
بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ
IN THE NAME OF ALLAH

THE ENDOCRINE SYSTEM

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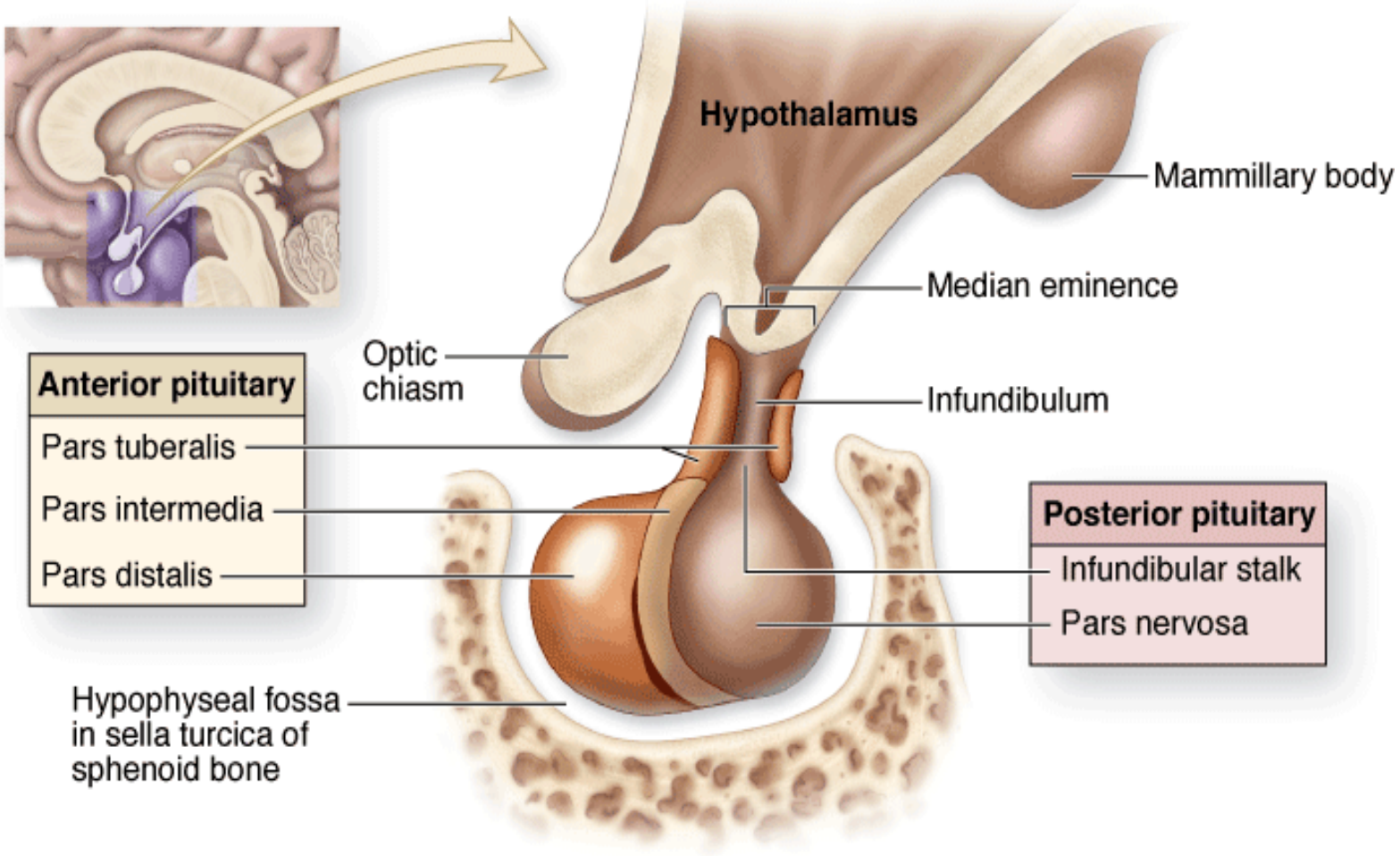
❑ The endocrine glands are ductless glands secreting hormones.

Endocrine glands are:

1. The pituitary gland
2. The suprarenal gland
3. The thyroid gland
4. The parathyroid gland
5. The sex glands
6. The pineal body
7. The islets of Langerhans

The Pituitary gland

- It is the master control gland of most endocrine glands.
- It is located in a bony depression (sella turcica) and attached to the base of the brain by the pituitary stalk.



The Pituitary gland

The gland is made up of two lobes:

Anterior lobe

It is highly vascular and stains brightly acidophilic.

It consists of:

Pars distalis.

Pars tuberalis.

Pars intermedia

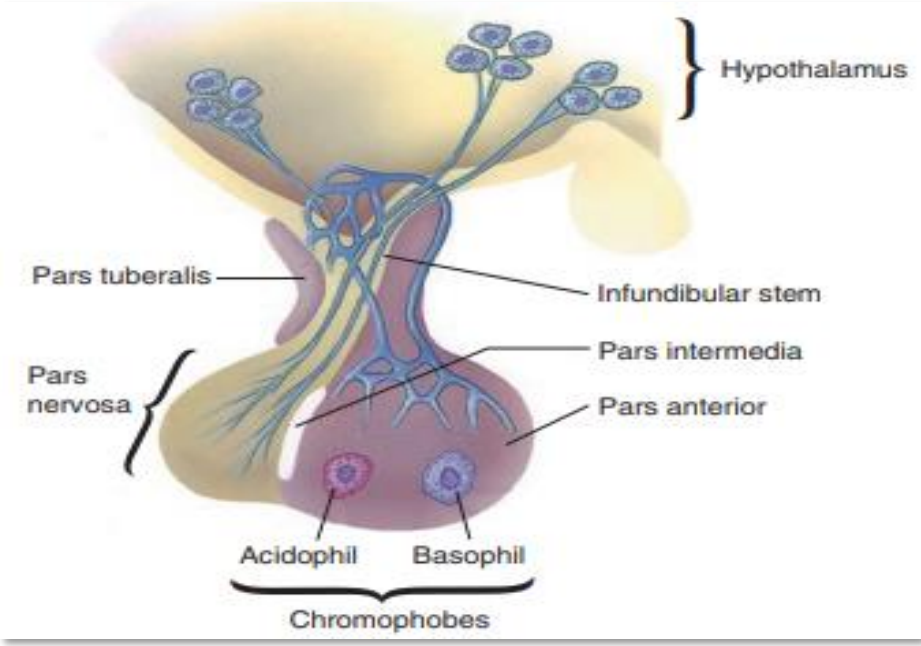
Posterior lobe

It is whitish in colour and stains pale.

It consists of:

Infundibular process (pars nervosa).

Infundibular stalk (pituitary stalk)



The Pituitary gland

HISTOLOGICAL STRUCTURE:

1. Pars Distalis

It consists of stroma and parenchyma

The stroma:

A- Dense fibrous capsule.

B- Trabeculae extending from the capsule.

C- Reticular fibres surround the cords of cells.

The parenchyma:

- Irregular anastomosing cords or clumps of cells. They are surrounded with extensive system of fenestrated sinusoidal capillaries.

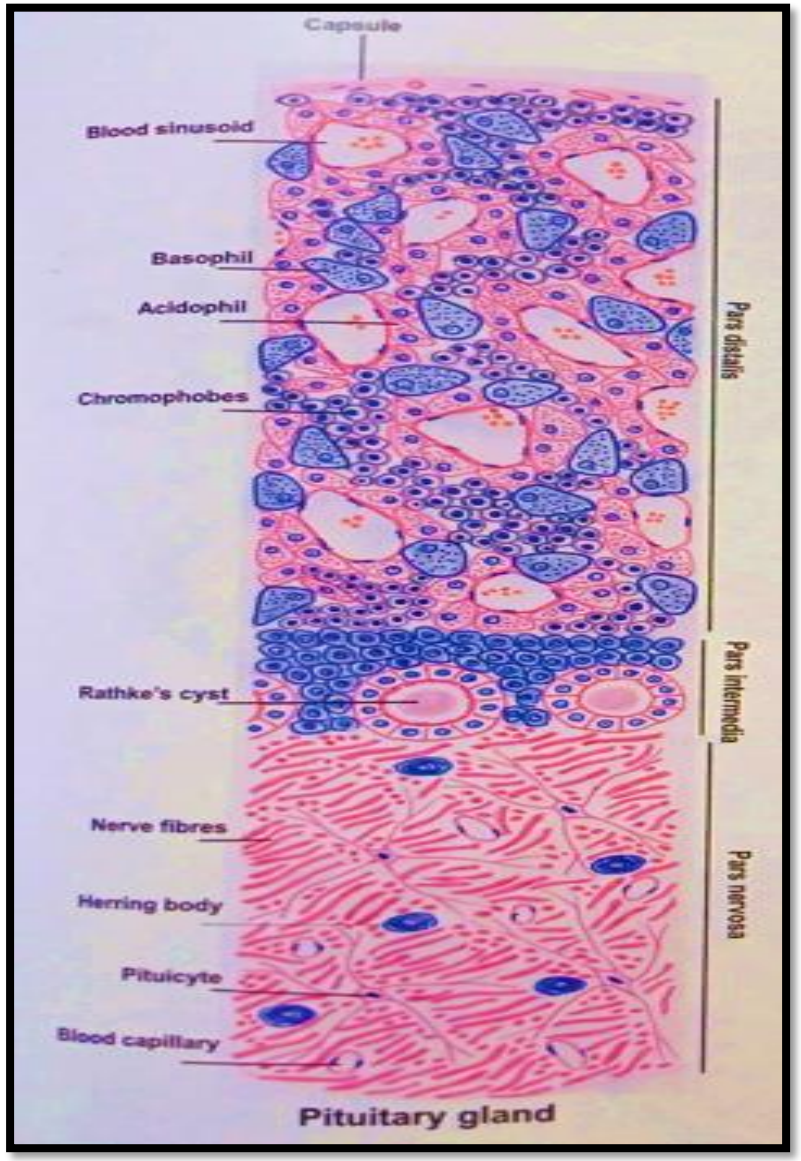
Cells of pars distalis:

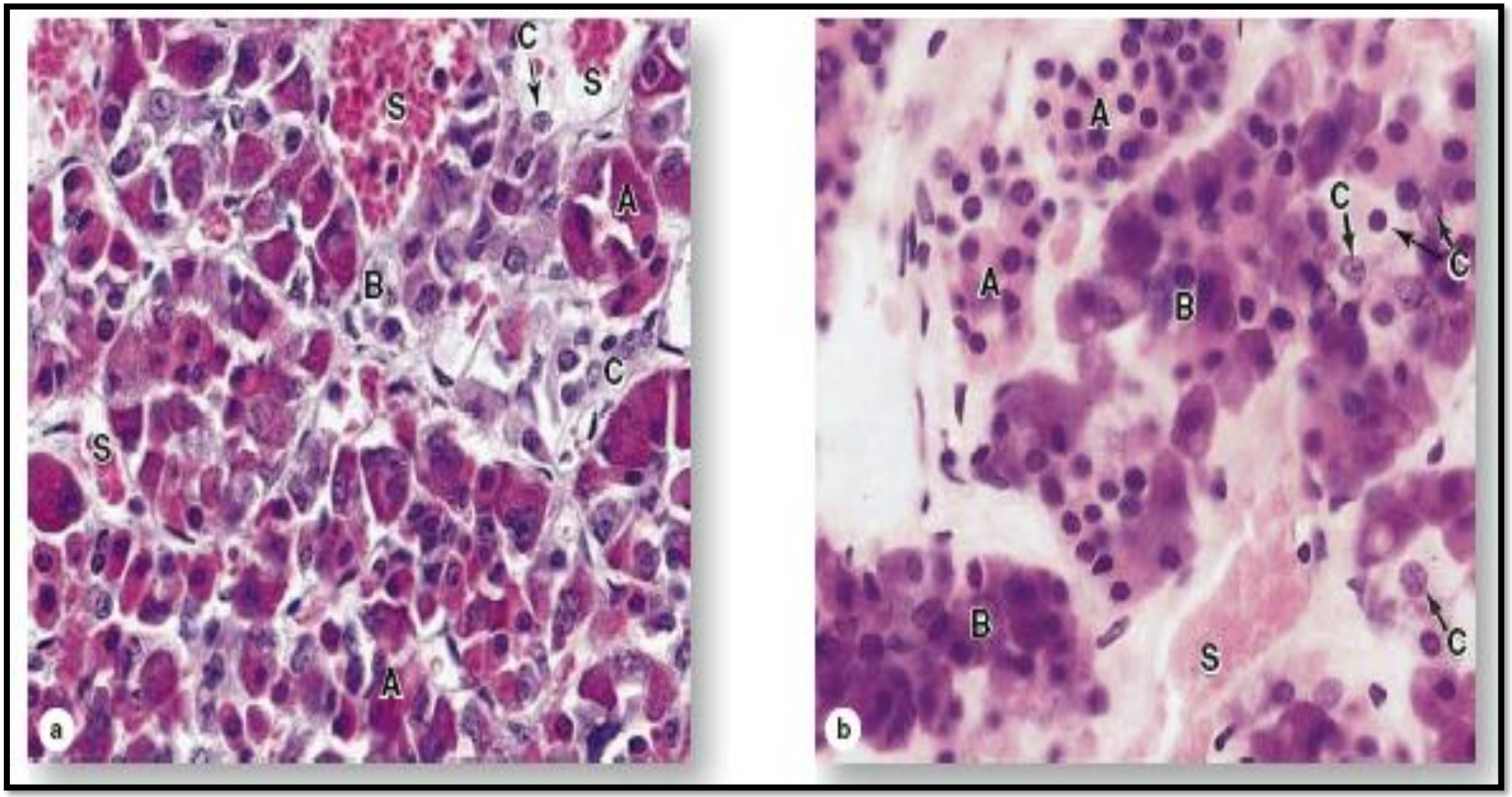
They are classified on the basis of their affinity or lack of affinity for dyes of routine staining into:

1. Chromophilic (48%) which are differentiated into:

- 1-Acidophilic cells (37%).
- 2-Basophilic cells (11%).

2. Chromophobic (52%) they are smaller in size and are lightly stained.

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A. Chromophilic cells

i) Acidophilic cells (acidophils or alpha cells):

- They are numerous, appear large in size and stain well with eosin.
- They are larger in size than chromophobes but smaller than basophils.
- Their granules are protein in nature.
- **With EM:** they reveal a well-developed Golgi, small mitochondria, rER and electron dense granules.

According to the size of their granules and the hormone which they secrete, they are classified into:

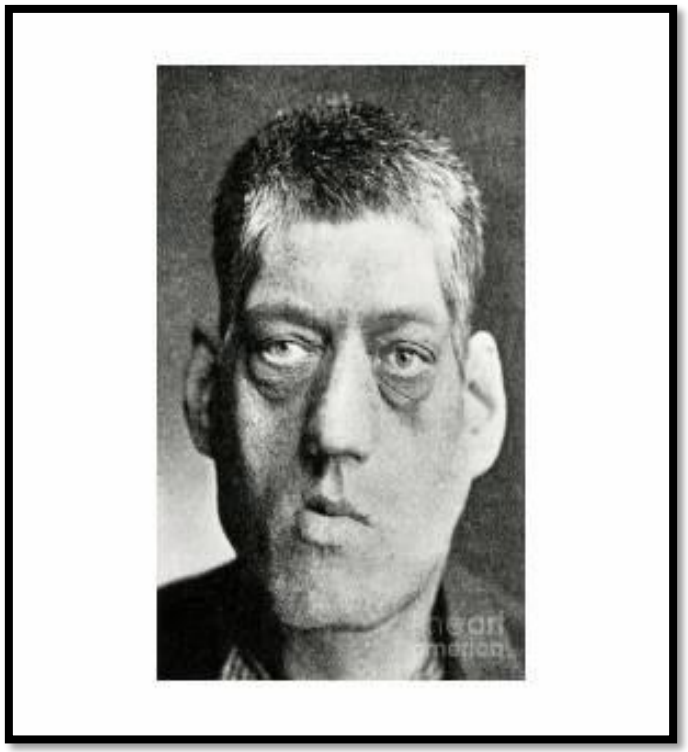
1. **Somatotrophs**
2. **Mammotrophs**

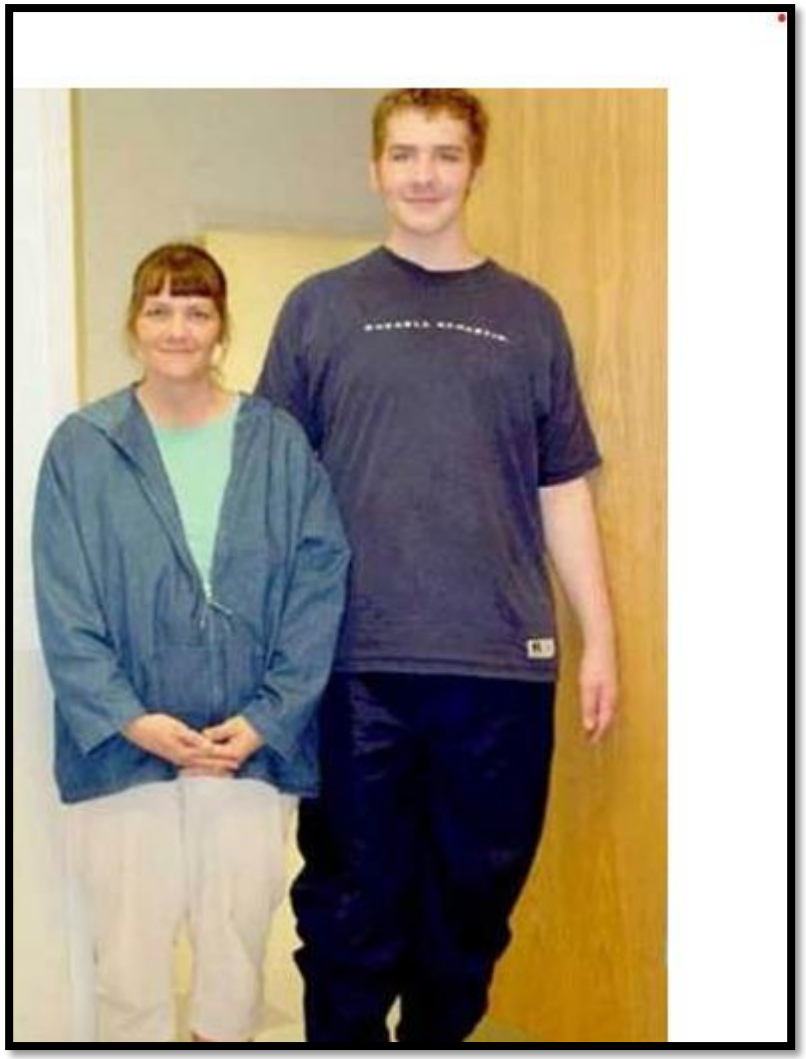
Somatotrophs:	Mammotrophs (prolactin cells)= Lactotroph cells:
They are rounded cells with rounded nuclei.	They have fusiform shape.
They are stained with orange G (called orangophils).	Their granules are stained with azocarmine (carminophils).
They occur in groups along the blood sinusoidal capillaries.	They are distributed singly in the interior of the cell cords.
They secrete the **growth hormone (somatotropin)** which has a role in the growth of long bones.	They secrete **prolactin**, which initiates and promotes milk secretion.

- Tumours of somatotrophs:

- Before puberty → gigantism.
- After puberty → acromegaly.

- Impaired function of somatotrophs: → dwarfism.





ii) Basophilic cells (basophils or β cells):

- They are larger than acidophils.
- They stain poorly with H & E.
- They stain well with PAS as their granules are glycoprotein in nature.

The basophilic cells are classified into three types:

1. **Thyrotrophs**
2. **Corticotrophs**
3. **Gonadotrophs**

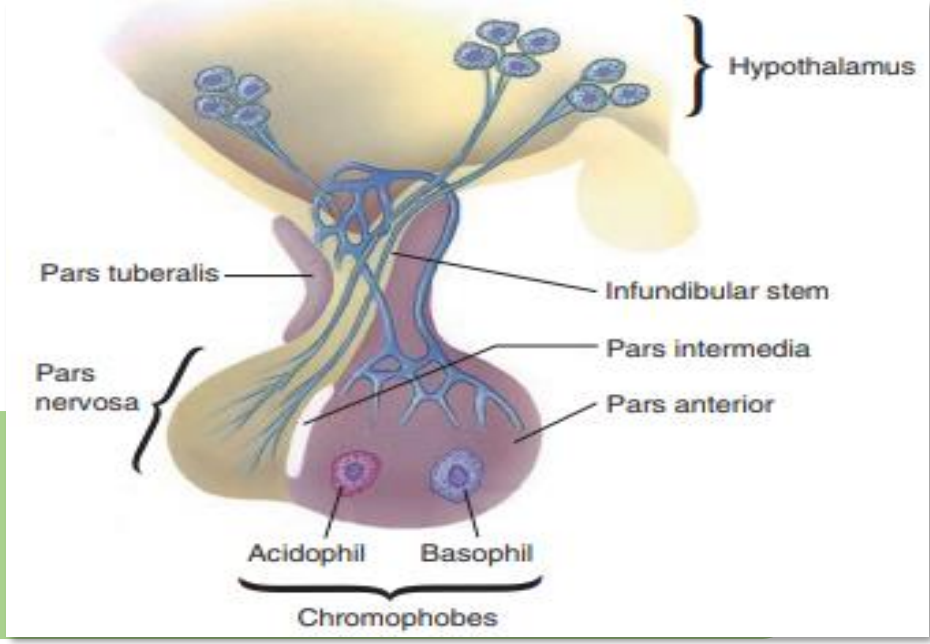
Thyrotrophs	Corticotrophs	Gonadotrophs or (FSH-LH cells)
They are polygonal in shape.	They are the commonest type of basophils. They are oval or round in shape.	They are rounded cells.
• They secrete thyrotrophic hormone (thyroid stimulating hormone) TSH which controls the functions of thyroid gland.	➢ They synthesise a pro-hormone, with cleavage, It produces: a. ACTH which control the function of suprarenal cortex. b. Melanocyte stimulating hormone and endorphin.	➢ They are of two types: a. Cells secrete **follicle stimulating hormone (FSH)** which stimulates follicle development in the ovary and spermatogenesis in male. b. Cells secrete **luteinizing hormone (LH)** or **Interstitial cell stimulating hormone (ICSH)**.
• Thyroidectomy → hypertrophy of thyrotrophs. • Thyroxine administration → atrophy of thyrotrophs.	• Adrenalectomy → the corticotrophs increase in number and size and the cells contain more granules. • Prolonged administration of cortisol → the cells decrease in size.	

B. Chromophobic cells

- They lack affinity to stains.
- They present in groups.
- They are smaller in size than chromophils.
- They are devoid of specific granules.
- They are considered to be a reserve population of relatively undifferentiated cells capable of differentiation into either acidophils or basophils.

Pars Nervosa

It consists of:



1. Pituicytes:

- They are irregularly branched cells which form a network around the axons.
- They contain lipochrome pigments and lipid droplets.
- They act as neuroglia cells.

2. Nerve fibers:

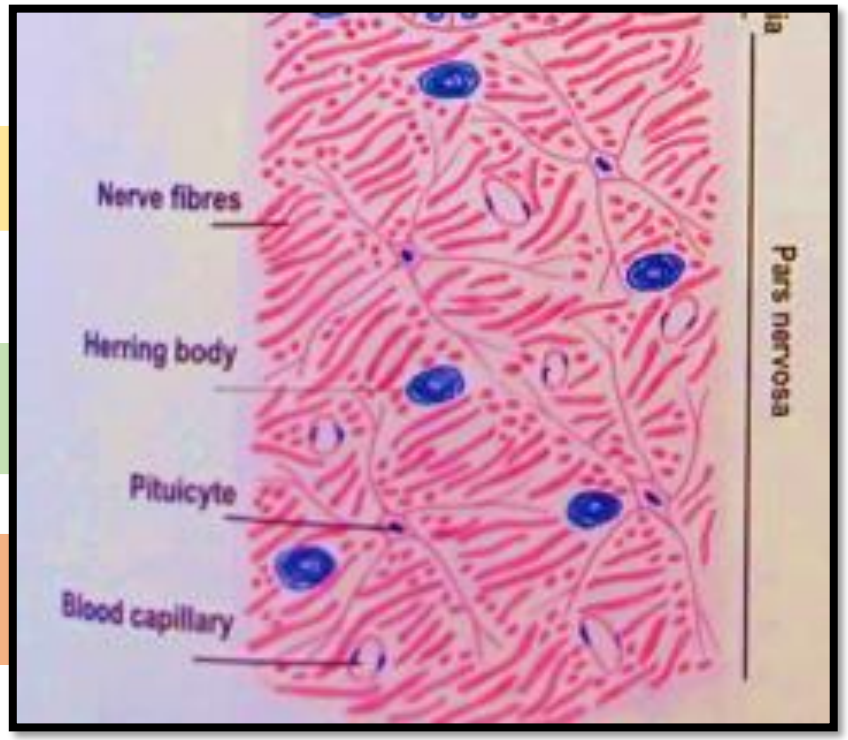
- They are unmyelinated axons of neurosecretory neurons in the hypothalamus (the paraventricular and supra-optic nuclei).
- The axon endings contain neurosecretory granules and are associated with fenestrated capillaries.

Pars Nervosa

It consists of:

3. Herring bodies:

- They are irregular masses of basophilic hyaline material formed of accumulation of neurosecretion in the terminal bulbs of the nerve fibres.

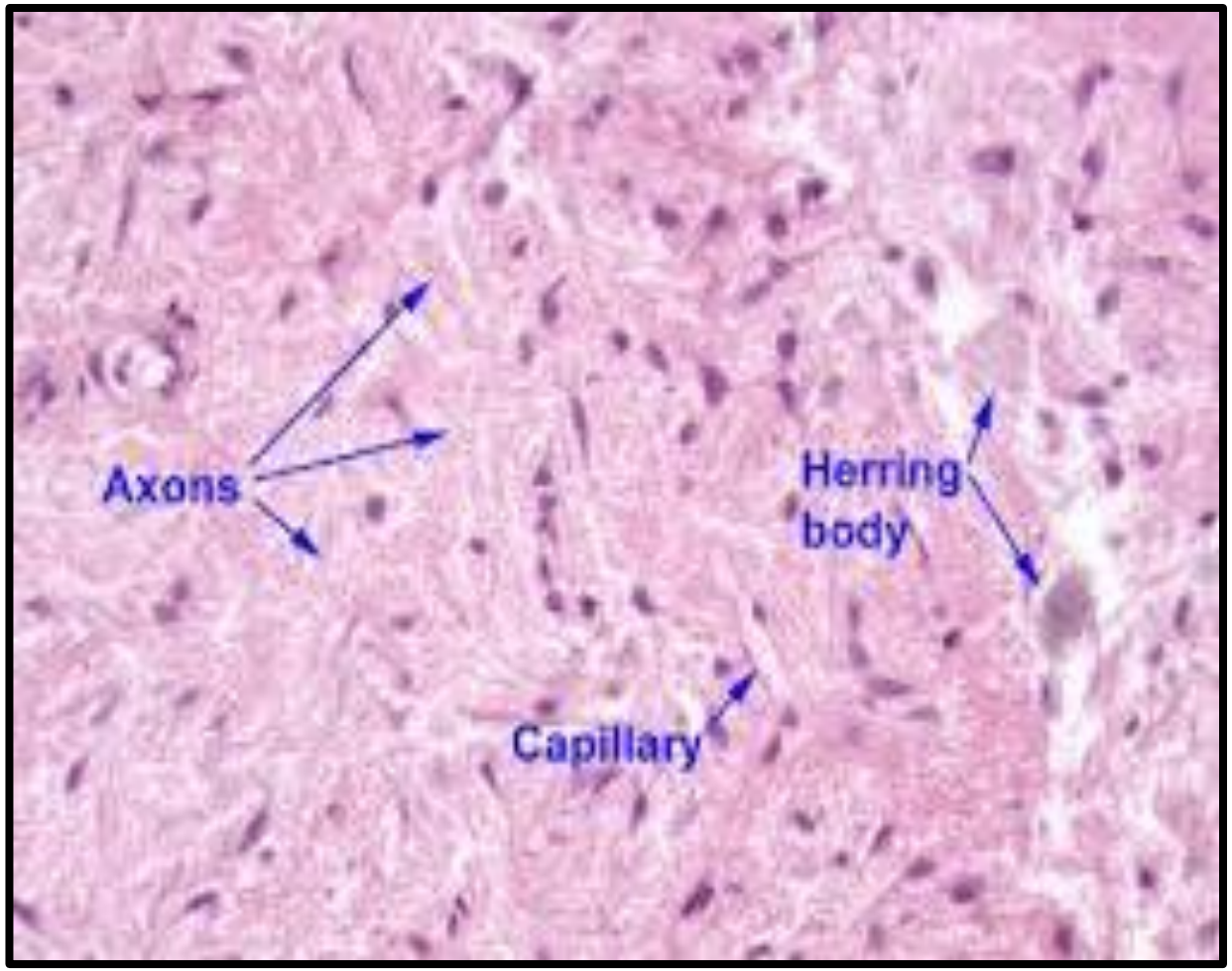


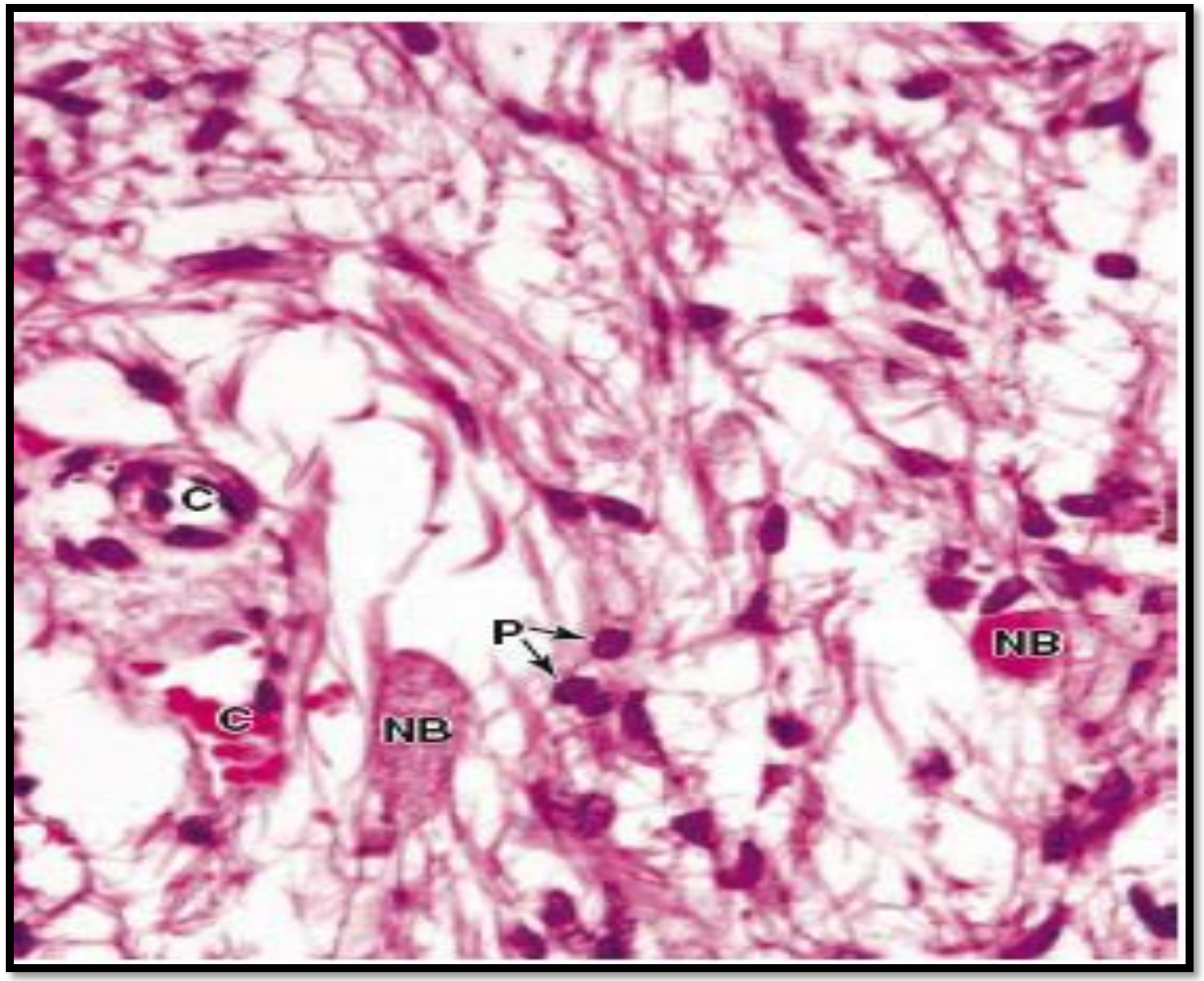
4. Fenestrated capillaries.

5. Neuroglia cells.

6. Reticular fibres: around the capillaries.

Pars Nervosa





Function of Pars nervosa:

It is the reservoir for the neurosecretion, which is formed by hypothalamic neurons in the supraoptic and paraventricular nuclei of the hypothalamus.

The secretory granules descend along the axons of the pituitary stalk and accumulate in the terminal bulbs nearby the fenestrated capillaries as Herring bodies.

The secretory granules are absorbed to the circulation.

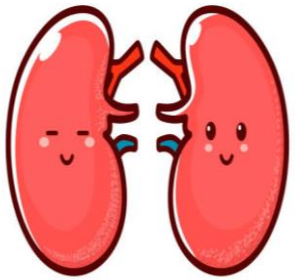
The secretion is fractionated into:

Oxytocin

- Causing Contraction of the smooth muscles of the uterus and facilitates child birth.
- Contraction of the myoepithelial cells around the alveoli of the mammary gland leading to ejection of milk during nursing.

Vasopressin or antidiuretic hormone

- Antidiuretic effect by acting on the collecting tubules of the kidney → increased reabsorption of water.
- In large amount, it causes contraction of smooth muscles of blood vessels → ↑ blood pressure.



Destruction of the pituitary stalk or pars nervosa → diabetes insipidus.

MCQ

1. **Mammotrophs secrete which of the following hormones?**

d

a. Growth hormone
b. Thyroid hormone
c. Calcitonin
d. Prolactin
e. Cortisone

MCQ

2. Destruction of pars nervosa leads to

a. Addison disease
b. Cushing disease
c. Diabetes insipidus
d. Acromegaly
e. Dwarfism

C


Thank
you

References

- Student medical histology book, Mansoura university.
- Junqueira's Basic Histology: Text and Atlas, Fourteenth Edition. 14th edn. New York, USA: McGraw-Hill Education.
- **Pawlina, W. and Ross, M.H. (2019)**. Histology: A Text and Atlas, International Edition: With Correlated Cell and Molecular Biology. 8th edn.