Kidney diseases and transplantation, urinanalysis

P1332

## DIAGNOSIS OF HEREDITARY XANTHINURIA IN A PATIENT WITH URINARY PROBLEMS

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### BACKGROUND-AIM

Inborn errors of purine metabolism represent a broad spectrum of diseases. XOR catalyzes two hydroxylation steps in the purine degradation pathway: (1) hypoxanthine to xanthine and (2) xanthine to uric acid. The prevalence of hereditary xanthinuria is not exactly known due to the high rate of asymptomatic cases and the lack of screening in newborns, which leads to underdiagnosis of this disorder. The most frequent clinical symptoms include kidney stones, crystalluria, and kidney failure, all related to the high renal clearance and the extreme insolubility of xanthine in urine, which create a favorable environment for its crystallization.

### METHODS

A 25-year-old woman came to the hospital due to dysuria, macroscopic hematuria, and colicky pain. Her personal health history includes recurrent urinary tract infections, kidney stones, and renal colic.

### RESULTS

Among the analytical tests carried out, the undetectable concentration of uric acid in the blood stands out. In addition, the concentration of hypoxanthine in urine was 312.8 mmol/mol creatinine (normal value: <40), and that of xanthine was 1515.3 mmol/mol creatinine (normal value: <51). The different imaging tests performed revealed that the patient had a hypoplastic/atrophic left kidney and renal lithiasis.
Given the suspicion of a possible xanthine oxidoreductase (XOR) enzymatic deficiency, a genetic study of the XDH gene was carried out, detecting a transition from a cytosine to a thymine at nucleotide 682 (c.682C>T), which at the protein level causes a meaningless substitution (p.Arg228X); this change is classified as pathogenic, associated with hereditary xanthinuria type I.
A genetic study was performed on the parents (both were heterozygous carriers), confirming that the patient was a homozygous carrier of the previous mutation.

### CONCLUSIONS

Possible abnormalities in purine metabolism should be considered when hypouricemia is discovered on a test. This case shows the importance of the laboratory in the diagnosis of this type of disorders. The undetectable levels of uric acid in the blood, with the increase in hypoxanthine and xanthine in the urine, led to the suspicion of an XOR enzymatic deficiency that was finally confirmed. with the genetic study of the XDH gene.

Kidney diseases and transplantation, urinanalysis

P1333

**SULFAMETHOXAZOLE CRYSTALS IN URINE. A CASE REPORT**

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**BACKGROUND-AIM**

Sulfamethoxazole is an antibiotic of the sulfonamide family that is indicated in urinary tract infections, and its main route of excretion is renal. Drug-induced crystalluria is not a frequent finding in the study of urinary sediment, but it can lead to acute renal failure due to tubular damage caused by the precipitation of these crystals.
Among the factors that favor the precipitation of sulfamethoxazole are high doses, dehydration, hypoalbuminemia, urinary pH less than 5.5, and underlying kidney disease. The incidence of acute renal failure due to sulfonamide crystals has decreased in recent years due to the appearance of more soluble sulfonamides and the decrease in their use due to side effects.
Sulfonamide crystals can be deposited at any level of the urinary tract, so the clinical presentation is varied. These crystals cause local mechanical abrasion and chemical irritation of the epithelium of the urinary tract and can also form stones at any level.

**METHODS**

A 27-year-old woman went to the hospital for dysuria and started empiric antibiotic treatment with fosfomycin due to suspected urinary tract infection. Two weeks later, the patient returns to the clinic due to the persistence of symptoms, so a study of the urinary sediment is requested, with a urine culture and amoxicillin with clavulanic acid is prescribed. The urine culture report revealed the presence of mixed growth due to probable contamination. Although the culture of a second urine sample was negative, empiric antibiotic treatment with fenticonazole was prescribed.

**RESULTS**

The laboratory report reveals the presence of macroscopic crystals that, visualized in the optical microscope, appear as crystalline groups in the form of a sheaf of probable medicinal origin. The urine had a pH of 5 and no nitrites, bacteria, or leukocytes.
Following this finding, the patient admitted having self-medicated with cotrimoxazole (trimethoprim 160 mg and sulfamethoxazole 800 mg). The crystal clusters were later identified as sulfamethoxazole crystals by Fourier transform infrared microspectroscopy.

**CONCLUSIONS**

This case shows the importance of identifying the crystals and knowing the origin of the crystalluria, allowing a modification of the dosage or the antibiotic treatment used to avoid possible complications in patients.

Kidney diseases and transplantation, urinanalysis

P1334

## COMPARATIVE OF THE STAGE OF RENAL FAILURE BETWEEN THE 2009 CDK-EPI AND 2021 CDK-EPI EQUATIONS

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### BACKGROUND-AIM

Estimated glomerular filtration rate (eGFR) as a marker of renal function is a very common test in clinical laboratories to evaluate chronic kidney disease (CKD) and classify it into different degrees. The CKD-EPI 2009 equation is the equation recommended in clinical guidelines, but a new version of it has recently appeared, the CKD-EPI 2021, which does not consider the corrective factor “race”.

### METHODS

Data were collected from the SIL (Laboratory Information System) Servolab® of serum creatinine measurements, sex and age from the last 6 months of requests sent from the nephrology service. They were determined on an Atellica Solution biochemistry autoanalyzer (Siemens Healthineers).
All these patients are screened by sex, age and with serum creatinine values greater than 0.9 mg/dL in men and greater than 0.7 mg/dL in women, and the result of applying both equations is calculated.
CKD-EPI 2009 (the corrective factor for race is not taken into account):
Women: 144 x (creatinine/0.7)^(-1.209) x (0.993)^age
Men: 141 x (creatinine/0.9)^(-1.209) x (0.993)^age
CKD-EPI 2021:
Women: 142 x (creatinine/0.7)^(-1.200) x (0.9938)^age x 1.012
Men: 142 x (creatinine/0.9)^(-1.200) x (0.9938)^age

### RESULTS

Total number of patients was 2744 of wich 1001 were women and 1743 men.
In the group of men, the comparison between the two equations gave the results that 1602 (92%) patients did not present variation in their CKD grade classification, compared to 141 (8%) who did it.
In the group of women, 932 (93%) did not show differences in terms of their classification against 69 (7%) who did vary.
In both men and women, these variations led to a reduction in the severity of the CKD classification.

### CONCLUSIONS

Calculation of estimated glomerular filtration rate using the new CKD EPI AS 2021 equation implies a more favorable classification of kidney damage for some patients, which could change clinical practice in these cases. To implement the equation, it is necessary to increase the number of patients in the study and not only in the nephrology department, and to evaluate the impact of the change.

Kidney diseases and transplantation, urinanalysis

P1335

## DIAGNOSIS OF HEREDITARY XANTHINURIA IN A PATIENT WITH URINARY PROBLEMS

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### BACKGROUND-AIM

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### METHODS

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Among the analytical tests carried out, the undetectable concentration of uric acid in the blood stands out. In addition, the concentration of hypoxanthine in urine was 312.8 mmol/mol creatinine (normal value: <40), and that of xanthine was 1515.3 mmol/mol creatinine (normal value: <51). The different imaging tests performed revealed that the patient had a hypoplastic/atrophic left kidney and renal lithiasis.
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Kidney diseases and transplantation, urinanalysis

P1336

## VALIDATION OF ENZYMATIC CREATININE USING LCMSMS CREATININE MEASUREMENT

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### BACKGROUND-AIM

Glomerular filtration rate (GFR) is a marker of renal function and its reduction is associated with increased morbidity and mortality. GFR is mainly determined using creatinine as an independent biomarker and in equations calculating eGFR. Therefore, Creatinine accurate measurement is crucial to diagnose and monitor acute and chronic kidney injury. Creatinine measurement is based on a method developed by Jaffee in 1886, that has been modified and optimized using a calibration traceable to Isotope Dilution Mass Spectrometry (IDMS) reference measurement procedure. However, the Jaffee method still exhibits interferences with numerous analytes and medications. An alternative method for creatinine is based on an enzymatic process and has been shown to exhibit improved specificity and reduced interference compared to the Jaffee method.
The goal of our study was to validate the enzymatic creatinine method using an analytical gold standard measurement method based on liquid chromatography Tandem Mass Spectrometry (LCMSMS).

### METHODS

80 samples exhibiting creatinine levels ranging from 0.09 mg/dl to 7.2 mg/dl were analyzed for their creatinine levels using three different methods: Jaffee method, enzymatic method and LCMSMS method. Ratios and factors of correlation were determined when analyzing enzymatic versus LCMSMS in comparison to Jaffee versus LCMSMS.

### RESULTS

Our results exhibited a clear advantage of the enzymatic method versus the Jaffee method in comparison to LCMSMS analysis. The mean ratio enzymatic method vs LCMSMS method was 0.98±0.14 whereas the mean ratio enzymatic method vs LCMSMS method was 1.49±0.51, thus confirming that although the Jaffee method is IDMS traceable, the enzymatic method exhibits a significantly superior analytical accuracy. Moreover, we obtained a coefficient of correlation ($r^2$) of 0.9983 between the enzymatic method and the LCMSMS method and of 0.9818 between the Jaffee method and the LCMSMS method, illustrating the superiority of the enzymatic method across the wide range of results that was used in this study.

### CONCLUSIONS

In conclusion, we have shown the clear analytical superiority of the creatinine enzymatic method above the Jaffee method when comparing to a gold standard LCMSMS method, even though the Jaffee method was IDMS traceable.

Kidney diseases and transplantation, urinanalysis

P1337

## MULTICENTER STUDY FOR DIAGNOSTIC PERFORMANCE OF URINARY RED BLOOD CELLS DISTRIBUTION IN UF-5000

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### BACKGROUND-AIM

Although the Urine RBC Distribution (URD) parameter has been introduced and evaluated, its clinical usefulness is still limited. Therefore, in this study, a multicenter study was conducted to evaluate the diagnostic performance of URD.

### METHODS

The study subjects consisted of 720 patients between December 2020 and December 2021 that visited to four tertiary medical centers in Korea. Patients were classified into glomerular nephritis (GN) and non-glomerular nephritis (NGN) group through reviewing patients' medical records. Renal function test, urine microscopic examination, urinalysis, and URD were measured using the blood and urine samples of the patients. The diagnostic performances of laboratory parameters were evaluated by receiver operating characteristic (ROC) curve analysis.

### RESULTS

In the ROC curve analysis, the cut-off values of dysmorphic RBCs and URD were 19% and 26.7%, and their AUCs were 0.734 and 0.727 respectively. However, in 4 hospitals, the AUC of dysmorphic RBC ranged from 0.636 to 0.89, and that of URD ranged from 0.706 to 0.788. Blood albumin/creatinine revealed the highest AUC value of 0.795. When the test results were combined, the AUC value was higher than 0.8, and especially, URD, protein-strip, and creatinine (UPC) were combined, the highest AUC value of 0.895 was obtained.

### CONCLUSIONS

To differentiate the patients with GN and those with NGN, URD showed similar AUC as dysmorphic RBC, but was more objective and easier to standardize. Therefore, URD will be more widely used than dysmorphic RBC. The UPC combination test showed the best AUC.

Kidney diseases and transplantation, urinanalysis

P1338

## STABLE CKD PREVALENCE WITH LOW AWARENESS OF CKD IN KOREA; DATA FROM KNHANES 2014-2017

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### BACKGROUND-AIM

Early diagnosis and management of chronic kidney disease (CKD) is important in order to reduce deaths and morbidity. It is unknown how much Koreans in general are aware of CKD.

### METHODS

In this study, we analyzed the awareness of CKD using KNHANES data. To evaluate the awareness of CKD, the results of answers to questionnaire items, "renal insufficiency (RI) diagnosis history by medical doctor", "suffering from RI at present" and "under treatment of RI at present," were analyzed according to CKD stages. In the questionnaire, "RI" means not only CKD but also acute kidney injuries. CKD awareness was defined by an answer of yes to "RI diagnosis history by doctor" (Korean).

### RESULTS

CKD prevalence did not change statistically from 2014 to 2017. CKD G3-G5 prevalence was 3.4% (2014), 4.3% (2015), 4.3% (2016), and 3.6% (2017). Among 842 CKD G3-G5 cases, 40 (4.8%) answered that they had a history of RI diagnosis by a doctor. Awareness increased with CKD stages; G3a (1.0%), G3b (5.5%), G4 (20.0%), G5 (75%). About 99%, 94.5%, 80%, and 25% of G3a, G3b, G4, and G5 answered "do not know" or "no answer" about whether they are suffering from RI or not and whether they are under treatment for RI or not.

### CONCLUSIONS

In summary, in this study, we show the stable CKD prevalence and low awareness of CKD. These results are consistent with previous studies in other countries. Control of risk factors for CKD, such as DM, HTN dyslipidemia, and old age are still important in Korea.

Kidney diseases and transplantation, urinanalysis

P1339

**DIAGNOSTICS OF PRECLINICAL STAGES OF CHRONIC KIDNEY DISEASE IN ELDERLY PATIENTS**

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**BACKGROUND-AIM**

to evaluate the diagnostic value of generally accepted approaches to assessing kidney function in elderly patients.

**METHODS**

The study included 78 patients aged 65 to 81 years (average 70.8±3.9 years), including 37 (47%) men and 41 (53%) women. 19 (24%) had myocardial infarction previously, 24 (31%) patients had angina pectoris class I-II. 38 (49%) of 78 pts. had hypertension grade I-III (I – 5 (13%) of 38, II – 38 (84%), III – 1 (3%). We performed biochemical blood test using an automatic analyzer "Architect c 4000" (Abbot, USA) with the determination of cystatin C, creatinine. Interpretation of renal function status was performed comprehensively based on estimated glomerular filtration rate (eGFR) using serum creatinine and/or cystatin C using the equation developed by the Collaboration for the Epidemiology of Chronic Kidney Disease CKD-EPI, the Cockcroft–Goult formula, and the method used in study MDRD (Modification of Diet in Renal Disease).

**RESULTS**

The average level of cystatin C in the group was 1.26±0.3 mg/l (norm 0.4-0.99 mg/l) and exceeded the norm in 71 (91%) patients. At the same time, the content of creatinine - 82.7±21.0 μmol/l - did not exceed the norm in 91% of patients. eGFR for creatinine was also on average within the normal range and amounted to 78.2±11.4 - according to CKP-EPI, 80.9±19.7 - according to the Cockcroft-Goult formula, and 78.2±11.3 - according to the MDRD formula At the same time, eGFR for cystatin C was 56.1±15.7 ml/min/1.73 m2 and was below 60 ml/min/1.73 m2 in 37 (47%) elderly people. It is noteworthy that with eGFR for cystatin C, corresponding to CKD C3b, in the examined elderly patients, the level of serum creatinine and eGFR for creatinine were within the normal range. Another important point is the increase in the level of cystatin C and eGFR for cystatin in the examined elderly people.

**CONCLUSIONS**

in elderly patients, the level of serum creatinine and eGFR based on creatinine using conventional approaches indicated the absence of CKD. The determination of cystatin C and eGFR by cystatin C increases the information content of diagnosing CKD in this category of individuals, which will allow timely medical nephroprotection and prevention of acute kidney injury during therapeutic and diagnostic measures.

Kidney diseases and transplantation, urinanalysis

P1340

**ALBUMIN DETERMINED BY BCG LEADS TO ERRONEOUS RESULTS IN ROUTINE EVALUATION OF PATIENTS WITH CHRONIC KIDNEY DISEASE**

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**BACKGROUND-AIM**

Measurement of plasma albumin is pivotal for clinical decisions in patients with kidney disease. Routinely used methods as bromocresol green (BCG) and bromocresol purple (BCP) can suffer from aselectivity, but the impact of aselectivity on the accuracy of plasma albumin results of chronic kidney disease (CKD)-patients is still unknown. Therefore, we evaluated the performance of BCG-, BCP- and JCTLM-endorsed immunological methods in patients with various stages of CKD.

**METHODS**

We evaluated the performance of commonly used albumin methods in patients with CKD stages G1 through G5, the latter divided in two groups based on whether they received dialysis treatment. In total, 163 patient plasma samples were measured at 14 laboratories, on six different BCG and BCP-platforms, and four different immunological platforms. The results were compared with a ERM-DA-470k-corrected nephelometric assay.

**RESULTS**

Albumin results determined with BCP- and immunological methods showed the best agreement with the target value (92.7% and 86.2%, respectively vs 66.7% for BCG). The relative agreement of each method with the target value was platform-dependent, with larger variability in agreement between platforms noted for BCG and immunological methods (3.2-4.6% and 2.6-5.3%) as opposed to BCP (0.7-1.5%). The stage of CKD had similar effects on the variability in agreement for the three method-groups (0.6-1.8% vs 0.7-1.5% vs 0.4-1.6%).

**CONCLUSIONS**

Our study shows that BCP is fit for the intended use to measure plasma albumin levels in CKD patients. In contrast, most BCG-based platforms falsely overestimate the plasma albumin concentration.

Kidney diseases and transplantation, urinanalysis

P1341

## CONCENTRATION OF KLOTHO PROTEIN AND FGF23 AS PREDICTORS OF MORTALITY IN HEMODIALYSIS PATIENTS

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**BACKGROUND-AIM**

Disturbances of bone mineral metabolism in chronic kidney disease (CKD) are associated with aortic calcification, cardiovascular events, and higher mortality. An initial increase in fibroblast growth factor 23 (FGF23) is the first biochemical evidence for a disturbance of mineral homeostasis in early HBI.

**METHODS**

In 140 dialysis patients and 80 controls, we determined the concentration of calcium, phosphorus, alkaline phosphatase, parathyroid hormone, vitamin D, FGF23, Klotho protein. During the five-year follow-up, the mortality rate was 52.1%, and 46.6% had cardiovascular complications as a direct cause of death.

**RESULTS**

Patients with hyperparathyroidism and elevated calcium phosphorus product are at the highest risk, both for all-cause and cardiovascular mortality ($p<0.001$). Patients with hyperphosphatemia are at higher risk for all-cause mortality($p<0.001$). By analyzing the parameters of mineral-bone metabolism, we showed that the deceased patients had significantly lower concentrations of Klotho protein and vitamin D compared to the survivors, without a significant difference in the concentration of FGF23. However, all three parameters of mineral-bone metabolism (Klotho protein, FGF23 and vitamin D) proved to be statistically significant predictors of overall mortality, based on univariate regression analysis. In the multivariate regression analysis model, Klotho protein and FGF23 retained statistical significance in the prediction of overall mortality

**CONCLUSIONS**

The results from this study confirmed the prognostic value of FGF23 and Klotho protein.
Further research will determine whether pharmacological modulation of FGF23 activity may be beneficial in the treatment of vascular and/or soft tissue calcifications.

Kidney diseases and transplantation, urinanalysis

P1342

## VITAMIN D LEVELS IN CHRONIC HEMODIALYSIS PATIENTS AT IBN SINA UNIVERSITY HOSPITAL CENTER OF RABAT

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### BACKGROUND-AIM

In patients with renal insufficiency, especially the ones on chronic hemodialysis , vitamin D deficiency is frequent. Chronic Kidney Disease (CKD) in its early stages is also an important risk factor for 25(OH) D3 deficiency. Numerous studies have also reported an independent link between vitamin D deficiency and mortality in CKD.

### METHODS

This is a retrospective study about 59 patients who have been on hemodialysis for more than 3 months.
Vitamin D is assayed using CMIA. While the determination of serum calcium and phosphorus (colorimetry).Two clinico-biological entities have been defined: Vitamin D deficiency with a level of 25 (OH) vitamin D < 10 ng/ml andVitamin D insufficiency with a level of 25 (OH) vitamin D between 10 and 30 ng/ml.

### RESULTS

Among the 59 patients with kidney failure, during the study period :
The mean serum calcium value was 2.265 ± 0.2 mmol/l and 21 of the patients (35.6%) had hypocalcemia.The mean value of phosphoremia was 1.196 ± 0.31 mmol/l. and 35 of the patients (59%) had hyperphosphatemia, and the mean value of the serum vitamin D level was 16.80 ± 10.47 ng/ml. A vitamin D deficiency wasobjectified in 18 patients (31%) and vitamin D insufficiency in 33 patients (55%). Only 8 patients(14%) had normal vitamin D levels. Our study showed that hypovitaminosis D is common in hemodialysis patients (86% of cases), as well as hypocalcemia and hyperphosphatemia. Our results corroborate those of the literature. Indeed, it has been shown that hypovitaminosis D, as well as hyperphosphatemia, are associated with an increased risk of cardiovascular events and mortality.The international KDIGO (Kidney disease improving global outcomes)recommendations suggest measuring 25(OH) D3 in CKD stages 3-5 and correcting the vitamin deficiency or insufficiency in a similar way to what is recommended in the general population.The goal is to maintain a plasma level of or above ≥ 75 nmol/l (30 ng/ml).

### CONCLUSIONS

Better management of patients with CKD,would prevent bone and cardiovascular complications and
reduce mortality due to the physiological role Vitamin D plays in many tissues. However, the performance of good quality clinical trials is nevertheless necessary to confirm the benefit of the treatment and
supplementation of Vitamin D.

Kidney diseases and transplantation, urinanalysis

P1343

**URINALYSIS: FALSE POSITIVE AND FALSE NEGATIVE RESULTS**

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[1]*CHULN, EPE*

**BACKGROUND-AIM**

Urinalysis is one of the most used laboratory tests, usually done by urine dipstick test, a widely accepted method for screening purposes due of its simple, quick, and inexpensive use.
Urine dipstick test (UDT) can be done by physicians and trained healthcare professionals in point-of-care (POC) settings, sometimes unaware of the limitations of this test.
The information about the limitations of the urinalysis is scattered in the literature.

**METHODS**

Search on the Pubmed.org platform (https://pubmed.ncbi.nlm.nih.gov/) for manuscripts related with factors responsible for false positive/negative results in urinalysis.

**RESULTS**

Factors responsible for false-positive (FP) or false-negative (FN) identified are: (resume)
1. Specific gravity:
FP: protein >5g/L, ketoacidosis, IV radiopaque dyes
FN: alkaline pH, glucose>1g/L
2. Leucocytes and leukocyte esterase:
FP: Contamination, formaldehyde, contamination with vaginal discharge (leucorrhea)
FN: Glycosuria, ketonuria, proteinuria, oxidizing drugs (nitrofurantoin, gentamicin, cephalosporins), vitamin C
3. Glucose:
FP: oxidizing detergents, hydrochloric acid
FN: ascorbic acid, bacteria
4. Proteins:
FP: quaternary ammonia, very alkaline urine
FN: hyperchromic urine
5. Ketones:
FP: N-acetylcysteine, levodopa metabolites, phenolphthalein, acidic urine
FN: sample mis preservation
6. Nitrites:
FP: Contamination, exposure of dipstick to air, phenazopyridine
FN: Elevated urobilinogen, nitrate-reductase negative bacteria, vitamin C, sample for hours at room temperature, dietary nitrate deficit, sample dilution e.g. by the use of diuretics
7. Bilirubin:
FP: Phenazopyridine
FN: Chlorpromazine, selenium
8. Blood/Hemoglobin:
FP: Dehydration, exercise, hemoglobinuria, menstrual blood, myoglobinuria, oxidizing substances, contamination with povidone iodine or by Lactobacillus spp (they produce pseudo-peroxidases)
FN: Captopril, pH<5.1, proteinuria, vitamin C, lack of sample homogenization
9. pH:
Acidification:formaldehyde, intake of blueberries and on high protein diets
Alkalinization: storage of urine at room temperature

**CONCLUSIONS**

Knowledge of the factors that interfere with urinalysis results by physicians and trained healthcare professionals are essential to reduce diagnostic and therapeutic errors.

Kidney diseases and transplantation, urinanalysis

P1344

## ESTIMATING GLOMERULAR FILTRATION RATE AND URINE ALBUMIN/CREATININE RATIO. USEFULNESS IN PRIMARY CARE

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### BACKGROUND-AIM

Chronic kidney disease (CKD) is a public health problem. Primary Care (PC) is key in its early detection, through the estimated glomerular filtration (eGF) and the degree of albuminuria as the albumin/creatinine ratio (ACR) in urine first thing in the morning.
The aim of our study was to analyze the prevalence of CKD by stage in patients seen in PC, considering the eGF and ACR values and to study the usefulness of ACR together with eGF in the referral of patients to the Nephrology Service.

### METHODS

CKD was stratified according to the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines based on eGF using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation into 6 stages: G1 (>90 mL/min/1.73 m2), G2 (89-60 mL/min/1.73 m2), G3a (59-45 mL/min/1.73 m2), G3b (44-30 mL/min/1.73 m2), G4 (29-15 mL/min/1.73 m2) and G5 (<15 mL/min/1.73 m2). Urinary albumin excretion was classified into 3 grades: A1 (<30 mg/g), A2 (30-300 mg/g) and A3 (>300 mg/g).
Recommendations for referral to a specialist were considered according to the eGF and albuminuria categories, and compared with the percentage of patients who would be referred using only eGF.

### RESULTS

Total of 64,819 results from patients with eGF, urine albumin was requested from 9,756 patients (15%). Of which were stratified according to eGF in: stage 1, 16.2%; stage 2, 61.8%; stage 3a, 16.4%; stage 3b, 4.3%; stage 4, 1.2%; and stage 5, 0.1%.
According to stage 1 by eGF and ACR, 0.8% would be referred compared to none with only eGF. In stage 2 by eGF and ACR, 0.7% would be referred, compared to none with eGF. In stage 3a by eGF and ACR, 1.6% would be referred, compared to 0% by eGF. In stage 3b by eGF and ACR, 6.2% would be referred compared to 0% due to eGF. In stage 4 and 5, in all cases 100% of patients would be referred.

### CONCLUSIONS

In some cases, in PC patients, the diagnosis of CKD can be established by the decrease in eGF. Determining the degree of albuminuria is a measure that has not been widely implemented in the usual practice of PC, it is a simple test for the correct stratification of CKD. It helps to better manage the referral of patients to the specialist.
It is necessary to encourage its measurement and in order to detect kidney disease as soon as possible, since it is sometimes the first manifestation of kidney damage.

Kidney diseases and transplantation, urinanalysis

P1345

**VALIDATION OF IOHEXOL DETERMINATION BY THE NEPHROLYX UPLC-UV ASSAY, THE FIRST COMMERCIALLY AVAILABLE METHOD TO MEASURE GLOMERULAR FILTRATION RATE.**

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**BACKGROUND-AIM**

A reliable assessment of glomerular filtration rate (GFR) is of paramount importance in clinical practice. KDIGO guidelines recommend measurement of GFR (mGFR) in specific populations (anorectic, cirrhotic, obese, renal and non-renal transplant patients). mGFR is also the only valuable test to assess the status of chronic kidney disease (CKD) in patients. Measuring GFR by plasma clearance of iohexol is one the best method to measure GFR but most laboratories use an in-house developed method. Nephrolyx (Berlin, Germany) proposes, for the first time, a complete and easy commercially available solution to measure GFR aiming at proposing the possibility of measuring GFR to laboratories who would not want to develop their own method. In this study, we validated this method and compared the results with an ISO 15189 certified LCMS/MS method.

**METHODS**

The Nephrolyx ready-to-use kit is based on quantification of iohexol using a 90 second gradient on UPLC-UV after ultra-filtration. For the validation, we assessed linearity, accuracy of measurement (6 spiked samples from 5 to 500 µg/mL, measured in 5-plicates on 5 consecutive days), limit of quantification (LoQ) and measurement uncertainty of the method and compared it with the certified LC-MS/MS (CHU of Liege, Belgium) on 140 iohexol remnant samples.

**RESULTS**

We obtained a perfect linearity. The relative biases ranged from 1.3 to 7.1%, the inter-assay CV from 3.0 to 7.1% and the combined measurement uncertainty from 6.1 to 14.6%. The LoQ was established at 5 µg/mL. The Passing-Bablok regression equation was: LC-MS/MS = 1.05 [95%CI: 1.04; 1.07] x Nephrolyx + 0.5 [-0.3; 1.06]. The mean GFR was 4.1±3.6 ml/min higher in patients when iohexol was measured with LCMS/MS.

**CONCLUSIONS**

The Nephrolyx assay is an easy and quick solution for laboratories who would like to measure GFR. We have completely validated this commercially available method and found excellent results, completely in accordance with previously published UPLC-UV methods.

Kidney diseases and transplantation, urinanalysis

P1346

## ALTERATIONS IN LIPID METABOLISM IN CHRONIC HEMODIALYSIS PATIENTS

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### BACKGROUND-AIM

The metabolism of lipoproteins in hemodialysis patients is disturbed. Lipid abnormalities are highly atherogenic and constitute one of the risk factors for atherosclerosis. Our objective was to determine the alterations in lipid metabolism in chronic hemodialysis patients and the atherogenic risk incurred.

### METHODS

This is a case-control study comprising 32 chronic hemodialysis patients recruited from the hemodialysis unit and 32 healthy controls.A blood sample was collected from each patient and control to measure: triglycerides(TG),total cholesterol(TC),HDL cholesterol(HDL-C),LDL cholesterol(LDL- C) and the atherogenicity index (AI).Triglycerides,total cholesterol and HDL cholesterol were measured on the Cobas 6000 C automaton by colorimetric enzymatic method.LDL cholesterol was calculated by Friedewald formula(LDL-C = CT − HDL-C − TG/2.2 (mmol/L)).The AI was determined according to the following formula:AI=Total cholesterol/HDL cholesterol.

### RESULTS

The duration of hemodialysis was 111.53±57.06 months.Chronic interstitial nephropathy was the main cause of chronic kidney disease in hemodialysis patients.For the hemodialysis group:the mean total cholesterol was 4.36 ±1.20(mmol/L),triglycerides was 1.85 ±0.94(mmol/L),HDL-C was 0.96 ±0.24 (mmol/L)and LDL-C was 2.56 ±0.93(mmol/L).Hypertriglyceridemia was noted in 37.5%of cases,a decrease in HDL-C in 100% of cases.These hemodialysis patients are classified as patients with very high cardiovascular risk, therefore their LDL-C is increased(>1.42 mmol/L according to the recommendations of the ESC)in 90.6% of cases.The atherogenicity index was increased in 34.4% of cases for our chronic hemodialysis patients.For the control group:the mean TC was 3.63 ±0.69 (mmol/L),TG was 1.05 ±0.62(mmol/L),HDL-C was1.09 ± 0.29(mmol/L) and LDL-C was 2.1±0.39 (mmol/L).Significant differences were noted between triglycerides,total cholesterol and LDL and HDL cholesterol between chronic hemodialysis patients and controls with($p < 0.001$, 0.004, 0.012 and 0.05 respectively).

### CONCLUSIONS

Alterations in lipid metabolism could contribute to an increased prevalence of cardiovascular morbidity and mortality. Therefore, the improvement of lipid abnormalities must be strict in hemodialysis patients in order to establish a strategy for the prevention of cardiovascular risks.

Kidney diseases and transplantation, urinanalysis

P1347

**LIPID PROFILE IN CHRONIC HEMODIALYSIS PATIENTS**

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**BACKGROUND-AIM**

Disorders of lipidic metabolism are frequent in hemodialysis patients. These alterations can lead to cardiovascular disease. The objective of our work was to determine the lipid profile in chronic hemodialysis patients and the atherogenic risk incurred.

**METHODS**

This is a prospective study involving 32 chronic hemodialysis patients recruited from the hemodialysis unit.A blood sample was collected from each patient to measure:Triglycerides (TG),total cholesterol (TC),HDL cholesterol(HDL-C),LDL cholesterol(LDL-C) and the malondialdehyde (MDA) as a lipid peroxidation marker. TG,TC and HDL cholesterol were assayed on the Cobas 6000 C automaton (c501 module) by colorimetric enzymatic method. LDL cholesterol was calculated by Friedewald formula(LDL-C = CT − HDL-C − TG/2.2 (in mmol/L)).The atherogenicity index(AI) was determined according to the following formula:AI=Total cholesterol/HDL cholesterol.

**RESULTS**

The mean age of our patients was 48.53±10.35 years,aged from 29 and 69. The sex ratio (M/F) was 1.28. The duration of hemodialysis was 111.53±57.06 months. Chronic interstitial nephropathy was the main cause of CKD (31.25%) followed by chronic glomerular nephropathy (28.13%), familial nephropathy (25%) and 15.63% unknown cause. The mean total cholesterol was 4.36 ±1.20 (mmol/L), Triglycerides was 1.85 ±0.94 (mmol/L), HDL-C was 0.96 ±0.24 (mmol/L), LDL-C was 2.56 ±0.93 (mmol/L ). The mean MDA in our patients was 2.8±2.1(µmol/L). Hypertriglyceridemia was noted in 37.5% of cases, a decrease in HDL-C in 100% of cases. In addition, these hemodialysis patients are classified as patients at very high cardiovascular risk, so the LDL-C is increased (>1. 42 mmol/L according to ESC recommendations) in 90.6% of cases. The atherogenicity index was increased in 34.4% of cases for our chronic hemodialysis patients.

**CONCLUSIONS**

Chronic kidney failure is associated with dyslipidemia and accelerated atherosclerosis. Chronic hemodialysis patients should benefit, as part of the cardiovascular risk prevention strategy, from measures to control these dyslipidemias.

Kidney diseases and transplantation, urinanalysis

P1348

## CLINICAL OUTCOME ACCORDING TO EPLET MISMATCHES IN KIDNEY TRANSPLANTATION RECIPIENTS WITHOUT PRE- AND POST-TRANSPLANT HLA DONOR-SPECIFIC ANTIBODIES

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### BACKGROUND-AIM

The probability of post-transplantation donor-specific antibody (DSA) development is increased with a higher number of mismatched eplets, and it leads to a higher risk of graft loss. However, there are few studies on the effect of eplet mismatches on clinical outcome in kidney transplantation (KT) recipients without DSA. In this study, we attempted to find out the correlation between eplet mismatches and the clinical outcome, in KT recipients without pre-and post-transplantation DSA.

### METHODS

Total 21 recipients who underwent living (n=10) or deceased (n=11) donor KT at Haeundae Paik Hospital, Busan, Korea, between June 2018 and October 2022. The recipients were negative for pre-and post-transplant HLA DSAs and final HLA crossmatch. The HLA typing for HLA-A, B, C, DRB1, and DQB1 was performed using NGS. Library preparation was performed using NGSgo kit with NGSgo-AmpX (GenDx, the Netherlands) and sequenced on an Illumina Miseq genomic sequencer (Illumina, California). Sequences were analyzed with the GenDX NGSengine software and the HLA alleles phased by comparison to the latest IPD-IMGT/HLA Database version at the time to confirm the genotype. The number of donor-recipient eplet mismatches were determined using HLAMatchmaker program (ABC Eplet Matching Program V4.0 and DRDQDP Antibody Analysis Program V3.1).

### RESULTS

Ten recipients (47.6%) experienced a biopsy proven rejection (median: 139 days, range:11-566 days), one of acute antibody-mediated rejection, three of acute T-cell-mediated rejection (TCMR), three of chronic TCMR, and three of suspicious for acute TCMR. The recipients who experienced rejection episode had significantly higher total number of eplet mismatches for HLA-A, B, C, DRB1, and DQB1 (29.7 vs 28.2, $p = 0.012$), and that for HLA-A, B, C, and DQB1 (20.5 vs 19.7, $p = 0.027$) than the other recipients.

### CONCLUSIONS

Recipients who experienced a biopsy proven rejection without pre-and post-transplantation DSA tended to have high number of eplet mismatches for HLA-A, B, C, DRB1, and DQB1 or that for HLA-A, B, C, and DQB1. However, this study has limitations, first of the small number of recipients and second of failure to analyze other HLA types, such as HLA-DP, that can be analyzed using HLAMatchmaker program, so further research is needed.

Kidney diseases and transplantation, urinanalysis

P1349

## APPLYING STRINGENT CRITERIA FOR THE DETECTION OF PKD2 MUTATIONS IN GREEK POLYCYSTIC KIDNEY DISEASE PATIENTS

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### BACKGROUND-AIM

Autosomal dominant kidney disease is characterized by the development of numerous cysts in both kidneys, leading to GFR decline and end-stage renal disease later in life. It is caused by mutations mainly in either PKD1 or PKD2 genes (78% and 15% of cases respectively). The remaining 2% of cases is caused by mutations in other genes, including HNF1B, GANAB, DNAJB1 etc. The PKD2 gene encodes for a 968-amino acid polycystin-2 membrane protein that together with polycystin-1 protein have a role in Ca+2 homeostasis in cilia of tubular renal cells.

### METHODS

After obtaining an informed consent, EDTA peripheral blood was collected from seven well-ascertained polycystic kidney patients >70 years of age with end-stage renal disease. A thorough genetic analysis was performed in all 15 PKD2 gene exons and exon-intron boundaries with DNA Sequencing in the Seq Studio platform (ABI Thermo, USA) and screened for large DNA rearrangements with MLPA technique (MRC Holland).

### RESULTS

3 patients with deleterious mutations were detected: one with the p.Arg872Ter mutation, the most common PKD2 mutation encountered in the corresponding database (https://pkdb.mayo.edu/variants), another with the novel p.L273Q likely pathogenic mutation (Varsome bioinformatics tool) and the third with a novel large deletion of exons 1-9 with MLPA.

### CONCLUSIONS

In this first effort to analyze the PKD2 gene in the Greek population by applying the stringent age criterion, the detection yield for PKD2 mutations increased from the expected 15% to 43% (3 out of 7 patients). An interesting spectrum of novel findings was revealed. Up till now, NGS (Next generation Sequencing) approaches to screen simultaneously all genes involved in polycystic kidney disease are not widespread because the most frequently mutated gene, PKD1, is extremely large and contains six pseudogenes that complicates its analysis. Therefore, quality thorough PKD2 genetic analysis in selected patients is granted to be prioritized.

Kidney diseases and transplantation, urinanalysis

P1350

## EVALUATION OF SIEMENS AUTOMATED IMMUNOSUPPRESSIVE DRUGS ASSAYS IN COMPARISON WITH CONVENTIONAL METHODS.

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### BACKGROUND-AIM

Therapeutic Drug Monitoring (TDM) of Immunosuppressive drugs (ISDs), administered in order to avoid transplant rejection, is essential. In this background, we compared the analytical performance of the assays performed on our in use platforms for ISD monitoring and on Dimension EXL 200 analyzer, we evaluated the correlation between methods and assessed the possible performance improvement due to the consolidation of ISDs TDM on a single platform.

### METHODS

A total of 611 consecutive samples of transplanted patients were processed using our conventional assays i.e., Abbott CMIA® Tacrolimus, Cyclosporine and Sirolimus (K2EDTA whole blood) run on Architect i1000SR platform, ThermoFisher Scientific QMS® Everolimus (K2EDTA whole blood) on CDX90 and ThermoFisher Scientific CEDIA® Mycophenolic Acid (plasma) on ILab Taurus and the equivalent Siemens Dimension automated ACMIA® and Petinia® (for Mycophenolic Acid) assays, with no manual sample pretreatment required. Results were statistically compared; within-run and within-laboratory precision on Dimension were evaluated using Quality Control materials.

### RESULTS

Within-run and within-laboratory precision tests show CVs ≤10% for the Siemens assays, as desired by the IATDMCT recommendations for ISDs monitoring. Considering all the assays, Passing-Bablok regression analysis of data show Correlation Coefficients ranging from 0.953 to 0.984. Bland-Altman plots reveal a negative absolute bias for Tacrolimus assay (-0.23 ng/mL, 95%CI -0.43 – -0.04) and a positive percent bias for Cyclosporine (+19.9%, 95%CI 16.28–23.51), Sirolimus (+22.8%, 95%CI 16.11–29.53) and Mycophenolic Acid (+9.65%, 95%CI 6.12–13.18) assays. Lastly, Siemens Everolimus assay shows an increasing absolute bias (2.72 ng/mL, 95%CI 2.6–2.9) in association with a decreasing positive 47.6% bias (95%CI 45.4–49.8).

### CONCLUSIONS

Siemens assays demonstrated good precision and good correlation between methods; anyway, Everolimus assay shows the weakest correlation between methods as well as the most complex bias pattern. Moreover, our findings suggest that the automated assays, run on Dimension platform, lead to workflow improvement in terms of TDM consolidation, faster TAT and the ability to run STAT samples h24.

Kidney diseases and transplantation, urinanalysis

P1351

## COMPARISON OF FULLY AUTOMATED URINE ANALYZER RESULTS AND MANUAL MICROSCOPIC URINE SEDIMENT ANALYSIS

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**BACKGROUND-AIM**

Microscopic analysis of urine is very important in the diagnosis and treatment of urinary system diseases. Fully automated urine analyzers are now used in high-capacity laboratories, as complete urinalysis constitutes a large part of laboratory requests. In our study, it was aimed to compare the urine sedimentation results of the fully automatic urine analyzer Sysmex UF-4000, which we use in our laboratory, and the manual microscopic method.

**METHODS**

4650 urine samples that came to our laboratory were randomly selected and included in our study without making any normal or pathological distinction. Urine samples were simultaneously studied on a Sysmex UF-4000 urine analyzer and manually examined under a microscope. The erythrocyte, leukocyte and epithelial cell counts in the microscopic images were evaluated by taking the averages of 10 different areas. SPSS 21.0 program was used for statistical analysis of the results. Data were analyzed with the Spearman correlation test.

**RESULTS**

The correlation coefficient between cell numbers obtained by both the automatic device and the manual method was r=0.863 for leukocytes, r=0.802 for erythrocytes and r=0.817 for epithelial cells. For all three values, $p<0.01$ was found.

**CONCLUSIONS**

Manual examination in urine sediment analysis is time-consuming and labor-intensive. Automated urine analyzers have advantages such as not requiring centrifugation, preparation between slides and coverslips, and being able to give results using a small amount of sample. Due to the significant and high correlation obtained in our study, we believe that the development and dissemination of fully automatic urine analyzers will be beneficial in terms of obtaining rapid laboratory results and standardization in analyses.

Kidney diseases and transplantation, urinanalysis

P1352

## RELIABILITY OF GRAM STAINABILITY FLAGS OF THE SYSMEX UF-5000 FOR PREDICTION OF THE BACTERIURIA

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### BACKGROUND-AIM

The automated UF-5000 urine sediment analyzer (Sysmex, Japan) provides additional infection-related information such as the Gram stainability flags. The "Gram Neg?" and "Gram Pos/Neg?" flags may be helpful for rapid identification of Gram negative bacteria causative for urinary tract infection (UTI). This study aimed to evaluate the reliability of the flags using real-world data.

### METHODS

Among the urine specimens requested for urinalysis and urine culture together on the same day, those with Gram Neg? or Gram Pos/Neg? flag on the UF-5000 were included during December 2022 at a Veterans hospital in Korea. Bacterial and white blood cell (WBC) particle numbers were collected from the UF-5000. Cultures were considered positive if there was $\geq 10^5$ colony forming units/mL bacterial growth, and compared with the UF-5000 results.

### RESULTS

A total of 109 samples were included for the analysis. Seventy-seven samples with Gram Neg? flag comprised 23 culture-negative samples, 45 Gram-negative bacteria positive, 5 Gram-positive and -negative bacteria positive, and 4 Gram-positive organism positive samples (concordance rate of 92.6% for culture-positive samples and 64.9% for all samples). Thirty-two samples with Gram Pos/Neg? flag comprised 4 culture-negative samples, 14 Gram-negative bacteria positive, 8 Gram-positive and -negative bacteria positive, and 6 Gram-positive organism positive samples. Overall, apart from 27 culture-negative samples and 12 mixed flora samples grown ≥3 organisms, 81 isolates were grown from 70 samples; 22 Escherichia coli, 14 Klebsiella pneumoniae, 10 Pseudomonas aeruginosa, 9 Proteus mirabilis, 14 other gram-negative bacteria, and 12 gram-positive microorganisms. The median bacterial number of culture-positive samples was higher than that of culture-negative samples (61694/μl vs. 1831/μl, $P < 0.0001$), whereas the WBC count did not show significant difference between 2 groups (median, 342/μl vs. 211/μl).

### CONCLUSIONS

Bacterial information flags of the UF-5000 is a useful tool for UTI screening with a high agreement with the urine culture.

Kidney diseases and transplantation, urinanalysis

P1353

## THE EVALUATION OF RENAL TUBULAR EPITHELIAL CELL AS A BIOMARKER OF KIDNEY MALFUNCTION

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### BACKGROUND-AIM

Chronic kidney disease (CKD) is caused by various diseases which is recognized as a leading public health problem worldwide. Urinalysis is the first screen test to determine if someone needs further examination. The aim of the study is to evaluate the renal tubular epithelial cells (RTEs) in urine sediment as a predicting biomarker of kidney malfunction.

### METHODS

A retrospective observational cohort study of 423 patients who had RTEs in urine sediment out of 651 patients without comorbidity in a medical center in Taiwan. The serum sodium, potassium and estimated glomerular filtration rate (eGFR) were tested. Patients were categorized by diseases. RTEs were compared to serum sodium, potassium and eGFR to predict kidney malfunction. Nonparametric Wilcoxon analysis was used to calculate the correlation of RTEs and each disease and test.

### RESULTS

The main diseases of 432 patients were cardiovascular disease (31.7%), renal disease (31.5%), cancer (28.0%), diabetes (16.4%), and autoimmune disease (14.1%). Of which, the major cardiovascular disease were hypertension (69.3%) and coronary artery disease (13.9%); the major renal disease were urinary tract infection (24.3%), chronic kidney disease (19.1%), acute kidney injury (14.7%) and urolithiasis (9.6%). Comparing to serum sodium, potassium and eGFR 60 ml/min/1.73m$^2$ as threshold, the sensitivity of RTEs to predict kidney malfunction were 96.8%, 86.8% and 100%, respectively; the negative predictive value were 99.1%, 94.4% and 100%, respectively (P<0.001). RTEs were divided into 4 group: 0, 0~2, 3~5 and >5 per high power field. The eGFR of each group were 86.9±11.9, 75.1±28.1, 67.7±27.2 and 64.1±28.3 ml/min/1.73m$^2$, respectively (P<0.001). It showed the more RTEs shed in urine, the lower eGFR was. The eGFR of subjects without RTEs in urine is 86.9±11.9 ml/min/1.73m$^2$ while it were 68.0±37.1 in cardiovascular disease, 53.4±27.2 in renal disease, 75.8±33.3 in cancer, 68.0±37.8 in diabetes and 76.0±27.0 in autoimmune disease (P<0.001).

### CONCLUSIONS

The results suggest that RTEs were highly correlated with worse eGFR which is affected by diseases relative to renal function. RTEs in urine sediment could be a biomarker to predict kidney malfunction.

Kidney diseases and transplantation, urinanalysis

P1354

**NEPHROLITHIASIS: A SIX YEAR (2017-2022) REVIEW AT A TERTIARY REFERRAL CENTRE**

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**BACKGROUND-AIM**

Urolithiasis is a common problem in primary care practice with an increasing incidence. Consequently, kidney stones studies have progressively increased over the last years in our laboratory. We therefore consider it important to analyze this pathology in our population.
The aim of this study has been:
1. To analyze which kind of kidney stones are the most frequent in our reference population (308,000 inhabitants)
2. To evaluate if there is any relationship between struvite stones and urinary infections by urease-positive microorganisms.

**METHODS**

The composition of kidney stones analyzed by infrared spectroscopy in the last 6 years (2017-2022) were retrospectively reviewed and the patients classified according to gender and age.

**RESULTS**

Between 2017 and 2022, 1729 kidney stones were analyzed from 1471 patients. 258 of them had more than one lithiasic episode. In this period, there has been an increase in the number of samples analyzed from 241 in 2017 to 393 in 2022. The median age of patients was 58 years, with a predominance of those older than 40 years (91%, >40 years), being most of them male subjects (74%).
Pure stone compositions were present in 38.5% of the samples analyzed, with calcium oxalate monohydrate (Whewellite) being the most prevalent (33.2% of cases).
Two different compounds were presents in 43.3% of the stones. Among them:
- Calcium oxalate dihydrate (Weddellite) + Whewellite (12.7%).
- Calcium phosphate (Apatite) + Whewellite (11.7%).
1344 (77.7%) were formed by Whewellite, either alone or in combination.
Magnesium ammonium phosphate (struvite) was the component of 109 (6.3%) kidney stones. 64 (58.7%) of these patients had suffered infectious episodes with a positive urine culture for urease-producing microorganisms (in a time interval of 1 year before and after the extraction of the kidney stone), 74% of which were identified as Proteus mirabilis and Morganella morganii.

**CONCLUSIONS**

1. As expected, we observe a progressive increase in the number of kidney stones analysed in our hospital over the last six years.
2. Most of them are composed of Whewellite, pure or in combination with Apatite or Weddellite.
3. Finally, we conclude that urease-producing bacteria could be the cause of the almost 60% of struvite stones formation.

Kidney diseases and transplantation, urinanalysis

P1355

**INDOXYL SULPHATE AS A CARDIOMETABOLIC RISK FACTOR IN CHRONIC KIDNEY DISEASE**

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**BACKGROUND-AIM**

Hypertension (HTA) and chronic kidney disease (CKD) are bidirectionally interlinked, because aspects of the pathophysiology are shared by both diseases in the kidneys. Antropometric measurements related to obesity and body fat distribution are considered indipendent risk factors for progression of cardiovascular diseases (CVD). Besides, uremia-specific metabolites also may have a role in pathogenesis of CVD in CKD. The aim of this study is to establish relationship between nephrovascular toxin indoxyl sulphate (IS) with mentioned risk factors.

**METHODS**

The cross sectional study included 63 patients with CKD devided into two groups based on estimated glomerular filtration rate (eGFR): I group 25 patients (M=11, F=14) with eGFR > 60ml/min, II group 38 patients (M=20, F=18) with eGFR < 60 ml/min. GFR was measured by radionuclide clearance Diethylene Triamine PentaAcetate (DTPA). Plasma concentration of IS were determined by using High Performance Liquid Chromatography. To all participants were determined antropometric measurements and standard laboratory parameters.

**RESULTS**

IS levels were significantly higher among Group II participants (1.25±0.85 vs 4.22±3.93 μg/ml, p<0.001). Among Group I participants, waist circumference (WC) and waist to hipp ratio (WHR)were significantly lower (92.7±9.2 vs 99.7±13.8 cm, p=0.03; 0.85±0.08 vs 0.95±0.12, p<0.01). Measured systolic blood pressure (SBP) were significantly higher in Group II (126,26±11,6 vs 141,87±17,6; p<0,001). Correlation IS with SBP, Body Mass Index, WC and WHRwere significant (r=0,4, p<0,001; r=0,4, p<0,001, r=0,3, p<0,05; r=0,3, p<0,05)

**CONCLUSIONS**

According to obtained results, we can conclude that IS may have a contributing role in development visceral fat distribution which is considered one of the main cardiometabolic risk markers.

Kidney diseases and transplantation, urinanalysis

P1356

**THE UPDATED TOPICS OF THE EFLM EUROPEAN URINALYSIS GUIDELINE 2023**

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**BACKGROUND-AIM**

The European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) Task and Finish Group (TFG) Urinalysis has now updated the old ECLM European Urinalysis Guideline (2000) on laboratory procedures in urinalysis and urine bacterial culture. A shared single-voided specimen again reinforced the co-operation between professionals in clinical chemistry and clinical microbiology.

**METHODS**

Rated recommendations were built based on the obtained evidence, using the GRADE system.

**RESULTS**

Recommendations:
Medical needs and test requisition: Strategies of urine testing were described to patients with low and high-risk to urinary tract infection (UTI) or kidney disease.
Specimen collection: Patient preparation, and urine collection are now supported with two quality indicators: contamination rate (cultures), and density of urine (chemistry, particles).
Chemistry: Measurements of both urine albumin and $\alpha$1-microglobulin are recommended for sensitive detection of renal disease in high-risk patients. Performance specifications for urine protein measurements and quality control of multiproperty strip tests were given.
Particles: Procedures for microscopy were reviewed for diagnostic urine particles, including urine bacteria. Technologies in automated particle counting were updated with advice how to verify new instruments with the reference microscopy.
Bacteriology: Chromogenic agar was recommended as primary medium in urine cultures. Limits of significant growth were reviewed, with an optimised workflow for routine specimens, using leukocyturia to reduce less important antimicrobial susceptibility testing. Automation in bacteriology is encouraged to shorten turn-around times. Matrix assisted laser desorption ionization time-of-flight mass spectrometry is applicable for rapid identification of uropathogens. Aerococcus urinae, A. sanguinicola and Actinotignum schaalii were taken into the list of uropathogens. Moreover, a reference examination procedure was developed for urine bacterial cultures.

**CONCLUSIONS**

The draft European Urinalysis guideline has been submitted to the Executive Board of the EFLM, and to the Guidelines Subcommittee of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), on Behalf of the EFLM TFG Urinalysis.

Kidney diseases and transplantation, urinanalysis

P1357

**ACUTE KIDNEY INJURY DUE TO SULFADIAZINE: A CASE REPORT**

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**BACKGROUND-AIM**

Sulfadiazine is a sulfonamide antibiotic used together with pyrimethamine as the treatment of choice for toxoplasmosis. It is metabolized in the liver and eliminated in urine, primarily unaltered and as acetyl-sulfadiazine. The low urinary solubility of this drug and its metabolites favors their precipitation within the renal tubules. They generate characteristic fan-shaped crystals, which can obstruct urine flow and lead to kidney failure. Crystal nephropathy is a well-known adverse effect of sulfadiazine.

**METHODS**

A 60-year-old man with a history of Hodgkin disease and hematopoietic stem-cell transplantation was diagnosed of Toxoplasma chorioretinitis. He started treatment with pyrimethamine (75 mg/d) and sulfadiazine (500 mg/d). Ten days later, he was admitted to hospital due to mild persistent lumbar pain and self-limited hematuria.

**RESULTS**

An urgent blood test revealed acute kidney injury (AKI), with an increase in serum creatinine from a baseline of 0.81 mg/dL to 1.79 mg/dL (eGFR from 96 to 40 mL/min/1.73m$^2$). Urine analysis showed pH 5.5, density 1013 g/L, trace proteinuria, trace hematuria and positive leukocyte esterase. The microscopic study of the urine sediment revealed numerous fan-shaped crystals with radial striations and birefringent on polarization. They were identified as sulfonamide crystals, as later confirmed by infrared spectroscopy. Renal ultrasound detected no urinary tract obstruction. Sulfadiazine-induced obstructive tubulopathy was established as the most likely diagnosis. Other causes, such as thrombotic microangiopathy or tumor lysis syndrome, were discarded. Treatment with pyrimethamine and sulfadiazine was suspended and intravenous sodium bicarbonate and 0.9% saline was initiated. After 48 hours, treatment was resumed with pyrimethamine (50 mg/d) and clindamycin (600 g/8h). One week later, the recovery of renal function was complete.

**CONCLUSIONS**

Urine precipitation of sulfadiazine can give rise to characteristic fan-shaped crystals, sometimes described as crystals in the form of sheaves of wheat. Sulfonamide crystal deposition is favored by persistent acidic urinary pH. These crystals can block renal tubules or the urinary tract and lead to acute kidney injury. Treatment consists on fluid therapy, urine alkalization and the suspension of the causing sulfonamide.

Kidney diseases and transplantation, urinanalysis

P1358

## CONFIDENCE IN YOUR CALIBRATORS: ASSESSMENT OF MASSTRAKTM IMMUNOSUPPRESSANT CALIBRATOR AND CONTROL SETS

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### BACKGROUND-AIM

The analytical performance of the Waters MassTrak Immunosuppressant Calibrator and Quality Control Sets (IVD) were evaluated using a laboratory developed LC-MS/MS method, to analyze all four immunosuppressants in a single run.

### METHODS

The MassTrak Immunosuppressant Calibrator and Quality Control Sets were used to quantify cyclosporine, everolimus, sirolimus and tacrolimus in human whole blood.
Samples (50µL) were treated with zinc sulfate and acetonitrile containing internal standards. A water/methanol/ammonium acetate gradient was used with a Waters C18 HSS SB column on a Waters ACQUITY™ UPLC™ I-Class FL and Xevo TQ-S micro Mass Spectrometer with an injection-to-injection time of less than 2 minutes.

### RESULTS

No system carryover was observed from high concentration samples. Precise quantification (≤20% CV, ≤15% bias) at concentrations equal to or lower than the lowest concentration calibrator was demonstrated. Total precision and repeatability (3 pools, 5 replicates, 5 days; n=25) were determined to be ≤7.1% CV. The method was linear over the measuring interval of 19.3-1500 ng/mL (cyclosporine) and 0.77-39 ng/mL (everolimus, sirolimus and tacrolimus). Addition of high concentrations of several endogenous materials did not affect quantification. External quality assurance samples for all drugs met the scheme acceptance criteria (cyclosporine: n=39, range 0-2658 ng/mL, mean % bias +0.8%; everolimus: n=35, range 0-21.9 ng/mL, mean % bias +0.9%; sirolimus: n=34, range 0-74.2 ng/mL, mean % bias -7.4%; tacrolimus: n=40, range 0-23.0 ng/mL, mean % bias -0.8%).

### CONCLUSIONS

Performance of the Waters MassTrak Immunosuppressant Calibrator and Quality Control Sets, with the developed method described provide good method performance. The accuracy data demonstrates confidence in the MassTrak Immunosuppressant Calibrator Set, providing harmonization across laboratories.
This method is an example of an application using the instrumentation, software and consumables described in this document. This method has not been cleared by any regulatory entity for diagnostic purposes. The end user is responsible for completion of the method development and validation. MassTrak Immunosuppressant Calibrator and Quality Control Sets are not available for sale in all countries.

Kidney diseases and transplantation, urinanalysis

P1359

**BIOCHEMICAL DIAGNOSIS FOR PRIMARY HYPEROXALURIA SYNDROMES**

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**BACKGROUND-AIM**

Primary hyperoxalurias (PHs) are a group of inherited disorders characterized by oxalate overproduction caused by defective glyoxylate detoxification. This leads to calcium oxalate deposition in body tissues. Each type of PH is characterized by specific liver enzyme defect, leading to an abnormal increase of specific biomarkers: glycolate for PH1, L-glycerate for PH2, 4-hydroxy-2-oxoglutarate (HOG) and 4-hydroxyglutamate (4OHGlu) for PH3. A simple analytical procedure for detecting these markers would be a useful diagnostic tool for the early diagnosis and management of PH in pediatric population.

**METHODS**

We present an analytical method that fulfills this need. The method is applied in our laboratory for the characterization of PH. Instrumental analysis of diluted urine or deproteinized serum is performed by means of liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS), with an Electrospray Ionization Source (ESI) operating in negative ion mode. This analytical technique, characterized by high sensitivity and specificity, allows the simultaneous detection of all PH markers in the same assay. Glycolic acid 13C2 and L-glyceric acid D3 were used as Internal Standards. The method was operated in the multiple-reaction monitoring (MRM) mode. Over a four months period, 800 outpatient urine samples were analyzed for oxalate. 44 urines, having exceedingly high oxalate (>0.55 mmol/mol cr), were screened for acids.

**RESULTS**

Out of 44 urines, one hyperglycolic and two hyperglyceric acidurias were identified. PH diagnoses were confirmed by genetic analysis. In addition, HOG and 4OHGlu in urines from two PH3 patients were detected and were significantly higher than in normals (>5 µmol/L).

**CONCLUSIONS**

These preliminary data, limited to a short period of time, confirm the high predictive power of the biochemical approach to the diagnosis of PH1: glycolate in PH1 patient is 10-30 and 4-10 folds higher, in blood and urine respectively, then in normal subjects. For PH2, glycerate is an even more powerful marker resulting more than 100 folds higher than in normals. The analytical technique proved useful for both early diagnosis and follow-up of patients treated with surgical and/or pharmacological therapies such as pyridoxine, or novel RNA interference (RNAi) drugs for selective enzyme inhibition.

Kidney diseases and transplantation, urinanalysis

P1360

**MITOQUINONE MESYLATE (MITOQ) AS A MITOCHONDRIA-TARGETED ANTIOXIDANT IN THE TREATMENT OF ISCHEMIA-REPERFUSION INJURY DURING KIDNEY GRAFT PERFUSION.**

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**BACKGROUND-AIM**

Oxidative stress is the most important damaging factor of ischemia-reperfusion injury (IRI) of transplant organs. Warm and cold ischemia provoke changes in structural proteins, ions imbalance and proper functioning of cell organelles. Following by massive production of reactive oxygen (ROS) and nitrogen (RNS) species after blood flow restoration that enhance graft damage and its further poorer functioning. Since mitochondria are the main source of ROS, the imbalance of respiratory electron transport chain during kidney transplantation process causes generation of mitochondrial ROS. Therefore, we propose mitochondria-targeted antioxidant- Mitoquinone mesylate (MitoQ) as a promising therapy that can be implanted during the kidney graft storage process. The aim of this study was to evaluate the protective effect of MitoQ added to the perfusion buffer during hypothermic kidney graft perfusion.

**METHODS**

Isolated Wistar rat kidneys were excised immediately (Sham) or after 30 min of warm ischemia (IRI), flashed and perfused with buffer for 22 hours in hypothermic environment (4 °C; perfusion system the EMKA Technologies, France) with or without MitoQ (IRI + MitoQ). The level of kidney injury markers (NGAL, KIM-1), MMP-2 and MMP-9, ROS/RNS concentrations were measured in kidney tissue homogenates.

**RESULTS**

IRI rats have significantly higher NGAL, KIM-1 and ROS/RNS concentrations ($p<0.05$) in kidney tissue compared to Sham rats. However, lower concentrations of NGAL and KIM-1 proteins in the tissue were observed when MitoQ was used ($p<0.05$). The administration of MitoQ also decreased the total level of ROS/RNS in kidney graft ($p<0.05$). We observed the reduction of MMP-2 concentration in IRI + MitoQ ($p<0.05$) group and no changes for MMP-9.

**CONCLUSIONS**

MitoQ as a strong antioxidant is a good candidate for prevention or mitigation of kidney IRI during the kidney transplantation procedure.
This work was supported by the National Science Centre, Poland, grant number 2017/27/B/NZ4/00601.

Kidney diseases and transplantation, urinanalysis

P1361

## CYSTATIN C MEASUREMENT SYSTEM EVALUATION IN COBAS 8000 SYSTEM (C702, ROCHE DIAGNOSTICS)

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### BACKGROUND-AIM

Cystatin C is a cysteine-protease inhibitory protein synthesized constantly by nucleated cells and totally excreted by glomerular filtration (GF), making it a good biomarker for renal function.
The aims are to evaluate the metrological characteristics of a measurement system for cystatin C serum concentration (Cys) and to test the usefulness of its measurement and CKDEPI equations in our population.

### METHODS

Metrological characteristics of the measurement system for Cys have been estimated: 2 control materials from Biorad, Immunology Control (I1 and I3) have been processed for 33 days to study imprecision (CV) and bias (B), and 2 control materials from Refernzinsititut für Bioanalytik Survey Program (IG) to study the measurement error (E).
193 serum samples have been processed to measure Cys and creatinine concentration (Cre). GF with CKDEPICre, CDKEPICys and CKDEPICre-Cys equations (Chronic Kidney Disease Epidemiology) have been calculated.
Concordance between pathological or non-patological results of CKDEPICre and Cys have been studied, classifying data in 4 GF groups (<45, 45-59, 60-89 and >90 mL/min/1,73m2).
Passing-Bablok test has been realized between CKDEPICre-CDKEPICys and CKDEPICre-CDKEPICre-Cys.

### RESULTS

I1 and I3 mean 0.45mg/L and 0.96mg/L, CV 3.75% and 2.2%, B 5.2% and 7.4% (peer group), B 5.2% and 3.9% (method group). IG program shows E 2.7% and 3.1% (peer group), -0.9% and -0.5% (method group), 0.0% and -0.5% (all methods group).
Concordance between pathological or non-patological results of CKDEPICre and Cys is 100% for GF<45 mL/min/1,73m2, 95.6% for GF 45-59 mL/min/1,73m2, 21.6% for GF 60-89 mL/min/1,73m2 and 60% for GF >90 mL/min/1,73m2.
Passing-Bablok equations are:
CKDEPICys=-8.7 (-13.7 to-4.1)+0.988 (0.902 to 1.067)×CKDEPICre
CKDEPICre-Cys=-4 (-6.7 to-2.5)+1 (0.968 to 1.057)×CKDEPICre

### CONCLUSIONS

Metrological characteristics meet the requirements established in our laboratory.
Concordance between pathological or non-patological results of CKDEPICre and Cys show great discrepancies for GF group 60-89mL/min/1,73m2.
Passing-Bablok test shows a negative constant systematic error for CKDEPICys and CKDEPICre-Cys, underestimating GF respect CKDEPICre.
More studies comparing Cys to the gold standard for GF may be needed before recommending it to study renal function.

Kidney diseases and transplantation, urinanalysis

P1362

**INCIDENTAL FINDING IN A NEW GENERATION SEQUENCING (NGS) STUDY OF POLYCYSTIC KIDNEY DISEASE**

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**BACKGROUND-AIM**

Patient referred from Primary Care to the Nephrology clinic of our hospital for presenting high blood pressure figures that do not remit with treatment. The patient is evaluated in the Nephrology Department, carrying out the pertinent tests and where nothing more than hematuria with cystatin levels in the upper normal range stands out. The spectrum of antihypertensive drugs is broadened and annual reviews are cited. After five years, he presented bilateral renal cysts, some small hemorrhagic, and a larger one in the upper pole of the right kidney with protein content and altered renal function (estimated glomerular filtration rate (MDRD): 75.5 cc/min/1.73 m2). Therefore, a genetic study of polycystic kidney disease was requested, although he had no family history of this disease.

**METHODS**

We extracted the patient's DNA from whole blood and performed massive sequencing (NGS) analysis of a clinical exome. We prioritize genes based on the patient's clinical data. In this specific case, a set of 4 genes have been selected: GANAB, PKD1, PKD2, PKHD1 corresponding to a panel of polycystic kidney disease.

**RESULTS**

The result of this study was negative. For this reason, we decided to expand the analysis with genes related to microhematuria, a symptom that the patient presented as well as his brother.
We found the following variant c.801_802delCT (p.Tyr268fs) in the COL4A4 gene associated with Alport Syndrome (AS) that we classified as probably pathogenic in heterozygosis..

**CONCLUSIONS**

We are dealing with a rare case of SA because our variant is heterozygous. Autosomal dominant AS (SAAD) ranges from an asymptomatic disease (presenting mainly as familial benign hematuria) to AD forms with proteinuria and focal segmental glomerulosclerosis. Progression to renal disease is usually slower than in SALX. For this reason, our patient has had a slow evolution of his disease and with an older age of presentation than in the case of recessive forms.
We can conclude by emphasizing the importance of carrying out directed clinical exomes that allow us the possibility of expanding the study when there is another clinical suspicion different from the condition for which said study was requested.

Kidney diseases and transplantation, urinanalysis

P1363

**KIDNEY AND BONE ASSESSMENT WHICH RECOMMENDATIONS FOR CHRONIC KIDNEY DISEASE?**

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**BACKGROUND-AIM**

Chronic kidney disease (CKD) is the result of the alteration of the two kidneys function, either by destruction of the parenchyma or by reduction of the filtration rate resulting in biological disorders which disturb hydro-electrolytic and phosphocalcic homeostasis, these mineral and bone disorders constitute the major clinical complications and impact on the vital prognosis of patients with CKD.
The aim of this work is to check the compliance of the "kidney and bone" biochemical assessment of our CKD population with international recommendations

**METHODS**

the study was carried out on 52 hemodialysis patients admitted to the nephrology-hemodialysis department of the University hospital center and to the RENADIAL hemodialysis clinic of SIDI BEL ABBES-Algeria. We have noted the clinical, therapeutic and, above all, biological parameters, 24-hour urine samples were taken for the determination of calcium by the orthocresol phtaleine complexon (OCPC ) method on the ADVIA 2400 chemistry system

**RESULTS**

it is about 20 women and 32 men with a mean age of 49.5 +/- 15 years. The etiologies underlying CKD were dominated by vascular and diabetic nephropathy. In this series of patient the conformity of the phosphocalcic balance indicator respect the Kidney Disease Improving Global Outcomes (KDIGO) recommendations around 58% for calcemia, 44% for phosphoremia, and 36% for PTH.
The clinical expression of bone remodeling was mainly bone pain (50%) while biological was marked by hypocalciuria in 70% of cases; however this marker lacked sensitivity and an elevation of alcalin phosphatase (PAL) in 25% of patients.

**CONCLUSIONS**

the prevalence of mineral and bone disorders in CKD remains high, hence the importance of early management of chronic kidney disease and effective dialysis.

Kidney diseases and transplantation, urinanalysis

P1364

## DIAGNOSIS OF PRIMARY HYPEROXALURIA TYPE I IN AN INFANT WITH MICROHEMATURIA AND DECREASED RENAL FUNCTION

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### BACKGROUND-AIM

Primary hyperoxaluria type I (PH1) is a rare inherited condition and the most severe form of hyperoxaluria. It is caused by dysfunction of the liver peroxisomal enzyme alanine:glyoxylate-aminotransferase (AGT), which catalyzes the conversion of glyoxylate to glycine, causing an overproduction of oxalate. This excess of oxalate, forms insoluble crystals with calcium that accumulate in the kidney, and lead to nephrolitiasis, nephrocalcinosis, failure to thrive related to renal failure and systemic oxalosis.

### METHODS

Next-generation sequencing (NGS) and bioinformatic analysis performed with NextSeq/NovaSeq Illumina® and Clinical Exome solution Sofia Genetics®.

### RESULTS

We present a 2-month-old girl admitted to urgencies with suspected urinary tract infection, who presented microhematuria and low weight gain. The blood analysis showed white blood cell count (WBC) 12.9x103/µL (VN: 4-10 x 103/µL), Creatinine 0.80mg/dL (VN: 0.17-0.42 mg/dL), and glomerular filtration rate (GFR) 27mL/min/1.73m2. Urinary sediment revealed microhematuria and calcium oxalate monohydrate or whewellite stones. Renal ultrasound showed bilateral hyperechogenicity, papillary calcifications, high resistance index, and probable nephrocalcinosis. Clinical suspicion of chronic nephropathy was established, so a renal biopsy was performed with findings attributable to calcium oxalate nephropathy, with extensive intratubular and interstitial crystal deposits. Plasma levels of oxalic acid were 178µmol/L (VN 29-47µmol/L). The sequencing of the AGXT gene, showed in a compound heterozygosity, the pathogenic variant c.33dupC, p.Lys12Glnfs*156 and the probably pathogenic variant c.686_688delAGA, p.Lys229del in the AGXT gene.

### CONCLUSIONS

PH1 is caused by mutations of the AGXT gene, is inherited in an autosomal recessive manner and affects 1/1000000habitants in Europe. As a rare disease, a high suspicion is required to establish an early diagnosis and prevent its progression. Identification of biallelic pathogenic variants in AGXT inherited from both parents confirmed the diagnosis. Although molecular studies allow us to make precise diagnoses, it is necessary to establish strategies that shorten response times, and avoid carrying out invasive tests such as renal biopsy in patients at risk.

Kidney diseases and transplantation, urinanalysis

P1365

**COLLABORATION BETWEEN NEPHROLOGY AND LABORATORY IN THE DIAGNOSIS AND MONITORING OF A CASE OF ACUTE TUBULAR NEPHROSIS SECONDARY TO ETHYLENE GLYCOL POISONING.**

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**BACKGROUND-AIM**

Ethylene glycol is the alcohol most frequently associated with poisoning. After being metabolized, it generates different acids, which lead to severe metabolic acidosis with elevated GAP anion and multi-organ damage.on the other hand, calcium oxalate crystals, the final metabolite of ethylene glycol, are deposited in multiple tissues causing tissue damage. The monohydrates are the most frequent, morphologically they resemble needles and are specific in ethylene glycol poisoning.
A 21-year-old male without personal history was transferred to the Hospital Emergency Service after voluntarily ingesting car's coolantc. The patient presented vomiting, hypogastric pain and acute kidney failure, no neurological alterations.

**METHODS**

Different laboratory techniques were fundamental for the etiological diagnosis of this patient, among them gas chromatography (ethylene glycol) and the urinary sediment.

**RESULTS**

-Presence of ethylene glycol (specific in ethylene glycol poisoning).
-Creatinine 1.94mg/dL.
-Sodium 135mEq/l, potassium 4.9mEq/L and chlorine 106mEq/L.
-pH:7.17; HCO3 10.6mmol/L; CO2 29mmHg; lactic acid 9.7mmol/l; GAP anion 23.3mEq/L (It is classically used in the differential diagnosis of metabolic acidosis secondary to poisoning).
-Abundant calcium oxalate crystals in the urinary sediment(it manifests as acute renal failure 24 hours after the poisoning).
All these parameters, together with the clinical symptoms of the patient, were essential for the definitive diagnosis of the patient: an acute tubular necrosis secondary to ethylene gycol poisoning.

**CONCLUSIONS**

After the rapid diagnosis provided by the laboratory,the patient was admitted to the Nefrology unit, and an urgent hemodialysis session was performed. During the first days, there was a progressive deterioration of renal function but afterward, it returned to normal and the patient was discharged from the hospital.
Treatment consisted of supportive measures, correction of acidemia, inhibition of ethylene glycol metabolism, and hemodialysis. Early initiation of hemodialysis was critical for early recovery from renal failure, as it is the best method to quickly remove ethylene glycol and improve acidemia.
Due to the close collaboration between the Clinical Laboratory and the Nephrology service, the patient made a rapid and complete recovery.

Kidney diseases and transplantation, urinanalysis

P1366

## ANALYSIS OF MONOCYTE DISTRIBUTION WIDTH (MDW) IN KIDNEY TRANSPLANTATION; ITS RELATIONSHIP TO HLA ANTIBODY STATUS, OTHER LABORATORY PARAMETERS, AND ACUTE REJECTION

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**BACKGROUND-AIM**

Monocyte distribution width (MDW) is a novel biomarker for early screening of sepsis. Its role has not been evaluated yet in kidney transplantation (KT). We aimed to analyze HLA antibody status, laboratory parameters, and acute rejection (AR) according to MDW level in KT recipients.

**METHODS**

From April 2019 to December 2022, the first, we studied in 51 KT recipients who could be analyzed pre-KT MDW levels in Eunpyeong St. Mary's Hospital in Korea. They divided three MDW quartile groups (Q1 [<16.4, N = 13], Q2 [16.4 – 18.0, N = 25], Q3 [>18.0, N = 13]). Panel reactive antibody (PRA), single antigen antibody (SAA), other laboratory parameters, and AR of them were evaluated. The second, 241 consecutive MDW levels from 72 KT recipients who had their monocyte count was more than 0.1 x $10^9$/L were analyzed to evaluate correlations with other laboratory parameters; white blood cell count (WBC), neutrophil count (N), lymphocyte count (L), N/L ratio (NLR), monocyte count (M), C-reactive protein (CRP), creatinine (Cr), and Chronic Kidney Disease Epidemiology Collaboration- estimated glomerular filtration rate (CKD-EPI eGFR).

**RESULTS**

In analysis of 51 pre-KT MDW levels, PRA-positivity was the highest in Q3 group (61.5%). SSA-positivity was higher in both Q1 and Q3 groups (both 7.7%). WBC, N, NLR, M, CRP, CKD-EPI-eGFR increased according to higher pre-KT MDW quartiles (Q1 to Q3). AR was similar in all three groups. In analysis of 241 consecutive MDW levels, MDW showed significantly positive correlations with NLR and CRP, significantly negative correlations with L and M, and no correlations with WBC, N, Cr, and CKD-EPI eGFR.

**CONCLUSIONS**

This is the first study to HLA antibody status, other laboratory parameters, and AR according to MDW levels in KT. HLA antibody-positivity was higher tendency in higher level of pre-KT MDW although there was no significant difference of AR between three pre-KT MDW quartile groups. Further evaluation with a large sample size is needed for clarifying MDW level associations with HLA antibody status and AR in KT recipients.

Kidney diseases and transplantation, urinanalysis

P1367

## VERIFICATION OF ANALYTICAL CHARACTERISTICS OF ELECSYS CYCLOSPORINE ASSAY ON COBAS E601 ANALYZER

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### BACKGROUND-AIM

Cyclosporine (CsA) is an immunosuppressive agent used to prevent acute rejection following kidney or liver transplantation. Monitoring of CsA concentrations is necessary to administer appropriate drug dosages. The study aimed to verify the analytical performance of Elecsys Cyclosporine assay on Cobas e601 (Roche, Basel, Switzerland).

### METHODS

EDTA-whole blood samples were treated with ISD Sample Pretreatment reagent, thoroughly mixed, and centrifuged for 4 minutes at 10000 g. CsA was determined in the supernatants. The reproducibility of hemolysates was determined using 3 levels of control materials PreciControl ISD (lot 54476503). Each hemolysate was analyzed 10 times in one run within 30 minutes as defined by the manufacturer. Reproducibility CV criteria were defined by the manufacturer as 4,1% PreciControl ISD 1 (57,4 nmol/L), 2,0% PreciControl ISD 2 (271 nmol/L), and 3,1% PreciControl ISD 3 (1023 nmol/L). To verify the accuracy of the measurement, an interlaboratory comparison between Clinical Hospital Center „Rijeka" and our laboratory was done using 40 patient samples transported at -20°C from Rijeka to Zagreb, according to manufacturer instructions. Bland-Altman and Passing-Bablok statistical tests were used for method comparison. Statistical analysis was done in MedCalc Statistical Software v16.2.0 (MedCalc Software bvba, Ostend, Belgium).

### RESULTS

Reproducibility CVs were as follows: 1,9% for mean CsA 82,9 nmol/L, 5,0% for 328,9, and 5,8% for 803,5 nmol/L. Bland Altman analysis showed statistically significant constant (3,7 nmol/L) and proportional (3,4%) bias. Passing Bablok regression analysis showed no statistically significant constant bias -1,089 (CI -2,647 – 0,513) and minor proportional 1,044 (CI 1,005-1,085).

### CONCLUSIONS

The reproducibility of hemolysates was verified for the low level of control material, but not for higher CsA concentrations. It is approved that CsA measurements are comparable between laboratories using the same Elecsys Cyclosporine assay method.

Kidney diseases and transplantation, urinanalysis

P1368

## GDF-15 AS BIOMARKER OF DISEASE PROGRESSION AND CARDIOVASCULAR RISK IN PREDIALYSIS PATIENTS

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### BACKGROUND-AIM

Growth differentiation factor 15 (GDF-15), a member of transforming growth factor β-superfamily, is highly expressed in placenta and prostate gland and in small amounts in almost all tissues. It has multiple roles in pathologies and our target were cardiovascular and kidney disease.

### METHODS

Serum GDF-15 was measured in 139 individuals by commercial kit Elecsys® GDF-15 (Cobas 8000, e602 module), as other biochemical parameters. Patients group consisted of men (n = 76, age from 27 to 85 years) and woman (n = 63, age from 19 to 86 years) with chronic kidney disease (CKD), stage 2 - 3, mean eGFR 24.6 ± 11.0 mL/min/1.73 m2.

### RESULTS

Mean GDF-15 serum levels in all subjects was 4 244 ± 3 054 ng/L with 95 % CI 3 730 - 4 758 ng/L. The influence of GDF-15 on the following three parameters was tested; overall survival (OS), cardiovascular survival (CVS) and time to dialysis (TTD). TTD was significantly affected by sex and diabetes mellitus (DM), OS and CVS by DM and cardiovascular disease (CVD). Therefore, we used Cox proportional hazard models to test association of each biomarker with the above mentioned outcomes. After all, we found a significant impact of GDF-15 to OS ($p = 0.0116$) and CVS ($p = 0.0207$). Blood samples were collected in patient´s predialysis phase (year 2007, 2008). To this date, we observed significant relationship between GDF-15 in these patients and CKD progress (expressed as TTD) and mortality in agreement with other authors.

### CONCLUSIONS

Elevated GDF-15 serum levels were significantly associated with increased overall mortality and cardiovascular survival in CKD patients in predialysis phase.

Kidney diseases and transplantation, urinanalysis

P1369

## EVEROLIMUS ACMIA AND QMS IMMUNOASSAYS: A COMPARISON BETWEEN METHODS

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### BACKGROUND-AIM

Everolimus, an inhibitor of the mammalian target of rapamycin (mTOR), is an immunosuppressive drug (ISD) mainly administer after kidney, liver, heart and lung transplantation in order to suppress the host immune system. Since it is characterized by a narrow therapeutic index and high inter-intraindividual pharmacokinetic variability, Everolimus sufficiently fulfils the criteria for a Therapeutic Drug Monitoring (TDM)-guided therapy; therefore, TDM is mandatory for Everolimus and different immunoassays are routinely used for its monitoring. In this study we investigated the correlation between our in use assay with a recently introduced automated assay for Everolimus TDM and we evaluated its analytical performance.

### METHODS

For comparison, 215 consecutive whole blood samples, collected in K2EDTA anticoagulant, were simultaneously processed performing ThermoFisher Scientific QMS® Everolimus assay, requiring a manual extraction procedure, on our conventional platform CDx90 (Tema Ricerca) and Siemens automated ACMIA® Everolimus assay (EVRO) run on Dimension EXL 200 analyzer (Siemens Healthcare Diagnostics Inc.). Method comparison was investigated by Passing-Bablok analysis and differences between methods were visualized with Bland-Altman plots. Within-run and within-laboratory precision on Dimension were evaluated using Quality Control materials.

### RESULTS

For precision evaluation of EVRO assay on Dimension, within-run and within-laboratory precision tests reveal CVs ≤5%. Passing-Bablok analysis yielded the Correlation Coefficient r=0.953 and the following regression equation y=1.18+1.31x. Bland-Altman bias plots display the presence of an increasing absolute bias (2.72 ng/mL, 95%CI 2.6–2.9) in conjunction with a positive 47.6% bias (95%CI 45.4–49.8) which tends to decrease with increasing Everolimus concentrations.

### CONCLUSIONS

EVRO assay demonstrated reliable analytical performance, showing good within-run and within-laboratory precision. The availability of an automated assay, without the need for manual activities, leads to workflow improvement and measuring standardization; however, a complex bias pattern has emerged comparing our in use method with EVRO assay, which currently makes the transition of Everolimus TDM from the conventional platform to Dimension analyzer difficult.

Kidney diseases and transplantation, urinanalysis

P1370

**VALUE OF MANUAL URINE SEDIMENT IN THE LABORATORY: CASE REPORT**

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**BACKGROUND-AIM**

The chance discovery of the presence of Trichomonas sp. in a sediment, made us consider evidencing the amount of unaffilated cells (NEC) that were detected by automated system and assessing the usefulness of mounting manual sediments.

**METHODS**

We collected the analytical data of the total number of urine samples taken during a year in our service, obtaining the following results: 63,763 systematic urine samples, of which 21.6% (13,801) were pathological and an automated sediment study was performed on them. NEC were present in 12.8% (8,135) of these sediments.

**RESULTS**

A male patient underwent a routine urine screening control analysis from Primary Care. The urine systematic was performed in the Aution Max AX-4030 equipment (Menarini ®), in which the reactive strip indicated a value of 500 leukocytes/µL, the rest of the parameters were normal. The sediment was processed automatically in the Sedimax 2 equipment (Menarini®) taking a volume of 100 microliters of urine. The autoanalyzer reported the NEC alarm. Cellular elements of variable size with an apparently vacuolated interior, shiny and with well-defined edges, were observed, suggesting unfilial cells. It was decided to carry out manual analysis under an optical microscope.
In the study it is clearly observed Trichomonas sp. protozoa. We contacted the Microbiology Unit for confirmation. Its presence was reported in the sediment report and it was recommended to send a second sample for microbiological study.

**CONCLUSIONS**

This clinical case shows us the limitations present in automated urine sediment analysis systems, both due to the low volume of urine used and the fixed images obtained automatically do not allow us to see the mobility of the protozoan and the observed appearance led to confusion with other unaffiliated cell types.
For this all, we must not forget the use of manual analysis under the microscope of the urinary sediment as a confirmatory method for checking automated results, since, although these are fast and comfortable in daily work, they can cause an under-diagnosis by a size of unrepresentative aliquot of the total sample and lack of resolution in the image. This translates into a lack of sensitivity and specificity of the automated technique compared to the traditional one.

Kidney diseases and transplantation, urinanalysis

P1371

## REFERENCE INTERVALS FOR AUTOMATIC URINE SEDIMENT ANALYZER, UF-5000 PARAMETERS FROM A SINGLE KOREAN HEALTH-CHECK CENTER

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### BACKGROUND-AIM

For decades urine sediment analysis has been conducted using a fully automatic urine analyzer in the clinical laboratory. We use the reference interval (RI) derived from the manual microscopic examination. Although it is the gold standard for detecting RBCs in urine sediments, also time-consuming and labor-intensive. Furthermore, a skilled observer is necessary to identify RBCs in urine sediments and different results are reported depending on centrifugation or other conditions. This study aimed to establish RIs of all UF-5000 parameters, including new research parameters, Urine RBC Distribution (URD).

### METHODS

Among the 3594 examinees who performed urine tests during seven months in 2022, the presumptive patients who were taking medication for a previously diagnosed disease or showing any abnormalities in the following tests were excluded - cell counts in CBC, hemoglobin A1c, total protein, total and LDL-cholesterol, CRP, AST, ALT, ALP, Rheumatoid factor, and creatinine. Data from 455 men aged 22 to 77, who answered less than half of the questions about urination abnormalities, were retrospectively reviewed and calculated.

### RESULTS

The upper limits of RI of RBC, WBC, and Epi, set as 97.5 percentile, particles per microliter, were 17.2, 17.8, and 6.2, respectively. The values were significantly lower than those converted inversely from microscopic reference grades by the manufacturer. In other studies, the 97.5 percentile values of cast, bacteria, and crystal evaluated were 17.9, 141.1, and 0.0, respectively, different from the results compared with image analysis and culture methods. The distribution of particle components was left-shifted, while the URD value representing the small RBC ratio among non-lysed RBCs is extremely right-oriented, meaning that attention needs to be paid to the interpretation of the non-hematuria results.

### CONCLUSIONS

Since the performance of the urine automation device has been verified through comparison with the microscopic examination, it is now necessary to present a RI derived from the measured quantitative values, not the converted ones. Also, in this study, we showed RI obtained from the clinical laboratory, including the new research marker URD, which is known to be associated with glomerular nephropathy.

Kidney diseases and transplantation, urinanalysis

P1372

**FIBROBLAST GROWTH FACTOR 23 MEASUREMENT IN CHRONIC KIDNEY DISEASE: A PILOT APPROACH TO CLINICAL USE**

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**BACKGROUND-AIM**

Fibroblast Growth Factor 23 (FGF23) increases at the initial stages of chronic kidney disease (CKD) to prevent phosphate accumulation. As observed in epidemiological studies, maladaptive FGF23 increases can damage bone, heart, or vessels. Data about its clinical implementation in laboratory medicine are scarce. We present preliminary baseline results of our clinical protocol based on FGF23 measurements as a surrogate marker of phosphate retention and therapeutic target in CKD.

**METHODS**

Fasting blood and second void urine was collected from sixty 2-4 stage CKD normophosphatemic patients (aged 18-75 yrs, 82,5% men). Polycystic, kidney recipients, tumors, or patients treated with non-calcium phosphate binders, active vitamin D, or calcimimetics were excluded. Intact FGF23, parathyroid hormone (iPTH), vitamin D, and other mineral metabolism parameters were measured. Bone densitometry (DEXA), trabecular bone score (TBS), echocardiogram, and carotid ultrasound were equally performed.

**RESULTS**

iFGF23 mean baseline levels were 80.4±25.6, 95.5±20.4, 118.8±22.7 and 134.9±50.4 (p:0.053) pg/mL at 2, 3a, 3b and 4 stages respectively. A negative correlation between iFGF23 and the glomerular filtrate (eGF) (p: 0.004); TPR (p: 0.002) and calcitriol (p:0.003) was observed, while iPTH showed a positive one with iFGF23 (p:0.025) and negative only with eGF (p: 0.001) and TPR (p:0.006). Only 8% of patients met osteoporotic criteria; however, 60% showed trabecular microarchitecture impairment with a significant inverse correlation between iFGF23 and lumbar T-score (p: 0.017) or bone microarchitecture (p:0.018) and direct one with TBS (p:0.005); calcitriol also correlated with these bone parameters (p: 0.006, 0.002 and 0.000 respectively), but iPTH did not. No significant correlation was registered between biochemical measurements and left ventricular mass index, ejection fraction, or carotid atheromatosis.

**CONCLUSIONS**

The progressive increase of iFGF23 levels along with GF decline; and its better behavior than iPTH, based on its association with biochemical and bone parameters, indicate that iFGF23 could be a useful biomarker in the management of CKD in clinical practice.

Kidney diseases and transplantation, urinanalysis

P1373

## A LC-MS/MS METHOD VALIDATION FOR INTRA-LEUKOCYTES CYSTINE LEVELS QUANTIFICATION IN CYSTINOSIS PEDIATRIC PATIENTS

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### BACKGROUND-AIM

Cystinosis is a rare lysosomal storage disorder caused by autosomal recessive mutations in the CTNS gene that encodes the cystine transporter cystinosin, which is expressed at the lysosomal membrane and mediates the efflux of cystine from the lysosome. Cystinosis is a systemic metabolic disorder that initially affects kidneys and, then, leads to multiorgan dysfunction. Quantification of intracellular cystine is important for both diagnosis and monitoring of cystinosis therapy. Cystine mainly accumulates in phagocytic cells—polymorphonuclear (PMN) leukocytes and monocytes—but not in lymphocytes. Leukocytes are the best cells for this analysis because they are easily and repeatedly accessible. Here, we have developed and validate a LC-MS/MS method to specifically quantify cystine levels in PMN cells.

### METHODS

This LC-MS/MS method was validated according to EMA and FDA guidelines for bioanalytical methods validation. It has been applied to PMN rings isolated after Ficoll gradient centrifugation from heparinized whole blood samples belonging to n=35 cystinosis pediatric patients followed-up at our Hospital and n= 25 from abroad Centres. Intra-leukocyte cystine levels (expressed as nM) were normalized on proteins amount measured through BCA assay. To further assess purity of PMN extraction, an aliquot of isolated rings was subjected to flow cytometry analysis.

### RESULTS

Our bioanalytical method was fully in agreement with EMA and FDA guidelines in terms of accuracy, precision, selectivity, specifity and carry-over. Calibration curve was linear over the range of 0.0-1.0 nM (R2=0.9999, y=1.044*X + 0.002111). Forward scatter vs side scatter dot plots, generated by flow cytometry analysis of PMN rings, revealed that 90.60 % of total isolated cells was composed by granulocytes.

### CONCLUSIONS

Intra-leucocyte cystine measurement is the only validated tool for disease monitoring. Our LC-MS/MS method allows a sensitive quantification of intra-leukocyte cystine amount. Using flow cytometry analysis, we are able to confirm purity of PMN rings and to provide specific determination of cystine levels into granulocytes. Therefore, this method could be used for monitoring intra-leukocytes cystine levels and for the optimization of therapies in cystinosis pediatric patients.

Kidney diseases and transplantation, urinanalysis

P1374

## CRITICAL TACROLIMUS VALUES IN TWO PATIENTS RECEIVING HOME THERAPY WITH NIRMATRELVIR-RITONAVIR FOR COVID-19

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### BACKGROUND-AIM

Grafted patients have a higher risk of progression to severe COVID-19. Due to SARS-CoV-2 variants no longer sensitive to monoclonal antibodies, therapeutic strategy has shifted to antivirals such as Nirmatrelvir-Ritonavir (NR), which has proven effective in reducing severe disease. However during NR therapy the immunosuppressive drug must be monitored because of pharmacokinetic interactions: tacrolimus (TAC) is metabolised by the cytochrome P4503A4 enzyme system while ritonavir is an inhibitor. This leads to TAC accumulation, with increased risk of nephrotoxicity and other adverse effects.

### METHODS

In November 2022, two grafted patients undergoing home therapy for COVID-19 were monitored by the Clinical Laboratory of Grosseto (ACMIA) in collaboration with the Toxicology Unit of the Clinical Laboratory of Arezzo (LC-MS), as part of the laboratory network of the South East Tuscany AUSL.

### RESULTS

MA, 31 years old, kidney transplant recipient, took NR in full dose for 5 days. On day 3, TAC was stopped for accumulation (>30 ug/L, ACMIA), with a slight rise in creatinine to 1.63 mg/dL. TAC remained elevated for several days (day 9: 25.6 ug/L, ACMIA; 16.6 ug/L, LC-MS), with creatinine dropping to 1.35 mg/dL. On day 13, TAC (6.2 ug/L, ACMIA; 2.8 ug/L, LC-MS) and creatinine (1.16 mg/dL) values returned to pre-NR therapy levels.
VL, 65 years old, undergoing TAC therapy for liver transplantation, took NR in a reduced dose for chronic renal failure on home therapy for COVID-19. TAC was discontinued after 2 days of NR therapy due to accumulation (>30 ug/L, ACMIA; 43.6 ug/L, LC-MS) and onset of nephrotoxicity with increased creatinine (1.37 to 1.58 mg/dL). NR was discontinued on day 3 due to onset of vomiting and diarrhoea. The patient was monitored clinically and laboratorily with reduction in TAC values (36.8 ug/L, ACMIA; 25.3 ug/L, LC-MS) on day 7 while creatinine further increased (2.28 mg/dL). On day 13, TAC (2.5 ug/L, ACMIA; 2.2 ug/L, LC-MS) and creatinine (1.36 mg/dL) values returned to pre-NR therapy levels.

### CONCLUSIONS

Therapeutic Drug Monitoring helped the management of home therapy. In addition, collaboration between laboratories allowed the determination of TAC with LC-MS, which was especially useful when the detection limit of ACMIA was exceeded.

Kidney diseases and transplantation, urinanalysis

P1375

## CHEMICAL CONSTITUTION AND QUANTITATIVE ANALYSIS OF A STAGHORN RENAL STONE BY FTIR SPECTROSCOPY: A CASE REPORT

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### BACKGROUND-AIM

Staghorn lithiasis constitutes one of the most serious forms of urinary lithiasis and although kidney stones are more common in men, coral stones are reported less frequently in men than in women and are usually unilateral. This kind of stone are associated with urinary tract infection by ureolytic bacteria, although there are also other factors that can favour its formation.

### METHODS

A 53-year-old male went to the hospital emergency department with a severe episode of haematuria. No significant medical or family history was mentioned. According to the clinical symptoms, abdominal X-ray and ultrasound tests was ordered. Findings illustrated an opaque staghorn stone in both kidneys being the right calculus with 5 cm longitudinal diameter. With this severe bilateral lithiasis the stone extraction was realized by open pyelolithotomy.

### RESULTS

The study of the composition of the fragment of the stone was carried out in each of the four phases most representative, based on the growth pattern of the calculus itself and its different tonality, indicative of a possible change in its molecular composition. In this way, each layer was meticulously scraped and the powder obtained labelled with ascending numbering as it passed from inner to outer layers. Finally, were analyzed directly on an IRAffinity-1S infrared spectrophotometer. The chemical compositions of the analyzed phases were as follows: 1: White, carbonate apatite(100%); 2: Grey, carbonate apatite(59%) and struvite(41%); 3: Grey, carbonate apatite(47%) and struvite(53%); 4: Ochre, carbonate apatite and struvite(41%).

### CONCLUSIONS

As the results show, the core of the stone was composed entirely of carbonate apatite. Passing from the core to the surface of the stone, it can be seen that the percentage of calcium phosphate decreases, appearing in the composition struvite, which reaches 53% in one of them, indicative of successive infectious processes suffered by the patient. Only 95% of renal lithiasis are caused by biochemical alterations that can be controlled by helping to change the natural history of the disease. Due to this, a correct quantitative constitutional analysis of the calculus by the laboratory can serve as a turning point to discover the causes of its formation and, most importantly, to avoid recurrences.

Kidney diseases and transplantation, urinanalysis

P1376

## EVALUATION OF URINARY SEDIMENTS BY FLOW CYTOMETRY FOR DETECTION OF URINARY TRACT INFECTION COMPARED TO URINE CULTURE

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### BACKGROUND-AIM

Urine culture is the gold standard to identify bacteria in urine. Flow Cytometry can differentiate and quantify multiple particles (including bacteria) in the urine. It can be useful as a method for rapid screening of urinary tract infection. We want to evaluate the detection of urinary tract infection by Flow Cytometry in comparison with standard urine culture.

### METHODS

We studied 3050 adult hospitalized and from emergency department patients and outpatients from February 2021 to February 2022 with a median age 65,4 years. There were 799 women (26,2%) and 2251 men (73,8%). Urine culture and urine flow cytometry (UFC) were performed on the same patients. UFC bacterium and UFC leucocyte were stained by specific fluorochromes for nucleic acids and for surface structures, and then passed through a laser beam in the UF-4500 (Sysmex) equipment. Qualitative variables and quantitative variables were studied by Independent Chi-square test, Fisher´s test, independent-samples t test, Anova One-Way. Significance level was set to 0.05 Statistical analysis was performed with SPSS version 28.

### RESULTS

A test was defined positive if UFC leucocyte and UFC bacterium was detected. Comparing the results of urine culture with UFC study, we obtained 2838 (93%) concordant results: 399 true positive samples (79,9% with concordant gram) and 2439 true negative samples, and 212 (7%) discordant results. In this last group there were 118 urine false positives (3.9%) and 94 false negatives (3.1%), significantly higher in women who went to the emergency room. The relationship between UFC bacterium count and urinary tract infection (positive culture) is statistically significant, $p<0.001$. These results allowed us to obtain: sensitivity of 77.2%, specificity of 96.3%, PPV (positive predictive value) of 80.9% and NPV (negative predictive value) of 95.4%.

### CONCLUSIONS

Our results showed a good correlation between urine study by UFC and urine culture, in the detection of urinary tract infection. A possible explanation for the discordant results of the two methods could be the way of urine collection: at different times and with different asepsis. Urine flow cytometry is a rapid screening method that can rule out urine infection.

Kidney diseases and transplantation, urinanalysis

P1377

## BLOOD UREA NITROGEN , CREATININE AND C REACTIVE PROTEIN INFLUENCE OVER PLATELET TRANSFUSION NEEDS IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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### BACKGROUND-AIM

Many studies revealed the decreased platelet count in chronic kidney disease (CKD), although it is not as well documented as anemia. The “excessive clotting and bleeding in CKD is related to platelet-dependent mechanisms”. Platelet functions are altered and there is an increased bleeding risk.
The aim of this study was to establish if the administration of platelet concentrate was effective and how creatinine, blood urine nitrogen (BUN) and C reactive protein (CRP) influenced the transfusion needs.

### METHODS

The study was realised on 104 patients with chronic CKD and thrombocytopenia, who received platelet transfusion, during 2015-2021. The patients were hospitalised in Constanta County Hospital, nephrology ward. Complete blood count, (BUN) and creatinine, and ( CRP) were tested at admission . The number of transfused platelet units were considered. The statistical analysis was performed using IBM SPSS software version 25.

### RESULTS

In the studied group, 55 were male and 49female. The mean age was 63.96 year. There are statistical differences between the mean age values in male (59.75 year) and female (68.69 year). Other associated diagnosis in the studied patients were liver cirrhosis (CKD+LC) and urosepsis (CKD+S).
For the patients in this study, the average BUN was 174.51 mg/dl and average creatinine was and 5.09 mg/dl. The median CRP was 6.92 mg/L, considered as metabolic inflammation. A Kruskal-Wallis H Test showed that for 3 transfused platelet units as well as for 6 platelet units the distribution of BUN (mg/dl) and the median values of BUN (mg/dl) are the same across categories of associated diagnosis.
Also, for 3 ad 6 transfused platelet units the distribution of CRP (mg/dl) and the median values of CRP (mg/dl) are the same across categories of associated diagnosis.

### CONCLUSIONS

The threshold for prophylactic platelet transfusion was 20 x103 /ml.
In all patients with platelets count under this threshold there were administrated at least 6 platelet units per patient considering the additional risk factors for bleeding.
There was no association between the necessity of transfusion and associated diagnosis.
The values of BUN, creatinine and CRP were not correlated with the initial number of platelets and number of transfused platelet units

Kidney diseases and transplantation, urinanalysis

P1378

## GOODPASTURE SYNDROME IN THE OLD AGE: A GOOD PROGRESSION CASE

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### BACKGROUND-AIM

Goodpasture syndrome (GPS) or anti-GBM disease is characterized by the presence of antibodies against the type IV collagen of the basement membrane, causing rapidly progressive glomerulonephritis (RPGN). Simultaneous involvement of the alveolar membrane is also frequent, causing hemorrhage at this level. It is a rare disease with an incidence of 1/100000 and a bimodal age distribution, with peak incidence in the third and sixth decades of life.

### METHODS

We present a 92-year-old male with symptoms of respiratory infection. As antecedents to highlight, his former profession as a metalworker and his active lifestyle.
During first two days of admission, the patient achieved a good recovery of the respiratory condition and was going to be discharge. Meanwhile, subtle deterioration in renal function went unnoticed until biochemical and urine analysis were required.

### RESULTS

In urine, nephrotic range proteinuria (2675mg/dL) stands out, along with an active sediment and presence of granular, hyaline-granular and cellular casts. 51% dysmorphic red blood cell were observed being suggestive of renal damage and glomerular hematuria.
Subsequently, a rapidly progressive deterioration of renal function occurs, reaching 9.3 mg/dL creatinine and 7.1 mEq/L potassium in less than two weeks.
Immunological study revealed positive anti-GBM antibodies (714 U/mL), guiding the diagnosis to GPS. Confirmation by renal biopsy was not required.
Therapy with corticosteroids and cyclophosamide started, which produced pancytopenia in the patient, but given his good condition, it was decided to exhaust therapeutic options using rituximab. Negativization of anti-GBM was never achieve.

### CONCLUSIONS

This is a paradigmatic case of GPS due to symptomatology and laboratory tests results of RPGN; even existing exposure to risk factors for being a metalworker. From the laboratory, mention the rapid action when analyzing and reporting the findings in urine that focused the clinical attention on the renal clinic.
Despite the poor prognosis due to persistence of anti-GBM, the patient is following a hemodialysis program monthly to replace his chronic renal failure. 16 months have elapsed and he continues with a formidable general condition and active independent life.

Kidney diseases and transplantation, urinanalysis

P1379

## EVALUATION OF THE EFFICIENCY OF AUTOMATIC URINE ANALYZER ATELLICA UAS 800 IN DETECTING PATHOGENS CAUSING URINARY TRACT INFECTIONS

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### BACKGROUND-AIM

Urinary tract infections (UTIs), commonly 50-90% of which are caused by gram-negative bacilli, are the most common infections worldwide. Atellica UAS800 (Siemens Healthineers, USA), an automatic microscopic analysis device, based on the principle of analyzing microscopic images with a digital camera, has the feature of discriminating pathogens as cocci and bacilli apart from the complete urinalysis. We aimed to evaluate the usability of the Atellica UAS800 microscopic analyzer as a screening tool in identifying urinary pathogens by comparing it with the gold standard urine culture method in our study.

### METHODS

A total of 1056 urine samples between June 2022 and July 2022 in Ankara Bilkent City Hospital were included. Atellica UAS800 (Siemens Healthineers, USA) was used for complete urinalysis. Simultaneous samples obtained for urine culture were processed in Walk Away Specimen Processor (WASP; Copan, Italy) and incubated for 24-48 hours at 37 °C. After evaluating on WASP, cultures with growth were identified by Matrix-Assisted Laser Desorption/Ionization Time-of-Flight, Mass Spectrometry (VITEK-MS; bioMerieux Diagnostics, France) device at the species level and the antimicrobial susceptibility testing was performed by VITEK 2 Compact (bioMerieux Diagnostics, France) device.

### RESULTS

Of the 1056 urine samples, 551 (52.2%) and 505 (47.8%) were from male and female patients respectively. In the ROC curve analysis of these 1056 samples, the AUC was determined as 0.743 and 0.865 in the detection of bacteria and bacilli, respectively. In the ROC curve analysis regarding gender, the AUC was found to be 0.772 and 0.865 in female patients and 0.693 and 0.860 in male patients in the detection of bacteria and bacilli respectively. Assuming the lower limit of detection ≥20 p/HPF for bacilli; sensitivity, specifity, positive predictive value (PPV) and negative predictive value (NPV) were found to be 67.3%, 95.3%, 75.9% and 79% respectively.

### CONCLUSIONS

The Atellica UAS800 automatic microscopic analyzer has a high specifity of detecting gram-negative bacilli, which are responsible for approximately 50-90% of UTIs and can guide clinicians in empirical treatment of UTIs.

Kidney diseases and transplantation, urinanalysis

P1380

## COMPARISON OF URINE DIPSTICK AND SYSMEX® UF-4000 RESULTS AS SCREENING FOR URINARY TRACT INFECTION DIAGNOSIS

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### BACKGROUND-AIM

Urine culture is the reference test for the diagnosis of urinary tract infection (UTI). It is a test with low diagnostic yield due to the high percentage of contaminations and negative cultures. With this study we aim to evaluate the efficiency of the urine culture process and compare the results of the urine strip and the Sysmex® UF-4000 automatic analyzer as screening.

### METHODS

The strip used as the first screening method is the AUTION Sticks from Akray, with colorimetric methodology. Nitrite detection is based on the Griess reaction and leukocytes are detected by leukocyte esterase activity.
The second method evaluated is based on quantitative counting of bacteria and leukocytes by flow cytometry by Sysmex® UF-4000 analyzer.
The urine culture is processed by mass seeding on blood agar and isolation on CLED.
The cut-off point on the Sysmex® UF-4000 is >200 bacteria/uL or >50 leukocytes/uL; the urine strip is considered positive if nitrites are positive or leukocytes>75cells/uL.

### RESULTS

259 urines obtained during the month of January 2022 were studied with dipstick, cytometry and urine culture. Forty-one urine cultures were positive (pure bacterial isolation) and 161 were negative (no bacterial growth or less than 1000 colonies). The remaining urine cultures were inconclusive because they were contaminated.
The Sysmex® UF-4000 analyzer had a sensitivity of 96.5%, specificity of 91.9%, positive predictive value of 65.8% and negative predictive value of 99.4%; while the Akray AUTION Sticks strip had a sensitivity of 78.6%, specificity of 89.6%, positive predictive value of 55% and negative predictive value of 93%.

### CONCLUSIONS

-A greater efficacy of the Sysmex® UF-4000 over the urine strip for such screening is confirmed.
-The sensitivity achieved by the Sysmex analyzer is excellent, allowing us to select infected urine.
-The negative predictive value detected is excellent, allowing us to exclude UTI in patients with negative screening.
-The Sysmex® UF-4000 can be used for urine culture screening, improving laboratory efficiency.

Kidney diseases and transplantation, urinanalysis

P1381

## IMPACT OF THE 2009 AND 2021 CKD-EPI CREATININE EQUATIONS ON ESTIMATED GLOMERULAR FILTRATION RATE RESULTS AMONG NON-BLACK PATIENTS

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### BACKGROUND-AIM

Assessment of glomerular filtration rate (GFR) is fundamental to clinical practice: it is basically used to diagnose, stage, and manage chronic kidney disease (CKD) and determine drug dosages. Methods to measure GFR are laborious, expensive and not broadly available. Estimated GFR (eGFR) is widely accessible and appropriate for use, but has limitations. In 2021, the National Kidney Foundation and American Society of Nephrology Task Force concluded that race should not be included in GFR estimating equations, and recommended use of the 2021 CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) creatinine equation. We introduced the new eGFR equation on July 1, 2022, and looked at how the new equation affected our non-black patients in the first semester.

### METHODS

Creatinine was determined by enzymatic method (Diasys, Creatinine PAP FS) on Abbott Architect c8000 chemistry analyzer. eGFR based on creatinine (eGFRcr) was calculated by both equations (2009 vs 2021 CKD-EPI). We processed the data of 11,710 men and 15,277 women over the age of 18. Patients were divided into groups based on GFR categories: 1: eGFRcr < 15; 2: eGFRcr 15-29; 3: eGFRcr 30-44; 4: eGFRcr 45-59; 5: eGFRcr 60-90; 6: eGFRcr >90 mL/min/1,73m$^2$. The median of the eGFRcr differences were calculated using the two equations in each group separately for males and females. We also examined what percentage of patients were placed in a higher GFR category due to the new equation.

### RESULTS

The median $eGFR_{cr}$ differences were almost the same for both groups (male-female) in each GFR category: 1: 1-1; 2: 2-2; 3: 3-3; 4: 4-4; 5: 5-4; 6: 3-3. During reclassification of CKD-stages based on 2021 CKD-EPI creatinine equation, a higher proportion was found in men than in women in all stages: 1.42% vs 0,96 % moved from 1 to 2; 23,1% vs 19,6% moved from 2 to 3; 25,4% vs 22,6% moved from 3 to 4; 31,6% vs 28,2 % moved from 4 to 5 and 20,6% vs 13,9% moved from 5 to 6 category.

### CONCLUSIONS

A fifth of our patients benefit from using the new equation. However, it is important to note if there is uncertainty about clinical decision-making using the 2021 CKD-EPI creatinine equation, it is recommended to use the 2012 cystatin C equation and the 2021 creatinine-cystatin C equation when greater accuracy is required.

Kidney diseases and transplantation, urinanalysis

P1382

## LOSS OF ALBUMINE IN PERITONEAL DIALYSIS PATIENTS

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### BACKGROUND-AIM

Hypoalbuminemia is associated with increased loss of albumin by urine and dialysate, the presence of systemic diseases, comorbid conditions and inflammation in peritoneal dialysis patients. Although dialysate albumin losses can induce albumin synthesis, this often cannot be sufficient to correct the lower serum albumin (SA) values. The aim was to examine loss of albumin by urine and dialysate for 24h in two groups of patients – diabetics and non-diabetics, to compare hospitalization and peritonitis rate, comorbid scores and outcome.

### METHODS

Prospective, single center, study for 55 patients treated by continuous ambulatory peritoneal dialysis in the Clinic for nephrology in Belgrade, divided in two groups – diabetics (63.6%) and non-diabetics (36.4%), compared loss of albumin at baseline and after six months, according residual renal function, transport characteristics of the peritoneal membrane, hospitalization and peritonitis rate, comorbid scores and outcome – mortality rate after two years. Measurements were performed at 0 and 6 months after starting dialysis.

### RESULTS

There was no statistical significance in the loss of albumin by dialysate in comparison to the diabetes at baseline, $F = 3.30$, $p = 0.070$, as after 6 months, $F = 1.72$, $p = 0.20$. Diabetic patients had significantly increasing loss of albumin in the urine at baseline, $F = 23.96$, $p<0.0001$, but without significant difference after 6 months, $F = 1.10$, $p = 0.291$. Significantly greater loss of albumin in the urine and dialysate for 24 h have diabetic patients at baseline $F$ 10.79, $p<0.0001$. Mortality rate was greater among patients with albumin less than 25 g/l, while the lowest was among patients with albumin 35 g/l and more, $X2$ 3.805, $p = 0.149$, but not statistically significant. Mortality rate was associated with high comorbid scores, diabetes and albumin less than 25 g/l ($p<0,05$) at the baseline. It was more common in diabetics after 2 years, but without statistical significance, $X2$ 1.414, $p = 0.493$. The hospitalization and peritonitis rates were more frequent in diabetics, but without significance.

### CONCLUSIONS

Hypoalbuminemia was associated with the loss of albumin by urine in diabetic patients at baseline and had important role in patient survival and quality of life.

Kidney diseases and transplantation, urinanalysis

P1383

## URINARY TEST STRIPS ADD VALUE IN THE IDENTIFICATION OF PATIENTS WITH CHRONIC KIDNEY DISEASE

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### BACKGROUND-AIM

Identifying patients at risk for chronic kidney disease (CKD) using urinary test strips may be a viable alternative. We aimed to evaluate the performance of urinary protein-creatinine ratio (PCR) and albumin-creatinine ratio (ACR) determined by urine test strips, as compared to quantitative lab tests.

### METHODS

We analysed one thousand random urine samples. Only samples taken in an outpatient setting were included, since these patient may benefit most by screening. Urinary PCR and ACR were determined using both quantitative lab tests (Abbott Architect c16000 and Roche Cobas 8000,respectively) and semi-quantitative urinary test strips (Sysmex UC-3500). Patients were classified in CKD-risk categories according to the KDIGO guidelines, based on ACR and eGFR.

### RESULTS

Proteinuria (PCR >0.15 g/g creatinine) and albuminuria (ACR >30 mg/g creatinine) were found in 38.4% and 41.4% of patients respectively. Urinary test strip PCR showed a concordance of 83.7% with the quantitative methods. Sensitivity, specificity, negative and positive predictive values at a cut-off of 0.15 g/g were 81.4% (95%CI: 77.0-85.3%), 90.9% (95%CI: 88.2-93.1%), 88.7% (95%CI: 86.3-90.7%), and 84.8% (95%CI: 81.0-87.9%), respectively. Urinary test strip ACR showed a concordance of 81.8% with the quantitative methods. Sensitivity, specificity, negative and positive predictive values at a cut-off of 30 mg/g were 88.0% (95%CI: 84.4-91.1%), 84.2% (95%CI: 80.8-87.1%), 90.9% (95%CI: 88.3-92.9%), and 79.7% (95%CI: 76.3-82.7%), respectively. When classified into CKD-risk categories, there was a class discrepancy in 121 (15.2%) of the samples between the quantitative and semi-quantitative test strip results. 82 of these 121 samples were classified one risk class worse and 39 were classified one class better than the reference, showing a trend of overestimating the risk score by test strip ACR.

### CONCLUSIONS

Because of the high negative predictive values, both semiquantitative PCR and ACR test strip results may add value to identify CKD patients. The poor positive predictive value can be overcome by performing a quantitative urinary albumin and protein reflex test on samples positive for ACR and PCR, respectively. CKD-risk classification determined by test strip ACR has a good concordance with quantitative ACR, but may tend to overestimate the risk.

Kidney diseases and transplantation, urinanalysis

P1384

**CLINICAL SIGNIFICANCE OF FIBROBLAST GROWTH FACTOR 23 IN MANAGEMENT OF PATIENTS WITH CKD.**

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**BACKGROUND-AIM**

Loss of kidney function in patients with chronic kidney disease (CKD) is associated with impaired phosphate excretion and rise in serum concentration of Fibroblast Growth Factor 23 (FGF23). FGF23 exerts its functions by binding with a dimer receptor composed of FGF-receptor and co-receptor Klotho. Activation of Klotho receptor in the kidney leads to inhibition of phosphate transporters Na Pi2a and Na Pi2c located in the proximal tubule. This leads to decrease in phosphate resorption and increase in phosphate excretion. Furthermore, FGF23 inhibits renal alpha-1-hydroxylase which lowers calcitriol levels and stimulates parathyroid hormone (PTH) secretion.
The aim of the study is to evaluate relationship between FGF23 and the main renal pathology, its stage and duration. To determine its link to PTH levels and hypertension.

**METHODS**

In the study were included 24 patients with CKD with different stages and duration of the disease. All 24 patients had hypertension and high cardiovascular risk. Blood for FGF23 was drawn at the time of admission and samples were stored at -20°C until the day of analysis. For the study of FGF23 was used ELISA test, specific for human FGF23 (Intact and C-terminal fragments of endogenous and recombinant human FGF23) with sensitivity of 0.08 pmol/L and linearity of 0-20 pmol/L [FGF23 (C-terminal) multi-matrix ELISA Kit / BI-20702 Biomedica].

**RESULTS**

The patients were divided into three groups after obtaining the results: Group 1 – patients with FGF23 levels between 0.2 – 4.2 pmol/L; Group 2 – with FGF23 between 4.2 – 20 pmol/L; Group 3 – patients with FGF23 levels above 20 pmol/L. The results showed significant correlation between the levels of FGF23 and the duration of CKD. An earlier increase in FGF23 levels is observed in patients with tubulointerstitial injury. Higher levels of FGF23 are associated with severe hyperparathyroidism.

**CONCLUSIONS**

FGF23 is suitable biomarker for measurement of chronic hyperphosphatemia, more indicative than single measurements of serum phosphate. Follow up of FGF23 levels is recommended in patients with CKD with duration of the disease more than 6 months and especially in patients with chronic tubulointerstitial nephritis. Increase in FGF23 levels is an indication for change in dietary style and use of phosphate binders.

Kidney diseases and transplantation, urinanalysis

P1385

**INSULIN RESISTANCE IN NON-DIABETIC HEMODIALYSIS PATIENTS**

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**BACKGROUND-AIM**

In chronic renal failure, insulin resistance (IR) appears in the early stages of the disease. IR is considered an independent risk factor for cardiovascular disease (CVD), along with oxidative stress, chronic inflammation and endothelial dysfunction.
The aim of this work was to determine IR in hyperglycemic and euglycemic patients on hemodialysis, and to find the correlation of IR with other CVD risk factors.

**METHODS**

60 patients (35 to 63 years old) on hemodialysis, with a high flux membrane, were selected. The patients were divided into two groups, 27 patients with blood glucose concentration above 6.1 mmol/L and 33 patients with glucose concentration below 6.1 mmol/L. None of the patients were treated as diabetics. We determined HOMA-IR, insulin, CRP, IL-6, B2 microglobulin (B2M), PTH, Phosphorus, Calcium, Albumins (Alb), cholesterol (Chol), LDL-C, HDL-C, triglycerides and Lp(a).

**RESULTS**

In the group of patients with glucose concentration above 6.1 mmol/L, compared to the group with glucose below 6.1 mmol/L, the average value of insulin (11.4 ± 3.89 and 7.0 ± 5.39; $p<0.001$) , Homa IR (2.03 ± 0.19 and 1.76 ± 1.08; $p<0.01$), CRP (18.98 ± 5.23 and 10.55 ± 4.53; $p<0.01$), IL-6 (2.80 ± 0.60 and 1.60 ± 0.54; $p<0.05$) B2M (22.77 ± 2.16 and 16.19 ± 5.11; $p<0.001$), triglycerides (3.30 ± 1.43 and 2.61 ± 0.64; $p<0.01$), PTH (146.55 ± 28.64 and 107.35 ± 50.0; $p<0.01$) and Phosphorus (1.9 ± 0.6 and 1.62 ± 0.33; $p<0.01$) are higher. While the average value of HDL (0.89 ± 0.21 and 1.05 ± 0.26; $p<0.01$) and Alb (36.83 ± 3.89 and 40.5 ± 3.94; $p<0.05$) are lower. Although in the first group of patients the average value of cholesterol, LDL-C and Lp(a) were higher, we didn't find a significant difference between groups of patients. In all patients, glucose concentration has a positive correlation with HOMA-IR, insulin, CRP, IL-6, cholesterol, LDL-C, triglycerides, Lp(a), B2M, PTH and Phosphorus, and negative correlation with HDL and albumins.

**CONCLUSIONS**

In chronic renal failure, IR also occurs in patients with low glucose concentration and has a positive correlation with other parameters that indicates the risk of CVD. Therefore, the early detection of IR can be a "target" therapy for the prevention of CVD and mortality reduction in patients on hemodialysis.

Kidney diseases and transplantation, urinanalysis

P1386

## EVALUATION OF UNAMAX® AUTOMATED URINE TEST STRIP ANALYSER

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### BACKGROUND-AIM

The urine dipstick test is the common method of urinalysis. According to workload of our center and the sample stability, a reliable and fast automated measurement system is important.
UNAMAX® is a new automated measurement system by Menarini® with higher speed and a dipstick with 14 parameters (LabUSticks14F®) that includes albumin, creatinine, calcium and ascorbic acid.
The aim is to evaluate UNAMAX® system for the 10 standard chemical-physical parameters and to check the usefulness for albumin/creatinine ratio (ACR) screening.

### METHODS

UNAMAX® reproducibility was studied for specific gravity (SG), pH, glucose, protein, bilirubin, urobilinogen, hemoglobin, ketones, nitrites, leukocyte esterase with UNAMAX® controls for 20 days; imprecision was calculated by % of agreement and accuracy was refered to the tolerance limits of manufacturer. Moreover, UNAMAX®-LabUSticks14F® were compared with AUTION_MAX®-Uriflet S9UB® urine strips in 462 urines; Pearson's correlation coefficient ($r^2$) was performed for SG and pH, for the rest of the parameters concordance and the average Cohen's Kappa index (k) was calculated and interpreted with the Landis and Koch scale.
The ACR screening for UNAMAX® (semi-quantitative; albumin range: 2-15 mg/dL) was compared in 729 urines with quantitative analysis in cobas®c702 Roche Diagnostics. The diagnostic sensitivity/specificity (SD/ED), positive/ negative predictive value (VPP/VPN) and false negatives (FN) were calculated.

### RESULTS

Reproducibility study showed that all the results were within tolerance limits of controls and an agreement > 93%.
Comparison of UNAMAX® and AUTION_MAX® strip test showed a positive and linear relationship for SG ($r^2$=0.97) and pH ($r^2$=0.88). All other parameters showed concordance >76% and average k=0.74 (none <0.41).
In the ACR study, results were: SD=57.76%; ED=89.34%; VPP=71.66%; VPN=81.92%; FN=18.08%. The albumin concentration for UNAMAX® was = 1 mg/dL in 524 samples.

### CONCLUSIONS

The UNAMAX® is a high throughput automated urine strip analyser that has good precision and accuracy for the standard urine test strip.
Its use in ACR screening is discouraged due to its low SD (57.76%) and FN (18.08%). In addition, the limitations of the UNAMAX® albumin measurement range prevent the assessment of most of the data.

Kidney diseases and transplantation, urinanalysis

P1387

**THE ROLE OF SERUM CYSTATIN C IN THE EVALUATION OF CHRONIC KIDNEY DISEASE IN CHILDREN**

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**BACKGROUND-AIM**

Chronic kidney disease (CKD) in children has a significant increase in incidence and prevalence in the world and our country. In our country, there are no precise demographic data on CKD in children. Early diagnosis is a challenge due to the complex etiology and the imperfection of existing methods. The aim of this study was to evaluate the value of serum cystatin C in early prediction of chronic kidney disease and to evaluate the value of serum cystatin C and urinary biomarkers among a study group of children with chronic kidney disease.

**METHODS**

This is a retrospective-prospective study, which included 75 pediatric patients who presented to the University Clinic for Children's Diseases with clinical signs, symptoms, laboratory analyses, and imaging studies for CKD. The examined group is divided into two groups: a group with congenital anomalies of the kidneys and urinary tract and a group with tubulopathies and metabolic diseases with renal affection. The two groups will be compared with each other regarding the degree of chronic kidney disease, serum creatinine, serum cystatin C values, urinary Ngal, urinary beta 2 microglobulin, microalbumin in urine

**RESULTS**

The study processed data on children with CKD (54.67%with congenital anomalies of the kidneys and urinary tract and 45.33% with tubulopathies and metabolic diseases with renal affection), aged 0-14 years. The value of serum cystacin C is significantly higher in the group with tubulopathies and metabolic diseases with renal affection ($p<0.05$). The value of serum cystacin C is significantly higher compared to urinary NGAL, urinary beta 2 microglobulin, microalbumin in urine in the studied groups.

**CONCLUSIONS**

Serum cystacin C is a biomarker that can be used for early prediction of chronic kidney disease in pediatric patients.

Kidney diseases and transplantation, urinanalysis

P1388

## DETERMINATION OF SUPAR CONCENTRATION IN PATIENTS ON HEMODIALYSIS

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### BACKGROUND-AIM

Soluble urokinase-type plasminogen activator receptor (suPAR) levels are increased in various infectious, inflammatory and autoimmune diseases. suPAR is also an important prognostic factor in kidney diseases. Elevated suPAR levels can predict chronic kidney disease incidence and progression of renal dysfunction. This study aimed to investigate whether there is a significant difference in suPAR concentrations in plasma samples before and immediately after hemodialysis. Comparatively, we tested suPAR concentrations in healthy individuals.

### METHODS

suPAR concentrations were measured in plasma from 15 patients, before and immediately after hemodialysis, and also in 20 healthy individuals (control group). suPAR measurements were done on a Beckman Coulter AU5800 analyser (Beckman Coulter, Tokyo, Japan) with suPARnostic reagent (Virogates, Denmark). Statistical analyses were performed in MedCalc (ver. 14.8.1, Ostend, Belgium) using the Wilcoxon test for paired samples (samples before and after dialysis) and the Mann-Whitney test for independent samples (dialyzed patients and control group).

### RESULTS

Results are presented as median and interquartile range (IQR). suPAR concentrations before dialysis were 6.93 ng/mL (4.88-7.53), after dialysis 7.37 ng/mL (4.84-8.11), and for the control group 1.11 ng/mL (0.89-1.71). suPAR concentrations before and after dialysis did not show a statistically significant difference (P=0.095). Concentrations of suPAR in the comparison of healthy individuals and dialyzed patients (samples before dialysis) showed a statistically significant difference (P<0.0001).

### CONCLUSIONS

suPAR levels in the control group were within the reference range (< 4 ng/mL) as expected. For dialyzed patients with various kidney diseases, there is no significant difference between suPAR levels before and immediately after dialysis, which means that the dialysis procedure does not affect suPAR levels in the plasma, and both samples (before and after dialysis) are suitable for monitoring suPAR levels in the plasma of dialysis patients. Also, suPAR levels are higher in patients on hemodialysis than in healthy individuals, hence it could be used as a biomarker in kidney diseases.

Kidney diseases and transplantation, urinanalysis

P1389

## BLOOD LEAD LEVEL IN PATIENTS ON MAINTENANCE HEMODIALYSIS

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### BACKGROUND-AIM

Chronic kidney disease (CKD) is a socially significant disease with a relatively high incidence among the Bulgarian population. Its presence predisposes to imbalance affecting the microelement homeostasis, knowledge of which is still limited. The risk of heavy metal intoxication is of significant clinical importance among patients undergoing Maintenance Hemodialysis (MHD). If certain substances are present in the dialysate but not in the blood, they can transfer across the membrane into the circulatory system, leading to clinically significant toxicity. Previous studies report that concentration of lead accumulates in patients with End-Stage Renal Disease (ESRD), yet to the best of our knowledge, there are no studies concerning the risk of Pb accumulation during the dialysis procedure, along with the possible correlation with its duration in time. The aim of the present study is to investigate the levels of blood lead in ESRD patients on MHD, as well as to consider whether there is any significant difference between the blood lead concentration (BLC) before and right after dialysis. In addition, we study if there is a correlation existing between BLC and the period of MHD therapy.

### METHODS

A total of 49 adult hospitalised patients with ESRD (35 of which are on MHD over 24 months and 14 patients on MHD between 18 and 24 months) were conducted as participants. We used atomic absorption spectroscopy (AAS) as a method for measuring the baseline and the post dialysis whole blood lead concentration.

### RESULTS

The results showed that the blood lead concentration was found to increase with the duration of the MHD. The patients on MHD over 24 months presented significantly higher baseline BLC than patients on MHD between 18 and 24 months (8,62±3,22 μg/dL vs. 4,00±1,57 μg/dL, $p<0,05$), as well as lead levels immediately after the dialysis procedure (8,40±3,12 μg/dL vs. 3,78±1,57 μg/dL, $p<0,05$).We didn't find a significantly difference in the BLC of the overall group before and after hemodialysis (7,49±3,51 μg/dL vs. 7,27±3,45 μg/dL, $p=0,76$).

### CONCLUSIONS

The reliable laboratory diagnosis of clinically significant toxic elements imbalances may contribute to successful prophylaxis and a better approach to managing CKD patients.

Kidney diseases and transplantation, urinanalysis

P1390

## OPTIMIZING THE DIAGNOSIS OF URINE TRACT INFECTIONS BY EMPLOYING AN ALGORITHM IN URINALYSIS

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### BACKGROUND-AIM

Urinary tract infections (UTI) are among the most frequent infections. The last study of prevalence of nosocomial infection in Spain, in the point related to community acquired infections, concluded that UTI represent the second cause of infection in Primary Care following respiratory tract infections. The microbiological urinalysis should include the detection of leucocytes and bacteria in urine, as well as the urine culture.
The aim of this study is to assess the usefulness of a screening algorithm based on urinalysis for the prediction of positive urine cultures, applying it to the samples from patients in the Emergency department and admitted to the hospital.

### METHODS

A total of 2513 samples, with both a basic urinalysis and a urine culture performed at our laboratory, were selected.
By using our algorithm, samples were divided in those that met criteria for culture and those that did not. The algorithm is based on the presence of leucocytes, bacteriuria and epithelial cells by microscopic examination, and on the results of the strip. Moreover, samples were divided into two groups according to the result of the urine culture: those with a positive culture and those with a negative or contaminated culture.
Hypothesis testing was performed using the Chi-square test. Differences were considered as statistically significant when p-value was <0.05.

### RESULTS

The estimated proportion of positive urine culture in samples that did not met criteria was 0.079 (CI 95% = 0.063 - 0.100), while in those samples that met criteria was 0.495 (CI 95% = 0.471 - 0.519), with a p-value <0.05. Therefore, both a statistically and clinically significant difference was found between the two groups.

### CONCLUSIONS

The proposed algorithm is useful in the prediction of positive urine culture, and therefore it can be used to select those samples that should be cultured. It is especially interesting in those samples from patients in the Emergency department or admitted to the hospital: it can help in a one-step diagnosis of UTI, which would reduce unnecessary or erroneous antibiotic treatment.
More studies are needed to improve this algorithm by using more accurate criteria that optimize the selection of pathological urines, and the reduction of those contaminated during collection.

Kidney diseases and transplantation, urinanalysis

P1391

## DIAGNOSTIC UTILITY OF URINE BETA-2 MICROGLOBULIN IN PAEDIATRIC PATIENTS WITH NEPHROPATHY, SOUTH AFRICA

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**BACKGROUND-AIM**

Proteinuria may be associated with tubular or glomerular dysfunction. This is considered a good predictor of disease progression. Urine beta-2 microglobulin (ß2M), a conventional tubular marker, has been underutilized as a marker of renal function in the paediatric population. The study aimed to investigate the diagnostic utility of urine ß2M in paediatric nephropathy patients.

**METHODS**

Data obtained over 6 years from paediatric patients (n=885) seen at the nephrology outpatient department of a tertiary hospital in South Africa was used. We evaluated the association of urine ß2M with protein: creatinine ratios (a currently used marker) in specified age groups and the correlation of urine ß2M with estimated glomerular filtration rate (eGFR). The proteinuria stages, based on the protein: creatinine ratio and the eGFR, calculated from height and serum creatinine values using the Modified Schwartz formula, were considered. We attempted to develop cut-offs of urine ß2M in stipulated age groups (4-9 years and 10-13 years respectively) that could be utilised in paediatric patients.

**RESULTS**

We observed a statistically significant difference in urine ß2M levels between all 3 proteinuria stages. We also demonstrated a positive correlation of urine ß2M with urine protein: creatinine ratio (p value < 0.001) and a negative correlation with eGFR (p value< 0.001). Higher empirical ß2M cut-offs in the age group 4-9 years were observed as compared to the 10-13 year age group. Age specific cut-offs may therefore have a role in monitoring patients.

**CONCLUSIONS**

Urine ß2M has a valuable prognostic and diagnostic role in paediatric nephropathy irrespective of aetiology of renal pathology. It correlates well with urine protein.

Kidney diseases and transplantation, urinanalysis

P1392

**NOSOCOMIAL URINARY INFECTION: OUR EXPERIENCE**

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**BACKGROUND-AIM**

Urinary tract infections (UTI) are mainly related to urinary catheterisation. The aetiology of catheter related UTI is variable, and multiresistant microorganisms are often isolated, making empirical antibiotic therapy complex. Clinical findings are frequently atypical, and its diagnosis is difficult. The therapeutic management of catheter-related UTI should be stratified according to the type of UTI: asymptomatic bacteriuria should not be habitually treated, but patients with septic shock should receive a broad-spectrum antibiotic.

**METHODS**

: In the period July 2020-June 2022, 3000 urine cultures were performed, of which 600 were positive. The higher prevalence of urinary infections in the different departments was analysed.

**RESULTS**

The number of positive urine cultures was higher in Medicine (30%), Intensive care unit (25%), Emergency Room (20%), departments where the risk factors predisposing to infection are: bladder catheterization, invasive procedures, advanced age, associated comorbidities, immunodepression, long hospitalization, the remaining departments to follow with positivity between 1-8%. The microorganisms isolated were Escherichia coli (35%), Pseudomonas aeruginosa (20%), Klebsiella pneumoniae (16%) Staphylococcus aureus (12%),Acinetobacter spp. (9%),Proteus mirabilis (7%)Streptococcus pneumoniae (1%).

**CONCLUSIONS**

Urinary tract infections comprise approximately one third of nosocomial infections. The results, thus, indicated that to reduce the incidence of UTI nosocomial infection, it was important to take factors that can be managed into consideration. Therefore, the involved persons should pay more attention and set practical and effective guidelines for the hospital.

Kidney diseases and transplantation, urinanalysis

P1393

## URINALYSIS GUIDELINES IN PATIENTS WITH COVID-19 INFECTION

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### BACKGROUND-AIM

Urine test, that consists in the biochemical measure of numerous parameters (i.e. proteins, leukocytes, blood, nitrites, glucose, bilirubin, pH-level etc.) and in the microscopic analysis of urinary sediment, is an excellent and not invasive method for early monitoring of potential kidney damage. Several studies have demonstrated that Covid-19 affects not only the lungs but also the kidneys and alterations of urinalysis in Covid-19 patients were reported. In particular, in severe cases, the kidneys can fail completely and can often degenerate in acute kidney failure (AKI), that is one of the most dangerous consequences of Covid-19 infection. This review aims to evaluate the role of urinalysis in predicting severity in Covid-19.

### METHODS

A total number of 34 articles, published between January 2020 and March 2022, was researched from PubMed using keywords: “Covid-19”, “urine parameters”, “inflammatory cytokines”, “urinalysis”.

### RESULTS

We considered 34 articles, but only 16 articles (47%) provided a subdivision of Covid-19 patients in: severe/moderate Covid-19, Covid-19 AKI/non-AKI and Covid-19 survivors and non survivors. Instead, the remaining 18 articles (53%) reported a general description of Covid-19 patients without a distinction between different Covid-19 cases. Of the aforementioned 16 articles, that included 2612 Covid-19 patients: 8 articles (24%) analyzed biochemical parameters, 4 articles (12%) reported urinary sediment and 4 articles (12%) identified inflammatory cytokines in Covid-19 patients with different characteristics. In this study it was reported that: i) the severity of disease is related to haematuria and proteinuria (blood and proteins are higher in severe Covid-19, Covid-19 AKI patients and non survivors than in moderate Covid-19 patients) and ii) the presence of coarse granular casts, waxy casts or renal tubular epithelial cell casts is observed in the urinary sediment of Covid-19 patients, especially in Covid-19-associated AKI patients.

### CONCLUSIONS

This review emphasizes the use of urinalysis and microscopic examination of urinary sediment as prognostic and diagnostic tools to optimize the screening of patients with the worst progression of Covid-19 disease, particularly towards AKI and mortality.

Kidney diseases and transplantation, urinanalysis

P1394

## THE INFLUENCE OF ANGIOTENSIN-CONVERTING ENZYME GENE POLYMORPHISM TO ERYTHROPOIETIN RESPONSE IN HEMODIALYSIS PATIENTS – A SINGLE CENTER STUDY

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**BACKGROUND-AIM**

Occurrence of anemia in chronic kidney disease (CKD), can be associated with impaired kidney production of erythropoietin (EPO). The main goal of this study was to evaluate the influence of angiotensin-converting enzyme (ACE) gene polymorphism to EPO/soluble EPO receptor ratio (EPO/sEPOR) as a potential predictor of hyporesponsiveness to erythropoiesis stimulating agents (ESA) treatment in maintenance hemodialysis (HD) patients.

**METHODS**

The study included 123 HD patients (102 patients were ESA treated) and 61 individuals with preserved renal function. Patients and controls were age and sex matched. Plasma EPO, sEPOR, interleukin 6 (IL-6) and ACE levels were evaluated. We calculated ESA Resistance Index (ERI) and EPO/sEPOR ratio, as an index of plasma EPO availability. The rs1799752 polymorphism, presence of insertion (I) or deletion (D) of sequences in ACE gene was determined in all participants, and they were classified into 3 genotype groups: II, ID and DD.

**RESULTS**

No difference in distribution of the examined polymorphism was found when patients and controls were compared. Significant difference was found in anemia parameters' values, EPOR and IL6 levels ($p<0.05$). When comparing patients grouped by their polymorphism, significant difference was found in EPO/sEPOR ratio ($p<0.05$), with the ratio in DD genotype group being lower. Correlation analysis demonstrated significant negative correlations between EPO/sEPOR and ACE and IL-6 among examined patients ($p<0.05$). With miltivariant linear regression model, adjusted for age and EPO dose, we found no significant link between presence of certain polymorphism and EPO/sEPOR ratio in patients who were ESA treated ($p=0.057$).

**CONCLUSIONS**

The results of our study did not show a significant association between the presence of examined ACE gene polymorphism and EPO/sEPOR, a potential predictor of hyporesponsiveness to ESA. However, due to the fact that the study was conducted in a single center and within a smaller group of participants, a more extensive research is required in order to make stronger conclusions.

Kidney diseases and transplantation, urinanalysis

P1395

**USE OF AN AUTOMATED URINE ANALYZER FOR EARLY DETECTION OF BACTERIAL INFECTIONS**

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**BACKGROUND-AIM**

Urinary tract infections (UTI) are the most prevalent bacterial infections, causing from uncomplicated UTI to severe bacteremia or sepsis.
The performance of a urine culture and antibiogram delays diagnosis and treatment, forcing the clinician to initiate a broad-spectrum empirical antibiotic treatment until the microorganism and its sensitivity are identified.
The aim of this work is to evaluate the possibility of using an automated urine analyzer to detect and differentiate the presence of Gram-positive (GP) and Gram-negative (GN) bacteria.

**METHODS**

249 urine samples were analyzed.
Each urine was seeded on chromogenic medium and blood agar for the isolation of the microorganism, which was subsequently identified on the BioMérieux VITEK2 analyzer.
Urines were also analyzed with the SYSMEX automated urinary sediment analyzer. SYSMEX is able to estimate the Gram staining of bacteria from a composition-based scatter plot and generates a "GP bacteria" or "GN bacteria" alarm when bacteria are detected.

**RESULTS**

In 75.9% of the cases the Gram stain estimation performed by SYSMEX was correct, when compared to the identification by culture. Analyzing each one separately, 79.6% was correct among GN bacteria, and 58.15% among GP.
Eighteen types of bacteria were isolated. The most frequent was Escherichia coli with a correct estimate of 87.79%.
Concordance study:
Kappa index was calculated to evaluate the degree of association between identification and Gram estimation. Its value was 0.361, with a standard error of 11.1% (95% confidence interval).
Chi-square was performed to confirm the strength of the association, with a concordance coefficient value of 0.605.

**CONCLUSIONS**

According to kappa, the association index between identification and its Gram estimate is considered acceptable, confirmed by the Chi-square concordance index.
SYSMEX is able to anticipate, detect and differentiate between GP and GN bacteria long before isolation by culture. Since E. coli (GN) is the main cause of UTI (>90%), the probability of success is very high in the detection of GN bacteria by SYSMEX (11.1% error). Therefore, this early detection and differentiation could help the clinician to choose a more appropriate empirical treatment in certain cases.

Kidney diseases and transplantation, urinanalysis

P1396

**ENABLING UNDERSTANDING OF THE IMPACT OF ANALYTICAL PERFORMANCE OF CREATININE ASSAYS UPON CKD STAGING; USING COMPUTERISED SIMULATION AND CONCORDANCE ESTIMATES TO LINK ANALYTICAL PERFORMANCE TO OUTCOMES.**

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**BACKGROUND-AIM**

Estimated glomerular filtration rate (eGFR) is used to diagnose and stage chronic kidney disease (CKD). This requires measurement of creatinine, and use of formulae. The eGFR is assessed against fixed internationally agreed staging criteria (CKD stage 1 to 5). Variation in analytical performance of creatinine assays directly impacts patient outcomes. Diagnostic criteria are fixed and shared across healthcare systems; comparative performance of creatinine assays therefore becomes critical from a population health perspective. Assay calibration against international standards, high accuracy, and low imprecision enable equity of access to protocol-driven healthcare and outcomes. A fixed bias will alter the population distribution to CKD stages misclassifying patients. Imprecision will cause oscillation of population between stages to impact on the veracity of CKD staging and outcomes. These issues are explored.

**METHODS**

A database of creatinine results (114,962) from 62,722 (34,755 females) anonymized adult patients was used. These results represent a 3-month primary and secondary care workload for a laboratory serving a population of 425,000. Simulations, using Microsoft Excel, were used to assess the impact of variation in imprecision and bias of creatinine assays upon concordance of CKD stages based on eGFR results (CKD EPI, 2009 and 2021 equations).

**RESULTS**

: The impacts and interactions of changes in bias and imprecision can be complex. Simulation of a fixed positive bias of 1 µmol/L results in 1.6% of the population of 114,962 results moving into a higher CKD group (1 through to 5); this total does not reflect the movement between groups. The concordance of (eGFR equation: EPI 2009) results drops from 100% to 97.3%. At zero bias, a CV of 1.5% will deliver concordance of eGFR at -1 SD of 96.5% and +1SD of 96.6%. With a fixed bias of +1 µmol/L, the concordance figures are 99.4% and 95.1% respectively.

**CONCLUSIONS**

Simulations employing a patient database and concordance measures can enable insight into complex interrelationships of analytical performance indices that need to be controlled to assure equitable patient outcomes. They may also deliver a method for identification and assessment of analytical performance specifications.

Kidney diseases and transplantation, urinanalysis

P1397

## IS IT USEFUL TO MEASURE CYSTATIN C FOR RENAL FUNCTION ESTIMATION IN HOSPITALIZED PATIENTS?

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### BACKGROUND-AIM

Assessing renal function is important in the management of a wide range of health conditions. The Glomerular filtration rate (GFR), its best overall indicator, can be measured through clearance of exogenous or endogenous markers, or estimated using serum levels of endogenous filtration markers.
Creatinine, is the most commonly used endogenous marker. Since its levels may be affected by some non-renal determinants, such as diet, muscle mass, or emaciation, other markers as Cystatin C has been proposed as suitable GFR biomarkers. However, Cystatin C is not widely used clinically due to the higher cost of test and the lack of clear evidence showing significant improvements over creatinine-based formulas.
Our goal is to provide new evidence on the comparison of creatinine and cystatin C in the estimation of glomerular filtration rate (GFR) in hospitalized patients.

### METHODS

GFR was estimated by CKD-epi creatinine (FG-crea) and Cystatin C (FG-CysC) formulas in 80 hospitalized patients with 24 hours' urine sample available. The results were compared to creatinine clearance (CrCl) as the gold standard method. Method comparison were performed by Passing-Bablok, Bland-Altman (BA), and kappa inter-rater agreement, using the MedCalc® software.

### RESULTS

Patients had a mean GFR (CrCl) of 61.5 ml/min/1.73 m2 (range 6–130), FG-crea 58.7(7-111) and FG-CysC 50.2(8-115). Both FG formulas performed similar, with a Regression Equation of y = -6,5 + 1,0 x. None of them were different from GFR measurement (p>0.1). The FG-crea had a slightly better correlation coefficient of 0.81 (1.03 when FG<90) compared to 0.77 (0.89 when FG<90) for FG-CysC.
Nevertheless, FG-CysC classified better the patients into GFR categories (G1-G5) with a slightly better kappa coefficient (0.29 vs. 0.27) than FG-crea. This difference was sharper in categories G2a-G5 (FG<60) (0.35 vs. 0.29). In general terms, FG-crea tends to overestimates GFR when FG<60.

### CONCLUSIONS

Estimation of GFR by serum creatinine performs well enough on average. However, it is inferior to GFR estimation from serum cystatin when it comes to accurately categorizing patients by GFR, particularly in the G2a and higher categories (FG<60) where it has a tendency to overestimate GFR. This can lead to incorrect treatment decisions.

Kidney diseases and transplantation, urinanalysis

P1398

**DYSLIPIDEMIA IN PATIENTS ON CHRONIC HEMODIALYSIS IN RELATION TO PRESENCE OF DIABETES MELITUS**

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**BACKGROUND-AIM**

Chronic renal failure results in profound lipid disorders, which stem largely from dysregulation of high density lipoprotein (HDL) and triglyceride-rich lipoproteins metabolism. Diabetic patients undergoing hemodialysis demonstrate much worse survival rates than do non diabetic.
To search for risk predictors, we study the dyslipidemia in diabetic and non-diabetic patients on chronic hemodialysis.

**METHODS**

60 hemodialysis patients were classified into two groups: 30 diabetic and 30 non-diabetic patients. Among all the patients, serum triglycerides, total cholesterol, LDL-Cholesterol, HDL-Cholesterol, and albumins were determined. The same parameters were determined in 30 healthy people, as a control group.

**RESULTS**

Results showed that serum concentration of triglycerides in diabetic patients, were significantly higher than in non diabetic patients (2.94 mmol/L vs. 2.30 mmol/L, $p<0.01$). Diabetic patients had significantly lower serum levels of HDL-Cholesterol and albumin than non diabetic (0.64 mmol/L vs. 0.97 mmol/L, $p<0.01$ and 28.43 g/L vs. 35.93 g/L, $p<0.01$). All diabetic patients (100%) had a HDL level lower than 1 mmol/L, which was significantly higher percentage than in non-diabetic patients (60%). No significant differences were detected in total cholesterol and LDL-Cholesterol (3.62 mmol/L vs. 4.54 mmol/L, $p>0.05$ and 1.8 mmol/L vs. 2.51 mmol/L).

**CONCLUSIONS**

Our results provide the evidence that hemodialysis diabetic patients were more affected from lipid metabolism disorders and cardiovascular morbidity than non-diabetic patients undergoing hemodialysis.

Kidney diseases and transplantation, urinanalysis

P1399

**KIDNEY STONE COMPOSITION IN NORTH MACEDONIA**

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**BACKGROUND-AIM**

The prevalence of urolithiasis is increasing worldwide, contributing to an inevitable health burden to all age groups. Stone analysis can reveal risk factors for stone disease, as well as identify treatment targeted to prevent stone formation or dissolve an existing stone (litholysis).
The aim of this analysis was to study the characteristics of urinary stones in North Macedonia and to report the following: Composition of urinary stones, age and gender distribution.

**METHODS**

Solutions of finely pulverized stone samples (15 mg) were analyzed by colorimetry by using LTA Stone Analysis Kit. Reagents provided by the manufacturer and specified as R1 to R15 were added drop-wise according to the manufacturer's instructions, and the appearance of certain colors indicated positive results for calcium, oxalate, ammonia, phosphate, cystine, uric acid, and magnesium. The percentage of each component was determined by visual comparison with the kit color scale (semi-quantitative results).

**RESULTS**

A total of 105 stones were analyzed. The study reported, urolithiasis was more suffered by individuals between the age group of 30 to 60 years (71.4%) with more predominance in males (59%) than females. Most of the stones were composed of mixture of two or more than two of tested chemicals. For both men and women, the majority of stones were calcium oxalate (56%), followed by calcium phosphate-apatite (19%), brushite (17%), uric acid (UA) stone (7%) and cystine (2%).In considering variation between genders, apatite was higher among female patients whereas cystine stones formed only in males. . In conclusion, Calcium oxalate and struvite mixed stones were the most predominant type in stones of all patients.

**CONCLUSIONS**

This study is based on simple qualitative biochemical study .This technique is simple and feasible for developing countries in terms of financial strength and available manpower. Proper dietary management following test results can substantially reduce recurrence of stones. Studies on larger test samples and if possible in correlation with routine examination of urine and urinary electrolyte excretion in a 24 hr urine sample would further aid in efforts aimed at preventing stone recurrence.

Kidney diseases and transplantation, urinanalysis

P1400

## EXPLORATORY STUDY INTO URINARY BIOMARKERS IN IMMUNE CHECKPOINT INHIBITOR ASSOCIATED KIDNEY DISEASE

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### BACKGROUND-AIM

Immunotherapy, with or without chemotherapy, proves to be successful to treat cancer patients. Large randomized clinical trials on immune checkpoint inhibitors (CPIs) targeting T-lymphocyte-associated protein 4, programmed cell death protein-1 or its ligand (PD-L1) pathways demonstrated impressive clinical efficacy in metastatic melanoma and non-small cell lung cancer patients. Despite this clinical success, there are patients that suffer from serious immune-related adverse events, including acute kidney injury (AKI). Renal complications can lead to reduction in the dose of the medication, modification of the therapy or permanent disqualification of a given treatment regimen, overall increasing morbidity and mortality. Currently, there is no biomarker to distinguish whether the AKI caused by immunotherapy. Therefore, we investigated the expression of various biomarkers in patients treated with CPIs with renal complications using a proteomics approach.

### METHODS

We collected urine samples at the time of AKI and several visits before and after recovering from AKI of patients with CPIs. As controls, urine samples from four patients with an AKI due to other causes were included. Urinary protein analysis was performed with liquid-chromatography-tandem mass spectrometry (LC-MS/MS). Samples were prepared using the PreOmics iST urine sample preparation kit according to manufacturer's guidelines (PreOmics, Planegg/ Martinsried, Germany).

### RESULTS

By using LC-MS/MS, we found differences in expression ($p<0.05$) for calnexin and clusterin between the patients and the controls, with patients having significantly lower values. The top 3 significantly elevated proteins in the patient cohort were CD44, PIK3IPK, and DDAH2

### CONCLUSIONS

LC-MS/MS proteomics could be a useful tool for the discovery and verification of biomarkers to distinguish AKI caused by immunotherapy.

Kidney diseases and transplantation, urinanalysis

P1401

## THE INFLUENCE OF ANGIOTENSIN-CONVERTING ENZYME GENE POLYMORPHISM ON ERYTHROPOIETIN RESPONSE IN HEMODIALYSIS PATIENTS – A SINGLE CENTER STUDY

V. Stojiljkovic [3], T. Cvetkovic [3], N. Stevic [6], N. Stefanovic [4], B. Djordjevic [2], J. Basic [2], M. Cvetkovic [5], V. Cosic [1]

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**BACKGROUND-AIM**

The occurrence of anemia in chronic kidney disease (CKD), can be associated with impaired kidney production of erythropoietin (EPO). The main goal of this study was to evaluate the influence of angiotensin-converting enzyme (ACE) gene polymorphism on EPO/soluble EPO receptor ratio (EPO/sEPOR) as a potential predictor of hyporesponsiveness to erythropoiesis-stimulating agents (ESA) treatment in maintenance hemodialysis (HD) patients.

**METHODS**

The study included 123 HD patients (102 patients were ESA treated) and 61 individuals with preserved renal function. Patients and controls were age and sex-matched. Plasma EPO, sEPOR, interleukin 6 (IL-6) and ACE levels were evaluated. We calculated ESA Resistance Index (ERI) and EPO/sEPOR ratio, as an index of plasma EPO availability. The rs1799752 polymorphism, presence of insertion (I) or deletion (D) of sequences in the ACE gene was determined in all participants, and they were classified into 3 genotype groups: II, ID, and DD.

**RESULTS**

No difference in the distribution of the examined polymorphism was found when patients and controls were compared. A significant difference was found in anemia parameters' values, EPOR, and IL6 levels ($p<0.05$). When comparing patients grouped by their polymorphism, a significant difference was found in EPO/sEPOR ratio ($p<0.05$), with the ratio in the DD genotype group being lower. Correlation analysis demonstrated significant negative correlations between EPO/sEPOR and ACE and IL-6 among examined patients (p<0.05). With the multivariant linear regression model, adjusted for age and EPO dose, we found no significant link between the presence of certain polymorphism and EPO/sEPOR ratio in patients who were ESA treated ($p=0.057$).

**CONCLUSIONS**

The results of our study did not show a significant association between the presence of examined ACE gene polymorphism and EPO/sEPOR, a potential predictor of hyporesponsiveness to ESA. However, due to the fact that the study was conducted in a single center and within a smaller group of participants, more extensive research is required in order to make stronger conclusions.

Kidney diseases and transplantation, urinanalysis

P1402

**STUDY OF LDH ELEVATION IN RENAL TRANSPLANT PATIENTS**

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**BACKGROUND-AIM**

Lactate dehydrogenase (LDH) is a ubiquitous cytoplasmic enzyme in the body that catalyzes the transfer of hydrogen ion (H+) between pyruvate and lactate. LDH has five isoenzymes (LDH1-5), whose distribution varies according to tissue, so that different conditions cause an elevation of plasma LDH at the expense of a different enzyme fraction. This elevation can be of hemolytic, cardiac, muscular, hepatic, renal, pulmonary or digestive origin.
The aim of this study is to determine the LDH isoenzyme that is elevated in transplant patients in order to study the cause of this elevation.

**METHODS**

A three-month follow-up was carried out, using a statistical system with the Modulab program, of transplanted patients with LDH determination in their control analysis. In those patients with LDH>250 U/L (VN: 125-220) accompanied by renal failure (creatinine>1.5mg/dL (VN:0.72-1.25)), in two consecutive analyses, the determination of LDH isoenzymes was extended. Samples were sent to an external laboratory for the determination of isoenzymes by electrophoresis of patients' serum, obtaining the percentage of each isoenzyme.

**RESULTS**

We analyzed a total of 309 transplanted patients with LDH determination, of which 97 patients had LDH values<250 U/L or creatinine<1.5 so they were excluded from the study. Of the 212 patients studied with LDH>250 U/L, 45 had to be rejected due to hemolyzed serum.
Finally, 160 sera were sent to the reference laboratory for the determination of LDH isoenzymes (the remaining 7 were not sent due to insufficient sample). Analyzing the results, all patients presented a very similar electrophoretic pattern of the different isotypes of the enzyme:
LDH1: 19-33% LDH2: 38-46% LDH3: 14-19.8% LDH4: 5-10% LDH5: 3-11%.
LDH2 being the majority isoenzyme in all the patients studied.

**CONCLUSIONS**

LDH isoenzymes are formed by the association of two polypeptides, M-type (present in muscle) and H-type (present in heart), the composition of LDH2 is H3 M1. In terms of tissue distribution, LDH2 is found in the heart, red blood cells, kidney and brain, as is LDH1.
Renal failure, including renal infarction, accompanied by lumbar pain and hematuria, causes LDH elevation. The distribution of the different isoenzymes would justify this elevation of LDH2, without any associated clinical implication.

Kidney diseases and transplantation, urinanalysis

P1403

## RELATION OF SERUM ANTIOXIDANT ENZYME ACTIVITY IN CHRONIC KIDNEY DISEASE PATIENTS UNDERGOING HEMODIALYSIS IN CLINICAL UNIVERSITY CENTER OF KOSOVA

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### BACKGROUND-AIM

Antioxidant enzymes are proteins that catalyze the transformation of reactive oxygen species and their byproducts into stable harmless compounds, making them the most significant defensive mechanism towards oxidative stress-induced cell damage. Chronic Kidney Disease is related to increased oxidative stress caused by uremic toxicity, a chronic inflammatory state, a deficit of nutrients and micro - nutrients, parenteral iron supplementation, and the dialysis process itself.

### METHODS

In the study, there were forty patients with chronic kidney disease (CKD) and twenty healthy people who served as controls. The aim of the present study was to evaluate the association of antioxidant enzyme activities (superoxide dismutase, or SOD, glutathione peroxidase, or GPx, and catalase, or CAT) in the categorized age groups (50–64 and 65–79 years old) with chronic kidney disease undergoing hemodialysis.

### RESULTS

The levels of GPx, SOD, and CAT were found to be significantly lower in the elderly patients' groups compared to the younger group of patients ($p < 0.001$; 23.35 ± 1.59 vs. 34.89 ± 3.87 U/mL, 2.33 ± 0.39 vs. 4.34 ± 0.49 U/mL, and 91.22 ± 5.11 vs. 124.33 ± 5.45 U/mgHb, respectively. These results were significantly lower than in healthy controls.

### CONCLUSIONS

As a result of their greater utilization in combating the harmful effects of free radicals, CKD patients are more likely to have lower levels of antioxidant molecules. Furthermore, CKD patients with other comorbidities, such as inflammation and diabetes, are at a higher risk of oxidative stress; hence, evaluating antioxidant enzyme levels in CKD patients can be beneficial in reducing oxidative stress.

Kidney diseases and transplantation, urinanalysis

P1404

**IMPORTANCE OF LABORATORY TESTS IN THE DIAGNOSIS OF CYSTINURIA.**

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**BACKGROUND-AIM**

Cystinuria is an autosomal recessive hereditary disease due to mutations in the SLC3A1 (2p21) and SLC7A9 (19q13.11) genes. These genes are expressed in the renal tubules and code for the subunits of the transepithelial dibasic amino acid transporter (cystine, ornithine, lysine and arginine). The defect in this transport ation causes to an excess of urinary cystine, which can lead to the formation of kidney stones.

**METHODS**

The study of a patient presenting symptoms characteristic of a renal pathology was carried out, focusing on laboratory aspects, specifically urinary sediment and genetic analysis.

**RESULTS**

A 12-year-old patient came to the emergency room of her reference hospital with abdominal pain in the left iliac fossa after several days of evolution. He had previously visited the nearest regional hospital on several occasions with the same symptoms, which had been resolved with analgesics and hydration.
A control analysis with systematic urine analysis was requested, the results were found to be normal, except for the presence of abundant cystine crystals in the urinary sediment. Since the presence of these crystals is uncommon, the emergency laboratory contacted the doctor to inform him of the results.
Subsequently, it was decided to admit the patient and a consultation with urology was requested.
Finally, the patient was referred to genetic counseling and a study was requested due to a suspicion of cystinuria, including the parents.
When the family tree was compilied, it was found that there was consanguinity in the family, with the patient's grandparents being cousins to each other.
The results of the massive sequencing identified a pathogenic variant associated with cistinuria: gen SLC7A9 NM_014270.5:c.997C>T p.(Arg333Trp)
In addition, in the study of the parents, the same pathogenic variant was detected in the father and the mother.

**CONCLUSIONS**

This clinical case demonstrates the importance of laboratory tests as well as the family and personal history of the patients, as they would have helped to guide the diagnosis in a earlier stage. Specifically, it shows the value of urinary sediment analysis, since the presence of cystine crystals in the urine had not been previously detected. Finally, thanks to ultrasound and genetic testing, a definitive diagnosis was found.

Kidney diseases and transplantation, urinanalysis

P1405

## ENZYMATIC CREATININE MEASUREMENT PROCEDURE COMPARISON AND BIAS ESTIMATION IN A PORTUGUESE TERTIARY HOSPITAL

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### BACKGROUND-AIM

Accurate serum creatinine (Cr) measurement is of paramount importance as it helps to assess renal function and calculate the glomerular filtration rate (GFR). The traditional Jaffe method – even the compensated form – is less specific than the enzymatic method. Although more expensive, there has been a shift towards the use of the latter method. The aim of this study was to evaluate the performance of the enzymatic method in a Portuguese tertiary hospital.

### METHODS

In total, 3236 paired Cr measurements – compensated Jaffe and enzymatic – were made on a Beckman Coulter AU5800 autoanalyzer during a period of six days. The samples were obtained from adult patients (42% outpatient, 27% inpatient, 20% emergency department, 11% intensive care units). The procedure comparison and bias estimation procedure were based on the EP09c CLSI guideline. The estimated GFR (eGFR) was calculated based on the paired values and then compared.

### RESULTS

The Cr levels ranged from 0.17 mg/dL to 16.24 mg/dL (mean 1.092, SD 1.029). The Bland–Altman plot showed a bias of 0.049 (95% CI 0.046-0.052). The cusum linearity test of Passing and Bablok regression determined that the relationship between the variables was not linear. The constant and proportional difference plots indicated that the dataset had mixed variability with constant SD at lower and constant CV at higher concentrations.
The transition point was calculated (rank order 1397). The average difference of the low concentration dataset (n=1397) was 0.04 (SD 0.05, CV 0.0024%). The average difference of the high concentration dataset (n=1839) was 3.83% (SD 0.10, CV 0.0045%). These values were within the acceptance criterion.
The eGFR was calculated using the paired Cr measurements, and chronic kidney disease stages (S1-S5) were assigned. There was discordance between the staging in a total of 263 cases (8.1%): S1-S2 169, S2-S3a 54, S3a-S3b 24, S3b-S4 13 and S4-S5 3 cases. All the discordant observations were attributed to higher eGFR levels by the Jaffe method.

### CONCLUSIONS

Based on the verification process, the enzymatic method can be safely introduced into the laboratory repertoire. Further studies are needed to evaluate cost-effectiveness and to identify patient groups where the use of the enzymatic method would be of added value.

Kidney diseases and transplantation, urinanalysis

P1406

**RENAL BIOMARKERS: POPULATION-BASED ANALYSIS OF CIRCADIAN INTRADAY VARIATION**

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**BACKGROUND-AIM**

All physiological processes are subjected to a circadian variation. A circadian regulation of renal function it has been described in the last few years. The main challenge in these studies is data collection from the same patient for 24 hours. The study of population values could be a solution for this problem. The purpose of this work is to study the circadian variation of the estimated glomerular filtration rate (eGFR) and the creatinine (C) using paired population data.

**METHODS**

We studied 334698 results of C and eGFR values of samples collected over a period of 24 hours. All records collected were from patients assisted at the emergency room from Jan 2013 to Dec 2018. C determination was performed using the dry chemistry methodology (VITROS 5600 analyzer (Ortho Clinical Diagnostics®)) Data were grouped by sex and those aged 18-85 years were selected. eGFR was calculated using the CKD-EPI formula. Critical C values above 7.5 mg/dL were excluded. All data was grouped by sex and hour. We calculated the waveform of all data by 30-minute intervals. Statistical methods used were circadian nonparametric index. We calculated for eGFR data, TM5 (average of 5 consecutive hours with highest values) and TL10 (average of 10 consecutive hours with lowest values) and for C data TL5 (average of 5 consecutive hours with lowest values) and TM10 (average of 10 consecutive hours with highest values)

**RESULTS**

The highest values for C (TM10) were observed at the end of daytime activity with a slight phase advance in the case of women (W) (18:30 h (W) and 22:00 h (men (M)), however the lowest values (TL10) agreed at the same time of the day 5:00 h. For eGFR, TM5 was observed at the beginning of the activity phase (5:00 h), when the population C values are lower. Conversely, the TL10 values of eGFR coincide with the highest C values at 18:30 h.

**CONCLUSIONS**

The circadian pattern observed in this population-based study is similar to maximum and minimum values of GFR and C described in the literature at individual level. At the physiological level, there is an adequate concordance between the elevation of eGFR and the decrease of creatinine, coinciding with the first hours of the activity phase when there is a greater physiological stress.

Kidney diseases and transplantation, urinanalysis

P1407

## CUT-OFF VALUES FOR DETECTION OF URINARY TRACT INFECTION (UTI) BY URINE FLOW CYTOMETRY (UFC) IN A MILITARY HOSPITAL

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### BACKGROUND-AIM

The gold standard for the diagnosis of a UTI is still significant bacterial growth in urine culture. However, the results of a urine culture can take up to several days, at least 24 hours, before they become available. Bacterium and leucocyte count in urine can be measured by urine flow cytometry (UFC).
Evaluation, and validation of cut-off values for UFC bacterium and UFC leucocyte counts to predict significant bacterial growth in urine culture.

### METHODS

We studied 3050 urines of adult hospitalized patients and outpatients from February 2021 to February 2022 with a median age 65,4 years. There were 799 women (26,2%) and 2251 men (73,8%). Urine culture and urine flow cytometry (UFC) were performed on the same patients. The UFC was performed with the UF-4500 flow cytometer (Sysmex). The area under the curve (AUC), the receiver operating curve (ROC) and its 95% confidence interval were calculated by logistic regression. This was used to determine the discriminatory performance of UFC bacterium and UFC leucocyte counts for predicting significant bacterial growth in urine culture. Statistical analysis was performed with SPSS version 28, and significance level was <0,05.

### RESULTS

The crosstabulation results from cultural urine and UFC bacterium count obtained: sensitivity -77.2%, specificity - 96.3%, PPV (positive predictive value) - 80.9% and NPV (negative predictive value) - 95.4%. The number of UFC bacterium and leucocyte counts was significantly higher in patients with urine cultures with colony number greater than 105 CFU/mL (18872.43/µL and 2593.1/µL), than with 104-105 CFU/mL (885.76 /µL and 350/µL respectively) ($p<0.001$). The values to predict significant bacterial growth in urine culture measured by AUC was 0.97 and the cut-off for UFC bacterium count was 77.5/µL and for UFC leucocyte count was 0.96 and 10.1/µL with a sensitivity of 95% and 99% respectively.

### CONCLUSIONS

Our study allowed to discriminate samples with significant bacteriuria from those with non-significant bacteriuria. Flow cytometry used routinely as urine screening can predict significant bacterial growth in urine culture and the result, if negative, can be given on the same day of sample collection to the clinician.

Kidney diseases and transplantation, urinanalysis

P1408

## COMPARISON OF SENSITIVITY AND SPECIFICITY BETWEEN URINARY MICROALBUMIN AND URINARY PODOCYTE SPECIFIC PROTEINS IN PREDICTION OF SECONDARY NEPHROPATHIES

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### BACKGROUND-AIM

Microalbuminuria is routinely used as a marker for early detection of secondary kidney diseases, but in the past years many studies has shown that microalbuminuria has insufficient sensitivity and specificity in early diagnosis of secondary nephropathies. Thus, many other markers are researched regarding specifity and sensitivity as an early markers of secondary nephropathy, among them are urinary podocyte proteins such as nephrin and podocalyxin. The aim of study was to compare the specificity and sensitivity of microalbumin and podocyte specific proteins nephrin and podocalyxin as markers for prediction of secondary nephropathies.

### METHODS

This study included 150 subjects, 30 subjects with diabetic nephropathy (DN), 30 subjects with hypertensive nephropathy (HN), 30 pregnant women with preeclampsia (PE) and 60 healthy subjects as control group (30 healthy subjects and 30 healthy pregnant women). In all subjects we measured nephrin and podocalyxin in urine by immunoenzyme assay, and microalbumin by immunoturbidimetric method. In blood sera, we measured a few standard biochemical parameters.

### RESULTS

We found that urinary nephrin has 96% sensitivity and 96% specificity, podocalyxin has 73.3% sensitivity and 93.3% specificity to detect DN in early stage. Microalbumin in urine showed 41.5% sensitivity and 90% specificity in predicting DN. In patients with HN, urinary nephrin has 89.7% sensitivity and 88.8% specificity while podocalyxin showed 73.3% sensitivity and 93.3% specificity to detect HN in early stage. Microalbumin in urine showed 44.8% sensitivity and 87.5% specificity in predicting HN. Urinary nephrin has 96.7% sensitivity and 96.7% specificity while podocalyxin showed 100% sensitivity and 93.3% specificity in prediction of PE. Microalbumin in urine showed 51.8% sensitivity and 82.1% specificity in prediction of PE.

### CONCLUSIONS

Microalbumiuria is less specific and sensitive marker for prediction of secondary nephropathies than podocyte specific proteins, thus these biomarkers must be further researched and implemented in routine laboratory practice.

Kidney diseases and transplantation, urinanalysis

P1409

## INTERLEUKINS 1, 6 AND 18 AS MARKERS OF CHRONIC KIDNEY DAMAGE IN ANTIRETROVIRAL-NAïVE AND ANTIRETROVIRAL-TREATED PATIENTS WITH HIV/AIDS

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### BACKGROUND-AIM

Interleukins-1, -6 and -18 have been reported as predictors of kidney dysfunction outcomes. We evaluated the relationships between these 3 cytokines and estimated glomerular filtration rate (eGFR) in Antiretroviral-naïve and Antiretroviral-treated Patients with HIV/AIDS

### METHODS

Serum interleukins-1,-6 and-18 were assayed using HPLC. Creatinine was determined by modified Jaffe-kinetic method with calibration traceable to IDMS. Creatinine values were used to determine eGFR by CKD-EPIcr equation (2009)

### RESULTS

One hundred and eighty-one subjects (86 ART-naïve and 95 ART-treated) were evaluated. Overall, 85 (47%) subjects: 39 (21.5%) naïve and 46 (25.4%) treated had stage 1 CKD; 65 (35.9%): 30 (16.6%) ART-naïve and 35 (19.3%) treated, had stage 2 CKD; 29 (16%): 15(8.3%) naïve and 14 (7.7%) treated had stage 3 CKD; only 2 (1.1%), both naïve, had stage 4 CKD; none had stage 5 CKD. The mean IL-1, IL-6, and IL-18 were significantly higher in the naïve than the treated subjects (0.37±0.07 versus 0.33±0.08 pg/ml, p=0.006; 0.69±0.05 versus 0.66±0.04 pg/ml, p=0.005; 1.09±0.13 versus 1.03±0.14pg/ml, p=0.005 respectively). There were no significant differences in mean interleukin levels among subjects with CKD stages 1, 2, and 3 (i.e IL-1: 0.36 ± 0.08 pg/ml, 0.35 ± 0.09 pg/ml, and 0.35 ± 0.08 pg/ml respectively; IL-6: 0.68 ± 0.05 pg/ml, 0.68 ± 0.05 pg/ml, 0.68 ± 0.06 pg/ml respectively; IL-18: 1.06 ± 0.15 pg/ml, 1.06 ± 0.13 pg/ml, 1.05 ± 0.16 pg/ml respectively). However, mean interleukin among subjects with stage 4 CKD were higher than those with stages 1, 2, and 3 CKD, viz: IL-1 (0.41 ± 0.03 pg/ml versus 0.36 ± 0.09 pg/ml); IL-6 (0.72 ± 0.02 pg/ml versus 0.68 ± 0.06 pg/ml); and IL-18 (1.20 ± 0.05 pg/ml versus 1.05 ± 0.12 pg/ml).

### CONCLUSIONS

HIV infection induces cytokine production which likely contributes to renal impairment, while HAART suppresses systemic cytokine levels, thereby improving renal dysfunction. Interleukins-1,-6, and-18 are higher in moderate-to-severe renal dysfunction (>stage 3 CKD) than in the mild-to-moderate (stage 1-3 CKD), implying cytokines possibly contribute to the magnitude and progression of CKD. Interleukins-1,-6 and -18 appear not to be useful biomarkers of early stages of progressive renal impairment but late CKD.

Kidney diseases and transplantation, urinanalysis

P1410

**FREELITE AND KLONEUS ASSAYS IN FREE LIGHT CHAIN MEASUREMENTS IN PATIENTS WITH RENAL IMPAIRMENT**

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**BACKGROUND-AIM**

Serum free light chain (FLC) quantification is a diagnostic criterion for monoclonal gammopathy. Due to the lack of internationally accepted standards, each manufacturer has to establish their own RR (reference ranges). Several authors have proposed new RRs that are different from those proposed by clinical guidelines.
The aim of this study was to evaluate FLC Freelite and Kloneus assays in patients with renal impairment.

**METHODS**

In this retrospective study, serum samples from 226 patients with with stable chronic kidney disease (CKD) (more than 3 months) and estimated glomerular filtration rate (eGFR) <70 mL/min/1.73m2 who attended Fuenlabrada University Hospital (Madrid, Spain) for clinical follow-up, were measured with a Freelite assay on the Optilite system and with a Kloneus assay on the AU5800 system and compared with controls without renal impairment.

**RESULTS**

In control population for Freelite assay, median kappa FLC (K-FLC) concentration was: 15.5 mg/L, median lambda FLC (L-FLC) concentration was: 12.2 mg/L and median kappa/lambda ratio (K/L-FLC) was: 1.26, 95%, min-max: 0.65-2.56. And for Kloneus assay median K-FLC concentration was: 8.5 mg/L, median L-FLC concentration was: 11.7 mg/L, and median K/L-FLC was: 0.70, min-max: 0.44-1.23.
Both K-FLC and L-FLC concentrations increased with Kloneus and Freelite assays with each increment in CKD stage. In patients with CKD, Kloneus detected lower concentrations of K-FLC (median: 20.4 mg/L; 95% range: 9.8-57.2) than Freelite (median: 36.5 mg/L; 95% range: 16.5-137.7) and higher concentrations of L-FLC (median: 32.2 mg/L; 95% range: 14.4-96.7) than Freelite (median: 25.4 mg/L; 95% range: 11.9-86.0). This resulted in significantly different K/L-FLC in patients with CKD for the two tests. The Freelite K/L-FLC in the CKD group (median: 1.50; min-max: 0.66-3.45) was significantly increased compared with healthy controls, and the Kloneus K/L-FLC in the CKD group (median: 0.63; min-max: 0.34-1.01) was slightly lower.

**CONCLUSIONS**

These findings demonstrate that Freelite and Kloneus assays provide higher but not parallel values when FLCs are measured in patients with CKD, so an increase in K/L-FLC was observed in the case of Freelite, and we found a slight decrease in the case of Kloneus.

Kidney diseases and transplantation, urinanalysis

P1411

## ROLE OF A URINE SEDIMENT MICROSCOPY DIGITALIZED DATABASE IN THE DIAGNOSIS OF A RARE URINARY TRACT INFECTION

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### BACKGROUND-AIM

Urinalysis is an important tool in the study of urinary tract infections (UTI). Digital image methods for the urinary sediment (US) enable the follow-up of patients over time and is especially useful in atypical cases.

### METHODS

We describe the case of a 51-year-old male with type 2 diabetes mellitus and poor glycemic control.
In 2021, the patient reported episodes of dysuria and haematuria and had a urinalysis performed. The urine strip showed intense glycosuria and the US showed pyuria and abundant yeast with a peculiar morphology, but no treatment was prescribed.
During his 2022 check-up, the patient still reported UTI symptoms, so he was referred to an urologist and had an ultrasound performed, which showed hydronephrosis and prostatic hypertrophy. Cystoscopy and cytology were also performed with no pathological findings.

### RESULTS

The urologist ordered a new urinalysis. Microphotographs of the US were compared to the ones stored in our database from 2021, confirming that yeast showed the same peculiar structures in both of them, and therefore a urine culture was also performed. >100,000 UCF/mL of small, dry colonies of yeast that turned blue in chromogenic agar were isolated. Hanseniaspora opuntiae was identified by MALDI-TOF mass spectrometry in two urine samples collected one month apart from each other. Microscopic examination of the colonies was also consistent with the US microphotographs.
The patient was treated with fluconazole for one month but there was no improvement of the symptoms and yeast are still present in the US, thus the presence of a prostatic reservoir is currently under investigation.

### CONCLUSIONS

Hanseniaspora is a genus of yeasts found in grapes and common in the wine industry. Some subspecies have been isolated in clinical samples, but it has not been previously reported as a causative agent of UTI. The origin of the infection remained unknown in all the cases reported.
Digital analysis of the US allowed the laboratory to keep a history of microphotographs that enabled a follow-up of the structures observed. This case also highlights the importance of good communication between general practitioners, urologists, microbiologists and laboratory specialists to evaluate clinical data, medical imaging and laboratory findings in the investigation of UTI due to rare causative agents.

Kidney diseases and transplantation, urinanalysis

P1412

**CYP24A1 MUTATION – BIOCHEMICAL INDICATORS.**

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**BACKGROUND-AIM**

Formula of infant fortification with vitamin D was followed by reports of cases of unexplained hypercalcemia, nephrocalcinosis and renal failure. Some of them were termed as idiopathic infantile hypercalcemia (IIH). IIH patients present high-normal or elevated serum calcium concentrations, hypercalciuria, suppressed serum levels of PTH and elevated levels of vitamin D metabolites. Vitamin D is a prohormone, which an active metabolite, 1,25-dihydroxyvitamin D3 [1,25(OH)2D3], regulates calcium homeostasis and plays an important role in bone growth and remodeling. Its inactivation ensures 24-hydroxylase (CYP24A1) leading to 1,24,25-trihydroxyvitamin D3 (calcitetrol) formation and in the same time it creates 24,25-dihydroxyvitamin D3 (secalciferol) metabolite during 25OHD3 hydroxylation. Secalciferol is more concentrated and easier to find in blood and that is the reason why it is chosen to be a biomarker of CYP24A1 activity. However, assessment of only 24,25(OH)2D3 metabolite may be insufficient to confirm the low activity of CYP24A1.

**METHODS**

Patients with CYP24A1 mutation and control group with low 25OHD concentration were analyzed by an Agilent Infinity LC system and Triple Quad 6460 with an electrospray ionization in a positive mode to measure vitamin D metabolites. For the quantitative analysis, multiple reaction monitoring (MRM) was applied.

**RESULTS**

Patients with CYP24A1 mutation had similar 25(OH)D3 serum concentration but presented significant alterations of vitamin D3 metabolism with lower median 24,25(OH)2D3 values and the narrowest range of its concentrations in comparison to subjects without this mutation. However, some cases overlapped with values of 24,25(OH)2D3 between these two groups. In contrast, 25(OH)D3/24,25(OH)2D3 ratio values were much higher for CYP24A1 mutation group and did not overlap with a control group.

**CONCLUSIONS**

The calculated ratio of 25(OH)D3/24,25(OH)2D3 is a good biomarker of CYP24A1 deficiency. Assessment of only 24,25(OH)2D3 metabolite is insufficient to confirm the low activity of CYP24A1, because it depends on the body's supply with vitamin D – the less of 25(OH)D3 metabolite the less of 24,25(OH)2D3 metabolite. Thus, only the ratio of these two metabolites reveals the malfunction of the enzyme.

Kidney diseases and transplantation, urinanalysis

P1413

## PREVALENCE, ANTIMICROBIAL SUSCEPTIBILITY PATTERN, AND ASSOCIATED FACTORS OF NEISSERIA GONORRHOEAE AMONG WOMEN ATTENDING AT DEBRE MARKOS TOWN HEALTH INSTITUTIONS, NORTHWEST ETHIOPIA

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**BACKGROUND-AIM**

Neisseria gonorrhoeae the causative agent of gonorrhea and accounts for the majority of sexually related illnesses, making it a major public health concern worldwide. There are few studies about the prevalence and antimicrobial susceptibility pattern of N. gonorrhoeae in Ethiopia.The aim of this study was to assess the prevalence, antimicrobial susceptibility pattern, and associated factors of N. gonorrhoeae.

**METHODS**

Institutional-based cross-sectional study was conducted among women attending at Debre Markos town health institutions, Northwest Ethiopia from May 1, 2022 to September 30, 2022. A semi-structured questionnaire was used to collect socio-demographic and clinical characteristics of study participants. The endocervical swab was collected and cultured on Modified Thayer Martin medium. The antimicrobial susceptibility test was performed by modified Kirby-Bauer disk diffusion technique for isolates based on CLSI guideline. Data were entered and analyzed by SPSS. Logistic regression was fitted to show the relationship between dependent and independent variables. P-value<0.05 with 95%CI was considered statistically significant.

**RESULTS**

A total of 384 women were recruited and tested for N. gonorrhoeae. The prevalence of N. gonorrhoeae among women was found to be 29/384(7.6%). Several factors were found to have significant association with N. gonorrhoeae positivity. These include rural residency (AOR: 2.95; 95%CI: 1.11- 7.75, P=0.029), multiple sexual partners (AOR: 2.68; 95%CI: 1.17– 6.1, P=0.019), no or inconsistent condom use (AOR: 6.3; 95%CI: 1.42– 28.29, P=0.015), and HIV sero-positivity (AOR: 3.4; 95%CI: 1.4- 8.26, P=0.007). The antimicrobial susceptibility profile of N. gonorrhoeae was 93.1% to ceftriaxone, 82.8% to cefotaxime, 55.2% to ciprofloxacin, 55.2% to azithromycin, 0% to tetracycline and penicillin. None of the antimicrobials were 100% susceptible to the isolates.

**CONCLUSIONS**

The prevalence of N. gonorrhoeae is high at Debre Markos health institutions among women. N. gonorrhoeae is significantly associated with patients living in rural, HIV patients and multiple sexual partners. This study also confirms that ceftriaxone, ciprofloxacin and azithromycin showed decreasing susceptibility. Ceftriaxone is still a recommended drug to treat N. gonorrhoeae.

Kidney diseases and transplantation, urinanalysis

P1414

## RELATIONSHIP BETWEEN SERUM 1,25-DIHYDROXYVITAMIN D AND BONE TURNOVER BIOMARKERS IN RENAL IMPAIRMENT

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**BACKGROUND-AIM**

Chronic kidney disease (CKD) is a serious global health concern. The majority of these individuals are at an increased risk of developing disturbances of bone mineral metabolism. The aim of study is to determine the correlation between 1,25(OH)2D and bone disease in individuals with kidney disease patients.

**METHODS**

Individuals in this cross-sectional study had their 1,25(OH)2 D levels measured between January 2015 and December 2021. Using the estimated glomerular filtration rate (eGFR), study subjects were divided into CKD phases (G1-G5). Association of bone biochemical marker with 1,25(OH)2D and CKD stages was evaluated.

**RESULTS**

Over the time period of seven years, 1553 subjects in total were tested for 1,25(OH)2D; the median age of the study subjects was 58 years. From G1, serum 1,25(OH)2D levels declined steadily, reaching their lowest levels in G5. In CKD G5, serum calcium (Ca) levels were significantly low, whereas phosphate (PO4), magnesium (Mg), and alkaline phosphatase (ALP) levels were comparatively higher. Serum Ca (p-value 0.001, r-0.244), serum PO4 (p-value 0.001, r-0.143), and ALP (p-value 0.001, r-0.1.4) were statistically correlated with 1,25(OH)2D levels.

**CONCLUSIONS**

Serum 1,25(OH)2D is an appropriate indicator of a vitamin D deficiency in CKD.

Kidney diseases and transplantation, urinanalysis

P1415

**SERUM SCLEROSTIN CONCENTRATIONS IN HAEMODIALYSIS PATIENTS; CHANGES BY TWO DIALYSIS METHODS**

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**BACKGROUND-AIM**

The SOST gene products sclerostin is the natural circulating inhibitor Wnt/β-catenin signalling pathway with a negative role in osteoblastogenesis, promoting bone metabolic disease. In most of dialysis patients, serum sclerostin levels are high, reason is not known, until. Sclerostin (MW 22kDa) could be handled differently by conventional haemodialysis (HD) and by hemodiafiltration (HDF). The aim of the study was to describe serum sclerostin changes during extracorporeal elimination.

**METHODS**

Eighty clinically stable maintenance dialysis patients were studied. Serum sclerostin concentrations were measured (Biomedica) before and after dialysis procedure. Twenty-one patients were excluded from the study due to unmeasurably high pre-dialysis sclerostin levels (over the upper detection limit of 252 pmol/L).
Fifty nine patients were treated either by conventional dialysis (n=30, low-flux dialyser, QB 300 ml/min, QD 500 ml/min, standard bicarbonate dialysate) or by on-line hemodiafiltration (HDF, n=29, high-flux dialyser with KUF above 80 ml/min/m2, post-dialysis substitution, QB 200 ml/min, QD 500 ml/min, substitution volume 20-24 litres). Small molecule eliminations were comparable in both subgroups, achieving eKt/V well above 1,2 in all patients.

**RESULTS**

Median pre-dialysis values were comparable in both HD and HDF groups (HD vs HDF, 119.2 vs 121.1 pmol/L, n.s.). During extracorporeal elimination, the decrease was observed in both groups (HD from 138.6 to 119.2 pmol/L, $p<0.001$; HDF 121.1 to 45.0 pmol/L, $p<0.00001$). Hemodiafiltration was associated with much more pronounced serum sclerostin decrease (statistical significance $p<0.00001$).

**CONCLUSIONS**

Serum sclerostin concentrations in dialysis patients are not stable. Sclerostin is eliminated both by haemodialysis and by hemodiafiltration. The decrease induced by hemodiafiltration is much more pronounced, probably due to larger dialyser pores used in HDF. As conventional low-flux dialysers are not permeable for the sclerostin molecular weight, further mechanism contributing to lower post-dialysis concentration in HD patients should be studied.
Detailed comments must accompany the results of sclerostin serum concentrations in patients on maintenance dialysis.
Supported by MH CZ NU20-02-00086 and Cooperatio Program RA DIAG

Kidney diseases and transplantation, urinanalysis

P1416

## INCIDENCE OFCARDIAC SURGERY ASSOCIATED ACUTE KIDNEY INJURY IN CHILDREN WHO HAD OPEN HEART SURGERY FOR CONGENITAL HEART DISEASES

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**BACKGROUND-AIM**

Acute kidney injury (AKI) which is an abrupt loss of the functions of the kidneys that is usually evidenced by a sudden increase in the value of serum creatinine is one of the major complications of open heart surgery in children with congenital heart diseases and is associated with increased risk of morbidity and mortality and increased hospital stay. The aim of the study was to determine the incidence of cardiac surgery associated acute kidney injury(CSA-AKI) among children who had open heart surgery for congenital heart diseases using a 50% increase in creatinine levels at 48hrs post-surgery from 0hrs(baseline).

**METHODS**

This was a prospective longitudinal study done in a tertiary hospital in south-western Nigeria. Forty (40) consecutive participants who had open heart surgery for congenital heart diseases were recruited for the study. Two and a half milliliter (2.5mL) of venous blood was collected from each participant at 0hr ( immediate pre-operative time) and 48hrs after surgery to yield plasma for creatinine assay. The plasma was assayed for quantification of creatinine using the Jaffe kinetic method by an automated chemistry analyzer machine.

**RESULTS**

The mean age of the participants was 3.7 ± 0.12 years with a male to female ratio of 1.2:1. The mean value of plasma creatinine in the study participant was 48.98±11.6µmol/l at 0hr and 70.78±21.86µmol/l at 48hrs.
The incidence of AKI in this study using plasma creatinine concentration of >50% rise above baseline at 48hrs was 17.5%.

**CONCLUSIONS**

The findings being reported in this study showed the incidence of CSA-AKI using an increase in plasma creatinine at 48hrs in children who had open heart surgery for congenital heart diseases.

Kidney diseases and transplantation, urinanalysis

P1417

**ANALYSIS OF COMPLEMENT SYSTEM: A NEW CHALLENGE FOR THE CLINICAL LABORATORY**

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**BACKGROUND-AIM**

Complement is a key component of innate immune system and is part of the first line defense against pathogens. The complement cascade includes approximately 50 soluble and cell surface-bound proteins organized to eliminate structures recognized as dangerous, such as invading microorganisms, apoptotic and necrotic cells and immune complexes. Furthermore, complement can link innate and adaptive immune responses by mediating regulation of T and B cell responses. Accordingly, the complement system plays a vital role in the pathogenesis of many diseases. Recommendations for accurate and standardized complement analysis are missing. The aim of our study is to define a shared protocol with clinicians through the retrospective evaluation of requests sent to the laboratory mainly by nephrology divisions.

**METHODS**

The methods actually used in our laboratory to assess complement activity include the MicroVueComplement SC5b-9 Plus EIA (Quidel) measuring the status of the terminal complement pathway (TCC) in EDTA-plasma specimens, the Svar Life Science Complement ELISA allowing to characterize the function of the three individual pathways of the complement system (classical, alternative and lectin/mannose-binding pathways) in serum samples, ELISA-VIDITEST IgG anti-complement factor H and ELISA IgG anti-C1q (Orgentec by Sebia).

**RESULTS**

During the last two years we performed 1131 SC5-b9 determinations, 1025 measurements of the three-way activity, 194 anti-C1q and 241 anti-factor H assays.

**CONCLUSIONS**

The adoption of a strict protocol involving sample handling and storage procedures as well as the choose of accurate and precise methods allowed us to give clinicians reliable results, thus widening possible application of these tests in the daily diagnostic setting. Initially aimed at monitoring and dosage adjusting in patients treated with eculizumab the evaluation of complement system is actually used also in the diagnosis and evaluation of some forms of nephropathy and kidney injury. Proper laboratory assessment needs appropriate pre-analytical precautions and robust and reliable analytical approaches.

Kidney diseases and transplantation, urinanalysis

P1418

**STAGING OF RENAL DISEASE IN A GROUP OF PATIENTS WITH MULTIPLE MYELOMA (ABOUT 47 CASES)**

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**BACKGROUND-AIM**

Multiple myeloma (MM) is a malignant proliferation of a plasma cell clone that inappropriately and excessively produces immunoglobulin or one of its fragments invading the hematopoietic marrow and other organs such as bone. It represents 1% of cancers and 10% of hematological malignancies. Renal involvement is one of the most serious complications of MM.
The aim of our work is to evaluate the stages of renal disease in patients with multiple myeloma at the time of diagnosis.

**METHODS**

This is a retrospective descriptive and analytical study over a 4-year period between January 2018 and December 2021 including patients with secretory multiple myeloma. Assessment of renal function was performed by calculation of glomerular filtration rate (GFR) by the simplified MDRD formula from enzymatic creatinine measurement.

**RESULTS**

The study population consisted of 47 patients, 25 males and 22 females with a slight male predominance and a sex ratio M/F 1.08, the average age was 58 years. The results of our study find that patients with end-stage renal disease with a GFR < 15 ml/min represented 29% of the total study population, 6% had severe renal failure, 17% had moderate renal failure, 23% had mild renal failure and 23% had no renal disease at diagnosis.
For end-stage renal disease, we found a male predominance: 64% of men versus 36% of women with a M/F sex ratio of 1.8. The average age was 66 years. The type of gammopathy involved was in 50% of the cases a light chain multiple myeloma, 28% presented an IgG or IgA multiple myeloma with a light chain at the urinary immunofixation and only 22% had a negative Bence Jones proteinuria.

**CONCLUSIONS**

Renal involvement in MM is a frequent and serious complication and is associated in the majority of cases with light chain myeloma or the presence of a light chain on urine immunofixation.

Kidney diseases and transplantation, urinanalysis

P1419

## EVALUATION OF 2021 CKD-EPI EQUATION IN DIABETIC PATIENTS WITH VARIOUS STAGES OF ALBUMINURIA AND CHRONIC KIDNEY DISEASE

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### BACKGROUND-AIM

2009 Chronic Kidney Disease Epidemiology Collaboration (2009-CKD-EPI) equation is routinely used in clinical laboratories to estimate glomerular filtration rate. A new CKD-EPI equation published in 2021 (2021-CKD-EPI) estimates glomerular filtration rate (eGFR) without a coefficient for race.
This study aimed to evaluate the new equation in Caucasian patients with diabetes and various stages of albuminuria and chronic kidney disease (CKD) from Croatia.

### METHODS

Serum creatinine was determined using a kinetic spectrophotometric compensated Jaffé method (Beckman Coulter, Brea, USA) in 300 diabetic patients (M/F: N=162/138; median age = 67/69). Patients were ranked according to the albumin-to-creatinine ratio into three albuminuria stages (A1-A3), and eGFR into five CKD stages (G1-G5). eGFR was calculated using both equations, and the difference between estimates was evaluated according to clinical stages of albuminuria and CKD.

### RESULTS

Bland-Altman analysis showed that eGFR estimates derived by the 2021-CKD-EPI equation were significantly higher than 2009-CKD-EPI-estimates (mean:5,2949 %; 95%CI=4,9751 to 5,6146; P<0,0001).
Absolute differences between the eGFR results derived by the two equations ranged from -5 to 6 and varied significantly across stages of albuminuria (one-way ANOVA; F ratio=9,301; P<0,001; mean±SD for A1: 2,76±1,53; A2: 2,60±1,45; and A3: 1,79±1,25 mL/min/1.73m2, respectively).
Also, there was a significant difference between the eGFR results derived by the two equations across the five stages of CKD (one-way ANOVA; F ratio=33,888; P<0,001; mean±SD eGFR for G1: 2,21±2,17; G2: 4,00±0,90; G3: 2,84±0,75; G4: 1,56±0,56 and G5: 1,00±1,13 respectively).

### CONCLUSIONS

Our study showed an average of 5% higher eGFR with 2021-CKD-EPI when compared to the 2009-CKD-EPI equation in diabetic patients. The highest bias was observed in the categories of normal kidney function (A1, G1, G2), while the differences between the equations were less pronounced in higher degree of albuminuria and CKD.
Given a small, albeit significant positive difference, observed distribution across the clinical stages, and the biological variability of eGFR the implementation of a new 2021-CKD-EPI equation is unlikely to elicit a bias in the screening and management of CKD in Caucasian patients with diabetes.

Kidney diseases and transplantation, urinanalysis

P1420

**EVALUATION OF A NEW AUTOMATED URINE SEDIMENT ANALYZER (UF-1500): PRELIMINARY REPORT**

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**BACKGROUND-AIM**

The use of automated analyzers for urinary sediment evaluation is highly recommended by urinalysis guidelines, even for laboratories with medium-small number of samples per day, to improve standardization and better identification of urine particles, especially those with higher clinical importance. We evaluated the new UF-1500 Sysmex analyzer, a benchtop analyzer of small size intended for small and medium laboratories, providing quantitative data for 17 parameters: red blood cells, RBC; non-lysed red blood cells, NRBC; white blood cells, WBC; WBC clump, cWBC; bacteria, BACT; epithelial cells, EC; squamous epithelial cells, SEC; non-squamous epithelial cells, NSEC; transitional epithelial cells, TEC; renal tubular cells, RTEC; total casts, CAST; hyaline casts, YCAST; pathological cast, PCAST; yeas-like cells, YLC; spermatozoa, SPERM; crystals, XTAL and mucus.

**METHODS**

CLSI protocols was adjusted to urine specimen features to evaluate the analytical performance of UF-1500. In detail:
1) 500 inpatients and outpatients' urine routine samples were tested twice both on UF-1500 and UF-5000 for comparison
2) Linearity, between and within-run reproducibility was evaluated for the main parameters. Carry-over was performed for RBC, WBC and SEC.
3) 230 urine routine samples with a wide range of values were tested twice on UF-1500, UF-5000 and manually counted at contrast phase microscope using Fuchs Rosenthal Chamber (FRC) to compare the clinical performances of all the parameters, except for BACT.

**RESULTS**

1) The correlation between the counts on UF-1500 vs UF-5000 was excellent, with an agreement > 95% for all the parameters, except YCAST (88%)
2) Linearity performance was r > 0,99 for all the parameters except for TEC and PCAST (r=0.95) and SPERM (r=0,97). The between and within-run CV for RBC, WBC, EC was <20%. The carry-over was absent.
3) The comparison with FRC showed good correlation for the main parameters, acceptable for YLC and XTAL.

**CONCLUSIONS**

The analytical performance of UF-1500 was very good and inherits the high levels of functionality and usability of the UF-5000. The availability of this new analyzer will deliver a wider range of solutions tailored to the customer's environment and contribute to the standardization of urine testing at small and medium-sized laboratories.

Kidney diseases and transplantation, urinanalysis

P1421

## IS CONCENTRATION OF URIC ACID IN HEMODIALYSIS PATIENTS ASSOCIATED WITH LEVEL OF OTHER MARKERS OF RENAL IMPAIRMENT AND CARDIOVASCULAR COMPLICATIONS?

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**BACKGROUND-AIM**

Increased concentration of uric acid (UA) is frequently encountered in end-stage renal disease (ESRD). Furthermore, hyperuricemia is related with an increased cardiovascular risk. Our was to assess the association between UA and other laboratory markers of renal impairment, as well as the presence of certain cardiovascular complications in patients with ESRD.

**METHODS**

A group of 110 patients on a chronic hemodialysis program was evaluated from 2011 to 2017. Clinical assessment included age, gender and body mass index (BMI), mean arterial blood pressure and presence of secondary hypertension, chronic ischemic myocardiopathy or development of acute coronary syndromes. Laboratory tests involved UA, glucose, urea, creatinine, albumin, total, HDL and LDL cholesterol, triglycerides, calcium, inorganic phosphate, C-reactive protein, natriuretic peptide type B (BNP), amino-terminal pro-natriuretic peptide type B (NT-proBNP) and intact parathyroid hormone (iPTH). Patients were grouped depending on whether UA was below or above 350 μmol/L. Clinical and laboratory data were compared between groups using Student t or Chi-square test, while their association with UA in the whole cohort was assessed with Spearman's correlation analysis.

**RESULTS**

Uricemia above 350 μmol/L was more frequently encountered in males (P = 0.0126). Also, higher concentration of urea (P = 0.004), creatinine (P = 0.028), triglycerides (P = 0.049), inorganic phosphate (P = 0.001) and CRP (P = 0.041), as well as lower level of HDL cholesterol (P = 0.005), were measured in group with UA higher that 350 μmol/L. Level of UA correlated with male gender (r = 0.233; P = 0.014), age (r = -0.331; P = 0.001) as well as concentration of urea (r = 0.355; P = 0.001), creatinine (r = 0.288; P = 0.004), HDL-cholesterol (r = -0.357; P<0.001); triglyceride (r = 0.288; P = 0.002); inorganic phosphate (r = 0.441; P<0.001), BNP (r = -0.319; P = 0.029) and CRP (r = 0.212; P = 0.031). Nevertheless, no significant correlation was found between UA level and presence of abovementioned cardiovascular complications.

**CONCLUSIONS**

In the study group, concentration of UA correlated with laboratory markers of renal impairment, while association with certain cardiovascular complications of ESRD was not evidenced.

Kidney diseases and transplantation, urinanalysis

P1422

## IS URINARY DENSITY A GOOD PREDICTOR OF URINARY OSMOLALITY?

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### BACKGROUND-AIM

Urine osmolarity (OsmU) is considered the gold standard for the evaluation of the kidney's urine concentration capacity. However since OsmU is not routinely measured, urinary density (UD) is often used as a surrogate for its estimation. We aimed to analyze the accuracy of UD in estimating OsmU.

### METHODS

A transversal study including urine specimens with simultaneous determination of UD assessed with refractometry (ATAGO T3-NE CLINICAL) and OsmU measured (OsmUm) by osmometer (Fiske® Micro-Osmometer Model 210). To estimate OsmU, we multiplied the last two digits of the UD by 35, 30, 32, 33.5, and 40; the estimates were considered precise if the value was ± 30 mOsm/kg from the OsmUm. Low, normal and high renal concentration ability was defined as UD lower or equal to 1.010, between 1.010 and 1.020, and above or equal to1.020, and OsmU lower than 350 mOsm/kg, between 350 and 600 mOsm/kg, and higher than 600 mOsm/kg, respectively. Factors that may influence the estimation of urine density such as pH urine, urine protein, and urine glucose were assessed by using urine test strips. An univariate correlation analysis of OsmUm an UD was performed using Pearson coefficient.

### RESULTS

A total of 32 urine specimens were collected. UD was significantly correlated to OsmUm ($r=0.967$; $p< 0.001$). UD was an excellent predictor of OsmU. when it was above 1.020; 92.3% of these samples exhibited OsmUm above 600 mOsm/kg and when UD was below or equal to 1.010, only one of 13 samples (7.7%) had OsmU above 350 mOsm/kg.
When analyzing the accuracy of the formulas used to estimate OsmU, factors of 30 and 32 underestimated the OsmUm while 35 and 40 overestimated it. These differences were statistically significant ($p<0.01$).
when using the factors 33.5, there were no differences between the means of OsmUm:539.97 mOsm/ kg and OsmUc: 540.19 mOsm/ kg with $p=0.986$.
For samples with proteinuria and/or glycosuria, the highest proportions of accurate estimations were obtained with the factor 30 (75%).

### CONCLUSIONS

The estimation of the OsmUm from UD showed acceptable performance. we recommend using the factor 33.5 for clean samples and 30 for samples with proteinuria and/or glycosuria.

Kidney diseases and transplantation, urinanalysis

P1423

## ANALYTICAL UNCERTAINTY OF THE ESTIMATED GLOMERULAR FILTRATION RATE (EGFR)

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### BACKGROUND-AIM

Estimated glomerular filtration rate (eGFR) is the most common test of renal function. GFR varies as a function of normal physiology and disease.Variation of eGFR is possible due to analytical error and biological variation in creatinine measurements. Uncertainties in eGFR can also led to overdiagnosis of some renal diseases.The aim of this study is to assesse the uncertainty measurment of plasma creatinine and to evaluate that impact on the results of eGFR.

### METHODS

Analysis of creatinine is performed on ADVIA® Chemistry 1800 analyzer. The 'top-down' approach was used to evaluate measurement uncertainty .The impact of creatinine uncertainty measurement on eGFRs using MDRD and CKD-EPI equations were compared using the Passing–Bablok regression and the Bland–Altman plots, according to the CLSI guidelines (EP09C-ED3).

### RESULTS

Two quality control materials were analysed regularly alongside patient samples. The results values were calculated from data obtained over a 10 month period (n = 122). Quality control results that were rejected as (out of specification) have been omitted from the calculations. Cumulative mean (QC1= 214.28 µmol/L, QC12 = 499.28 µmol/L), CV % (QC1 = 4.55, QC2 = 3.58) . There was an impact of creatinine results levels when approximated to 1 and 2 decimals if the units are mg/dL.1 and µmol/L on the eGFRs using MDRD and CKD-EPI equations results .There were cases where il was observed a change from one stage of chronic kidney disease to another when estimating eGFR from creatinine with both formulas ( 18% in MDRD vs 13% CKD-EPI ).The results demonstrated also that the use of a one decimal will produce differences in eGFR greater than ± 5% for serum creatinine values below 1.2 and greater than ± 10% when serum creatinine values are below 0.6mg/dl.

### CONCLUSIONS

Estimated glomerular filtration rate is subject to uncertainty due to serum creatinine imprecision and biological variability. It is recommend that each laboratory determine this uncertainty by calculating the uncertainty associated with results for creatinine in serum . However, it is important to note that the creatinine uncertainty, and thus the eGFR, varies with creatinine levels, the analytical methods used to determine creatinine and other factors.Therefore caution should be used when interpreting eGFRs .

Kidney diseases and transplantation, urinanalysis

P1424

## CORRELATION BETWEEN SERUM CALCIUM AND PHOSPHORUS CONCENTRATIONS AT DIFFERENT LEVELS OF INTACT PARATHYROID HORMONE (IPTH) CONCENTRATIONS OF PATIENTS UNDERGOING HEMODIALYSIS

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**BACKGROUND-AIM**

Mineral and bone disorder affects patients with chronic kidney disease (CKD), resulting in abnormalities in serum calcium (Ca), phosphorus (P), and parathyroid hormone (PTH). Mineral metabolism changes have also been linked to greater of all-cause and cardiovascular mortality rates. The majority of hemodialysis patients are also insufficient in the endogenous hormone 1,25-dihydroxyvitamin D (calcitriol), which frequently contributes to secondary hyperparathyroidism (SHPT) and, as a result, aberrant Ca, P, and PTH levels. The Kidney Disease Outcomes Quality Initiative (KDOQI) Guidelines are widely utilized, and this study was conducted to assess the present state of serum Ca and P management in patients on maintenance hemodialysis at the Clinical University Center of Kosova.

**METHODS**

A total of 58 patients receiving maintenance hemodialysis had their data collected. We measured the serum levels of calcium (Ca), phosphorus (P), and intact parathyroid hormone (iPTH), and we compared the results of serum calcium and phosphorus concentrations at different levels of iPTH concentrations using the Mann-Whitney U test.

**RESULTS**

The levels of calcium and phosphorus in the serum were 2.18 ± 0.8 mmol/L and 1.62 ± 0.96 mmol/L. However, 43% and 47%, respectively, of patients had Ca and P levels that were within KDOQI guideline ranges. Of the 58 patients, 10 (17.24%) had uncontrolled secondary hyperparathyroidism (iPTH > 300 pg/mL), while 32 patients (55.17%) had iPTH < 150 pg/mL. When compared to patients with iPTH levels below 300 pg/mL, patients with uncontrolled SHPT had significantly higher serum Ca and P values.

**CONCLUSIONS**

In conclusion, this study showed how serum Ca, P, and parathyroid hormone control are currently affected by maintenance hemodialysis. Despite the current clinical practice recommendation, many patients' SHPT appears to be insufficiently controlled. Due to the association between uncontrolled secondary hyperparathyroidism and higher serum levels of Ca and P, effective treatment of SHPT may lower cardiovascular mortality and improve patient outcomes.