

Histology of Endocrine Glands I

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Objective of Lecture

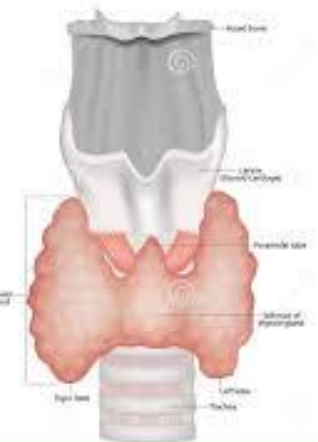
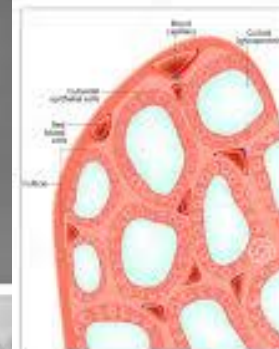
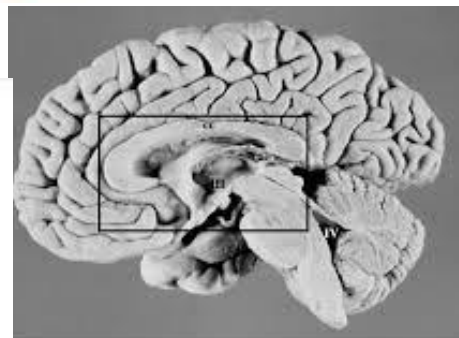
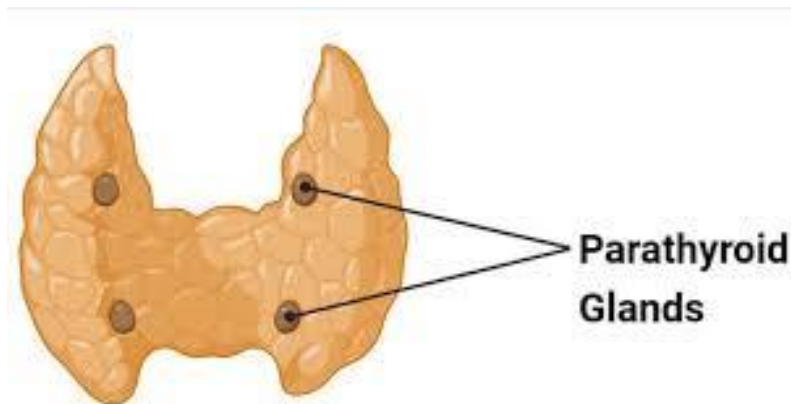
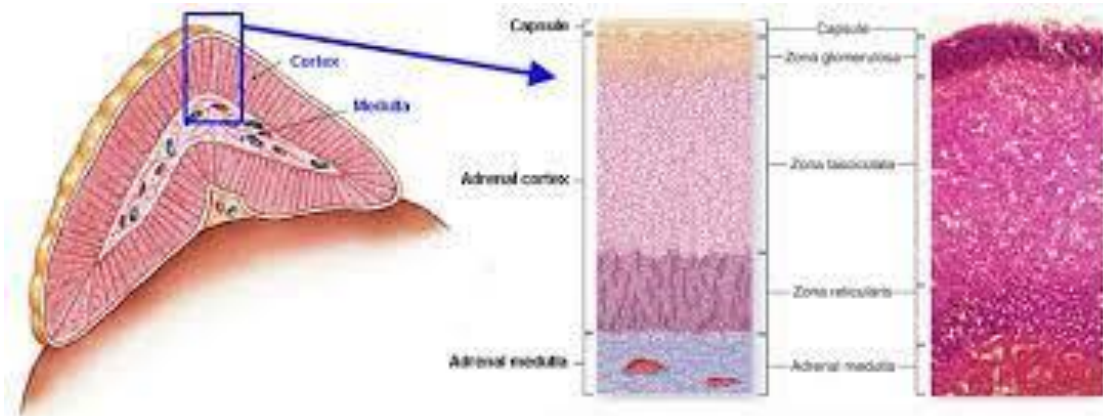
At the end of this lecture the students must be able to:

- **Understand the consent of endocrine glands.**
- **Able to determine the location of endocrine glands.**
- **Obtain knowledge about histological structure of endocrine glands (type of cells, shape of cells, shape and location of nucleus and effect of staining) .**

Structure of Endocrine System

The major glands that make up the endocrine system are the:

- Hypothalamus.
- Pituitary.
- Thyroid.
- Parathyroids.
- Adrenals.
- Pineal body.



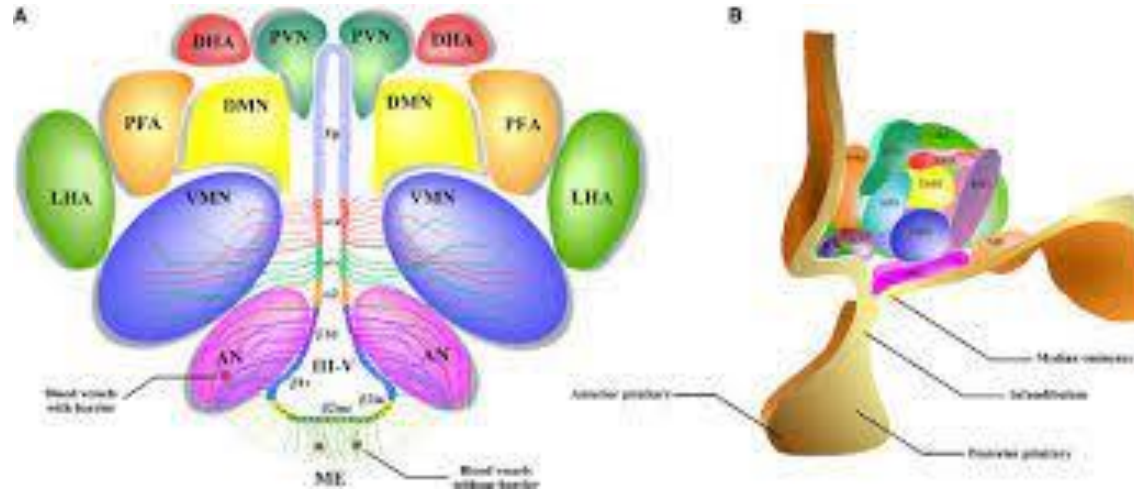
Hypothalamus (Introduction)

Anatomically:

Hypothalamus is a minute region, almost the size of an almond, present at the centre of the human brain, near the pituitary gland.

It consists of three main regions:

- The anterior region.
- The middle region.
- The posterior region.



Structure of Hypothalamus:

The structure of hypothalamus is made up of three main regions:

Anterior region: Is also known as the **supraoptic region**.

There are several small nuclei in the hypothalamus. The major hypothalamic nuclei include **supraoptic** and **paraventricular nuclei**.

Middle region: Is known as the **tuberal region**.

It consists of **ventromedial** and **arcuate nuclei**.

Posterior region: Is also known as **the mammillary region**.

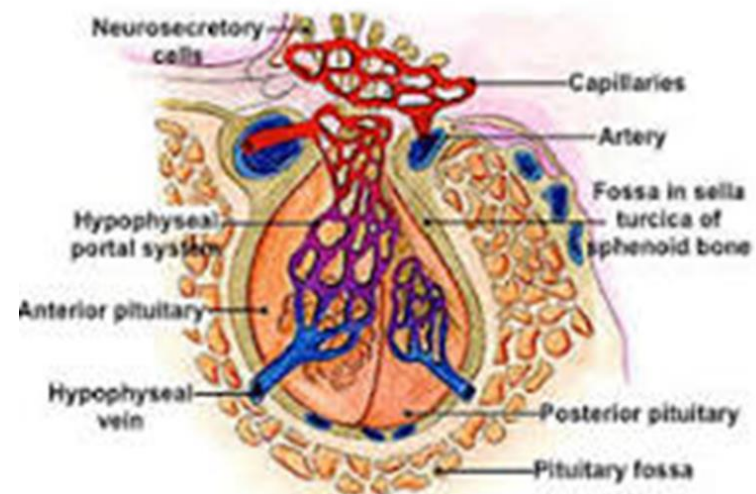
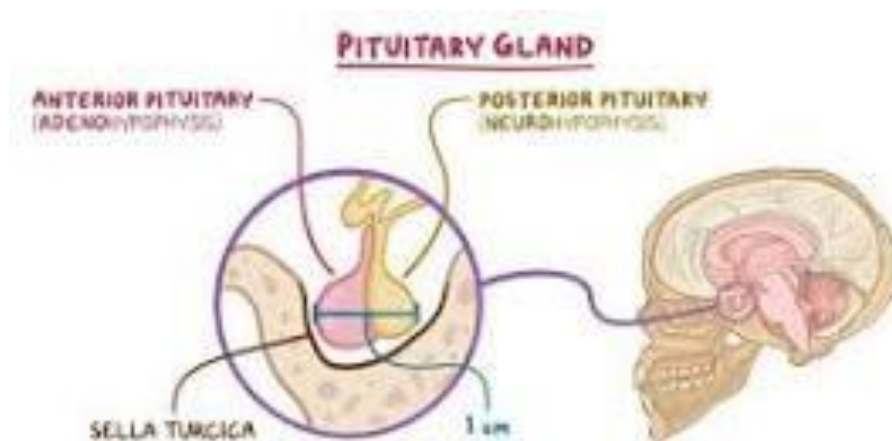
The major nuclei include **posterior hypothalamic nucleus** and **mammillary nuclei**.

Pituitary Glands

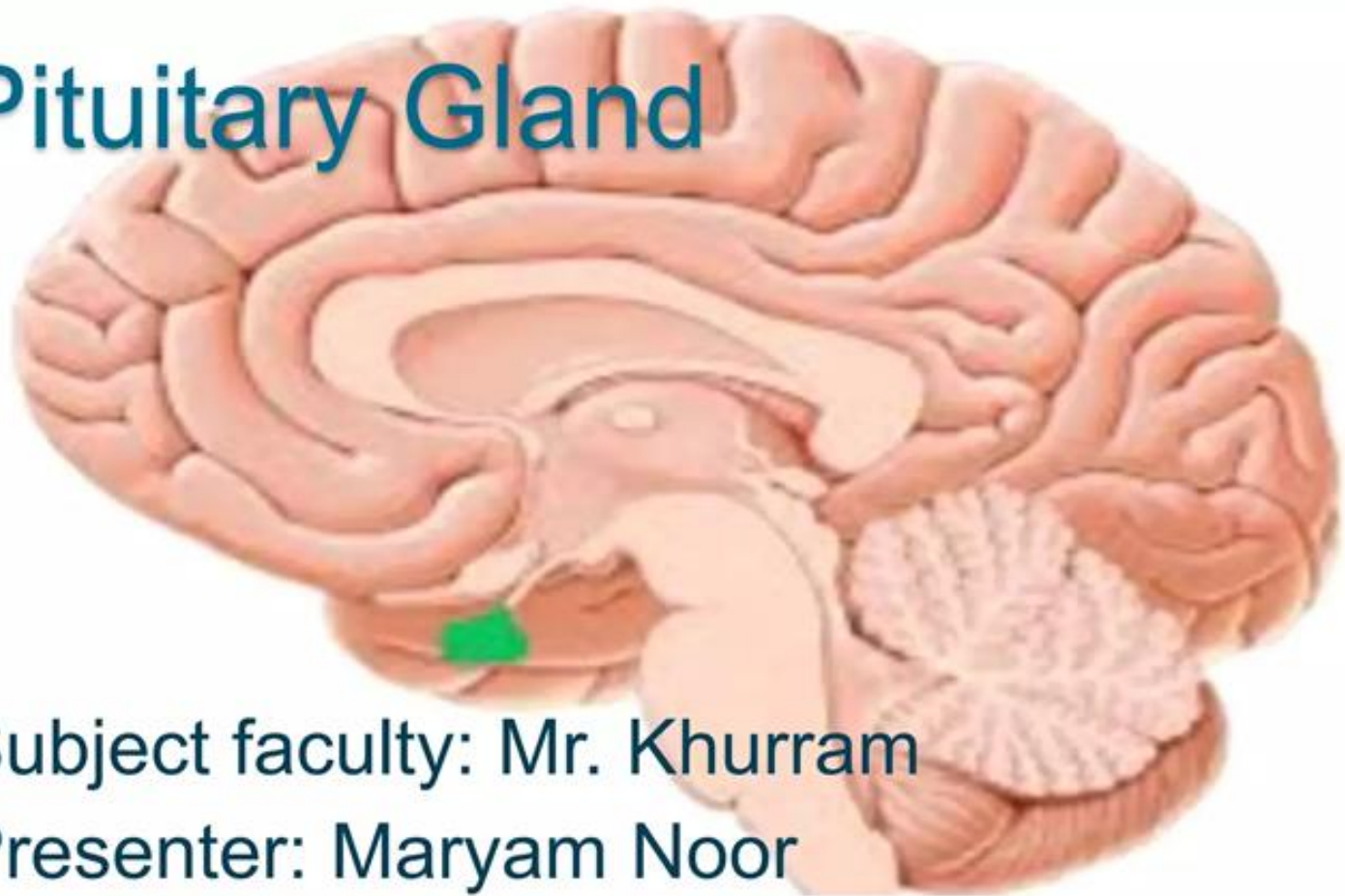
(Introduction)

Anatomically:

- The pituitary (also known as the hypophysis) is found at the base of the brain.
- About 1cm in diameter, lying beneath the third ventricle in a bony cavity (sella turcica) in the base of the skull.
- It has a complex structure divided into two lobes (**anterior & posterior**)



Pituitary Gland



Subject faculty: Mr. Khurram

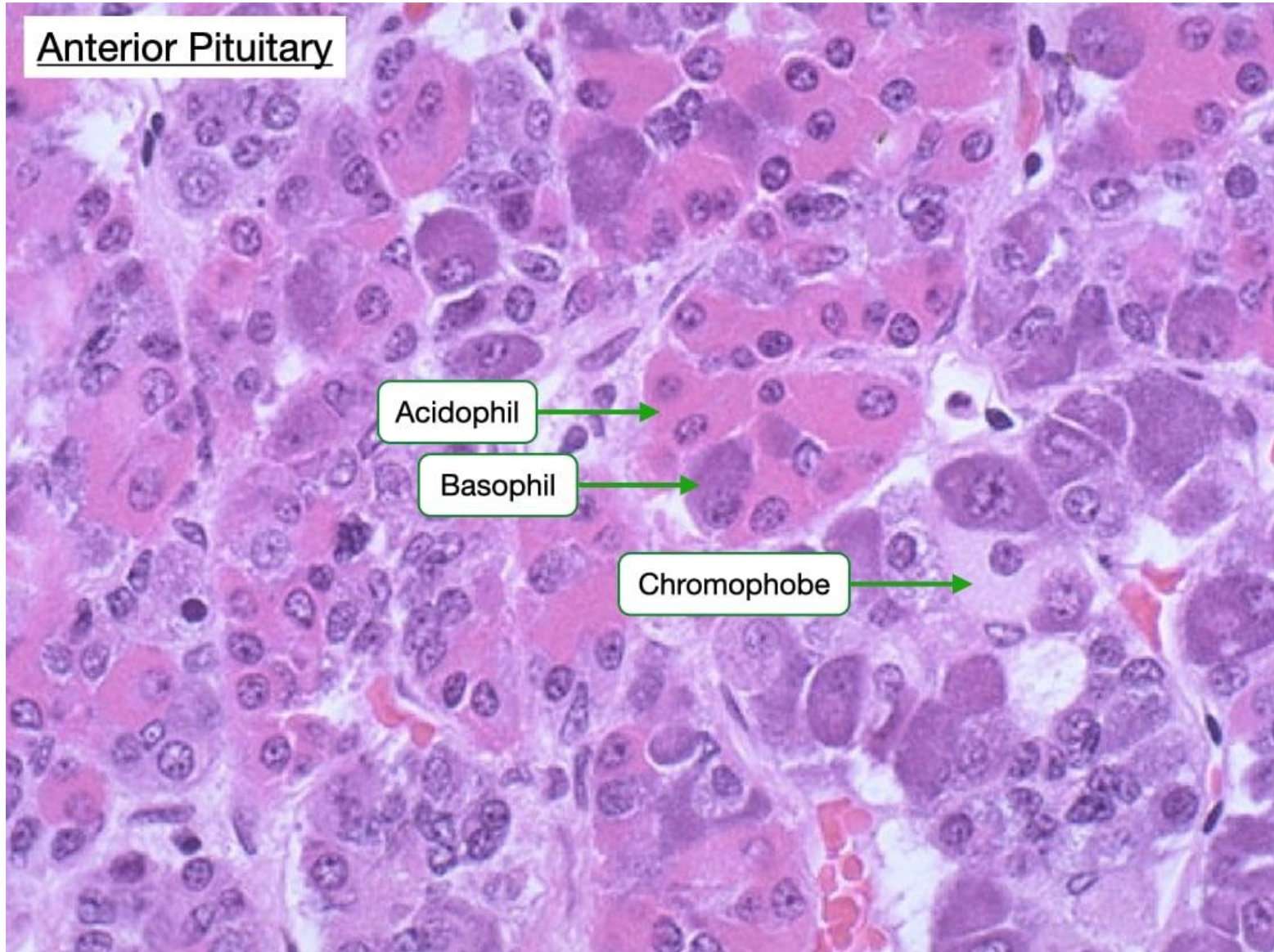
Presenter: Maryam Noor

Histological structure of pituitary gland:

Anterior Pituitary:

- There are two types of chromophils (cells which take up stain) called **acidophils** and **basophils**.
- **Acidophils** and **basophils** are divided into different classes of cells which have different secretory products and target organs.
- These cannot be distinguished by H&E or other histological stains, but can be stained specifically by immunohistochemical techniques.
- The capillaries in this gland are fenestrated, to enable passage of hormones from the secretory cells into the bloodstream.

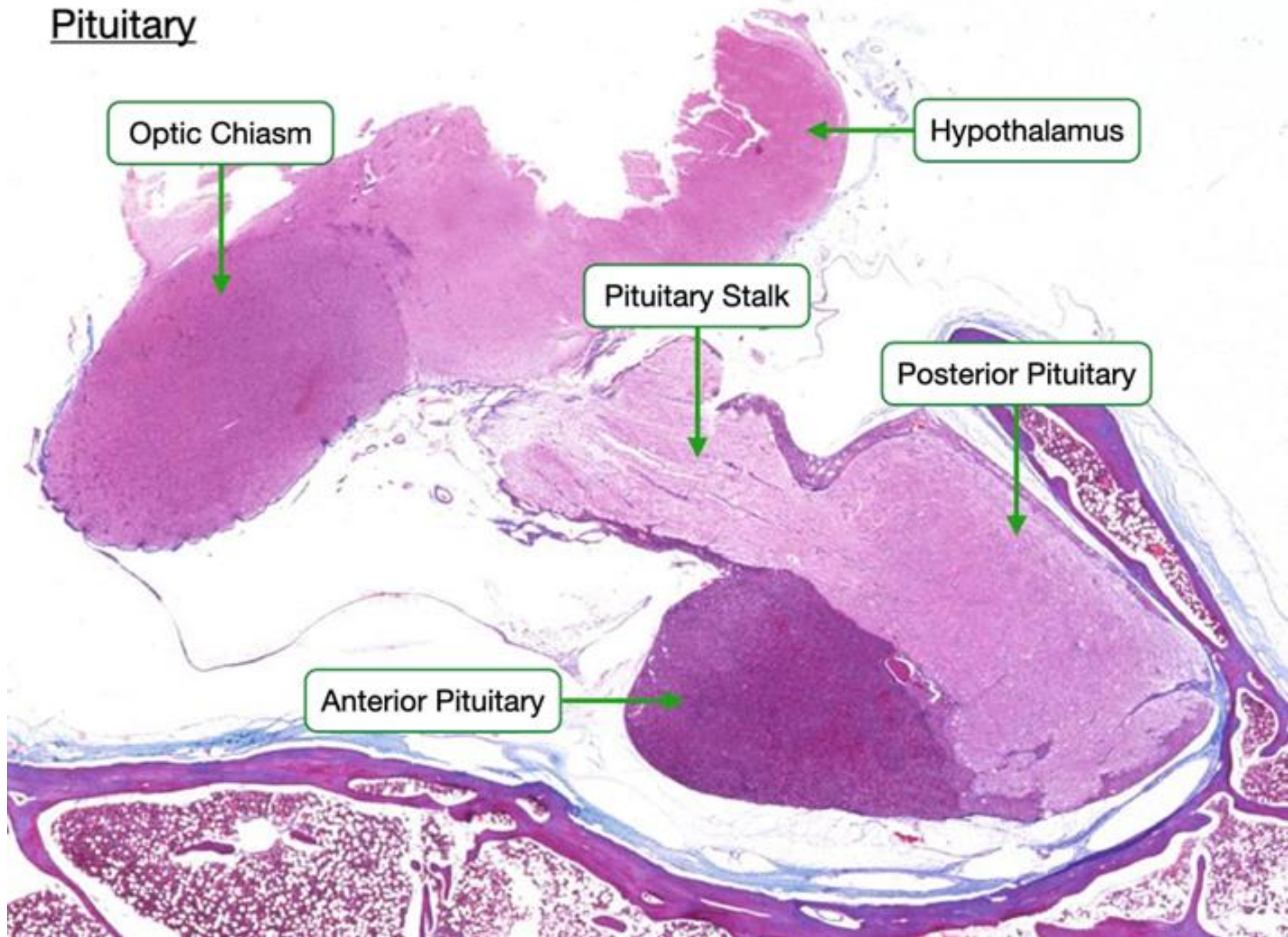
In H&E-stained samples of the anterior pituitary one can distinguish three types of cells: acidophils, basophils and chromophobes



- Acidophils are more eosin-stained and secrete the protein hormones growth hormone and prolactin.
- Basophils appear basophilic and secrete glycoprotein hormones such as adrenocorticotrophic hormone (ACTH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), and leutenizing hormone (LH).
- Chromophobes have clear nuclei and scant cytoplasm. They may be cells that are non-secretory or exhibit minimal hormone storage.
- All three types of cells reside in clusters and that in a single field one can usually see all three types.

- The anterior and posterior pituitary appear strikingly different.
- The anterior pituitary stains much darker because it contains many more cells than the posterior pituitary.
- In contrast, the posterior pituitary contains mostly axons of neurons whose cell bodies are in the hypothalamus along with a few support cells.
- Pituitary is connected to the hypothalamus by the pituitary stalk.
- The stalk contains axons of neurons of the posterior pituitary and also a unique capillary bed that will allow the hypothalamus to regulate the production of hormones in the anterior pituitary.

Pituitary

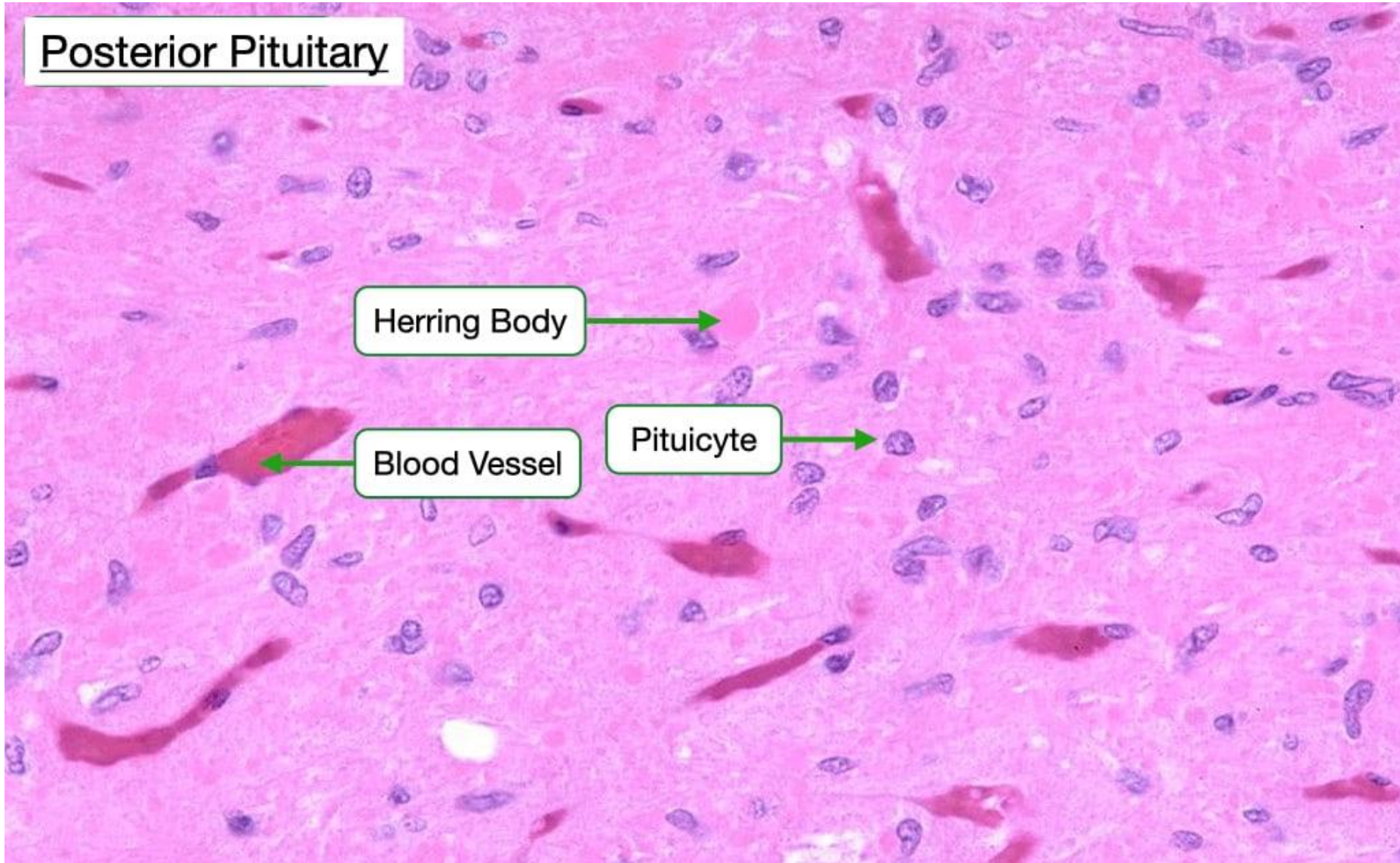


Posterior Pituitary:

- The posterior pituitary looks very different to the anterior pituitary. It contains non-myelinated axons which are the neurosecretory cells.
- The cell bodies of these cells are located in the hypothalamus.
- The posterior pituitary appears more lightly stained compared to the anterior pituitary due to fewer cells in the posterior pituitary.

- The cell bodies of the neurons whose axons release hormones in the posterior pituitary are located in the hypothalamus, so most of the nuclei visible in the posterior pituitary belong to supporting cells known as **pituicytes**.
- Pituicytes are the glial or Schwann cells of the pituitary gland. The posterior pituitary also has characteristic **Herring bodies**, which are focal axonal swellings packed with secretory granules.

H&E-stained sample of posterior pituitary show support cells, blood vessels and axons



Thyroid Glands

(Introduction)

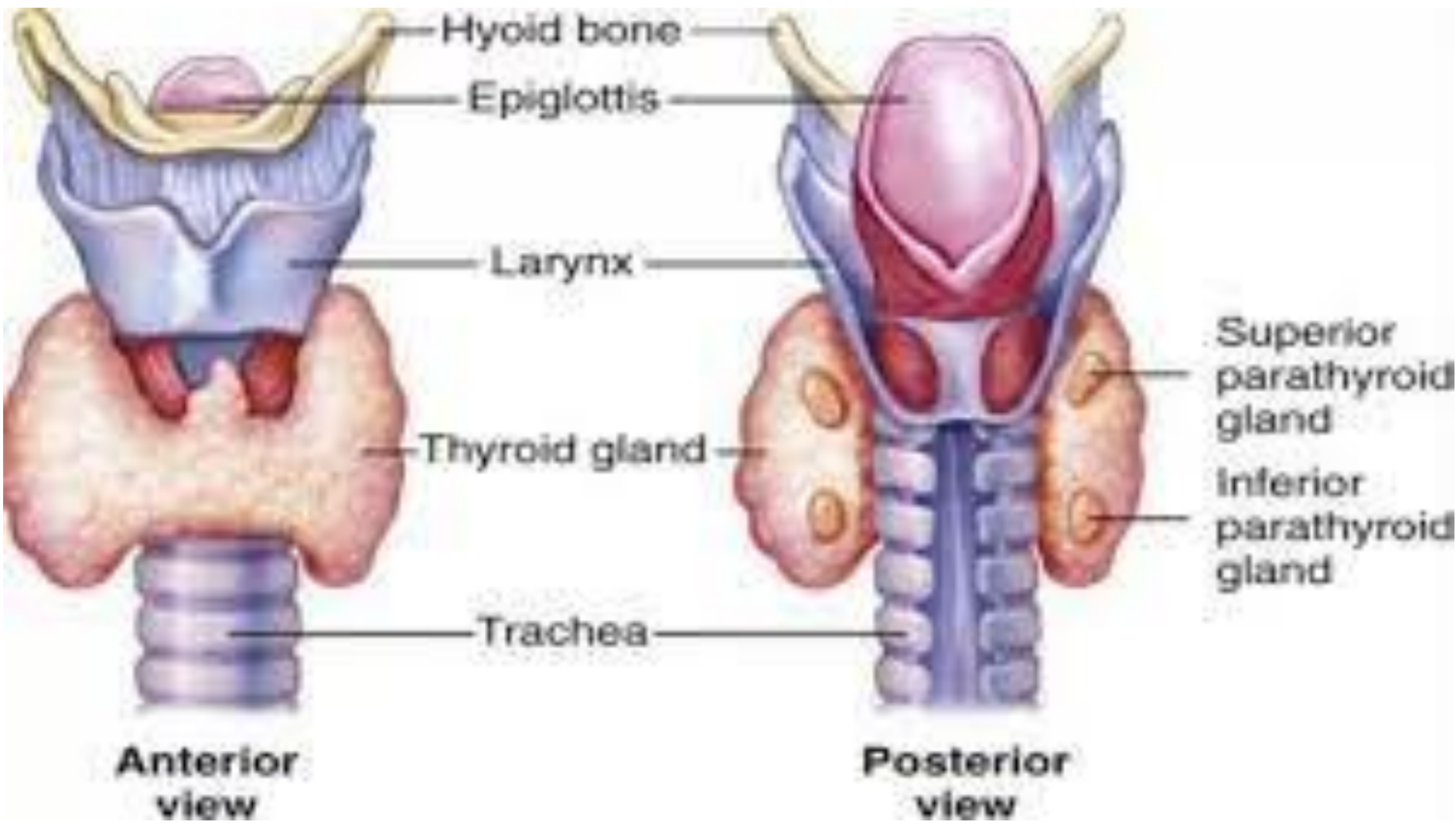
Anatomically:

- The thyroid gland is a vital butterfly-shaped endocrine gland situated in the lower part of the neck.
- It is present in the front and sides of the trachea, inferior to the larynx.
- It is a gland consisting of two lobes, the right, and the left lobes, joined together by an intermediate structure, the isthmus.
- Sometimes a third lobe called the pyramidal lobe projects from the isthmus.
- The lobes are 5 x 2.5 x 2.5 cm in dimension and weigh around 25 gm.

- The lobes are conical in shape and have an apex, a base, three surfaces – lateral, medial, and posterolateral, and two borders – the anterior and posterior.
- The isthmus, however, has two surfaces – anterior and posterior and two borders – superior and inferior.
- The lobes are related anteriorly to the skin, superficial and deep fascia, and platysma.
- Posteriorly, the lobes are associated with the laminae of the thyroid cartilage and tracheal rings and laterally to the external carotid artery and internal jugular vein.

Function of Thyroid gland:

- It plays an essential role in regulating the basal metabolic rate (BMR) and vital role in calcium metabolism.
- The thyroid gland secretes many hormones, collectively called thyroid hormones.



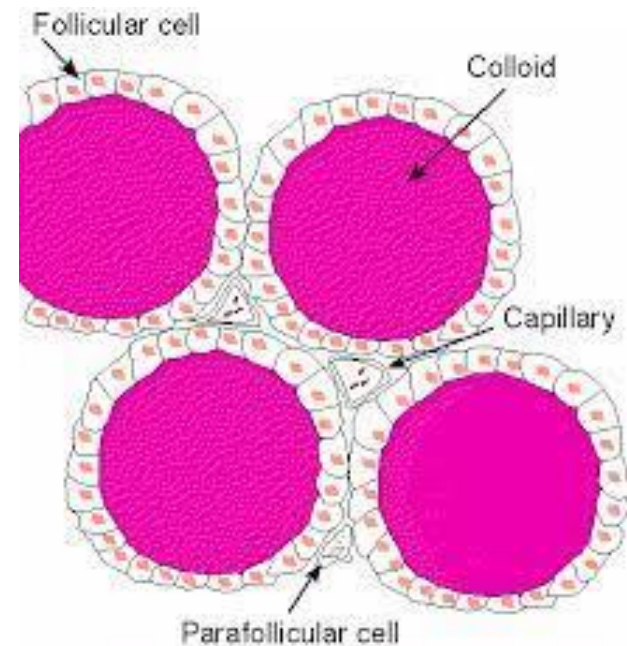
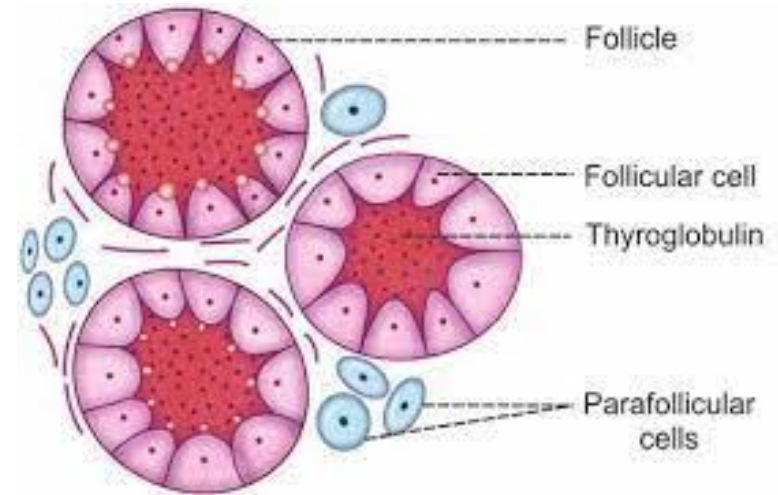
Histological structure of thyroid gland:

➤ A- Stroma

- It is covered by a double capsule, the outer is the pretracheal gland fascia, and the Inner is the true CT capsule of the gland.
- The capsule sends fibrous septa dividing the gland into incomplete lobes and lobules.
- The stroma carries the blood vessels, nerves, and lymphatics of the gland.
- Reticular fibers extend from the septa and form a network supporting the thyroid parenchyma.

➤ B- Parenchyma:

- It is composed of follicles, which appear in histological sections round to oval of different sizes.
- The follicles are surrounded by a network of fenestrated [blood capillaries](#), The follicles are lined by cuboidal cells and contain a gelatinous eosinophilic material in their lumina called colloid.
- The follicles are lined by two types of cells which are follicular cells & parafollicular cells.



1- Follicular cells:

By LM:

- They are cuboidal cells with central rounded nuclei and basophilic cytoplasm resting on the basement membrane.
- These cells change their shape according to the degree of activity. They become columnar when they are active and squamous when they are inactive.

By EM:

- They show the ultrastructural features of active protein secretion, as well as endocytosis and digestion.
- Numerous profiles of rER are present in the basal region
- Supranuclear Golgi complex is associated with small secretory (vesicles containing thyroglobulin.
- The cell membrane at the luminal border has a moderate number of microvilli.
- Follicular cells also contain abundant apical lysosomes and endocytotic vesicles.

2- Parafollicular (Clear cells or C cells):

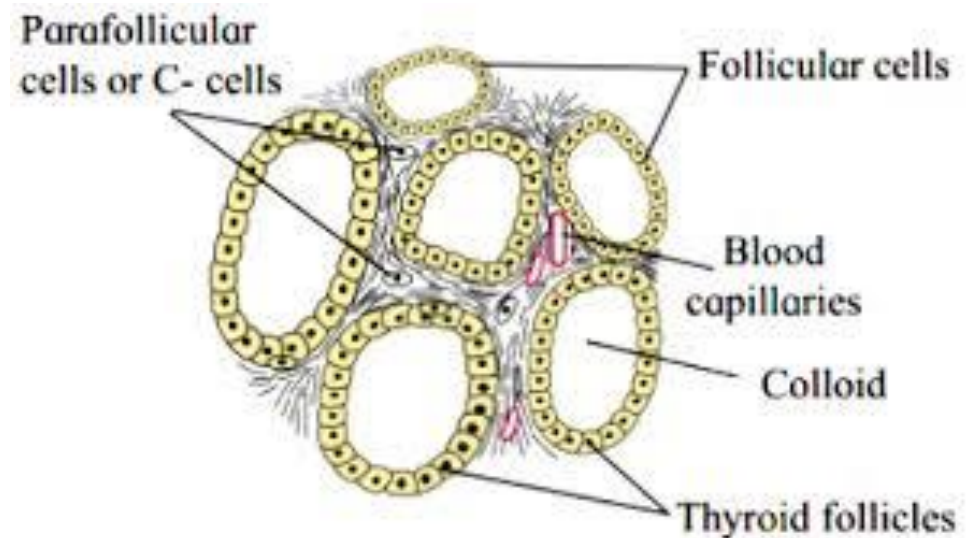
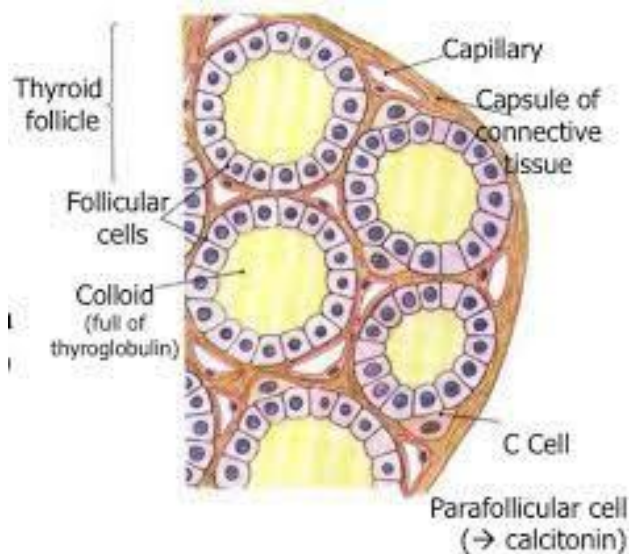
These cells are found as part of the follicular epithelium, scattered between the follicular cells or as isolated clusters between the follicles. They form about 0.1% of the follicular epithelium.

By LM:

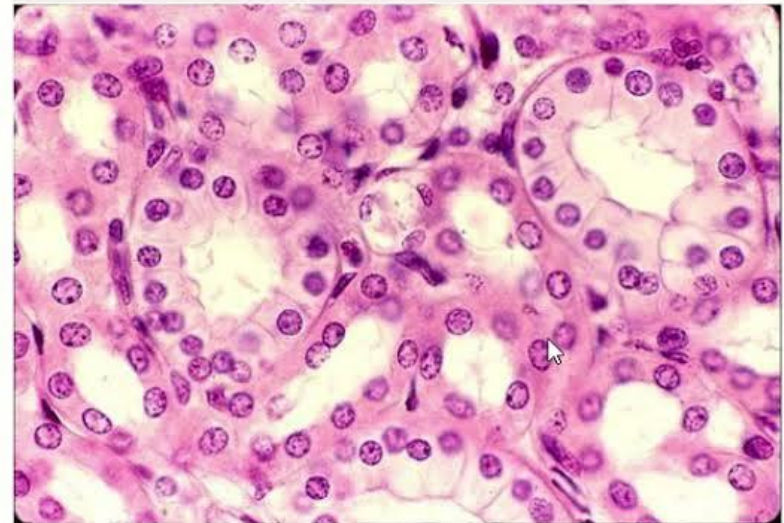
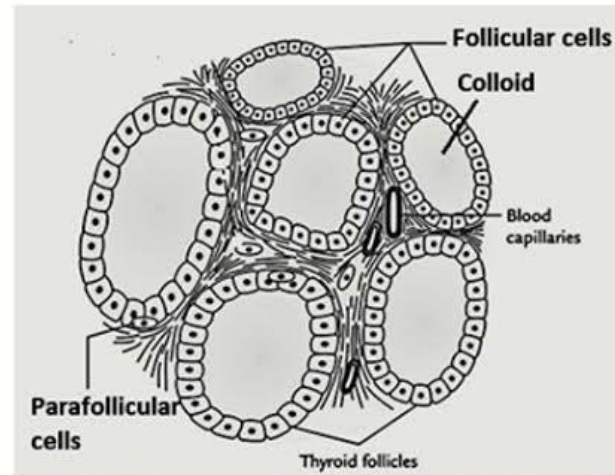
- They are larger than the follicular cells with pale cytoplasm and so are called clear cells.
- Their basal surfaces rest on the follicular basement membrane but their apical surfaces never reach the lumen of the follicles.

By EM:

- A moderate amount of organelles of polypeptides secreting cells.
- The Golgi complex is infranuclear.
- The secretory granules are small, dense, and basal towards the capillary bed.



- **Thyroid gland**
- **1. Colloid filled thyroid follicles are present.**
- **2. thyroid follicle is formed by Follicular cells and parafollicular cells**



Thank you for your attention