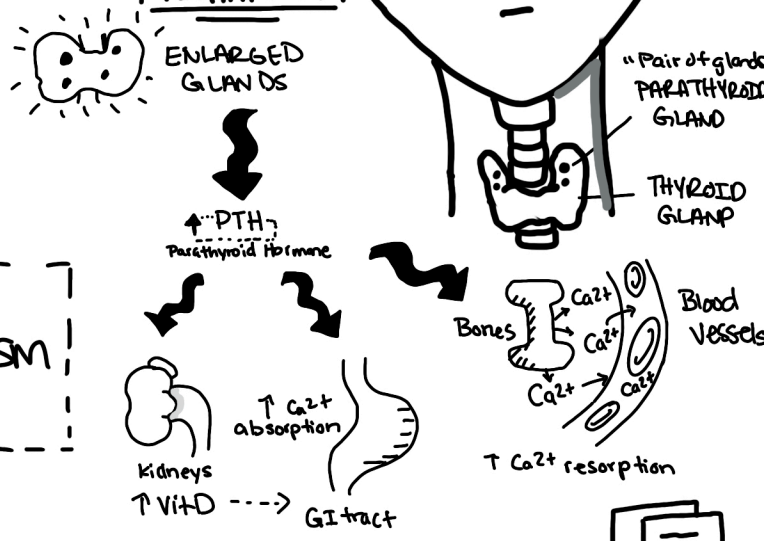


# HYPERCALCEMIA

↑  $Ca^{2+}$

## MECHANISM



## DEFINITION

SERUM  $Ca^{2+}$ : > 10.5 mg/dL  
 Ionized  $Ca^{2+}$ : > 5.5 mg/dL (1.4 mmol/L)

## CAUSES

- ▶ PRIMARY HYPERPARATHYROIDISM
- ▶ MALIGNANCY

## SYMPTOMS/SIGNS

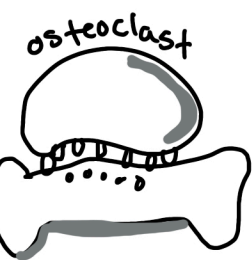
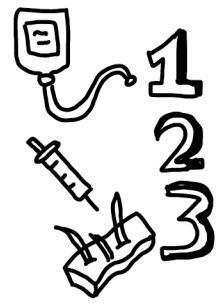
- ▶ STONES: Kidney stones (↑  $Ca^{2+}$  causes precipitation)
- ▶ BONES: Bone Pain (weaken bones)
- ▶ GROANS: Abdominal pain (N/V, constipation)
- ▶ PSYCHIATRIC MOANS: Depression, Confusion, Agitation
- ▶ EKG CHANGES: Arrhythmias

## WORK UPS

- LABS
- ① Sr  $Ca^{2+}$  I/LS + Albumin I/LS  
 Corrected = Every 1 g/dL ↓  $Ca^{2+}$   
 Albumin from 4g/dL ↑  $Ca^{2+}$  by 0.8 mg/dL
  - ②  $K^+$ , Phosp, Scr
  - ③ Thyroid hormones, PTH
  - ④ EKG

## MANAGEMENT

- 1 IV FLUIDS: 250-500 cc/hr until euolemic then 100-150 cc/hr x 24 hrs
- 2 LASIX: Only when patient is volume overloaded (ex: CHF, CKD)
- 3 CALCITONIN:
  - ▶ ↓  $Ca^{2+}$  by 1 mg/dL
  - ▶ 4 units/kg SQ or IM q12hrs
  - ▶ Works rapidly (1-2 hrs) but efficacy is limited to first 48 hours
  - ▶ SE: nausea + hypersensitivity
- 4 BIPHOSPHONATES: inhibits osteoclast
  - ⇒ Pamidronate 60-90 mg IV x1
  - ⇒ Zoledronic acid 4 mg IV over 15min



- ✓ Renal function
- PROS MOST EFFECTIVE ↓  $Ca^{2+}$
- CONS DELAYED ONSET (2-4 days)

## ALTERNATIVES [OUTPATIENT]

- ★ Calcimimetics [mimics  $Ca^{2+}$  to ↓ PTH levels]
  - ▶ Cinacalcet
    - 30 mg PO BID titrated every 2-4 weeks
- ★ Denosumab
  - ▶ Inhibits NF- $\kappa$ B + RANKL (mediator in osteoclast survival)
  - ▶ 120mg SQ every 4 weeks
- ★ Corticosteroids
  - ▶ Reduce GI calcium absorption
  - ▶ Dose: 40-60mg of prednisone
  - ▶ Cons: slow onset and more adverse effects

## GOALS

- ▶ Corrected  $Ca^{2+}$ : 8.4-9.5 mg/dL
- ▶ Phosp: 3.5-5.5 mg/dL