Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1606

COMPARATIVE STUDY OF THREE METHODS FOR ASSESSING RENAL FUNCTION

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BACKGROUND-AIM

Estimation of renal function is essential for the management of patients because of its diagnostic, prognostic and therapeutic implications. Several formulas have been developed with the aim of estimating renal function by calculating or measuring the glomerular filtration rate (GFR).
The aim of our work was to compare three methods for estimating GFR: measurement of creatinine clearance (Cl-Cr) in 24-hour urine, calculation by the MDRD and CKD-EPI formulas.

METHODS

This was a retrospective study that included 123 patients. Serum and urine creatinine were measured by Jaffe method on Cobas 6000 machine. GFR was measured and calculated for all patients using the 3 formulas: Cl-Cr, MDRD and CKD-EPI. The concordance of the results was studied by the Bland and Altman plot.

RESULTS

-There were 123 patients aged 55.83±15.36 years with a sex ratio of 0.66.
-The medians of measured or calculated GFR are as follows: Cl-Cr=65.56ml/min(32.3–110.7), MDRD=77.35ml/min/1.73m2(45.1–105.6), CKD-EPI=84.87ml/min/1.73m2(45.88–105.56).
-The MDRD formula overestimated the GFR with a bias of 7.0497 ml/min compared to Cl-Cr. This overestimation is not statistically significant.
-According to Bland and Altman plot, Cl-Cr and MDRD gave concordant results for stages II, III, IV and V. Discordant results are observed especially as the GFR increases.
-The CKDEPI formula slightly underestimated the GFR compared to Cl-Cr(bias -0.1493 ml/min). This underestimation is not statistically significant. According to Bland and Altman plot, Cl-Cr and CKDEPI gave concordant results for stages II, III, IV and V of CKD. On the other hand, for stage I, there is a discordance of 5 points.
-The MDRD formula overestimated results by CKDEPI by a mean difference of 7.1990 ml/min. This difference is statistically significant.
-In terms of correlation, the 3 methods were well correlated with a Pearson correlation coefficient of r=0.747, 0.672 and 0.984 respectively, $p<0.0001$.

CONCLUSIONS

Big variability in the estimation of GFR is observed depending on formula used despite a good correlation between them. The results were discordant especially for a GFR>60 ml/min. This discrepancy gives errors in the diagnosis of CKD as well as insecurity in the medical prescription of certain nephrotoxic drugs.

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P1607

NOVEL IMMUNOHISTOCHEMICAL MARKERS OF STEROID RESISTANCE IN FOCAL SEGMENTAL GLOMERULOSCLEROSIS (FSGS)

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BACKGROUND-AIM

Focal segmental glomerulosclerosis (FSGS) is a progressive disease that leads to end-stage chronic kidney disease. The therapeutic approach requires the administration of steroids to prevent further damage and proteinuria; however, some patients develop steroid resistance, leading to persistent proteinuria. Previous proteomic analyses of urine from steroid-resistant FSGS patients identified potential protein biomarkers. This study aims to assess the prognostic power of novel protein markers for steroid resistance in biopsy samples of FSGS patients.

METHODS

This is a cohort study. Data collected from hospital information systems of two tertiary care hospitals in Oman, from 2006 to 2020. Patients presented with proteinuria and had biopsy proven primary FSGS were included. Patients were followed for presence of steroid resistance which is identified based on persistent proteinuria or double plasma creatinine for > 8 weeks post-therapy. The biopsy tissue slides were collected. The inclusion criteria for novel protein marker selection were previous proteomic evidence, evidence of expression in renal tissue, and availability of commercial providers. Stained slides were quantified for staining intensity using the Fiji tool. A statistical comparison of staining intensity between steroid-resistant and sensitive patients was performed and prognostic odds ratios were reported. A positive control tissue was used to assess the performance of the commercial antibody.

RESULTS

Our cohort consisted of 13 sensitive and 19 steroid-resistance patient samples. We identified seven potential markers for our study: Neurotrophic Receptor Tyrosine Kinase 1 (NTRK1), vitamin D–binding protein (VDBP), Podocin, Synoptopodin (SYNPO), fetuin-A, Mα-Dystroglycan (DAG1), Wilms tumor protein (WT1). Most of the seven markers were significantly lower in expression in the resistance group except for DAG1 and SYNPO. Patients with lower expression of NTRK1 and Fetuin-A at time of diagnosis were 92% (OR = 0.08, 95% CI: 0.01–0.89), 97 % (OR 0.03, 95%C.I 0.002-0.3), respectively, more likely to develop steroid resistance.

CONCLUSIONS

We identified Fetuin-A and NTRK1 as potential immunohistochemical markers to predict steroid resistance in FSGS patients. Knowing the possibility of resistance can help in avoiding unnecessary exposure to steroids.

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P1608

DISTRIBUTION OF GLUTATHIONE S-TRANSFERASE THETA 1 (GSTT1) AND MU 1 (GSTM1) POLYMORPHISMS IN A COHORT OF KIDNEY TRANSPLANT RECIPIENTS IN A TERTIARY CARE CENTER IN BOSNIA AND HERZEGOVINA

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BACKGROUND-AIM

Oxidative stress has been implicated in delayed graft function in patients with transplanted kidneys. Glutathione S-transferases (GSTs) are a large family of enzymes that play a crucial role in detoxification and oxidative stress responses. Moreover, polymorphisms in GST genes, particularly the null genotypes (deletion) for GST theta 1 (GSTT1) and GST mu 1 (GSTM1), have been suggested to contribute to graft rejection. This study aimed to investigate the distribution of GSTT1- and GSTM1-null genotypes in a cohort of kidney transplant recipients in a tertiary care center in Bosnia and Herzegovina.

METHODS

The study included adult kidney transplant recipients who were followed up at the Clinical Centre University of Sarajevo after transplantation at the same institution or elsewhere. Genomic DNA was isolated from peripheral blood using a commercial kit. GSTT1- and GSTM-null or non-null genotypes were detected using multiplex polymerase chain reaction. The β-globin gene was used as an internal reference.

RESULTS

The study included 64 kidney transplant recipients from across the country, out of which 15 (23.4%) were female. The mean age of patients was 47.5 (±13.7 SD) years. The frequency of GSTT1-null genotype was 34.4% and of GSTM1-null genotype was 35.9%. The frequency of the double null genotype (GSTT1 and GSTM1) was 9.4 %.

CONCLUSIONS

While GSTT1 and GSTM1 are important in protecting against oxidative stress, available studies offer conflicting results on the link between their null genotypes and kidney graft function. Follow-up of patients as well as detailed clinical outcome data are required to establish the association of GSTT1 and GSTM1 polymorphisms with graft function and/or rejection.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1609

INTERFERENCE IN CREATININE MEASUREMENT CAUSED BY INTRAVENOUS N-ACETYLCYSTEINE OVERDOSE: A CASE REPORT.

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BACKGROUND-AIM

Serum creatinine and urea tests are essential for assessing kidney function. The enzymatic method is considered the most specific for creatinine determination in serum or plasma, with less interference compared to the Jaffé kinetic method. However, certain metabolites and drugs can interfere, leading to inaccurate results. Clinical laboratory professionals must recognize these interferences and communicate them to clinicians.

METHODS

A 79-year-old woman presented to the Emergency Room with dizziness, dyspnea, hypotension, and liver and kidney alterations. Clinical history: arterial hypertension, type II diabetes mellitus, heart failure, and chronic kidney disease. She had been admitted 4 days earlier with similar symptoms, where a pharmacological or cardiac cause was suspected. A complete blood analysis was performed.

RESULTS

Initial blood analysis showed: hemoglobin 10.8 g/dL [12-16], creatinine 3.28 mg/dL [0.51-0.95], urea 149 mg/dL [19-62], ALT 2907 U/L [3-35], AST 5683 U/L [3-35], PT/INR 3.37 ratio [0.9-1.2]. Hepatic impairment and worsening renal function were evident. A control analysis 12 hours later revealed a discordant creatinine value of 0.73 mg/dL. Suspecting an error due to inconsistency with the patient's clinical context, the creatinine assay was repeated on the same sample, yielding progressively higher results until stabilizing at 2.07 mg/dL. Equipment and quality controls were functioning properly. However, the clinical history revealed intravenous administration of N-acetylcysteine (NAC) for suspected drug-induced liver injury, with an administration error leading to a 10-fold overdose. The enzymatic method used for creatinine determination is known to be affected by NAC, causing falsely low results. A new sample was requested, ultracentrifuged, and showed a creatinine level of 2.05 mg/dL. A subsequent analytical control 12 hours later reported 2.3 mg/dL, likely reflecting gradual correction of the NAC overdose.

CONCLUSIONS

This case highlights interference in creatinine measurement caused by intravenous N-acetylcysteine. Despite being a known interference, laboratory specialists should remain vigilant when using the enzymatic method and ensure awareness of the patient's medications before reporting results.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1610

EVALUATION OF THE IMPACT OF CENTRIFUGATION SPEED ON MICROSCOPIC URINE SEDIMENT ANALYSIS

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BACKGROUND-AIM

A review of standard operating procedures for microscopic urine sediment analysis across a newly integrated laboratory organization identified a significant difference in centrifugation speed at a regional hospital laboratory. This study aims to evaluate the impact of centrifugation speed on urine sediment analysis.

METHODS

This study was performed at community and tertiary care hospital laboratories. Urine samples with abnormal macroscopic urinalysis results with sufficient volume (> 6 mL) were split equally into two tubes to be centrifuged at 400g or 1500g for 5 minutes. The supernatant was poured off, stain was added and mixed gently with sediment. Casts were examined and quantified at 10X magnification, and all other sediment components were examined at 40X magnification. At each magnification, 10 random fields were scanned. Agreement and Cohen's Kappa (κ) between centrifugation speeds were calculated with EP Evaluator statistical software.

RESULTS

Urine samples analyzed for red blood cells (n=61) showed agreement of 88.5% between the two centrifugation speeds (κ= 81.8%). For white blood cells (n=60) and white blood cells clumps (n=41), the agreement was 83.3% (κ=76.9%) and 95.1 % (κ=85.8%), respectively. For samples with squamous epithelial cells (n=51), the agreement was 92.9% (κ=.6%) Hyaline casts showed lower concordance at 73.4% (κ=64.2%). Bacteria (n=59), granular casts (n=3), calcium oxalate crystals (n=8) and yeast (n=3) showed 100% agreement between the two different speeds.

CONCLUSIONS

For most urinary sediment, there is no significant difference in microscopic urine analysis between samples spun at 400g compared to 1500g.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1611

DETECTION OF ULTRAFILTRATION FAILURE IN PERITONEAL DIALYSIS PATIENTS: A CASE REPORT.

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BACKGROUND-AIM

Peritoneal dialysis (PD) is a renal replacement therapy modality in which the peritoneal membrane is used as a semi-permeable barrier to facilitate the exchange of fluids and solutes between the patient's blood and the dialysing fluid. To evaluate the function of the peritoneal membrane and optimize treatment, various diagnostic tests are used, among which the Enteral Permeability Test (PET) stands out. This test measures the solute transport capacity through the peritoneal membrane, as well as the convective capacity, i.e., ultrafiltration efficiency.
This ultrafiltration capacity is calculated by sodium screening, which consists of measuring the difference in sodium concentration between the basal dialysate fluid and the dialysis fluid extracted 60 minutes after starting the test. When this difference is less than 5 mEq/L, it is associated with a high risk of ultrafiltration failure (UFF).

METHODS

We present a case of a 44-year-old male on peritoneal dialysis whose sodium screening was 3 mEq/L, suggesting compromised ultrafiltration capacity.
Given this laboratory finding, the nephrology team made adjustments in the patient's dialysis treatment. The number of dialysis cycles was increased and the duration of dialysis cycles was reduced, with the goal of improving aquaporin function and optimizing the efficiency of the ultrafiltration process.

RESULTS

These changes also helped to reduce the risk of volume overload, which could have resulted in hydroelectrolyte imbalance and dialytic technique failure, allowing the patient to continue on peritoneal dialysis and improve the convective capacity of the membrane.

CONCLUSIONS

Early detection of ultrafiltration failure in patients on peritoneal dialysis is essential to prevent the need for transfer to hemodialysis, which can have a negative impact on patients' quality of life and survival. Early identification of this complication allows therapeutic adjustments that improve the efficacy of the dialytic technique, optimize the hydroelectrolyte balance and contribute to better management of medical resources in patients with chronic renal failure.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1612

VALIDATION OF 24-HOUR URINE COLLECTION USING THE URINARY CREATININE ASSESSEMENT

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BACKGROUND-AIM

Daily urinary creatinine excretion is strongly correlated with skeletal muscle mass. Thus, the validity of a timed urine collection can be judged by measurement of 24 hour urinary creatinine excretion.
The aim of our study was to verify the validity of 24 hour-urine collection by urinary creatinine measurement.

METHODS

This was a retrospective study, conducted at the clinical chemistry laboratory, over a period of 3 months, involving requests for analysis of urinary parameters on 24-hour urine. We excluded those from patients with renal failure. The collection of 24hour urine was validated if urinary creatinine was between 7-14 mmol/24 h for women and 9-21 mmol/24 h for men.

RESULTS

Data from thirty-five patients were collected. Sex ratio was 1.1. The median age was 49 years (26 – 71). Twenty-nine patients (82.86%) had 24-hour urine collection validated by urine creatinine measurement with a mean of 12.39 ± 3.07 mmol/24 h. Three patients showed incomplete 24-hour urine collection with a mean urine creatinine of 6.03 ± 0.65 mmol/24 h and and 3 patients had urine collection exceeding 24 hours with a mean urine creatinine of 17.83 ± 4.88 mmol/24 h.

CONCLUSIONS

The measurement of urinary parameters can be impaired by incomplete 24-hour urine collection. Urine creatinine measurement is a quick and inexpensive method to check the completeness of 24-hour urine collection. This makes it possible to detect pre-analytical non-conformities in order to set up corrective measures.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1613

CATASTROPHIC ANTI-PHOSPHOLIPID SYNDROME IN SYSTEMIC LUPUS ERYTHEMATOSUS

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BACKGROUND-AIM

Anti-phospholipid syndrome is an autoimmune disorder characterized by episodes of thrombosis in the presence of anti-phospholipid antibodies.Catastrophic anti-phospholipid syndrome (CAPS) is an accelerated form of the disease with rapid involvement of multiple organ systems often posing a diagnostic challenge.

METHODS

We present one case of CAPS in patient with SLE that resulted in the end–kindney damage. A 37 years old female admitted in Internal Medicine Unit in August 2024 for unexplained inflammatory syndrome,generalized edema,weakness.She does not suffer from other diseases. No familiar history for renal diseases.

RESULTS

These tests were performed:-Total protein-4.4 g/dl,Albumin-1.9 g/dL,Creatinine-1.45 mg/dL,Urea-49 mg/dL,CRP-10 mg/L,C3 complement-68 mg/dL,C4 complement-9.8 mg/dL. -Microscopic exam of urine:15-20 blood cells HPF Proteinuria-321.9 mg/dl,Proteinuria/24 h-9657 mg/24 h -ANA-titer>1:320,Anti-nRNP/Sm-5.1,Anti-SSA-6.19,Anti-PLA2R–Negative. -ACA IgM 74.8 U/mL and PTT-LA-58.4.

CONCLUSIONS

CAPS is a form of APS with multiorgan failure.CAPS occurs usually as a primary disease in patients with SLE.The disease has a rapid progression and frequently affecting the kindneys with acute kidney injury,haematuria and proteinuria.The endothelial injury is a central feature involving the kidney within 1 month.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1614

OPTIMIZING LABORATORY REPORTS FOR GLOMERULAR HEMATURIA: THE ROLE OF ACANTHOCYTES

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BACKGROUND-AIM

The detection of dysmorphic erythrocytes (DE) in urine plays a crucial role in the early identification of glomerular hematuria, a condition that affects kidney function and requires precise diagnosis. Moreover, the presence of over 5% acanthocytes is recognized as a highly reliable marker of glomerular pathology (GP). Our current laboratory reports focus on identifying samples with more than 20% DE. This study aims to evaluate the inclusion of an additional classification—more than 5% acanthocytes—to provide clinicians with enhanced tools for a more accurate and comprehensive interpretation of results.

METHODS

We conducted a thorough review of images recorded in the Menasoft database from validated urine analysis requests containing over 20% DE (n=25) between June 2023 and March 2024. An equivalent number of samples (n=25) with no DE were also reviewed to calculate the relevant statistical indicators. Using a counter, we reassessed and identified samples with both over 20% DE and over 5% acanthocytes. Clinical histories of these patients were subsequently reviewed to confirm the presence of glomerular pathology. Cases labeled as "suspected GP" in the clinical records were treated as true GP for statistical purposes.

RESULTS

Among the 25 samples with over 20% DE, 16 (64%) also showed over 5% acanthocytes. None of the samples with less than 20% DE contained over 5% acanthocytes. The predictive value of the current “over 20% DE” category yielded a negative predictive value (NPV) of 100%, effectively ruling out glomerular hematuria in samples below this threshold. Conversely, the “over 5% acanthocytes” category showed a higher positive predictive value (PPV) of 69%, aligning with existing literature as a more reliable indicator of glomerular pathology.

CONCLUSIONS

Our findings suggest that the “over 20% DE” category currently used in laboratory reports offers a high NPV, effectively distinguishing patients unlikely to have glomerular hematuria. However, adding a new category for “over 5% acanthocytes” improves the PPV, enhancing clinicians' ability to identify glomerular pathology with greater precision. As a result, we propose incorporating the “over 5% acanthocytes” classification into laboratory reports to optimize diagnostic accuracy and clinical utility.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1615

PREVALENCE OF PYURIA AND ITS ASSOCIATION WITH END-STAGE CKD PATIENTS AND THEIR COMORBIDITIES AT HEMODIALYSIS CENTERS OF MUKALLA AND AL-SHIHER CITIES, YEMEN

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BACKGROUND-AIM

Chronic kidney disease (CKD) is a signifi cant health issue.Pyuria, the presence of pus in urine, appears to be common among CKDpatients, regardless of urinary tract infections (UTIs). This study aimed to determine the prevalence of pyuria and its association with end-stage CKD and their comorbidities among Yemeni patients.

METHODS

A total of 156 CKD Yemeni patients, comprising 102 males and 54 females aged ≥18 years, were recruited for a cross-sectional study conducted between November 1, 2023, and June 30, 2024, at the hemodialysis centers in Mukalla and Al-Shiher. Anthropometric, clinical, and laboratory data were colected from all participants. Hemoglobin, red blood cell count, white blood cell count, random blood glucose, HbA1c, blood urea, serum creatinine, uric acid, total protein, and albumin levels were analyzed using hematology and chemistry analyzers. Additionally, routine urinalysis and urine culture were performed. Evidence of pyuria was confirmed by bacterial culture in urine specimens.

RESULTS

The present study found that 68 patients (43.59%) showed evidence of pyuria, while 56.41% did not. Additionally, serial pyuria was observed in 33.82% of the cases, with 66.18% indicating urinary tract infections (UTIs). Among the 45 patients with pyuria who had CKD, the most common causative agent of UTIs was Escherichia coli (17.3%), followed by Staphylococcus saprophyticus (4.5%), Klebsiella pneumoniae (3.8%), Staphylococcus aureus (1.9%), and Candida albicans (0.6%).

CONCLUSIONS

Pyuria is common among patients with CKD undergoing dialysis. These findings highlight the importance of early UTI management and suggest that pyuria may act as a marker for tracking CKD progression, regardless of the presence of urinary infection.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1616

EPIDEMIOLOGICAL PROFILE OF PEDIATRIC UROLITHIASIS IN SOUTHERN TUNISIA

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BACKGROUND-AIM

Pediatric urolithiasis is approximately 20 times less common than in adults. However, its incidence appears to have increased over the last two decades, especially among adolescents.
The aim was to analyze the epidemiological characteristics of pediatric urolithiasis in southern Tunisia

METHODS

This retrospective study included children under 17 years of age with urolithiasis whose calculi were analyzed at the biochemistry laboratory of Habib Bourguiba Hospital Sfax between January 2011 and December 2020. Morphological typing and compositional analysis of the calculi were performed using infrared spectrophotometry.

RESULTS

A total of 46 children with urolithiasis were identified. There was a male predominance, with a sex ratio of 4.7. The median age was 4.5 ± 5 years. Renal stones were found in 47.5% of cases, while bladder stones accounted for 15%. Abdominal pain was the most common presenting symptom (38.9%), followed by urinary tract infections (25%). Four children had urinary tract malformations, and six had a history of urinary tract infections. Open surgery remained the most commonly used treatment method (44.7%). Whewellite was the most frequent major component (56.5%), followed by weddellite (17.4%) and carbapatite (8.7%).

CONCLUSIONS

Our study revealed that the composition of pediatric urinary calculi in this region is similar to that observed in industrialized countries, with calcium oxalate monohydrate being the main component.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1617

EVALUATION OF GLOMERULAR FILTRATION RATES EQUATIONS USING CREATININE SERUM IN CHILDREN WITH CONGENITAL ANOMALIES OF KIDNEY AND URINARY TRACT

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BACKGROUND-AIM

Congenital abnormalities of the kidney and urinary tract (CAKUT) in children are a common cause of death and are linked to many complications, such as chronic kidney disease (CKD), with about half of these cases progressing to end-stage renal disease. Consequently, early assessment of renal function is crucial in this instance. Nonetheless, there is no universally applicable formula, as it is contingent upon the population or specific demographic. Therefore, we evaluate paediatric eGFR creatinine formulas, namely Revised Schwartz and European Kidney Function Consortium (EKFC), utilising creatinine as the equivalent variable.

METHODS

Data were collected from 70 patients diagnosed with CAKUT at Dr. Soetomo Academic Hospital. We compare the eGFR Revised Schwartz and European Kidney Function Consortium (EKFC) creatinine-based equations with measured GFR Tc-99mDTPA. The Pearson correlation coefficient (r) was calculated, and the equations for estimating glomerular filtration rate (eGFR) were assessed using root mean square errors (RMSE) and P30, which denote the percentage of eGFR values that fall within 30% of the measured GFR (mGFR).

RESULTS

A moderate correlation was found between Revised Schwartz, EKFC, and mGFR ($r = 0.521$ and $r = 0.501$, respectively, $p < 0.05$). RMSE Revised Schwartz and EKFC values were 34.1 and 31.9, respectively, and p30% were 38.9 and 41.7, respectively, with median differences of 1.49 and 3.41, respectively.

CONCLUSIONS

The use of Equation eGFR Revised Schwartz and EKFC for evaluating eGFR in patients with CAKUT could be considered.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1618

BRIDGING THE LABORATORY GAP: IDENTIFYING THE BEST METHOD FOR ACCURATE SERUM ALBUMIN MEASUREMENT

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BACKGROUND-AIM

Accurate measurement of serum albumin is essential for diagnosing and managing conditions such as nephrotic syndrome. While photometric dye-binding methods using bromocresol green (BCG) and bromocresol purple (BCP) are commonly employed due to their efficiency, discrepancies between these methods can affect clinical decisions, particularly in patients with kidney diseases.

METHODS

A 2-year-old boy presented with facial swelling and reduced urine output, leading to a diagnosis of nephrotic syndrome. Despite aggressive treatment, local laboratory results using the BCG method indicated persistently low serum albumin levels, while a private laboratory using the BCP method showed higher and clinically congruent values. This discrepancy prompted a comparative study of serum albumin measurement techniques.

RESULTS

Serum albumin levels from 59 anonymized patient samples were analyzed using three analyzers (BCP and BCG assays) and compared using linear regression and Bland-Altman analysis. Quality control checks ensured reliable results.
Linear regression showed a strong correlation between BCP measurements across different analyzers ($R^2 = 0.9848$). However, Bland-Altman analysis revealed that BCG assays produced positive biases of approximately 6–8 g/L compared to BCP assays, highlighting clinically significant discrepancies despite the general linear agreement.

CONCLUSIONS

The BCG method overestimates serum albumin levels compared to the more specific BCP method. Clinicians must recognize these biases to avoid misinterpretation of albumin levels, particularly in nephrotic syndrome patients. The BCP method is recommended for accurate serum albumin assessment and improved clinical management.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1619

EBSELEN AMELIORATES SEPSIS-INDUCED ACUTE KIDNEY INJURY BY MODULATING ENDOPLASMIC RETICULUM STRESS, APOPTOSIS, AND OXIDATIVE STRESS

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BACKGROUND-AIM

Acute kidney injury (AKI) is a serious complication of sepsis that is linked with high morbidity and mortality and lacks an effective treatment. Ebselen holds considerable pharmacological importance in the treatment and prevention of several human illnesses, including cancer and cardiovascular diseases. However, the role of Ebselen in the pathogenesis of sepsis-induced AKI is still unknown. Thus, we first aimed to examine the effect of Ebselen, a bioactive seleno-organic molecule, on AKI induced by lipopolysaccharide (LPS). Secondly, we sought to elucidate the link between Ebselen and molecular mechanisms, such as endoplasmic reticulum (ER) stress, apoptosis, and oxidative stress.

METHODS

The sepsis-induced AKI rat model was established by intraperitoneal injection of 5 mg/kg of LPS. The rats received Ebselen orally at doses of 5 and 10 mg/kg for 3 days prior to receiving the LPS injection. We performed histopathological analysis on kidney tissues to assess structural changes. We examined apoptosis using Caspase-3 immunohistochemistry and TUNEL assays. We measured NGAL, a kidney injury marker, and ER stress markers using ELISA. We measured renal dysfunction markers, including BUN and creatinine, using standard laboratory methods. Additionally, we evaluated oxidative stress and antioxidant activity by analyzing MDA, SOD, CAT, and GPx levels.

RESULTS

Ebselen therapy mitigated renal tubular damage and the concentrations of BUN and CREA in an LPS-induced sepsis model. Immunohistochemical and TUNEL investigations demonstrated that Ebselen decreased Caspase-3 expression and the number of apoptotic cells induced by LPS in renal tissues. LPS-induced sepsis generated ER stress, and Ebselen therapy reduced ER stress by modulating EIF2AK3 and GRP78 in kidney tissue as well as ATF4 and ATF6 in serum. Ebselen mitigated LPS-induced oxidative stress by regulating MDA and SOD levels in renal tissues, as well as SOD, GPx, and TAS levels in serum.

CONCLUSIONS

In conclusion, we show for the first time that Ebselen may alleviate sepsis-induced AKI through the modulation of endoplasmic reticulum stress, apoptosis, and oxidative stress.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1620

DIAGNOSTIC RELIABILITY OF SERUM ANTI-PHOSPHOLIPASE A2 RECEPTOR ANTIBODIES FOR PRIMARY MEMBRANOUS NEPHROPATHY

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BACKGROUND-AIM

Membranous nephropathy (MN) is a specific glomerular disease with an incompletely understood etiology. About 80% of MN cases are primary forms of the disease (PMN). The remaining 20% are associated with autoimmune, infectious or malignant diseases, drug or toxin-induced conditions, etc. and are referred to as secondary membranous nephropathy (SMN). It is believed that phospholipase A2 receptor is a major target autoantigen in about 80% of patients with PMN. The aim of our study was to determine the diagnostic reliability and the cut-off value of serum anti-phospholipase A2 receptor (anti-PLA2R1) antibodies in patients with PMN.

METHODS

The study included a total of 233 individuals, of which 52 patients with PMN, 12 with SMN, 49 with others nephropathy (ON) and 120 clinically healthy individuals (HC). The participants were divided into a PMN group and non-PMN group. The serum concentration of anti-PLA2R1 antibodies was determined with ELISA kit (Anti-PLA2R ELISA, IgG, EUROIMMUN, Lübeck, Germany) using MR-96A microplate reader (MINDRAY). True positive, true negative, false positive and false negative results are included in a four-cell table. Diagnostic reliability criteria - specificity, sensitivity, efficiency, positive predictive value (PPV) and negative predictive value (NPV) were calculated. A receiver-operating characteristic (ROC) curve was constructed to determine the cut off value of the test. Statistical analysis of data was performed using the program MedCalc v. 18.5, 2018 MedCalc Software.

RESULTS

The cut-off value for anti-PLA2R1 antibodies for diagnosis of PMN was 19.84 RU/ml, sensitivity was 56%, specificity was 100%, and efficiency was 90%, PPV – 100%, NPV – 89%. The area under the ROC curve was 0.714 (95% CI 0.614 – 0.815), P = 0.0001.

CONCLUSIONS

The quantification of anti-PLA2R1 antibodies with the ELISA method has good characteristics of diagnostic reliability and can be used in routine laboratory practice. The cut-off value we received is 19.84 RU/ml distinguishes patients with PMN from other forms of MN and can be used to diagnose PMN.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1621

OVERESTIMATION OF SERUM CREATININE BY THE JAFFE METHOD

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BACKGROUND-AIM

Serum creatinine (Creat) is a parameter frequently prescribed in routine practice for the assessment of renal function. Its dosage can be performed by different colorimetric, enzymatic or chromatographic techniques. The aim of our work was to compare the levels of Creatinine measured by the Jaffe method and an enzymatic technique.

METHODS

The study involved 120 blood samples. The (Creat) assays were performed using the Jaffe method on Cobas Integra400 machine and the enzymatic method on Cobas Pure machine. The results were compared using the Bland and Altman graph on SPSS software.

RESULTS

-The medians and quartiles of (Creat) by Jaffe method vs. enzymatic technique are: 119 µmol/l (72.42-222.75) vs. 115.5 µmol/l (69-201.75).
-The results of the two techniques were well correlated with a correlation coefficient r=0.996, p<0.0001).
-According to the Bland and Altman graph, the Jaffe method overestimates (Creat) by 9.1708 µmol/l on average compared to the enzymatic technique. This overestimation is statistically significant (p<0.0001).
-The samples were subdivided into 3 groups according to the (Creat) level: group1: (Creat) <85µmol/l, group2: 85≤Creat <200µmol/l, group3: Creat ≥200µmol/l.
-The agreement of results between the two methods was acceptable for group1 except for 6 points.
- For groups 2 and 3, the results by the Jaffe method were increased compared to those obtained by the enzymatic method with a respective bias of 7.715 and 20.871 µmol/l.

CONCLUSIONS

Creatinine levels given by the Jaffe method are increased by approximately 2.5% compared to those obtained by the enzymatic method. This difference is attributed to the sensitivity of the Jaffe technique to numerous interferences from endogenous or medicinal substances. This observed difference encourages a standardization of creatinine dosage.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1622

CORRELATIONS OF PARATHORMONE, CALCIUM, PHOSPHORUS, AND MAGNESIUM IN CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

Hyperparathyroidism due to chronic kidney disease (CKD) is a common complication characterized by elevated parathyroid hormone (PTH) levels secondary to derangements in the homeostasis of calcium and phosphorus. In our daily practice, we have noticed that PTH as a biomarker in CKD is slightly overestimated by clinicians. The aim of our study was to determine PTH, calcium, phosphorus, and magnesium levels in CKD and the possible correlations between them and the stages of CKD.

METHODS

We performed a prospective study including 217 outpatients with levels of serum creatinine out of reference range from February 2023 to July 2024. We calculated the glomerular filtration rate (eGFR) with 2021-CKD-Epi equation using serum creatinine. We used Jamovi Statistical Software version 2.3.28. We tested differences with Kruskal-Wallis for non-parametric variables between more than two groups. We performed Pearson correlation and linear regression. A two tailed “p” value equal to or less than 0.05 was considered statistically significant.

RESULTS

We had 105 females (48%) and 112 males (52%), median age 72 years (35-94yrs). We found differences of PTH and phosphorus levels between distinct stages of CKD. For PTH the differences were found between stages II and IV ($p=0.005$), IIIa and IV ($p<0.001$), IIIb and IV ($p=0.004$), while for phosphorus between stages IIIa and IIIb ($p=0.009$), IIIa and IV ($p<0.001$), IIIb and IV ($p=0.029$). We found correlation between PTH and eGFR ($r= -0.366$, $p<0.001$), PTH and magnesium ($r=0.216$, $p=0.001$), eGFR and calcium ($r=0.197$, $p=0.004$), eGFR and magnesium ($r= -0.157$, $p=0.021$), eGFR and phosphorus ($r= -0.353$, $p<0.001$), magnesium and calcium ($r=0.209$, $p=0.002$), magnesium and phosphorus ($r=0.280$, $p<0.001$).

CONCLUSIONS

We concluded that there is a statistically significant correlation between PTH and various stages of CKD, but the strength of this correlation is low and therefore cannot be generalized, therefore each patient with CKD must be assessed individually.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1623

RED BLOOD CELL DEFORMABILITY AND INFLAMMATORY MARKERS IN HEMODIALYSIS PATIENTS WITH END-STAGE RENAL FAILURE: A NOVEL HEMORHEOLOGICAL PERSPECTIVE

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BACKGROUND-AIM

CKD is a progressive disorder that often involves chronic inflammation, contributing to elevated circulating proteins, impaired blood flow, and increased cardiovascular risks.In ESRF, RBC deformability is crucial for adequate tissue oxygenation. This study investigates RBC deformability in HD patients in Saudi Arabia and explores its association with inflammatory markers.

METHODS

EDTA blood samples were collected from ESRF patients and healthy blood donors at King Khalid National Guard Hospital under ethical approval (Ref No. IRB/1861/23). CBC and biochemical markers were retrieved from the hospital's laboratory information system (LIS). RBC deformability was assessed using ektacytometry (LORRCA Maxsis, Mechatronics, The Netherlands), measuring the elongation index (EI) under varying shear stress (SS). Statistical analysis was conducted using GraphPad Prism 10, employing the Mann-Whitney test for group comparisons and Spearman correlation to examine relationships between inflammation markers and RBC deformability. A p-value of <0.05 was considered statistically significant.

RESULTS

HD patients exhibited significantly elevated CRP levels 14.6 ± 24.8 mg/L vs. normal range 0–3.2 mg/L, suggesting persistent inflammation. Other markers, including Alb (39.1 ± 4.2 g/L vs. normal 35–50 g/L) and TP (70.8 ± 4.9 g/L vs. normal 64–83 g/L), remained within normal limits. RBC deformability was markedly reduced in HD patients, with significantly lower EI values at 0.9 and 9.49 Pa ($p < 0.0009$ and $p < 0.001$, respectively). At higher SS (max Pa), EI differences between groups diminished (0.6 ± 0.002 vs. 0.6 ± 0.001, $p = 0.08$). The shear stress required to reach half of the maximal EI (SS1/2) was significantly elevated in HD patients (1.06 ± 0.04 vs. 0.9 ± 0.03 Pa, $p = 0.001$), indicating increased RBC rigidity. However, no significant correlation was found between inflammatory markers and RBC deformability at different SS levels.

CONCLUSIONS

Hemodialysis patients with ESRF exhibit impaired RBC deformability, which may exacerbate microvascular dysfunction and tissue hypoxia, potentially worsening clinical outcomes. Future investigations should employ proteomic and metabolomic approaches to identify specific metabolites and amino acid alterations in the RBC membrane that contribute to hemorheological dysfunction.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1624

CRYSTALLURIA. AN IMPORTANT SIGNAL OF RENAL DAMAGE IN THE URINARY SEDIMENT TEST

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BACKGROUND-AIM

Cystinuria is an autosomal recessive inherited disease characterized by mutations in the SLC3A1 (2p21) and SLC7A9 (19q13.11) genes. It's characterized by defect in transport of cystine and dibasic amino acids (ornithine, lysine and arginine) in proximal renal tubule and gastrointestinal tract. Therefore , increases ciystina in urine and then increases the formation of stones in renal pelvis or bladder. It occurs in 1-3% adults and 6-10% children.

METHODS

An 35-year-old woman comes to the emergency room with fever and left flank pain. She had a long medical kidney stone history but she was never properly diagnosed.

RESULTS

The urine analysis reveals proteinuria and leukocytosis with pH=6 and density 1.043. The urine sediment examination shows an abundant hexagonal crystals, flat and transparent. The 24-hour urine biochemistry performed shows increased levels of glucose 1750#mg/dL [0–2,3] and ions: sodium 140#mEq/L [20–110], potassium 83#mEq/L [15–75] and calcium 32#mg/L [7–24]. Citrate excretion is 90#mg/24#h [140–940]; uric acid 1120#mg/24#h [250–750]; protein 0.33#mg/24#h [0.05–0.08] and cystine 2320#mg/24#h [7–67]. Confirmatory diagnosis of cystinuria should be include also an analysis of urinary calculi by X-ray crystallography and a genetic study to characterize genetic mutations.

CONCLUSIONS

Cystinuria is the most common cause of hereditary renal lithiasis (average 1/7000 live births). However, this disease is underdiagnosed since a high percentage of patients do not form stones. Because the genetic study isn't usually performed the urine sediment testing and the correct interpretation and classification of crystals is very important and it suposed a fast and cheap diagnostic tool in the clinical laboratory. Given the severity and chronicity of these conditions and the associated risk of progressive renal injury, is very important to made an early diagnosis and appropriate management cannot be overemphasized.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1625

MENINGEAL CARCINOMATOSIS IN A PATIENT WITH UROTHELIAL CANCER

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BACKGROUND-AIM

Leptomeningeal carcinomatosis is an infrequent complication of solid tumors with an incidence of 0.8-8%. Although this condition is commonly associated with neoplasms such as melanoma, breast and lung cancer, its occurrence in the context of urothelial carcinoma is rare, typically manifesting in advanced stages, often following chemotherapy treatment.

METHODS

Descriptive observational study of case report.

RESULTS

This report details the case of a 71-year-old male with high-grade urothelial carcinoma, referred to our hospital for refractory headache unresponsive to analgesia, diplopia, and appetite loss. His medical history includes left radical nephroureterectomy and chemotherapy.
Initial evaluation with cranial computed tomography (CT) revealed moderate cortical subcortical atrophy without other significant findings. Cerebrospinal fluid (CSF) analysis showed 14 leukocytes/μL (80% lymphocytes, 20% polymorphonuclear cells), abundant unfiliated cellularity, elevated proteins (77.3 mg/dL) and decreased glucose (52 mg/dL). Multiplex PCR for meningitis/encephalitis was negative. Brain magnetic resonance imaging (MRI) identified nodular enhancements in both cerebellar hemispheres. Lastly, CSF cytology confirmed malignant cells consistent with metastasis of urothelial carcinoma.
Based on these findings, a definitive diagnosis of leptomeningeal carcinomatosis was established. Further evaluation with whole-body CT revealed widespread osseous metastases. Given the advanced disease progression and the patient's clinical status, the Oncology team opted for palliative care. The patient passed away 15 days after hospital admission.

CONCLUSIONS

This case highlights the importance of considering leptomeningeal carcinomatosis in patients with urothelial carcinoma who present with neurological symptoms such as persistent headache, nausea, visual disturbances, as well as mental status changes. CSF analysis is a key diagnostic tool for this condition, with characteristic findings including pleocytosis, elevated protein levels, reduced glucose and the presence of malignant cells. The significance of this case lies in raising awareness about the potential for this complication in patients with advanced urothelial neoplasms, emphasizing the necessity of a multidisciplinary approach for diagnosis and treatment.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1626

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 biomarkers of kidney injury. We evaluated the relationships between the cytokines and estimated glomerular filtration rate (eGFR) in Antiretroviral-naïve and -treated Patients with HIV/AIDS

METHODS

Serum interleukins were assayed using High Performance Liquid Chromatography. Creatinine was determined by a modified Jaffe-kinetic method traceable to isotope dilution mass spectrometry. Creatinine values were used to determine eGFR by the CKD-EPIcr equation 2009.

RESULTS

One hundred and eighty-one subjects (86 ART-naïve and 95 ART-treated) were evaluated. eGFR values, 85 (47%) subjects: 39 (21.5%) naïve and 46 (25.4%) treated had stage 1 CKD (eGFR: ≥90ml/min/1.73m2); 65 (35.9%): 30 (16.6%) ART-naïve and 35 (19.3%) treated had stage 2 CKD (eGFR: 60 -89); 29 (16%): 15(8.3%) naïve and 14 (7.7%) treated had stage 3 CKD (eGFR: 30-59); only 2 (1.1%), both naïve, had stage 4 CKD (eGFR: 15 – 29).
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, 0.35 ± 0.09, and 0.35 ± 0.08 pg/ml respectively; IL-6: 0.68 ± 0.05, 0.68 ± 0.05, 0.68 ± 0.06 pg/ml respectively; IL-18: 1.06 ± 0.15, 1.06 ± 0.13, 1.05 ± 0.16 pg/ml respectively). However, mean interleukin levels among subjects with stage 4 CKD were higher than those with stages 1, 2, and 3 CKD, viz: IL-1 (0.41 ± 0.03 versus 0.36 ± 0.09 pg/ml); IL-6 (0.72 ± 0.02 versus 0.68 ± 0.06 pg/ml); and IL-18 (1.20 ± 0.05 versus 1.05 ± 0.12 pg/ml).
There was no significant correlation between eGFR and any of the interleukins (p= 0.943, 0.937, 0.942 for IL-1, IL-6, and IL-18 respectively).

CONCLUSIONS

HIV infection induces cytokine production which likely contributes to renal impairment, while HAART suppresses systemic cytokine levels. Serum interleukins-1, -6, and -18 are higher in moderate-to-severe HIV-induced renal dysfunction (> stage 3 CKD) than in the mild-to-moderate stages (stage 1-3 CKD), implying cytokines possibly contribute to the magnitude and progression of chronic renal dysfunction.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1627

BIOCHEMICAL AND NOVEL IMMUNOHISTOCHEMICAL MARKERS OF STEROID RESISTANCE IN FOCAL SEGMENTAL GLOMERULOSCLEROSIS (FSGS)

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BACKGROUND-AIM

Focal segmental glomerulosclerosis (FSGS) is a progressive disease that leads to end-stage chronic kidney disease. The therapeutic approach requires the administration of steroids to prevent further damage; however, some patients develop steroid resistance. This study aims to determine the biochemical predictors to assess the prognostic power of novel protein markers for steroid resistance in biopsy samples of FSGS patients.

METHODS

This is a cohort study. Data collected from hospital information systems of two tertiary care hospitals in Oman, from 2006 to 2020. Patients presented with proteinuria and had biopsy proven primary FSGS were included. Predictors' data collected retrospectively from first visit. Patients were identified as steroid resistant based on persistent proteinuria or double plasma creatinine for >8 weeks post-therapy. The biopsy tissue slides were collected. The inclusion criteria for novel protein marker selection were previous proteomic evidence, evidence of expression in renal tissue, and availability of commercial providers. Slides were quantified for staining intensity using the Fiji tool. A statistical comparison of staining intensity between steroid-resistant and sensitive patients was performed.

RESULTS

32 cases with primary FSGS and treated with steroid were found and analyzed. A total of 19 (59.4%) patients were found to be resistant to steroid. Baseline parameters taken and showed that total and non-HDL cholesterol levels were significantly higher in patients who developed steroid resistance ($p < 0.050$). ROC curve applied and the optimal cut point for total cholesterol was 6.7 mmol/L with 94% sensitivity and 58% specificity (95% CI: 56.5–94.5). Likelihood ratio was 2.3. For novel protein markers, we identified seven potential markers for our study: NTRK1, VDBP, Podocin, SYNPO, Human fetuin-A, Mα-Dystroglycan (DAG1) and WT1. Patients with lower expression of NTRK1 and Fetuin-A at time of diagnosis were 92% (OR = 0.08, 95% CI: 0.01–0.89), 97 % (OR 0.03, 95%C.I 0.002-0.3), respectively, more likely to develop steroid resistance.

CONCLUSIONS

Lipid profile may serve as a biochemical predictor of steroid resistance in patients with FSGS. Fetuin-A and NTRK1 may work as potential immunohistochemical markers to predict steroid resistance in those patients.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1628

UNIVERSITY STAFF TOWARD ORGAN DONATION: AN OBSERVATIONAL STUDY

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BACKGROUND-AIM

Organ donation rates remain suboptimal, often influenced by limited knowledge and negative attitudes. While previous research has primarily focused on specific groups such as healthcare professionals, students, or patients, little is known about organ donation knowledge and attitudes across diverse occupational categories. This study aimed to address this gap by evaluating these factors among university staff across various job roles.

METHODS

A cross-sectional study was conducted from June 2023 to January 2024 using an online, validated, self-designed questionnaire. University employees were categorized into academic, medical, technical, and administrative staff. The questionnaire comprised five sections: research information, informed consent, sociodemographic details, knowledge of organ donation, and attitudes toward organ donation. Data were analyzed using descriptive statistics and chi-square tests.

RESULTS

A total of 385 staff members participated, with 64.4% females and 52.2% aged 30–41 years. Overall, 67.5% of participants exhibited good knowledge about organ donation, and 63.9% understood brain death, yet 64.4% held negative attitudes toward organ donation. Medical staff had the highest knowledge (94.7%) and positive attitudes (60.5%). The primary motivation for supporting organ donation was saving lives (67.3%), while hesitation (45.7%) was the most cited reason for refusal. Staff with good knowledge (84.1%) were more likely to have positive attitudes.

CONCLUSIONS

The findings reveal moderate knowledge and predominantly negative attitudes toward organ donation among university staff, with medical and academic staff demonstrating better outcomes. Reliance on the internet as an information source underscores the need for targeted awareness campaigns and educational initiatives to enhance knowledge and foster positive attitudes, ultimately encouraging greater organ donation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1629

KIDNEY DAMAGE AND FIBROSIS IN ADAM17/MMPS/TNF/AREG PATHWAY MAY BE IMPROVED BY MMP-2 SIRNA TREATMENT

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BACKGROUND-AIM

Kidney transplantation (KT) is the most stable and economical therapeutic option in the treatment of end-stage kidney failure. However, KT is associated with organ damage due to ischemia/reperfusion injury (IRI). IRI leads to activation of metalloproteinases (MMPs), including ADAM17 (a disintegrin and metalloproteinase), which play an important role in tissue damage and remodeling.
Since MMPs are able to activate proinflammatory pathways and fibrosis, the aim was to analyze if administration of MMP-2 siRNA may reduce kidney damage and fibrosis during KT.

METHODS

Rats` kidneys were excised, cannulated by the artery, washed out and perfused with Krebs–Henseleit buffer with albumin by hypothermic machine perfusion (EMKA) for 22 h with or without siRNA (330 pM per kidney) +siPORT Amine in the following groups: Aero, I/R I/R+siRNA, n=4-6. In I/R groups 30 min of warm ischemia was used. LDH, MMP-2/9, ADAM-17, IL-6, TNF, amphiregulin (Areg), and galectin (Gal) were analyzed.

RESULTS

LDH in an extracellular space was increased in I/R in comparison to I/R+siRNA group (2787 [1387-3759] vs 36.3 [18.9-436.3] mU/ml p<0.001). I/R group presented enhanced MMP-2/9 (1.36 ±0.2 vs 0.52±0.2 p=0.006, 0.44 ±0.1 vs 0.19±0.03 ng/mg p=0.002) and ADAM17 (0.62±0.1 vs 0.34±0.1 pg/mg p=0.001) expression, and LDH positively correlated with MMP-2/9 (r=0.84 p=0.003 and r=0.92 p=0.002) and ADAM17 (r=0.66 p=0.017) confirming their role in IRI. ADAM17 further induced TNF (441±136 vs 193±98 pg/mg p=0.004), Areg (5196±3115 vs 2767±1776 pg/μg p=0.007), and Gal (0.18±0.09 vs 0.10±0.02 ng/μg p=0.051) expression and was correlated whith MMP-2 (r=0.84, p=0.001) and MMP-9 (r=0.92, p=0.008). Areg correlated with Gal (r=0.58, p=0.043) confirming its role in fibrosis. siRNA decreased MMP-2/9 (0.34±0.15 ng/mg p=0.001, 0.14±0.01 ng/mg p=0.001) and LDH release into extracellular space (824 [374-1932] mU/ml p=0.029) as a marker of cell damage. SiRNA also reduced TNF (441±196 vs 151±96 pg/mg p=0.003) and IL-6 (273 [192-560] vs 164 [37-183] pg/mg p=0.03) leading to decreased fibrosis.

CONCLUSIONS

We have proven that oxidative stress induces ADAM17 pathway, leading to activation of tissue proteolysis, inflammation and fibrosis. The use of MMP-2 siRNA prevented IRI by inhibiting MMPs, inflammation and fibrosis.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1630

UTILITY OF URINALYSIS BY FLOW CYTOMETRY SYSTEMS IN IDENTIFYING URINARY TRACT INFECTIONS

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BACKGROUND-AIM

The aim of the present study to evaluate the potential of chemical-physical and microscopic urine examination (CPME) in identifying individuals with urinary tract infections (UTIs).

METHODS

Over a period of 18 months, 1932 outpatients with a median age of 70 (IQR: 48-81) years, who tested positive on urine culture and had a sample for CPME, were evaluated.
The main pathogens isolated were: Escherichia coli (61.0%), Klebsiella pneumoniae (9.0%), Enterobacter cloacae (5.8%), Enterococcus faecalis (5.8%), Proteus mirabilis (3.0%), Pseudomonas aeruginosa (1.6%), Klebsiella oxytoca (1.4%), and Morganella morganii (1.3%); GRAM +: n=210, -: n=1722.
CPME was performed using the Sysmex UF-5000, UC-3500, and UD-10 systems. The UF-5000 system, based on the principle of fluorescence flow cytometry with hydrodynamic focusing, enables the identification and counting of cellular elements (e.g., bacteria) per µL. It also allows for rapid discrimination between GRAM – and + bacteria.

RESULTS

Concordance between urine culture positivity and the presence of bacteria (cutoff: 500 bacteria/µL) was observed in 92.3% of samples. The median white blood cell (WBC) count in this group was 17/µL (IQR: 4-66). Bacteriuria without leukocyturia was found in 113 samples (5.8%).
At dipstick nitrite positivity was detected in 1001 samples (51.8%).
The UF-5000 system did not provide GRAM classification information for 355 samples (18.4%). Among 121 GRAM + samples 90.9% had a correct classification, 8.3% a doubtful one (GRAM +/-) and 0.8% were misclassified. Among 1456 GRAM - samples, 66.3% were correctly classified, 20.0% were doubtful and 9.3% were misclassified.

CONCLUSIONS

CPME had a high diagnostic efficiency for UTIs diagnosis, with excellent concordance at the cutoff of 500 bacteria/µL. Flow cytometric counting applied to CPME represents a significant improvement in diagnostics as stated in EFLM 2023 Urinalysis guidelines as it allows the quantification of elements such as bacteria and WBCs, as well as initial discrimination between GRAM types.
CPME is a valuable test for identifying samples that may require further investigation through urine culture, pathogen identification, and antibiotic susceptibility testing, accelerating the diagnostic process for UTIs.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1631

MICROALBUMINURIA AS A POSSIBLE BIOMARKER FOR EARLY DETECTION OF KIDNEY LESIONS IN PATIENTS WITH TYPE 2 DIABETES 10.01. 2025

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BACKGROUND-AIM

Introduction: There is growing evidence supporting the association between renal failure and microalbumin (McA) concentration. The role of McA in the damage to microcirculation in diabetic nephropathy (DN) has been proven.
Aim: The purpose of this study was to perform a prospective observational analysis in 78 patients. We showed that the baseline level of McA in urine was significantly increased in patients with DN, and we proved that this was related to the severity of the disease.

METHODS

Methods: In this study, we focused on patients with a five-year history of type 2 diabetes mellitus (DM-2) (n = 78). We determined that McA levels in urine were elevated, with two years of follow-up data. In the laboratory of the ME Biochemistry Institute, we examined the second morning urine sample for albumin using the Muleman's turbidimetric method, and serum creatinine was measured using a standardized enzyme method. The MDRD formula was used to estimate the glomerular filtration rate (GFR).

RESULTS

Results: The results of albumin in urine showed a mean of 42.04 mg/L, extremely high CV, and a negative correlation with GFR. Using a multivariate linear regression model, we proved that the increased level of McA in urine significantly influences the decline of GFR. The large variability could be due to differences in disease progression among individuals, as microalbuminuria is a marker of early kidney damage, in addition to other promoters of disease progression.

CONCLUSIONS

Conclusion: In patients at high risk of developing diabetic nephropathy, we took appropriate measures to register and prevent disease progression on time.

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COMPARATIVE STUDY OF CKD-EPI AND MDRD EQUATIONS FOR ESTIMATING GLOMERULAR FILTRATION RATE IN PATIENTS OVER 70 YEARS OLD IN THE EMERGENCY DEPARTMENT

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BACKGROUND-AIM

Chronic Kidney Disease (CKD) is an increasing global issue due to population aging. To detect CKD, the estimated glomerular filtration rate (eGFR) is used, with the most commonly employed equations being MDRD, CKD-EPI and BIS1. The pathological eGFR cutoff for CKD is <60 mL/min/1.73 m².

METHODS

A retrospective cross-sectional study was conducted from January to December 2023, involving 5055 patients aged over 70, with ages ranging from 71 to 105 years (median=84). Of these, 2823 were women (55%) and 2232 were men (45%). eGFR was calculated using the MDRD and CKD-EPI formulas. Creatinine was analyzed using the Allinity C system with the compensated kinetic Jaffe method. The linearity of the results was assessed using Pearson's correlation coefficient, while method comparison was done using Passing-Bablok regression analysis and difference of the means were analyzed using the Bland-Altman test.

RESULTS

The Pearson correlation coefficient (Rho) obtained for both equations showed a strong correlation confidence interval (CI95%) of 0.995. The Passing-Bablok regression showed the following equation: Y = 0.0788 + 0.8857 X, with an intercept CI95%: 0.0788 (-0.0526 to 0.2181) and a slope CI95%: 0.8857 (0.8819 to 0.8893).The intercept contained 0, but the slope did not contain 1, indicating the presence of bias. The Bland-Altman analysis revealed a mean difference of 12.2783 (-32.9533 to 15.1777). The classification according to KDIGO, with a eGFR ≥60 mL/min/1.73 m²: CKD-EPI classified 2121 patients, and MDRD classified 1415 patients, with a eGFR <60 mL/min/1.73 m²: MDRD classified 2655 patients and CKD-EPI classified 2934 patients.

CONCLUSIONS

Significant differences were found between eGFR results from the MDRD and CKD-EPI formulas, indicating the need for standardization of eGFR, particularly in the population over 70 years old. CKD may first be detected in the hospital emergency setting, highlighting the importance of applying a “standardized” formula for elderly patients to avoid overestimation of eGFR.

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EARLY URINARY MARKERS FOR RENAL INJURY IN OBESE CHILDREN AND ADOLESCENTS WITH OR WITHOUT INSULIN RESISTANCE

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BACKGROUND-AIM

Background: Recent data indicate that overweight and obesity contribute to increase of chronic kidney disease (CKD) incidence in children and adolescents. Aim: To examine of several markers for early detection of renal injury in overweight and obese children and adolescents with and without insulin resistance.

METHODS

Methods: In total 64 overweight and obese children and adolescents and 50 healthy children and adolescents with normal body weight, 5-19 years old, matched for gender and age, were enrolled in the study. Anthropometric measurements measurements were conducted for each subject. In the second morning urine levels of KIM-1 (kidney injury molecule-1) were determined with ELISA method, the activity of the enzyme NAG (N-acetyl-beta-D-glucosaminidase) with spectrophotometric method and microalbumin with chemiluminescent method. Serum concentrations of creatinine, urea, uric acid, fasting glucose and insulin, and parameters of lipid profile, were determined by using standard biochemical methods. Insulin resistance was estimated using homeostasis model (HOMA-IR).

RESULTS

Results: No significant difference were found between two groups of subjects for the serum creatinine, glucose, urea, uric acid and for lipid profile parameters ($p > 0.05$). Urine KIM-1/Cr and NAG/Cr ratio were found significantly higher in the group of overweight and obese children and adolescents. The modest significant correlation was detected in this group between urinary microalbumin/Cr ratio and KIM-1/Cr ($r=0.53$, $p<0.05$). There was also significantly high correlation ($r=0.83$, $p<0.05$) between KIM-1/Cr and NAG/Cr ratio, as well as between microalbumin/Cr and NAG/Cr ratio ($r=0.76$, $p<0.05$). Insulin resistance was detected in 53% of overweight and obese children and adolescents. No significant difference was detected between subjects with or without insulin resistance for KIM-1, NAG and microalbumin.

CONCLUSIONS

Conclusion: The results have shown that urinary KIM-1, NAG and microalbumin are promising markers for detection of early renal injury in overweight and obese children and adolescents, that could be used with aim to prevent development and progression of chronic kidney disease.

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DRUG-INDUCED ACUTE INTERSTITIAL NEPHRITIS: A CASE REPORT

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BACKGROUND-AIM

Acute interstitial nephritis (AIN) represents a frequent cause of acute kidney injury, accounting for 15-27% of renal biopsies performed because of this condition. Drug-induced AIN is currently the commonest etiology of AIN, due to antimicrobials and nonsteroidal anti-inflammatory drugs.
The characteristic interstitial infiltrates, mostly composed of eosinophils, experience a rapid transformation into areas of interstitial fibrosis. The presence of specific extrarenal symptoms such as fever, skin rash, arthralgias, and peripheral eosinophilia has an important role to orientate clinical diagnosis. Identification and removal of the offending drug are the mainstay of the treatment. Early steroid administration (within 7 days after diagnosis) improves the recovery of renal function.
A 62-year-old woman with hypertension, smoking and alcoholic habits, is admitted for supracondylar fracture of the right femur. The massive haemorrhage causes an acute renal failure of probable pre-renal origin.

METHODS

A blood count, coagulation tests, serum biochemical study including kidney tests, urine test strip and a microscopic examination of urinary sediment are requested.

RESULTS

The haemogram showed a slight eosinophilia (1400 cells/μL). Serum renal profile was compatible with renal failure. In the urinary sediment study, few desquamation cells and abundant leukocytes are observed.
The sediment is stained with modified Wright's stain and observed under the microscope. 98% of the leukocytes turn out to be eosinophils. Laboratory physicians recommend histopathological examination. A renal biopsy was performed to rule out AIN.
Study from pathological anatomy reveals that the interstitium shows extensive fibrosis associated with tubular atrophy and an inflammatory infiltrate with eosinophils, compatible with AIN.
Omeprazole treatment is discontinued because it is a drug that can cause AIN and steroid treatment is started.

CONCLUSIONS

Although the symptoms of AIN are quite non-specific, the potential diagnosis of this pathology should never be ruled out, with special emphasis on the review of treatment, peripheral eosinophilia and, above all, the study of urinary sediment. Collaboration between laboratory and nephrologists is essential to decrease the risk of chronic renal impairment induced by misdiagnosed AIN.

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EVALUATION OF THE SEMIQUANTITATIVE ALBUMIN/CREATININE RATIO AS A SCREENING METHOD FOR THE NEGATIVE MICROALBUMINURIA SAMPLES

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BACKGROUND-AIM

Microalbuminuria is a condition characterized by an increased excretion of albumin in urine in the absence of manifest nephropathy. Our objective was to study the reliability of urine strips (US) for the determination of albumin, creatinine and albumin-to-creatinine ratio (ACR) considering that the strip test results are semi-quantitative.

METHODS

A total of 284 urine samples were processed for the determination of ACR, both semi-quantitatively and quantitatively. The semi-quantitative determination of ACR was performed using LabUSticks 12F reagent strips (reflectance photometry) on the UNAMAX analyzer (Menarini®). The analyzer reported semi-quantitative results for albumin and creatinine, and the ACR ratio was calculated.
The Cobas 8000 analyzer from Roche Diagnostics® was used to quantitatively determine creatinine (kinetic alkaline picrate method) and albumin (immunoturbidimetry), and the ACR ratio was calculated in the Laboratory Information System (LIS). That was considered the reference method.
The validity of the semi-quantitative tests was assessed by considering an ACR value ≥30 mg/g as positive. Sensitivity (S), Specificity (E), Negative Predictive Value (NPV), and Positive Predictive Value (PPV) were calculated.

RESULTS

Using an ACR cut-off of ≥30 mg/g, the following results were obtained: E = 95.7%; S = 60.71%; PPV = 60.71%; NPV = 95.7%. This cut-off demonstrates high specificity and NPV, allowing us to select which cases could be screened as negative and not require quantification.

CONCLUSIONS

The LabUSticks 12F ® urine strip seems to be a good option for correctly identifying patients in whom quantitative confirmation is necessary, saving future costs for the laboratory. Therefore, this semi-quantitative ACR ratio enables its use as a screening method for microalbuminuria, potentially preventing future kidney injury-related diseases.

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PLASMA BNP CONCENTRATIONS IN DIABETIC CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

In patients with chronic kidney disease (CKD), as in other populations, elevations in cardiac biomarkers level predict increased risk of cardiovascular events. Plasma b type natriuretic peptide (BNP) is produced and released from cardiac ventricles. BNP regulates excretion of water and sodium in the kidney and when renal function deteriorates, BNP level is increased. In this study we examined the value of BNP in assessing the risk of developing end stage renal disease and prediction of congestive failure in diabetic patients with CKD.

METHODS

Our study consisted on 56 patients with CKD, type 2 diabetes and cardiomyopathy diabetic (group 1) and 58 patients with CKD and diabetes mellitus, without clinical evidence of congestive heart failure (group 2). In both groups we had 9 predialysis patients and 9 on dialysis. We were analyzed plasma BNP concentrations, serum creatinine and proteinuria for all patients.

RESULTS

BNP concentrations were significantly elevated in the group 1, compared to the group 2 (p=0.0098). The average BNP level of the 56 patients was 1729.0 pg/mL (from 156.4 pg/mL to 5000.0 pg/mL). Median plasma BNP level in group 2 was 512.0 pg/mL. Serum creatinine and proteinuria concentrations were not significantly different between groups, but BNP concentrations correlated positively with longer diabetes duration (p=0.001) and higher proteinuria in both groups.

CONCLUSIONS

Deterioration in kidney function, in both groups increased BNP levels, and these values were the highest in patients on hemodialysis. Because of relationship between proteinuria and BNP, increased BNP may be a risk factor for the progression of renal disease. Measurment of BNP may improve the identification of patients with CKD who are closed to require renal replacement therapy, supporting a link between congestive failure and the development of end stage of CKD.

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EVALUATION OF A TUMOR MARKER GASTRIN-RELEASING PEPTIDE PRECURSOR IN THE PATIENTS WITH KIDNEY INJURIES

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BACKGROUND-AIM

Gastrin-releasing peptide precursor (ProGRP) is a bioactive precursor of GRP and might play an important role as an emerging tumor marker in early cancer diagnosis. It might also be abnormal in the nonmalignant disease and renal function abnormalities. The present study was undertaken to investigate the changes of ProGRP levels in patients with kidney injuries, especially with chronic kidney disease (CKD), determine the upper reference intervals and clinical diagnostic value of ProGRP in CKD, and thus help oncologists in interpreting ProGRP levels and making clinical judgments of malignances.

METHODS

676 individuals were enrolled in this cross-sectional study and divided into five groups: healthy control (n=194), CKD (n=272), nephrotic syndrome (NS) (n=137), antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (AAV) (n=41), and urinary tract infection (UTI) (n=32). A total of 27 features including age, gender, and 25 laboratory markers were analyzed. Machine learning algorithms were built for the diagnostic models of CKD. Statistical analysis was performed by R software.

RESULTS

It was shown that serum ProGRP level in CKD was significantly higher than that in healthy controls, UTI and NS ($P < 0.01$). The upper reference limit of ProGRP was 188.42 pg/ml for CKD, 245.40 pg/ml for CKD #-#, and 97.25 pg/ml for NS. Compared with the healthy control, the level of serum ProGRP in CKD stage #, III, #-# was significantly increased and elevated progressively with CKD grade ($P < 0.01$). Random Forest (RF) model works best among 4 building machine learning algorithms. 5 vital indicators, ProGRP, eGFR, urea, albumin (ALB), and direct bilirubin (DBIL), were selected to establish RF model for diagnosing CKD with an area under the curve (AUC) of 0.96 (95% confidence interval [CI]: 0.94-0.97) and high sensitivity (0.89) and specificity (0.92).

CONCLUSIONS

This study demonstrates that the level of ProGRP in patients with CKD, nephrotic syndrome or AAV, was significantly higher than that in the healthy population. The machine learning model of ProGRP with DBIL, eGFR, ALB, and urea, could provide good clinical value for CKD evaluation.

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A COMPARATIVE STUDY BETWEEN IMMUNOTURBIDIMETRY & CHEMILUMINESCENCE FOR MEASURING URINARY ALBUMIN

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BACKGROUND-AIM

Several Immunoassays are used in medical laboratories to assay urinary Albumin. There are wide variations between the performance of these methods, making it difficult for referral physicians to select among laboratories for diagnosing and monitoring patients.

METHODS

The present work is a comparative study between Immunoturbidimetry and Chemiluminescence methods used to assay urinary Albumin. The comparison was conducted on 108 random urinary samples. Both methods were verified first for precision, accuracy, linearity and analytical sensitivity.

RESULTS

The precision of both methods was tested by repeatability and reproducibility studies, using control materials and patient samples. All calculated coefficients of variation (CVs), for both methods, in all levels, were compared to Westgard desirable specifications for precision and they were all accepted. Accuracy was tested by calculating the mean percentage recovery for both methods and by calculating the bias percentage after testing a reference material. Both Immunoturbidimetry bias (7.4%), and Chemiluminescence bias (14.8%), were accepted based on the desirable bias % recommended by Westgard. The analytical measuring range of Immunoturbidimetry (0.9 - 130 mg / L) was better than that of Chemiluminescence (2.5 - 60 mg / L). One hundred and eight random urinary samples were tested using both methods, and their results were compared using Wilcoxon Signed Ranks test, Bland Altman Plot and MCNemar test, and all showed p-values > 0.05, for grouped samples and for samples divided based on a medical decision level of 30 mg / L. Regression line analysis showed a significant strong positive correlation between the two methods with 91% agreement (for 95% CI). (P value: <0.001, R Sq Linear: 0.91).

CONCLUSIONS

Both Immunoturbidimetry and Chemiluminescence methods are comparable in measuring urinary Albumin, though Immunoturbidimetry had shown better analytical measurement range and accuracy.

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EPIDEMIOLOGY AND OUTCOMES OF HOSPITAL-ACQUIRED ACUTE KIDNEY INJURY.

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BACKGROUND-AIM

Acute kidney injury (AKI) is a sudden loss of kidney function affecting over 13 million individuals annually and resulting in 1.7 million deaths worldwide. In developed countries, hospital-acquired AKI (HA-AKI) is the most prevalent form, occurring in 1 in 5 hospitalized patients and reaching incidences as high as 50% among critically ill individuals. HA-AKI is independently associated with extended hospital stays, increased healthcare costs, heightened risk of chronic kidney disease progression, elevated mortality, and the need for long-term post-discharge care.
The aim of this study is to analyse the outcomes of patients who develop HA-AKI within our healthcare setting.

METHODS

We included data from adult patients (≥ 18 years) admitted to a large tertiary care hospital during 2022. We utilized data from the Basic Minimum Data Set, which is collected at hospital discharge and contains information on each stage of care, including the diagnosis based on the International Classification of Diseases – 10th Revision (ICD-10) coding. Statistical analysis was conducted using IBM SPSS Statistics for Windows; For the comparison of outcomes between the two groups, we utilized Chi-square tests and independent Mann–Whitney U tests.

RESULTS

During 2022, a total of 26,769 adult patients were admitted to our hospital, of whom 2,796 were diagnosed with HA-AKI (incidence of 10.4%) based on ICD-10 coding. Among HA-AKI patients, 58% were male, with a median age of 77 years (IQR 68–85), and were predominantly admitted to Internal Medicine (58.3%), Gastroenterology (6.1%), and Cardiology (5.1%). Statistically significant differences were observed across all studied outcomes between the HA-AKI group (n=2,796) and hospitalized patients without AKI (n=23,973): hospital length of stay: 8 (IQR 5–14) vs. 5 (IQR 2–8) days; ICU admission: 10% vs. 3.3%; in-hospital mortality: 22.3% vs. 5%; and predominant level of severity of hospital admission: high severity (41%) vs. low severity (41%).

CONCLUSIONS

In hospitalized patients within our healthcare setting, the development of AKI during hospitalization is associated with prolonged hospital stays, increased ICU admissions, and higher mortality rates. This underscores the need for proactive strategies to identify and manage HA-AKI, given its substantial impact on patient prognosis.

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BILIRUBIN CRYSTALS IN URINE IN THE CONTEXT OF FEVER AND JAUNDICE. A CASE REPORT

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BACKGROUND-AIM

Biliary atresia (BA) is a rare congenital condition characterized by obstruction or absence of bile ducts, leading to bile accumulation, cholestasis, and progressive liver damage. Surgical intervention, typically the Kasai procedure, is the primary treatment in infancy. Long-term complications include cirrhosis, portal hypertension, and episodes of cholangitis. Urinary bilirubin crystals, a rare finding in urinalysis, may appear in cases of severe hyperbilirubinemia secondary to cholestasis.

METHODS

A 36-year-old male with a history of BA, previously treated surgically during infancy, and complicated by cholangitis at age two presented to the emergency room with a 5-day history of fever. Physical examination revealed mucocutaneous jaundice and epigastric tenderness without peritoneal irritation.

RESULTS

Laboratory tests showed: Thrombocytopenia=65000/µL [150000-450000], total bilirubin=11 mg/dL [0.3-1.3], direct bilirubin=6.76 mg/dL [0-0.21], alanine aminotransferase=191 U/L [3-50], aspartate aminotransferase=190 U/L [3-50], gamma-glutamyltransferase=86 U/L [1-55], C-reactive protein=158 mg/L [0-3]. Abdominal ultrasound revealed splenomegaly without bile duct dilation. Despite empirical antibiotic therapy, additional testing, including urinalysis and magnetic resonance cholangiopancreatography (MRCP), was performed due to the atypical clinical presentation. Urinalysis showed significant findings: Positive for bilirubin (2 mg/dL), pyuria (500 leukocytes/µL), nitrites, and mild hematuria. Sediment analysis revealed intense pyuria (>100leukocytes/field), moderate bacteriuria, and frequent bilirubin crystals. MRCP demonstrated nodular confluent areas in the right hepatic lobe (segments 7/8), suggestive of hepatitis-cholangitis, without bile duct dilation. Despite initial management with empirical antibiotics, the patient requested voluntary discharge to continue his care at his reference hospital in another city. This request was granted after discussion with the medical team.

CONCLUSIONS

Bilirubin crystals in urine sediment are an uncommon finding that may serve as an indirect marker of severe hyperbilirubinemia associated with cholestasis. This case highlights the clinical relevance of urinary bilirubin crystals in supporting the diagnosis of biliary and hepatic pathology.

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EARLY DIABETIC KIDNEY DISEASE PREDICTION: A LABORATORY DATA-DRIVEN COHORT STUDY MODEL

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BACKGROUND-AIM

Diabetic kidney disease (DKD) is a serious complication of type 2 diabetes mellitus (T2DM), and early biomarkers are considered to enable earlier diagnosis, which is crucial for preventing the progression of renal impairment. This study aimed to forecast early DKD prevalence by establishing a model through laboratory data.

METHODS

A total of 263 inpatients with T2DM were retrospectively enrolled from January 2018 to March 2022. We collected and analyzed relevant laboratory data (the training set and validation set were randomly allocated at a ratio of 7:3), and selected feature variables via the least absolute shrinkage and selection operator (LASSO) regression. Multivariate logistic regression was used to determine the independent risk factors, and a prediction nomogram model for patients with early DKD was constructed. The area under the curve (AUC), calibration curve and decision curve analysis (DCA) were adopted to evaluate the model.

RESULTS

The median age of T2DM patients enrolled was 54 (44, 61) years, with 57.8% (152/263) being males. The incidence of early DKD was 52.5% (138/263). LASSO regression and multivariate regression analysis identified that serum DBP, 25 (OH) D, FBP, CREA and potassium were independent risk factors, and serum chloride was the independent protective factor for early DKD. These characteristic factors constructed a predictive nomogram model for early DKD in T2DM patients, with AUC=0.827 in the training set (95% CI: 0.766-0.888, sensitivity 88.3%, specificity 78.4%), and AUC=0.824 in the validation set (95% CI: 0.731-0.917, sensitivity 86.5%, specificity 75.2%). Both calibration curve and DCA indicated high accuracy and uniqueness of this prediction nomogram.

CONCLUSIONS

The nomogram model constructed based on laboratory data: serum DBP, 25 (OH) D, FBP, CREA, potassium and chloride exhibited superior predictive effects in predicting the onset of early DKD in T2DM patients. Integrating this model into clinical practice could improve the outcomes of early detection and intervention of early DKD.

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GITELMAN'S SYNDROM: A CASE REPORT.

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BACKGROUND-AIM

Hypokalemia is one of the most frequent analytical alterations, its origin being mainly digestive and renal. Among renal causes, tubulopathies are a rare cause of hypokalemia. Due to the multiple functions of the kidneys, and the tubules in particular, they often overlap and it is difficult to distinguish them clinically and biochemically, sometimes requiring a genetic diagnosis. An example is Gitelman syndrome, which is often confused with subtypes of Bartter syndrome.

METHODS

We studied the case of a woman who, in 2002, went to the emergency room due to muscle weakness and cramps. The biochemistry showed hypokalemia and hypomagnesemia. During her multiple visits to emergency, persistent metabolic alkalosis without apparent cause was also observed. This led us to suspect tubulopathy as the main cause of her analytical abnormalities. Of those that were suspected, Bartter syndrome was proposed as the most probable cause, although the patient had parameters more consistent with Gitelman syndrome, such as hypocalciuria. This recquired a genetic test.

RESULTS

The genetic test confirmed the diagnosis of Gitelman syndrome.

CONCLUSIONS

Gitelman syndrom is an autosomal recessive tubulopathy whose main defect is in the SLC12A3 gene, which encodes a sodium-chloride cotransporter at the luminal level of the distal tubule, preventing the reabsorption of sodium and chloride at this level, and causing hyperaldosteronism. secondary. This increases the excretion of potassium and hydrogen ions at the collecting duct in an attempt to compensate for sodium losses. Likewise, this defect induces compensatory calcium reabsorption at the distal tubule. As a result, a hypokalemic hypocalciuric metabolic alkalosis occurs. At a clinical level it manifests itself in periods of generalized weakness and cramps, and in severe cases it can cause paralysis due to tetany.
Although there are parameters more indicative of one syndrome or another, the definitive diagnosis is genetic.This is why both the biochemistry and genetics laboratories must work together on this type of patient.

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STATUS OF KYNURENINE IN CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

Essential aminoacid tryptophan is going through several metabolic pathways in its breakdown, resulting in the production of many biologically active components. The most common metabolic pathway is kynurenine pathway and its metabolite kynurenine (KYN). KYN in higher concentration may cause toxic effects on the body cells related to oxidative stress, mitochondrial disfunction, apoptosis and inflammatory process. Since chronic kidney disease (CKD) causes alterations in metabolism of several aminoacids, aim of this study was to investigate status of KYN in this patients and its relationship with parameters for assessment of kidney function.

METHODS

The study included 60 patients with CKD devided into two groups: I group of 25 patients (M=11, F=14) with eGFR >60 ml/min and II group of 35 patients (M=20, F=15) with eGFR <60 ml/min. To all participants were determined routine parameters for assessment od kidney function (urea, creatinine). Glomerular filtration rate (GFR) was measured by radionuclide clearance Diethylene Triamine Pentaacetic Acid (DTPA) and estimated GFR by selected blood parameters related to CKD diagnosis (serum creatinine, cystatin c). Serum and urine concentration of KYN were determined by using High Performance Liquid Chromatography (HPLC).

RESULTS

Concentration of urea and creatinine in II group were significantly higher compare to group I (urea 5.2±1.3 vs 9.5±3.8, $p<0.001$; creatinine 80.5±18.3 vs 128.0±57.5, $p<0.001$). Serum KYN concentration in the I group was significantly lower compared to II group (3.08±0.22 vs 3.2±0.23, $p=0.014$). Significant correlation were obtained between KYN and Cystatine C ($r=0.3$, $p<0.05$), DTPA ($r= -0.4$, $p<0.001$) and EFBP ($r=0.4$, $p<0.001$).

CONCLUSIONS

According to our results, serum concentration of KYN increasing due to CKD progression. Significant correlations with parameters of estimating GFR makes it potential marker of evaluation of GFR.

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TRYPTOPHAN METABOLITES IN DIFFERENT STAGES OF CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

Chronic kidney disease (CKD), considering higher enzymatic activity induced by inflammation and its influence on gut microbiome, may leads to specific alterations in tryptophan (TRP) metabolism. TRP is essential aminoacid involved in tree major metabolic pathways. The aim of this study was examining the status of metabolic products of indoleacetate and kynurenine pathways, indoxyl sulphate (IS) and kynurenine (KYN) in different stages of renal impairment.

METHODS

The study included a total of 70 participants divided into two groups based on the values of glomerular filtration rate (GFR). The first group included 30 participants (M = 12, F = 18) with stage 1 and 2 disease, and the second group included 40 participants (M = 21, F = 19) with stage 3 and 4. To all participants were determined standard laboratory parameters for assessment kidney function. Plasma and urine concentration of IS and KYN were measured by High Performance Liquid Chromatography and GFR were measured as Diethylene Triamine Penta Acetate clearance.

RESULTS

Urea and creatinine concentration were significaly higher in Group II (urea 5.4±1.4 vs 10.1±3.5, $p<0.001$; creatinine 82.7±19.1 vs 130.2±57.7, $p<0.001$). Higher plasma concentrations were obtained for both metabolites in Group II (IS 1.09±0.88 vs 2.45±4.04 μg/ml, $p<0.001$; KYN 3.14±0.21 vs 3.23±0.18μg/ml, $p<0.05$). Significant correlation were obtained between KYN and urea $r=0,4$, $p<0.001$, creatinine $r=0.3$, $p<0.05$, mGFR – DTPA -0.4, $p<0.001$, Cystatine C $r=0.3$, $p<0.05$, and between IS and urea $r=0,7$, $p<0.001$, creatinine $r=0.4$, $p<0.001$, mGFR – DTPA -0.6, $p<0.001$, Cystatine C $r=0.7$, $p<0.001$.

CONCLUSIONS

According to our results, concentrations of both metabolites are significantly different between two examined groups. Considering significant correlation with parameters of kidney function, both metabolites may be potential biomarkers for assessment of renal impairement or for monitoring of disease progression.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1645

COMPARATIVE PERFORMANCE OF HEMODIAFILTRATION MEMBRANES IN LIGHT CHAIN CLEARANCE IN CHRONIC KIDNEY DISEASE PATIENTS

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BACKGROUND-AIM

Hemodiafiltration (HDF) is an extracorporeal clearance technique that combines hemodialysis and hemofiltration. Membranes used in HDF play a crucial role in the efficiency of toxin removal, depending on patient's characteristics. In our hospital, two different membranes with different ultrafiltration volume are used, one of 24L (HDF-24) and other of 12L (HDF-12).
The aim of this study is to compare the performance of HDF membranes in terms of microalbumin loss in dialysate and removal of kappa and lambda light chains in serum.

METHODS

Fifteen patients undergoing HDF with both membranes were selected. Samples of dialysis fluid, pre- and post-dialysis serum were collected. Microalbumin concentration in dialysis fluid and albumin concentration in serum were determined by immunoturbidimetry and colorimetry, respectively, on the Olympus AU5800®. Measurement of kappa and lambda light chains was performed by immunoturbidimetry on Optilite®.
Statistical analysis was carried out using the Mann-Whitney U test in the Medcalc program.

RESULTS

A greater loss of microalbumin in dialysis fluid was observed with HDF-24 (mean=31.6 mg/L) compared to HDF-12 (mean=9.1 mg/L). Albumin losses between pre- and post-dialysis serum were less than 10% in all cases.
The clearance was statistically significant higher with HDF-24 than with HDF-12 for lambda chain (median difference=17.8%, p=0.0001) and for kappa chain (median difference=12.1%, p=0.0006).

CONCLUSIONS

According to the results, the HDF-24 membrane shows a higher loss of microalbumin in dialysis fluid, which could pose a health problem for patients due to its osmotic consequences. However, this is not reflected in post-dialysis serum albumin concentration, as the losses were less than 10% in both membranes, explaining why there are no significant clinical repercussions.
This higher clearance capacity of the HDF-24 over the HDF-12 is equally reflected in the clearance of both kappa and lambda light chains. The superiority of HDF-24 in light chain removal positions this membrane as a better option to reduce the risk of diseases associated with light chain accumulation, such as amyloidosis. This finding underscores the importance of selecting efficient membranes and individualizing treatment for each patient to optimize clinical outcomes in hemodiafiltration.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1646

IS THIRD GENERATION PTH ASSAY MORE ACCURATE IN THE EVALUATION OF CKD-MBD? -OUR INITIAL EXPERIENCE

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BACKGROUND-AIM

Patients with Chronic Kidney Disease (CKD) are known to develop alteration in their mineral metabolism leading to impaired bone remodeling known as Chronic Kidney Disease - Mineral and Bone Disorder (CKD–MBD). Parathyroid hormone (PTH) is often used for the evaluation of the latter with the second generation assay (intact PTH) being most widely utilized. One of the challenges using this method is the increase in inactive PTH fragments, mainly 7-84 PTH caused by decrease in renal excretion leading to overestimation of PTH values. The use of third generation assays (1-84 PTH) may provide solution to this problem.
The study aims to assess whether third generation PTH assays provide greater accuracy in evaluating bone remodeling caused by secondary and tertiary hyperparathyroidism due to CKD.

METHODS

Data was collected retrospectively using the laboratory information system. Results of 50 nephrology patients (mean age of 65.5, of them 30 males) were gathered for the period of July 2024 to September 2024. The patients were divided based on eGFR into 5 CKD stages: stage 1 - 7; stage 2 - 7; stage 3 - 9; stage 4 - 14; stage 5 - 13;
Included parameters in the study were intact PTH (Alinity ci, Abbott), 1-84 PTH (Liason XL, Diasorin), Creatinine, Calcium and Phosphate (Alinity ci, Abbott). CKD stage was determined using the eGFR-CKD EPI formula. The samples were analysed within 8 hours of collection, following the laboratory's standard operation procedure. The fragment content was calculated and expressed as % of total intact PTH.

RESULTS

Comparison between the two PTH assays revealed high correlation with r = 0.98 but statistically significant difference (p=0.0004). Results with intact PTH assay showed constantly higher values with an average difference of 124.32 pg/mL (bias 55.6%). With progression of the disease, this difference showed to be more pronounced with inactive fragments percentage ranging from 47.9% to 78.9% in CKD stage 1-5. Our data did not show significant correlation between PTH, calcium and phosphate values. This may be explained by long-standing CKD and therapeutic supplementation.

CONCLUSIONS

Based on our results we can conclude that third generation PTH assays provide significant advantages such as more accurate diagnosis and improved disease management in patients with CKD.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1647

UTILITY OF GLUCOSE IN URINE TEST STRIPS AS A SCREENING TEST FOR URINARY SEDIMENT STUDY

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BACKGROUND-AIM

In urinalysis test strips are often used as a screening tool for the urinary sediment study.The usefulness of dipstick glucose determination is based on urinary sediment analysis of samples with high urine glucose concentrations that may cause false negatives in the dipstick leukocyte esterase result,identification of glycosuria in diabetic patients and the follow-up of patients in cases where blood samples cannot be used or in patients treated with glyozines.The main aim is to check the utility of dipstick glucose determination as a screening test for urinary sediment study in those samples that do not present any other altered parameter in the urine test strip.

METHODS

A dipstick analysis and urinary sediment study is performed with 500 urine samples from single urination using only positive glucose results of +3 (500 mg/dL) or +4 (1000 mg/dL) as criteria.LabUsticks12F test strips are used for glucose determination.The measurement is performed automatically on the Unamax analyzer by reflectance photometry.The sediment is measured by digital brightfield and phase contrast microscopy with the Sedimax instrument.Both results are analyzed with Menasoft software (A.Menarini Diagnostics).

RESULTS

In 348(69.6%) of the 500 samples analyzed,there was no element of interest and in 152(30.4%) there was some element of interest in the urinary sediment.Of these 152 urine samples,the following results were observed:6 had red blood cells (15-40 µL),31 leukocytes (15-40/µL),62 squamous epithelial cells, 11 bacteria,13 yeasts,4 amorphous urates,2 amorphous phosphates,9 hyaline cylinders,8 calcium oxalate dihydrate,3 uric acid and 3 with sperm presence.

CONCLUSIONS

In 69.6% of samples analyzed,there was no element of interest that would show the usefulness of glucose as a criterion for urine sediment study. Samples showing any element are associated with contamination during collection or inadequate preservation of the sample.In these cases it has no clinical significance and a new urine sample is recommended.The finding of other form elements is not related to glycosuria.Therefore, the use of glucose as the only criterion for urinary sediment can be discarded as long as there are no diagnostic clinical observations or other analytical findings suggesting its study.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1648

A MULTI-CENTER STUDY ON THE OPTIMAL THRESHOLD OF ABNORMAL ERYTHROCYTES FOR DETECTING HEMATURIA SOURCES AND ESTABLISHING A DIAGNOSTIC MODEL FOR GLOMERULAR HEMATURIA

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BACKGROUND-AIM

Accurate identification of the source of hematuria is crucial for diagnosing renal involvement in diseases. Microscopic examination of RBC morphology in urine has traditionally been used to differentiate between glomerular and non-glomerular sources of hematuria. However, there is no universally accepted criteria for this differentiation. This study aims to identify the most relevant RBC morphological features and the optimal threshold for distinguishing glomerular from non-glomerular hematuria using a sediment analyzer. Additionally, we developed an AI model, incorporating urine-related parameters from urinalysis, to assist in diagnosing glomerular hematuria.

METHODS

A total of 599 urine samples collected from patients across eight hospitals, including 296 cases with confirmed glomerular disease and 303 cases with non-glomerular disorders, were analyzed using the EU 8600 urinalysis line. Diagnostic performance of RBC morphology parameters was assessed and optimal threshold were determined using ROC analysis for disease differentiation. Additionally, machine learning models were developed using parameters from the urinalysis line using algorithms including support vector machine (SVM), logistic regression (LR), and linear discriminant analysis (LDA), with their performance evaluated using a validation set.

RESULTS

Acanthocyte, Jagged RBC, Annular RBC, and other abnormal RBCs were identified as having the highest AUC for distinguishing glomerular from non-glomerular hematuria. The optimal threshold for the total abnormal RBC rate associated with glomerular hematuria was 26%, with a sensitivity of 92.23%, specificity of 80.86%, and an AUC of 0.907. For the glomerular hematuria diagnosis model, Normocyte, Acanthocyte, Jagged RBC, Crenocyte, and Protein were identified as the most relevant features strongly associated with glomerular hematuria. Among the three algorithms, the SVM model exhibited the best performance. In the validation set, the SVM model demonstrated a sensitivity of 91.00%, specificity of 87.00%, and an AUC of 0.938.

CONCLUSIONS

This study identified optimal abnormal RBC threshold to differentiate glomerular from non-glomerular hematuria. The glomerular hematuria offers a promising tool aiding clinical decision-making in hematuria management.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1649

ACCURACY OF EQUATIONS FOR PREDICTING 24-H URINARY POTASSIUM EXCRETION FROM SPOT URINE SAMPLES

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BACKGROUND-AIM

Greater potassium intake has been associated with lower blood pressure and lower risk of diabetes, chronic kidney disease, stroke, and cardiovascular disease. Evidence suggests that potassium enhances the excretion of sodium and therefore reduces the adverse effect of high sodium intake on blood pressure. Twenty-four-hour urinary potassium (24-h uK) excretion is a biomarker for intake. 24-h uK urine collections are the suggested method to measure daily urinary potassium excretion but are costly and burdensome to implement.
The objective of this study is to test the validity of previously published equations to estimate 24-h uK from spot urine samples.

METHODS

The concentrations of potassium in spot and 24-h urine samples were analysed of 229 adult patients who attend hospital clinics. Estimated 24-h uK was predicted from spot urine concentration using the Kawasaki and Tanaka formulas. Agreement by Bland-Altman method were computed for estimated and measured 24-h uK excretion.

RESULTS

The mean measured 24-h uK was 56.4 ± 26.5, while the mean estimated values were 60.5 ± 12.8 for the Kawasaki formula and 47.7 ± 9.3 for the Tanaka formula. The absolute mean biases (95% CI) for predicting 24-h uK excretion using the two formulas were 4.1 (0.8 to 7.4) mmol for Kawasaki and -8.7 (-12.0 to -5.5) mmol for Tanaka. The relative mean biases (95% CI) were 15.8 (9.8 to 21.9) % for Kawasaki and -6.4 (-12.5 to -0.4) % for the Tanaka equation.

CONCLUSIONS

Optimal Analytical Performance Spectification for Urine Potassium from Spanish Society of Laboratory Medicine is 14.2%. The Kawasaki equation overestimates urinary potassium excretion and also exceeds the optimal quality specification criterion. Although the equations were developed in a population not similar to the one studied, in a first approximation, the Tanaka equation shows better results than the Kawasaki equation, although further studies are required warranted for accuracy and validation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1650

SERUM VASCULAR ENDOTHELIAL GROWTH FACTOR HELPS IDENTIFY PATIENTS WITH CLEAR CELL RENAL CELL CARCINOMA WHO BENEFIT MORE FROM [68GA]GA-PSMA PET/CT

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BACKGROUND-AIM

To validate the application of serum vascular endothelial growth factor (VEGF) in the selection and prognosis of patients with clear cell renal cell carcinoma (ccRCC) using 68Ga-PSMA.

METHODS

The analysis encompassed radiological parameters and angiogenesis indicators. The correlation of VEGF and PSMA was evaluated, and the efficacy of VEGF in selecting high PSMA uptake lesions of ccRCC.

RESULTS

44 patients confirmed ccRCC who evaluated serum VEGF levels before PSMA PET. VEGF showed poor correlation with PSMA IHC stain (r=-0.054, P=0.816) and VR (r=0.065, P=0.748), moderate correlation with SUVmax (r=0.338, P=0.025) and TBR (r=0.310, P=0.041), and strong correlation with visual score (r=0.405, P=0.008). VEGF was significant different in low (0-1) and high group (2-3) (P=0.029). VEGF was a good predictor of PSMA PET visual score with AUC value of 0.707 (P=0.043), and stratified by the critical value of VEGF, 67.71 pg/mL, the sensitivity and specificity for predicting PSMA visual scores (0-1 vs. 2-3), were 85% and 78%. Patients had high pre-operation VEGF might show high PSMA uptake. 19 patients measured VEGF post-operation and the median of follow-up was 81 days. All patients imaging examination and clinical signs were normal during follow-up time, VEGF of 9 patients increased. Compared the pre-operative PSMA uptake characteristics between VEGF increased and decreased group, SUVmax was no statistically difference (P=0.464), the VR showed significantly difference (P=0.049), patients with increased VEGF had lower VR. ROC curve analysis found that using VR to predict postoperative VEGF changes, with AUC value of 0.750 (P=0.143), the sensitivity and specificity were 50% and 100%. Patients with preoperative VR≤0.42 were likely to have increased VEGF postoperative. VEGF was associated with patient prognosis, and results suggested that patients with low VR (high intra-tumor heterogeneity) may have poor prognosis.

CONCLUSIONS

Serum VEGF was indicative of [68Ga]Ga-PSMA PET/CT uptake characteristics for ccRCC. Pre-operative serum VEGF levels have the potential to serve as a screening tool to identify patients who are more likely to benefit from PSMA imaging, and VR demonstrated potential as a prognostic predictor for tumor risk.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1651

IRON CONTENT OF SERUM FERRITIN: MARKER OF IRON DEFICIENCY ANEMIA IN CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

Iron Deficiency Anemia (IDA) is common in patients with chronic kidney disease (CKD). Gold standard for diagnosis of IDA is bone marrow (BM) aspiration and staining for estimating iron by Gale's method of scoring. Repeated bone marrow aspirations is an impractical way to make a diagnosis of IDA in CKD. The usual markers of IDA in CKD of a combination of serum ferritin and transferrin saturation are not helpful in CKD because the ferritin is not only a marker of iron stores but the level of ferritin is high due to inflammation in CKD

METHODS

We studied the iron content in ferritin, soluble transferrin receptor (sTFr) and iron deficiency status in bone marrow in CKD patients. The present study was a prospective study aimed to verify that if the ferritin bound iron can be used as a marker of IDA in 41 CKD patients consisted of 61% male and 39% female with mean age group of 53.5 years.
The ferritin was extracted from the serum by methanol (44% v/v) treatment followed by heating at 75°C for 10 minutes. The extracted ferritin was measured by Maglumi automated platform using CLIA kit.The sTFr index was calculated by the formula (sTFR/Log Ferritin). BM aspiration was done in all participants. The BM aspirate smears were stained for stainable iron by Prussian Blue method. The BM iron stores were graded by Gale's method from a score of 0 to 6.

RESULTS

The mean ± SD of Hemoglobin, Ferritin, percent saturation of Transferrin, sTFr and the iron content of Ferritin in the study population were 7.94 ± 1.44 g/dl, 328.9 ± 386.7 ng/ml, 20.1 ± 16.1, 2.03 ± 1.55 µg/ml and 4.54 ± 3.09 µg/dl respectively. There was positive linear correlation between iron content of ferritin and bone marrow iron grade (r=0.5636, P=0.0003). The Receiver Operating characteristic(ROC) curve for diagnosis of IDA by BM for ferritin content of iron showed 0.85. The ROC curve for the calculated sTFr index above 0.86 also demonstrates AUC>0.80 for the confirmation of IDA by BM iron.

CONCLUSIONS

Iron content of serum ferritin is significantly associated with IDA in CKD. The sTFr index is significantly associated with IDA in CKD

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1652

COMPARISON BETWEEN SPOT SAMPLE AND 24-HOUR MEASUREMENT FOR PROTEINURIA ASSESSMENT

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BACKGROUND-AIM

The European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) published guidelines for urinalysis in 2023 in which a 24-hour measurement is recommended for proteinuria. However, in routine, proteinuria is usually measured on a spot sample of urine with other analyses.
The aim of this study was to evaluate the agreement between the proteinuria/creatininuria ratio (PCR) and the recommended 24-hour proteinuria measurement for proteinuria levels in patients.

METHODS

We performed a monocentric retrospective study on 83 patients, hospitalized between January 1, 2024, and December 31, 2024. We used routine analysis samples for which the two measurements were performed. Levels of 24-hour proteinuria and PCR were assessed in our laboratory using Cobas Roche devices. Agreement rate between them was evaluated using linear regression and Spearman test.

RESULTS

A strong correlation was found between 24-hour proteinuria and PCR, with a correlation coefficient R^2 at 91,6% for proteinuria levels < 4g/24h and/or 4g/g of creatinin and Spearman's Rhô at 0.88 ($p < 0.001$). By adding proteinuria levels > 4g/24h and/or 4g/g of creatinin, we obtained a correlation coefficient R^2 at 88,7% and Spearman's Rhô at 0.89 ($p < 0.001$).

CONCLUSIONS

We demonstrated a strong agreement between the 24-hour proteinuria levels and PCR for proteinuria levels < 4g/24h and/or 4g/g of creatinin. We can assume that PCR could replace 24-hour proteinuria measurement in assessing proteinuria. PCR could also help simplify preanalytical conditions of urine measurement analysis.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1653

EVALUATION OF RENAL FUNCTION USING DIFFERENT EQUATIONS FOR ESTIMATING GLOMERULAR FILTRATION RATE

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BACKGROUND-AIM

The estimated glomerular filtration rate (eGFR) was recommended to evaluate renal function. In order to explore individualized applicability of each equation, this article compared the performance of clinically recognized twelve equations with the 2012 Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) $_{Cr\text{-}CysC}$ equation.

METHODS

The adults who simultaneously tested creatinine and cystatin C in Peking University First Hospital from January to December 2021 were recorded. The performance of each equation was compared about the correlation, bias and differences in terms of gender, age and CKD staging with the 2012 CKD-EPI$_{Cr\text{-}CysC}$ equation. SPSS 26.0 and GraphPad prism 9.0 were used for statistical analysis and graphing.

RESULTS

This study collected 2050 samples including 1337 males and 713 females. The spearman correlation analysis results indicated that the 2021 CKD-EPI$_{Cr\text{-}CysC}$ with r = 0.999 had strongest correlation with the reference equation, followed by the 2017 FAS$_{Cr\text{-}CysC}$ equation. This was consistent with bias plots of different equations against reference eGFR in which the 2021 CKD-EPI$_{Cr\text{-}CysC}$ equation showed better correlation with lower slope. In the comparison of the diagnosis consistency of CKD stage, the 2017 FASCysC equation showed the highest consistency with 33.8% samples belonging to CKD stage 3-5. The 2021 CKD-EPI$_{Cr\text{-}CysC}$ equation also had the best correlation with the reference equation in three age subgroups, with correlation coefficients of 0.999, 0.999 and 0.998 respectively.

CONCLUSIONS

The combined equation of creatinine and cystatin C shows less bias and more accurate in overall participants. The 2021 CKD-EPI$_{Cr\text{-}CysC}$ equation and 2017 FAS$_{Cr\text{-}CysC}$ equation have good applicability in Chinese.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1654

COMPARISON OF DEMOGRAPHICAL FEATURES AND CHEMICAL COMPOSITION IN PATIENTS WITH RENAL STONES IN A TERTIARY CARE CENTER

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BACKGROUND-AIM

Renal stones are a quite common urological condition that gives rise to one of the most painful conditions resulting in ureteric colic. The prevalence rate is varied from 1 to 20% and increased incidence is seen in developed countries. Several factors including geography, climate, dietary habits, metabolic disorders, and genetic factors may be associated with the stone composition. The composition of the stone plays a major role in diagnosing and management of a patient with renal stone disease.
The aim of the study was to assess the demographic details, clinical presentation, and the chemical composition of the adult and pediatric, calculi samples received by LRH, island-wide.

METHODS

This retrospective descriptive cross-sectional study was conducted at the Chemical Pathology department of Lady Ridgeway Hospital in Sri Lanka from 2019 to 2023, with qualitative and quantitative analysis using Fourier Transform Infrared Spectroscopy.

RESULTS

Among a total of 212, adult and pediatric samples received, it showed that males were affected the most; (n=96/145) 66% of adults and (n=54/67) 81% of children. Most patients were reported from the Western Province; (n=116/145) 80% of adults and (n=22/67) 33% of children. Nephrolithiasis was found to be more prevalent; affecting (n=97/145) 67% of adults and (n=31/67) 46% of children. The majority of stones in children were composed of calcium oxalate monohydrate (n=24/67, 36%), whilst in the adults it was mainly uric acid 80% and calcium oxalate monohydrate 20% (n=53/145, 37%) stones.

CONCLUSIONS

Renal stones were common in males in both adult and pediatric populations, particularly in the western province. Calcium oxalate monohydrate stones are more common in children whereas uric acid stones are more prevalent in the adult population

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1655

PON 1 POLYMORPHISM AND OXIDATIVE STRESS STATUS IN CHILDREN WITH RENAL DISEASES

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BACKGROUND-AIM

Paraoxonase 1 (PON1) is an enzyme with anti atherogenic and anti-inflammatory properties. Lower PON 1 activity is associated to metabolic disorders related to childhood overweight and risk of development diabetes and CVD later in life. Data on the relationship between genetic PON 1 polymorphisms and oxidative status in children with renal diseases are limited. The aim of this study was to determine the phenotype distribution of PON1 and association with oxidative stress status in children with CKD and a healthy subjects as a control group.

METHODS

Oxidative stress status parameters were measured in the sera of 51 children with CKD and in 50 healthy children matching age and sex. Individual variation in PON1 were determinate using the dual substrate (paraoxon and phenyl acetate) method.

RESULTS

The following phenotype distributions were found in the CKD and control group: CKD group (n=51): 12%(QQ), 57%(QR), 31%(RR) and control group (n=50): 32%(QQ), 33%(QR), 35%(RR). Patients with QR phenotype showed lower PON 1 ($p=0.03$), SOD ($p=0.04$) activity and higher MDA ($p=0.01$) and AOPP ($p< 0.001$) compared to the control group. Similar findings are seen in the RR phenotype: significantly lower PON 1 ($p=0.04$), SOD ($p=0.02$) activity and higher MDA ($p=0.03$) and AOPP ($p=0.05$) compared to controls.

CONCLUSIONS

QR and RR phenotype were dominant in children with CKD. Reduced PON 1 activity in children with renal disease could contributed to accelerated development of atherosclerosis with disease progression. Comparing the parameters of oxidative stress and antioxidant capacity, we found that children carrying the R allele were probably more vulnerable group in terms of the development of impairment in oxidative stress/antioxidant balance in renal disease.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1656

ROLE OF URINARY SEDIMENT IN A CASE OF ATYPICAL C3 GLOMERULOPATHY WITH ACUTE TUBULAR NECROSIS

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BACKGROUND-AIM

Atypical C3 glomerulopathy is a rare and complex kidney disease characterized by dominant C3 deposits, often accompanied by other immunoglobulins such as IgA, resulting from dysregulation of the complement alternative pathway. This condition can lead to various degrees of glomerular and tubular damage, sometimes presenting with acute kidney injury (AKI) as a result of acute tubular necrosis (ATN). This study aims to highlight the diagnostic challenges of atypical C3 glomerulopathy and the complementary roles of urinary sediment analysis and kidney biopsy.

METHODS

A 60-year-old male presented to the ICU with hypoxic AKI (KDIGO 3), suspected alveolar hemorrhage, and respiratory distress. Initial urinalysis revealed: density 1019 g/mL, pH 5, proteins 100 mg/dL, and negative glucose, bilirubin, urobilinogen, ketones, and nitrites. Quantitative measurements included 2008 RBCs/µL, 928 WBCs/µL, and an albumin-to-creatinine ratio of 180.8 mg/g. Although clinical suspicion of a glomerular disease warranted a kidney biopsy, it was initially deferred due to the patient's ongoing Apixaban therapy and associated bleeding risk. Hence, microscopic examination of the urinary sediment (Nikon Eclipse 50-i Phase Contrast) was prioritized, revealing 100–150 isomorphic RBCs/field, 90–100 WBCs/field, abundant renal tubular cells, hematic, granular, and hyaline casts, and scarce waxy casts. Crystals were absent. While sediment findings were suggestive of ATN, the biopsy was performed two days later when anticoagulation was no longer a contraindication.

RESULTS

Histopathology confirmed the diagnosis of C3 glomerulopathy with dominant C3 and IgA deposits, extensive tubular necrosis, and glomerulosclerosis. The patient required intermittent dialysis, and eculizumab therapy. The absence of dysmorphic RBCs, despite significant hematuria, supported the conclusion that tubular injury was the primary source of hematuria, consistent with ischemic ATN.

CONCLUSIONS

Urinary sediment analysis provided initial insights into the nature of tubular injury, but the kidney biopsy was essential to confirm the glomerulopathy and its underlying complement-mediated etiology. This case highlights the importance of integrating non-invasive and invasive diagnostic tools to guide the diagnosis and management of rare kidney diseases.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1657

EVALUATION OF THE DIAGNOSTIC RELIABILITY OF ANTI-THROMBOSPONDIN TYPE-1 DOMAIN CONTAINING 7A PROTEIN ANTIBODIES RESULTS

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BACKGROUND-AIM

In recent years, there has been an increase in the clinical significance of the determination of anti-phospholipase A2 receptor antibodies (anti-PLA2R1) serum concentrations. Recently, in patients with primary membranous nephropathy (PMN), Tomas et al. (2014) described a thrombospondin type-1 domain containing 7A protein as a novel target antigen for diagnosis. Determination of anti-thrombospondin type-1 domain containing 7A protein antibodies (anti-THSD7A) is a relatively new indicator, which is currently not widely used in clinical laboratory practice. A review of the scientific literature showed that clinical trials evaluating anti-THSD7A changes in membranous nephropathy (MN) are very few. Its role in the diagnosis, prognosis and treatment of PMN is still not fully understood (Tomas et al. (2016).

METHODS

A total of 134 persons were examined, of which the patients with kidney diseases were 84, and the control group included 50 healthy individuals. The renal disease group included patients with PMN who were negative for anti-PLA2R1 (n = 23), with secondary membranous nephropathy (SMN) (n = 12), and with others nephropathy (ON) (n = 49). The serum titer of anti-THSD7A was investigated by indirect immunofluorescence assay (IIFT) of EUROIMMUN. The MedCalc v. 18.5, 2018 MedCalc Software program was used to assess the diagnostic reliability of anti-THSD7A results.

RESULTS

Summary data for indicators of diagnostic reliability of results for anti-THSD7A antibodies show sensitivity 8.69%, specificity 100%, diagnostic efficiency (DE) 84.33%, positive predictive value (PPV) 100%, and negative predictive value (NPV) 84.09%.

CONCLUSIONS

Our data suggest that the IIF method for the determination of anti-THSD7A antibodies has good characteristics of the diagnostic reliability of the results and allows the specific determination of circulating anti-THSD7A antibodies in patients with PMN.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1658

PROTEINURIA/CREATININURIA RATIO: DIAGNOSTIC PERFORMANCES OF PROTEINURIA

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BACKGROUND-AIM

Proteinuria measured on 24-hour urine is considered the " gold standard " for the diagnosis and monitoring of kidney disease. However, failure to comply with the pre-analytical phase by incorrect collection of 24-hour urine is the cause of several errors in the measurement. Therefore, an alternative is proposed to replace this diagnostic marker with a measurement on a urine sample and to divide the measured value by that of creatininuria (RPC).
The aim of this work was to evaluate the diagnostic performance of the proteinuria/creatininuria ratio (RPC) from a single urine sample, compared to measurement of 24-hour proteinuria.

METHODS

This is a cross-sectional descriptive study of 44 patients, in whom a request for 24-hour proteinuria was prescribed, carried out at the Biochemistry laboratory of the Pierre and Marie Curie Center in Algiers . Proteinuria and creatininuria assays were measured on C 501 Cobas ® 6000, Roche diagnosis. The statistical study was carried out using EPIDATA software.

RESULTS

The 24-hour proteinuria assay showed that 43.18% of patients had positive proteinuria, while the RPC detected only 38.64% of positive proteinuria . No significant difference was found between the mean of 24-hour proteinuria (236.78 mg/24) and the mean of the RPC (279.01 mg/g) with a p value = 0.20. The sensitivity of the RPC returned to 82.35% and the specificity to 81.48 % with a positive predictive value (PPV) of 73.68% ; and a negative predictive value (NPV) of 88%.

CONCLUSIONS

The RPC is a useful diagnostic tool to detect significant proteinuria, with good performance.Given the small sample size, a study on a larger population remains desirable in order to discuss the interchangeability of the two methods.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1659

ERYTHROCYTE CHANGES IN URINE ANALYSIS OVER TIME

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BACKGROUND-AIM

This study aimed at investigating how storage conditions influence erythrocyte counts over time. According to the EFLM European Urinalysis Guideline 2023, urine analysis should be done within 5 hours (hrs) or keeping it in the refrigerator or preserved in boric acid. The present study was designed to find out whether the RBC count analysis could be done using samples kept for 24 or 48 hrs.

METHODS

Urine samples from 10 patients with >20 erythrocytes/HPF under normal specific gravity and pH were analyzed. Each sample was divided into three aliquots stored at:
1. Room temperature
2. Refrigerator
3. With boric acid
Samples were analyzed at 0, 2, 4, 24, and 48 hrs for erythrocyte counts microscopically.
Urinalysis Equipment:
• Chemical Analysis: LabUMat 2 (fully automated)
• Microscopy: UriSed 3 Pro (automatic sediment analyzer)

RESULTS

1. 0–4 hrs: RBC counts remained stable in refrigeration and boric acid samples.
o Room temperature samples showed a slight variation, with increases up to +36.8% and decreases of −14.3%.
o Refrigerated samples showed reductions of −8% to −32.2%.
o Boric acid-treated samples experienced a minimal range from −8% to +5%.
2. 24 hrs: Refrigerated samples were better preserved, with decreases ranging from −23.4% to −77%.
o Room temperature samples exhibited significant degradation, with reductions of −62.3% to unreliable levels due to bacterial growth.
o Boric acid-treated samples showed moderate preservation, with changes between −13.9% and −27.6%.
3. 48 hrs: The room temperature samples had the least RBC counts, with reductions reaching −92.9% to complete lysis (−100%).
o Boric acid-treated samples showed moderate stability, with decreases between −25.5% and −42.5%.
o Refrigerated samples retained the highest RBC counts but still experienced reductions of −63% to −88.5%.

CONCLUSIONS

Erythrocyte stability is highly dependent on storage conditions:
1. Storage of samples at 2–8°C (Refrigeration) is the best and can maintain RBC counts up to 48 hrs. 2. Boric acid offers moderate stability at room temperature if refrigeration is not available.
3.Room temperature without preservatives results in rapid degradation of RBCs after 24 hrs.
Recommendation: Process samples within 4 hrs; if delayed, refrigerate or use boric acid to prevent degradation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1660

EVALUATION OF PROTEIN CLEARANCE IN CHRONIC HEMODIALYSIS: A COMPARISON BETWEEN HIGH-FLUX AND MEDIUM CUT-OFF MEMBRANES

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BACKGROUND-AIM

Efficient removal of uremic toxins is a critical goal in hemodialysis (HD), focusing on small and medium-sized molecules while preserving essential proteins like albumin. High-flux membranes used in-online hemodiafiltration (HDF-OL) and medium cut-off (MCO) membranes used in expanded hemodialysis (HDx) represent advanced technologies for HD. HDF-OL combines diffusive and convective transport, while MCO membranes enhance middle molecule clearance. However, their comparative efficacy in removing proteins of different molecular weights requires further investigation.
This study aims to compare the reduction rates (RR) of prolactin, myoglobin, alpha-1 glycoprotein and albumin—representing a range of molecular sizes—between high-flux membranes used in HDF-OL and MCO polyethersulfone membranes (Elisio) in a cohort of patients undergoing chronic HD.

METHODS

A prospective study was conducted involving 16 patients with chronic kidney disease (CKD) who underwent dialysis using two techniques:
1. HDF-OL with a high-flux polysulfone membrane (Toraysulfone).
2. HDx with a MCO polyethersulfone membrane (Elisio).
Plasma levels of proteins were measured pre- and post-dialysis: myoglobin (18 kDa) and alpha-1 glycoprotein (41-43 kDa) by nephelometry, prolactin (23 kDa) by immunoassay and albumin (66.5 kDa) by colorimetry.
Reduction rates (RR) for each protein were calculated and compared. Statistical analysis was performed using paired-samples t-tests in IBM SPSS Statistics.

RESULTS

Paired t-tests revealed statistically significant higher RR for prolactin (mean difference: 19.6%, $p < 0.001$), myoglobin (mean difference: 15.3%, $p < 0.001$), and alpha-1 glycoprotein (mean difference: 5.1%, $p = 0.007$) with the HDF-OL membrane compared to Elisio membrane. In contrast, no significant difference was observed in the RR of albumin between the two membranes (mean difference: 2.4%, $p = 0.190$).

CONCLUSIONS

The HDF-OL membrane demonstrated superior RR for prolactin, myoglobin, and alpha-1 glycoprotein compared to the Elisio membrane, suggesting enhanced clearance of small and medium-sized molecules. Both membranes effectively preserved albumin, making them suitable options for selective molecule removal with minimal albumin loss. These findings contribute to optimizing hemodialysis strategies based on molecular targets.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1661

EVALUATION OF AUTOMATED VERIFICATION RULES FOR URINALYSIS: IMPROVING EFFICIENCY AND QUALITY IN CLINICAL LABORATORIES

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BACKGROUND-AIM

Urinalysis is a highly demanded test in clinical laboratories due to its ease of sample collection and valuable diagnostic information. Despite automation, a high percentage of urine sediment samples still require manual review. In our laboratory, 45-50% of analyzed urine samples meet positive screening criteria based on dipstick results and require sediment examination. The implementation of automated verification rules could improve the selection of samples requiring manual review, enhancing laboratory efficiency and quality.
This study aims to evaluate automated verification rules recommended by the manufacturer (Menarini Diagnostics S.A.) and from the literature.

METHODS

Seven verification rules were programmed in Menasoft software, correlating dipstick results (Unamax) with sediment findings (Sedimax ConTRUST Pro) in a total of 2775 samples. The rules were as follows:
Rule 1: Dipstick shows 0 red blood cells (RBC)/uL and sediment ≤ 5 RBC per high power field (HPF).
Rule 2: Dipstick shows ≤ 10 RBC/uL and sediment ≤ 15 RBC/HPF.
Rule 3: Dipstick shows 0 white blood cells (WBC)/uL and sediment ≤ 5 WBC/HPF.
Rule 4: Dipstick shows ≤ 25 WBC/uL and sediment ≤ 20 WBC/HPF.
Rule 5: Dipstick shows negative nitrites and sediment has no or scant bacteria.
Rule 6: Dipstick shows positive nitrites and sediment shows moderate or abundant bacteria.
Rule 7: Dipstick shows protein < 100 mg/dL with no alterations in sediment.

RESULTS

A total of 298 samples were reviewed using the specified rules, with some samples meeting one or more verification criteria. The average number of automatically verified samples per day was 43 (range: 14 to 66). The number of verified samples varied by rule type, with Rule 4 being the most frequent (77 samples), and Rule 7 the least frequent (15 samples).

CONCLUSIONS

The rules showed high accuracy, ranging from 92.3% to 100% depending on the specific rule. Discordant cases, involving spermatozoa, crystals (oxalate and amorphous), and hyaline casts, were clinically insignificant. Automated verification rules could reduce the workload for sediment review by approximately 10.25%, improving the efficiency and quality of urinalysis. While these initial results are promising, expanding the sample size and study duration is recommended to validate these findings comprehensively.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1662

VARIATION OF CREATININE CLEARANCE DEPENDING ON THE METHOD OF BLOOD CREATININE MEASUREMENT

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BACKGROUND-AIM

Many studies have shown variations in blood creatinine results depending on the assay technique used. The aim of our work was to compare the creatinine clearance results calculated by the MDRD formula depending on whether blood creatinine was assayed by an enzymatic method or by the Jaffe method.

METHODS

The study involved 120 blood samples. Blood creatinine measurement was performed using the Jaffe method on cobas Integra400 and by enzymatic method on cobas Pure. Creatinine clearance was calculated using the MDRD formula for all patients with estimation of the stage of chronic kidney disease. The results were compared using the Bland and Altman graph on SPSS software.

RESULTS

-The median and quartiles of creatinine clearance (MDRD) with creatinine dosage by Jaffe method is: 47.75ml/min/1.75m2 [25.13-85.01].
-The median and quartiles of creatinine clearance (MDRD) with creatinine dosage by enzymatic method is: 49.91ml/min/1.75m2 [27.22-90.74].
-Creatinine clearance obtained by Jaffe creatinine is underestimated compared to that by enzymatic creatinine with a mean bias of -3.1995 ml/min, 95% CI (-4.267, -2.132).
-The results of clearances by Jaffe creatinine and Enzymatic creatinine were perfectly correlated ($r=0.99$, $p<0.00$), however the difference between the calculated clearances was significant with $p<0.000$.
- According to the Bland and Altman plot, creatinine clearances by Jaffe and enzymatic creatinine showed good agreement for clearance values ≤120ml/min with the exception of two points at 60 and 80ml/min.
-For clearance values >120ml/min, the agreement was poor.

CONCLUSIONS

Significant differences can be observed in the calculation of creatinine clearance according to its dosage method. Therefore, the current recommendations given by learned societies are aimed at standardizing the dosage of creatinine. Indeed, the Jaffe technique, due to its sensitivity to interference, is disadvantaged in favor of enzymatic or other techniques.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1663

COMPARISON OF PEDIATRIC EGFR EQUATIONS

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BACKGROUND-AIM

Compared to adults, precise GFR estimation in the pediatric population using a single filtration marker (sFM) based equation may be challenging. The aim of this study was to compare KDIGO 2024 approved pediatric equations on our pediatric hospital population.

METHODS

In a retrospective study 402 pediatric patients were included. In total 602 reported eGFR results estimated by CKiD, 2012 equation (8-202 mL/min/1.73m2) together with corresponding cystatin C (CysC), creatinine (Cr) and BUN values as well as patient sex (48% male, 52% female), age (0,17-19 years) and height (0,56-2 m) have been extracted from laboratory information system.
On the basis of these data eGFR was calculated using sFM based equations (U25cr, U25cys, CysC-2012, CAPA) and double filtration marker (dFM) based equations (EKFC, U25, CKiD). EKFC equation was used as standard for calculation of a median bias, interquartile range (IQR) and p30 value.

RESULTS

Compared to dFM EKFC equation derived GFR estimate
1) in our cohort sFM based eGFR equations (U25cr, U25cys, CysC-2012, CAPA) showed comparable average absolute values of bias 5,25 mL/min/1.73m2 to dFM eGFR equations (U25 and CKiD) 4 mL/min/1.73m2. However, dFM equations showed on average better precision (IQR = 9,5) compared to sFM equations (IQR = 17,1)
2) the bias and precision of CKiD, U25 and CysC based U25cys and CysC-2012 equations are stable across G1 to G5 stages while U25cr has marginal precision in G1 group (IQR = 20)
3) in our cohort the accuracy, measured as p30, of the sFM based equations was optimal (on average 92%) except for CAPA (83,5%) but lower than for dFM based U25 and CKiD equations (on average 99,1%)
4) in G2-G5 eGFR range the difference in accuracy between dFM (U25 and CKiD) and sFM based equations is even more pronounced, 99,1% and 83,5% respectively.
Finally, the sFM and dFM equations counting for creatinine showed higher and more variable eGFR results in children under 2 years (N = 14) and oncologic patients (N = 15) compared to CysC sFM equations.

CONCLUSIONS

Our findings suggest that none of the sFM based equations is optimal to use in our pediatric population while U25 and CKiD showed eGFR values equivalent to EKFC equation across the whole eGFR range except for children under 2 years and oncologic patients.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1664

UROMODULIN: A COMPREHENSIVE REVIEW OF ITS ROLE IN KIDNEY PHYSIOLOGY, BIOMARKERS, AND CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

Uromodulin has gained significant attention for its protective role in the urinary tract and its emerging potential as a biomarker for kidney health. Recent studies have expanded our understanding of uromodulin, revealing its involvement in immune responses and kidney damage. Understanding its dual role as both a urinary protein and a serum biomarker has opened new opportunities for diagnosing and monitoring chronic kidney disease (CKD). This review provides an overview of uromodulin's physiology and molecular mechanisms. By exploring its role in kidney function and its potential as a biomarker for CKD, we aim to highlight its critical importance in nephrology.

METHODS

Relevant literature was collected from PubMed, Google Scholar, and PMC up to June 2024. Search terms included "Uromodulin," "Chronic Kidney Disease," "Oxidative Stress," and "Kidney Biomarkers." Articles were selected based on their relevance to uromodulin's physiological role, molecular mechanisms, involvement in CKD progression, clinical use as both a serum and urinary biomarker, and its immunomodulatory properties. Statistical and experimental data were extracted when necessary to compare results across studies, particularly regarding uromodulin secretion, polymerization, and genetic polymorphisms influencing kidney disease progression.

RESULTS

Uromodulin’s response to oxidative stress is vital for protecting kidney tubules from damage, with its effects potentially extending to systemic health. Studies suggest that enhancing uromodulin production or mimicking its protective effects could slow CKD progression and its complications. Given its broad range of functions, uromodulin has therapeutic potential for treating CKD. Research on kidney concentrating function under minimal dehydration through fluid restriction further supports the framework for evaluating kidney health, with refractometry chosen as the optimal method for measuring urine osmolality.

CONCLUSIONS

As evidence linking uromodulin to kidney pathologies increases, its potential as a diagnostic biomarker becomes clearer. Measuring uromodulin levels in serum and urine offers promising opportunities for early detection and monitoring of CKD, particularly regarding tubular health, which is often overlooked by traditional markers like glomerular filtration rate and albuminuria.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1665

FROM FUNCTION TO BIOMARKER: THE EVOLVING ROLE OF UROMODULIN IN KIDNEY HEALTH AND DISEASE (A COMPREHENSIVE REVIEW)

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BACKGROUND-AIM

Uromodulin is gaining recognition for its protective role in the urinary tract and its potential as a biomarker for kidney health. Recent research has deepened our understanding of how it contributes to immune responses and kidney damage. Uromodulin's dual function as a urinary protein and a serum biomarker presents new possibilities for diagnosing and monitoring chronic kidney disease (CKD). This review aims to provide a better understanding of uromodulin's functions, its underlying molecular mechanisms, and its growing relevance in CKD.

METHODS

We gathered relevant studies from PubMed, Google Scholar, and PMC up until June 2024, using search terms like "Uromodulin," "Chronic Kidney Disease," "Oxidative Stress," and "Kidney Biomarkers." We selected studies based on their focus on the physiological functions of uromodulin, its molecular mechanisms, and its role in the progression of CKD. Additionally, we looked into its potential clinical use as both a serum and urinary biomarker. When needed, we extracted data from various studies to compare findings on uromodulin secretion, its polymerization, and the influence of genetic factors on kidney disease progression.

RESULTS

Uromodulin plays a key role in protecting kidney tubules from oxidative stress, and its effects may also benefit overall health. Research suggests that boosting uromodulin production or replicating its protective actions could help slow CKD progression and complications. Given its wide range of functions, uromodulin shows therapeutic potential for CKD. A portion of the authors' research supports investigating kidney concentrating ability under mild dehydration, achieved by restricting fluid intake for 12 hours, validating the conceptual framework. Due to the small urine volume and the need for precise osmolality measurement, refractometry was selected as the ideal method for analysis.

CONCLUSIONS

As research increasingly links uromodulin to kidney disease, its value as a diagnostic biomarker is becoming more apparent. Testing uromodulin levels in both serum and urine holds promise for early detection and ongoing monitoring of CKD, particularly for assessing tubular health, an aspect often overlooked by traditional markers such as glomerular filtration rate and albuminuria.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1666

EVALUATION OF THE IMPLEMENTATION OF MICROALBUMINURIA SCREENING USING URINE TEST STRIPS.

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BACKGROUND-AIM

The prevalence of chronic kidney disease (CKD) is increasing due to the rise in its main risk factors (diabetes and hypertension). The presence of albuminuria along with glomerular filtration rate is essential for its diagnosis, with the determination of the albumin-to-creatinine ratio being the preferred method. Additionally, the use of test strips (TS) for estimating albuminuria, along with confirmation by a quantitative method, may be the most cost-effective strategy for population screening. Therefore, the use of TS that incorporate the semi-quantitative determination of albumin and creatinine for calculating their ratio represents a useful tool as a screening test to reduce the number of biochemical determinations. The objective is to evaluate the implementation of microalbuminuria screening through semi-quantitative determination using urine TS in our area.

METHODS

A retrospective study of urine samples analyzed since the implementation of the strategy (October 2024 to January 2025) using LabUSticks12F test strips on the Unamax system (Menarini Diagnostics), followed by quantification of albumin (immunoturbidimetry) and creatinine (Jaffé method) on the Cobas c702 analyzer (Roche Diagnostics).The strategy consisted of rejecting the biochemical determination of albumin, creatinine, and their ratio when the latter was ≤20 mg/g on the TS (the normal threshold according to the literature is <30 mg/g, but abundant false negatives were observed in values between 20-30 mg/g).

RESULTS

A total of 7.566 urine samples were obtained with determinations of albumin, creatinine, and their ratio, both semi-quantitative and quantitative. Of these, 6.462 were normal on the TS, and 5.829 (90.2%) were rejected by the implemented strategy. Additionally, it was observed that this strategy rejected 85.40% of the quantitative determinations of albumin and creatinine.

CONCLUSIONS

The results obtained have demonstrated that the implementation of the new microalbuminuria screening strategy using test strips reduces the number of quantified albumin and creatinine tests that would not be diagnostically useful, always in accordance with the knowledge of the patient's clinical status. This approach saves costs for the laboratory without compromising the quality of care and improves the sample workflow in a high-demand context.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1667

USEFULNESS OF CHEMICAL TEST STRIPS IN SCHOOL HEALTH.

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BACKGROUND-AIM

The rapid tests (POC) are useful in prevention campaign. Our aim is to evaluate the effectiveness of the urinary chemical strips in school medicine consultations within children aged 6-12 years attending a primary school in a sub-rural area (Tahar Tero at Zeralda-Algiers).

METHODS

After obtaining the authorization from the parents, the education authorities and the primary school director, we have organized the survey with the director of the school and her staff. The sterile recipients and the questionaries were distributed. The criteria inclusion were the children attending the primary school of Tahar Tero. All the adults and the children outside this school were excluded. The academic staff have explained to the children the aim of the survey and the urine collection protocol. They have fulfilled the short questionaries (identity, medication, illness as diabetes, urination burns, scratching/itching, age, sex)in case of it was not done by the parents.The survey was held on the 27th May 2021. Regarding a planning, the children have brought their recipient full of their urine to the investigators with a fulfilled questionnaire. The strip tests were run on site, with a double blended lecture. We have used Excell Microsoft version 2010.

RESULTS

Out of 300 children, 117 have participated: 50.42% girls vs 48.71% boys. The majority were 10-11 years old. The rate of urinary abnormalities was 3.86%. The cloudy appearance rate was 1.16% for boys vs. 5.97% for girls. No case of glucosuria-ketonuria association, neither glucose and urobilinogen. Proteinuria rates at 15 mg/dl and 30 mg/dl were respectively 20.34% girls vs 16.27% boys and at 30 2.32% for both sexs. The urine gravity was mainly 1.030 (19.81% girls vs 25% boys). Proteinuria, ketone bodies and glucosuria were absent for children whose urine specific gravity was 1.015 (n=7). Leukocyturia at 15 elements/mm3 and 70 elements/mm3 was present in 4.65% girls vs. 1.74% and 5.81% girls vs. 0% boys, respectively. Haematuria was observed in 2.32% girls vs 0.58%. The majority had a urinary pH of 5. .

CONCLUSIONS

The chemical test strips in school health are useful. They detect some urinary abnormality for more laboratories exploration to investigate a probable urinary infection and/or and urinary abnormality.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1668

COMPARISON OF ENZYMATIC AND COMPENSATED JAFFE METHODS FOR GFR ESTIMATION IN PEDIATRIC PATIENTS

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BACKGROUND-AIM

Current clinical guidelines recommend enzymatic creatinine (eCr) analysis in children. Creatinine analysis by Jaffe method (jCr) may overestimate results due to non-creatinine chromogens, especially in the pediatric population due to low creatinine concentrations and higher pseudochromogen levels. Therefore, a compensation factor is applied in Jaffe-based assays.

METHODS

Routine clinical samples from patients <18 years with creatinine measurement were analyzed on the c503 platform (Roche Diagnostics) using both the enzymatic and compensated Jaffe method (compensation factor: -0.3 mg/dL) over 4 weeks. The eGFR was calculated using the EKFC and FAS formula (patients aged 2–17 years). Spearman correlation and Bland-Altman analysis were used for data comparison. To evaluate the clinical impact, KDIGO CKD stages were assigned based on $eGFR_{EKFC/FAS}$ using both analytical methods.

RESULTS

A total of 355 samples (181 males, 174 females) were analyzed by both the Jaffe and enzymatic method, $eGFR_{EKFC/FAS}$ calculations were performed in 207 samples. Median concentrations were 0.35 mg/dL (jCr) and 0.30 mg/dL (eCr). A strong correlation was observed between both methods (r = 0.98), and for eGFR calculations derived by EKFC (r = 0.98) and FAS (r = 0.89) formulas. Bland-Altman analysis showed a mean bias of -0.034 mg/dL [95% CI: -0.038, -0.030] for eCr compared to jCr. Mean biases of $eGFR_{EKFC}$ and $eGFR_{FAS}$ were 5.0 mL/min/1.73m² [95% CI: 4.2, 5.7] and 9.1 mL/min/1.73m² [95% CI: 7.8, 10.4], reflecting a slight underestimation in eGFR values based on jCr. CKD stage reclassification rates based on $eGFR_{EKFC}$ and $eGFR_{FAS}$ were 9.7% and 12.6%, respectively. Reclassifications were limited to G1-G2 transitions, with 89% ($eGFR_{EKFC}$) and 95% ($eGFR_{FAS}$) from G2 (jCr) to G1 (eCr). Reclassification rates for patients classified as G1 based on jCr ranged from 0.6% to 1.9%.

CONCLUSIONS

In this pediatric cohort, the compensated Jaffe method showed only minimal overestimation of creatinine values, with limited clinical impact on eGFR calculations in patients with normal kidney function (>90 mL/min/1.73m²). In patients with reduced eGFR by Jaffe analysis, reflex enzymatic analysis could be considered to reduce misclassification.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1669

SUPAR AS A PROGNOSTIC BIOMARKER IN DIABETIC NEPHROPATHY: INSIGHTS INTO RISK STRATIFICATION AND DISEASE PROGRESSION

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BACKGROUND-AIM

Diabetic nephropathy (DN) is one of the major complications of type 2 diabetes mellitus (DM2) and represents a leading cause of chronic kidney disease (CKD). Early detection and risk stratification are essential for preventing DN progression, however, albuminuria and estimated glomerular filtration rate (eGFR), have limitations in detecting subclinical kidney damage. Soluble urokinase plasminogen activator receptor (suPAR) has emerged as a promising biomarker for DN progression. suPAR acts by interacting with integrins, located This study investigated the role of suPAR as a prognostic biomarker in DN and its utility to stratify low-risk KDIGO patients.

METHODS

A total of 235 T2DM patients were recruited, blood and urine samples were collected to measure plasma suPAR levels, eGFR, and the urinary albumin-to-creatinine ratio (UACR). Patients were categorized into KDIGO risk classes at baseline (T0). After a median time of 6 months (T1), 105 patients returned for a second blood collection (T1) to assess renal function decline, defined as an eGFR reduction ≥10% or an increase in UACR ≥10%.

RESULTS

At T0, suPAR levels were inversely correlated with eGFR ($\rho = -0.45$, $p < 0.001$), indicating higher suPAR levels in patients with impaired renal function. No significant correlation was found between suPAR and UACR. Analysis of KDIGO risk categories revealed a progressive increase in suPAR levels from low to high KDIGO risk CATEGORY. At T1, 31% of patients experienced a significant decline in renal function. By ROC curve analysis (AUC=0.6098) a cut-off of suPAR levels at T0 was established to predict eGFR reduction ≥10% (7.81 ng/mL). Patients with suPAR levels at T0 ≥7.81 ng/mL had significantly higher risk to experience eGFR worsening compared to those with lower suPAR levels (OR 4.18, $p = 0.028$).

CONCLUSIONS

suPAR is a valuable biomarker for predicting DN progression, strongly associated with eGFR decline and KDIGO risk. Its integration into KDIGO could enhance early risk stratification and guide interventions. Further studies are needed to validate these findings and support suPAR's clinical implementation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1670

PHARMACOGENETICS OF CYP3A5*1 INFLUENCES TACROLIMUS PHARMACOKINETICS AND RENAL FUNCTION IN KIDNEY TRANSPLANT RECIPIENTS: TOWARD PERSONALIZED IMMUNOSUPPRESSION STRATEGIES

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BACKGROUND-AIM

Interindividual variability in tacrolimus pharmacokinetics challenges optimal immunosuppression in renal transplant recipients. Genetic polymorphisms in the cytochrome P450 3A (mainly CYP3A5) gene, are directly implicated in tacrolimus metabolism. Carriers of the CYP3A5*1 allele (*1/*1; *1/*3) have increased drug clearance, requiring higher tacrolimus doses to achieve and maintain therapeutic concentrations. We aimed to investigate the association between CYP3A5*1and CYP3A4*22 allele carriage, tacrolimus pharmacokinetics and long-term renal function in real-life monitoring of renal transplant recipients.

METHODS

This observational, ongoing study was conducted on 60 renal transplant recipients. Polymorphisms of CYP3A5 and CYP3A4 genes were identified using real-time PCR. Laboratory measures included tacrolimus dose, whole blood tacrolimus concentration (C0), glomerular filtration rate (GFR) and serum creatinine. Tacrolimus was measured by tandem mass spectrometry (MS/MS). Donor-derived cell-free DNA (dd-cfDNA) was quantified by Next Generation Sequencing. Statistical analyses were performed in SPSS using the Mann-Whitney test.

RESULTS

Comparing carriers of the CYP3A5*1 allele with non-carriers, a significant increase in the administered dose of tacrolimus and a significant decrease in the concentration-dose ratio (C0/D) at all follow-up points: 15 days (N=61), 2 months (N=59), 3 months (N=58), and 6 months (N=40) post-transplant, was observed. Carriers of the CYP3A5*1 allele exhibited a more pronounced decline in renal function reflected by a significantly lower GFR ($p<0.05$) and a higher serum creatinine ($p<0.05$) first observed at month 2 and persisting through months 3 and 6. Based on our current data, we have found no evidence of an increased incidence of graft rejection or infections in CYP3A5 expressers.

CONCLUSIONS

Carriage of the CYP3A5*1 allele significantly influences tacrolimus pharmacokinetics and renal function outcomes in kidney transplant recipients. Carriers required higher tacrolimus doses to achieve target concentrations and exhibited consistently lower dose-normalized concentrations C0/D) throughout follow-up. Despite adequate dose adjustments, CYP3A5*1 carriers experienced a more pronounced impairment of the renal function.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1671

CIRC DENND4C INHIBITS PYROPTOSIS AND ALLEVIATES ISCHEMIA-REPERFUSION ACUTE KIDNEY INJURY BY EXOSOMES SECRETED FROM HUMAN URINE-DERIVED STEM CELLS

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BACKGROUND-AIM

Acute kidney injury (AKI) is a disease characterised by acute onset, high mortality, and poor prognosis, and is mainly caused by ischemia-reperfusion (I/R). Human urine-derived stem cells (USCs) exhibit antioxidant, antiinffammatory,and anti-apoptotic cytoprotective effects. Previously, we found that exosomes from USCs had the ability to inhibit apoptosis and protect kidneys from I/R injury. This study aimed to investigate the role of USC-derived exosomes (USC-Exos) in reducing pyroptosis and alleviating I/R-AKI.

METHODS

Models of HK-2 cells hypoxiareoxygenation(H/R) and I/R kidney injury was established in Sprague Dawley rats to simulate AKI in vitro and in vivo. USC-Exos were isolated using ultracentrifugation and identiffed via electron microscopy and western blotting. USC-Exos were co-cultured with HK-2 cells and injected into rats via the tail vein. The expression of pyroptosis-related molecules was veriffed using PCR and western blotting. Changes in renal function were reffected in the serum creatinine, urea, and cystatin C levels. Differentially expressed circRNAs in I/R rat kidneys were screened by transcriptome sequencing.

RESULTS

Ischemia-reperfusion resulted in signiffcantly impaired renal function and expression of pyroptosis molecules, and signiffcantly increased concentrations of inffammatory factors. These effects were reversed by injecting USCExos.Circ DENND4C was the most signiffcantly decreased circRNA in I/R rat renal tissue, and knock-down of circ DENND4C can aggravate AKI in vivo and in vitro.DAVIDwebsite showed that miR 138-5p/FOXO3a is a potential downstream target of circ DENND4C. Knock-down of circ DENND4C in HK-2 cells resulted in increased expression of miR 138-5p and increased miR 138-5p can reverse the regulation of FOXO3a. Dual-luciferase assay veriffed the reverse interaction between circ DENND4C, miR 138-5p, and FOXO3a.

CONCLUSIONS

Exosomes promote cell proliferation and inhibit the activation of NLR family pyrin domain containing 3 through the circ DENND4C/miR 138-5p/FOXO3a pathway, thereby reducing pyroptosis and AKI. Circ DENND4C may be a potential therapeutic target for AKI.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1672

NEPHROTIC SYNDROME WITH UNUSUAL HYPERCHOLESTEROLEMIA: A CASE REPORT

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BACKGROUND-AIM

Nephrotic syndrome occurs when urinary protein excretion exceeds 3.5 g/day, resulting from increased permeability of the glomerular membrane. The massive loss of serum proteins, primarily albumin, can potentially cause edema. Additionally, increased lipid synthesis results in hyperlipidemia and lipiduria. Nephrotic syndrome can be caused by various diseases, including glomerulonephritis, diabetic nephropathy, and autoimmune disorders. Treatment depends on the underlying cause and typically involves measures to control symptoms.

METHODS

We consider that the study and report of this case are particularly interesting due to the exceptionally high cholesterol levels detected in a routine analysis of this patient, a 29-year-old female patient with Raynaud syndrome.

RESULTS

Routine analysis: total cholesterol = 23.4 mmol/L and triglycerides = 3.2 mmol/L. Extended lipid profiling revealed markedly elevated levels of LDL cholesterol (LDL = 19.7 mmol/L), apolipoprotein B (Apo B = 10.72 µmol/L), and lipoprotein(a) [Lp(a)] (Lp(a) = 312.7 mg/dL). The determinations of both samples were repeated by different analytical equipment. Renal biopsy confirmed nephrotic syndrome secondary to minimal change disease. Over the subsequent two months, treatment consisting of dietary control, the use of diuretics and high-potency statins resulted in normalization of lipid levels (total cholesterol = 4.61 mmol/L, LDL = 2.46 mmol/L, Apo B = 1.58 µmol/L, Lp(a) = 59 mg/dL), with a marked decrease in Lp(a) levels.

CONCLUSIONS

This clinical case highlights two key points:
Lipoprotein(a) Monitoring: Since Lp(a) levels are primarily genetically determined, most laboratories measure them only once per patient. However, as observed in this case and in others with acute kidney injury, significant transient elevations in Lp(a) can occur. This highlights the importance of serial Lp(a) measurements until kidney function normalizes.
Cholesterol Levels in This Case: The patient had cholesterol levels higher than typically seen in nephrotic syndrome, suggesting an additional underlying condition. However, her lipid levels were successfully regulated with statins, without the need for advanced treatments like PCSK9 inhibitors.
The patient will remain under follow-up to monitor her clinical evolution.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1673

ANALYTICAL PERFORMANCE FOR TRUENESS OF LABSAN TRION URINE DIPSTICK PARAMETERS ACCORDING TO EFLM EUROPEAN URINALYSIS GUIDELINE 2023

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BACKGROUND-AIM

Urinalysis is a common testing in clinical laboratories that provides significant information for various medical conditions involving the kidneys, such as diabetes mellitus, hypertension, or urinary tract infections. Urine test strip analysis serves as an initial and efficient screening method for reflex testing with accurate quantitative methods. Our aim in this study was to find out the trueness of Labsan Trion urine dipstick according to EFLM European Urinalysis Guideline 2023.

METHODS

76 (56 positive and 20 negative for urine glucose), 1657 (405 positive and 1252 negative for urine protein) and 2296 (668 positive and 1628 negative for urine microalbumin) random freshly voided urine samples were analyzed simultaneously with urine dipstick and Roche Cobas C702 Chemistry Analyzer.

RESULTS

Optimal trueness of measurements is suggested to be a fraction of false positive (FP) rate (FPD) <10% at limit of detection (LoD) (LoD values were 3 mmol/L, 0.1 g/L and 0.2 g/L for glucose, microalbumin and protein, respectively) and a fraction of false negative FN (FNC) <5% at limit of confirmation (LoC) (LoC values were 15 mmol/L, 0.5 g/L and 1 g/L for glucose, microalbumin and protein, respectively), when compared with an applicable quantitative procedure. Calculated FPD and FNC values of Trion urine strip were 9.5%, 8.3% and 1.3% (FPD values); 0%, 0.9% and 2.1% (FNC values) for glucose, microalbumin and protein, respectively.

CONCLUSIONS

According to EFLM European Urinalysis Guideline 2023, Labsan Trion urine dipstick glucose and protein parameters demonstrated satisfactory performance compared to quantitative comparison procedures in chemistry analyzer.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1674

IGA VASCULITIS IN AN ADULT WITH HEMATURIA, PROTEINURIA AND LIPIDURIA.

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BACKGROUND-AIM

IgA vasculitis (IgAV) (also known as Henoch-Schölein purpura) is an immune-mediated small vessel vasculitis. IgAV in adults is rarer and is associated with a worse prognosis than in children. These patients usually present palpable purpura with multiorgan involvement. Renal impairment may manifest only as microhematuria and proteinuria, although some patients develop nephrotic syndrome.

METHODS

A 65-year-old woman went to hospital for lower back pain. She was diagnosed with vasculitis three weeks ago. Her personal health history included celiac disease, trigeminal neuralgia, dyslipidemia and hypertension. A clinical examination revealed small palpable purpura in the lower limbs and lower legs edema and diffuse abdominal pain.

RESULTS

Laboratory tests showed normal kidney function, serum protein (5.2 g/dL), albumin (2.8 g/dL), cholesterol (392 mg/dL) and triglycerides (255 mg/dL). Urine analysis showed proteinuria (3+) and hematuria (3+). The urine sediment examination showed dysmorphic hematuria (acanthocytes >5%), hyaline casts, granular casts, fatty casts, oval fat bodies and fatty droplets. The urine protein level was 15.30 g/L. She presented serum IgA of 237 mg/dL with normal serum complement levels. Negative for the rest of antibodies tested.
With the suspicion of rapidly progressive glomerulonephritis, she was admitted for skin and renal biopsy. Skin biopsy revealed leukocytoclastic vasculitis with perivascular granular deposits of IgA in direct immunofluorescence. Renal biopsy showed mild endocapillary hypercellularity and deposition of IgA mainly pericapillar and barely mesangial. Crescents were not observed.
Acccording to this findings, she was diagnosed with IgAV with nephritis and nephrotic syndrome. Treatment with intravenous methylprednisolone) was initially administrated.

CONCLUSIONS

IgAV in adults can rapidly worsen, leading to progressive glomerulonephritis manifested by fast deterioration of renal function. Therefore, the role of the clinical laboratory is crucial for prompt diagnosis, starting timely treatment as soon as possible and preventing the progression of the disease. In this case report, although creatinine levels were normal, the finding of dysmorphic hematuria with acanthocytes, proteinuria and lipiduria was important for its early diagnostic orientation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1675

HUMAN UROMODULIN: UNIQUE SERUM BIOMARKER FOR EVALUATION OF KIDNEY DAMAGE

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BACKGROUND-AIM

Recent studies have suggested human Uromodulin as a valuable marker for the evaluation of level of kidney damage. Determination of Uromodulin alongside Cystatin C and estimated glomerular filtration rate (CKD-EPI) improves differential diagnostics through monitoring kidney function and diagnosing nephropathy, such as diabetic nephropathy, pyelonephritis, chronic renal failure or interstitial nephropathy. Currently, detection of Uromodulin can be performed using ELISA kits intended for research use only. New IVD CLIA Uromodulin kit is intended to be an invaluable support in clinical routine. Convincing clinical performance studies are presented herein.

METHODS

TestLine CLIA Uromodulin (CL-UMOD050) kit for KleeYa® automated analyzer platform was used. The immunoassay relies on capturing the analyte with specific antibodies coated on magnetic particles and quantification of the captured analyte using acridinium ester antibody conjugate. Serum samples from healthy donors of blood (n = 127) and patients indicated for chronic kidney disease (CKD-EPI <1 ml/s/1,73m2, increased albuminuremia, proteinuremia and cystatin C, n = 133) were collected for the preliminary clinical trial.

RESULTS

The reference range of Uromodulin in apparently healthy individuals was 109.9 to 482.0 ng/ml on 95% confidence interval (265.1 ng/ml in average). Patients indicated for kidney damage ranged from 14.4 to 172.0 ng/ml (95% CI) depending on the stage of renal dysfunction. Based on the determined cut-off 168.15 ng/ml, sensitivity 93.98 % and specificity 83.46 % was evaluated. Proportional relation between CKD-EPI, Cystatin C and Uromodulin was observed.

CONCLUSIONS

Serum determination of human Uromodulin protein shows great potential as a critical test for comprehensive evaluation of kidney damage. It allows prediction and early identification of kidney function loss and early diagnosis of chronic kidney disease before clinical symptoms appear.

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Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1676

CORRELATION OF CONVENTIONAL SPERM ANALYSIS RESULTS WITH SPERM DNA FRAGMENTATION

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BACKGROUND-AIM

Men play a role in 40-50% of infertility cases in Indonesia. Sperm analysis is one of the tests recommended by WHO to identify infertility. To help establish the diagnosis, it is also important to examine sperm DNA fragmentation. The purpose of this study was to determine the correlation between the results of conventional sperm analysis and the results of sperm DNA fragmentation.

METHODS

This study used a correlational research design with a cross-sectional method. The study subjects were 79 patients who performed conventional sperm analysis along with sperm DNA fragmentation. This study used secondary data taken from the results of patients at the Prodia National Reference Laboratory (PNRL) in December 2022 – January 2023.

RESULTS

The results of normal sperm analysis had good sperm DNA fragmentation results of 73.07%, moderate 23.08% and bad 3.85 %. The results of abnormal sperm analysis had good sperm DNA fragmentation results of 62.26%, moderate at 26.42% and bad at 11.32%. The results of the Rank-Spearman statistical test showed a p-value of 0.282.

CONCLUSIONS

This means that there is no relationship between the results of conventional sperm analysis and the results of sperm DNA fragmentation. Conventional sperm analysis has high variability, so it needs to be enforced by examining sperm DNA fragmentation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1677

BIOCHEMICAL ALTERATIONS IN DIALYSIS PATIENTS: INSIGHTS INTO CKD-RELATED COMPLICATIONS AND MANAGEMENT STRATEGIES

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BACKGROUND-AIM

Mineral and metabolic imbalances are common in dialysis patients, often resulting in adverse clinical outcomes. Biomarkers such as parathyroid hormone (PTH), ferritin, calcium (Ca), phosphorus (P), iron, and C-reactive protein (CRP) provide valuable insights into these imbalances and their interactions with inflammation. This study aimed to explore the correlations among these key biomarkers, emphasizing their interactions and clinical significance, particularly in the context of inflammation.

METHODS

This cohort study included data from 113 dialysis patients (63 male and 50 female) to analyze key biomarkers: PTH, ferritin, Ca, P, and CRP. Spearman's rank correlation was used to assess the relationships between these biomarkers, with statistical significance set at a p-value of < 0.05. Descriptive statistics were used to calculate the mean values and variability (standard deviation) of these biomarkers in the study population.

RESULTS

The analysis of hemodialysis patients showed notable variability in key biomarkers. PTH levels (417.07 ± 571.57) exhibited significant variation, while ferritin levels (848.1 ± 642.02) were elevated. Calcium (2.1 ± 0.35) and phosphorus (1.69 ± 0.63) were generally within target ranges, with some variation. CRP levels (11.1 ± 16.08) were markedly elevated, and iron levels (13.37 ± 6.08) showed considerable variability.

CONCLUSIONS

In conclusion, this study highlights the clinical challenges in managing hemodialysis patients, focusing on metabolic imbalances and inflammation. Elevated and variable PTH levels point to persistent secondary hyperparathyroidism, requiring improved strategies for mineral metabolism management. Although Ca and P levels were generally controlled, outliers suggest risks of vascular calcification or bone disorders, necessitating individualized treatment. Despite iron levels being optimal, high ferritin and CRP levels indicate significant inflammatory activity, calling for closer monitoring and targeted interventions due to their association with poor cardiovascular and overall outcomes. These findings underline the importance of a multidisciplinary approach to optimize the management of anemia, inflammation, and mineral metabolism.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1678

A POSSIBLE SIGNATURE OF INFLAMMATORY BIOMARKERS TO PREDICT KIDNEY DECLINE IN LONG COVID: THE EXPERIENCE OF VANVITELLI COHORT

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BACKGROUND-AIM

Long Covid (LC) is an inflammatory disease, associated with damage to multiple organs, including the kidney. Several studies tried to determine a signature of inflammatory biomarkers related to LC. Due to the multitude of symptoms and organs involved in LC, these results are non-homogenous, rendering very hard the possibility to determine a panel of markers to define LC. We focused our attention on kidney dysfunction, with the aim of defining a putative relation between some inflammatory biomarkers and decline in kidney function in LC patients.

METHODS

To this aim, a single-center observational study was carried out at COVID Centers of the University of Campania "L. Vanvitelli". Patients admitted from December 2020 to May 2021, and surviving the acute and post-acute phases were offered an outpatient follow-up visit at least 12 months after discharge. Patients were stratified into 3 categories, by evaluating the estimated Glomerular Filtration Rate (eGFR). Multiplex ELLA platform was applied to quantify the LC-associated biomarkers Interleukin-6 (IL-6), IL-17, IL-10, IL-1ß, Pentraxin-3 (PTX3), Tumor- Necrosis-Factor- a (TNF-a), Vascular Cell Adhesion Molecule 1 (VCAM-1), Intra Cellular Adhesion Molecule 1(ICAM-1) and E-Selectin in serum samples. Quantified biomarkers were analyzed for their putative association with eGFR in LC.

RESULTS

We found that the panel of biomarkers composed of IL-6, IL-17 and IL-10 was independently associated with kidney decline in LC. In addition, in our cohort, IL-6 increased together with the decrease of eGFR (i.e. with the kidney decline). IL-17 and IL-10 were significantly increased only in the 3rd eGFR category, (i.e. stages 3, 4, and 5 of CKD). Together with IL-17 and IL-10, also VCAM1 increased in the 3rd group of eGFR. These data suggest that IL-17, IL-10, and VCAM1 could be associated with advanced kidney dysfunction and, for this reason, could represent a signature for a worse prognosis for kidney dysfunction in LC.

CONCLUSIONS

In conclusion, these data highlight an increase in serum of the biochemical panel composed of IL-6 – IL-17 – IL-10 and VCAM1, rendering it a possible signature for evaluating kidney dysfunction in LC. ELLA is well considered fit for supporting inflammatory biomarker studies.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1679

DECOY CELLS IN EARLY DIAGNOSIS AND MANAGEMENT OF BK VIRUS NEPHROPATHY

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BACKGROUND-AIM

Decoy cells are epithelial cells from the urinary tract infected by latent viruses, such as BK virus (BKV), cytomegalovirus or adenovirus. These cells are primarily observed in kidney transplant patients undergoing immunosuppressive therapy, which triggers viral reactivation. BKV-associated nephropathy (BKVN) is a significant concern, potentially leading to graft dysfunction and rejection.
Identification of decoy cells in urine is based on their distinctive morphological features, including comet-like shape, increased nucleus-to-cytoplasm ratio and chromatin condensation along the nuclear membrane. Their early detection in urine cytology could play a pivotal role in the diagnosis and management of BKV reactivation and BKVN. Despite its potential clinical relevance, this approach is rarely implemented in routine laboratory practice. Therefore, we aimed to evaluate the utility of decoy cells as an early screening method for BKV reactivation and BKVN.

METHODS

We retrospectively analysed data from 26 kidney transplant recipients with confirmed BKV viremia over the past two years. For each patient, all the available data from renal biopsies, BKV viremia and urinary sediments were reviewed. The presence and quantity of decoy cells were evaluated across 15 images per sample obtained with sediMAX conTRUST PRO (Menarini Diagnostics). The timing of decoy cell detection was then compared with the onset of BKV viremia and BKVN diagnosis.

RESULTS

Decoy cells were detectable prior the onset of BKV viremia in 69% of cases (18/26) and in 92% of patients with biopsy-confirmed BKVN patients (11/12). In half of them (6/12) decoy cell detection preceded viremia by more than one month, offering a valuable window for early therapeutic intervention, particularly in patients undergoing infrequent viremia testing.

CONCLUSIONS

Urinary decoy cell detection is a sensitive and cost-effective screening strategy for early identification of BKV reactivation and potential BKVN in kidney transplant recipients. Its routine use as a complement to viremia monitoring could facilitate earlier interventions, reducing the risk of graft dysfunction. Based on our findings, a new protocol has been implemented at our institution, automatically requesting a viremia test if decoy cells are detected, enhancing diagnostic anticipation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1680

COMPARISON OF CREATININE AND CYSTATIN C DERIVED EGFR IN ICU PATIENTS

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BACKGROUND-AIM

Estimation of glomerular filtration rate (eGFR) is essential for appropriate drug dosing, diagnosis, and classification of chronic kidney disease (CKD), as well as other clinical decisions. Traditionally, eGFR is derived from serum creatinine, a widely available and commonly used method. However, creatinine is influenced by factors such as muscle mass, age, and gender, which can lead to inaccuracies. An alternative biomarker, serum cystatin C, is not affected by these factors. Its use is supported by new KDIGO guidelines (2024) recommending combined equations for more accurate eGFR calculation. However, combined equations may not be optimal when significant differences exist between estimates, as bias in one parameter may distort the result.
This study aimed to compare eGFR derived from creatinine and cystatin C in intensive care unit (ICU) patients hospitalized in University Hospital Pilsen.

METHODS

In August and September 2024, 3047 samples were collected from 1194 patients across ICU departments. Measurements were performed on Roche analysers (c701). The mean age was 63 years (SD 16.97), with 63% male and 37% female.

RESULTS

An increasing discrepancy in eGFR values derived from serum creatinine and serum cystatin C was observed across the following ICU departments, with median differences (ml/s/1.73 m^2) as follows: Outpatient Emergency (0.03), Orthopedics (0.06), Cardiosurgery (0.09), Cardiology (0.11), Surgery Uncomplicated (0.12), Neurosurgery (0.13), Anestesiology (0.22), Internal Medicine (0.24), Hematooncology (0.35), and Surgery Complicated (0.45). Statistically significant differences ($p < 0.05$, Kruskal–Wallis with Conover post hoc) were detected among four groups: A (Outpatient Emergency, Orthopedics), B (Cardiosurgery, Cardiology, Surgery Uncomplicated, Neurosurgery), C (Anestesiology, Internal Medicine), and D (Hematooncology, Surgery Complicated).

CONCLUSIONS

We hypothesize that prolonged ICU stay leading to muscle wasting contributes to the overestimation of renal function by creatinine-based eGFR, suggesting that cystatin C may be more appropriate for eGFR assessment in these patients.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1681

LIPID PROFILE ANOMALIES IN PATIENTS WITH NEPHROTIC SYNDROME AND THEIR IMPACT ON SERUM PROTEIN CAPILLARY ELECTROPHORESIS

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BACKGROUND-AIM

Nephrotic syndrome (NS) is a renal disorder characterized by excessive urinary protein loss, disrupting blood protein distribution, including lipoproteins. This imbalance may cause analytical interferences, particularly in serum protein capillary electrophoresis, commonly used in NS evaluation. This study aims to assess the prevalence of lipid anomalies, the occurrence of albumin zone electrophoretic alterations, and the factors contributing to these anomalies in NS patients.

METHODS

A retrospective study was conducted over four years (January 2021–December 2024) in the Biochemistry Department of Sahloul University Hospital, Sousse, Tunisia. Data were collected from serum protein electrophoresis (SPE) profiles indicative of NS, biologically confirmed by established criteria. Lipid profile parameters were retrieved from the laboratory's information system. An anodic albumin zone alteration (AAZA) was defined as any distortion in the anodic region of the albumin fraction during electrophoretic analysis. Statistical analyses were performed using SPSS® version 21.

RESULTS

Among 153 patients with SPE profiles suggestive of NS, 98 cases were biologically confirmed. Patients' ages ranged from 1 to 87 years, with a median age of 37.5 years and a sex ratio of 0.96. Most patients were referred from nephrology (64.3%) and pediatrics (21.4%).
Lipid abnormalities included mixed dyslipoproteinemia (50.5%), isolated hypercholesterolemia (17.3%), and isolated hypertriglyceridemia (15.1%). Decreased HDL was observed in 17.4% of cases, while elevated LDL was detected in 44.6%.
AAZA was identified in 43.9% of cases, categorized as mild (14.3%), moderate (16.3%), or pronounced splitting (13.3%). AAZA showed significant associations with severe hypoalbuminemia (<20 g/L) (OR = 3.105 [1.349-7.142], p = 0.008), mixed dyslipoproteinemia (OR = 2.6 [1.11-6.07], p = 0.036), and hyper-LDLemia (OR = 7.8 [3.1-20], p < 0.001). No significant associations were found with decreased HDL, isolated hypercholesterolemia, or isolated hypertriglyceridemia.

CONCLUSIONS

Mixed dyslipoproteinemia, prevalent in NS patients, is significantly associated with marked albumin zone alterations, potentially progressing to bisalbuminemia. These findings should guide electrophoretic profile interpretation in NS evaluation.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1682

ESTIMATION OF DIETARY INTAKE IN PATIENTS WITH UROLITHIASIS

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BACKGROUND-AIM

Urinary lithogenesis is linked to several factor. Dietary intake and nutritional status is therefore an important part of the etiological investigation and the follow up of patients. The aim of this study was to estimate dietary intakes of salt, protein and water in patients with urolithiasis based on biochemical formulas.

METHODS

This was a retrospective study, conducted at the clinical chemistry laboratory, over a period of 13 months, focusing on patients with a first episode of lithiasis or a recurrence. We collected values for urinary sodium, urinary urea, urinary density and diuresis for 24 hours. Salt intake was estimated using the formula: urinary sodium (mmol/day) / 17 = g salt/day. The target intake is < 6 g/day. Protein intake was estimated using the formula: urea in mmol/day x 0.21 = protein g/day. The target intake is < 1 g/Kg/day (< 70 g/day). Water intake is considered insufficient if the urine specific gravity on a morning sample is > 1012 and a 24-hour diuresis < 1500 mL.

RESULTS

Data from fifty-nine patients were collected. Sex ratio was 1.7. The median age was 50 years (1 – 81). Among a total of 52 patients with urinary ionogram analyses, 39 patients (75%) had excessive salt intake with a mean of 9,35 ± 3,97 g/day. Among 47 patients with urinary urea measurement, 19 patients (40.43%) had excessive protein intake with a mean of 87,94 ± 13,53 g/day and 17 patients (36.17%) had inadequate fluid intake.

CONCLUSIONS

Excessive salt intake was common in patients with urolithiasis. The first-line assessment, which is easy to carry out, makes it possible to identify lithogenic risk factors in many cases, which may lead to the introduction of dietary readjustment measures to prevent recurrences.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1683

NSUN6 OVEREXPRESSION IS ASSOCIATED WITH MALIGNANT BIOLOGICAL BEHAVIOUR AND POOR PROGNOSIS IN CLEAR CELL RENAL CELL CARCINOMA

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BACKGROUND-AIM

As the most common pathological subtype of renal cancer, clear cell renal cell carcinoma (ccRCC) lacks early clinical diagnostic markers, and advanced ccRCC has a poor prognosis and is prone to metastasis and recurrence. NSUN6, as a key component of m5C methyl-modifying enzymes, is abnormally expressed in several tumours and correlates with the prognosis. However, the level of expression of NSUN6 in ccRCC as well as its regulatory mechanism are unknown.

METHODS

RNA-seq expression and survival data of ccRCC tissues and para-cancerous tissues were obtained and analysed from the TCGA database. RT-qPCR and Western blot techniques were used to detect NSUN6 expression in tumour cells and clinical tumour tissues. In vitro migration and invasion assays were used to assess the effect of NSUN6 on the malignant function of ccRCC cells. ssGSEA, ESTIMATE, CIBERDORT, and TIMER databases were used to study the immune cell infiltration of NSUN6 in ccRCC. TIDE database, IPS scores, and GDSC database were used to assess the different NSUN6-expressing groups' drug therapeutic effects.

RESULTS

Bioinformatics and clinical experiments demonstrated that the mRNA and protein expression of NSUN6 was significantly higher in ccRCC than in normal tissues. NSUN6 was an independent prognostic factor for ccRCC patients, and its high expression was significantly correlated with overall survival and disease-specific survival. In vitro experiments showed that NSUN6 promotes migration and invasion of ccRCC cells. NSUN6 was associated with immune infiltration of ccRCC and might affect the efficacy of immune and targeted therapies in patients.

CONCLUSIONS

High levels of NSUN6 were associated with poor prognosis in ccRCC and might promote tumour cell invasion and migration. In addition, NSUN6 played an important role in influencing the efficacy of tumour therapy. NSUN6 might further serve as a potential prognostic biomarker and therapeutic target.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1684

URINE SEDIMENT CRYSTALS ANALYSES, RESULTS FROM 11000 URINE SAMPLES MADE WITH LABUMAT 2 & URISED 3 PRO PERFORMED IN 2023, 2024 YEAR

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BACKGROUND-AIM

Fully automated urine analyzers play an important role in routine urinalysis in most laboratories. We recently acquired in our laboratory the LabUMat 2 & Urised 3 Pro has a new automated urine sediment analyzer with a digital image that greatly facilitated and accelerated our work. In this paper we present findings of crystals in urine made in more than 11,000 subjects.

METHODS

The study was performed using 11 000 urine samples collected into the clean tubes without preservatives, which have been obtained from the patients applied to Hospital for routine visit. Samples were analyzed every day in small batches for one year period beginning from May 2023 to May 2024 year. The urine sample were analyzed in an hour at the latest.

RESULTS

Of the 11000 urines analyzed 10618 samples were free of crystals and 382 urines were with crystals and were included in the analysis. 272 (71%) samples have calcium oxalate dihydrate crystals, followed by calcium oxalate monohydrate 69 (18%) samples, followed by 22 (6%) triple phosphate crystals and 19 (5%) uric acid crystals. The majority of calcium oxalate dihydrate crystals were detected in females 152 (56%) versus males 120 (44%). Calcium oxalate monohydrate crystals have 33 (48%) males and 36 (52%) females. Triple phosphate crystals have10 (45%) females and 12 (55%) males, and uric acid crustal have 4 (21%) females' ant 15 (79%) males.

CONCLUSIONS

The most abundant crystals in the urine in our study were found to be calcium oxalate dihydrate crystals, followed by calcium oxalate monohydrate crystals, followed by tripel phosphate and uric acid. Knowledge of the mechanisms of crystal and stone formation is necessary in order to provide appropriate individualized treatment to each patient and to prevent their recurrence.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1685

CAN 24-HOUR URINE BE SUBSTITUTED FOR ISOLATED URINE FOR THE CLASSIFICATION OF CHRONIC KIDNEY DISEASE?

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BACKGROUND-AIM

It is well known that 24-hour urine collection is a tedious process for patients, and it presents numerous pre-analytical challenges. Several attempts are made to minimize the need for these analyses. The presence of high protein concentrations in urine along with glomerular filtration rate, form the basis for the current diagnosis and classification of chronic kidney diseases (CKD) stages.
The objective of this study is to evaluate the predictive capacity of protein excretion from spot urine samples versus 24-hour urine samples, as well as to assess reclassification according to the KDIGO categories for CKD.

METHODS

A total of 327 samples were analyzed including simultaneous 24-hour urine and spot urine samples. Protein and creatinine concentrations were measured in duplicate for all samples. Using the Abbott Alinity c analyzer. Data processing was conducted using Medcalc software.

RESULTS

After excluding aberrant results, the Bland-Altman graphical method was applied to evaluate the proteinuria/creatinuria ratio in 24-hour urine versus the same ratio in isolated urine to minimize the effects of the degree of hydration. We obtained a mean difference of -0.0184 with a confidence interval of 95% = -0.0428 to 0.0059).
Subsequently, a linear regression by Passing-Bablock was performed taking the results of the 24-hour sample as the independent variable. A slope of 0.9953 (CI 95% = 0.9883 to 1.00), an intercept of 0.0029 (CI 95% = 0.00 to 0.0104) and a correlation coefficient of 0.9915 were obtained.
Additionally, a weighted kappa index was calculated to evaluate for potential reclassification according to the KDIGO categories to assess CKD. These categories were A1 (normal or mild increase) when the ratio is less than 150 mg/g of protein/creatinine, A2 (moderate increase) when it is between 150 and 500, and A3 (severe increase) when it is greater than 500. Resulting in a κ(CI 95%) =0.878 (0.838-0.918).

CONCLUSIONS

In view of the results, it could be considered that isolated urine is a good predictor of daily protein excretion since, according to the results of both statistical methods, they are interchangeable results. Furthermore, the kappa index shows a very strong degree of agreement between the methods.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1686

WINTER-SPRING COMPARATIVE STUDY OF TACROLIMUS LEVELS

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BACKGROUND-AIM

Tacrolimus(TAC), a calcineurin inhibitor, is a first-line immunosuppressive drug for the prevention of graft rejection in kidney and liver transplantation in children and adults. TAC has demonstrated high efficiency and tolerance. Its short therapeutic range, low clearance and the fact that it takes a few days for new levels to stabilise after a change in dosage means that drug therapeutic levels should be determined regularly to ensure that therapeutic efficacy is maintained. Fluctuations in drug concentration are part of the daily routine of both doctor and patient. The variations that TAC may have in response to seasonal changes due to temperature differences have been studied in the past. We will investigate whether there is a difference in TAC levels between winter and spring of the year 2023 in our centre.

METHODS

A total of 2122 TAC level determinations were performed in adults who had undergone kidney or liver transplantation and undergo TAC level determinations at regular basis. 1007 were performed from 1/12/2022-28/2/23(Group-A) and 1115 from 1/3/2023-31/5/2023(Group-B). TAC levels were determined on the alinity-i (Abbott) immunoassay system with chemiluminescence(CMIA). The nonparametric Mann-Whitney U-test was used to compare TAC levels between the two groups. Level of statistical significance was set at $p<0.05$.

RESULTS

In Group-A TAC median value was 6.3(1.9-24.7)ng/ml, while in Group-B it was 6.1(1.2-22.6)ng/ml. There was no statistically significant difference in TAC levels between the two groups ($p=0.463$).

CONCLUSIONS

TAC levels variability due to concomitant drugs, comorbidities, ethnicity, environmental factors, CYP3A6 and/or P-glycoprotein genotypes justify closer TAC levels monitoring. TAC levels changes correlate with nephrotoxicity, formation of graft-specific antibodies, development of graft vs host disease and if levels do not stabilize, graft rejection. No statistically significant difference was found between TAC levels between winter and spring 2023, suggesting that patients close monitoring leads to well adjusted TAC levels despite temperature changes.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1687

MULTI-OMICS ANALYSIS IDENTIFYING DIFFERENTIALLY EXPRESSED GENES AND MIRNA INTERACTIONS IN TUBULOINTERSTITIAL DIABETIC NEPHROPATHY

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BACKGROUND-AIM

Diabetic Nephropathy (DN) is a significant metabolic disorder associated with severe comorbidities. A multi-omics approach can aid in identifying novel therapeutic targets and biomarkers, particularly by validating microRNA (miRNA) interactions. This study aimed to identify differentially expressed common target genes in various renal tissues and their regulating miRNAs by analyzing publicly available Gene Expression Omnibus (GEO) datasets from patients with DN and healthy control using in silico methods.

METHODS

Differentially expressed genes (DEGs) were identified from four publicly available datasets, including two tubulointerstitial diabetic nephropathy (TDN) datasets and two IgA nephropathy (IgA-N) datasets. Functional enrichment, coexpression, and network analyses were conducted to identify pathways, protein-protein interactions, and miRNA-mRNA interactions among the DEGs.

RESULTS

A total of 95 significant common DEGs were identified from the GEO datasets GSE30122 (TDN), GSE30529 (TDN), GSE35487 (IgA-N), and GSE35488 (IgA-N). Tissue-specific DEGs in TDN and IgA-N were categorized into functional classes to elucidate their molecular roles. Notable transcription factors, including CREM, ERF, FOSL2, HES1, NR4A1, NR4A3, KLF6, SRF, BHLHE40, DDIT3, ZMYM4, NR0B2, and KLF9, were classified as inducers or repressors. Cytokines (CYR61, CCL2, CLCF1) and cytokine receptors (CD83, CD74, CALCR) were prominent, with CCL2 playing a key role in immune responses. Identified enzymes included kinases (PLK3, STK38, CDKN1B) and phosphatases (PPP1R3C, PPP2R1B, PTPRF, PTPRO, DUSP1, DUSP2). miRNA-34a-5p was highlighted for its regulation of over 50 DEGs, including those in the AGE-RAGE signaling pathways implicated in diabetic complications.

CONCLUSIONS

This study identified 95 significant DEGs and key miRNA interactions in tubulointerstitial diabetic nephropathy and IgA nephropathy, revealing molecular pathways, including the AGE-RAGE signaling pathway, that are critical to diabetic complications. These findings provide a foundation for developing targeted therapeutic strategies and biomarkers for diabetic nephropathy.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1688

SPECTROPHOTOMETRIC AND ELECTROCHEMICAL ANALYSIS OF METAL IONS PHOSPHATATE COMPEXES

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BACKGROUND-AIM

Phosphates are defined as a group of compounds composed of phosphorus and oxygen. At varying pH levels, different ions are formed. Inorganic phosphates react with ions, to form complexes (e.g. with calcium, copper). Many of these compounds forming crystals and various structures within living organisms, which cause clinical manifestations requiring intervention (e.g. calcification, stones). The aim of the work was to analyse a variety of phosphate complexes that have potential clinical relevance.

METHODS

For chemical analysis, Atellica Solutions CH 930 analyzer were used. Urine sediment was analysed on an Atellica Clinitek Novus UAS 800. Electrochemical measurements were performed with an AUTOLAB Analyser connected to VA-Stand 663. UV-Vis was measured on UV-3100PC. FTIR spectroscopy (Nicolet iS10 Spectrometer) was assessed by the KBr pellet method. For visualization the OLYMPUS BX53 polarization microscope was used.

RESULTS

The crystallisation process yielded highly defined crystals of the individual molecules (pyrophosphate, Cu-pyrophosphate, Ca-pyrophosphate). Polarization microscopy revealed anisotropic acicular crystals with visible growth lines at their edges. FTIR analysis revealed the pyrophosphate specific absorption to be located within the region of 930-940 cm-1, with a distinct peak at 930 cm-1. Typical DPV voltammograms of copper ions were observed at potentials of 0.15±0.01 V. When phosphate complexes are formed with copper ions, redox signals are observed at peaks with following potentials: peak A:-0.30±0.03 V, peak B:-0.05±0.01 V and peak C:0.11±0.02 V. The methodological procedure was applied to the analysis of real samples of crystals and stones. The analysis of the pyrophosphate stone of a child (phosphate/creatinine ratio 2.31 and 1.65 mmol/mmol) was undertaken. FTIR bands obtained demonstrate clear overlaps between the urine sample and pyrophosphate.

CONCLUSIONS

In order to analyse complexes of phosphate molecules, spectrophotometric and electrochemical methods have been utilised. The interactions of complexes with calcium and copper ions have been investigated.The pivotal function of FTIR spectroscopy in the identification of pyrophosphate urinary stones was confirmed.

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Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1689

UNVEILING THE INOS-DDAH-1-ADMA-NO AXIS: A PROTECTIVE SHIELD AGAINST ISCHEMIC INJURY IN COLD-STORED RAT KIDNEYS FOR TRANSPLANTATION

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BACKGROUND-AIM

Ischemia-reperfusion (IR) injury is a pivotal factor contributing to organ dysfunction and failure in renal transplantation. Disruption of nitric oxide (NO) homeostasis, primarily driven by inducible nitric oxide synthase (iNOS) activation, exacerbates cellular damage and inflammation. Targeting iNOS-mediated dysregulation of the dimethylarginine dimethylaminohydrolase-1 (DDAH-1)- asymmetric dimethylarginine (ADMA) -NO pathway represents a promising strategy for mitigating IR-induced renal injury and improving organ preservation.

METHODS

Adult male rats were subjected to nephrectomy and allocated into three experimental groups: (1) aerobic group, undergoing 18 hours of cold machine perfusion; (2) IR group, exposed to 30 minutes of warm renal ischemia followed by 18 hours of cold machine perfusion; and (3) 1400W group, pretreated with the iNOS-selective inhibitor 1400W (10 mg/kg) prior to undergoing 30 minutes of warm renal ischemia and 18 hours of cold machine perfusion.

RESULTS

Administration of 1400W significantly ameliorated the adverse effects of renal IR injury. Compared to the untreated IR group, 1400W treatment resulted in reduced expression of iNOS, ADMA and DDAH-1. Restoration of NO bioavailability to levels comparable to the aerobic control group was observed, highlighting effective modulation of the DDAH-1-ADMA-NO axis. Additionally, biochemical analysis of tissue revealed improved tissue integrity and reduced inflammation in the 1400W-treated group.

CONCLUSIONS

These results demonstrate that selective inhibition of iNOS by 1400W provides renal protection against ischemia-reperfusion injury. The protective mechanism involves restoration of NO balance through modulation of the DDAH-1-ADMA-NO pathway, highlighting the axis as a crucial target for enhancing organ preservation strategies.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1690

COMPARISON OF MORPHOLOGICAL ANALYSIS OF URINARY SEDIMENT USING AUTOMATED ANALYZERS EH–2090 AND IQ200 WITH MANUAL MICROSCOPY

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BACKGROUND-AIM

To compare the morphological analysis of erythrocytes (RBCs) and leukocytes (WBCs) using a new automated urine sediment analyzers EH–2090 (Mindray = M) and iQ200 (Beckman Coulter = BC) with conventional manual microscopy (MAN).

METHODS

65 urine samples were included in the study (median age of patients: 65.75 years, 95% CI: 57.33–71.33). We analyzed samples for RBCs and WBCs by three methods – M, BC and MAN. Samples were first analyzed on the BC system, then on the M system, followed by MAN of the centrifuged urinary sediment. Microscopic readings were taken by experienced personnel in 10 fields of view. For statistical analysis Medcalc software was used (version 20.216). Bland–Altman plots and Cohen's kappa were used to evaluate agreement between methods. Statistical significance was defined as $p<0.05$. Strength of agreement was evaluated as <0.20 Poor; 0.21–0.40 Fair; 0.41–0.60 Moderate; 0.61–0.80 Good; 0.81–1.00 Very good.

RESULTS

For RBCs, no significant difference was observed between BC and MAN ($p=0.4653$; mean difference -2.6 RBCs/µL, 95% CI -9.8 to -4.5). Significant differences were found between M and MAN ($p=0.0291$; -6.7 RBCs/µL, 95% CI -12.6 to -0.7) and between M and BC ($p=0.0158$; -4.0 RBCs/µL, 95% CI -7.2 to -0.8). Cohen's kappa values were 0.55, 95% CI 0.36 to 0.73 (M vs MAN), 0.58, 95% CI 0.39 to 0.77 (BC vs MAN), and 0.92, 95% CI 0.88 to 0.96 (M vs BC).
For WBCs, significant differences were observed between M and MAN ($p<0.0001$; -29.2 WBCs/µL, 95% CI -38.4 to -20.1), BC and MAN ($p<0.0001$; -22.7 WBCs/µL, 95% CI -30.3 to -15.1), and M and BC ($p=0.0033$; -7.3 WBCs/µL, 95% CI -12.0 to -2.5). Cohen's kappa values were 0.76, 95% CI 0.64 to 0.87 (M vs MAN), 0.76, 95% CI 0.64 to 0.88 (BC vs MAN), and 0.95, 95% CI 0.90 to 0.99 (M vs BC).

CONCLUSIONS

Automated analyzers EH–2090 and iQ200 showed acceptable agreement with MAN, with Cohen's kappa indicating moderate agreement for RBCs and good agreement for WBCs. Statistically significant differences were found between methods for both RBC and WBC counts, particularly for WBCs. These findings underscore the need to interpret automated analyzer data with caution and reaffirm MAN's value, particularly for method verification in clinical laboratories.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1691

CORRELATION BETWEEN URINE ALBUMIN-TO-CREATININE RATIO AND GLUCOSURIA IN PATIENTS TREATED WITH SGLT-2 INHIBITORS

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BACKGROUND-AIM

Diabetes is a group of metabolic diseases which common feature is chronic hyperglycemia. Type 2 diabetes, which occurs in 90-95% of cases, is characterized by insulin resistance of tissues with concomitant impairment of insulin secretion. One of the complications of diabetes is diabetic nephropathy, which is monitored by the urine albumin-creatinine ratio (uACR). Sodium/glucose cotransporter-2 (SGLT-2) inhibitors (flozins) are group of new drugs that are widely used in treating type 2 diabetes, chronic kidney disease and heart failure, that lower blood glucose levels by increasing glucose secretion in the urine.
The study aimed to show whether there are correlations between uACR and glucosuria in patients using SGLT-2 inhibitors.

METHODS

The study group consisted of 126 patients with type 2 diabetes, hospitalized at the University Clinical Center of the Medical University of Warsaw, from July 2024 to December 2024. Patients were treated with empagliflozin (Jardiance), dapagliflozin (Forxiga) or canagliflozin (Invokana). The study material consisted of urine specimens in which glucose (mg/dl), albumin (mg/l) and creatinine concentration (mg/dl) were determined using an automated biochemical analyzer Cobas c701 (Roche), and then uACR (mg/g) was calculated. The study group was divide to 3 groups including (A) 74 individuals who have uACR < 1-30 mg/g, (B) 44 individuals with uACR 31-300 mg/g, (C) 8 individuals with uACR >300 mg/g.

RESULTS

Medians urinary glucose concentrations were comparable in the groups of patients with ACR < 30 mg/g, ACR 30-300 mg/g and ACR > 300 mg/g, 2179 (690 - 8193) mg/dl, 1591 (307 - 6689) mg/dl, 2104 (3.8 - 4318) mg/dl, respectively, $p > 0.05$. There was a slight negative correlation between uACR and glucosuria in patients with uACR 1-300 mg/dl, $r = -0.1817$ at $p = 0.0489$, but no correlation was found for each selected group A, B, C nor whole study group ($p=0.0505$). Administered drug did not affect glucosuria level or uACR value.

CONCLUSIONS

Our study showed that in diabetic patients who did not develop proteinuria due to diabetic nephropathy increase in glucosuria caused by SGLT-2 inhibitors in associated with decrease in uACR, which may suggest that the proper use of flozins may improve renal function.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1692

METABOLIC STUDY FOR NEPHROLITHIASIS RISK: AN INTEGRATED APPROACH BETWEEN CLINICAL PATHOLOGY AND NEPHROLOGY

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BACKGROUND-AIM

Nephrolithiasis, or kidney stones, is a common condition and the metabolic testing for nephrolithiasis risk is essential to assess metabolic risk factors and plan personalized therapeutic strategies. The Clinical Pathology Laboratory, in collaboration with the Nephrology and Dialysis Department, has undertaken a project to optimize the management of patients with nephrolithiasis.

METHODS

Patients were provided with a 24-hour urine collection kit, with detailed instructions. The 24-hour urine sample was collected in two containers, one with hydrochloric acid and one with chlorhexidine, dividing each urination equally. A morning urine sample was also requested, inwhich creatinine, calcium and proteins were measured. Calcium, oxalate, magnesium, citrate, phosphorus, sodium (acidified urine), potassium, chlorine, ammonium, uric acid, creatinine, protein, urea and pH (chlorhexidine urine) were measured in 24-hour urine. Urinary parameters were compared with standard threshold values. The report includes the evaluation of uric acid saturation and risk indices according to the Tiselius formulas, together with the analysis of protein, salt and phosphorus intake. A final comment provides further clinical recommendations.

RESULTS

From the analysis of data collected on 33 patients with known renal calculosis already in follow-up, the following results emerged: Hypercalciuria of metabolic origin (16 pts, 48%); Increased urinary pH (15 pts, 45%); Hypocitraturia (14 pts, 42.%); Hyperoxaluria (5 pts, 15%); High risk indices for calcium phosphate stone formation (17 pts, 51.%); High risk for brushite stones (10 pts, 30%), for uric acid stones (9 pts, 27%), calcium oxalate stones (6 pts, 18%).

CONCLUSIONS

The metabolic test allowed to identify and correct the specific, unknown risk factors, potentially reducing the rate of recurrence of renal stones. This integrated and personalized approach represents a significant advance in the treatment of nephrolithiasis, offering a therapeutic possibility with strategies based on specific metabolic evidence.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1693

ROLE OF BIOMARKERS IN EARLY DIAGNOSIS IN CONTRAST-INDUCED ACUTE KIDNEY INJURY IN ADULT HOSPITALIZED PATIENTS

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BACKGROUND-AIM

Background:Contrast-induced acute kidney injury is the third leading cause of intrahospital acute kidney disease, accounting for 11% of all cases.Intravenous iodinated contrast media are commonly used with CT to evaluate disease and to determine treatment response.NGAL and Cystatin C may be useful in the early detection of kidney disease.
Aim: Evaluation of biomarkers both in plasma(P) and urine(U) after intravenous contrast in adult ICU patients.

METHODS

Methods:Total of 20 patients were involved in the study. ICU patients who were >20 years with radiographic contrast for diagnostic or interventional computed tomography (CT scan), were included.Samples of 5 ml blood and 5 ml urine ,which were collected before contrast exposure and in the distance at 4h,24 h, and 48 h after contrast exposure. NGAL and Cystatin C assay was done by ELISA,and urinary levels were normalized as per urine creatinine (UCr) values for each sample. In thisstudy, CI-AKI is defined as a rise in SCr of ≥0.3 mg/dl within 48 hrs. Data presented in a mean or median analysis were performed

RESULTS

In this study, 20 CT scan episodes requiring intravenous contrast in 25 ICU patients were included. Median age was 46 yrs and 14 (43%) were male. On day of inclusion, median SOFA score was 2.8; 17% In patients having CI-AKI, mean values changes from pre-contrast to at 4 h, 24 h and 48 h after contrast are presented..Kinetics of plasma (P) and urine (U) NGAL and Cystatin C levels (Mean±SD) with p value among patients having CI-AKI P NGAL (ng/ml), Before Contrast(BC)(707.5±202.76) , 04hrC(861.5±322.05, p=0.07), 24hrC(1083.25±235.03, p=0.02), 48hr C(798±313.4, p=0.21), UNGAL (ng/mg of U Cr) BC(68.63±49.09) , 04hrC(38.69±20.79, p=0.07) , 24hrC(100.97±91, p=0.12) , 48hrC(58.87±57.85, p=0.73) , P Cystatin C (ng/ml) BC(4688.85±574.71), 04hrC(4714.57±1144.87) , p=0.02) , 24hrC(4528.85±1235.73, p=0.03), 48hrC(4388.85±415.8, p=0.17), U Cystatin C (ng/mg of UCr) BC(3 56.06±214.7), 04hrC(229.66±73.18, p=0.91), 24hrC (480.21±526.28, p=0.99), 48hrC(623.61±821.77, p=0.23).

CONCLUSIONS

Analysis of the results during pre-contrast exposure revealed: NGAL, and Cystatin C), both plasma and urine level AUC was significantly higher in patients who develop CI-AKI and Post-contrast exposure. Plasma levels AUC significantly higher than Urine levels.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1694

ROLE OF VITAMIN D RECEPTOR (VDR) POLYMORPHISMS ON THE EFFICACY OF CALCITRIOL THERAPY IN CHRONIC KIDNEY DISEASE (CKD): A PROSPECTIVE DOUBLE-BLIND STUDY

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BACKGROUND-AIM

This study aimed to examine the association of VDR polymorphisms with calcitriol therapy efficacy in stage 3-5 CKD patients.

METHODS

179 adults with stage 3-5 CKD were recruited, started on calcitriol therapy, and followed to observe a 25% PTH reduction at 3 months (115 completed follow-up) or 50% at 6 months (90 completed follow-up). VDR polymorphisms were analyzed using PCR-RFLP, and serum levels of PTH, FGF-23, Sclerostin, and α-Klotho were measured by ELISA. Odds ratios (OR) were calculated between wild type and mutated variants to study the association of VDR polymorphisms with efficacy of calcitriol therapy.

RESULTS

After 3 months, 60/115 patients achieved a 25% PTH reduction (3m-Responders). VDR variants in 3m-Responders were: FokI (FF:Ff:ff=43:11:6), ApaI (AA:Aa:aa=24:32:6), BsmI (BB:Bb:bb=22:19:9), TaqI (TT:Tt:tt=33:22:6), and Cdx2 (CC:Cc:cc=20:4:25). At 6 months, 30/90 patients achieved a 50% PTH reduction (6m-Responders). VDR variants in these 6m-Responders were: FokI (FF:Ff:ff=21:4:2), ApaI (AA:Aa:aa=9:16:2), BsmI (BB:Bb:bb=12:6:2), TaqI (TT:Tt:tt=15:7:3), and Cdx2 (CC:Cc:cc=7:4:9).
Baseline and 3-month levels for 3m-Responders were: FGF-23: 101±115/93±101, Sclerostin: 141±139/162±115, and α-Klotho: 410±351/278±204. For 3m Non-responders: FGF-23: 134±209/90±125, Sclerostin: 131±119/169±97, and α-Klotho: 400±279/306±242. At 6 months, 6m-Responders had FGF-23: 109±141/137±195, Sclerostin: 184±157/250±135, and α-Klotho: 470±433/367±288. For 6m Non-responders: FGF-23: 106±192/116±232, Sclerostin: 100±90/188±119, and α-Klotho: 375±270/452±312.

CONCLUSIONS

At 3 months, a significant association was found between the Bb/bb genotype and calcitriol therapy response (OR 2.42, p=0.045). A comparison of baseline FGF-23, Sclerostin, and α-Klotho levels showed significant differences in α-Klotho at 3 months. This suggests α-Klotho may be an early marker for assessing calcitriol therapy response before PTH. No differences were found for FGF-23 or Sclerostin.
Response to calcitriol therapy was associated with BsmI genotypes (Bb/bb), showing 2.42 times higher likelihood of non-response. α-Klotho showed significant differences in both responders and non-responders at 3 months, indicating its potential as an early marker for calcitriol therapy response. Further validation in a larger cohort is needed.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1695

EFFECTS OF BMPR1B AND MYH9 VARIANTS ON SICKLE CELL NEPHROPATHY

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BACKGROUND-AIM

Genetic abnormalities may be associated with sickle cell nephropathy. The aim of this study was to evaluate the influence of certain variations of the BMPR1B and MYH9 genes on albuminuria during sickle cell nephropathy.

METHODS

We recruited sickle cell anemia patients. Urine protein were measured using a colorimetric pyrogallol red, molybdate dye-binding assay and urine creatinine using an enzymatic method. Urine protein excretion, expressed as the urine protein-to-creatinine ratio (UPCR) was defined according to the 2021 KDIGO clinical practice guidelines as grade A1 or normal albuminuria (UPCR< 150 mg/g), grade A2 or microalbuminuria (150≤UPCR≤ 500 mg/g) and grade A3 or macroalbuminuria (UPCR > 500 mg/g). Increased albuminuria regroups patients with albuminuria grade A2 and A3. Genetic variants of BMPR1B-rs17022863 and MYH9-[rs4821469, rs-3752462, rs-2032487] were genotyped using Mass Array. The effects of the variants on albuminuria were then evaluated using multivariate analysis after box-cox transformation of quantitative variables to fit a normal distribution.

RESULTS

A total of 150 patients were included in the study with a median age of 20 years [minimum–maximum : 4-57] and a female frequency of 51,33%. Increased albuminuria was observed in 50.67% (n=76) of patients of which 33.33% had grade A2 albuminuria and 17.33% grade A3. The minor allele frequency was observed as followed : BMPR1B-rs17022863 G (53.68%), MYH9-rs4821469 C (51.69%), MYH9-rs-3752462 C (27.08%), MYH9-rs-2032487 T (32,14%). MYH9-rs4821469 C was a protective factor against increased albuminuria (OR=0.342, 95%CI 0.118-0.986). BMPR1B-rs17022863 G, MYH9-rs-3752462 C and MYH9-rs-2032487 T had no effect on increased albuminuria but the presence of these three SNVs in the modele was necessary to observe the effect of MYH9-rs4821469 C on increased albuminuria.

CONCLUSIONS

Our results showed that MYH9-rs4821469 can be used as genotypic biomarker of sickle cell nephropathy. Senegalese patients living with sickle cell anemia who have MYH9-rs4821469 C appear to be protected against increased albuminuria.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1696

EVALUATION OF THE MUS-3600 URINE ANALYZER FOR THE DIAGNOSIS OF URINARY TRACT INFECTION; A COMPARISON STUDY WITH URINE CULTURE

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BACKGROUND-AIM

Urine culture is considered the gold standard for diagnosing urinary tract infections (UTI) in the laboratory. The majority of specimens sent for urine culture are negative. A rapid and reliable screening method will shorten the time to result for negative specimens, reduce laboratory workload, and lower costs. This study aimed to evaluate the performance of the MUS-3600 in patients with suspected UTI.

METHODS

Methods: Urine samples sent to the clinical microbiology laboratory were analyzed immediately after culturing using the MUS-3600 Urine Analyser. The MUS-3600 uses flow-type micro-imaging technology. For detection and classification, the system uses artificial intelligence identification. Culture results were considered positive if pathogen colony counts were $\geq 10^4$ cfu/mL and negative if $<10^4$ cfu/mL.

RESULTS

In our study, the cut-off value for WBC was 39, with a sensitivity of 63.4%, a positive predictive value (PPV) of 50.8%, a negative predictive value (NPV) of 90.1%, and an elimination rate of 67.5%. Cut-off values for bacilli (gram-negative bacilli) and suspected cocci (cocci) were 103 and 859, respectively. The elimination rate for bacilli was 70.4%, sensitivity 62.1%, PPV 56.9% and NPV 90.2%. For suspected cocci, the elimination rate was 62.8%, sensitivity 44.4%, PPV 34.5%, and NPV 84.9%.

CONCLUSIONS

When WBC (>39) and bacillus (>103) were evaluated together as a screening method, the highest elimination rate of 77.2% (NPV 87.9%)was achieved. The elimination rate for this combination was 87.4% (NPV 93.9%) in males and 68.5% (NPV 82.1%) in females. In our study, the MUS 3600 analyzer was found to be good at predicting UTI. However, further studies are needed on its use as a screening test for culture elimination.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1697

AN EXPERIMENTAL STUDY OF QUANTITATIVE DRIED BLOOD SPOT SELF-SAMPLING TECHNOLOGY FOR CREATININE ANALYSIS IN CHRONIC KIDNEY DISEASE

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BACKGROUND-AIM

Chronic Kidney Disease (CKD) remains a major global health issue. The estimated glomerular filtration rate (eGFR), derived from creatinine levels, is a widely utilized test for early detection and monitoring of CKD. Recent advancements in microsampling technologies, such as quantitative dried blood spot (qDBS), provide more convenient and less invasive blood sampling options. This study aimed to identify optimal elution protocols of qDBS discs for creatinine analysis on the Abbott Alinity c Clinical Chemistry Analyzer.

METHODS

Anonymized venous EDTA samples were used to test different elution protocols. Three different extraction protocols were evaluated both for the enzymatic and the Jaffé method by analyzing 25 samples on the Alinity c analyzer in an accredited laboratory to determine the most suitable protocol for dried whole blood. Blood was pipetted onto qDBS cards (Capitainer AB, Solna, Sweden), which automatically measure two 50 µL aliquots of blood using microfluidic technology onto two pre-cut paper discs. After overnight drying, extractions were performed at room temperature with one hour of shaking. The most robust protocol was selected based on the correlation coefficient between venous creatinine and qDBS creatinine and used for further method comparison and imprecision calculation (n=90). Subsequently, we utilized simulated patient data to calculate the estimated glomerular filtration rate (eGFR) with LM-Rev based on creatinine results obtained with qDBS. Finally, the performance of the qDBS method for CKD staging was assessed.

RESULTS

The extraction protocol using 150 µL isopropanol (IPA) for elution demonstrated the best linearity, achieving a correlation coefficient of 0.97 with the enzymatic creatinine method. This protocol correctly classified 89% of the results into the appropriate CKD stage compared to the venous results.

CONCLUSIONS

Enzymatic creatinine analysis performed on the Alinity c analyzer with qDBS eluted in 150 µL IPA appears to offer a promising microsampling solution for further clinical research and implementation. Further refinement of the elution protocol could enhance its performance and adaptability for various creatinine assays and analytical instruments.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1698

OPTIMISING THE REFERRAL OF PATIENTS WITH CHRONIC KIDNEY DISEASE TO SPECIALISTS

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BACKGROUND-AIM

Chronic kidney disease (CKD) is a major public health problem, often asymptomatic until advanced stages and monitored through laboratory parameters. Referral to Nephrology by Primary Care (PC) depends on CKD stage, progression rate, albuminuria, comorbidities and baseline condition.
CKD is classified according to KDIGO guidelines using the glomerular filtration rate (GFR) into 6 categories: G1, G2, G3a, G3b, G4, G5 and urine albumin/creatinine ratio (ACR): A1, A2, A3. Combining these, patients are color-coded by progression and complication risk: green (low), yellow (moderate), red (high).
This study analyses CKD prevalence in PC patients using GFR and/or ACR and evaluates the usefulness of these compounds in creating alerts for referral to the Nephrology Service.

METHODS

Retrospective study of PC analyses from February 2024, with GFR (CKD-EPI 2009) and/or ACR requested. Referral criteria to Nephrology were patients with albuminuria >300 mg/g (A3) or with CKD stages G4-G5 (red risk). Data was analysed using Excel.

RESULTS

A total of 16,724 patient results with GFR and/or ACR were analysed. Of these, 14,989 had GFR measurements. 9,024 patients were classified in G1 (60.2%) and 5,965 in G2 (39.8%). Using GFR alone, no patient would be referred to a nephrologist.
Both GFR and ACR were requested together in 2,589 patients. Among these, 2,414 were classified as green (93.2%), 165 as yellow (6.4%), and 10 (0.4%) as red. After classification, 0.4% of patients would have been referred.
Lastly, 1,735 patients had only ACR ordered, with 1,270 (73.2%) classified as A1, 395 (22.8%) as A2 and 70 (4%) as A3. Based on this, 70 patients would have been referred.

CONCLUSIONS

Overall, 80 patients required referral, averaging 4 notifications/day. After reviewing their clinical histories, 70% were not under Nephrology follow-up, resulting in 56 new patients to be seen by this speciality (2.6 patients/day).
Although GFR is commonly used to assess renal injury, ACR proves to be a valuable early marker of renal damage. The findings suggest that ACR enhances the effectiveness of referrals to specialists. Therefore, it's essential to establish standardized protocol to ensure appropriate referrals to Nephrology.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1699

URINARY CARNITINE EXCRETION IN CHILDREN WITH IDIOPATHIC NEPHROTIC SYNDROME – PILOT STUDY

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BACKGROUND-AIM

Kidneys play an important role in homeostasis of carnitine by its ability to reabsorb substances almost completely from the glomerular filtrate. It is also the site of esterification of carnitine with preferential excretion of short-chain carnitine esters. Carnitine metabolism is disturbed in some renal diseases, such as nephrotic syndrome (NS). The aim of the present study was to determine FC, total carnitine (TC) and AC concentrations in urine during acute, before glucocorticoids (GCS) treatment and remission periods, after GCS treatment.

METHODS

The study included 25 children with idiopathic nephrotic syndrome (INS). We collected urine from the first morning voided samples twice: first, in the beginning of the relapse and second, during GCS treatment, after achieving remission of proteinuria. The reference group consisted of 26 children with monosymptomatic nocturnal enuresis and normal renal function. Urinary FC and TC were determined by the spectrophotometric method. AC concentration was calculated from the difference between TC and FC. The carnitine levels were expressed as median and range of urinary ratio in micromole per gram creatinine (μmol/g cr.).

RESULTS

The patients had lower urinary FC concentration in the acute period (AP) of the disease than in the remission period (RP) and in the control group (CG): 23.7 (0.0-223) vs 87.4 (0.6-362) and vs 16.6 (0.2-116), respectively, ($p<0.05$). TC concentration in the AP was lower than in RP and CG: 42.8 (0.0-285) vs 106 (1.5-489) and vs 22.4 (1.0-125), respectively, ($p<0.05$). AC excretion was significantly lower in AP than in RP and CG: 6.5 (0.0-61.4) vs 18.1 (0.2-241) and vs 6.8 (0.5-26), respectively, ($p<0.01$). The proteinuria in children before treatment was significantly higher compared to RP and CG: (mg/dL),1530 (230-7300) vs 0.0, ($p<0.01$). INS patients in AP had significantly higher urine creatinine concentrations than in RP and CG: 1.65 (0.29-2.49) vs 1.12 (0.24-1.75) and vs 0.68 (0.17-2.74) g/L, respectively, ($p<0.001$).

CONCLUSIONS

CONCLUSION: This study showed abnormal LC levels in INS however carnitine’s participation and its role in complex metabolic disorders observed in nephrotic syndrome requires further studies and analyses.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1700

WOMEN IN SPORTS: THE ASSESSMENT OF RENAL FUNCTION AND KIDNEY DAMAGE

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BACKGROUND-AIM

Intense physical activity causes numerous metabolic and functional changes and adaptations in the athlete's body. Many studies indicate changes in renal function immediately after intense physical activity. However, little is known about whether these changes are permanent and visible without physical exertion. The study aimed to explore possible pathological changes in renal function and kidney damage in young, healthy female athletes.

METHODS

We included 122 female team sports athletes in the study. Venous blood and urine samples were collected after a 12-hour fasting and before strenuous physical activity. Serum and urine creatinine, urine albumin and total protein (measured on Olympus AU 400 biochemistry analyzer), serum cystatin C, α2-macroglobulin, β2-microglobulin, and urine α1-microglobulin (measured on Siemens BN ProSpec nephelometer) were considered as possible renal function and kidney damage biomarkers. We compared the results to the manufacturers' reference intervals used in the laboratory.

RESULTS

Serum creatinine concentrations (73.1 ± 8.9 µmol/L), although positively skewed (P=0.0086), were within the reference interval (RI) (49 – 90 µmol/L). Cystatin C, a muscle mass and nutrition-independent kidney biomarker, followed the normal distribution (0.76 ± 0.09 mg/L) and was well within the RI (0.62 – 1.11 mg/L). Both α2-macroglobulin (2.3 ± 0.5 g/L) and β2-microglobulin (1.61 ± 0.29) concentrations were within the manufacturer RI. The majority of athletes had very low concentrations of urine albumin (median 0.6 mg/mmol creatinine), urine protein (median 7.0 mg/mmol creatinine), and urine α1-microglobulin (median 5.5 mg/L, proposed cut-off <12.0 mg/L). However, a substantial proportion of female athletes (13%) had an albumin/creatinine ratio exceeding the internationally adopted cut-off for detecting albuminuria (>3.0 mg/mmol).

CONCLUSIONS

Most biomarker concentrations were within the reference intervals and the proposed cut-offs, indicating no impairment in renal function or reduced glomerular filtration rate among young, healthy female athletes. It is possible that increased muscle mass, daily dehydration, as well as a protein-rich diet contributed to the higher levels of creatinine observed. Mild albuminuria should be confirmed in the total absence of physical activity.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1701

ANALYTICAL PERFORMANCE EVALUATION OF THE CREATININE_3 ASSAY ON THE ATELLICA CH ANALYZER

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BACKGROUND-AIM

The Atellica CH Creatinine_3 (Crea3) assay measures creatinine in human serum, plasma (lithium heparin, dipotassium EDTA, sodium heparin), and urine. The assay aids diagnosis and treatment of renal diseases, and monitoring of renal dialysis. This study evaluated analytical performance of the Creatinine_3 (Crea3) assay on the Atellica CH Analyzer.

METHODS

Precision studies were performed per CLSI EP05-A3 using native human and spiked serum, urine, and quality control samples. Repeatability and within-lab precision samples were tested in duplicate, 2 runs/day for 20 days (n=80). Reproducibility samples were assayed in five replicates, 1 run/day for 5 days (n=225). Method comparison (MC) studies used the Deming regression model per CLSI EP09c and compared the Atellica CH Crea3 assay (y) (serum and urine) to the Atellica CH Crea_2 assay (x). Limit of blank, detection, and quantitation (LoB, LoD, and LoQ) samples were tested per CLSI EP17-A2. Linearity studies were performed per CLSI EP06-ED2. Specimen equivalency was determined per CLSI EP09c.

RESULTS

Precision serum repeatability coefficients of variation (CVs) were 0.2–3.2% and within lab, 1.1–4.0% at 34-2523 µmol/L (0.38-28.54 mg/dL); urine repeatability CVs were 0.1–0.2% and within lab CVs were 1.2–1.3% at 5016–17,308 µmol/L (56.74–195.79 mg/dL). Reproducibility CVs for serum were 0.9–5.0% at 35–2542 µmol/L (0.40-28.76 mg/dL) and for urine 1.4–1.6% at 5059–17,631 µmol/L (57.23–199.45 mg/dL). MC Deming regression equations were y=1.00x-4 µmol/L (y=1.00x-0.04 mg/dL) at 39–2532 µmol/L (0.44–28.64 mg/dL) (serum) (n=151; r=1.000), and y=1.00x+12 µmol/L (y=1.00x+0.14 mg/dL) at 1114–20,956 µmol/L (12.60–237.06 mg/dL) (urine) (n=113; r=1.000). LoB, LoD, and LoQ were 4, 9, 13 µmol/L (0.05, 0.10, 0.15 mg/dL) (serum/plasma), and 44, 88, 265 µmol/L (0.50, 1.00, 3.00 mg/dL) (urine). Linear range was 13–2652 µmol/L (0.15–30.00 mg/dL) (serum/plasma) and 265–21,658 µmol/L (3.00–245.00 mg/dL) (urine). Specimen equivalency for sodium heparin-, lithium heparin-, and dipotassium EDTA plasma vs. serum yielded slopes 0.98–1.00 and intercepts 0–5 µmol/L (0.00–0.06 mg/dL).

CONCLUSIONS

The Atellica CH Crea3 assay demonstrated acceptable analytical performance and specimen equivalency; MC results for the Crea3 and Crea_2 assays were similar for the same specimen type.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1702

SERUM ANTIBODIES AGAINST PHOSPHOLIPASE A2 RECEPTOR AND THROMBOSPONDIN TYPE-1 DOMAIN-CONTAINING 7A IN PATIENTS WITH MEMBRANOUS NEPHROPATHY FROM THE BULGARIAN POPULATION: ARE THERE DOUBLE POSITIVE RESULTS?

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BACKGROUND-AIM

About 40% of patients with membranous nephropathy (MN) develop end-stage kidney disease, accompanied by high mortality due to complications from infections, cardiovascular or malignant diseases. Primary membranous nephropathy (PMN) is associated with the presence of serum antibodies directed against an antigen expressed on the renal podocytes. The role of two main antibodies - against the phospholipase A2 receptor (anti-PLA2R1) and against thrombospondin type-1 domain-containing 7A protein (anti-THSD7A) is discussed. Causes of secondary membranous nephropathy (SMN) are infections, malignant or autoimmune diseases, toxins, drugs, etc. The aim of the study is 1) to determine the percentage of positive results for anti-PLA2R1 and anti-THSD7A in patients with MN and 2) to determine whether there are double positive results in the studied groups.

METHODS

The study included 52 patients with PMN, 12 with SMN and 49 with others nephropathy (ON). Serum concentrations of anti-PLA2R1 were determined in all patients. To distinguish anti-PLA2P1 (+) from anti-PLA2P1 (-) results, a cut-off value ≥ 20 RU/ml, specified by the manufacturer of the reagents, was used. The serum concentration of anti-PLA2R1 was determined with ELISA kit (Anti-PLA2R ELISA, IgG, EUROIMMUN, Lübeck, Germany) using MR-96A microplate reader (MINDRAY). The titer of anti-THSD7A was investigated by indirect immunofluorescence assay (EUROIMMUN).

RESULTS

We found that in the PMN group, 23 of the patients were negative for anti-PLA2R1 antibodies and 29 of the patients were positive. In the SMN and ON groups, all patients were negative for anti-PLA2R1 antibodies. Of the PMN patients negative for anti-PLA2R1 antibodies, two patients (8.7%) were anti-THSD7A positive, or 3.9% of the total PMN group. Patients with SMN and with ON were also tested for the presence of antibodies against THSD7A, but we did not obtain positive results. We did not identify patients who were both positive for anti-PLA2P1 and anti-THSD7A antibodies.

CONCLUSIONS

Our study shows that in patients negative for anti-PLA2R1 antibodies, the determination of anti-THSD7A antibodies is appropriate. We did not find double positive results for anti-PLA2R1 and anti-THSD7A antibodies in patient with PMN, SMN and ON.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1703

OPTIMIZED LC-MRM-MS TEST FOR EARLY DETECTION OF ACUTE KIDNEY INJURY USING URINARY BIOMARKERS

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BACKGROUND-AIM

Acute Kidney Injury (AKI) requires early and precision diagnosis for timely and effective intervention, yet reliable detection methods remain challenging. We previously developed a Mass Spectrometry (MS) based test targeting eleven proteins. However, in patient urines some analytical challenges became obvious due to poor analytical sensitivity and specificity, and endoprotease activity. Here we present an optimized AKI-test quantifying nine urinary kidney injury biomarkers—KIM-1, NGAL, TIMP-2, IGFBP7, CXCL9, nephrin, SLC22A2, Calbindin, and Cubilin.

METHODS

Urinary target proteins were immunocaptured, followed by denaturation, reduction, alkylation, and enzymatic digestion with trypsin to generate proteotypic peptides for analysis. Stable-isotope-labeled peptides served as internal standards for accurate quantification. Clinically less relevant proteins were removed and the reduction temperature was increased from 56 °C to 80 °C to minimize non-specific proteolytic activity. The method was evaluated for performance parameters according to CLSI protocols, including precision (CV <25%), ion ratio for analytical specificity (CV <20%), linearity (Pearson's $R \geq 0.975$), method comparison (Pearson's $R \geq 0.975$), and carryover (<1%).

RESULTS

Intermediate precision of the test was 8.4%, 19.7%, 7.2%, 20.7%, 19.2%, 10.5% and 14.1% for Calbindin, Cubilin, IGFBP7, KIM-1, Nephrin, NGAL and TIMP-2, respectively. Carryover was <1% for all proteins. Linear measuring ranges of 10-564 pmol/L, 10-460 pmol/L, 10-65 pmol/L, 10-1766 pmol/L, 10-509 pmol/L, 10-75 pmol/L, 10-12497 pmol/L and 10-5345 pmol/L were obtained for Calbindin, Cubilin, CXCL9, IGFBP7, KIM-1, Nephrin, NGAL and TIMP-2. Equivalent results were obtained for Calbindin, CXCL9, IGFBP7, KIM-1 and TIMP-2 in a method comparison.

CONCLUSIONS

The improved AKI-test has adequate analytical performance for translational research and enables early detection of kidney injury and nephrotoxicity. This test is important for nephrologists in transplant settings, oncologists in cancer centers, and pharmacologists studying drug safety. The AKI-test complements current kidney function tests. Further studies are needed to assess the clinical performance of this optimized test in patients at risk for AKI.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1704

EVALUATION OF RENAL MARKERS BY BMI IN YOUNG ADULTS FROM WESTERN MEXICO

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BACKGROUND-AIM

Renal function is influenced by metabolic and anthropometric factors, such as body mass index (BMI). Young adults represent a key population for the early detection of metabolic and renal alterations, enabling preventive interventions before chronic diseases develop. Overweight and obesity, increasingly prevalent in this group, are associated with glomerular hyperfiltration and subclinical renal damage. This study aims to describe the behavior of renal markers according to BMI in young adults from western Mexico, providing insights into how BMI influences renal function in this population.

METHODS

A descriptive cross-sectional study was conducted at the University of Colima between September and December 2024. Participants were young adults aged 18–40 years (22 ± 3.9 years) from western Mexico, with no known pathological conditions, who provided written informed consent. Ethical considerations were addressed according to institutional and international guidelines. Anthropometric measurements, including weight, height, and waist circumference, were taken following standardized protocols. Parameters such as microalbuminuria, serum and urinary creatinine, glucose, lipid profile, and cystatin C were evaluated using Biosystems reagents and nephelometry. Data were analyzed with JAMOVI v. 2.6, applying statistical tests for comparisons between BMI groups.

RESULTS

A total of 204 participants (103 men, 101 women) were included. BMI distribution was 49% normal weight, 28% overweight, 17% obese, and 6% underweight. Supplement use (protein or creatine) was reported by 8.7%. Cystatin C levels were significantly higher in the obese group ($p < 0.05$). Glomerular hyperfiltration occurred in 12.6%, while 7.3% were classified as G2 and 0.97% as G3a according to KDIGO 2024. No significant sex differences were found in microalbuminuria or the albumin-to-creatinine ratio ($p > 0.05$).

CONCLUSIONS

Cystatin C was strongly associated with BMI, particularly in obese young adults, incorporating cystatin C into routine evaluations could enable the early detection of renal impairment, allowing timely interventions to prevent progression to chronic kidney disease. This study underscores the importance of proactive renal health monitoring in young populations.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1705

ESTIMATED GFR IN CLINICAL PRACTISE: ROLLING THE DICE

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BACKGROUND-AIM

Renal function is evaluated in clinical practice by estimating creatinine- and/or cystatin-C-based formulas. More than 70 formulas have been published to date, and the most commonly used are aMDRD and CKD-EPI. Recently, EKFC equation has been published, improving the performance of the former. However, these formulas were not compared with the rest of the equations. Our objective was to compare the performance of the vast majority of formulas in a cohort of 5128 patients (2015 with measured cystatin-C) with different clinical conditions and to study whether cystatin-C-based formulas really improve those based on creatinine.

METHODS

At the Renal Function Laboratory, we measured GFR by the plasma clearance of iohexol using dried blood spots (iohexol-dbs) since July 2013 and June 2024, also evaluating estimated GFR using 54 formulas based on creatinine and/or cystatin-C. We used the statistics of agreement (TDI, CCC and CP) to evaluate the concordance of formulas with measured GFR, in addition to the accuracy (P) at 10, 20 and 30%.

RESULTS

TDI averaged 69, 67 and 51 for the formulas based on creatinine, cystatin-C and the combination of both markers respectively, meaning that 90% of the estimates of GFR showed an error ranging from −69 to +69%, −67 to +67% and −51 to +51% when compared with measured GFR using iohexol-dbs. Likewise, the creatinine-based formulas showed a mean percentage of estimated GFR within 10% of measured GFR of 26%, being 27% for those based on cystatin-C and 32% for the equations that use both markers in their algorithm. The best creatinine-based formula was LMrev with a TDI of 47%, followed by EKFC=48%. The best cystatin-C formula was Stevens with a TDI of 51%. The Stevens and CKD-EPI formulas based on creatinine and cystatin-C showed the best TDI of 41%.

CONCLUSIONS

In conclusion, cystatin-C-based formulas do not improve those based on creatinine, but the combination of both markers does. However, no formula is reliable in assessing the real renal function in patient with CKD, and therefore, measured GFR should be used in clinical situations where a reliable measurement of renal function is crucial, such as living kidney donors, renal transplantation, pre-dialysis patients, ADPKD, adjustment of potentially nephrotoxic drugs or dosing of drugs that are adjusted by GFR.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1706

VALIDATION OF A NEW SIMPLIFIED METHOD FOR QUICK AND EASY QUANTIFICATION OF IOHEXOL AS PART OF PRECISE KIDNEY FUNCTION MEASUREMENT

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BACKGROUND-AIM

The exact determination of kidney function (mGFR) in everyday clinical situation is usually very time-consuming, difficult to carry out on a routine basis and hardly available. The estimation formulas used (eGFR) have a variability of 25%. The method is not suitable for precise determination of renal function which is necessary in many clinical situations. Kidney function measurement can be carried out precisely using exogenous markers such as iohexol. However, the currently used iohexol methods are complex in preanalytics and analysis, so that they have not yet been able to establish themselves in routine use. Here we tested a new iohexol determination method, which has been available as an CE-approved kit for simple and quick kidney function measurement since May 2022 (Nephrolyx, Berlin)

METHODS

The method combines an one-step sample preparation using filters and rapid chromatographic separation using a UHPLC-DAD system (Hitachi). The method was checked for the quantification range, as well as precision, variability and accuracy. Renal function was determined in 40 patients using conventional renal function measurement (precipitation-HPLC-UV.

RESULTS

The method was validated with a linear range of 8.6 - 500 mg/ml iohexol in human serum. The inaccuracy within a day or between different days was ≤0.8% and ≤1.84%. The accuracies within one day and between different days were -1.12% to 1.04% and between 1.24% to 0.1%, respectively. The sample preparation time after receipt of the sample is 20 minutes and the measuring time of the sample is 90 seconds. It usually takes 45 - 60 minutes from the blood sample to the measured value. When comparing 120 blood samples from 40 patients, the kidney function determination shows a deviation of 1.2%, i.e. 46.2 ml/min (HPLC) vs. 46.8 ml/min (UPLC).

CONCLUSIONS

The new simplified method for the iohexol method was successfully validated and shows excellent precision and accuracy. The method is based on a simple sample preparation in a 96-well format, allowing robustness, high sample throughput and automation to be achieved. The new method was able to successfully determine the iohexol concentration in human serum in order to also determine kidney function. The simplicity of the method offers the possibility of easily using it in clinical routine.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1707

SINGLE AND COMBINED USE OF THE PLATELET–LYMPHOCYTE RATIO AND NEUTROPHIL–LYMPHOCYTE RATIO IN HEMORRHAGIC FEVER WITH RENAL SYNDROME

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BACKGROUND-AIM

The platelet–lymphocyte ratio (PLR) and neutrophil-lymphocyte ratio (NLR) are markers of systemic inflammatory responses, and several studies demonstrated their correlation with the prognosis of infectious illness. However, the diagnostic value of these markers in hemorrhagic fever with renal syndrome (HFRS) is unclear, and no research has examined their combined use. In this study, we investigated the individual and combined use of these indices for HFRS diagnosis.

METHODS

This retrospective study included 215 patients with HFRS (HFRS group) and 256 healthy controls (HC group) whose peripheral blood samples were obtained for analysis. The platelet count (PLT) was recorded, and PLR and NLR were subsequently calculated.

RESULTS

Compared with the findings in the HC group, white blood cell, neutrophil, and lymphocyte counts were significantly higher in the HFRS group, whereas the PLT and red blood cell counts, NLR, and hemoglobin (HGB) level were significantly lower (all $P < 0.001$). PLR had a better area under the curve (AUC) for diagnosing HFRS (AUC = 0.8141; 95% confidence interval [CI] = 0.7682-0.8600; $P < 0.01$) than NLR (AUC = 0.6412; 95% CI = 0.5882-0.6942; $P < 0.01$). The PLT count had the highest AUC (0.8729; 95% CI = 0.8356-0.9102; $P < 0.01$), specificity (94.92%) and sensitivity (76.74%). When the three indicators (PLT, PLR, and NLR) were combined, the AUC was significantly greater than that of the each indicator alone (AUC = 0.9029, 95% CI = 0.8711-0.9347; $P < 0.01$). NLR significantly differed among the age groups (younger [(≤40 years], middle-aged [41–59 years], older [≥60 years]). Post hoc analysis confirmed that NLR was remarkably higher in older subjects than in middle-aged ($P = 0.013$) and younger subjects ($P = 0.008$). Older patients tended to have higher NLR, and when considering the subject status, there was a significant effect of host age.

CONCLUSIONS

These data suggest that the PLT count, PLR, and NLR can serve as diagnostic markers for HFRS. The combination of the three indicators could provide a more comprehensive diagnosis of HFRS.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1708

MESALAZINE: A NOVEL ETIOLOGY FOR DRUG-INDUCED URINARY CRYSTALLURIA - A CASE REPORT

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BACKGROUND-AIM

Mesalazine is a first-line therapy for inflammatory bowel disease. While it is generally safe and well-tolerated, rare but serious side effects, such as pancreatitis, hepatitis, and perimyocarditis may occur. One of the lesser-known side effects is renal stone formation, reported at an unknown frequency.
This case report highlights the importance of early detection and characterization of nephrolithiasis in patients undergoing mesalazine therapy.

METHODS

Given the rarity of this side effect, we consider interesting reviewing though this case: A 27-year-old female patient diagnosed with Crohn's disease and treated with mesalazine (4g/24h) presented to the emergency department with dysuria.

RESULTS

Urinalysis performed with the AutionMAX-SediMAX platform, yielding the following results: pH: 5.5 (reference range: 5.0–7.5); Specific Gravity: 1027 g/L (reference range: 1015–1025); Protein: 70 mg/dL (reference range: <30); Glucose, Ketone Bodies, Urobilinogen, Nitrites, Leukocytes and Red Blood Cells: Negatives. The urine sediment revealed abundant atypical needle-shaped crystals, suspected to be drug-related.
Subsequently, crystals in the urinary sediment were identified as unmetabolized mesalazine by Fourier transform infrared spectroscopy (FTIR).
The Emergency and Nephrology Departments were informed, and the patient was advised to maintain adequate hydration. A priority follow-up with the Gastroenterology Department was scheduled to review her ongoing treatment. The case was reported to the Spanish Pharmacovigilance System

CONCLUSIONS

Nephrolithiasis associated with mesalazine is poorly documented. Although a few cases of mesalazine-induced lithiasis have been reported, the crystals identification was not usually confirmed in other studies. In this case, only the unmetabolized drug was identified, which may be explained by greater digestive absorption compared to other individuals.
The visualization of needle-shaped crystals in urinary sediment, followed by confirmation through FTIR, enables the identification of mesalazine crystals. This facilitates clinical decision-making, including dosage adjustments, treatment modifications, or the reinforcement of practices like maintaining proper hydration, with the aim of preventing possible recurrences.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1709

VOLUMETRIC ABSORPTIVE MICROSAMPLING TO MEASURE IOHEXOL AND CREATININE CONCENTRATIONS FOR ESTIMATION OF GLOMERULAR FILTRATION RATE IN CATS: ALIGNING ANIMAL WELFARE WITH PRACTICAL FEASIBILITY

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BACKGROUND-AIM

Chronic Kidney Disease (CKD) is not only common in humans, but also in cats, and early detection is crucial for better prognosis. Currently, the gold standard to assess renal function is measurement of glomerular filtration rate (GFR), allowing early detection of decreased kidney function. To overcome the practical limitations of this procedure, microsampling can be used. Application of volumetric absorptive microsampling (VAMS) in feline nephrology would be of tremendous value, aligning with animal welfare and improving practical feasibility of GFR measurements.

METHODS

In this context, we developed and validated an LC-MS/MS method to simultaneously measure iohexol and creatinine in plasma, blood and VAMS samples, the latter collected via ear-prick. Furthermore, a clinical study was conducted in which 23 cats were enrolled to collect both conventional venous blood, plasma and VAMS samples in parallel for GFR measurement. Clinical method validation was performed using the validated methods. Finally, an application study was conducted to evaluate the clinical applicability of ear-prick sampling for iohexol and creatinine based GFR determination in cats.

RESULTS

The LC-MS/MS methods fulfilled all pre-set validation acceptance criteria. Based on the clinical validation results, correction formulas were established to reliably convert the capillary VAMS results to plasma results. Validation of the formulas using the application data revealed an excellent agreement for both iohexol and creatinine between capillary VAMS and plasma concentrations (94% and 96% of differences lay <20%, respectively).

CONCLUSIONS

In conclusion, we demonstrated that ear-prick sampling using VAMS is a suitable alternative to conventional venous sampling to measure iohexol and creatinine for GFR determination in cats.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1710

RISK FACTORS FOR KIDNEY DAMAGE IN HIV PATIENTS

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BACKGROUND-AIM

Life expectancy in HIV patients has improved with antiretroviral therapy (ART) and better healthcare access. However, the increase in longevity has facilitated the appearance of comorbidities that, along with renal damage caused by the virus itself and certain ART, may lead to renal impairment.
This study assesses which renal risk factors are directly related with kidney damage progression in HIV patients.

METHODS

A retrospective study was conducted on 3324 HIV-positive patients older than 18 years. Patients were classified by glomerular filtration rate into stages: Stage 1:≥90mL/min; Stage 2:60-89mL/min, Stage 3a:45-59mL/min; Stage 3b:30-44mL/min; Stage 4:15-29mL/min; Stage 5:<15mL/min.
Demographic, clinical and laboratory parameters were included: age, sex, body mass index, current/previous smoker, hypertension, diabetes, cardiovascular events, hepatitis B/C, HIV acquisition mode, duration and current HIV infection, prior acquired immunodeficiency syndrome, current ART regimen and CD4 and viral load.
Univariate analysis identified which of these variables were associated with a decline in renal function stage after five years. Variables with $p<0.05$ were included in the multivariate Cox model to assess their independent association. Results were expressed as hazard ratios (HR) with 95% confidence intervals (CI) and p-values. Statistical analyses were performed using Stata 9.2.

RESULTS

From total of 3324 patients, 1256 progressed to worse stages. Univariate study identified the risk factors: age (HR 1.028; 95%CI 1.021-1.035), female sex (HR 1.203; 95%CI 1.010-1.432), hypertension (HR 1.421; 95%CI 1.166-1.732), dislipemia (HR 1.237; 95%CI 1.011-1.514), and cardiovascular disease (HR 1.423; 95%CI 1.009-2.006), heterosexual mode of HIV acquisition (HR 1.254; 95%CI 1.070-1.469), and duration of HIV infection (HR 1.015; 95%CI 1.006-1.024). After multivariate adjustment, only age (HR 1.028; 95%CI 1.017-1.039) and cardiovascular disease (HR 1.880; 95%CI 1.045-3.382), remained significant.

CONCLUSIONS

This study found comorbidities associated with renal impairment, being the most significant the age and cardiovascular disease. It would be interesting to study these variables in early stages of progression to develop strategies to prevent the progression to end-stage kidney disease.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1711

COMPARISON OF TWO URINE CORTISOL CHEMILUMINESCENT IMMUNOASSAYS WITHOUT PRETREATMENT WITH LC-MS/MS AS GOLD STANDARD

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BACKGROUND-AIM

Cortisol is a glucocorticoid hormone involved in energy metabolism, immune regulation, stress responses, inhibit allergic and inflammatory reactions. It is produced by the adrenal cortex and its release is controlled by the hypothalamic-pituitary-adrenal axis through corticotropin-releasing hormone (CRH) and adrenocorticotropic hormone (ACTH). Cortisol measurements are crucial for diagnosing and monitoring Cushing's syndrome (excess cortisol production) and Addison's disease (adrenal insufficiency). Other situations that can increase cortisol levels are pregnancy and stress (depression, trauma, surgery, alcoholism or uncontrolled diabetes), on the contrary, the decrease of these levels occurs in primary or secondary adrenal insufficiency due to pituitary damage that causes a decrease of ACTH.
The determination of free urine cortisol is the usual measure to evaluate the adrenal axis. Most of the methods used require a previous extraction phase with organic solvents, however, the aim of this study is to compare a 24-hour urinary cortisol values of patients measured by two different chemiluminescent immunoassays that do not require prior extraction and to evaluated which technique is more valid for detecting different cortisol-related disorders.

METHODS

40 urinary cortisol samples from specialised care patients, processed by the Cobas e 411 and ALINITY i, were analysed and subsequently compared with the results obtained by Liquid Chromatography with tandem mass spectrometry (LC-MS/MS) as gold standard.

RESULTS

In the evaluation of the efficacy of the two diagnostic assays (ALINITY i and Cobas e 411) compared to the reference method (LC-MS/MS), the main and most important difference was observed in sensitivity, with a value of 8% and 47% for ALINITY i and Cobas e 411 respectively.

CONCLUSIONS

The immunoassays of ALINITY i (Abbott) and Cobas e 411 (Roche) for 24-hour urinary cortisol showed important discrepancies compared to LC-MS/MS, both have a reduced capacity to detect the diseased population, however, the Cobas e 411 assay has a sensitivity five times higher than ALINITY i (Abbott). Both methods should be rapidly reevaluated and their reference intervals revised due to the clinical consequences on the patient.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1712

URINARY SOLUBLE CD163 AS A BIOMARKER OF RENAL DISEASE: RETURN OF EXPERIENCE OF A FRENCH HOSPITAL

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BACKGROUND-AIM

Urinary determination of soluble CD163 (sCD163U), a transmembrane protein expressed by macrophages infiltrating renal tissue, has been recently proposed as a non-invasive biomarker, to identify active renal inflammation in systemic vasculitis and lupus nephritis as a screening tool. We studied the role of proteolytically cleaved soluble CD163 (sCD163) as an urinary biomarker reflecting renal status of patients presenting ANCA or IgA-associated vasculitis (VA), and of patients with systemic lupus erythematosus (SLE).

METHODS

We collected retrospectively data from patients with VA and SLE. sCD163U was measured using an ELISA assay (BioTechne, Minneapolis, USA). Results were normalized to creatininuria (sCD163U/C, expressed in ng/mmol) or proteinuria (sCD163U/P, expressed in pg/mg), as recommended in the literature. Results are expressed in median [IQR] or in numbers (percentage).

RESULTS

Forty-six documented patients were included, 31(67%) of whom were women. All patients were treated, 35(76%) with immunosuppressive treatment. Median age of the studied population was 61 [39-72] years ; 18(39%) patients had SLE, and 28 (61%) VA. Urinary concentrations of sCD163U/C in the studied population were 88 [50-197] ng/mmol and those of sCD163U/P were 917 [249-2740] pg/mg. Urinary concentrations of CD163U/C were correlated to creatininemia (r=0,532; p=0,002), but not correlated to age, creatininuria nor proteinuria. Urinary concentrations of CD163U/P were not correlated to age, creatininemia, creatininuria nor proteinuria. There was no difference between SLE and VA for sCD163U/C (p=0.099). Conversely, we found a significant difference for the sCD163U/P (p=0.042): in SLE patients, the values of sCD163U/P were higher (2180 [997-4244] pg/mg) than in VA patients (455 [50-2456] pg/mg). We did not observe correlation between sCD163U/C or sCD163U/P and glomerulonephritis classification in SLE.

CONCLUSIONS

Our study shows a strong correlation between sCD163U/C and creatininemia, suggesting its potential use for renal status evaluation of SLE and VA patients, independently of their age. We also found higher values of sCD163U/P in SLE patients, as compared with VA patients. Further study of urinary protein profile is planned to investigate the relationship of sCD163 and renal dysfunction in our population.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1713

PRECISION DIAGNOSTICS IN KIDNEY TRANSPLANTS: A NOVEL MOLECULAR SIGNATURE TO DETECT ALLOGRAFT REJECTION

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BACKGROUND-AIM

Acute allograft rejection affects approximately 20% of kidney transplant recipients, underscoring the critical need for rapid and sensitive diagnostic methods to optimize graft survival. While histopathology remains the gold standard for diagnosing renal allograft rejection, it has notable limitations, including its qualitative nature, labor-intensive process, high cost, and susceptibility to interobserver variability. To address these challenges, this study aimed to develop a robust molecular signature that provides a faster, cost-effective, and quantitative approach for diagnosing renal allograft rejection.

METHODS

Transcriptomic and clinical data from 916 renal transplant patients (Non-rejection (n=666), TCMR (T cell-mediated, n=117), ABMR (B cell-mediated, n=105), Mixed-type rejection (n=28)) from four GEO datasets (GSE25902, GSE36059, GSE48581, GSE72925) were analyzed. An integrative transcriptomic analysis was conducted using PARTEK Genomics Suite. The mRNA levels of genes commonly differentially regulated in each rejection subtype were used to calculate the molecular risk score for each patient. The discriminatory power of the molecular signature was assessed by Receiver Operating Characteristic (ROC) curve analysis.

RESULTS

GBP1, IDO1, and FAM26F were found to be commonly upregulated in TCMR, ABMR, and Mixed-type rejection biopsies compared to controls (|log2 FC|>3, FDR adj.p<0.05). In four internal datasets and one external validation dataset (GSE21374, rejected (n=76), non-rejection (n=206)), the molecular signature distinguished rejected renal allografts from stable allografts with high specificity and sensitivity (AUC>80,p<0.0001). In the GSE36059 and GSE48581 datasets, the molecular signature effectively identified TCMR (AUC=89 and 71, respectively), ABMR (AUC=77 and 74, respectively), and Mixed-type rejection (AUC=90 and 66, respectively) biopsies from non-rejection biopsies (p<0.0001).

CONCLUSIONS

In this study, we identified and validated a novel molecular signature capable of distinguishing rejection biopsies from non-rejection biopsies, independent of the rejection subtype. We are currently conducting a validation study to further confirm the robustness and clinical utility of this molecular signature.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1714

ACCURACY-BASED PROFICIENCY TESTING FOR CREATININE IN KOREA: LESSONS FROM A 14-YEAR JOURNEY

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BACKGROUND-AIM

The Korean Association of External Quality Assessment Service (KEQAS) has been managing the accuracy-based creatinine (ABCr) proficiency testing (PT) program since 2011. Using the results of this 14-year program, the authors aimed to analyze bias trends in creatinine assays in Korea and propose strategies for improving assay accuracy in the future.

METHODS

The ABCr PT program was conducted biannually, utilizing three commutable fresh frozen serum samples in each round. Participation increased from 54 institutions in the first round of 2011 to 1,840 institutions by the second round of 2024. Data collected over 14 years (2011–2024) were analyzed to assess trends in creatinine assay bias. Bias was evaluated based on major reagent manufacturers, assay principles, and creatinine target values. Outliers were excluded from the analysis.

RESULTS

The median %bias (1Q, 3Q) for creatinine testing was 7.1% (0.0, 16.5) in 2011, 0.0% (-3.6, 7.1) in 2014, 0.0% (-2.9, 4.3) in 2017, and 1.3% (-2.4, 6.3) in 2024. The %bias by reagent manufacturer in 2011 and 2024 was as follows: Sekisui Medical, 13.0% (6.8, 16.9) and 2.1% (-1.6, 8.0); Roche, 1.2% (-1.3, 3.9) and 1.2% (-1.6, 4.0); and Beckman Coulter, 6.9% (0.0, 13.9) and 2.5% (0.0, 5.0). The %bias by assay principle in 2018 and 2024 was as follows: enzymatic, 1.7% (-1.9, 4.4) and 1.2% (-2.8, 6.7); kinetic Jaffe with compensation, -1.1% (-3.5, 1.6) and 1.8% (-1.8, 5.6); kinetic Jaffe without compensation, 2.8% (-1.2, 12.5) and 1.4% (-2.8, 7.6); and rate-blanked and compensated kinetic Jaffe, 2.3% (-1.4, 6.4) and 1.2% (-1.5, 4.0). The median bias for samples with a target value below 1.0 mg/dL ranged from -1.2% to 21.2%. For samples in the 1.0–1.9 mg/dL range, the median bias ranged from -2.1% to 7.1%. For samples with concentrations of 2.0 mg/dL or higher, the median bias ranged from -3.4% to 1.9%.

CONCLUSIONS

Since 2011, the bias in creatinine assays has decreased and has remained stable since 2014. The Kinetic Jaffe method without compensation, in particular, shows a significant positive bias for low-concentration samples, highlighting the need for appropriate compensation. Clinical laboratories are encouraged to consider transitioning to the enzymatic method, as recommended by international guidelines.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1715

ESTABLISHMENT AND EVALUATION OF AUTO-VALIDATION RULES USING AN AUTOMATED URINALYSIS LINE: A MULTI-CENTER STUDY

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BACKGROUND-AIM

Urinalysis is important for diagnosing and monitoring kidney and urinary tract disorders and it typically involves both chemistry and sediment analysis. However, discrepancies between test strip results and sediment findings often require manual review, which is time-consuming and labor-intensive. This study aimed to develop auto-validation rules based on the Mindray EU 8600 automated urinalysis line, integrating urine chemistry and sediment particle analysis, to efficiently identify samples requiring manual review while ensuring the accuracy of automated reporting.

METHODS

A total of 9,051 fresh urine samples were collected from 11 hospitals in China, with 5,521 samples used for the development of auto-validation rules and 3,530 samples for evaluation. The samples were analyzed using the Mindray EU 8600 automated urinalysis line, and digital sediment images were validated. Manual microscopic examination served as the gold standard. Discrepancies and concordance between key analytes, hemoglobin peroxidase (Hb) levels and RBC, leukocyte esterase (LEU) and WBC, as well as proteins and casts, were analyzed to design auto-validation rules, which were optimized to ensure a sensitivity greater than 95%. The rules were subsequently evaluated using the validation dataset.

RESULTS

Fifteen auto-validation rules were established, including eight interception rules—seven for digital image validation and one requiring manual microscopic examination. Among the 3,530 validation samples, 72.89% were automatically reported, with 93.90% of these samples aligning with manual microscopy. The false-negative rate was 3.09% (109/3,530), with no associated clinical risk upon careful evaluation. A total of 27.11% of samples were intercepted for manual review, including 21.64% requiring digital sediment image validation and 5.47% necessitating manual microscopy. Effective interceptions accounted for 17.22% (603/3,530), while 9.89% (349/3,530) were ineffective.

CONCLUSIONS

This study successfully developed auto-validation rules for urinalysis, which automated reporting for the majority of routine samples accurately while prioritizing those requiring manual review, thereby increasing laboratory efficiencies and reducing the workload.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1716

IMPACT OF BODY MASS INDEX ON THE COMPOSITION OF URINARY STONES

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BACKGROUND-AIM

The prevalence of urolithiasis has significantly increased in recent decades, paralleling the rise in the global incidence of obesity. This has suggested a potential link between obesity and an increased risk of stone formation.
Aim: To study the morphology and composition of urinary stones in relation to body mass index (BMI).

METHODS

This was a retrospective study conducted in the biochemistry laboratory of Habib Bourguiba Hospital Sfax, from January 2011 to December 2020. The study focused on records of urinary stones where BMI was documented. A morphological analysis of stones and a compositional analysis using infrared spectrophotometry were performed. The stones were classified according to their major components. BMI values were categorized into three groups: normal BMI (< 25 kg/m²), overweight (BMI: 25–29.9 kg/m²), and obesity (BMI ≥ 30 kg/m²). The Chi-square test was used to compare percentages, with a statistical significance threshold of 0.05.

RESULTS

In our study, 309 stones were collected (209 men and 100 women). The average age was 46.9 ± 16.1 years. Among these patients, 135 (43.7%) were overweight, and 82 (26.5%) were obese. Recurrence was significantly more frequent in obese (61.5%) and overweight patients (60.2%) compared to those with a normal BMI (35.3%)($p < 0.001$). Morphological analysis of the stones showed that type III stones were significantly more common in obese and overweight subjects compared to those with a normal BMI ($p = 0.04$), while type IV stones were more frequent in the group with a BMI < 25 ($p = 0.03$). The analysis of the major stone component revealed that whewellite was predominant in all three groups, followed by uric acid. We also observed that the proportion of uric acid stones progressively increased with BMI, rising from 8.7% in the normal BMI group to 29.3% in obese subjects ($p< 0.001$).

CONCLUSIONS

Urinary stone disease in obese or overweight individuals is characterized by a high recurrence potential and a notable increase in uric acid stones. Screening for urolithiasis in this population through crystalluria could be beneficial for preventing and controlling lithogenesis.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1717

ASSESSMENT OF CREATININE MEASUREMENT METHODS FOR CKD CLASSIFICATION BASED ON KDIGO 2024 GUIDELINES

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BACKGROUND-AIM

There are different biomarkers to assess kidney function for the management of patients with chronic kidney disease (CKD), with one of the classic markers being creatinine clearance (ClCr). The two most widely used methods for measuring creatinine are the Jaffé method and the enzymatic method, with the latter being recommended by some scientific societies due to fewer interferences than the former, and therefore, greater specificity.
The aim of this study is to determine whether the calculation of ClCr using the two creatinine measurement methods leads to different classification and stratification according to the KDIGO 2024 guidelines.

METHODS

A total of 114 samples were processed, including both serum and their corresponding 24-hour urine samples, measuring (in duplicate) urinary creatinine (CreO) and serum creatinine (CreaS) using both methods on the Alinity c (Abbott) system. Statistical analysis was performed using the MedCalc software.

RESULTS

ClCr (mL/min) was calculated using the formula ClCr = (urine volume (mL) x CreO) / (CreaS x 1440 min) for both the Jaffé method (ClCr1) and the enzymatic method (ClCr2).
The results of ClCr for both methods were compared using Passing-Bablok regression. A slope of 1.0053 (95% confidence interval (CI)) = 0.9999 to 1.0110), an intercept of -0.0135 (95% CI = -0.1411 to 0.1465) and a correlation coefficient of 0.9996 were obtained.
Furthermore, patients were classified according to their ClCr1 and ClCr2 in the different stages established by the KDIGO 2024 guidelines (G1-G5). The weighted Kappa index was calculated to evaluate their possible reclassification. The result was κ = 0.974 (95% CI: 0.953 to 0.995).

CONCLUSIONS

An excellent correlation between both methodologies was observed since r> 0.974 and κ> 0.81, approaching 1, with only 5.3% of patients being reclassified. Additionally, the Passing-Bablok regression ruled out the presence of constant and proportional systematic errors.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1718

VALIDATION OF NON-ALBUMIN-PROTEIN-TO-CREATININE-RATIO AS A PREDICTOR OF DIABETES KIDNEY DISEASE AND ALL-CAUSE MORTALITY IN PATIENTS WITH IMPAIRED GLUCOSE METABOLISM

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BACKGROUND-AIM

Diabetes mellitus is characterized by impaired glucose metabolism and increases the risk of diabetic kidney disease (DKD) and mortality. Proteinuria is composed of albuminuria and non-albumin protein. Albuminuria predicts DKD progression and mortality. However, DKD can progress without significant albuminuria, highlighting the need for alternative predictors of DKD progression and mortality. The aim of the present study is to validate non-albumin protein as a predictor of all-cause mortality in patients with impaired glucose metabolism.

METHODS

Retrospective cohort study (2019-2024) of 620 patients with impaired glucose metabolism (HbA1c ≥ 5.7%). Proteinuria was evaluated through urine protein-to-creatinine ratio (UPCR), albuminuria through the urine albumin-to-creatinine ratio (UACR) and non-albumin protein through urine non-albumin protein to-creatinine ratio (UNAPCR), calculated as UPCR − UACR. Elevated albuminuria and non-albumin protein were defined as UACR ≥ 30 mg/g and UNAPCR ≥ 120 mg/g, respectively. Statistical processing included correlation test, mortality comparisons and multivariable logistic regression (RStudio).

RESULTS

A significant correlation between UACR and UNAPCR was demonstrated, showing a moderateto-strong positive correlation (Kendall's Tau = 0.56, p<0.05). Mortality was significantly higher among patients with elevated UACR (≥ 30 mg/g: 25.93%) compared to low UACR (13.90%; p<0.05). Similarly, high UNAPCR (≥120 mg/g) was associated with higher mortality (28.48%) than low UNAPCR (<120 mg/g, 12.30%; p<0.05). Subgroup analysis (comprising all UACR-UNAPCR high/low combinations)revealed that the "UACR<30 mg/g-UNAPCR<120 mg/g"group had lower mortality than expected (z = -2.70), while the "UACR≥30 mg/g-UNAPCR≥120 mg/g" group showed higher mortality than expected (z = 2.83). Multivariable logistic regression confirmed UNAPCR (≥120 mg/g) as a predictor of mortality (OR 1.37, 95% CI: 1.18–5.04, p<0.05), neither UACR nor the interaction of UACR-UNAPCR were significantly associated with mortality (OR 1.37, 95% CI: 0.64–2.80, p = 0.397; OR 0.96, 95% CI: 0.36–2.65, p = 0.933, respectively).

CONCLUSIONS

Elevated UNAPCR (≥120 mg/g) is an independent predictor of all-cause mortality in patients with impaired glucose metabolism and could potentially serve as a novel predictor for DKD progression.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1719

IMPLEMENTATION AND OUTCOMES OF A UROTHELIAL CARCINOMA DETECTION PROGRAM IN ROUTINE URINALYSIS: FIRST-YEAR EXPERIENCE

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BACKGROUND-AIM

Urothelial carcinoma (UC) is the most common malignancy of the urinary tract, with early detection being critical for improving prognosis. This study reports the first-year outcomes of a UC detection program implemented through routine urinalysis in hospital, outpatient, and primary care settings. The program aimed to identify high-grade urothelial carcinoma (HGUC) cases by combining advanced imaging and cytological techniques.

METHODS

Urine samples were collected from routine urinalysis and screened using two strategies: (1) trained technicians reviewed images from the SediMax conTrustPro analyzer to identify atypical or neoplastic cells; and (2) laboratory physicians conducted a focused review of urological hematuria cases, prioritizing patients over 50 years old without lithiasis, urinary tract infections (UTIs), or anticoagulant use. Suspect samples were examined microscopically, followed by cytocentrifugation and May-Grünwald Giemsa staining. Samples with potential pathology were referred to the pathology department for urinary cytology.

RESULTS

Of the 40 samples sent to pathology, 26 (65%) were positive for atypia, HGUC suspicion, or confirmed HGUC. Biopsies confirmed 17 cases of HGUC, with 4 additional cases pending cystoscopy. The remaining samples were either negative or required no follow-up. Notably, 94% of the patients exhibited microscopic hematuria, while only 41% reported lower urinary tract symptoms. The program's detection rate translates to an incidence of 29 HGUC cases per 100,000 patients undergoing urinalysis.

CONCLUSIONS

The first year of this program successfully identified 17 HGUC cases, demonstrating the value of combining automated urinalysis imaging with targeted microscopy analysis. These findings support the integration of such protocols to enhance early detection and improve outcomes for patients with high-grade urothelial carcinoma.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1720

ATYPICAL URINARY CELLS IN URINE SEDIMENT EXAMINATION AS EARLY INDICATORS OF UROTHELIAL CARCINOMA: A CASE SERIES STUDY INTRODUCTION AND OBJECTIVES

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BACKGROUND-AIM

Urinalysis is a widely used diagnostic test in clinical laboratories, where examination of urinary sediment aids in identifying kidney, urinary tract, and other systemic diseases. This study aims to evaluate the diagnostic accuracy of urine sediment examination (UsE) for detecting urinary carcinoma (UC), including among asymptomatic patients and those without a prior history of the disease.

METHODS

This case series study evaluated atypical cells (Atyp.C) identified in urine samples at a single public academic medical center, based on the analysis of 90,601 samples collected between January 2023 and September 2024. Cells that could not be classified or mostly, were misclassified by automated systems, underwent expert manual review, followed by urinary cytology and imaging assessments, including ultrasound (US), computed tomography (CT), and cystoscopy, to detect UC. Positive imaging findings prompted transurethral resection of the bladder tumor (TURBT).

RESULTS

We identified 48 patients with Atyp.C on expert operator review, with a mean age of 73.2 years (SD 8.22); 93.8% were male, and 91.1% were smokers. This cohort included 33 patients with no previous suspicion. Among these 48 patients, 84.8% received a diagnosis of UC, mostly bladder cancer, based on pathology findings. The remaining cases did not undergo TURBT due to insufficient corroboration from additional diagnostic tests.
Our evaluation of additional diagnostic tests revealed that cytology accurately identified malignancy in only 26.4% of cases with Atyp.C ($p = 0.017$). In contrast, ultrasound (US) detected malignancy in 69.2% of cases ($p = 0.045$), computed tomography (CT) identified positive findings in 70% ($p = 0.021$), and cystoscopy revealed malignancy in 90.5% of cases ($p = 0.106$).

CONCLUSIONS

Our findings highlight that the incidental detection of Atyp.C and carcinoma in rutinary sediment examination represents a significant early indicator of potential UC, which can facilitate prompt evaluation by urology and enable the implementation of supportive diagnostic and therapeutic pathways.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1721

ANALYTICAL AND DIAGNOSTIC EVALUATION OF THE ANVAJO FLUIDLAB-2: A PROMISING DEVICE FOR APPLICATION IN A POINT-OF CARE SETTING?

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BACKGROUND-AIM

The performance of a novel, point-of-care (POCT) urine particle analyzer, Fluidlab-2 (Anvajo GmbH, Dresden, Germany), was evaluated against phase-contrast visual microscopy according to the most recent EFLM European Urinalysis Guideline.

METHODS

The Fluidlab-2 device uses digital holographic microscopy in combination with neuronal network object detection to perform particle classification. Its benchtop size makes it a promising device for bedside use and hence reduces turnaround times. Analytical performance (imprecision, linearity and limit of quantification (LoQ)) was assessed according to the EFLM European Urinalysis Guideline 2023. Method comparisons were performed by analyzing 450 urine specimens. The accuracy of red blood cell (RBC), white blood cell (WBC), and squamous epithelial cell (SEC) counts against visual microscopy was determined using Passing-Bablok regression with non-parametric Spearman's correlations. Bland-Altman plots were assessed against clinically acceptable analytical performance specifications for urinary particles. The significance of the ordinal scale agreements was assessed using the weighted Cohen's kappa coefficient to further evaluate diagnostic performance.

RESULTS

By applying Dahlberg's procedure, an optimal relative coefficient of variation R(CV) $\leq$1.5 was obtained for RBC and WBC. Linearity of up to approximately 7×10^6/L and 5×10^6/L was achieved. The LoQ at CV=30% reached about $20x10^6$/L for RBC and $5x10^6$/L for WBC. Spearman's correlation coefficient against visual microscopy was 0.86, 0.92 and 0.94 for RBC, WBC and SEC, respectively. Agreement with visual microscopy (Cohen's weighted kappa) was 0.92 for RBC, 0.93 for WBC, 0.96 for SEC, 0.86 for casts, 0.82 for non-SEC, 0.33 for crystals and 0.51 for bacterial counts.

CONCLUSIONS

Fluidlab-2 provides an optimal imprecision for RBC and WBC, and meets the criteria for linearity and LoQ. Cohen's weighted kappa coefficients show an optimal comparison to visual microscopy for RBC, WBC and SEC and a minimum comparison for casts and non-SEC. This evaluation showed promising results for using the Fluidlab-2 analyzer as a POCT device in a clinical setting to detect kidney-related diseases based on urine particle analysis.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1722

OPTIMIZATION OF SCREENING STRATEGY FOR CHRONIC KIDNEY DISEASE BY URINE TEST STRIPS USING THE ALBUMIN-CREATININE READ-OUT

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BACKGROUND-AIM

Clinical laboratories play an important role in the diagnosis and monitoring of chronic kidney disease (CKD). Our aim was to evaluate the performance of qualitative and semi-quantitative albumin-to-creatinine ratio (ACR) and protein-to-creatinine ratio (PCR) test strip results as screening tools for albuminuria in multiple representative patient cohorts.

METHODS

ACR and PCR were evaluated in both cross-sectional (n=940) and validation (n=927) patient cohorts. Semi-quantitative urinary ACR and PCR were performed using a UC-3500 instrument (Sysmex, Kobe, Japan). The diagnostic performance of semi-quantitative ACR and PCR was determined using quantitative ACR and PCR as references.

RESULTS

In the cross-sectional cohort, a sensitivity and specificity of 78.1% and 93.3%, respectively, were obtained for semi-quantitative ACR at a cut-off of 30 mg/g creatinine, with an overall agreement of >90% between both methods. The sensitivity and specificity increased in the target population (validation cohort) to 89.9% and 92.1%, respectively. In contrast, the sensitivities of qualitative protein concentration (78.6%) and semi-quantitative PCR (69.8%) were lower.

CONCLUSIONS

The results confirm that urine test strip readouts are a valuable screening tool for CKD in low-risk individuals. ACR should be the preferred criterion for reflex testing when using a urine test strip for screening CKD.

Kidney diseases and transplantation, urinalysis, urinary biomarkers

P1723

RENAL TUBULAR EPITHELIAL CELLS: A URINARY BIOMARKER THAT ADDS VALUE IN THE DIAGNOSIS OF ACUTE KIDNEY INJURY

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BACKGROUND-AIM

Acute kidney injury (AKI) is a common clinical complication after cardiac surgery. Although urinary particle analysis is useful for differentiating AKI, its value in AKI diagnosis has not been well described. We sought to determine the contribution of urinary particle analysis in the diagnosis of AKI.

METHODS

Two-hundred and forty adult patients were prospectively included after cardiac surgery. The diagnostic performance of urinary particle analysis at different time-points after intensive care unit (ICU) admission was evaluated. AKI was diagnosed and classified according to KDIGO consensus group definitions. Urinary particles, including renal tubular epithelial cells (RTEC) and non-hyalin casts, Nephrocheck®, urinary alpha-1-microglobulin and urinary γ-glutamyltransferase (GGT) were measured at 4, 12 and 24h after ICU admission and evaluated against different endpoints.

RESULTS

Of the 240 patients included, 41 (17.1%) had AKI stage 1, 118 (49.2%) stage 2 and 16 (6.7%) stage 3, respectively. In the early post operative period, urinary alpha-1-microglobulin and Nephrocheck® were good predictors for AKI stage $\geq$1 within 48h after ICU admission (primary endpoint) and AKI stage $\geq$2 (1st secondary endpoint), respectively. RTEC counts at 12h and 24h after ICU admission had the highest predictive value for AKI up to 48h after ICU admission based on serum creatinine alone [AUC: 0.812 (95%CI: 0.755 – 0.860)] and for all AKI criteria up to 172h after ICU admission [0.946 (95%CI: 0.907 – 0.972)], respectively. Correction of the obtained counts for hydration status did not improve the obtained results.

CONCLUSIONS

Urinary particle analysis, based especially on RTEC, is valuable for the early diagnosis of AKI, especially at 12 and 24 hours after ICU admission.