PD03-04
INTRARENAL CALCIFICATIONS – PROSPECTIVE PHENOTYPIC CHARACTERIZATION BY ENDOSCOPIC AND HISTOLOGIC QUANTIFICATION

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INTRODUCTION AND OBJECTIVES: Two papillary pathologies have been described that appear to be precursors of kidney stone growth: interstitial Randall's plaques and duct of Bellini plugs. Both appear to be composed of calcium phosphate. The underlying pathogenesis of either lesion is incompletely understood. In the current study we analyzed data from a large cohort of patients with diverse stone phenotypes and complete papillary mapping data in order to determine the relationship of papillary pathology to patient demographics, stone type and urinary chemistries.

METHODS: A total of 295 patients undergoing percutaneous nephrolithotomy (PCNL) were prospectively evaluated with preoperative and postoperative dual energy CT, intraoperative endoscopic mapping and papillary biopsy as well as postoperative stone analysis, serum and 24-hour urine collection. Each papilla was mapped following stone removal with percent papillary plaque and plug coverage digitally measured using image analysis software and a representative papillary tip was biopsied. Stone composition was determined by micro-computed tomography and infrared analysis. A 24-hour urine collection was used to measure supersaturation (SS) and crystal growth inhibition.

RESULTS: Across the cohort, 24-hour apatite and brushite SS significantly correlated with the amount of papillary plug ($p<0.01$). Twenty four hour urine calcium excretion correlated with plaque amount ($p<0.01$). Compared to the entire cohort, patients with hydroxyapatite (HA) stones tended to be younger, with a mean age of 44 (SD 15.4) years ($p<0.0001$). Compared to the rest of the cohort HA stone formers had the highest amount of tubular plugging with a mean surface area of 1.9% (SD 5.9) ($p<0.03$). Overall nearly 16 % of the cohort had significant plugging, defined as >1% plug surface area. Plaque was common throughout the group with 94% of stone formers having plaque on at least 1 papilla. Intraluminal crystals were present in 100%, 83%, 77%, in brushite, calcium oxalate and HA stone formers, respectively. Interestingly, within the entire cohort there were no differences between stone groups regarding any 24-hour urinary parameters except urinary oxalate ($p< 0.01$) and pH ($p <0.01$). There was a significant difference in all supersaturations corresponding appropriately to each stone type with the exception of Na Urate Crystal supersaturation for which there was no difference.

CONCLUSIONS: These data suggest that urinary SS predicts intratubular crystallization. Plaque formation may be more complicated and calcium excretion appears important.

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PD03-05
ANTIBIOTICS AND A HIGH FAT/HIGH SUGAR DIET REDUCE MICROBIAL OXALATE METABOLISM IN A MOUSE MODEL

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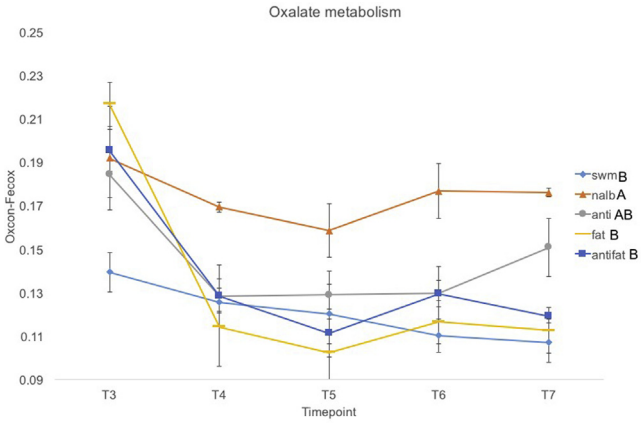
INTRODUCTION AND OBJECTIVES: The incidence of urinary stone disease (USD) has increased 4-fold in the last fifty years. This emergent trend implicates systemic changes to public health as the primary driver behind the increase. The incidence of USD is associated with the gut microbiota both at the whole community level and at the level of specific functional species, such as the oxalate-degrading Oxalobacter formigenes. Thus, the objective of the current study was to test the hypothesis that antibiotics and a high fat/high sugar (HFHS) diet, both of which have increased over the last fifty years and has a significant impact on the gut microbiota, negatively impacts microbial oxalate metabolism in the gut.

METHODS: A high oxalate-degrading mouse model was developed by administering fecal transplants from the wild mammalian rodent Neotoma albigula to Swiss-Webster mice, which produces a microbiota that contains all of the bacteria necessary for persistent oxalate metabolism. One treatment group received its own feces as transplants as a negative control. Following transplants, animals were given either antibiotics, a HFHS diet, antibiotics in combination with a HFHS diet, or no treatment. Total oxalate metabolism and the composition of the gut microbiota was tracked over the ensuing two-week period.

RESULTS: Over the course of the diet trial, the Swiss-Webster mice with the native microbiota exhibited significantly lower oxalate degradation than animals receiving fecal transplants alone. Furthermore, there was a significant decline in oxalate degradation for animals receiving either the HFHS diet or the combination treatment. Interestingly, while animals receiving antibiotics initially saw a decline in oxalate degradation, the function had recovered by the end of the diet trial.

CONCLUSIONS: The results of our study indicate that diet had a greater effect on microbial oxalate metabolism than antibiotic use, implicating diet as a potential factor driving the increase in USD, through changes to the microbiota. This work has implications for the dietary management of USD and bacteriotherapies designed to inhibit the formation of stones.



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PD03-06
PLAQUE, PITTING, CONTOUR LOSS - A PATHOGENETIC SEQUENCE IN RENAL PAPILLAE OF IDIOPATHIC CALCIUM STONE FORMERS

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INTRODUCTION AND OBJECTIVES: Renal papillary abnormalities are thought to have deeper roots in renal physiology and stone pathogenesis. A unifying hypothesis is that Randall's plaque (RP) production is continuous, plaque loss gives rise to pitting, and this loss of tissue gives rise to changes in papillary contour (Figure 1). We have tested these predictions in a cohort of idiopathic calcium stone formers (ICSF).

METHODS: A previously described renal papillary grading system, which quantifies the degree of RP, pitting, plugging, and contour on each papillum, was applied to ICSF during ureteroscopy. We