and to determine the relationship between these analytes in the mentioned groups of patients.

Materials and methods: The study included 43 children with asthma, 20 with allergic rhinitis, 20 with atopic dermatitis and 30 healthy children as controls. ECP and total IgE serum values were determined using an automated fluorescence enzyme immunoassay (FEIA) on an UniCAP R 100 immunoanalyzer.

Results: Although the ECP concentration median was highest in the group of asthmatic patients (15.3 µg/L) and lowest in the group of atopic dermatitis patients (10.4 µg/L), there was no significant difference among the groups of patients, while total IgE concentration was higher in the groups of patients with asthma and allergic rhinitis (P < 0.001). ECP and total IgE concentrations were significantly higher in patients with asthma (P < 0.001 for both) and allergic rhinitis (P = 0.018; P < 0.001) compared to controls. Weak positive correlation between these analytes was found in asthmatic patients (r = 0.478, P = 0.001).

Conclusion: The results indicate that ECP values can be used as a marker of inflammation in asthmatic patients and those with allergic rhinitis. ECP and total IgE concentrations were weakly correlated only in asthmatic patients.

P12 – Kidney diseases

P12-01

The performance of compensated serum creatinine in pediatric samples

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Background: According to current recommendation serum creatinine measurement in adults should be performed by compensated Jaffe method. The enzymatic method is recommended for pediatric population but high commercial price is limiting factor for its implementation in routine practice. We estimated proportion of compensated serum creatinine concentration below measuring range in children; following to method comparison analysis of compensate Jaffe *vs*. enzymatic creatinine method.

Materials and methods: A total of 58 pediatric serum samples were included in the study (median age 44 months, age range 2 days-18 years). The measurement of creatinine by enzymatic method (measuring range 0-2700 µmol/L) was done on the Cobas c311 analyzer (Roche Diagnostic) and by compensated Jaffe method (measuring range 18-2200 µmol/L) on the Olympus AU400 analyzer (Beckman Coulter).

Results: In 36 out of 58 samples (group 1, median age 66 months, age range 2 days-18 years) concentrations of compensated creatinine were in measuring range (median 34 µmol/L, range 18-195 µmol/L) but it was not a case in 22 out of 58 samples (group 2, median age 12 months, age range 15 days-6 years) with compensated creatinine concentrations below measuring range. There was a significant difference between two groups regarding age (t-test, P < 0.001). The Passing and Bablok regression analysis showed (N = 36) intercept -4.42 (95%CI 6.03 to -3.00), slope 1.02 (95%CI 1.00 to 1.06); r = 0.99; range tested 18-195 µmol/L.

Conclusion: A high proportion of creatinine concentrations under measuring range was unacceptable, concerning younger children. Method comparison analysis revealed underestimation of pediatric serum creatinine by compensated Jaffe method.

P12-02

The impact of different methods of creatinine measurements on MELD scoring system

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Background: The Model for End-Stage Liver Disease (MELD) scoring system is used to prioritize patients for liver transplantation by their disease severity based on three laboratory parameters: serum creatinine and bilirubin concentrations and INR prothrombin ratio. The aim of this study was to investigate impact of two different creatinine methods on MELD score.

Materials and methods: We assessed 40 blood samples obtained from 32 patients listed for liver transplantation. Serum creatinine concentrations was measured by the kinetic Jaffe method (Beckman Coulter OSR6178) traceable to NIST SRM 909b level 2 and enzymatic method (Beckman Coulter OSR61204) traceable to the IDMS method and SRM 967. The MELD score was calculated according to the formula currently in use by Eurotransplant. Patients are stratified in a descening order starting with the highest MELD.

Results: There was a significant difference in serum creatinine among Jaffe and enzymatic methods: median 93 (range 67-744) *vs.* 73,5 (range 49-747) μmol/L, respectively. The variation in creatinine measurements resulted in differences up to 2 points in a single patients. When the enzymatic methods was used instead of Jaffe methods, MELD scores were unchanged in 23 cases wheras in 17 cases MELD scores decreased by 1-2 point.

Conclusion: Observed variability in the assessment of the MELD score due to methodological variation in serum creatinine measurement may not significantly alter prognosis or have clinical consequences but may affect prioritization for liver transplantation. For this reason standardization of creatinine measurements using specific enzymatic method traceable to SRM 967 is of most importance.

P12-03

"Screening" for chronic renal disease in a Portuguese population

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Background: According to the "Chronic Renal Disease (CRD) national registration" in terms of renal replacement therapy, the incidence of patients on dialysis has been increasing in Portugal, in the last decade. However, there is no precise information about prevalence of CRD at national level. We have conducted a study to assess the extent of the problem in the population of Matosinhos Local Healthcare Unit (ULSM).

Materials and methods: Evaluation of glomerular filtration rate (GFR) with MDRD-4 formula, in ULSM population with scheduled medical consultation between Feb/2010 and Feb 2011. Patients from hospitalization and emergency were excluded and acute renal failure cases were avoided. Patients with at least two 60 mL/h/m^2 measuring of GFR in a 3 months minimum interval.

Results: Evaluation of renal function of 44869 patients (29 were excluded due to incomplete data), average: 54 years (minimum 12; maximum 99); M: 41.9% / F: 58.1%; 3949 had GFR < 60 in at least one measuring. 1547 patients met the CRD criteria, which corresponds to 3.4% prevalence. From those 74.6% are in stage 3 (prevalence = 2.57%); 20.6% in stage 4 (prevalence = 0.71%) and 4.6% in stage 5 (prevalence = 0.16%). 38.4% of the CRD population are diabetics.

The global prevalence of CRD seems slightly inferior to the described in European studies. Diabetes mellitus is still a major risk factor for these individuals.

Conclusions: The introduction of the analytical protocol for calculating GFR proved to be a good CRD screening method, like in most European countries. It helps prevent CRD and reduce the cardiovascular risk.

P12-04

Osteoporosis and kidney impairment in postmenopausal women

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Background: Both osteoporosis and kidney impairment become more prevalent with age. The aim of this study was to investigate the prevalence of compromised kidney function in women with osteopenia and osteoporosis, and to assess the agreement between GFR estimated with creatinine clearance (CrCl) and the Cockcroft-Gault equation (CG).

Materials and methods: We studied postmenopausal women, divided according to T-scores into two groups: normal/osteopenic and osteoporotic. They were further divided, using CrCl and CG, into groups depending on chronic kidney disease. Serum calcium, phosphorus and creatinine, 24hour-urine calcium and creatinine were determined. Estimated GFRs were calculated using the CrCl and CG. Informations about age, height, weight were collected.

Results: 190 postmenopausal women (median age 67 (45-88) years) were divided into subgroups: normal/osteopenia (N = 143; 75%) and osteoporosis (N = 47; 25%). Differences were found comparing age, weight, urine creatinine and eGFR with the CG. The prevalence of kidney impairment (GFR < 60 mL/min/1.73 m^2) according to CrCl and CG in normal/osteopenic women was 17% and 19%, respectively; and in the osteoporosis group 34% and 36%, respectively. The prevalence was higher in the osteoporosis group (P = 0.029 for CrCl; P = 0.025 for CG). Weighted kappa between CrCl and CG was 0.500, 0.483 and 0.487 in the overall, normal/osteopenia and osteoporosis subgroup, respectively.

Conclusions: Our results showed substantial prevalence of kidney impairment in postmenopausal women with osteoporosis. This must be taken into account when considering the prescription of medications with kidney clearance (like bisphosphonates). The kappa statistics classified the agreement between CrCl and CG as moderate.

P12-05

Iron content of serum ferritin: a biomarker of iron storage

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Introduction: Ferritin is an iron-storage protein. The serum ferritin concentration reflects the amount of iron in the human body. Serum ferritin concentration is non-specifically elevated in the presence of infection, inflammation, liver disease and malignancies. Iron content of serum ferritin (ICF) isn't influenced by inflammation and ICF represents an iron status biomarker regardless of inflammation. Thereafter, ICF can be confidently used to assess a functional iron deficiency in patients undergoing hemodialysis.

Materials and methods: Fifty-five hemodialysed patients that had been treated with Ferrlecit and/

or erythropoietin past three months were included in this clinical trial. Ferritin, transferrin, serum non-ferritin iron and immaturity reticulocytes fraction index (IRF) were measured by standard methods. Total iron concentration was measured by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). ICF was calculated from total iron, non-ferritin iron and ferritin concentration.

Results: There were significant positive association between logarithm-transformed ICF with IRF (rP = 0.377; P = 0.005) and transferrin (rP = 0.555; P < 0.001). ICF median (14.1 µmol/mg) was below reference range.

Conclusion: Transferrin concentration firstly depends on nutritional status, and ferritin concentration firstly depends on inflammation rather than iron status. Concussively, ferritin and/or transferrin don't represent confidential biochemical predictors of iron deficiency in hemodialysed patients. Regardless of inflammation, ICF can confidently predict functional iron availability for erythropoiesis. ICF represents clinically relevant biomarker which reflects the true iron needs and can be safely used to optimize iron supplementation for correcting iron deficiency in patients undergoing hemodialysis.

P12-06

Nitric oxide and homocysteine in patients with chronic kidney disease

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Background: Nitric oxide (NO) and homocycteine have an important role in the complex pathogenesis of chronic kidney disease (CKD).

Material and methods: The levels of NO (spectrophotometric assay, Griess reaction) and homocysteine (chemiluminescence microparticle immunoassay) were determined in plasma/serum and/or urine of patients with CKD (N = 101) and of the control subjects (N = 51). The total number of patients with CKD was divided into subgroups according to: a) the primary cause of impaired renal function, b) the National Kidney Foundation guidelines, and c) the intensity of proteinuria.

Results: The results show that serum concentrations of NO (median 9.20 µmol/L), and homocysteine in plasma (median 16.95 µmol/L) in patients with CKD was significantly higher (P = 0.009, P < 0.001) compared with the control group (median 7.27 µmol/L and 13.04 µmol/L, respectively). The concentration of homocysteine in plasma showed a relatively good diagnostic sensitivity (60.0 to 89.5%) and diagnostic specificity (63.4 to 90.2%) in distinguishing between groups of patients with CKD and a group of control subjects.

Conclusions: Results of logistic regression showed that the increase of both NO level and homocysteine level for 2.72 µmol/L raises the possibility for development of CKD (2 times for NO: OR = 2.021, or 6.5 times for homocysteine: OR = 6.512). Moreover, the increase of NO level in serum and increase of homocysteine level in plasma is a risk factor for progression to higher stages of CKD (P = 0.002 and P < 0.05, respectively).

P12-07

Estimated glomerular filtration rate, hypertension and blood mercury in a hospital working population

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Background: Blood mercury has been associated with nephrotoxicity and cardiovascular disease among the general population. The aim of this study is to evaluate the association between blood mercury concentrations and estimated glomerular filtration rate (eGFR) and hypertension in a hospital working population.

Material and methods: We recruited 395 employees (64 men and 331 women) who were given the EMA® exposure questionnaire. Blood mercury concentration (µg/L) was measured by atomic absorption spectrometry and thermal decomposition amalgamation. Serum selenium concentration (µg/L) was measured by electrothermal atomic absorption spectrometry. eGFR was assessed using the abbreviated MDRD formula (Levey et al. 2000).

Results: The median of blood mercury was 8.00 µg/L (IQR: 5.20-11.60) and the mean of eGFR was 74.44 mL/min/l.73 m² (SD: 10.29). A statistically significant correlation was found between blood mercury and the eGFR (r = -0.127, P = 0.014). This significant correlation was observed in women (r = -0.109; P = 0.05) but not in men. In order to explore possible hidden kidney disease we used a cutoff of 60 mL/min/l.73 m² for eGFR and a cutoff of 5.8 µg/L for mercury and no significant differences were observed. A positive correlation between eGFR and selenium/mercury ratio was found (r = 0.11; P = 0.034). This significant correlation was seen in men (r = 0.255; P = 0.049) but not in women. No differences were observed between hypertension and blood mercury or with the selenium/mercury ratio.

Conclusions: The association between eGFR and mercury is different when considering the selenium status. It is necessary to consider the interactions between these elements in order to evaluate mercury toxicity.

P12-08

Cadmium, estimated glomerular filtration rate and hypertension in a hospital working population

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Background: Low cadmium levels (0.43 µg/L) have been associated with nephrotoxicity and cardiovascular disease among the general population. The aim of this study is to evaluate the association between blood cadmium concentrations with estimated glomerular filtration rate (eGFR) and hypertension in a hospital working population.

Material and methods: We recruited 395 employees (64 men and 331 women) who were given the PESA® exposure questionnaire. Blood cadmium was measured by electrothermal atomic absorption spectrometry. eGFR was assessed using the abbreviated MDRD formula (Levey et al. 2000): eGFR [mL/min/l.73 m²] = 186 × (Serum creatinine [mg/dL])-1.154 × (Age [y]) 0.203 (× 0.742 if female).

Results: The median of blood cadmium was 0.29 µg/L (IQR:0.18-0.50) and the mean of eGFR was 74.44 mL/min/l.73 m² (SD:10.29). A statistically significant correlation was found between blood cadmium and the eGFR (r = -0.176, P = 0.001). This significant correlation was also observed in men (r = -0.301; P = 0.019) and women (r = -0.147; P = 0.009). In order to explore possible hidden kidney disease we used an eGFR cutoff of 60 mL/min/l.73 m² and a cadmium cutoff of 0.43 µg/L and no significant differences were found. In connection

with hypertension, we found no significant differences between blood cadmium concentrations and hypertension were found.

Conclusions: The association found between eGFR and cadmium levels in men as well as in women supports the role of cadmium in kidney disease. However, using a cutoff of 60 mL/min/l.73 m² we cannot confirm this correlation, probably due to the low number of events under the cutoff used.

P12-09

uNGAL in deceased donors as a marker of early kidney transplant injury

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Background: The standard approach to the selection of deceased donors by assessment of urine output and serum creatinine levels do not allow to predict delayed graft function (DGF) or slow GF.

Materials and methods: We analyzed the association between the concentration of uNGAL and renal graft function (RGF) in early postoperative period in deceased donors with brain death. Urine was collected in 25 deceased donors and analyzed using Architect.

Results: DGF was diagnosed in 10% and SGF in 6% kidney recipients. All patients were devided into 2 groups according to uNGAL concentrations. 1st group - 26 recipients that obtained renal graft from deceased donors with low NGAL concentration (≤ 18 ng/mL), the 2nd - with high NGAL(≥ 18 ng/mL). There were no significant differences in mean donor age, sex ratio (male/female), time of cold storage and cause of death in these groups. A

comparative analysis showed that delayed or SGF occured in the 1st group in 11.5% (3/26) patients, and in the 2nd group-21.7% (5/23) patients respectively. RGF was significantly better in the 1st recipients group: creatinine 117.4 ± 25.5 mmol/L, eGFR using MDRD 78.4 ± 29.5 mL/min, the 2nd recipients groups: creatinine 141.4 ± 72.4 mmol/L and eGFR-68.9 ± 20.1 mL/min (P < 0.05) 1 month after the transplantation.

Conclusion: The study showed that uNGAL level in deceased donor with brain death can be used as a biomarker for prediction of RGF in early postoperative period.

P12-10

Low-grade inflammation and iron metabolism in chronic kidney disease (CKD) patients

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Background: Patients with CKD are exposed to persistent low-grade inflammation. Increased level of proinflammatory cytokines cause cellular iron retention and repress iron efflux from sites of main iron flow into the blood reducing thus iron availability and contributing to development of anemia in CKD patients. This study aimed to assess relationship between indicators of inflammation and routine biochemical markers of iron metabolism as well as hematological indicators of iron availability in group of HD patients with low-grade inflammation (defined as CRP < 15 mg/L, without clinical manifestation of inflammation).

Materials and methods: The study was conducted in 45 HD patients and 21 healthy subjects. Biochemical markers (serum iron, transferrin, transferrin saturation, ferritin), haematological indexes (%Hypo and CHr) were determined by routine lab-

oratory methods. As inflammatory markers, CRP and hsIL-6 were determined.

Results: Levels of serum CRP [2.9 (0.9-10.9) *vs*. 0.8 (0.4-3.2) mg/L] and IL-6 [5.03 (1.69-10.5 *vs*. 1.20 (0.14-10.55) ng/L] were significantly higher in HD patients compared with control group (P < 0.05). We found a statistically significant (P < 0.05) lower level of serum iron, transferrin, transferrin saturation and higher level of ferritin and %Hypo but there were no significant correlations between CRP/IL-6 and biochemical markers of iron status or hematological indexes in HD group.

Conclusions: Parameters of iron metabolism are changed but inflammation indicators do not correlate with parameters of iron metabolism in our studied group. Since levels of serum inflammatory markers are subjected to a substantial variability over time repeated versus single measurements in a future studies could give a more valuable information about examined relationship.

P12-11

Cystatin C in early diagnosis of contrast-induced acute kidney injury

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Objective: Contrast-induced acute kidney injury (AKI) may take place in some patients after percutaneous coronary interventions and diagnostic procedures. Early diagnosis allows beginning the treatment in time and preventing severe renal insufficiency. Recent data showed cystatin C (CysC) as useful marker in AKI, but less information is about the contrast-induced one.

Materials and methods: The level of serum creatinine (Cr) and CysC was measured before and after 18-20 h of contrast administration in 30 patients, admitted for coronary angiography and/or balloon angioplasty in university clinic. All patients

had risk factors but not confirmed kidney injury; 28 men and 2 women, 63.0 ± 9.9 ears old. CysC was measured by immunoturbidimetry method (KON-ELAB-20 analyser, Alfresa kit, Japan). Glomerular filtration rate (GFR) was calculated by MDRD and the equation Levey for cystatin C.

Results: The average increase in cystatin C level in 18-20 hours was 21.0%, and in serum creatinine - 5.5% (P < 0.05). The cystatin C sensitivity was found to be 94%, and specificity - 69% for ACI. Decreasing of the GFRCysC and GFRMDRD also showed significant differences: from 92.4 ± 36.8 to 73.1 ± 26.6 mL/min/1,73 m^2 (20.9%); and from 81.3 ± 19.1 to 77.2 ± 20.7 mL/min/1,73 m^2 (5.0%), respectively (P < 0.05).

Conclusion: Cystatin C proved to be an early marker in interventional cardiology and may be used for the diagnosis of contrast-induced acute kidney injury.

P12-12

Protein:Creatinine ratio in spot urines to predict proteinuria in chronic kidney disease

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Background: The measurement of protein in 24-hr urine collection has been regarded as the gold standard. Spot urine protein:creatinine ratio (PCR) have been widely used as alternative to 24h urine protein (UTP).

Objective: The aim of this study was to examine the ability of PCR to predict urinary 24h protein loss in Nepalese patients with CKD.

Materials and methods: This Study comprises 933 CKD patients (178 had stage 1 CKD, 230, 222, 158, and 145 patients with stage 2, 3, 4, and 5 re-

spectively). Patients were instructed to collect 24h urine and spot urine, both were subjected for determination of UTP and spot PCR.

Results: 24.3%, 25%, 46.8%, 75.7% and 90.1% of stage 1, 2, 3, 4 and 5 CKD respectively had proteinuria as determined by UTP (> 150 mg/day). There was good correlation between UTP and PCR, with correlation coefficients(r) of 0.923. Receiver operator characteristic (ROC) curve analysis showed PCR to be a good predictor of proteinuria, with area of 0.973 (95% CI; 0.961-0.985, P < 0.001). At PCR cutoff of 20 mg/mmol sensitivity of 93% and specificity of 92% can be achieved. The optimal cutoff varies among stage of CKD. The optimal cutoff of PCR is 13.2 mg/mmol in stage 1, 15.1 20 mmol in stage 2, 20.5 mg/mmol in stage 3, 26.1 mg/mmol in stage 4 and 33 mg/mmol in stage 5.

Conclusions: Spot PCR can be a good alternative to 24 hour UTP. By careful choice of cutoffs, PCR can be used in patients with CKD to identify significant proteinuria.

P12-13

Sensitivity and specificity of NGAL in acute pyelonephritis

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Background: Neutrophil gelatinase-associated lipocalin (NGAL) is a small protein expressed in renal tubules where it is considerably induced in ishemic or nephrotoxic injury. A single urine NGAL measurement is proposed test for distinguish acute kidney injury. However, single urine can sometimes be concentrated or diluted, which can influence results of measurements.

Materials and methods: We have analyzed 90 children under 5 years of age, which were admit-

ted to the Pediatric Clinic. 62 of them had acute pyelonephritis, while 28, who represented controls, had cystitis or fever of other etiology. Routine laboratory analyses (CBC, CRP and urine analysis), urine culture, kidney ultrasound and static scintigraphy were also done. Urine NGAL was measured using CMIA method (ARHITECT i1000, ABBOT). We have compared single NGAL concentrations with mg NGAL/g creatinine in same patient. Statistical calculation was performed using Mann-Whitney rank sum test and ROC analyses.

Results: At a cut-off value of 29.1 ng/ml NGAL, sensitivity and specificity for detecting acute pyelonephritis was 0.964 (95% CI, 0.901 to 0.992), while at cut-off value of 120.1 mg NGAL/g creatinine sensitivity and specificity was 0.988 (95% CI, 0.938 to 1.000). Mann-Whitney rank sum test also showed significant difference in median values between the two groups for both measurements (P < 0.001).

Conclusion: Although the values of NGAL / g creatinine were a bit superior, there is no statistical significant difference between measurements.

P12-14

Assessment of the new CKD-EPI formula to estimate CKD in hospitalized patients

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Background:A recent report by the CKD-EPI group describes a new equation to estimate the GFR. The CKD-EPI equation improved the accuracy and precision of results of the current first-choicec MDRD IDMS formula, specially for GFR > 60 mL/min/1.73m^2. A high percentage (28.3%) of hospitalized patients in Spain have deteriorated renal function stages 3-5 as measured by MDRD 4 formula.

Materials and methods:The goal of our study was to compare the estimated GFR by using the

new equation CKD-EPI with MDRD 4 in a wide cohort of hospitalized patients (14,658 adults) and to analyze the impact of the new CKD-EPI formula on the satging of patients with CKD.

Results: The concordance correlation coefficient beetween both formulas was 0.9949 (95% CI: 0.9947 to 0.9951). The distribution of KDOQI stages were: CKD-EPI (1 + 2, 69.9%; 3a, 14.9%; 3b, 9.4%; 4, 4.3%; 5, 1.5%),MDRD (1 + 2, 72.7%; 3a, 14.9%; 3b, 7.7%; 4, 3.4%; 5, 1.2%). Weighted Kappa statistics was 0.861 (very good agreement). Overall, CKD-EPI detected an additional 2.8% of patients with GFR < 60 mL/min/1.73m^2.

Conclusions: CKD-EPI equation reclasified an additional 2.8% of patients to stages of worse GFR

P13 - Lung, liver and gastrointestinal diseases

P13-01

Serum copper concentrations and cardiomyopathy in cystic fibrosis patients

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Background: Copper deficiency has been reported in cardiomyopathy and may occur in patients with intestinal malabsorption, as occurs in cystic fibrosis (CF). The aim of this multicenter study is to evaluate copper in CF patients, who have a high prevalence of cardiomyopathy.

Materials and methods: We studied 123 adult CF patients (63 male and 60 female) with a mean age of 31 (SD: 8.90). Serum copper concentrations were measured using flame atomic absorption spectrometry. The concentration of serum ceruloplasmine was measured by immunonephelometry. In addition, we estimated the Cu/Ceruloplasmine ratio. The left ventricular ejection fraction (LVEF) was determined by a Philips IE33 Echocardiogram. We defined systolic dysfunction as an LVEF less than 55% (Simpson's method).

Results: The mean copper concentration was 131.8 µg/dL (SD: 37.7). The mean serum ceruloplasmine was 34.00 mg/dL (SD: 9.1). The mean Cu/Ceruloplasmine ratio was 3.9 (SD: 0.4). No correlation was found between total copper and LVEF or between the Cu/ceruloplasmine ratio and LVEF. However, upon considering patients with an LVEF under the cutoff of 55 % we found a lower serum copper concentration (117.8 µg/dL SD:18.4 *vs*. 132.6 µg/dL SD: 38.3), although this difference was not statistically significant.

Conclusion: In spite of the malabsorption associated with CF, we did not observe copper deficiency in this population. Since we found a decrease in copper concentrations in patients with lower LVEF, more studies should be performed with a greater sample size in order to clarify the role that copper may play in the cardiomyopathy of CF patients.

P13-02

Lead and cadmium in cystic fibrosis

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Background: Exposure to lead and cadmium is a public health problem due to the broad exposure to these toxic substances among the general population, and in recent years they have been associated with an increased cardiovascular risk. The objective of this multicenter study is to determine blood lead and cadmium concentrations in a population of unselected patients diagnosed with