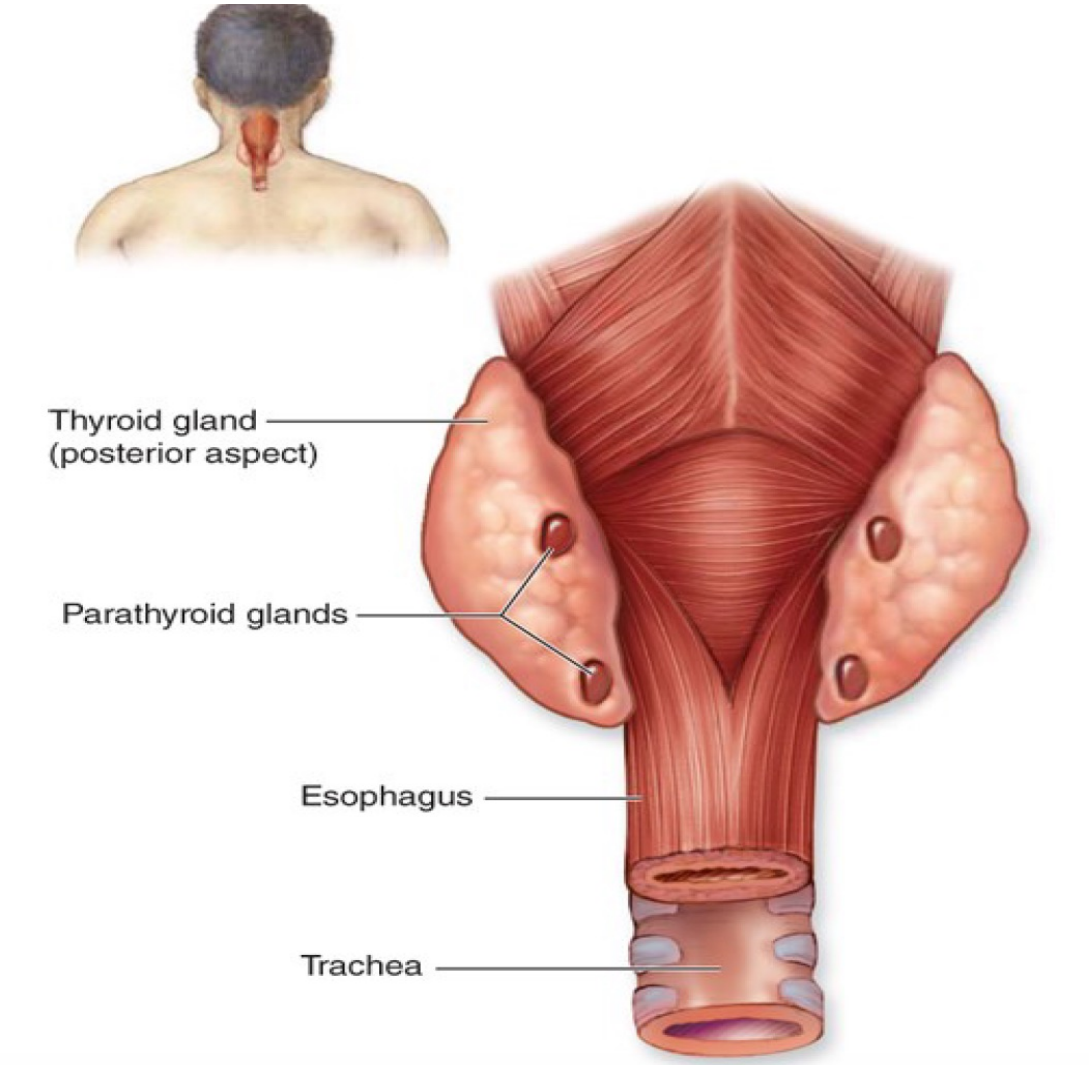
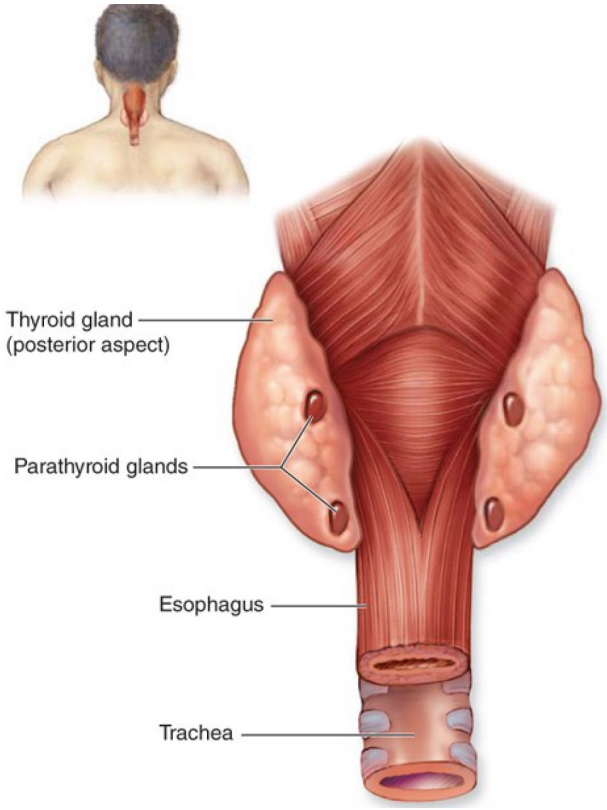
Parathyroid glands



Anatomy/ Characteristics

- Four small ovoid masses—3 × 6 mm—total weight 0.4 g.
- Located on the back of the thyroid gland, usually embedded in the gland's capsule.
- Closely related to the posterior border of the thyroid gland.

Increasing age---many secretory cells are replaced with adipocytes (>50%) of the gland in older people.



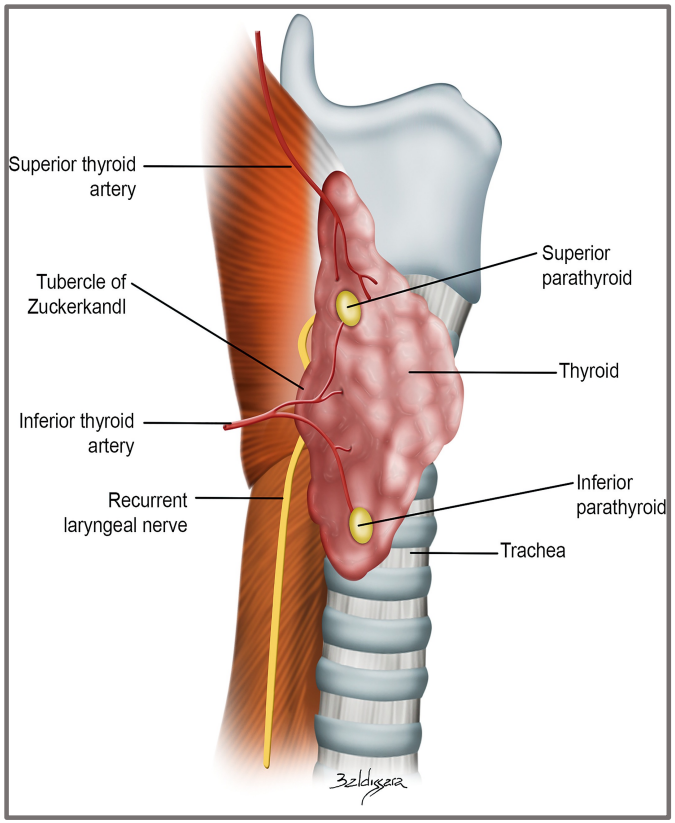
Blood supp./Venous D./ Lymph D.: same as thyroid

- The two superior parathyroid glands are the more constant in position--- lie at the level of the middle of the posterior border of the thyroid gland
- Contained within a thin capsule from which septa extend into the gland (septa).
- The two inferior parathyroid glands usually lie close to the inferior poles of the thyroid gland

Anatomy/ Embryology

Superior parathyroid glands

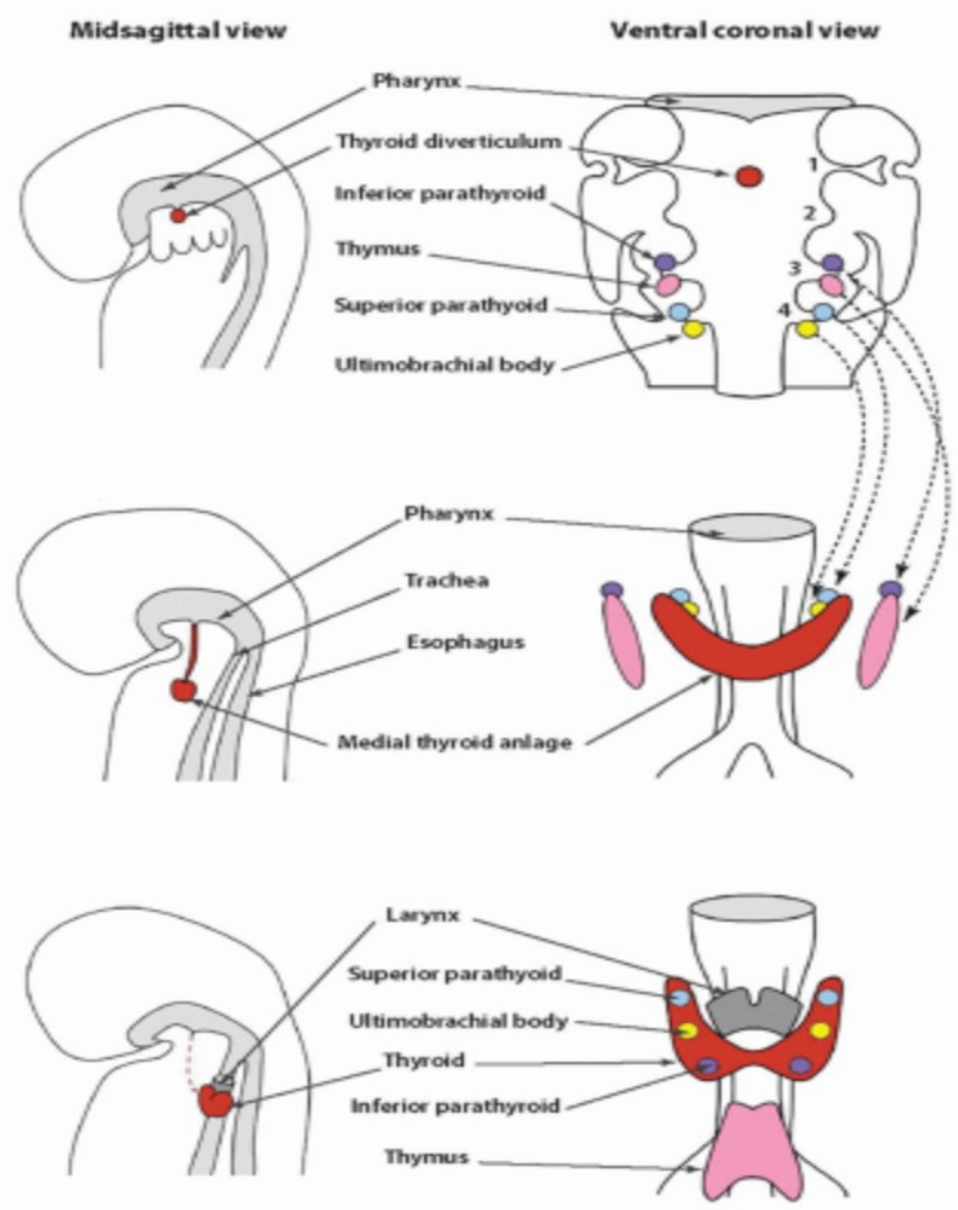
- Derived from the **fourth** pharyngeal pouch.
- Located near the posterolateral aspect of the superior pole of the thyroid, 1cm superior to the junction of the recurrent laryngeal nerve (RLN), and the inferior thyroid artery.



Inferior parathyroid glands

- Derived from the **third** pharyngeal pouch.
- Located near the inferior poles of the thyroid glands, within 1-2 cm of the insertion of the inferior thyroid artery into the inferior pole of the thyroid.
- Location is much more variable than the superiors, and can be intra-thyroidal or within the thymus or other mediastinal structures, and can even be found along the aortic arch (16%).

Embryology


Midsagittal view
Ventral coronal view
Pharynx
Thyroid diverticulum
Inferior parathyroid
Thymus
Superior parathyroid
Ultimobrachial body
1
2
3
4
Pharynx
Trachea
Esophagus
Medial thyroid anlage
Larynx
Superior parathyroid
Ultimobrachial body
Thyroid
Inferior parathyroid
Thymus

Structure

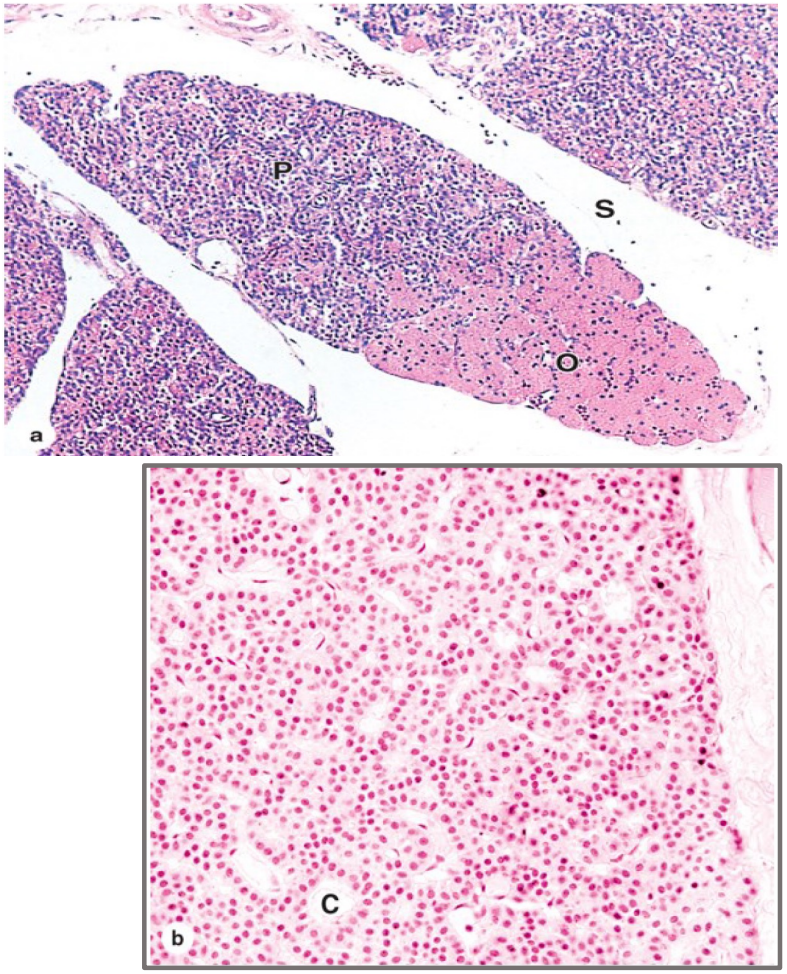
Chief cells:

- Manage the secretion of parathyroid hormone (**PTH**).
- Prominent Golgi apparatus and a developed endoplasmic reticulum (synthesis and secretion of the hormone)
- Smaller than the oxyphil cells, they are more abundant.

Oxyphil cells:

The purpose of these cells is not entirely understood.

Larger than the chief cells and seem to increase in number with age.



(a) A small lobe of parathyroid gland, septa (S),
(b) (b) Higher magnification shows that principal cells have round central nuclei and pale-staining cytoplasm

PTH major targets:

Intestine

Activated vitamin D promotes the absorption of calcium due to the increased formation of the calcium-binding protein in the intestinal epithelial cells.

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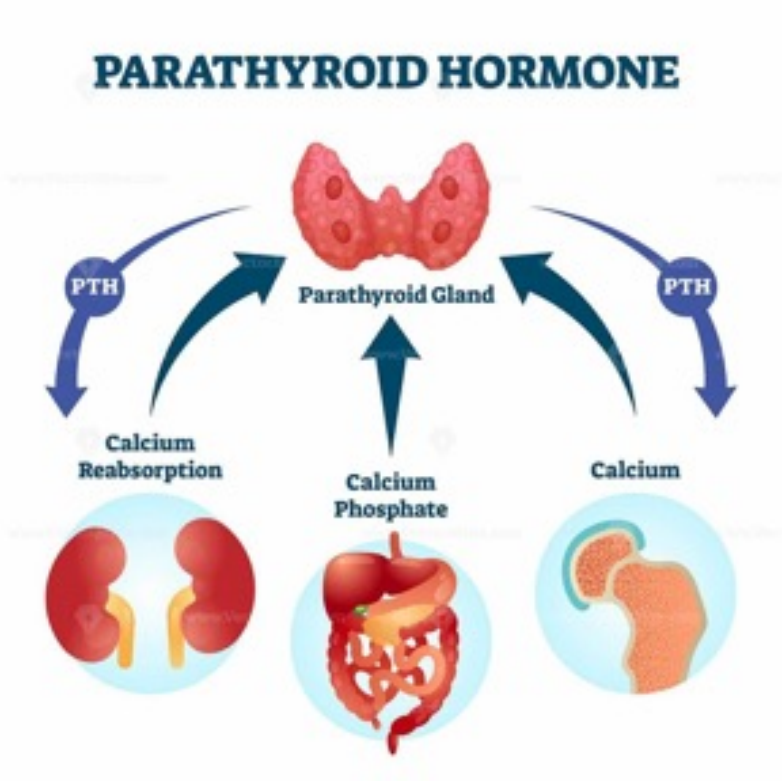

Kidney

PTH promotes calcium reabsorption and excretion of phosphate.

Osteoblasts/Osteoclasts

- Elevate the number and activity of osteoclasts.
- Resorption of the calcified bone matrix and release of Ca^{2+} increase the concentration of circulating Ca^{2+} -----suppresses PTH production.
- Opposite to that of calcitonin.

Surgical Considerations

- Have inconsistent locations between individuals and these locations can vary widely.
- Damage to the glands can occur during neck surgery, especially thyroidectomy.
- Preservation of as many parathyroid glands as possible.
- A single parathyroid gland should be sufficient!!!!!
- Lifelong calcium and vitamin D supplementation may be required, when?
- Removal of both pairs of the parathyroid gland is extremely uncommon.