Unit V – Problem 12 – Pathology: Renal Stones and Hyperparathyroidism

- **Kidney stones (nephroliths – حصوات الكلى):**
  - **Clinical presentation:**
    - ✓ Unilateral flank tenderness (ألم الخاصرة).
    - ✓ Colicky pain radiating to groin (الفخذ).
    - ✓ Hematuria (with no RBC casts).
  - **Complications:**
    - ✓ Hydronephrosis (accumulation of urine in kidney due to obstruction by the stone).
    - ✓ Pyelonephritis (inflammation of kidney as a result of bacterial infection).
  - **Treated and prevented by:**
    - ✓ Encouraging fluid intake.

Content	Precipitates at	X-ray findings	Urine crystal	Notes
Calcium (80%)	• ↑pH (calcium phosphate) • ↓pH (calcium oxalate)	Radiopaque (can be seen on X-ray)	Envelope of dumbbell-shaped	• Secondary to conditions that cause hypercalcemia (e.g. cancer and ↑PTH). • Oxalate crystals can result from ethylene glycol, vitamin C abuse or Crohn's disease • Treatments for recurrent stones include: thiazides and citrate. • Most common kidney stone presentation: calcium oxalate stone in a patient with hypercalciuria and normocalcemia.
Ammonium, magnesium, phosphate (15%)	↑pH	Radiopaque	Coffin-lid	• Caused by: infection with urease (+) bugs that hydrolyze urea to ammonia → urine alkalinization. • Can form staghorn calculi that can be a nidus (site of origin) for urinary tract infections (UTIs). • Treatment: eradication of underlying infection and surgical removal of stone.
Uric acid (5%)	↓pH	Radiolucent (cannot be seen on X-ray)	Rhomboid or rosettes	• Risk factors: ↓ urine volume, dry climates and acidic pH. • Visible on CT and ultrasound, but not X-ray. • Strong association with hyperuricemia (e.g. gout). • Treatment: alkalinization of urine.
Cystine (1%)	↓pH	Radiopaque	Hexagonal	• Mostly seen in children, secondary to cystinuria. Can form staghorn calculi. • Treatment: alkalinization of urine and hydration.

- **Hyperparathyroidism:**
  - **Primary hyperparathyroidism:**
    - ✓ Usually an adenoma.
    - ✓ Characterized by: hypercalcemia, hypercalciuria (renal stones), hypophosphatemia and ↑parathyroid hormone.
    - ✓ Most often asymptomatic but may present with:
      - ❖ Weakness and constipation.
      - ❖ Abdominal/flank pain.
      - ❖ Depression!
  - **Secondary hyperparathyroidism:**
    - ✓ Secondary hyperplasia due to decreased gut calcium absorption and increased phosphate levels.
    - ✓ Most often in chronic renal disease.
    - ✓ Characterized by: hypocalcemia and hyperphosphatemia.
  - **Tertiary hyperparathyroidism:**
    - ✓ Refractory (autonomous) hyperparathyroidism resulting from chronic renal disease.
    - ✓ Characterized by: ↑↑PTH and ↑Ca^{2+}.