**Physiological and Dietary Differences in Stone Formers**

Kidney stones are a common condition and cause significant morbidity in terms of pain, septic episodes and increased risk of renal failure. The commonest type of stone is calcium oxalate followed by calcium phosphate. Certain monogenic conditions create an environment where calcium phosphate is more likely to precipitate. For example, distal renal tubular acidosis causes alkaline urine and is consequentially associated with calcium phosphate stones. However only a fraction of calcium phosphate stone formers have this condition. We sought to compare calcium phosphate and calcium oxalate stone formers to gain insights into what may be driving the propensity to form each stone type.

We used the stone database at the Centre for Nephrology at the Royal Free to identify patients with predominantly calcium phosphate and calcium oxalate stones. Data was collected on urine and blood biochemistry and dietary factors.

From our database we identified 139 calcium oxalate stones formers (defined as calcium oxalate percentage greater than 50) and 43 calcium phosphate stone formers (defined as calcium phosphate percentage greater than 50). Calcium phosphate stone formers had significantly higher urine pH than their counterparts with calcium oxalate stones (6.66 versus 6.13). Significant differences were also found with urine citrates (0.03 versus 0.2), serum potassium (4.18 versus 4.3). Calcium oxalate stone formers had higher consumption of animal protein and higher rates of heart disease and hypertension.

The pattern of alkaline urine, low urinary citrates and low serum potassium seen in the calcium phosphate stone formers is similar to the picture seen in distal renal tubular acidosis. This suggests that these patients may have similar tubular defects. Genetic analysis of these patients may lead to further insights into defects leading to stone formation. The association of calcium oxalate stones with higher animal protein, heart disease and hypertension suggest that dietary factors may be more important for this stone sub-type (for example higher salt intake).