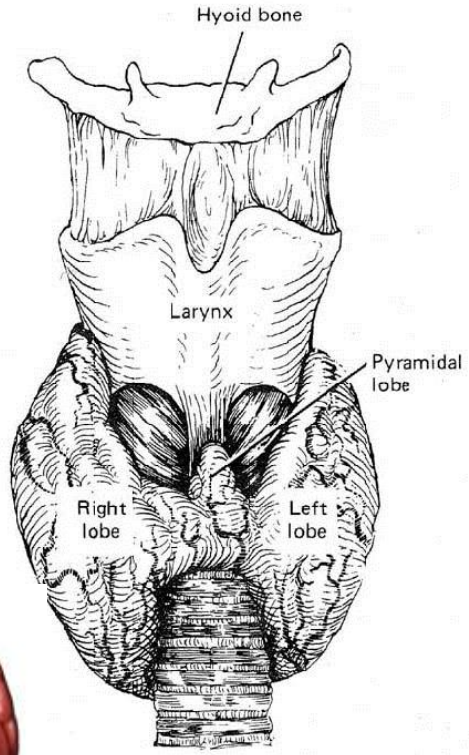
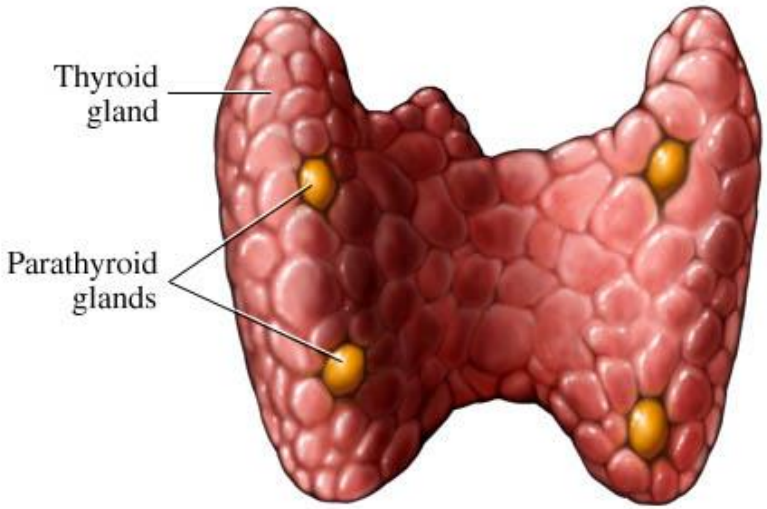
Parathyroid Glands Physiology

Dr. Nervana

- Four glands located on the posterior surface of the thyroid gland.
- Secrete the polypeptide hormone PTH.
- Decreased blood level of Ca^{++} → stimulates the Parathyroids to secrete PTH.





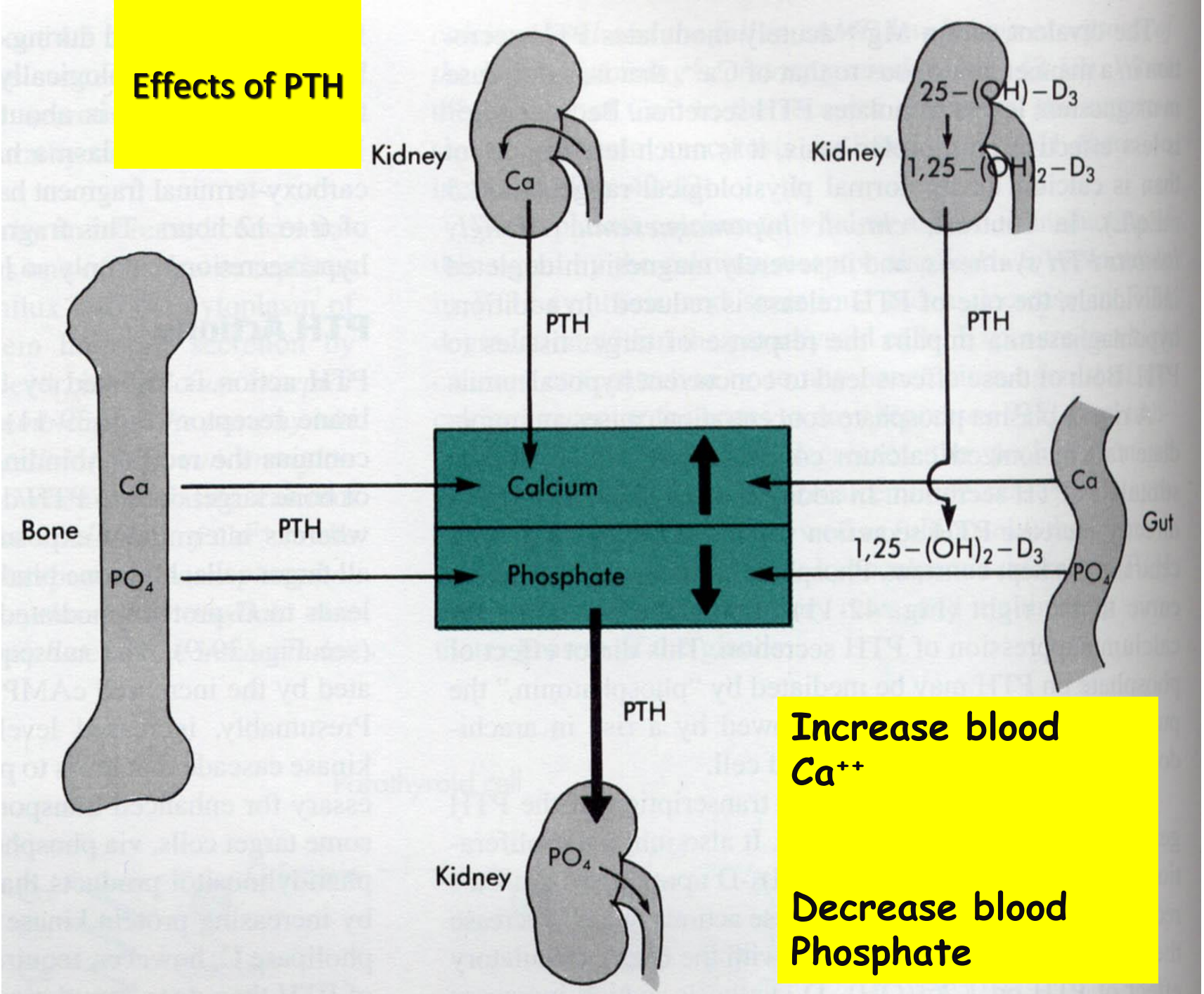
Regulation of PTH secretion

- Secretion of PTH is inversely related to plasma [Ca^{2+}] because →
- Plasma Ca^{2+} level is the dominant regulator of PTH secretion :

- Plasma Ca^{2+} level < 3.5 mg/dL → stimulates PTH secretion

- Plasmna Ca^{2+} level > 5.5 mg/dL → inhibits PTH secretion

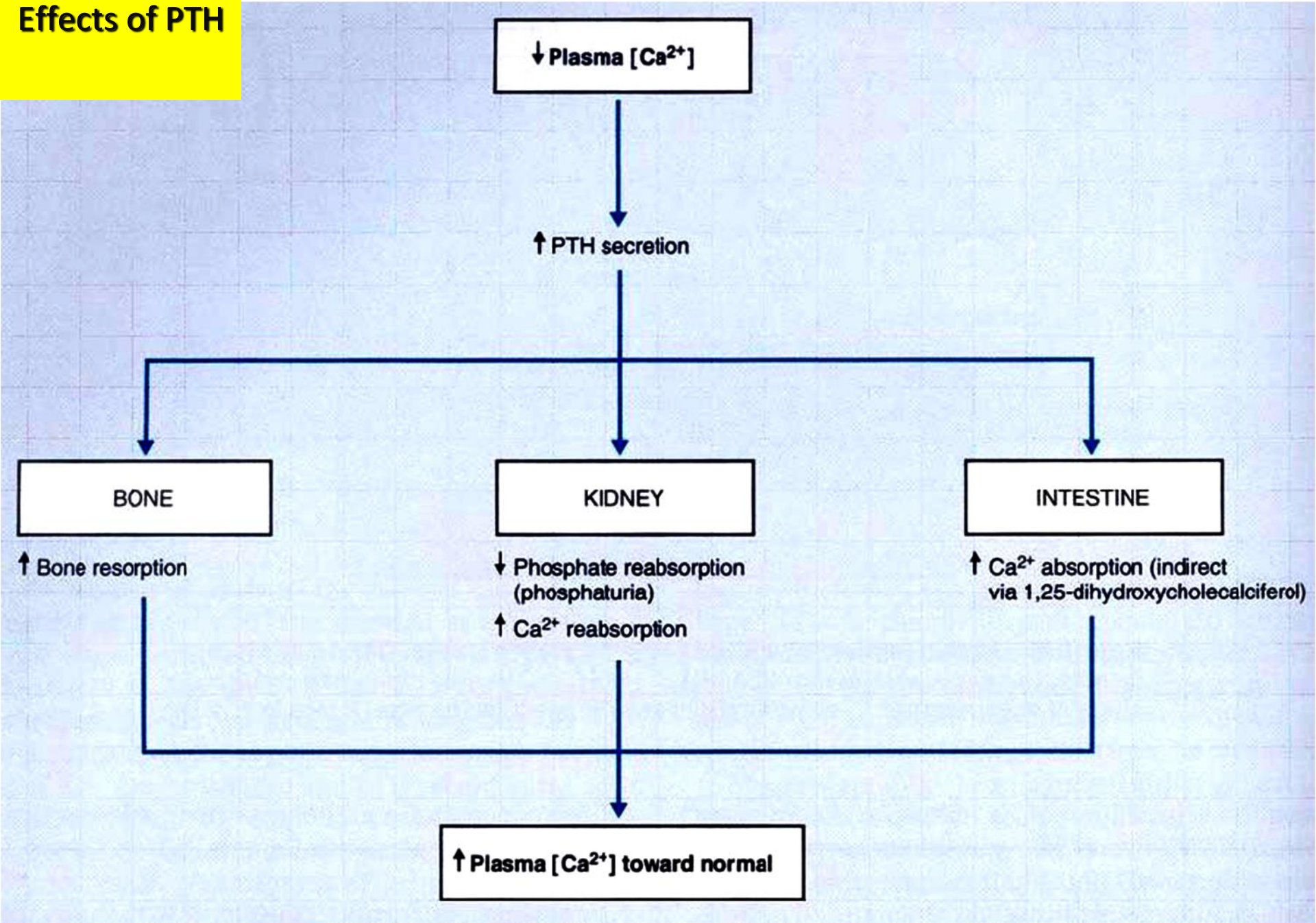
Effects of PTH



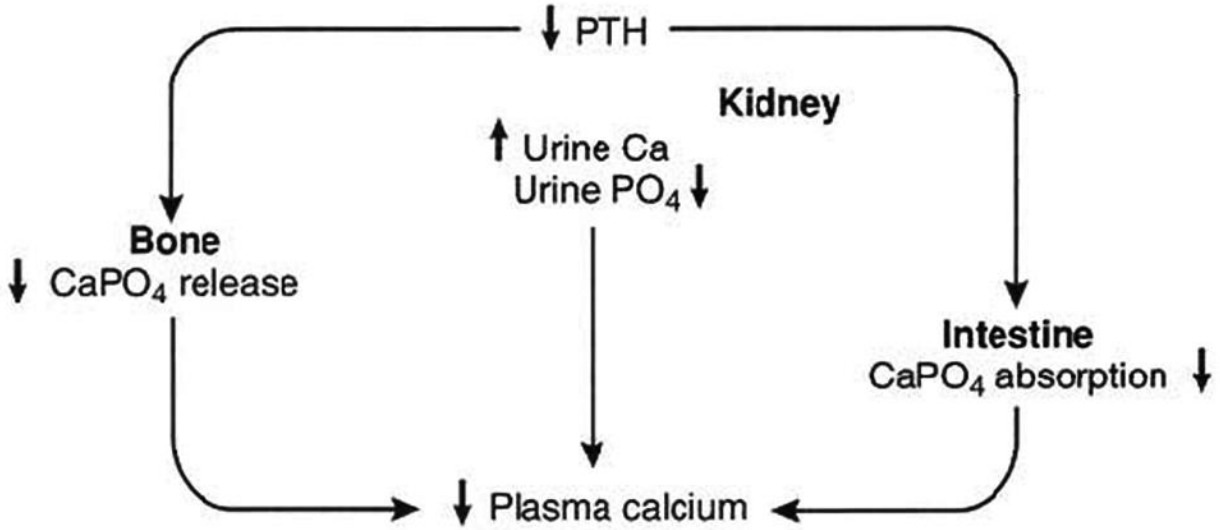
Increase blood Ca^{++}

Decrease blood Phosphate

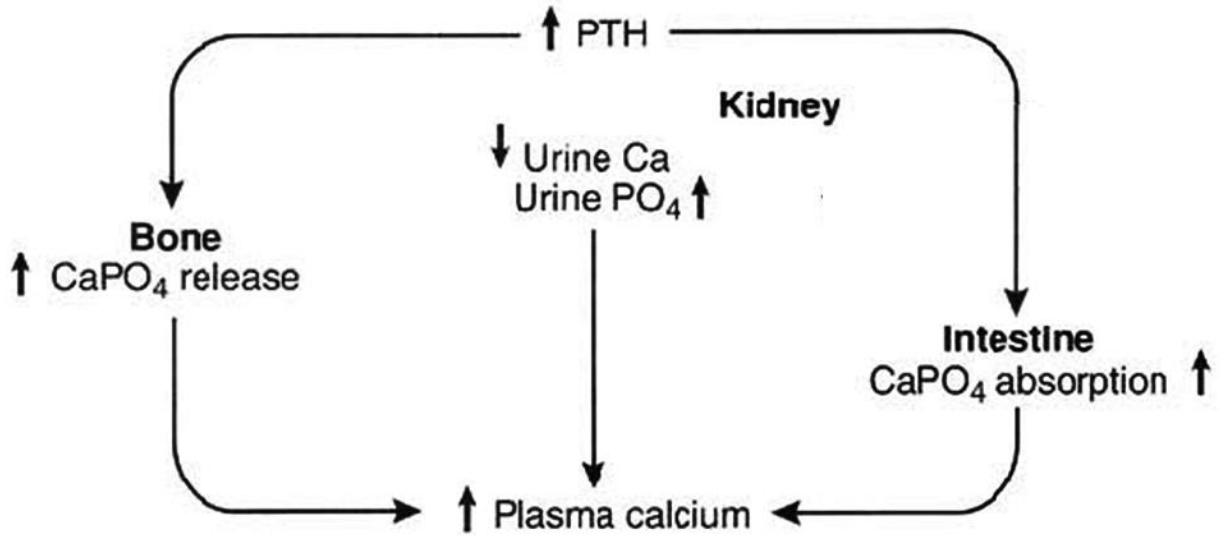
Effects of PTH



If plasma calcium increases...



If plasma calcium decreases...



Hypoparathyroidism

- Causes →

(1) Abnormal parathyroid gland →Reduced or absent synthesis of PTH

(2) Inadvertent (by mistake) removal of parathyroid gland during thyroid surgery

This may lead to **Tetany** (increased excitability & hypersensitivity of nerves and muscles) .

- Hypoparathyroidism is associated with hypocalcemia , but hypocalacemia can also accompany severe Vit D deficiency .

Signs & Symptoms of Hypoparathyroidism

- Positive Chvostek's (facial muscle twitch) sign
- Positive Trousseau's (carpal spasm) sign
- Delayed cardiac repolarization with prolongation of the QT interval
- Paresthesia
- Tetany

HYPO PARATHYROIDISM

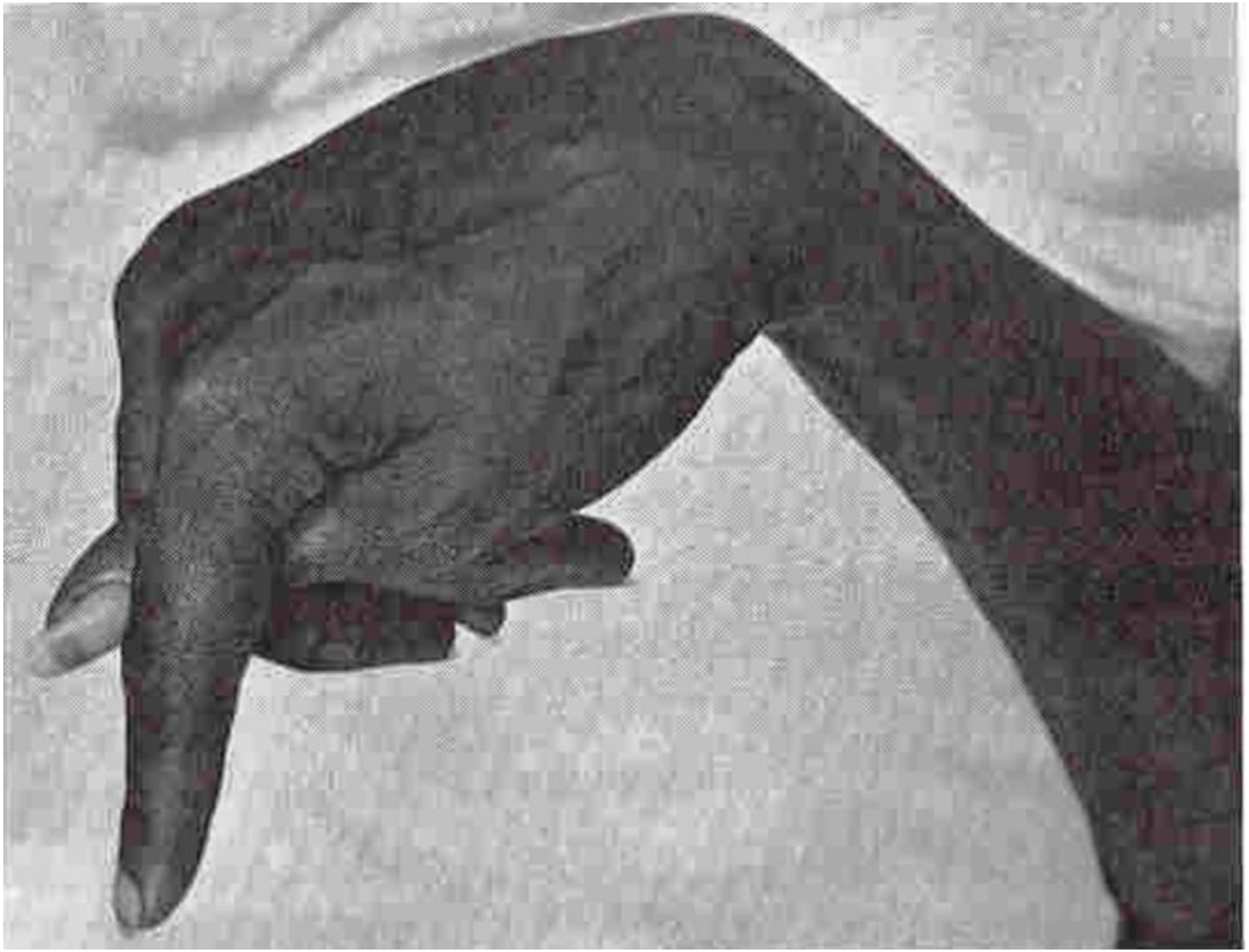
- Tetany can be overt or latent can be tested by :

Chvostek's sign: Tapping the facial nerve as it emerge from the parotid gland in front of the ear → causes contraction of facial muscles.

Trousseau's sign :

Arresting (stopping) blood flow to the forearm for for minutes (e.g., by sphygmomanometer) → causes flexion at the wrist, thumb and metacarpophalangeal joints.

Carpopedal spasm : sign of tetany



Hyperparathyroidism

- Adenoma (tumor) of parathyroid gland → excessive PTH secretion:

Hypercalcemia results from combined effects of increased :

(1) bone resorption.

(2) intestinal and renal calcium absorption.

Features of Hyperparathyroidism

- **Kidney** : polyuria , polydipsia , renal stones.
- **Bones** : Rickets or osteomalacia , **osteitis fibrosa cystica** (soft bones with cyst formation: in picture arrows point to cysts)
- **GIT** : nausea , vomiting , indigestion , constipation , peptic ulcer , pancreatitis.
- **Musculoskeletal** : proximal muscle weakness
- **CNS** : depression, memory loss, psychosis, coma