



RUN THE LIST

# Hypercalcemia

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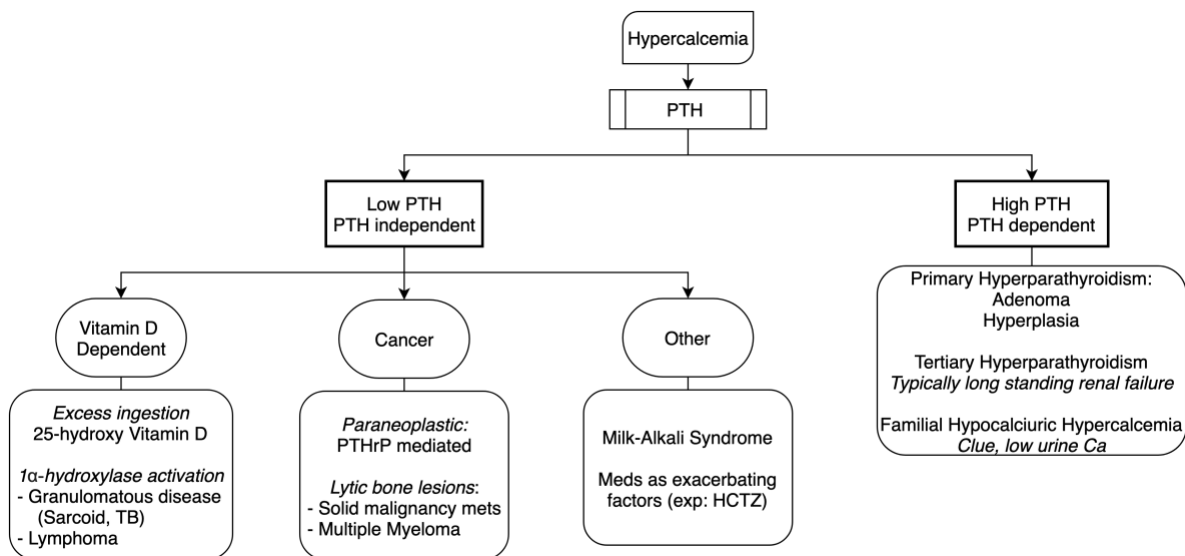
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- Calcium Physiology (reference range typically 8.6 – 10.2)
  - Total Ca = ionized (free & regulated by PTH) + protein bound
  - PTH increases calcium by acting on:
    - Bones: increases bone resorption by osteoclasts
    - Kidney: increases Ca reabsorption + increases  $\text{PO}_4$  excretion, increases activity of  $1\alpha$ -hydroxylase which is the enzyme that activates vitamin D
    - GI: indirect increase in Ca absorption via vitamin D activation

- DDx: Also see [Penn Frameworks](#) and [CPSolvers schema](#)

**Outpatient:** primary hyperparathyroidism = most common. **Inpatient:** think malignancy



- History: *Pearl: typically, don't get any symptoms until  $\text{Ca} > \approx 11.5$ , severe symptoms at  $> \approx 13$* 
  - Bones** (pain, fragility), **stones** (nephrolithiasis), **groans** (abdominal pain, constipation), **psychiatric overtones** (fatigue, cognitive dysfunction, depression).
  - Polyuria/Polydipsia: due to a nephrogenic DI like state
- Evaluation:
  - 1<sup>st</sup>: Repeat test and [calculate corrected Ca](#) for albumin level. *Note: ionized calcium has rapid sample processing requirements*
  - Initial workup: PTH,  $\text{PO}_4$ , Albumin, 25-hydroxyvitamin D - *Pearl: [Chloride/ \$\text{PO}\_4 \geq 33\$](#)  is suggestive of a PTH-mediated process*
  - If PTH suppressed (appropriate): PTHrP, calcitriol (1,25-dihydroxyvitamin D), lytic lesions (SPEP, bone imaging), granulomatous disease (CXR, ACE levels)
  - If PTH elevated: consider FHH vs. primary Hyperparathyroidism. Imaging of neck is useful if patient is surgical candidate
- Management:
  - Indications for surgery: symptomatic, [criteria](#) from American Association of Endocrine Surgeons
  - 1/3 of patients initially not meeting surgical criteria will develop an indication in the next 10 years. Follow-up is key!
  - Medical management: Fluid intake, avoid excess Ca intake, avoid contributing meds
    - For poor surgical candidates: cinacalcet (calcimimetic), bisphosphonates, denosumab
    - Severe:  $\text{Ca} > \approx 14$  consider IVF, bisphosphonates, calcitonin, denosumab