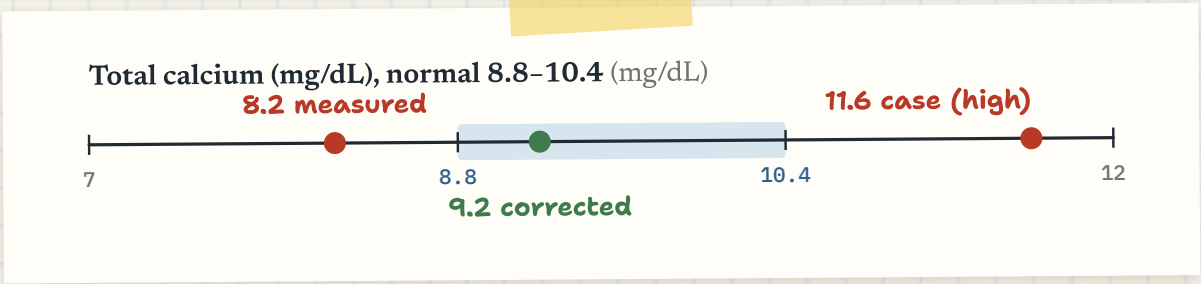
Calcium and phosphate in one card

PTH, vitamin D and calcitonin across bone, kidney and gut



Step by step

1. Low calcium releases PTH; high calcium shuts it off.
2. Bone: osteoblasts signal osteoclasts via RANK ligand.
3. Kidney: distal calcium in, proximal phosphate out.
4. PTH switches on 1α-hydroxylase: calcitriol.
5. Gut: calcitriol raises calcium and phosphate absorption.

ALBUMIN-CORRECTED CALCIUM

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corrected Ca = measured Ca +
(4 − albumin) × 0.8
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Example: 8.2 with albumin 2.8 gives about 9.2 mg/dL.

Condition	Ca	Phos	PTH
Primary hyperparathyroidism	High	Low	High
Hypoparathyroidism	Low	High	Low
Kidney failure	Low	High	High
Vitamin D deficiency	Low / low-normal	Low	High

Lab patterns

Who does what

PTH: calcium up, phosphate down

Calcitriol: calcium up, phosphate up

Vitamin D: skin → liver → kidney

Exam traps

- PTH lowers phosphate even though bone releases it: the kidney wastes it.
- The distal tubule retains calcium, not phosphate.
- Calcitonin responds to high calcium; its everyday role in humans is thought to be small.
- Total calcium moves with albumin: correct it.

Calcium homeostasis: PTH, vitamin D and calcitonin

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/endocrinology/calcium-homeostasis-pth-vitamin-d-and-calcitonin

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