD in the HD clinic at night. The aim of this study is to evaluate whether the plasma Pent level of HHD patients is lower than that of CHD patients, and whether HHD is effective in eliminating Pent.

Methods: The subjects were 20 HHD patients (mean age: 50.5±9.8 years, HD history: 150.8±55.5 days, BW: 63.4±11.1 kg, HD time: 5.1±0.6 h/session, 13.0±2.4 h/wk, hemodialysis product (HDP): 58.0±20.0, KT/V: 1.60±0.22) and 28 CHD patients (mean age: 54.5±9.7 years, HD history: 143.4±103.3 days, BW: 61.2±12.2 kg, HD time: 4.5±0.5 h/session, 13.6±1.1 h/wk, HDP: 40.9±4.2, KT/V: 1.45±0.22). There were 2 diabetes mellitus (DM) patients in the HHD group and 3 DM patients in the CHD group. Plasma Pent levels were measured using an ELISA kit (Fushimi Pharmaceutical Co., Japan), and then compared between the HHD and CHD groups. Correlations between the following items and plasma Pent levels were investigated:

- HD duration and frequency
- Diffusion calcium balance
- Total calcium balance
- Number of HD sessions/month, hemodialysis product (HDP)

The statistical difference was determined with two-sided Student t-test and P<0.05 were considered significant. Pairwise associations were examined with Pearson’s correlation coefficient test.

Results: 1) The plasma Pent level was 0.225±0.07 μg/ml in the HHD group (n=20) and 0.348±0.041 μg/ml in the CHD group (n=28), significantly lower in the HHD group (P=0.007). Excluding DM patients, the plasma Pent level was 0.229±0.008 μg/ml in the HHD group (n=18) and 0.347±0.046 μg/ml in the CHD group (n=25). Thus, plasma Pent was significantly lower in the HHD group (P=0.019) even when DM patients were excluded. 2) Plasma Pent levels showed inverse correlations with HD duration/session (R = -0.404, P = 0.004), total HD duration/month (R = -0.408, P = 0.004), number of HD sessions/month (R = -0.296, P = 0.041) and HDP (R = -0.337, P = 0.019). However, no correlation was seen with KT/V.

Conclusions: Plasma Pent levels were significantly lower in the HHD group than in the hospital CHD group, and this group may therefore have lower expression of dialysis complications. This is thought to be due to the longer HD duration and more frequent HD in HHD.

Introduction and Aims: The calcium mass balance during hemodialysis and the effect of different transport mechanisms in dialyzer on calcium removal or absorption were recently debated. However, the role of two different forms of calcium in dialysis fluid - ionic and diffusible but complexed to small anions - in net calcium balance was not assessed yet. The contribution of ultrafiltration to calcium transport was evaluated as the mass transport by diffusion was calculated as the difference between the total mass and the mass removed by ultrafiltration. The concentration of complexed calcium in dialysate was calculated as the difference between concentration of total calcium and calcium ions.

Results: The measured concentration of calcium in inulin dialysate fluid was 5.37 ± 0.48 mg/dL with 78.6 ± 4.2 % in ion form, and in the outlet it was on average 5.25 ± 0.69 mg/dL (NS) with the fraction of ion form decreased to 75.0 ± 4.2 % (p < 0.001). The concentration of complexed calcium in dialysis fluid increased from 1.16 ± 0.31 mg/dL at the inlet to 1.34 ± 0.29 mg/dL at the outlet of dialyzer. The removal of calcium was observed in 35 dialysis sessions, whereas in 19 sessions calcium was absorbed from dialysate. The removed calcium mass was on average 52.5 ± 242, range 706 to -739, mg, but concomitantly 187 ± 203, range -129 to 827, mg of ion calcium was absorbed. Thus, 239 ± 261, range 592 to 842, mg of complexed calcium was removed. The absorption of calcium ion was mostly by UFH group (284 ± 202, range 46 to 933, mg) with some contribution of UFH group (24 ± 34, range 28 to 197, mg). Complexed calcium ions were also removed mostly by diffusion (206 ± 260, range -608 to 827, mg) with some contribution of ultrafiltration (33 ± 14, range 7 to 69, mg). The convective removal of total, ionic and complexed calcium was higher during the session after the long interdialytic break with higher ultrafiltration than during the other two sessions. Less calcium ions were absorbed during the session after long interdialytic break than during the session after long break. Results demonstrate an important role of ion form of calcium from the blood that balances the absorption of ionized calcium to the body.
Conclusions: Heparin is a risk factor in dialysis patients, particularly in those with hemorrhagic diathesis, anticoagulant therapy or with a long hemostasis time at the end of HD treatment. Combining Citrate in dialysis fluid and heparin-grafted membrane could, based on our preliminary data, routinely halve the heparin dose in the 100% of ESRD patients treated with UFH and decrease of 30% the heparin dose in patients treated with LMWH. Further studies to validate our data and to investigate further decrease in the dose of heparin are required.

MP511 NEW INSIGHTS INTO THE EFFECT OF HEMODIALFILTRATION ON MORTALITY: THE ROMANIAN EXPERIENCE.

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Introduction and Aims: Despite improvements in the complex management of dialyzed patients, morbidity and mortality rates remain unacceptably high. It was hypothesized that the removal of larger metabolites by hemodiafiltration (HDF) could be a potential approach to improve dialysis outcomes. Three large randomized controlled trials have recently been published. With the exception of the ESHOL study, they failed to show an improvement in survival associated with HDF treatment as compared with hemodialysis (HD). Two meta-analyses reported different results on all-cause mortality, but both confirmed a reduced cardiovascular mortality in HDF treated patients.

Methods: We tested this hypothesis by retrospectively analyzing all available patients on April 1st, 2013 (N=4942) from the Romanian Fresenius Medical Care Database. We conducted two types of analyses. In the first one we analyzed all patients that were on dialysis March 1st 2010 and considered only those patients that were performing HDF treatment at that moment ( prevalent patients). In the second one we analyzed all patients that started dialysis between March 1st 2010 and April 1st 2013 and used two definitions for the HDF group: ≥30 or 50% of all dialysis sessions using HDF (incident patients).

Results: In the intention-to-treat approach 1546 patients were considered for the final analysis. There were more men in the HDF group, with a longer dialysis vintage, a higher prevalence of male sex and diabetes. Patients in either predominant HDF group had a better anaemia control, with higher hemoglobin and ferritin levels and with a lower usage of erythropoietin stimulating agents. Although in the univariate analysis there was a better survival in the HDF group (HR=0.67, CI=0.46-0.96, p=0.029), after adjustment for all univariate predictors of death, only chronic heart failure, albumin, iPTH, alkaline phosphatase and eKt/V remained significantly associated with mortality risk. In the second analysis we included 2447 incident patients. In the HDF group (as per definition ≥30% or ≥50% of all dialysis sessions) patients were younger, had longer dialysis vintage, and a higher prevalence of male sex and diabetes. Patients in either predominant HDF group had a lower mortality than those in the HD group treatment (HR=0.24, CI=0.15-0.38 and HR=0.20, CI=0.11-0.38 for ≥30% and ≥50% of all dialysis sessions HDF definition, respectively; p<0.001 for both). In multivariate Cox analysis, using all univariate predictors for death, HDF treatment remained associated with mortality risk (HR=0.28, CI=0.18-0.45 and HR=0.25, CI=0.13-0.46 for ≥30% and ≥50% of all dialysis sessions HDF definition, respectively; p<0.001 for both).

Conclusions: Our study shows that in incident patients HDF treatment could reduce all-cause mortality even after correction for different confounders. Although interesting, these findings need confirmation in larger randomized trials.

MP512 ACHIEVING HIGH CONVECTION VOLUMES IN POSTDILUTIONAL HEMODIALFILTRATION - PRELIMINARY RESULTS FROM THE FEASIBILITY STUDY

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Introduction and Aims: Recent evidence indicates that high volume HDF (convection volume [CV] ≥22L in online postdilution HDF) is associated with a beneficial effect on survival in patients with end stage kidney disease (ESKD). The present study was designed in order to substantiate the proportion of ESKD patients that can reach and maintain high CV. Methods: HD and HDF patients were considered eligible if they were compliant, treated 3x/week for ≥6 weeks and had no life expectancy <3 months due to non-renal disease. At baseline, data of participants and aggregated data of non-participants were collected. Determinants of CV were consecutively increased in a stepwise, structured fashion: treatment time up to 4 hours, blood flow up to 400 mL/min and ultrafiltration fraction up to 33%. The magnitude of the reached CV was monitored after finishing the step-wise protocol and 4 and 8 weeks thereafter.

Results: In this preliminary analysis, we report on the first 39 patients who completed the study or dropped out at any time. After the step-up protocol, which took 6 weeks at max, 35 patients (89.7%) had reached a CV of ≥22L, (max 32.8L; mean 28.1L). 4 weeks thereafter, 4 dropped out due to various reasons. Of the remaining 31, 33 still reached ≥22L CV (max 30.1L; mean 26.9L). 8 weeks after the step-up protocol was finished, 33 patients remained, of whom 31 reached ≥22L CV. Mean CV was 26.8L. Overall, of 39 patients participating in the study, in 31 (79.2%) a high CV was achieved consistently. Baseline data between participants and non-participants (N=33) did not differ with respect to demographic variables, primary diagnosis, dialysis treatment, laboratory values and use of antihypertensive medication.

Conclusions: In the great majority of ESRD patients, high volume HDF can be reached consistently with a structured treatment protocol.

MP513 EFFECT OF HEMODIALYSIS DURATION ON PARAMETERS OF ADEQUACY AND ALL-CAUSE MORTALITY – 24 MONTHS FOLLOW UP

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Introduction and Aims: Weekly duration of hemodialysis is traditionally 12 hours, and randomized controlled HEMO trial found no advantage in survival with higher dialysis dose or using high-flux dialysis membrane. However, experiences of French authors showed that the length of hemodiafiltration treatment is associated with benefits concerning MB and MV of dialysis patients. The aim of study was to compare the parameters of anaemia, malnutrition, inflammation, mineral metabolism and survival rate, depending on the duration of hemodiafiltration treatment.

Methods: A total of 206 hemodialysis patients were divided into 2 groups according to the total weekly duration of dialysis treatment: group I (≤15 h) and group II (>15 h weekly HD). We analyzed one-year average biochemical parameters, and 24 months patients’ survival.

MP513 Table 1. Patient’s characteristics and average biochemical parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group I (TT ≤12 h n=160)</th>
<th>Group II (TT ≥15 h n=46)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male g. (%)</td>
<td>58.8%</td>
<td>73.9%</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Age (y.)</td>
<td>62.6±11.8</td>
<td>55.4±9.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time on HD (months)</td>
<td>76.9±59.1</td>
<td>183.4±96.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hgb (g/dL)</td>
<td>10.5±1.0</td>
<td>11.8±1.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ESA use (%)</td>
<td>86.3%</td>
<td>43.5%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ESA weekly (IU)</td>
<td>5636±4348</td>
<td>5265±3920</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>ERI (U/kg/week)</td>
<td>8.8±7.2</td>
<td>6.8±5.2</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>BML (kg/m2)</td>
<td>24.1±4.4</td>
<td>25.3±4.7</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>s.albumin (g/L)</td>
<td>38.2±23.8</td>
<td>41.6±2.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CRP (mg/L)</td>
<td>9.6±10.2</td>
<td>7.5±7.0</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>iPTH (pg/ml)</td>
<td>446.7±500</td>
<td>348.2±348</td>
<td>0.024</td>
</tr>
<tr>
<td>Ca (mmol/L)</td>
<td>2.28±0.17</td>
<td>2.40±0.19</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>P (mmol/L)</td>
<td>1.60±0.41</td>
<td>1.54±0.43</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>P binders use (%)</td>
<td>84.4%</td>
<td>67.4%</td>
<td>0.01</td>
</tr>
<tr>
<td>Vit. D use (%)</td>
<td>50.6%</td>
<td>39.1%</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>K/V value</td>
<td>1.32±0.26</td>
<td>1.49±0.34</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>
Methods: The three-year follow-up study included 2153 patients on regular HD in 23 HD centers in Serbia (- 50% of overall HD population in Serbia). There were 833 females, aged 18-90 (59±12.5) years, dialyzed averagely 11.8±1.9 hours/week. Patients were followed from January 2010 to December 2012. Demographic, clinical and laboratory data that were collected at study enrollment were used for the analysis. Univariate survival analysis was performed with Cox proportional hazard model (dependent variable: months from the beginning of HD treatment to death) with adjustment for patient age and gender. Significant variables in univariate analysis were tested in a multivariate Cox models using the backward stepwise method.

Results: During the follow-up period, 577 patients died, 44 were transplanted, 69 were lost from the follow-up and 1463 remained on regular HD. By univariate Cox proportional hazard model, the following variables were selected as potential predictors of death: age, gender, duration of HD treatment, hours of HD/week, type of HD, interdialytic weight gain, systolic blood pressure, Kt/V, nephropathy, Balkan nephropathy, polycystic kidney disease) duration of HD treatment, age, gender, underlying kidney disease (glomerulonephritis, diabetic nephropathy), yes 0.63 1.49 (1.37-2.60) <0.001

Conclusions: Age, gender, duration of HD treatment, hours of HD/week, number of transfusion per year and diabetic nephropathy were selected as significant independent predictors of HD patient mortality. The relative risk of mortality was associated with being outside the guidelines targets for Kt/V and Hb, but not outside the target ranges for Ca, P04 and PTH.

MP515 EFFECT OF HEMODIALYSIS MODALITY ON PARAMETERS OF ADEQUACY AND ALL-CAUSE MORTALITY - 24 MONTHS FOLLOW UP

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Introduction and Aims: Retrospective studies showed that HDF was associated with a risk reduction of mortality over standard hemodialysis (HD) in patients with end-stage renal disease. Recently, a few prospective randomized clinical trials (except the "ESHOL study"), found no advantage in survival with HDF vs. high-flux HD (HPHD)

MP515 Table 1. Patients’ characteristics and average biochemical parameters

<table>
<thead>
<tr>
<th>Variable</th>
<th>group I LF-dialysis</th>
<th>group II HF-dialysis</th>
<th>group III HDF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=69</td>
<td>n=64</td>
<td>n=26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male g. (%)</td>
<td>50.7%</td>
<td>68.8%</td>
<td>53.8%</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Age (y)</td>
<td>67.2±10.8</td>
<td>59.9±11.8</td>
<td>57.4±10.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time on HD (m.)</td>
<td>44.6±36.5</td>
<td>96.1±67.2</td>
<td>117.9±39.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hb(g/dL)</td>
<td>10.2±0.7</td>
<td>10.7±1.2</td>
<td>10.6±0.7</td>
<td>0.006</td>
</tr>
<tr>
<td>ESA use (%)</td>
<td>97.1%</td>
<td>76.6%</td>
<td>80.8%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ESA weekly (I.U.)</td>
<td>8.2±5.0</td>
<td>9.0±8.2</td>
<td>10.4±10.0</td>
<td>&gt;0.05</td>
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<tr>
<td>BMI(kg/m2)</td>
<td>24.1±4.6</td>
<td>24.4±4.0</td>
<td>23.6±4.8</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>s.albumin(g/L)</td>
<td>37.9±2.7</td>
<td>38.6±2.8</td>
<td>38.0±3.1</td>
<td>&gt;0.05</td>
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<tr>
<td>CRP(mg/L)</td>
<td>10.3±11.4</td>
<td>9.0±9.0</td>
<td>9.0±9.6</td>
<td>&gt;0.05</td>
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<tr>
<td>iPTH(pg/ml)</td>
<td>345.0±356</td>
<td>554.7±638</td>
<td>451.0±402</td>
<td>&gt;0.05</td>
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<tr>
<td>Ca (mmol/L)</td>
<td>2.29±0.19</td>
<td>2.55±0.15</td>
<td>2.31±0.12</td>
<td>&gt;0.05</td>
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<tr>
<td>P (mmol/L)</td>
<td>1.48±0.36</td>
<td>1.71±0.44</td>
<td>1.64±0.41</td>
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<tr>
<td>P binders use (%)</td>
<td>(84.1%)</td>
<td>(82.8%)</td>
<td>(92.3%)</td>
<td>&gt;0.05</td>
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<tr>
<td>Vit. D use (%)</td>
<td>(47.8%)</td>
<td>(51.6%)</td>
<td>(53.8%)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Kt/V value</td>
<td>1.32±0.23</td>
<td>1.25±0.24</td>
<td>1.50±0.29</td>
<td>&lt;0.001</td>
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and low-flux HD (LFHD). The aim of the study was to compare the parameters of anaemia, malnutrition, inflammation, mineral metabolism and survival rate, depending on the type of hemodialysis treatment.

**Methods:** A total of 159 hemodialysis patients were divided into 3 groups according to the type of hemodialysis treatment: group I - low-flux membranes, group II - high-flux membranes, and group III - hemodiafiltration. We analyzed one-year average biochemical parameters, and 20 months patient’s survival.

**Results:** Patients on HDF were significantly younger and they had longer dialysis vintage as compared with patients on LFHD and HFHD. Compared to patients on LFHD, patients on HDF and HFHD had significantly higher hemoglobin value despite the less frequent ESA use (Table 1). Patient on HDF had significantly higher Kt/V than patients on LFHD and HFHD without difference between two later groups. According to Kaplan-Meier survival analysis patients on HDF and HFHD had significantly better two-year survival than patients on LFHD (Log-rank test P=0.029 (Figure 1). Cox proportional hazards model confirmed that HDF caused a significant, 56 % RR reduction of mortality compared to LFHD (HR 0.44; 95% CI 0.22 - 0.905; P=0.026), and HDF caused a 58 % RR reduction of mortality compared to LF dialysis (HR 0.42; 95% CI 0.15 to 0.202; P=0.105).

**Conclusions:** This study demonstrates 2-year survival benefit with use of HFHD and HDF compared with LFHD. There was no difference in survival between HFHD and HDF groups. Dialysis adequacy is not sufficient explanation for this HDF/HFHD benefit.

### MP516 Table 2

<table>
<thead>
<tr>
<th>Units</th>
<th>Total Patients</th>
<th>%CRP &lt;3mg/l</th>
<th>%CRP 5-14.9mg/l</th>
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<td>26.8</td>
<td>33</td>
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**Conclusions:** Above results is the average from twelve dialysis units. Some centres has better control of the studied variable than others. This is possibly due to use of hemodiafiltration modality in some centres and difference in vascular access. Overall it’s found that there is a scope for better control of serum phosphate, serum bicarbonate across centres to improve patient’s morbidity and mortality. Minimizing dialysis central catheters has been proven in studies to reduce infection rates hence assuming less inflammation and achieving better control of CRP. Effect of more frequent daily dialysis on adequacy will be evaluated in our home hemodialysis population later.

### MP517

**Clinical Aspects of Vitamin D Pathway Gene Polymorphism in Hemodialysis Women and Men**

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**Introduction and Aims:** Vitamin D metabolism is associated with life-threatening diseases with gender-dependent prevalence like myocardial infarction (MI) or bone mineral disorders. Our aim was to evaluate a frequency distribution of vitamin D pathway gene polymorphisms in hemodialysis (HD) women and men in relation to prevalence of coronary artery disease (CAD) and severity of secondary hyperparathyroidism (SHPT).

**Methods:** HD women (n=431, age 63.4±14.8 yrs) and men (n=625, age 61.3±14.8 yrs) as well as control women (n=163, age 49.5±12.7 yrs) and men (n=150, age 48.9±12.4 yrs) were enrolled into the study. Polymorphisms of genes encoding vitamin D binding acidosis, bone metabolism, anaemia, fluid balance and nutritional status. We performed a regional survey of our practice and collected data which are directly related to dialysis adequacy.

**Methods:** 606 patient data collected from 12 hemodialysis units in June 2013. Majority of the patients have 12 hours per week hemodialysis. Pre-dialysis samples collected to check serum albumin, bicarbonates, C reactive protein (CRP) and phosphate levels on first session in beginning week of June 2013. Data recorded on pre generated proforma which was distributed among centres to record number of variables for hemodialysis adequacy assessment. Data for dialysis access were also recorded.

**Results:** Average pre dialysis serum bicarbonate levels from all centres were between 22-29 mmol/l in 74%. Serum Albumin above 35 g/l found in in 59% while 44.75% had serum phosphate levels above 1.7 mmol/l (table 1)Serum CRP 15 mg/l in 40.2% of patients (table 2). It’s also noted that higher levels of CRP were related to patient dialysed via vascular catheter 23.6±5.8 (87 cases), 15.5 ± 2.3 (12 cases) with graft and 15.5 ± 2.3 (343 cases) with arterio venos fistula (AVF). we were unable to recorded data from one of the centres for CRP.

**Conclusions:** Above results is the average from twelve dialysis units. Some centres has better control of the studied variable than others. This is possibly due to use of hemodiafiltration modality in some centres and difference in vascular access. Overall it’s found that there is a scope for better control of serum phosphate, serum bicarbonate across centres to improve patient’s morbidity and mortality. Minimizing dialysis central catheters has been proven in studies to reduce infection rates hence assuming less inflammation and achieving better control of CRP. Effect of more frequent daily dialysis on adequacy will be evaluated in our home hemodialysis population later.
protein (VDBP): rs2298849 (genotyped by High Resolution Mel analysis - HRM), rs7041 (Restriction Fragment Length Polymorphism analysis - RFLP, restriction enzyme - HaeIII), rs1155563 (HRM), vitamin D receptor (VDR): rs222870 (RFLP, FokI), rs1544410 (RFLP, Espl), and retinoid A receptor (RARα): rs10776909 (HRM), rs10881578 (HRM), rs479597 (RFLP, BstXI) were genotyping in all study subjects. Frequencies of the respective genotypes were compared between groups with and without age matching. Clinical data (prevalence of CAD, MI, parathyroidectomy (PTX), and treatment of cinacalcet (TC), 955 patients were reviewed) and laboratory results [serum Ca, P, ALP, and PTH, 827 mean values of 2-4 results for each parameter; plasma 25(OH)D, 207 results] were compared in HD women and men bearing different polymorphic variants of the analyzed genotypes. In patients who underwent PTX or TC, laboratory data shown before these treatment commencements were taken into analysis.

Results: HD women and men did not differ in a frequency distribution of vitamin D pathway gene polymorphisms, also if age pair matched subjects were compared which also did not differ in RRT vintage and main causes of ESRD (P trend<0.05).

Plasma vitamin D levels were lower in HD women than those in men (13.0±5.2 vs 15.5±4.6 ng/mL, P=0.000004).

HDwomen compared to healthy women differed in a frequency distribution of rs10776909 independently on whether age matched or not (P trend<0.02). Prevalence of CAD was higher in TT than in CC +TT rs10776909 (women OR 3.79, 95%CI 1.34-11.6, P=0.010).

Lower 25(OH)D plasma levels were in CC +TT compared to CC rs2228750 carriers (P=0.045).

TT female carriers compared to GG+GT rs7041 carriers showed higher P level (P=0.008). AA rs10881578 women had higher prevalence of PTH≥500 pg/mL (P=0.028) and higher ALP activity (P=0.020) than AG+GG women. HD men compared to healthy men did not differ in the frequency distribution of vitamin D pathway gene polymorphisms independently on whether age matched or not (P trend=0.05).

Prevalence of MI was higher in HD men bearing GG compared to HD women (OR 3.79, 95%CI 1.34-11.6, P=0.010). Lower 25(OH)D plasma levels were in AA compared to GG+AG rs1544410 carriers (P=0.025). Higher Ca levels were shown in CC compared to TT rs2228570 (P=0.040).

TT +TT rs10776909 women (OR 3.79, 95%CI 1.34-11.6, P=0.010). Lower 25(OH)D plasma levels were in CC +TT compared to CC rs2228750 carriers (P=0.040). TT compared to GG+GT rs7041 carriers showed higher P level (P=0.008).

Higher Ca levels were shown in CC compared to TT rs2228570 carriers (P=0.040). TT +TT rs10776909 women (OR 3.79, 95%CI 1.34-11.6, P=0.010). Lower 25(OH)D plasma levels were in AA compared to GG+AG rs1544410 carriers (P=0.025). Higher Ca levels were shown in CC compared to TT rs2228750 carriers (P=0.040). TT compared to CC rs10776909 (P=0.010), and GG compared to AA rs10881578 (P=0.04) HD men.

Conclusions: In HD patients there are associations between vitamin D pathway gene polymorphisms, CAD/MI prevalence, mineral disorders, and severity of sHPT. Gender related factors may be important in expression of associations between vitamin D pathway polymorphic variants and mentioned abnormalities.

**Results:** A total of 178 patients completed this study. Among the study participants, 34.8% suffered from uremic pruritus. The patients with uremic pruritus had higher serum interleukin-31 levels than those without pruritus symptoms (31.7±51.0 vs 11.8 ±17.2, P<0.04). Higher serum levels of interleukin-31 were positively correlated with higher 25(OH)D plasma levels (P<0.04). Furthermore, univariate and multivariate regression analysis showed that higher serum levels of interleukin-31, C-reactive protein, and alanine transaminase, as well as lower Kt/V, were independent predictors for higher pruritus intensity after adjusting for potential confounding factors (Table 1). A C reactive protein response relationship between serum levels of interleukin-31 and 25(OH)D plasma levels was also found (Figure 1).

**Conclusions:** Interleukin-31 may play an important role in hemodialysis patients with uremic pruritus. Whether a causal relationship exists between interleukin-31 and uremic pruritus deserves further study.

**MP519**

**LOWER SERUM HIGH-DENSITY LIPOPROTEIN-CHOLESTEROL LEVEL IS ASSOCIATED WITH THE NEW-ONSET OF PERIPHERAL ARTERIAL DISEASE IN NON-DIABETIC HEMODIALYSIS PATIENTS**

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**Introduction and Aims:** Some studies have demonstrated inverse correlation between the serum level of high-density lipoprotein-cholesterol (sHDL-C) and the risk of new-onset peripheral arterial disease (PAD) in general population. However, little is known regarding this relationship in hemodialysis (HD) patients.

**Methods:** We prospectively observed consecutive 132 non-diabetic HD patients diagnosed without PAD at baseline in a single center in Japan for five years. Diagnosis of PAD was defined as the significant lower limb arterial stenosis (60% and more) diagnosed without PAD at baseline in a single center in Japan for five years. Diagnosis of PAD was defined as the significant lower limb arterial stenosis (60% and more) using ultrasonography at baseline and five years later. We set new-onset of PAD diagnosed by ultrasonography as the main outcome measure in this investigation. Main exposure to be tested was sHDL-C at baseline: sHDL-C greater or equal 40mg/dl (the Japanese guideline cut-off level) was defined as reference. Logistic regression analysis was employed to estimate the odds ratio (OR) and 95% confidence interval (CI) of newly PAD onset by sHDL-C at baseline. Multivariate analyses were adjusted for age, gender, smoking, coronary artery disease, and statin use.

**Results:** The number of new-onset PAD were 12/34 cases (35.3%) and 6/77 cases (7.8%) in low-sHDL-C (less than 40mg/dl) group and high-sHDL-C (greater or equal 40mg/dl), respectively. Multivariate logistic regression analyses revealed that lower sHDL-C was significantly related with greater odds of new-onset PAD (OR 2.1, 95%CI 1.1 to 4.0, p=0.05).

**Conclusions:** These results suggests that lower sHDL-C is associated with new-onset PAD in non-diabetic HD patients.

**MP520**

**SODIUM GRADIENT AND LONG-TERM OUTCOMES IN HEMODIALYSIS PATIENT**

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**Introduction and Aims:** Sodium gradient (SG) is a potentially important factor to improve clinical outcomes in hemodialysis (HD) patients; however, there are limited data linking the SG with long-term clinical outcomes. The aim of this study was to...
This study showed that HDF treatment had a relationship with low addition, HDF patients had lower HOMA-IR levels compared with low flux resistance by convection enhancing the removal of middle-molecular-weight HOMA-IR level in non-diabetic HD patients, and HDF treatment might reduce insulin resistance.

Methods: A cross-sectional study, 82 non-diabetic HD patients (47 men, mean age at beginning of HD 49.6±9.15 years, mean HD vintage 99.54±72.15 months, diabetes 17%) were enrolled. The patients were divided into a standard diuresis sodium of 140mEq/L (13.8±0.6 mEq/L) and a higher sodium of 150mEq/L (15.9±1.64 mEq/L) group. HD patients with negative SG were older, with higher body weight, shorter duration of HD, lower interdialytic weight gain, Kt/V, glycemia and higher albumen level. There was no significant difference in survival between patients with a positive and a negative SG (log rank; p=0.215). Between three groups of patients stratified by SG (SG > +2mEq/L, SG between +2mEq/L to -2mEq/L, patients with SG > +2mEq/L were younger than the other two groups, ultrafiltration and interdialytic weight gain significantly reduced from positive to negative gradient, left ventricular mass index was significantly higher in patient with SG > +2mEq/L (150.4±37.97 m/g/m²) and patients with SG > +2mEq/L (159.8±164.43m/g/m²) than in patients with SG between +2mEq/L and -2mEq/L (138.9±96.32m/g/m²) and patients with SG between -2mEq/L and +2mEq/L (135.9±76.09m/g/m²). These groups showed lower mortality risk in patients with SG between +2mEq/L to -2mEq/L (log rank; p=0.002), while higher mortality was observed in patients both SG > +2mEq/L and < -2mEq/L (95% CI 3.43-7.23; p=0.000) for patients with SG > +2mEq/L compared to patients with SG between +2mEq/L to -2mEq/L. We did not find significant difference in HR (IRR 1.04; 95% CI 0.83-1.22; p=0.86) between patients with SG > +2mEq/L vs. 2mEq/L to -2mEq/L.

Conclusions: This study showed that a sodium gradient between +2mEq/L to -2mEq/L was associated with lower all-cause mortality HD patients, but the prospective studies with larger numbers of patients are needed to apply in clinical practice.

MP522  THE RELATIONSHIP BETWEEN HEMODIALYSIS MODALITY AND INSULIN RESISTANCE IN NON-DIABETIC HEMODIALYSIS PATIENTS

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Introduction and Aims: Cardiovascular disease (CVD) is the leading cause of mortality in patients on end-stage renal disease (ESRD). Insulin resistance (IR) is associated with the development of CVD. Although various modalities of hemodialysis (HD) are presumed to have different effects on insulin resistance, there is no study on the relationship of hemodialfiltration and HDJ and IR.

Methods: In a retrospective study, 82 non-diabetic HD patients (47 men, mean age 59.2±14.4 years) were enrolled. The patients were divided into two groups according to the median HOMA-IR value of 1.685, and clinical and bio-chemical data were compared. The Pearson’s correlation between HOMA-IR and other variables were computed, and multiple logistic regression analysis was performed to identify the independent factors associated with higher HOMA-IR.

Results: The higher HOMA-IR group had increased body mass index (BMI) (23.0±1.3 vs. 20.9±2.3 kg/m²; p=0.001), decreased HDL cholesterol and lower beta-2 microglobulin reduction rate (β2-MG RR) compared to the lower HOMA-IR group (42 ±1 vs 47±10 mg/dL; p=0.038; 16.02±22 vs 39.1±12,52%; p=0.001, respectively). HOMA-IR was significantly correlated with β2-MG RR (r=-0.318; p=0.004). In addition, HDF patients had lower HOMA-IR levels compared with low flux hemodialysis (LF-HD) patients (LF-HD: 2.47±1.56 vs LF-HD: 1.88±1.20 vs HDF: 1.41±1.05, P=0.026). On multivariate logistic regression analysis, BMI (OR 1.264 (95% CI 1.009-1.583; p=0.042) and HDF treatment (OR 0.132 (95% CI 0.023-0.748; p=0.022, vs LF-HD) were independent factors associated with higher HOMA-IR.

Conclusions: This study showed that HDF treatment had a relationship with low HOMA-IR level in non-diabetic HD patients, and HDF treatment might reduce insulin resistance by confection enhancing the removal of middle-molecular-weight substances in ESRD patients.

EVALUATION OF A BEDSIDE MONITOR OF INTERNATIONAL NORMALISED RATIO (INR) IN HEMODIALYSIS PATIENTS ON ACENOCOUMAROL

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Introduction and Aims: The use of a portable International Normalized Ratio monitor (PortINR) is considered a safe and effective alternative to laboratory INR (LabINR) testing for oral anticoagulation monitoring. There is paucity of data on the performance of this device in the management of hemodialysis (HD) patients on chronic P.O.S anticoagulation treatment. We conducted a prospective study to determine the safety and reproducibility of PortINR compared to standard LabINR in HD patients receiving acenocoumarol therapy.

Methods: During a 6 month period, from a pool of 87 hemodialysis patients, 18 (11 men, 7 women), median age 71 years (range 57-89), median time on HD 63 months (range 6-372) receiving acenocoumarol, at least 1 month before enrollment, provided at least 4 blood samples. Each sample was tested by PortINR (using a CoagCheck X5, Roche diagnostics) and LabINR. Blood samples were drawn from the vascular access (fistula, graft or permanent venous catheter: 10, 5 and 3 patients, respectively), immediately before HD session. Indications for anticoagulation were atrial fibrillation and heart valve replacement in 13 and 5 patients, respectively. Mean INR values were compared using a paired t-test, with significance defined at p<0.05.

Results: There were 158 paired INR values with no significant differences between Port and LabINR values and an excellent correlation between the two modalities (r=0.96; p=0.0001). According to Bland-Altman analysis the mean difference between PortINR and LabINR was 0.03 (limits of agreement: -0.43 to 0.49). Measured INR values differed by 0.5 in one and ≥ 1 units in two samples (one in the case of sampling via a permanent catheter). In no instances there were conflicting INR results indicating different dose alterations in the opposite direction from its paired INR. In only 2 occasions a change in dose was suggested by PortINR but not by LabINR. There were no major hemorrhagic or thromboembolic complications during the study period.

Conclusions: The PortINR controlled by a bedside prothrombin time monitor in hemodialysis patients on P.O.S anticoagulation, resulted in an excellent agreement with an in-hospital laboratory INR measurement. This immediately available INR result obtained by an easily applied method has the advantage for on time therapeutic decisions as well as more frequent home self-controls in this hemodialysis population continuously exposed to hemorrhagic adverse events.
sTWEAK is a marker of endothelial dysfunction in HD patients, as showed by the positive correlation between sTWEAK and diastolic blood pressure.

**MP524** PROJECTED CANCER RISK FROM MEDICAL IONIZING RADIATION PROCEDURES IN DIALEDYzed PATIENTS.

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**Introduction and Aims:** Advances in medical imaging have been associated with increased Ionizing Radiation Exposure (IRE). The relationship between IRE and cancer risk shows a strong, good and reasonable evidence for doses >100 mSv, 50-100 mSv and 10-50 mSv, respectively. Retrospective studies confirmed an excess risk of cancer in adults who underwent computer tomography in childhood, while other Authors estimated the projected cancer risk, by estimating the Effective and Organ Doses (ED, OD) and applying organ-specific cancer incidence or mortality data, as summarized in the Biological Effects of Ionizing Radiation (BEIR VII) report. The aims of this retrospective study were to quantify the cumulative ED and OD to relevant organs and to assess radiation risks of cancer in hemodialysis patients (HDp).

**Methods:** 159 HDp with a follow-up ≥1 year and without previous neoplasia were enrolled. Cumulative ED and OD were estimated from the Radiation Information System and Picture Archiving and Communication System of our Radiology Department. Radiation risk, expressed as Risk of Exposure Induced Death (REID %) was estimated according to the BEIR VII model.

**Results:** 159 HDp (101 males, mean age 65.3 ± years) were followed for a median of 2.7 years (486 patient-years). The median and mean cumulative ED were 35.9 ± and 84.2 ± mSv, respectively; the median and mean annual CED were 12.1 ± and 24.8 ± mSv, respectively. 23.15% (16 ± 10%) HDP received a total CED of 100-200 and >200 mSv, respectively. The mean cumulative OD were 102, 100, 97, 77 and 58 ± mSv for lung, stomach, liver, colon and bone marrow, respectively. Computer tomography contributed to 99% for breast, minimum 81% for lung; nuclear medicine contributed to 4.5% of OD (maximum 10% for bladder and colon); conventional radiology contributed to 5% of OD (maximum 17% for lung). The mean (median) REID was 0.99 (0.45) and maximum REID was 4.46%. Increasing age and diabetes mellitus were associated with lower REID, while the transplant waiting list status was associated with a significantly higher REID.

**Conclusions:** HDp receive high CED from medical imaging, and the excess cancer risk attributable to IRE is not negligible (about 1% in a few years). This should be of concern for nephrologists since HDp are living longer and have several comorbid conditions that are associated with an increased cancer risk.

**MP525** COMPARISON OF CENTRAL AORTIC AND BRACHIAL BLOOD PRESSURE LEVELS DURING A 48-HOUR AMBULATORY RECORDING IN END-STAGE RENAL DISEASE PATIENTS UNDER HEMODIALYSIS.

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**Introduction and Aims:** Peripheral blood pressure (BP) at the brachial artery cannot accurately reflect BP in the ascending aorta, due to the pressure amplification phenomenon. End-stage renal disease (ESRD) is characterized by increased arterial stiffness and in ESRD patients arterial BP was shown to be a better predictor of mortality than brachial BP. We investigated in comparison aortic and brachial BP levels during a 48-hour ambulatory BP monitoring (ABPM) in ESRD patients receiving hemodialysis.

**Methods:** Aortic and brachial ABPM was performed with the use of the Mobil-O-Graph device (IEM, Stolberg, Germany) for a 48-hour period including a hemodialysis session and the following interdialytic interval in 92 ESRD patients receiving maintenance hemodialysis treatment. Mobil-O-Graph is a newly introduced‐brachial cuff‐based automatic oscillometric device, which records brachial BP and pulse waveforms and assesses central BP via mathematical transformation (generalized transfer function).

**Results:** Mean aortic systolic BP (SBP) and pulse pressure (PP) during the 48-hour recording period was significantly lower than ambulatory SBP and PP at the level of brachial artery (121.7±14.7 vs 133.1±16.6 mmHg, P<0.001 for SBP and 41.1±5.7 vs 54.5±8.9 mmHg, P<0.001 for PP respectively). In contrast, ambulatory 48-hour diastolic BP (DBP) was significantly higher in the ascending aorta than in brachial artery (80.2±10.4 vs 78.6±10.2 mmHg, P<0.001). These differences between aortic and brachial BP were evident for both day-time and night-time periods, as well as during both the hemodialysis and hemodialysis-free days.

**Conclusions:** This is the first study comparing 48-hour central and brachial BP in hemodialysis patients and shows about 12 mmHg lower ambulatory SBP and PP in the aorta than in brachial artery, consistent during the 48-hour period. Future studies are needed to investigate any possible effects of this difference on cardiovascular risk.

**MP526** AMBULATORY RECORDING OF WAVE REFLECTIONS AND ARTERIAL STIFFNESS DURING INTRA- AND INTERDIALYTIC PERIODS IN END-STANCE RENAL DISEASE PATIENTS UNDER HEMODIALYSIS.

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**Introduction and Aims:** Elevated wave reflections and arterial stiffening are strong predictors of cardiovascular morbidity and mortality in hemodialysis patients. Previous studies investigating arterial cushioning function in these individuals were based only on office measurements obtained shortly before or after the hemodialysis procedure. The aim of this study was to investigate potential variations in wave reflection and arterial stiffness parameters during the intra- and inter-dialytic periods over a 48-hour period in chronic hemodialysis patients.

**Methods:** A total of 92 hemodialysis patients underwent a 48-hour brachial and aortic ambulatory blood pressure monitoring (ABPM) with the use of the newly commercially available Mobil O-Graph device (IEM, Stolberg, Germany). ABPM included a whole 4-hour hemodialysis session and the subsequent 44-hour interdialytic interval. Mobil-O-Graph is a novel validated brachial cuff-based automatic oscillometric device, which additionally records in ambulatory conditions pulse waveforms at brachial artery and assesses wave reflection and arterial stiffness (Pulse Wave Velocity, PWV) via mathematical transformation.

**Results:** In hemodialysis-on day (Day-1) mean heart rate-adjusted augmentation index (Aix(75)) was significantly lower during the intradialytic period than during the out-of-dialysis period (25.0±9.1 vs 27.0±7.8%, P<0.001). In contrast, PWV did not significantly differ between the intradialytic and out-of-dialysis intervals of the hemodialysis-on day (29.2±2.4 vs 29.7±2.5 mmHg/msec, P=0.679). Both Aix(75) and PWV were significantly elevated during the 24-hour period of the hemodialysis-off day (Day-2) as compared to the out-of-dialysis period of the hemodialysis-on day (28.0±4.8 vs 27.0±2.8%, P<0.05 and 9.40±2.5 vs 9.27±2.5 m/sec, P<0.001, for Aix(75) and PWV respectively).

**Conclusions:** This study shows a gradual interdialytic increase in arterial wave reflections along with a significant and potentially BP-dependent elevation in arterial stiffness during the interdialytic period in hemodialysis patients.
serum free testosterone concentration and changes of serum PTH, calcium and phosphate concentration and cinacalcet dose, respectively.

Conclusions: Treatment with cinacalcet decreases serum free testosterone concentration in male hemodialysed patients with chronic kidney disease and secondary hyperparathyroidism.

**MP528 FIREFLIES STUDY: A FIRST THREE MONTH FOLLOW UP**

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Introduction and Aims: Free Light Chain immunoglobulins (FLCs) accumulate in the sera of patients with chronic renal failure as result of a reduced or abolished clearance and may be considered as members of uremic toxins family.SUPRA hemodiafiltration therapy, combining a very high performing membrane, in term of extraction capability, and the adsorption of ultrafilterate on a resin cartridge, could reduce levels of FLCs in ESRD patients.Aim of the multicenter FIREFLIES study is the evaluation of SUPRA therapy on long-term reduction of FLCs levels. Moreover is expected an improvement, due to FLCs reduction, on the immunological and inflammatory parameters.

Methods: Within a cohort of 147 patients (selected for pre-screening) and on the basis of inclusions criteria of this protocol (i.e. active inflammatory and immunological diseases determine exclusion) were enrolled 27 patients (16M, 11F) with a mean age of 70±12 years, in 5 Dialysis centres.A wash out period of 2 weeks in Bicarbonate-Dialysis (BD) was followed by a six month of SUPRA treatment (4 hours, three times per week). Plasma Samples were collected at beginning of the dialysis session after three month and at the end of the study (Fig 1).After Three months pre dialysis levels of FLCs k, FLCs λ, and β2M were determined by nephelometric assays (FREELITE; The Binding Site, Birmingham, UK); TGF β-1 and CFD were evaluated by Solid Phase ELISA (QuantiKine ELISA kit, R&D System, Minneapolis, MN, USA).

Results: Here we present a preliminary and partial results on FLCs level in the twenty-seven patients that have completed the first three month of the study.The results showed a statistically significant reduction for FLCs k, FLCs λ, β2M, TGF-β1, and Complement Factor D (CFD) with the respect to the basal value (Table 1).Another marker, such as FLCs k/λ ratio, not shows significantly variation between T0 and T3 (1.90±0.14 vs 1.80±0.12) confirming that the SUPRA technique is able to remove both k and λ FLCs.

Conclusions: The preliminary results of FIREFLIES study shown that SUPRA treatment is able to reduce the FLCs serum concentration as well as CFD and may be considered as members of uremic toxins family.SUPRA hemodiafiltration therapy on long-term reduction of FLCs levels. Moreover is expected an improvement, due to FLCs reduction, on the immunological and inflammatory parameters.

**MP550 PREDICTIONS OF HEALTH RELATED QUALITY OF LIFE PERCEIVED BY END STAGE RENAL DISEASE PATIENTS UNDER ONLINE HEMODIAFILTRATION**

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Introduction and Aims: Patients’ perception of health quality of life (HRQOL) is a consistent and powerful predictor that affects the outcome of end-stage renal disease (ESRD) patients under dialysis. This study aims to identify factors that could predict the HRQOL among ESRD patients under online-hemodiafiltration (OL-HDF).

Methods: We evaluated 322 ESRD patients under OL-HDF (59.63% males; 64.9 ± 14.3 years old) from five dialysis units in the north of Portugal. Socio-demographic data, comorbidities, hematological data, iron status, dialysis adequacy, nutritional and inflammatory markers were collected from patients records. Moreover, patient’s reported HRQOL score, by using the Kidney Disease Quality of Life-Short Form (KDQOL-SF) was assessed.

Results: Analysing the results according to quartiles of total score of HRQOL, significant differences were found. Patients with higher total score of HRQOL showed a significant increased age, mean cell volume (MCV), mean cell hemoglobin concentration (MCHC), urea and creatinine serum levels, and a decrease in RDW. A trend (p=0.01) for higher hemoglobin concentration was found in patients with higher total score of HRQOL. Moreover, the highest total score of HRQOL was associated with a higher proportion of males, and with a lower proportion of diabetic patients and central venous catheter use. For multiple linear regression analysis, we included variables presenting a p value less than 0.1 in the ANOVA analysis. The model included the following independent variables: age, home-clinic distance, gender (male), type of vascular access (arteriovenous fistula), presence of diabetes, body mass index, hemoglobin concentration, MCV, MCHC, RDW and serum levels of potassium, creatinine, urea and total proteins. Our results showed three significant predictors of HRQOL: RDW, gender (male) and diabetes. Linear regression equation can be written as: HRQOL = 62.66 - 2.32 X RDW + 6.37 X gender (male) - 6.46 X diabetes, male - 6.46 X diabetes (yes). The final model explained 12.1% of the variation of total score of HRQOL.

Conclusions: In conclusion, our results showed that associated morbidities, specially diabetes, gender and erythropoietic disturbances are independent predictors of HRQOL in patients under OL-HDF.

**MP531 ASSOCIATION OF SEROTONIN 1A RECEPTOR POLYMORPHISM WITH HEALTH RELATED QUALITY OF LIFE IN THE KOREAN HEMODIALYSIS PATIENTS**

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Conclusions: Our results showed that associated morbidities, specially diabetes, gender and erythropoietic disturbances are independent predictors of HRQOL in patients under OL-HDF.
Cognitive impairment is a common finding in end-stage renal disease patients on chronic hemodialysis, but data on the associated factors are still scanty.

**Methods:** We enrolled 72 patients admitted to the hemodialysis Unit of the Catholic University, Rome. Cognitive performance was evaluated using the Mini Mental State Examination (MMSE); a cutoff of 24 was used to diagnose cognitive impairment. Left ventricular ejection fraction (LVEF) was assessed by echocardiography. Multivariable linear and logistic regressions were adopted to assess the adjusted association between cognitive performance and LVEF. Also, linear discriminant analysis was performed to ascertain the cutoff level of LVEF which best predicted cognitive impairment.

**Results:** Cognitive impairment was found in 37 (51%) patients. Subjects with a MMSE score <24, as compared with other participants, were significantly older and more frequently disabled in the IADLs; also, they showed a higher Charlson comorbidity score index and a more prevalent diagnosis of depression. In addition, they showed lower creatinine and albumin serum levels, and higher IL-6 levels, as compared with patients without cognitive impairment. According to linear regression, LVEF was associated with MMSE in the unadjusted model (B=12; 95% CI=-0.15; P=0.004), after adjusting for age and sex (B=0.95; 95% CI=-0.13; P=0.004), as well as in the multivariable model (B=0.95; 95% CI=0.01; P=0.04), adjusting for those variables which showed significant differences in univariate analyses (i.e. education level, Charlson index, disability in the IADLs, diagnosis of diabetes, presence of depression, dialytic blood flow, and interleukin 6, albumin, and creatinine levels). When the same linear model was analyzed considering WMSI instead of LVEF, MMSE was not associated with this score (B=25; 95% CI=2.24.94; P=0.83). In multivariable logistic regression model, after adjusting for those variable which showed significant differences in univariable analyses, LVEF was inversely associated with cognitive impairment (OR=0.85; 95% CI=0.78; P=0.022). When the same logistic model was analyzed considering WMSI instead of LVEF, cognitive impairment was not associated with this score (OR=1.58; 95% CI=0.24.50; P=0.810). According to linear discriminant analysis, LVEF ≤ 51% best predicted a MMSE<24 (P=0.002). A LVEF ≤ 51% was detected in 13/72 (18%) of patients.

**Conclusions:** Cognitive impairment is a common finding in hemodialysis patients. Even mildly depressed LVEF is independently associated with cognitive impairment. This association and its potential therapeutic implications should be assessed in dedicated studies.

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**Abstracts**

**Introduction and Aims:** Hemodialysis patients suffer psychological distress and have reduced quality of life (QoL) due to chronically ongoing physical health problems. Genetic polymorphisms associated with emotional distress may contribute to the reduced level of QoL in this patient group. The aim of study was to investigate the relationship of genetic polymorphisms and other clinical characteristics with health-related QoL in Korean hemodialysis patients.

**Methods:** One hundred and ninety clinically stable patients from 6 hemodialysis centers participated in this study. Thirty-six items of the Short-Form Health Survey (SF-36) and Hospital Anxiety and Depression Scale (HADS) were used to assess health-related QoL and psychological distress, respectively. Sociodemographic factors, hemodialysis-related clinical factors, and serotonin 1A receptor, BDNF, glucocorticoid receptor gene polymorphisms were assessed.

**Results:** In bivariate correlation analyses, mental and physical QoL scores showed significant correlations with age, total hemodialysis duration, the number of comorbid medical illnesses, serum calcium level and cholesterol level, C reactive protein level, and severity of anxiety and depression. In the final linear regression analyses, mental QoL level was significantly associated with age, anxiety, depression, and serotonin 1A receptor CC type. Physical QoL level was significantly associated with age, depression, total dialysis duration, and serotonin 1A receptor CC type.

**Conclusions:** mild depression LVEF is independently associated with Cognitive impairment. This association and its potential therapeutic implications should be assessed in dedicated studies.

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**Introduction and Aims:** Plasma levels of copeptin, a surrogate marker of the vasconstrictor arginine vasopressin (AVP), are increased in hemodialysis (HD) patients. Importantly, higher copeptide levels were independently associated with increased all-cause mortality in these patients. Presently it is unknown what drives copeptin levels in HD patients. We investigated whether the established physiological stimuli for copeptin release, i.e. plasma osmolality, blood volume and blood pressure, are operative in HD patients.

**Methods:** One hundred and ninety-eight HD patients on a thrice-weekly HD schedule were studied during the first dialysis session of the week. Plasma levels of copeptin, sodium as the major determinant of plasma osmolality, NT-proBNP, blood volume and blood pressure were measured before and at the end of HD. Multivariate analysis was used to determine the association between copeptin and its stimuli pre- and during HD and these analyses were corrected for age, sex, and diabetes.

**Results:** Patients were 63±15.6 years old and 65% were male. The median dialysis vintage was 1.6 years (IQR 0.7-4.0). Twenty-five patients had diabetes mellitus and 86% had hypertension. Median pre-HD copeptin levels were 141±50 pmol/l (IQR 90.1-244.8 pmol/l). Pre-HD plasma sodium levels, plasma NT-proBNP levels and blood pressure were not significantly associated with higher plasma copeptin levels pre-HD. During HD, copeptin levels rose significantly to 164±50 pmol/l (IQR 898.3-290.2 pmol/l) at the end of dialysis (P=0.01). Greater decreases in blood volume and MAP were associated with a greater increase in copeptin levels (β=0.06; P=0.01 and β=0.05; P=0.04, respectively), whereas there was no significant association between the change in plasma sodium levels and the change in copeptin concentration during HD (β=0.01; P=0.97).

**Conclusions:** Plasma copeptin levels are elevated pre-dialysis and increase further during HD. Volume stimuli, i.e. decreases in blood pressure and blood volume, rather than the change in plasma sodium level as the main determinant of an osmotic stimulus, are significantly associated with the rise in plasma copeptin levels during HD.
only few studies reporting the relation between 25(OH)D level and physical performance function in maintenance hemodialysis (MHD) population.

Methods: This ongoing study has recruited ambulatory MHD patients aged ≥20 years old on MHD ≥26 months, without hospitalization history for the previous 3 months. Study participants performed various performance function tests the day after hemodialysis treatment, such as short physical performance battery (SPPB), sit to stand test-30 (ST30S, the number of sit to stand cycles completed for 30 seconds), 6 minute walk test (6MWVT, distance measured for 6 minutes) and timed up and go test (TUG, seconds). Grip strength (GS, kg) was measured three times in dominant hand with Jamar® Hydraulic Hand Dynamometer and the best score was selected for data analysis. Demographic and laboratory data were obtained from a review of medical records. 250HD level was measured twice at 3-month interval and averaged for analysis.

Results: Sixty three patients evaluated were 57.5±11.6 years of age (mean±SD) on MHD for 5.2±5.5 years; 49.2% were male. 250HD level was 12.4±7.8 ng/mL and 56 participants (89.9%) were in a state of vitamin D deficiency (defined as <20ng/mL). According to serum 250HD levels, study participants were classified into severely deficiency group (defined as ≤10ng/mL) and >10 ng/mL group (n=38). Severely deficient patients were more likely to have diabetes (72.0 vs. 39.5%: P<0.05) and higher Charlson-Comorbidity Index (CCI) score (6.3±2.1 vs. 5.0±2.1: P<0.05). Severely 250HD deficient patients also showed worse physical function than the other group as follows; lower SPPB scores (10.5±1.2 vs. 11.4±1.1; P<0.01), lower STS30 (16.2±5.7 vs. 19.2±5.7; P<0.05), shorter 6MWT distance (416.8±104.5 vs. 489.4±79.1; P<0.01),1 lower TUG (8.3±2.2 vs. 6.8±1.5; P<0.01) and lower GS (22.9±4.9 vs. 28.4±7.9; P<0.01). In multivariate analysis, SPPB, TUG and GS showed significant associations ( odds ratio [95% CI]: 1.93 [1.08-3.54]; 0.52 [0.33-0.83] and 1.20 [1.03-1.42], respectively) with 250HD level above 10 ng/mL after adjustment for age, gender, diabetes, CCI levels of hemoglobin and albumin.

Conclusions: Severe vitamin D deficiency is significantly associated with poorer physical performance function and less skeletal muscle strength. Randomized controlled trial with vitamin D replacement should be considered to confirm clinical implications of 25-hydroxyvitamin D to improve physical function and strength in this population.

IONIZING RADIATION EXPOSURE FROM MEDICAL IMAGING IN DIALYZED PATIENTS UNDERGOING RENAL PRETRANSPLANT EVALUATION

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Introduction and Aims: Ionizing radiation exposure (IRE) from medical radiological procedures (RP) accounts for 3 mSv against the 2.4 mSv from natural background. The association between IRE and cancer risk shows a strong, good and reasonable evidence for doses >100 mSv, 50-100 mSv and 10-50 mSv, respectively. Hemodialyzed patients (HPD) receive high doses of IRE from RP because of several comorbidities and patients who will undergo kidney transplantation receive additional imaging during the pretransplant evaluation. The aim of this retrospective study is to assess the cumulative effective doses (CED) among HPD undergoing renal pre-transplant evaluation.

Methods: 70 HPD were evaluated between June 2007 and December 2012. 2 were excluded due to cardiovascular disease, 4 death, 3 neoplasia and 4 other. 54 HPD (36 males) were enrolled, aged 46 ± 12.0 years. The number and type of RP were collected through the Radiology Information System of our Institution. CED is expressed as a summation over the study period (total CED [mSv]) and as annual CED (mSv/yr/year).

Results: During the follow up 74 RP were performed, accounting for 3869 mSv of IRE. Conventional radiology, computer tomography and nuclear medicine accounted for 78%, 14% and 8% of the frequency but for 8%, 83% and 9% of the total CED. The (median [mean]) annual total CED was 35.7 (76.7) mSv/yr/year and 72.3 (158.3) mSv/yr/year respectively. 37 HPD were active waiting listed and received 67(10) mSv during the evaluation phase and 36 (5) mSv to maintain the active status. 47(10%) patients were in the low (<3 mSv per year), 39(5%) in the moderate (3 to <20 mSv per year), 8(15%) in the high (20 to 50 mSv per year), 23 (43%) in the very high (≥ 50 mSv per year). IRE groups of cancer risk; 7(14%) RTP had a total CED >100 mSv. The age ≥50 years, diabetes and prevalent neoplasia did not influence the CED, maybe due to the low prevalence (less than 10%).

Conclusions: Our study demonstrated that, during the pretransplant evaluation, HPD receive a high IRE, that could put them at an increased risk of cancer. The finding that kidney transplanted patients have high incidence of cancer due to multifactorial etiology, is mandatory to reduce IRE during the dialysis pretransplant evaluation.

FATIGUE OVER TIME IN HEMODIALYSIS PATIENTS

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Introduction and Aims: The present study aimed at evaluating in chronic HD patients the course of fatigue over time and the possible correlation between fatigue and demographic, clinical and laboratory variables.

Methods: All prevalent patients affected by end-stage renal failure who received chronic hemodialysis at the Hemodialysis Unit of the Università Cattolica del Sacro Cuore of Rome, Italy between January 2011 and January 2013 were eligible for inclusion in the study. The following demographic, clinical, and laboratory data were recorded for each patient at the moment of the inclusion in the study: age, gender, underlying renal disease, hemodialysis regimen,duration on dialysis, type and number of comorbidities, symptom of depression and anxiety (through the Beck Depression Inventory and the Hamilton Anxiety Rating Scale), cognitive function (through the Mini Mental Status Examination), time of recovery after the hemodialytic session (evaluated through the Radiology Information System of our Institution. CED is expressed as a summation over the study period (total CED [mSv]) and as annual CED (mSv/yr/year).

Results: During the follow up 74 RP were performed, accounting for 3869 mSv of IRE. Conventional radiology, computer tomography and nuclear medicine accounted for 78%, 14% and 8% of the frequency but for 8%, 83% and 9% of the total CED. The (median [mean]) annual total CED was 35.7 (76.7) mSv/yr/year and 72.3 (158.3) mSv/yr/year respectively. 37 HPD were active waiting listed and received 67(10) mSv during the evaluation phase and 36 (5) mSv to maintain the active status. 47(10%) patients were in the low (<3 mSv per year), 39(5%) in the moderate (3 to <20 mSv per year), 8(15%) in the high (20 to 50 mSv per year), 23 (43%) in the very high (≥ 50 mSv per year). IRE groups of cancer risk; 7(14%) RTP had a total CED >100 mSv. The age ≥50 years, diabetes and prevalent neoplasia did not influence the CED, maybe due to the low prevalence (less than 10%).

Conclusions: Our study demonstrated that, during the pretransplant evaluation, HPD receive a high IRE, that could put them at an increased risk of cancer. The finding that kidney transplanted patients have high incidence of cancer due to multifactorial etiology, is mandatory to reduce IRE during the dialysis pretransplant evaluation.
such score over time, BMI was the one variable independently associated with reduction.

Conclusions: Fatigue is stable over time in patients on chronic hemodialysis

MP539 SEVELAMER POSSIBLY INFLUENCES NEUTROPHIL FUNCTION IN DIALYSIS PATIENTS VIA ENDOTOXIN BINDING

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Introduction and Aims: Bacterial infection and sepsis are among the most common complications in patients on dialysis. The aim of this study was to investigate the impact of sevelamer on endotoxin levels and on neutrophil function in patients undergoing haemodialysis (HD) or haemodiafiltration (HDF).

Methods: Neutrophil function was determined by coincubating whole blood with FITC labelled E.Coli (Phagotest, Glycotope, Germany). Samples were analysed by flow cytometry. Endotoxin was measured by an adapted LAL assay (Kinetic Chromogenic LAL, Charles River, USA). Endotoxin binding proteins such as lipopolysaccheride binding protein (LBP) and sCD14 were measured by ELISA (Human LBP, Human sCD14, Hyclut biotech, Netherlands).

Results: Fifteen dialysis patients on sevelamer and 14 dialysis patients without sevelamer were studied and compared with healthy controls (n=19). Vascular access type was an arteriovenous fistula in 12, a graft in 8 and a central venous catheter in 9 patients. Phagocytic capacity was significantly decreased by 40.3% (p<0.001) in patients not taking sevelamer compared to sevelamer treated patients, who on the other hand showed equal phagocytic capacity compared to healthy controls. Endotoxin was only detected in two patients not on sevelamer. sCD14 was increased to 3.74 µg/ml (p<0.001) in patients on sevelamer and 4.23 µg/ml (p<0.001) in patients not on sevelamer compared to controls (1.66 µg/ml). LBP was not different between all groups. Vascular access type had no influence on phagocytosis, sCD14 or LBP. Conclusion: These preliminary results show that patients receiving sevelamer have a lower neutrophil phagocytic capacity, no detectable endotoxin in serum and lower sCD14 levels. Our data suggest that sevelamer has positive effects on innate immune function due to its enteral endotoxin binding capacity. Other influencing factors need to be assessed to better characterise the role of sevelamer in innate immune function.

Introduction and Aims: The role of comorbidity factors and glomerular filtration at the start of dialysis and their relationship with mortality are currently controversial issues. The goal of this study was to analyze whether clinical conditions and renal function at the start of renal replacement therapy (RRT) are related with mortality in incident hemodialysis patients.

Methods: Retrospective study with 220 incident hemodialysis patients between 2007 and 2010 in Southern Gran Canaria. Patients' demographic, clinical and laboratory data were analyzed at the start of RRT. Glomerular filtration rate (GFR) was calculated by using the MDRD4 and Cockcroft-Gault formula. Patients were classified into 3 different groups according to their GFR: MDRD4 > 15, MDRD4: 8-15 and MDRD4 < 8 ml/min. Survival rates were compared between groups. Patients were followed up until death or until March 31st, 2013.

Results: 65.5% male, 61.3± 13 years old on average, 35.6% diabetic and 17.7% with cardiovascular disease; 65.5% of them started with catheter, the mean age-adjusted Charlson comorbidity index (ACCI) was 6.2 ± 2.4 and the average MDRD4 at the start of hemodialysis was 10.67 ± 3.25 ml/min. Patients who started with MDRD4 < 8 ml/min were (p<0.05) younger, with lower ACCI and higher incidence of start with catheter; they showed lower albumin and hemoglobin levels and higher urea and phosphorus levels. Groups were homogeneous in terms of gender, cardiovascular disease background, hypertension and cancer. The median follow-up time was 39 months. Eighty patients died (17.2 % of them with early and 3.8% with late start of dialysis). The risk of death was significantly higher for patients with hypobulminemia, age > 65 years, higher ACCI, MDRD4 > 15 ml/min at the start, heart failure or history of cerebrovascular disease. After adjusting the model (Cox regression) the global risk of death was higher (p<0.05) for patients who started with catheter (HR: 2.4 CE 1.3 - 4.4), higher ACCI (HR: 1.16 CE 1.03 - 1.13), older than 65 years (HR: 1.7 CE 1.01 - 3.08) and for patients who started with MDRD4 < 8 ml/min (HR: 1.13-1.3).

Conclusions: Patients with a late RRT start were younger, with lower ACCI and with lower albumin and hemoglobin levels. Factors affecting the survival of incident hemodialysis patients are: early start, start with catheter, older age, the GFR-MDRD4 and high ACCI.

MP540 EFFICACY AND SAFETY OF LOW-DOSE FEBUXOSTAT IN CHRONIC HEMODIALYSIS PATIENTS WITH HYPERURICEMIA

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Introduction and Aims: Hyperuricemia is strongly associated with the development of chronic kidney disease (CKD). Febuxostat can carefully administrate to mild to moderate renal dysfunction with hyperuricemia, and decrease serum uric acid. However, no data are available regarding the effect of Febuxostat in patients with end stage renal disease (ESRD). Therefore, the primary aim of this study is to examine the efficacy and safety of low-dose treatment of Febuxostat in chronic hemodialysis patients with hyperuricemia.

Methods: Thirty-two ESRD patients in chronic hemodialysis with hyperuricemia (Male 15, Female 17, mean age 64.8 years, DM 11 patients) were enrolled. Low-dose treatment of Febuxostat (5-10 mg) was prescribed newly or in place of allopurinol 100mg/day. Clinical, hematological and biochemical parameters were measured at baseline and 3.6 and 12 months of treatment. We define our study end points as: (1) reduction and maintenance of serum uric acid < 6.0 mg/dl; (2) the effect and tolerability of Febuxostat.

Results: Serum uric acid levels significantly decreased from 8.4±1.0 mg/dL to 5.2 ±1.2 mg/dl after 2 weeks (p<0.01). Also, serum uric acid levels were shown under 6.0 mg/dl during treatment. Final average dose of Febuxostat was 8.8 mg/day, and low-dose therapy could keep during the study. There were significantly decreases of total cholesterol (from 174±40 mg/dl to 165±34 mg/dl; p<0.01), and especially LDL cholesterol (from 94±29 mg/dl to 80.22 mg/dl; p<0.001) after 12months. In our study, no serious adverse effects appeared during the treatment.

Conclusions: Low-dose treatment of Febuxostat can be an effective and safety drug in chronic hemodialysis patients, not only to decrease hyperuricemia quickly and keep lowering serum uric acid for a long time, but also to improve lipid markers finally.

MP541 CLINICAL FACTORS AND RENAL FUNCTION AT THE START OF DIALYSIS: IMPACT ON MORTALITY IN INCIDENT HEMODIALYSIS PATIENTS

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Introduction and Aims: The knowledge of the barriers that are associated with decreased physical activity (PA) in patients on chronic hemodialysis (PD) may be of

MP542 TESTOSTERONE, RELATION WITH BODY COMPOSITION AND PHYSICAL ACTIVITY IN HEMODIALYSIS PATIENTS

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Introduction and Aims: CKD induces changes in body homeostasis by altering the production of various hormones, including testosterone. Testosterone has anabolic activity by stimulating the production of muscle mass. Low testosterone levels and muscle mass have been associated with increased cardiovascular mortality. Performing physical activity (PA) has mainly beneficial cardiovascular effects. HD dialysis patients have lower physical activity that may be partly related to a decreased muscle mass. The aim of this study was to determine the association between testosterone with body composition and physical activity hemodialysis (HD) patients. Methods: In a cross-sectional study, testosterone levels were measured: serum testosterone levels (performed by Chemiluminescence, reference values: males 241-827 ng/dL; female 14-76 ng/dL); PA with a geonaute onstep- 400 pedometer; body composition (BC) using bioelectrical impedance measures, and general nutritional and inflammatory biochemical parameters. For the measure of PA patients were asked to use the pedometer during 6 days (2 HD days, 2 non-HD midweek days and 2 non-HD weekend days). Patients with physical limitations (amputation), neurological impairment or recent admission were excluded.

Results: Mean Testosterone levels were 332.70 ± 159.72 ng/dl in men and 29.06 ± 22.37 ng/dl in women (33% men and 36% women had levels below the normal range) We found a direct relationship between testosterone levels and age in the male group, this association does not occur in women. Testosterone keep relationship with BC, associating higher testosterone values greater lean mass (p = 0.011) and lower fat mass (p = 0.016). When we correlate testosterone levels with physical activity (controlled by gender) we find that higher testosterone levels are associated with greater physical activity (p = 0.046) in males. This correlation was not found in the female group. Although, a trend towards better nutritional biochemical parameters and reduced inflammation in the group of patients with higher levels of testosterone was evidenced, a significant association was not found.

Conclusions: Testosterone levels are decreased in the dialysis population. Higher testosterone levels are associated with higher lean body mass and greater physical activity in males. There is no relationship between testosterone levels and lean mass in the female group. Studies valuing other hormonal parameters studies are needed in this gender.
primary importance for the nephrologists. Thus we aimed to assess the barriers associated with absent or reduced PA in PCh of a Mediterranean country

**Methods:** Patients were invited to answer to the question “How often do you exercise during your leisure time?” Also, patients included in the study were asked to answer to questions regarding barriers to physical lower than desired. These questions correspond to the following broad categories of barriers to exercise: psychological barriers, physical barriers, lack of time and presence of comorbidities. The barriers investigated were: “I don't want to”, “I have no time”, “fear of getting hurt, too many medical problems, reduced walking ability (defined as a some-a lot of difficulty or not able to walk about 2 or 3 blocks)” (9), fatigue on the dialysis days, fatigue on non-dialysis days, shortness of breath, hip pain, leg pain, feet pain, mood disturb, sadness, anxiety, no exercise partner, no place to exercise, feeling too old, heart disease, chest pain, ulcers on legs and feet,” no one suggested me to exercise” . Participants were asked to answer “yes” or “no”.

**Statistical Analyses**

Statistical analysis was performed by using the Statistical Package for Social Science (SPSS), release 15.0. All data were first analyzed for normality of distribution using the Kolmogorov-Smirnov test of normality. Continuous variables were expressed as mean ± SD, categorical variables displayed as frequencies and the appropriate parametric (Student t-test) or non-parametric (Mann-Whitney U-test or χ²-test) test was used to assess significance of the differences between subgroups. A P value of less than 0.05 was considered statistically significant. A multivariate logistic backward regression model was built utilizing previously described variables significantly associated with the physical activity at the univariate analysis. Effect modification by each covariate was evaluated by testing whether including the interaction term in the multivariate logistic model significantly changed the log likelihood of the model applying stepwise logistic regression. The coefficients obtained from the logistic regression were expressed in terms of odds ratio with 95% confidence intervals.

**Results:** We studied 105 patients. Forty (38.1%) patients reported to never exercise, 10 (9.5%) reported to exercise less than once/week or once/week, 23 (21.9%) two to three times/week, 12 (11.4%) four to five times/week and 20 (19%) daily. Overall, 55 (52.4%) patients reported to exercise more than once a week and were categorized as “regular exercisers” and 50 (47.6%) reported to exercise once a week or less and were categorized as “inactive patients”. At the multivariate analysis, reduced walking ability, fatigue on the non-dialysis days, shortness of breath, and no exercise partner were independently and negatively associated to PA. The same results were found when the reduced model of the multivariate logistic regression was built introducing in the model also clinical and laboratory variables.

**Conclusions:** In PCh, fatigue on the non-dialysis days, reduced walking ability, shortness of breath, and no exercise partner are barriers independently associated to decreased PA. The acquisition of new knowledge about the causes and mechanisms that generate these barriers is needed.

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**PNEUMONIA IN MAINTENANCE HEMODIALYSIS PATIENTS: DETECTION RATE OF CAUSATIVE ORGANISMS IN SPUTUM VARIES BY TIME OF SAMPLING AND QUALITY**

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**Introduction and Aims:** Previous studies have demonstrated that almost half the deaths by infection in hemodialysis patients are due to pneumonia. Causative organisms in pneumonia are not defined. We assessed the positive rate of blood and sputum cultures in a cohort of dialysis patients admitted with pneumonia.

**Methods:** We retrospectively enrolled 50 consecutive pneumonia patients on maintenance hemodialysis attending on outpatient clinic at a single department of nephrology between October 2005 and October 2013. Pneumonia was defined by chest computed tomography findings and clinical status. The severity of pneumonia was scored using the pneumonia severity index (PSI) and the presumed causative organisms were identified.

**Results:** Among the 50 subjects, median age was 75 (interquartile range, 68 - 78) years, 70.9% were men, 32.4% had chronic obstructive pulmonary disease, and 58.7% had diabetes mellitus. Almost all patients (93.5%) were class IV or V on PSI. Blood cultures were all negative, but 38.0% of sputum cultures were positive. The most common pathogens were Staphylococcus aureus (14.0%), Pseudomonas aeruginosa (8.0%), Escherichia coli (4.0%), and Chlamydia pneumonia (4.0%). The detection rate of causative organisms contribute was related to quality of sputum (group 4 and 5 of Geckler classification) and was 63.5% in samples collected before dialysis on a day of dialysis, and 36.8% in samples collected on the day before a day of dialysis. In contrast, the detection rate was low (18.5%) when sample were collected after dialysis on a day of dialysis.

**Conclusions:** In hemodialysis patients, the detection rate of causative organisms is elevated if sputum samples are collected before undergoing dialysis on a day of dialysis. Prospective confirmation in a larger number of patients is warranted.

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**IMPACT OF DIFFERENT TREATMENTS OF SECONDARY HYPERPARATHYROIDISM (PARACALCITOL, ALFALCICOL, CINACALCET + LOW-DOSE ALFALCICOL, CINACALCET + PARACALCITOL) ON FGF-23, TESTOSTERONE, PTH, Ca AND P IN DIALYSIS PATIENTS**

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**Introduction and Aims:** It is known that FGF 23, PTH, P and Ca directly correlate with mortality, but testosterone inversely. Application of vitamin D analogs increase Ca, P, FGF 23 and testosterone, on the contrary cinacalcet can reduce FGF23, Ca, P and testosterone. Both medicines decrease PTH.

**Methods:** We analysed 75 hemodialysis patients. The enrolled subjects were with IPTH >300 pg/ml. In groups which were treated vitamin D analogs serum P was less than 1.8 mmol/l. We selected 4 groups of dialysis patients with secondary hyperparathyroidism who were treated for up to 6 months: Group 1: 20 patients were treated alfacalcidol in the stable dose of 0.5µg/day; Group 2: 20 patients were treated with cinacalcet in the stable dose of 30.0 mg/day and alfacalcidol in the dose of 0.25 µg/day; Group 3: patients (n=15) were treated paricalcitol in the stable dose of 0.25 µg/day; Group 4: patients(n=15) were treated paricalcitol in the stable dose of 1.5 µg/day. Groups were matched for age, gender, time on dialysis. The control group consisted of 15 healthy subjects.

**Results:** Initial PTH was not significantly different in patients (657.3±284.5; 678.9±276.2; 647.4±271.2 and 582.7±284.9 pg/ml, respectively). After 6 months PTH significantly decreased (p<0.01) in all groups, but more considerably in 3 group (-62.4%). In 1 group (-8%), in 2 group (-15.9%), in 4 group (-39%). Ca and P significantly increased in groups which were treated with alfacalcidol or paricalcitol, without cinacalcet. P decreased in 2 group (cinacalcet + alfacalcidol), but did not change in 3 group (cinacalcet + paricalcitol). FGF 23 significantly decreased only in groups which were treated with cinacalcet. FGF 23 even increased in 1 group and did not change in 4 group . Testosterone did not significantly change in all groups. PTH, Ca, P, testosterone were normal values and FGF 23 was minimal amount (4.2±2.0 pg/ml) in control group. Parameters of patients were shown in table 1. (note * p<0.01 between 0 and 6 months).

**Conclusions:** The use only alfacalcidol or paricalcitol in the treatment of secondary hyperparathyroidism is associated with increased P, Ca. Alfalcicidol on its own even increased the level of FGF 23. Cinacalcet makes it possible to decrease FGF23 level, even if used in combination with alfacalcidol or paricalcitol. The treatment effect on P, Ca in combination therapy depends on the dose of vitamin D analog. Testosterone values did not change in treatment either with cinacalcit or vitamin D analog.
Diagnosis and follow-up of HCV infection in hemodialysis patients and renal transplant recipients: HCV core antigen and IgM anti-HCV.

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Introduction and Aims: Hepatitis C Virus (HCV) infection has a great impact on the prognosis of patients affected by end-stage renal disease. The prevalence of HCV infection in hemodialysis (HD) patients is still significantly higher than the one observed in general population. In this group, the infection bears a strong effect on both mortality and morbidity. Similar considerations can be made for renal transplant (RTx) recipients: in addition to an increased mortality risk due to progressive liver damage, cardiovascular disease, infections and neoplasms, HCV infection is a negative prognostic marker of graft function and survival. Indeed, infected RTx patients have a higher relative risk for post-transplant glucocorticoid use and chronic allograft nephropathy. To date, laboratory confirmation of HCV infection is based on two different principles: immuno-enzymatic assays (EIA), which can be considered as a screening test that identifies anti-HCV antibodies in the patients serum, and molecular biology techniques, based on viral RNA quantification, which are employed as confirmatory and follow-up assays. The latter methods are considered as the gold standard due to their high accuracy, but they are burdened by some negative aspects, such as the high cost, the elevated turnaround time, and the need for dedicated personnel and space.

Methods: The primary aim of the study was to determine the accuracy of two EIA for the quantification of HCV core antigen (HCVAg ARCHITECT®) and IgM anti-HCV (DIA.PRO HCV IgM), employed as a confirmatory test in two cohorts of HCV-positive patients (HD and RTx). We analyzed 32 serum samples from HD patients (Group A) from three different hemodialysis facilities, and 11 samples from RTx recipients (Group B). We compared the obtained results with a standardized molecular biology method, a real-time PCR (COBAS® TaqMan® HCV Test, v2.0).

Results: The HCVAg ARCHITECT® immunoassay, used as a confirmatory test for the infection, showed a perfect sensitivity (100%) in both of the two groups of patients, while the specificity was estimated to be 85.7% and 66.7% in Group A and Group B respectively. The DIA.PRO HCV IgM immunoassay showed a low concordance with the viremia, with a sensitivity of 100% and 85.7%, and a specificity of 75% and 50% in the two groups respectively (Table 1). Owing to the high sensitivity of both assays in Group A, we considered as positive only the samples which tested reactive for both tests: in HD patients the accuracy of this combined test reached 100%. We also found a strong correlation of the HCV core antigen and the HCV-RNA levels in both Group A (R = 0.77) and Group B (R = 0.85) [Figure 1].

Conclusions: Both of the assays showed a good accuracy as confirmatory tests for HCV infection. In particular, HCVAg ARCHITECT® proved to be a reliable marker of viral replication, with an extremely good correlation with the viremia in both of the studied cohorts. Therefore, these assays could be a useful complementary tool to the gold-standard diagnostics for HCV infection.

Fatigue is associated with serum interleukin-6 levels and symptoms of depression in patients on chronic hemodialysis

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Introduction and Aims: Recently, we have shown that depression, anxiety, number and severity of comorbidities and IL-6 levels were significantly correlated with fatigue and that the presence of both anorexia and fatigue in chronic HD patients was associated with significantly higher levels of plasma IL-6 in end-stage renal disease patients receiving chronic hemodialysis. The present study aimed at evaluating in a larger population of chronic HD patients the possible correlation between fatigue and markers of inflammation such as serum levels of Interleukin-6 (IL-6) and C-reactive protein (CRP).

Methods: All prevalent patients affected by end-stage renal failure who received chronic hemodialysis at the Hemodialysis Unit of the Università Cattolica del Sacro Cuore of Rome, Italy between January 2009 and July 2013, were eligible for inclusion in the study. The following demographic, clinical, and laboratory data were recorded for each patient at the moment of the inclusion in the study: age, gender, underlying renal disease, hemodialysis regimen, duration on dialysis, type and number of comorbidities, symptom of depression and anxiety (through the Beck Depression Inventory and the Hamilton Anxiety Rating Scale), cognitive function (through the Mini Mental Status Examination), time of recovery after the hemodialytic session (TIRD), disability though the determination of daily activities through the ADL (activities of daily living) and the IADL (instrumental activities of daily living), weight, height, BMI. In addition the following laboratory parameters were measured: haemoglobin, hematocrit, serum albumin, creatinine, urea, calcium, phosphorus, C-reactive protein, Interleukin-6 (IL-6), parathyroid hormone (PTH), vitamin D, fibrinogen, ferritin.

Results: A total of 124 patients were screened for study participation. Of these, 14 were excluded because of dialytic vintages <6 months, 6 for inability to answer to the questionnaires for deafness or reading problems and 4 for previous diagnosis of psychotic or neurological disorders. Forty three (43%) patients constituted the fatigued group and 57 (57%) the non-fatigued group. The age of fatigued patients was significantly higher than that of non-fatigued ones. The scores of Charlson Comorbidity Index, BDI and HARS and the TIRD were significantly higher in fatigued patients than in non-fatigued ones. Conversely, the scores of ADL, IADL and MMSE were significantly lower in fatigued than in non-fatigued ones. With regard to laboratory parameters, serum IL-6 levels (pg/ml) were significantly higher in the fatigued group (5.1±3.4) than in the non-fatigued one (1.6±1.5; p<0.001), whereas serum albumin and creatinine levels were significantly lower. At the univariate analysis, the score of the SF-36 Vitality subscale was correlated to age, dialytic age, Charlson comorbidity Index, BDI, BDI, HARS, MMSE, TIRD, ADL, IADL, serum urea, creatinine, albumin and IL-6 levels. At the multivariate analysis, BDI (correlation coefficient: -1.227 ± 0.372; p=0.003) and serum IL-6 levels (correlation coefficient: 0.357; p=0.001) were independently associated to the score of the SF-36 Vitality subscale.

Conclusions: In summary, we found that fatigue was significantly associated with symptoms of depression and serum IL-6 levels in end-stage renal disease patients receiving chronic hemodialysis. The findings of this exploratory analysis should help generate additional longitudinal studies to possibly demonstrate the causative role of chronic inflammation and depression in the onset of fatigue in end-stage renal patients receiving chronic hemodialysis.

Clinical and laboratory factors associated with frequency of intradialytic hypotension in chronic hemodialysis patients

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Introduction and Aims: Intradialytic hypotension (IDH) is a common complication of hemodialysis with an adverse effect on survival rates and quality of life. The aim of this study was to assess the influence of clinical and laboratory factors on IDH frequency.

Methods: We included 102 patients with CKD stage 5 receiving chronic hemodialysis for at least 12 months. We analyzed intradialytic blood pressure profiles, clinical and laboratory data. IDH episodes were defined according to EBPGR criteria (2007). Frequency of IDH was estimated as a number of IDH episodes per month. All clinical and laboratory parameters were taken as average during a month of follow-up. Spearman’s correlation coefficients (rs) were calculated to assess the relationship between the frequency of IDH and clinical data.

Results: Average number of IDH episodes per month was 2.49±0.34. IDH frequency correlated negatively with: body mass index (rs = -0.234; p=0.039), average predialytic systolic (rs = -0.399; p=0.001) and diastolic (rs = -0.358; p=0.001) blood pressure, average postdialytic systolic (rs = -0.691; p=0.001) and diastolic (rs = -0.650; p=0.001) blood pressure and left ventricular mass index (rs = -0.302; p=0.023). IDH frequency correlated positively with: average serum potassium level (rs = 0.289; p=0.014), interdialytic weight gain/dry weight ratio (rs = 0.223; p=0.049) and ultrafiltration volume/dry weight ratio (rs=0.222, p=0.047).

Conclusions: Our study demonstrated clinical and laboratory factors associated with frequency of IDH in chronic hemodialysis patients. These findings should be used for further individualization of IDH prevention and treatment.

Predictors of insulin resistance and the impact of vitamin D supplement in chronic hemodialysis (HD) patients

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Abstracts

Nephrology Dialysis Transplantation

Volume 29 | Supplement 3 | May 2014
Introduction and Aims: Vitamin D deficiency is associated with insulin resistance while both are with increased cardiovascular risk and prevalent in chronic HD patients. This aim of this study is to investigate the predictors of insulin resistance as well as the impact of vitamin D supplement on insulin resistance in chronic HD patients.

Methods: We conducted a cross-sectional, observational study and collected the demographic, clinical, laboratory, and the measured Homeostasis Model Assessment–Insulin Resistance (HOMA-IR) data in chronic HD patients (aged ≥ 16 years).

Results: Among the enrolled 110 patients, 35 (32%) were type 2 diabetes subjects. In all chronic HD patients, male, higher triglycerides (TG) and hemoglobin were associated with higher log-HOMA-IR. In non-diabetic chronic HD patients, higher Hba1c, TG, and creatinine were associated with higher HOMA-IR. Vitamin D supplement was associated with lower HOMA-IR in non-diabetic patients. (P = 0.002)

Conclusions: TG seems to be the constant predictor of HOMA-IR in all or non-diabetic chronic HD patients. Vitamin D supplement was associated with lower HOMA-IR only in non-diabetic chronic HD patients.

**MP550**

FRAILTY IS SIGNIFICANTLY RELATED TO PHYSICAL PERFORMANCE FUNCTION IN MAINTENANCE HEMODIALYSIS PATIENTS

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Introduction and Aims: Frailty is very common concerns in maintenance hemodialysis (MHD) patients, which is associated with disability, hospitalization and mortality. However, there is only few study reporting the relation between frailty and physical performance function in this population.

Methods: This ongoing study has recruited ambulatory MHD patients aged ≥ 20 years (y) old on MHD ≥8 months, without hospitalization history for the previous 3 months. We adopted frailty phenotype composed of the following components: (1) unintentional weight loss (more than 4.5 kg or 5% of the previous body weight for the last 1 y), (2) physical inactivity, (3) RAND-36 physical function (PF) scale <75 and (4) total energy expenditure (TEE) <2000 kcal/y. The frailty index (FI) was calculated as the fraction of components that a patient scored as 2 points and other components as 1 point each. Those with or more points were considered as “frail”. Short physical performance battery (SPPB), sit to stand test (STS30, the number of sit to stand cycles completed for 30 seconds), 6 minute walk (6MWT, distance in meters measured for 6 minutes) and timed up and go (TUG, seconds) tests were measured the day after hemodialysis treatment. Demographic and laboratory data were obtained by review of medical records.

Results: Forty three patients evaluated were 57±11.6 years of age (mean±SD) for MHD for 5.2±5.4 years (y); 49.2% were male. Frail patients were 28.6% (18/63), who were more likely to be older (64.4±10.4 vs. 54.8±10.9; P = 0.05), diabetes (DM) (72.2 vs. 44.4%; P = 0.05), have higher Charlson–Comorbidity Index (CCI) (6.9±1.9 vs. 5.0±2.1; P = 0.001) and lower 25-hydroxyvitamin D (25OHD) level (ng/ml) (9.6±4.9 vs. 13.4±8.5; P = 0.05). Frailty was significantly associated with lower SPPB scores (10.2±1.4 vs. 11.4±1.0; P = 0.001), lower STS30 (14.3±3.9 vs. 19.5±5.4; P = 0.001), lower 6MWT (377.9±92.2 vs. 493.7±76.3; P = 0.001) and longer TUG (s) (8.9±1.7 vs. 6.8±1.7; P = 0.001). In multivariate analysis, SPPB, STS30, 6MWT and TUG showed significant association (odds ratio (OR): 0.45; 95% confidence interval (CI): 0.25–0.85; P = 0.03, OR: 0.75; 95% CI: 0.51–1.10; P = 0.39, OR: 1.17 (1.08–2.59); respectively) with frailty, after adjustment for age, gender, DM, CCI, levels of hemoglobin, albumin and 25OHD.

Conclusions: Frailty is very common even in relatively stable MHD patients. Frailty phenotype is useful to reflect impaired physical performance function in MHD population.

**MP551**

ASSOCIATION BETWEEN HIGH-DENSITY LIPOPROTEINS, BETA2-MICROGLOBULIN AND INFLAMMATION IN PATIENTS ON RENAL REPLACEMENT THERAPIES

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Introduction and Aims: High-density lipoprotein (HDL) protects against atherosclerotic plaque formation. Beta2-microglobulin (beta2M) is accumulated in the circulation of dialysis patients. The present study examined the relationship between HDL serum concentrations, beta2M and markers of inflammation in patients on renal replacement therapies.

Methods: We studied 96 dialyzed patients, 62 males and 34 females, on mean age 62.1 ± 14.27 years old and 24 healthy controls. The treatment modalities which were applied were: regular hemodialysis (HD, n=34), predilution hemofiltration (HDF, n=42) and peritoneal dialysis (PD, n=20). Dialysis adequacy was defined by Kt/V for urea and serum bicarbonate levels were measured in gas machine. Cholesterol, triglycerides, HDL and LDL serum concentrations were biochemically measured. hsCRP serum concentrations were measured by ELISA. Beta2M and leptin serum concentrations were measured by radioimmunoassays.

Results: The patients presented increased beta2M, hsCRP, leptin and triglycerides than control group, but HDL exhibited significant reduction (P = 0.05). The patients on PD had significantly higher serum bicarbonate levels than other groups of patient (P = 0.05). HDL positively associated with Kt/V, presented negative correlation with beta2M (r = -0.291, p = 0.004). Suppuratively, the patients with high beta2M values (higher than the median value = 26 mg/L) simultaneously had low HDL serum concentrations (lower than the mean value = 38.8 mg/dL) (x2 = 9.379, p = 0.004). Beta2M was positively associated with hsCRP (r = 0.257, p = 0.01), which, in the meantime, was inversely associated with serum bicarbonate levels (r = -0.232, p = 0.05), but positively associated with leptin concentrations (P = 0.341, p = 0.005).

Conclusions: The low HDL was associated with increased beta2M concentrations in patients on renal replacement therapies. The HDL reduction was lower in PD patients compared to hemodilution modalities patients. The acidosis state influenced the inflammatory environment and dialysis adequacy was positively correlated to HDL serum concentrations.

**MP552**

LOW ACTIVITIES OF DAILY LIVING (ADL) RELATES TO UNSTABLE HEMODYNAMICS IN DIALYSIS PATIENTS

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Introduction and Aims: In hemodialysis (HD) patients, hemodynamics is unstable by ultrafiltration and extracorporeal circulation during dialysis therapy. It was easily considered that improvements of activities of daily living (ADL) in dialysis patients affect beneficially on hemodynamics during the HD therapy, however details are still unclear. To clarify this issue, we investigated the relation between ADL of HD patients and hemodynamical or biochemical data at the initial time and one year after the initiation of HD.

Methods: We employed retrospectively 47 HD patients, treated regularly 4 to 5 hours HD therapy one time a week (64.1±1.5 years, mean age ± SD). They were divided into three groups. 1) wheelchair group (n=9); patients in need of a wheelchair when moving, 2) DM group; patients with diabetes mellitus and a free standing ADL (n=16), 3) NDM; patients with non-diabetes and a free standing ADL (n=22). A decline in ADL in the wheelchair group was caused by cerebrovascular diseases, diabetic neuropathy and disuse syndrome. General condition of all subjects was basically stable and continued the same dialysis method during the observation period. Following data were obtained at the start of dialysis beginning of the week: systolic blood pressure decrease calculated by a subtraction of 1) minus 2) (p<0.05). While, there were no significant differences on ultrafiltration volume in NDM group (22.5±14.6 mmHg) and the wheelchair group (69.6±35.3 mmHg). We conducted a cross-sectional, observational study and collected the demographic, clinical, laboratory, and the measured Homeostasis Model Assessment–Insulin Resistance (HOMA-IR) data in chronic HD patients (aged ≥ 16 years). There were no significant differences among the three groups at the initial dialysis therapy. However, that of the wheelchair group decreased one year after the initiation of dialysis therapy (p<0.05). While, there were no differences among the three groups at the initiation of dialysis therapy. On the contrary, Cre level of the wheelchair group was significantly lower than that of the other two groups at initial dialysis therapy (p<0.05), however the difference had disappeared after one year. There were no differences about BUN levels among the three groups during the observation period. On the contrary, Cre level of the wheelchair group was significantly decreased (8.2 ± 2.4 mg/dL) compared to that in DM group (653 ± 572 mL/day) and NDM group (658 ± 462 mL/day) one year after the initiation of dialysis therapy (p<0.05). However, the difference had disappeared after one year. There were no differences among the three groups at the initiation of dialysis therapy (p<0.05). While, there were no differences among the three groups at the initiation of dialysis therapy. On the contrary, Cre level of the wheelchair group was significantly decreased (8.2 ± 2.4 mg/dL) compared to that in DM group (653 ± 572 mL/day) and NDM group (658 ± 462 mL/day) one year after the initiation of dialysis therapy (p<0.05). While, there were no differences among the three groups at the initiation of dialysis therapy. On the contrary, Cre level of the wheelchair group was significantly decreased (8.2 ± 2.4 mg/dL) compared to that in DM group (653 ± 572 mL/day) and NDM group (658 ± 462 mL/day) one year after the initiation of dialysis therapy (p<0.05).