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**Introduction.** Renal calculi have been plaguing humanity since the advent of civilization. The majority of kidney stones consist of calcium oxalate, followed by calcium phosphate, uric acid, cysteine, and struvite stones. Many factors influence the development of a stone including diet, genetics, environment, and comorbid conditions.
**Aim of the study.** To describe a hypothesis for the initial events leading to urinary stones. A biomechanical perspective on Randall's plaque formation through form and function relationships is applied to functional units within the kidney, we have termed the 'medullo-papillary complex' - a dynamic relationship between intratubular and interstitial mineral aggregates.
**Materials and methods.** A complete research was performed to examine the existing literature on the anatomical and physiological relationships in the renal medulla and papilla. Sectioned human renal medulla with papilla from radical nephrectomy specimens were imaged using a high resolution micro X-ray computed tomography. The location, distribution, and density of mineral aggregates within the medullo-papillary complex were identified.
**Results**. Mineral aggregates were seen proximally in all specimens within the outer medulla of the medullary complex and were intratubular. Distal interstitial mineralization at the papillary tip corresponding to Randall's plaque was not seen until a threshold of proximal mineralization was observed. Mineral density measurements suggest varied chemical compositions between the proximal intratubular (330 mg/cm$^3$) and distal interstitial (270 mg/cm$^3$) deposits. A review of the literature revealed distinct anatomical compartments and gradients across the medullo-papillary complex that supports the empirical observations that proximal mineralization triggers distal Randall's plaque formation.
**Conclusions.** Randall's plaques may not be the entire explanation for lithogenic phenomena, they do play an important role in a subset of patients with calcium oxalate stones, whose incidence has been increasing in recent decades. The early stone event is initiated by intratubular mineralization of the renal medullary tissue leading to the interstitial mineralization that is observed as Randall's plaque. We base this novel hypothesis on a multiscale biomechanics perspective involving form and function relationships, and empirical observations. Additional studies are needed to validate this hypothesis.
**Key words:** calcification; kidney; physiological; urinary tract physiology; urolithiasis

## 162. ACUTE RENAL INJURY INDUCED BY SEPTIC PROCESSES

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**Introduction.** AKI is a common complication of sepsis and carries an ominous prognosis. Mortality was reported higher in patients with septic AKI (74.5%) than in those whose renal failure did not result from sepsis (45.2%). AKI risk factors include age, severity of the disease, the presence of other chronic pathologies.
**Aim of the study.** Analysis of cases of acute kidney damage caused by septic processes during 2016 in the following sections: septic surgery, general surgery, general therapy, urology, haemodialysis of the Republican Clinical Hospital.
**Materials and methods**. 147 patients were included in the study, fulfilling the following inclusion criteria: indicators of the presence of septic and AKI processes.

**Results.** The study group included 81 (55.1%) men, and 66 (44.9%) women, their average age being 60.1 ± 13.2 years. The average values of AKI indicators were the following: urea - 23.5 ± 12.5 mmol/l, creatinine - 343.9 ± 371.2 mmol/l. Deregulation of diuresis: anuria - 10.8%, oliguria - 6.1%, polyuria - 14.2%, lack of data or norm - 68.7%. In 24.48% of deceased patients during the morphopathological examination acute renal tubular necrosis was found, although some of them had creatinine volumes ranging from 86-147 mmol/l, these still being increased compared to the previous values. Localization of the primary septic outbreak was the following: 38.77% of the gastrointestinal system (pancreonerosis, thin and thick intestine necrosis, intraabdominal abscesses, purulent angiocolitis, cholecystitis, liver abscesses, massive liver necrosis, suppressed hydatid cyst, acute gangrenous appendicitis), urogenital system - 31.97% (pioneer, acute pyelonephritis, renal abscesses, acute purulent nephritis, cystitis, urethritis, prostatitis), skin and soft tissue damage - 12.24% (phlegm, abscess), respiratory system - 7.4% (bronchopneumonia), osteoarticular system - 6.8% (gangrene with bone and soft tissue damage, purulent coxarthrosis, osteomyelitis), cardiovascular system - 2.72% (pericarditis, endocarditis), septic pneumonia - 54.42% of the studied group. The respiratory system was affected as a secondary stage in sepsis. CID syndrome was present in 23.8% of the studied group, development and severity of CID correlating with mortality rates and MODS development in sepsis. Methods of treatment (detoxification): plasmapheresis - 11.56%, haemodialysis - 14.28%, haemofiltration - 3.4%, conservative treatment - 70.74%. Lethality rates were of 46%.
**Conclusions.** Despite progress in pathophysiology, diagnostic procedures, and appropriate therapeutic interventions, sepsis-induced AKI still registers high mortality rates, the lethality being 46% of the patients included in the study. Creatinine is not capable of detecting precocious AKI induced by sepsis. A major obstacle for the effective treatment of sepsis-induced AKI is lack of early and effective diagnostic tools.
**Key words:** acute kidney injury, sepsis, lethality

## 163. THE ROLE OF ULTRASONOGRAPHY-GUIDED BIOPSY IN THE DIAGNOSIS OF PROSTATE CANCER

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**Introduction.** Currently, the appropriate number of fragments obtained during a prostate biopsy in order to detect early histological changes in the prostate tissue is constantly debated.
**Aim of the study.** To reveal the correlation between the PSA value and the number of biopsies required to be performed for the detection of prostate cancer.
**Materials and methods.** The study was conducted on the basis of 52 ultrasonography-guided prostate biopsies performed between May 2016 - March 2017. The case-control, retrospective study involved evaluating the results of the 52 biopsies, of which 13: 6-core and 39: 12-core. The Transrectal Ultrasound-guided Prostate Biopsy (TRUS) was performed according to the National Clinic Protocol with the main indication being the level of PSA higher than 4 ng/ml and taking into consideration the contraindications and possible complications that may occur. For statistical data processing SPSS program was used, applying descriptive and comparative statistical analysis.
**Results.** Patients that underwent the biopsy aged between 52 and 88 years, and PSA varied between 2.81 and 177.00 ng/ml with an average of 89.90 ng/ml. In 22 patients (42.30%) of the group of subjects who underwent the biopsy, the morphological clinical picture of adenocarcinoma was found, and in 30 patients (57.69%) – benign prostatic hyperplasia. In none of the patients any major complications have occured. In patients with 6-core biopsy were