

1) Differentiate the Action of parathyroid hormone and vit D on Ca^{2+} Metabolism.

ACTION OF PARATHORHME:

- Primary Action is to maintain blood Ca^{2+} level 9-11 mg/dL.
- Mainly Act on: Bones, Kidney, Gastrointestinal tract.

BONES:

- PTH Act on the Receptors present in osteoblast of osteoclasts.
- PTH cause demineralization through osteoclast.

PTH induces pyrophosphatase in osteoclasts.

↓
no. of osteoclasts are increased

↓
Release lactate into surrounding medium

↓
It solubilize Ca .

- PTH Also secrete collagenase from osteoclasts.
 - cause loss of matrix and bone Resorption.
 - Hucopolysaccharides and hydroxy proline & excreted through urine.
 - PTH Also Act on osteoblast → Inhibit synthesis of collagen by high con.
- ⇒ Net eff of PTH in bone is ↑ in bone mass in lower conc & ↓ in bone mass in higher conc.

KIDNEY: PTH Receptors present in PCT & DCT (epithelial cells).

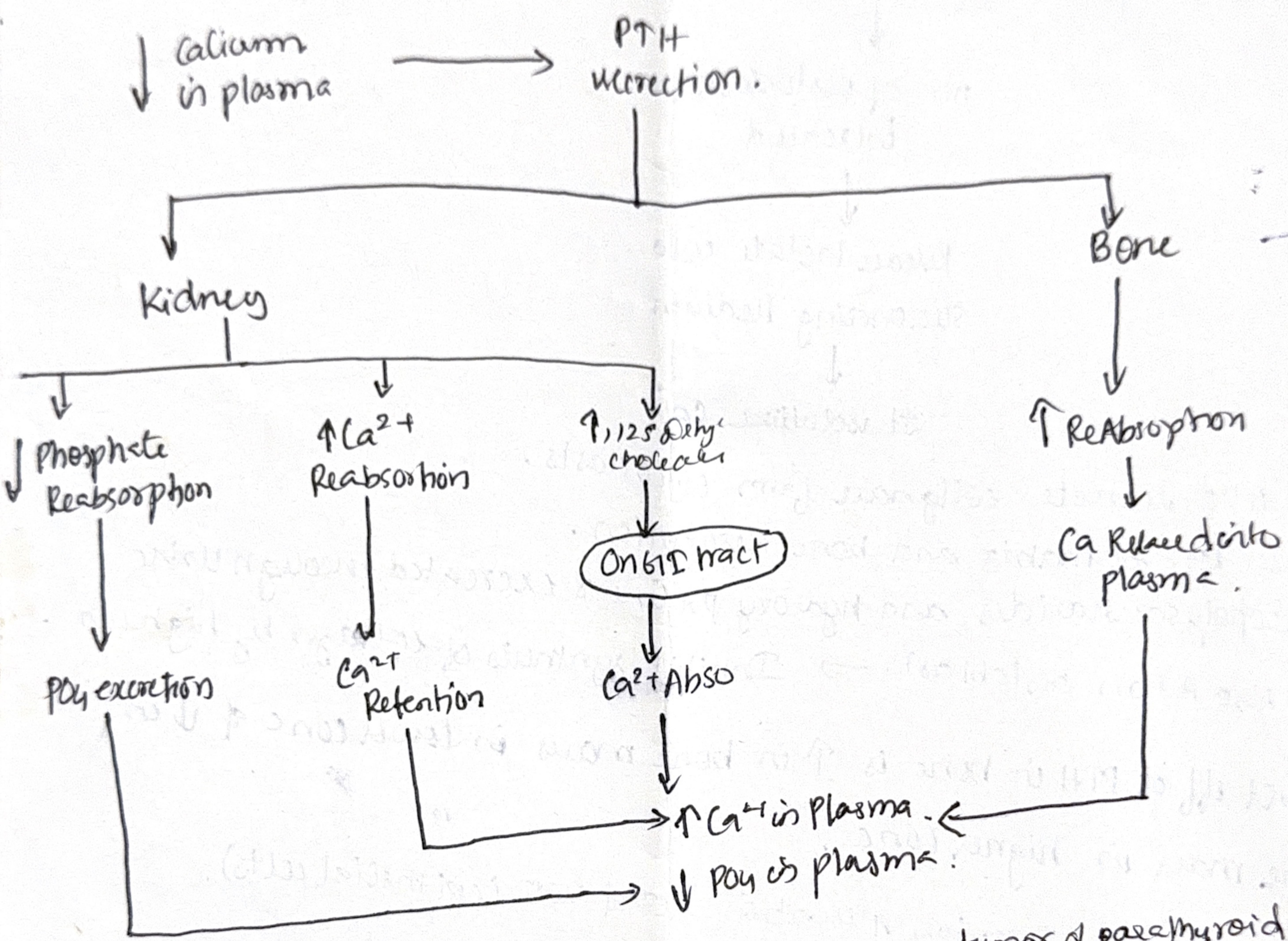
Major effect:

- ⇒ ↑ Reabsorption Ca .
- ⇒ ↑ Reabsorption of PO_4 .
- ⇒ Stimulate 1,25-dihydroxycholecalciferol.
- ⇒ ↑ Reabsorption Ca by Ca is Reabsorbed in PCT & thick Ascending limb of loop of Henle. It Also ↓ the Ca^{2+} excretion to a very minimal quantity.

- ↓ Reabsorption of phosphate
→ Mainly Act on PCT.
→ prevent Ca-phosphate salts to precipitate.
- stimulation of 1,25-Dihydroxycalciferol.
→ PTH facilitates to the formation of Active vit D.
→ ↑ Ca Resorption from kidney, GIT & Bone

GIT

- ↑ Ca Absorption, Most Indirect.



APPLIED ASPECT:

Hyperparathyroidism → PTH is excess → 1° → tumor of parathyroid gland
 → 2° → chronic renal disease

Tetany → severe hypoparathyroidism.

Signs → choreiform signs.
 Carpal pedal spasm.

Vitamin D:

It ↑ the Ca^{++} level by Acting on PTHrP kidney & bone.

In BONE:

- ↑ Osteoblast.
- Stimulate osteoblast to secrete ALP → local con of PO_4 ↑ used.
- Ionic product of Ca & P is ↑ used → ↑ mineralization of bone.

INTESTINE:

- Promote Absorption of Ca & P from the Intestine.
- Induces the synthesis of calbindin in Intestine, ↑ Ca Absorption. Blood.

Lumen

Intestinal cell

Calcitriol - Receptor complex



Calcitriol - Receptor complex bind with DNA



Calbindin Ca^{++}

→ Ca^{++}

Calbindin.

KIDNEY:

↑ ReAbsorption of Ca & P by Renal tubules.

AA:

Rickets : → deficiency in children.

due to

- chronic liver disease
- chronic renal disease
- Inadequate Intake
- lack of exposure to sunlight.

1,25 dihydroxy vitamin D₃

