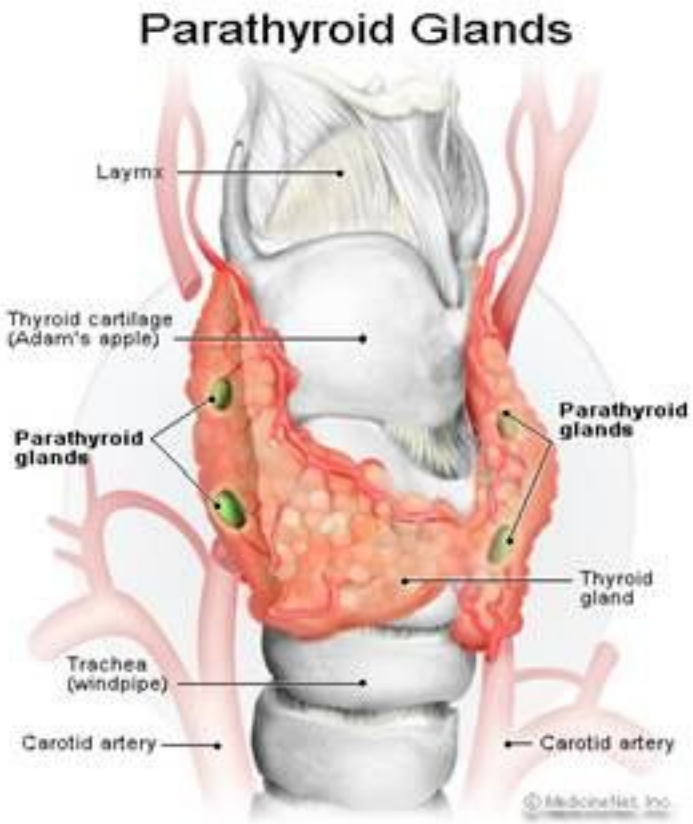
Calcium and Phosphate Metabolism



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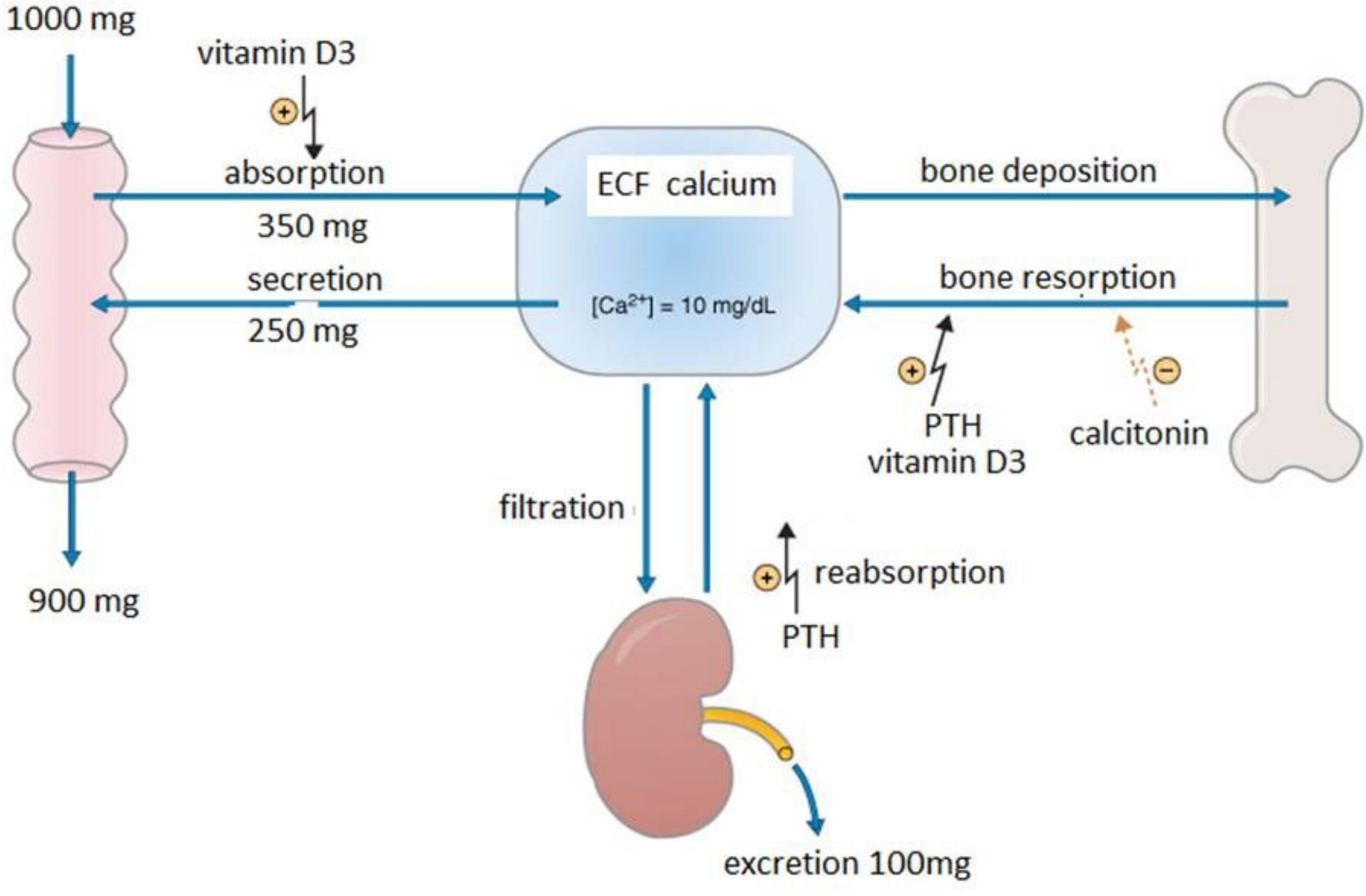
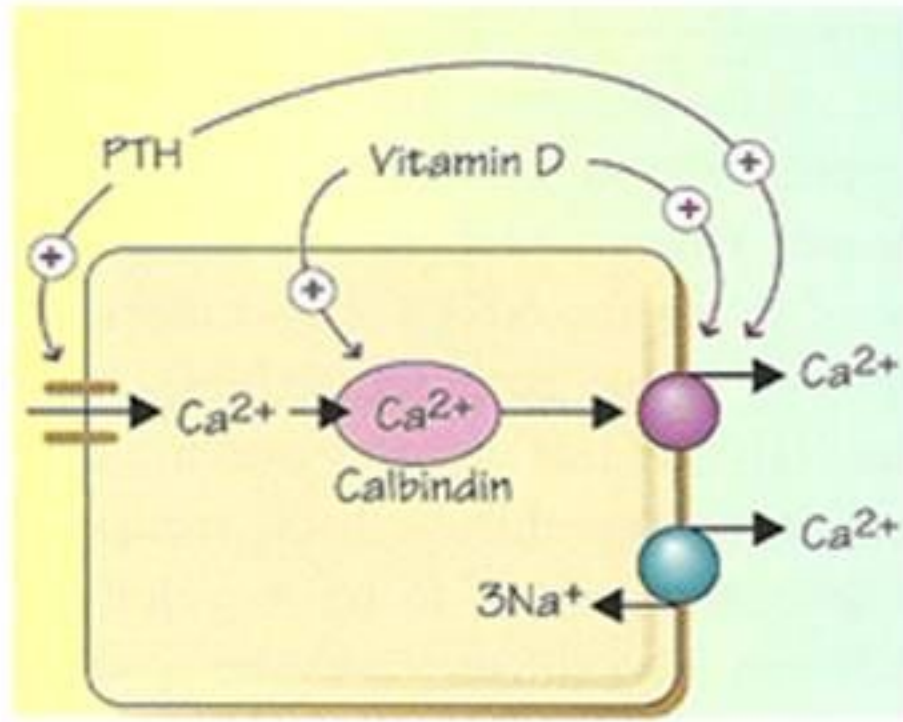
Overview of calcium homeostasis



Proximal tubule
70%

Loop of Henle
20%

Late distal tubule
& collecting duct
5-10%



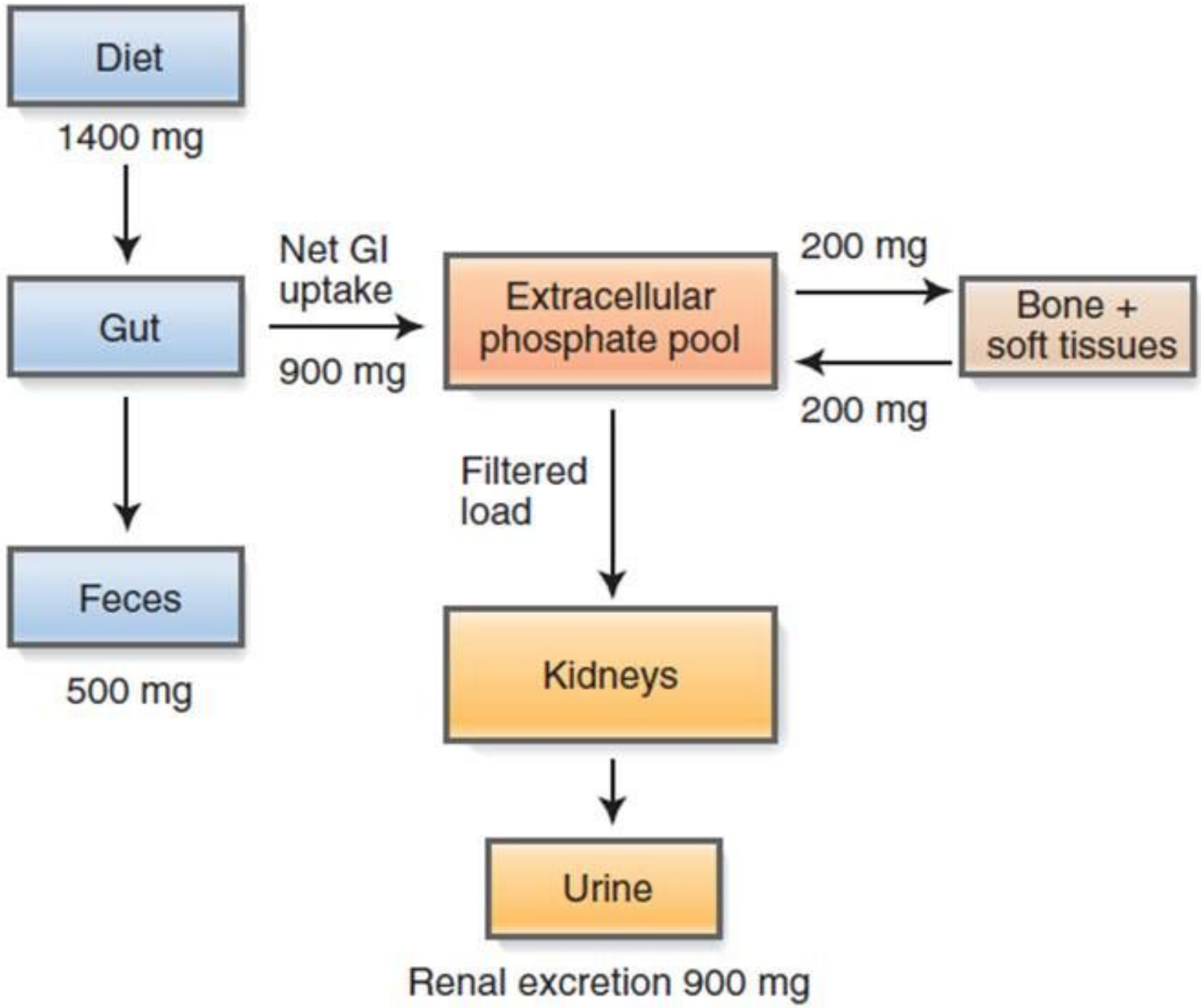
• phosphate

FINAL

- Approximately 85 % of the body's phosphate is stored in bones, 14 to 15 % is in the cells, and less than 1% is in ECF.

Phosphate occurs in two major forms in plasma, 1. 80% exists as alkaline phosphate (HPO_4^{2-}) 2. 20% exists as acid phosphate ($H_2PO_4^-$).

Overview of Phosphate homeostasis

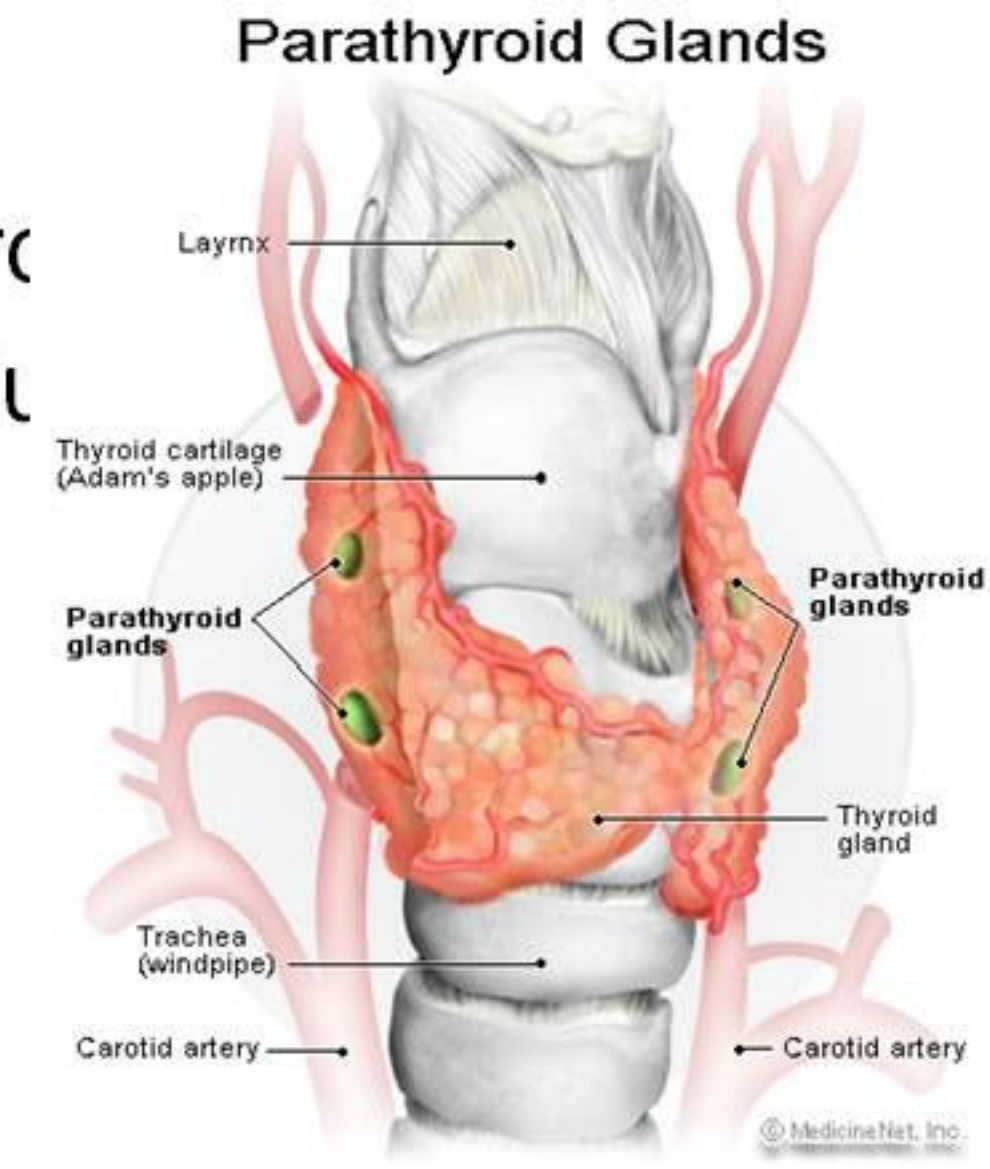


- ***Parathyroid Hormone***

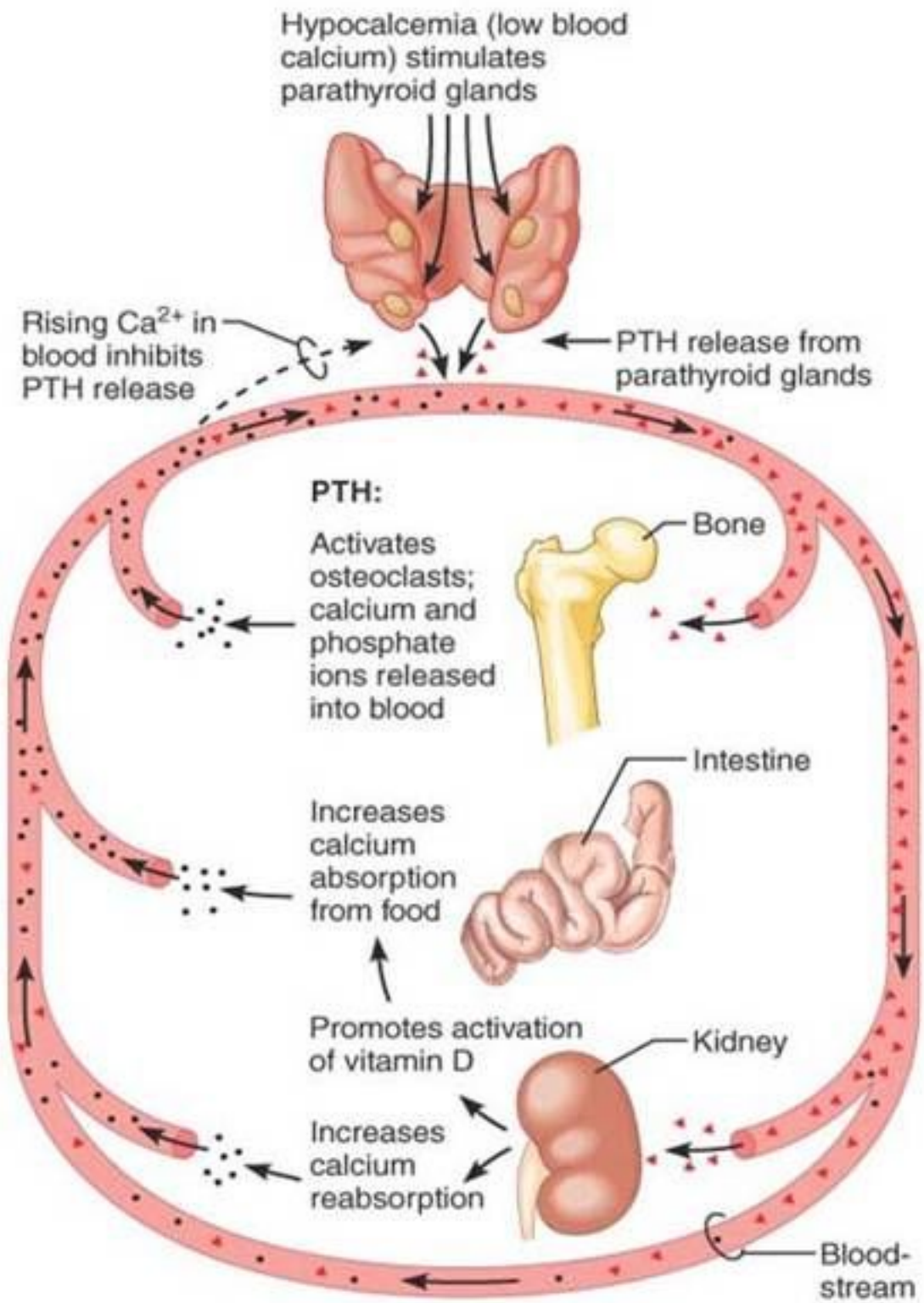
PTH is released from the parathyrc
response to a fall in serum calciu

Its main actions are:

- Acts on the bone to stimulate o steoclastic activity To release Ca
- Acts on the kidney to:
  - Increase Ca^{2+} reabsorption at the DCT and decrease PO_4^{2-} reabsorption
  - Stimulates conversion of 25-hydroxyvitamin D to 1,25-dihydroxyvitamin D



Hypercalcaemia and Hypocalcaemia



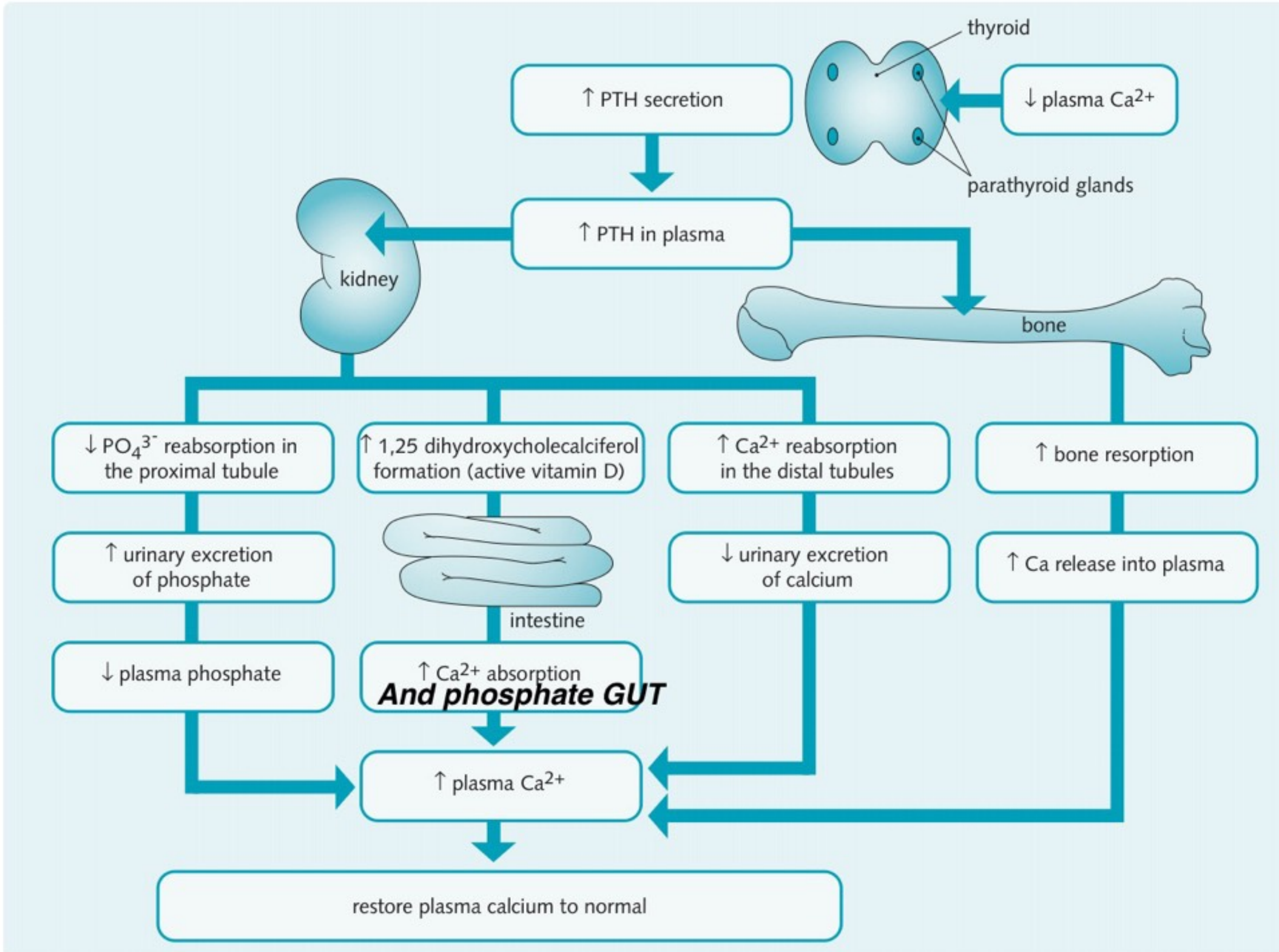
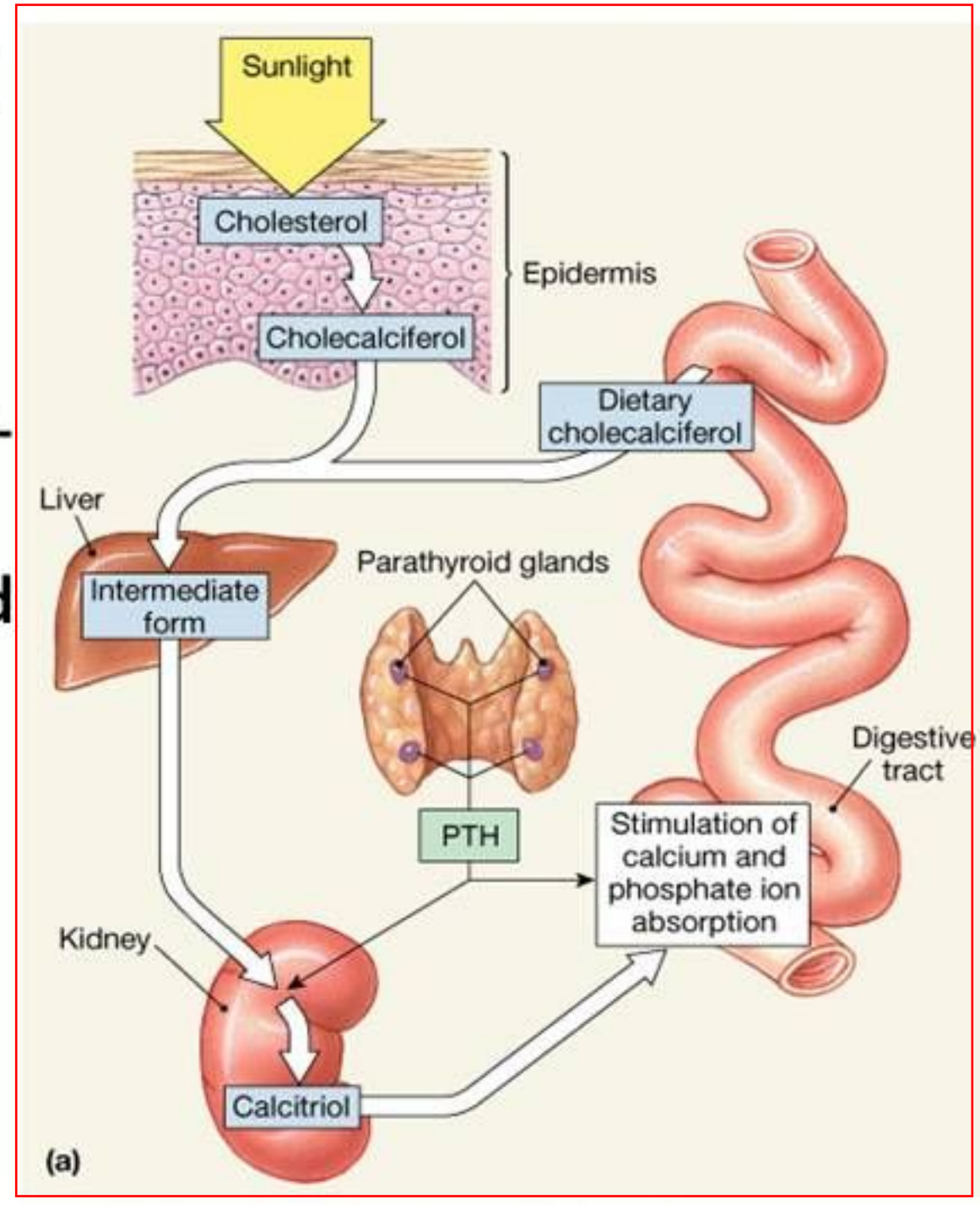


Fig. 3.10 Mechanisms of Ca^{2+} and phosphate homoeostasis. PTH, parathyroid hormone.

Vitamin D

- Increases the amount of calcium and phosphate uptaken at the gut
- Promotes osteoblastic activity
- Acts on the kidney to:
  - ❖ Inhibit formation of 1,25-dihydroxyvitamin D
  - ❖ Minimal effect of calcium and phosphate reabsorption

24,25-dihydroxyvitamin D



Hypercalcaemia

The main causes are:

- Hyperparathyroidism

primary hyperparathyroidism

Secondary hyperparathyroidism

tertiary hyperparathyroidism

- Maligancy is the second most common cause.

Substances like PTH

* ***multible myloma***

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Hypocalcaemia

The main causes are:

- Vitamin D deficiency
- Hypoparathyroidism

primary causes

secondary (such as iron deposition or autoimmune diseases).

**** Renal failure***

Renal Calculi