GD bio URI

- **Case 1: A young man with right loin pain**
- **A 35-year-old male chef presents with a 4-hour history of acute right-sided loin pain radiating to the groin. He is otherwise fit and well, is a non-smoker and gives a family history of renal stones. On examination, he is afebrile and haemodynamically stable and is tender over the right loin region. Routine blood tests are normal and urinalysis is positive for blood**

- **1 What is the differential diagnosis in this case?**
- **Correct answer:**

- **Given presentation with acute loin pain and urinalysis findings, ureteric stone disease should be considered. Other urological pathology would include urinary tract infection or tumours (unlikely given the patient's age).**

- **2 What is the imaging modality of choice for diagnosing urinary stones?**
- **Correct answer:**
- **A non-contrast CT (NCCT) scan of the urinary tract has become the standard imaging modality for acute flank pain. The sensitivity of this study in picking up urinary tract stones is 96–100% and specificity is 92–100%, and is superior to intravenous urography (IVU). A NCCT will show stone location, size and density while also potentially identifying alternative pathology in the absence of stone.**

Describe the General Mechanism of Urinary stone Formation?

- **1- One of the well-accepted precipitating factors for renal calculi formation is decreased solvent volume due to decreased fluid intake. The incidence of symptomatic nephrolithiasis is significantly greater in areas with high temperatures and sunlight exposure. Decreased volume of solvent leads to increased concentration of solute, consequently leading to stone formation**

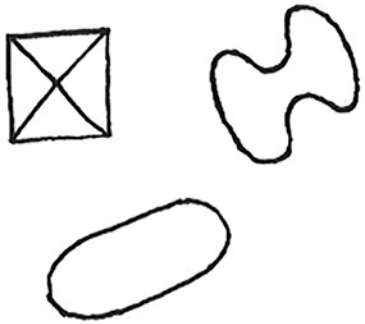
- **2-The environment of the solution plays a role in calculi formation as well, most prominently, the pH of the solution. Normal urine pH is typically 6.0 to 7.5, although the normal range may extend from 4.5 to 8.0 and depends on a specific lab's reference range.9 Because each solute is soluble at certain pH ranges, when urine pH falls outside of that range, the solute is more likely to precipitate out of solution, creating a nidus for calculi formation. For instance, cystine solubility at a pH of 7.0 is 200 to 400 mg/L. At a pH of 5.0, cystine solubility is 150 to 300 mg/L. For this reason, one of the mechanisms for the treatment of cystinuria is alkalization of the patient's urine**

What Are the 4 Main Types of Urinary Calculi?

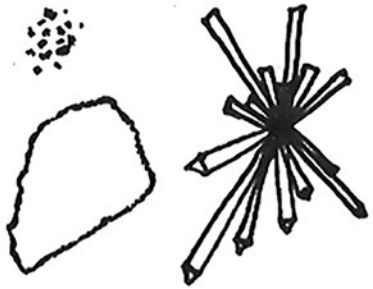
- **The 4 most common urinary stones are calcium, struvite, uric acid, and cystine.**
- **Calcium stones comprise approximately 70% of stones in the general population and are primarily composed of calcium oxalate but can be made of calcium phosphate or a combination of the . These stones form in patients with hypercalciuria (with or without hypercalcemia), hyperuricosuria, hyperoxaluria, hypocitraturia, or in those with no identifiable cause.**

- **Hypercalciuria without hypercalcemia may be identified in patients with impaired reabsorption of calcium in renal tubules or to excessive calcium absorption in the intestine. Increased secretion of uric acid as in patients with excess intake of purines or secretion of uric acid.Patients with chronic enteric diseases such as Crohn disease may absorb excess oxalate in the intestine.**

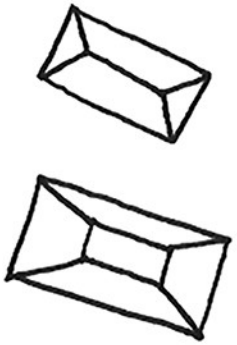
Shape of associated crystals



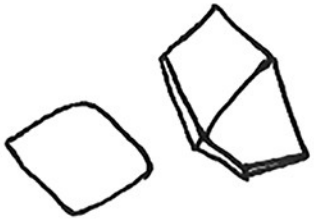
Calcium oxalate



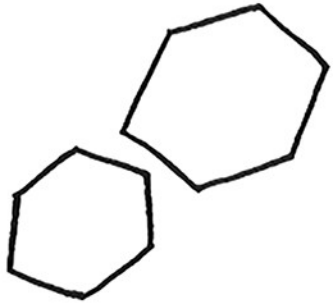
Calcium phosphate



Triple phosphate



Uric acid

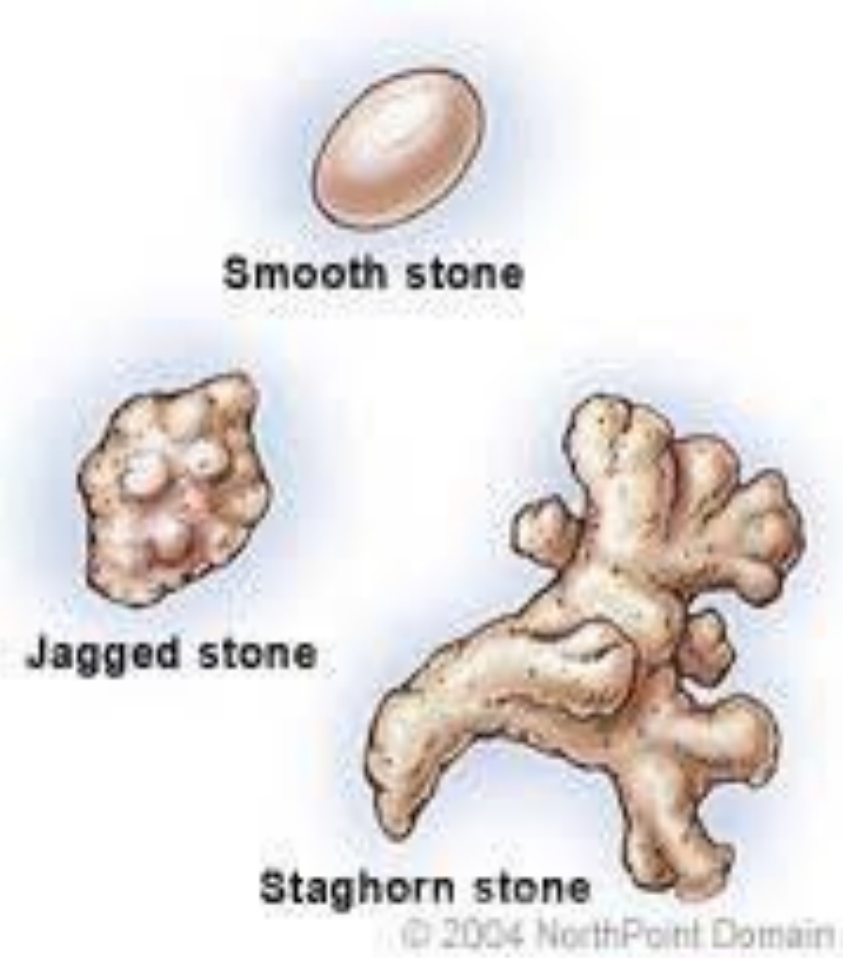


Cystine

- **Uric acid stones form in acidic urine and in the setting of hyperuricemia and hyperuricosuria. Consequently, individuals with medical conditions leading to increased uric acid production or altered metabolism (eg, gout, Lesch-Nyhan syndrome, tumor lysis syndrome) or decreased urine pH (eg, chronic diarrhea, metabolic syndrome) have a higher incidence of uric acid calculi**

- **Cystine stones occur in the setting of cystinuria, which is an autosomal recessive genetic disorder. Patients with cystinuria have an impaired ability to transport the amino acids cystine, ornithine, lysine, and arginine in the proximal nephron due to a dysfunctional transporter subunit in renal tubular epithelia.Cystinuria should be suspected in individuals who present with urolithiasis at an age younger than 30 years. As previously mentioned, cystine stones develop in acidic urine**

- **Struvite (also called magnesium ammonium phosphate or triple phosphate) stones are also often referred to as staghorn calculi, which is often how they appear in radiologic studies. These stones are often large and obstructive**


Smooth stone
Jagged stone
Staghorn stone
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