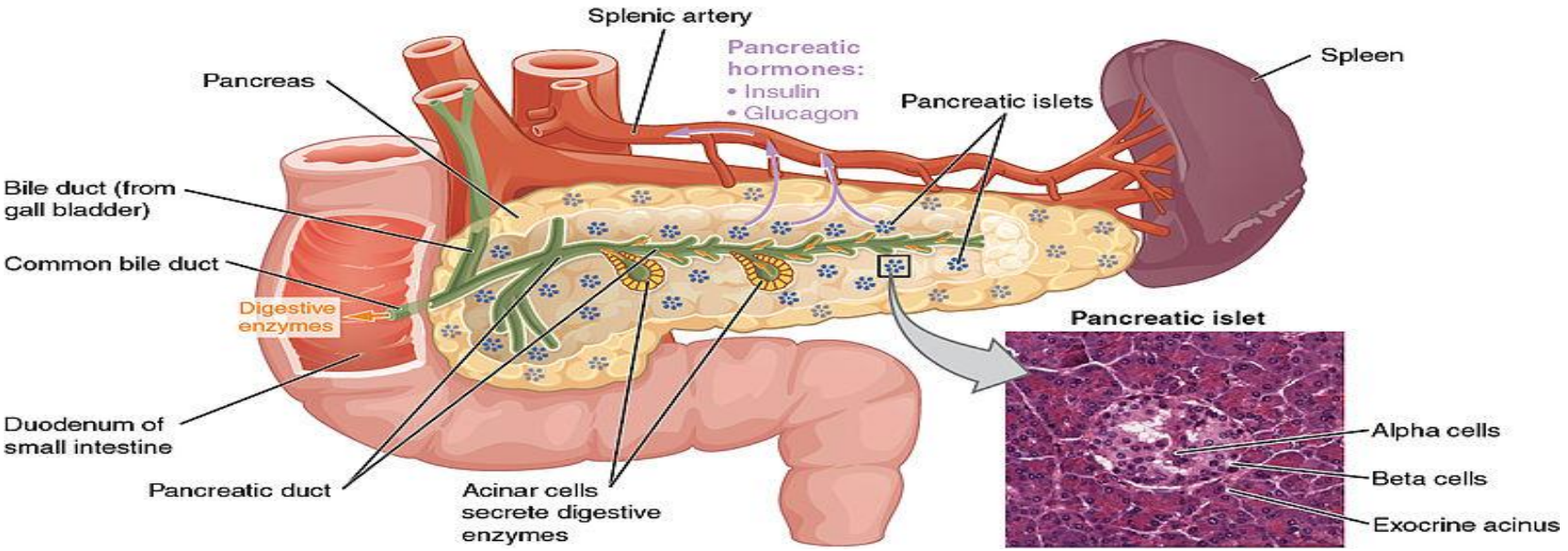
PANCREAS



Exocrine
Acinar and duct tissue

Endocrine
Islets of Langerhans

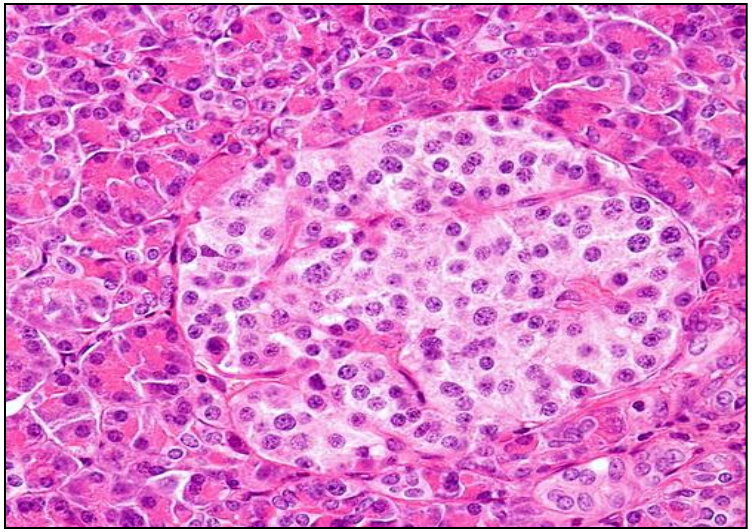
PANCREAS

- Exocrine and endocrine gland.
- The exocrine part produces pancreatic juice.
- The endocrine part, ~1% , consists of the cells of the **islands of Langerhans**.

Endocrine part: Islets of Langerhans

Masses of pale staining cells scattered between the pancreatic acini

- They are more in the **tail** than head of pancreas
- The cells are separated by fenestrated capillaries (highly vascularized)
- Cells of islets of Langerhans are Alpha, Beta, Delta, F (PP) cells



- **Structure :** of the **islands of Langerhans**.

Stroma:

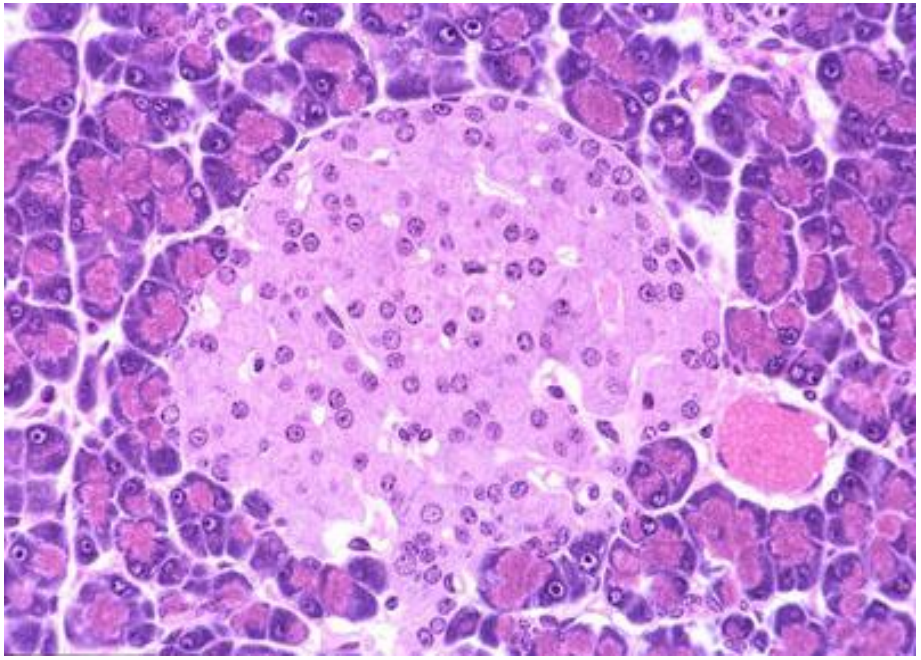
Surrounded by **thin** capsule

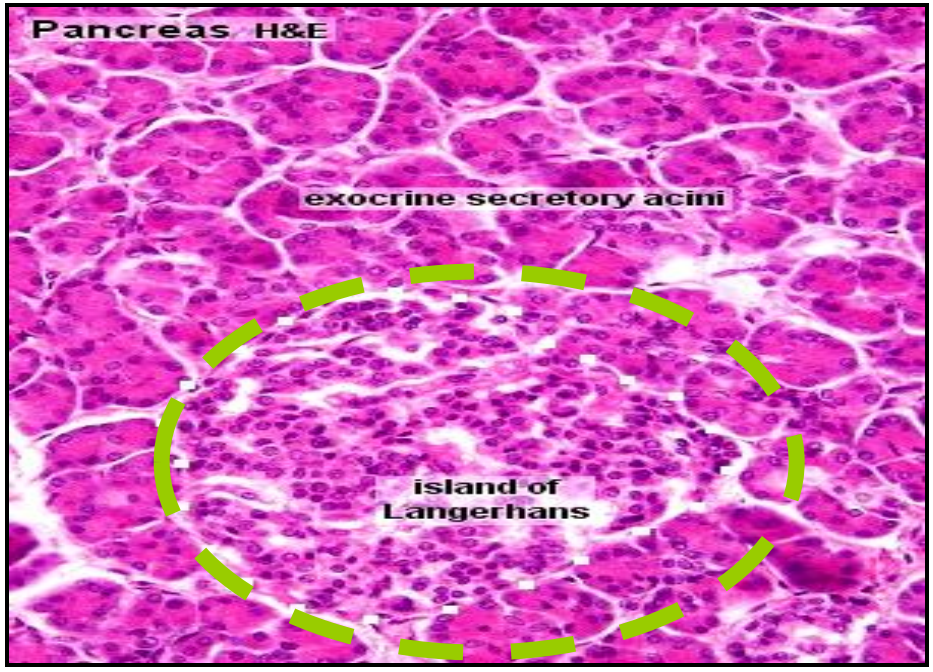
Parenchyma

cellular composition of the islands

- **70% beta-cells**, **insulin**. Insulin stimulates
- **20% alpha-cells**, **glucagon**.
- **5- 10 % delta-cells** which secrete **somatostatin**,
- **F- cells (PP)**

pancreatic polypeptides





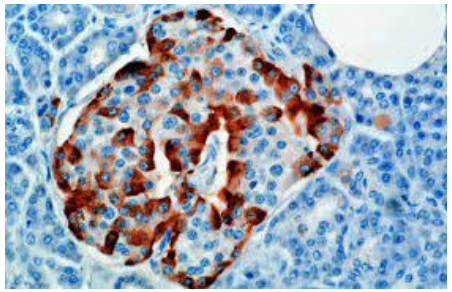
Beta (B) cells (70%):

- Produce **insulin** which **lower** blood sugar
- Cells are small in size, most numerous cell type, central in location in islets
- Stain **blue**
- EM: appear in two functional stages active & resting
- When active synthesize insulin. When resting packed with granules storing insulin
- Cells divide at very slow rate

Beta cells

Alpha (A) cells (20%):

- Produce **glucagon** which **increase** blood sugar
- Cells larger in size, fewer in number, peripheral location in Islets
- Stain **pink**



Alpha cells

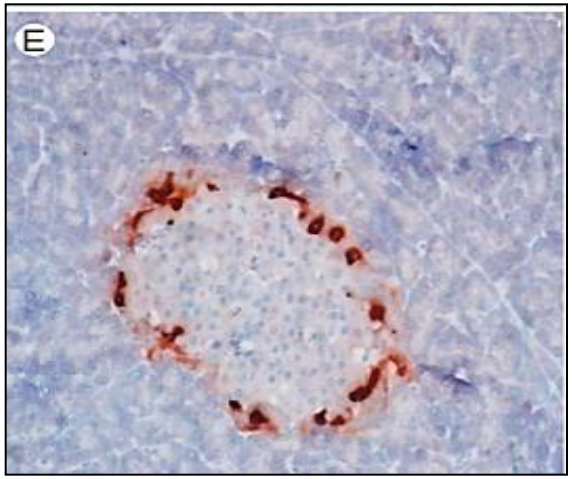
Delta cells:

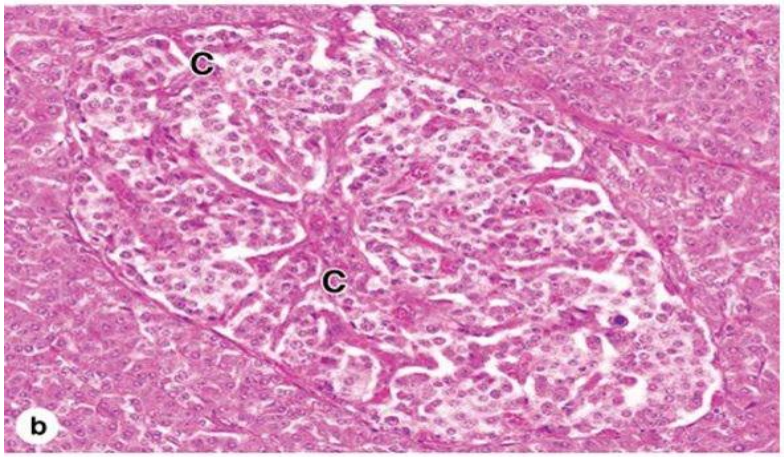
- Secret somatostatin (growth inhibiting factor)
- Cells scattered at periphery and less abundant

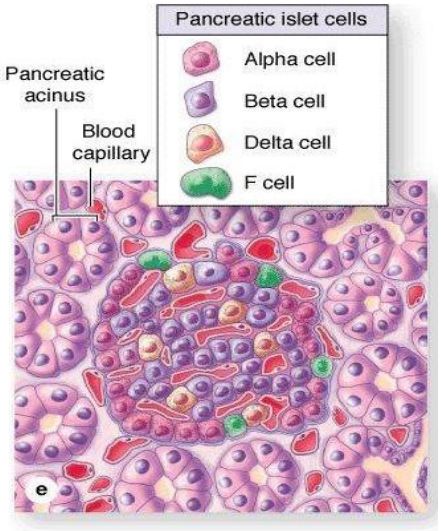
F (PP) cells:

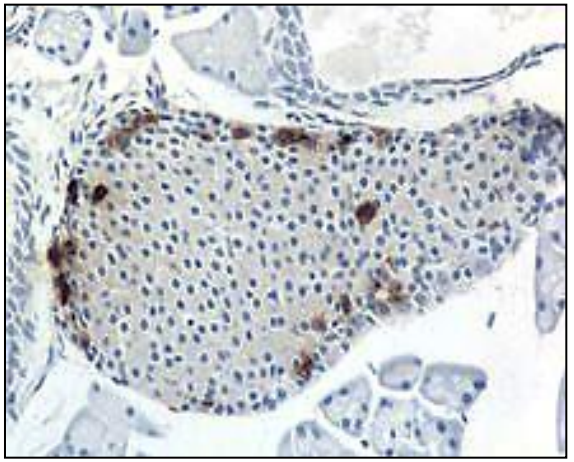
- Very few
- Secrete pancreatic polypeptide h.
- Regulate exocrine pancreas secretions

Delta cells



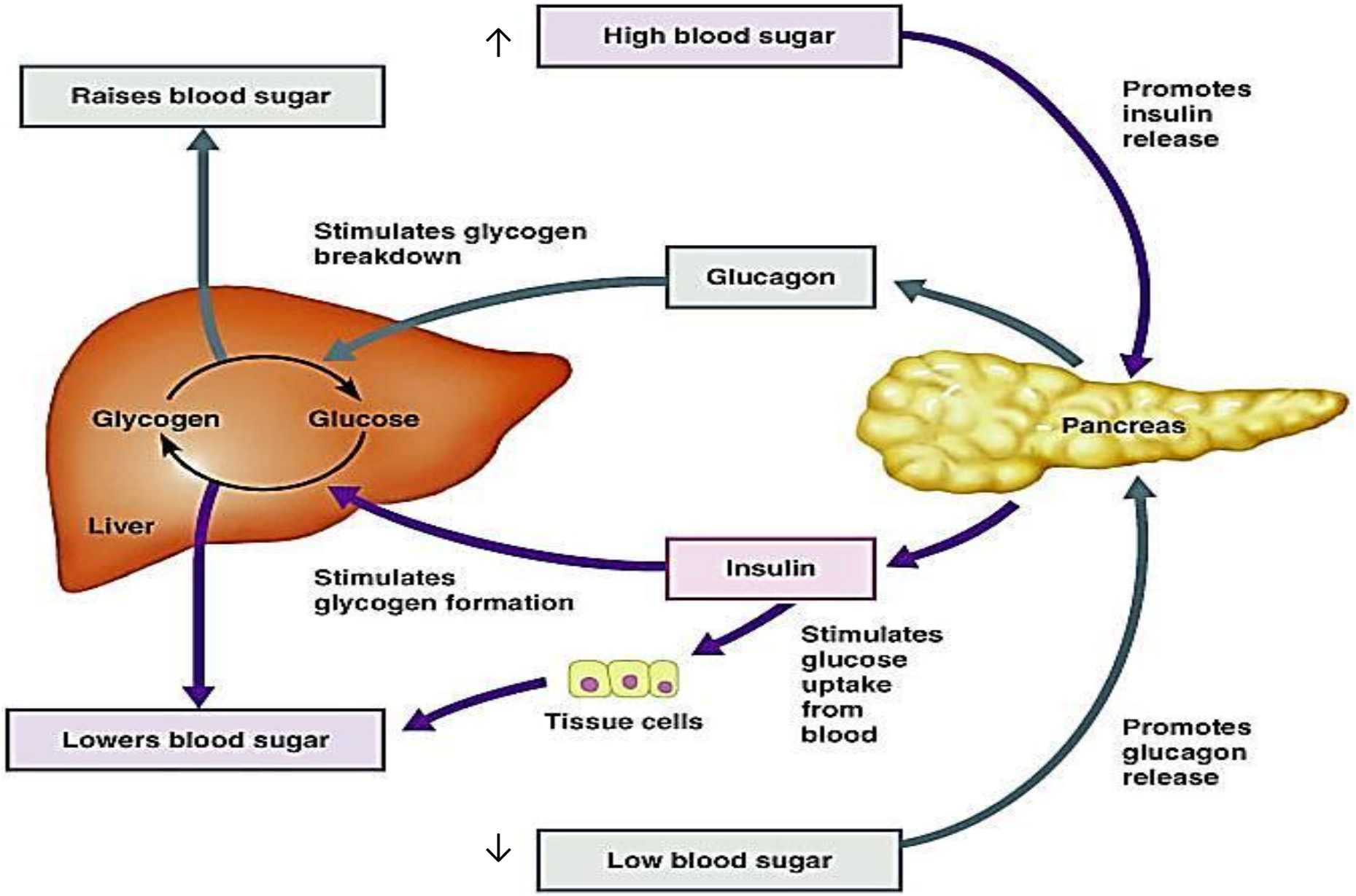




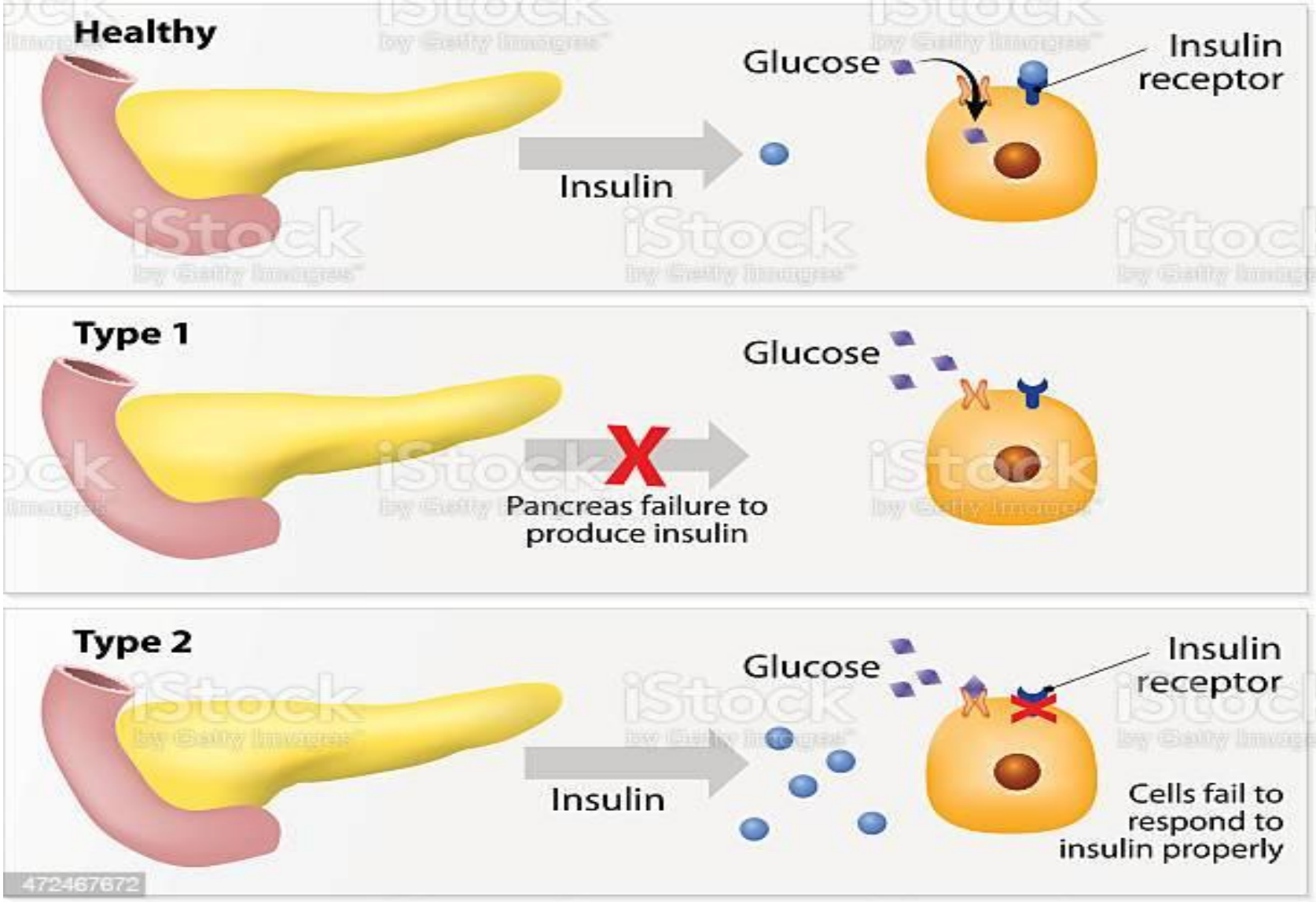


PP cells

Regulation of blood glucose level



DIABETES MELLITUS



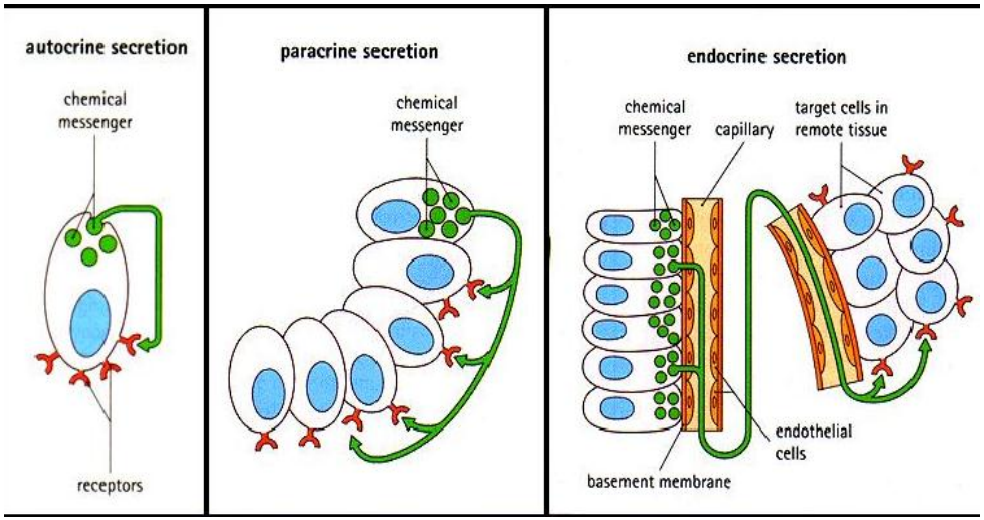
Diffuse neuroendocrine system

- Apudocytes or **APUD cells**
- Classification according to staining activity

1. **Argentaffin cells:** ppt silver in absence of reducing agent
2. **Argyrophilic cells:** ppt silver in presence of reducing agent
3. **Chromaffin like cells:** bind K dichromate

- **Mode of action**

1. Endocrine → target organ
2. Paracrine → surrounding tissue
3. Autocrine → themselves
4. Neuroendocrine → neurosecretion



Distribution of APUD cells

- **GIT (enteroendocrine cells) :**
  G cells EC cells
  ECL cells D cells
  S cells
- **Respiratory system**
  Bronchial Kulchitsky cells
  Small granule cells
  Neuroepithelial bodies
  among tracheobronchial epithelium.

- **Other sites**

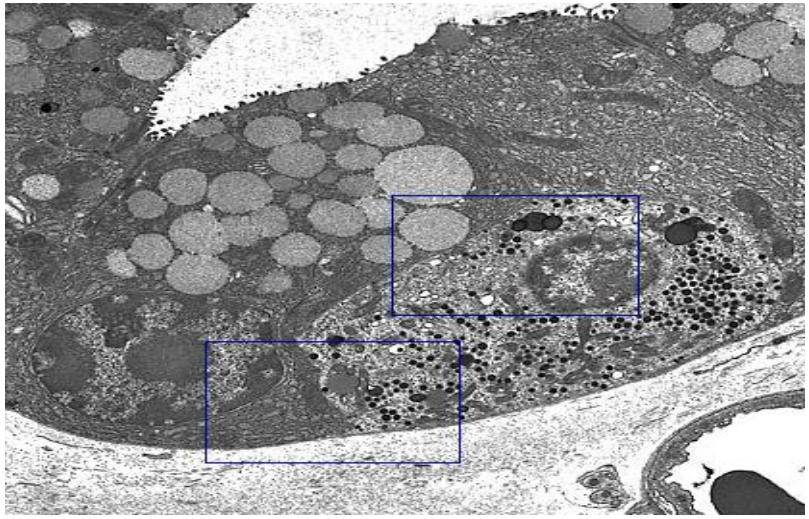
1. **Myocardium:** → cardiodilatins and atrial naturetic polypeptides
2. **Hypothalamus:** supraoptic and paraventricular nuclei → oxytocin and vasopressin
3. **Endocrine system:** pinealocytes,parafollicular cells, chief cells, cells of islets of Langerhans and some adenohypophyseal and adrenal medullary chromaffin cells

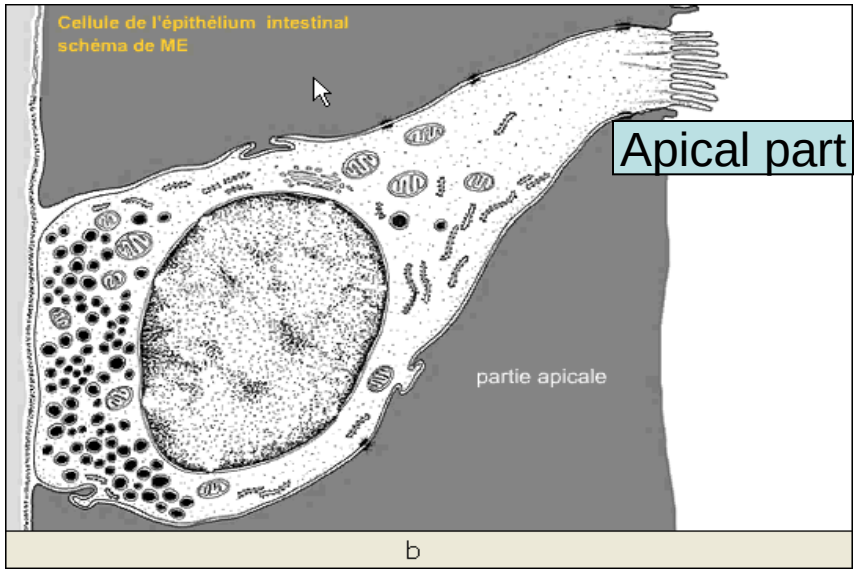
Microscopic features

- **Two types:**

1. **Open type**
2. **Closed type**

- Electrolucent cytoplasm
- Few small secretory granules **at the base** or vascular pole
- Small infranuclear Golgi
- Sparse rER

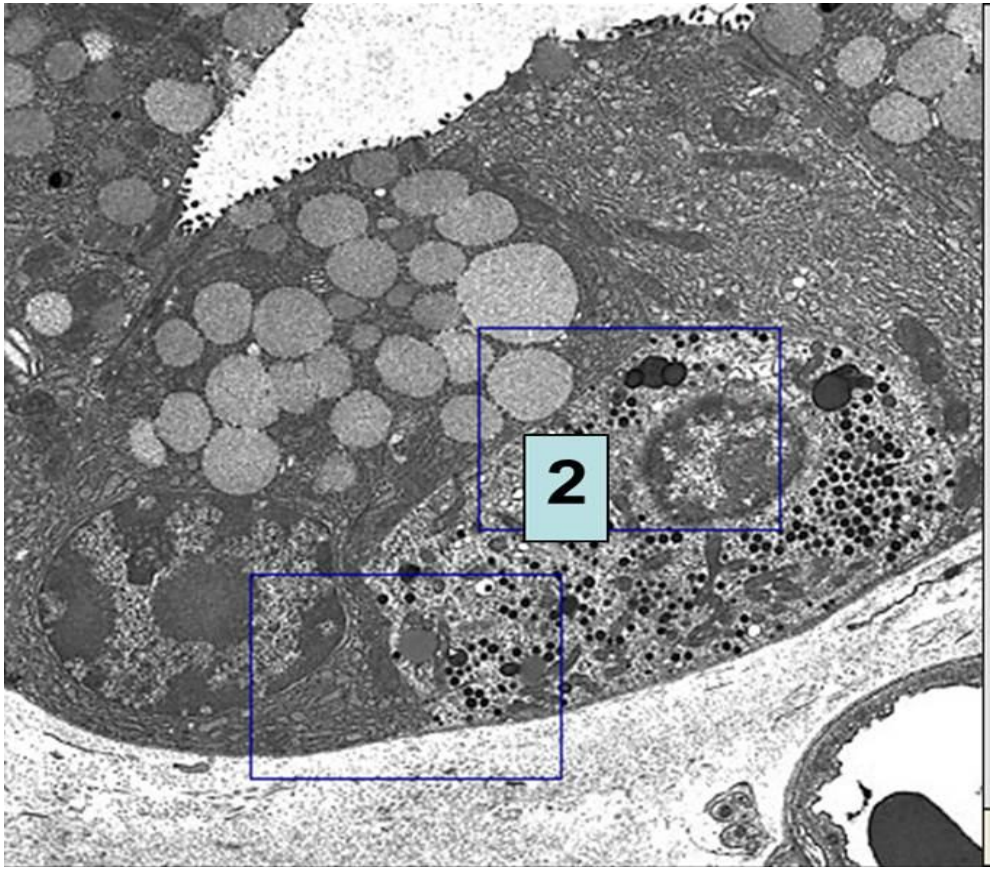


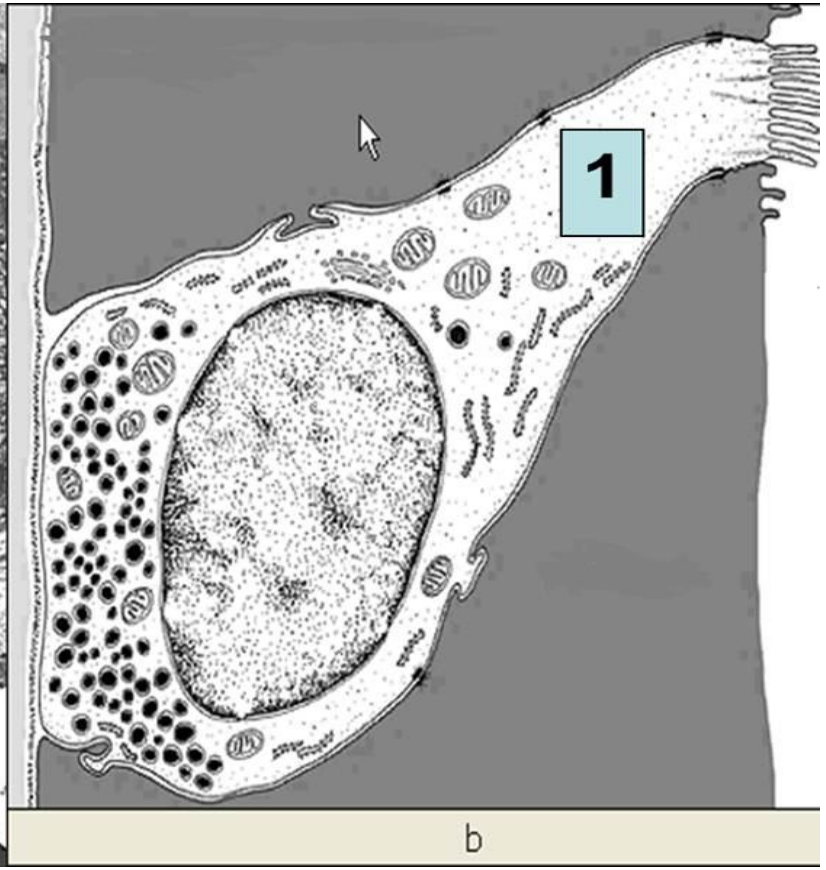


APUD of small intestine

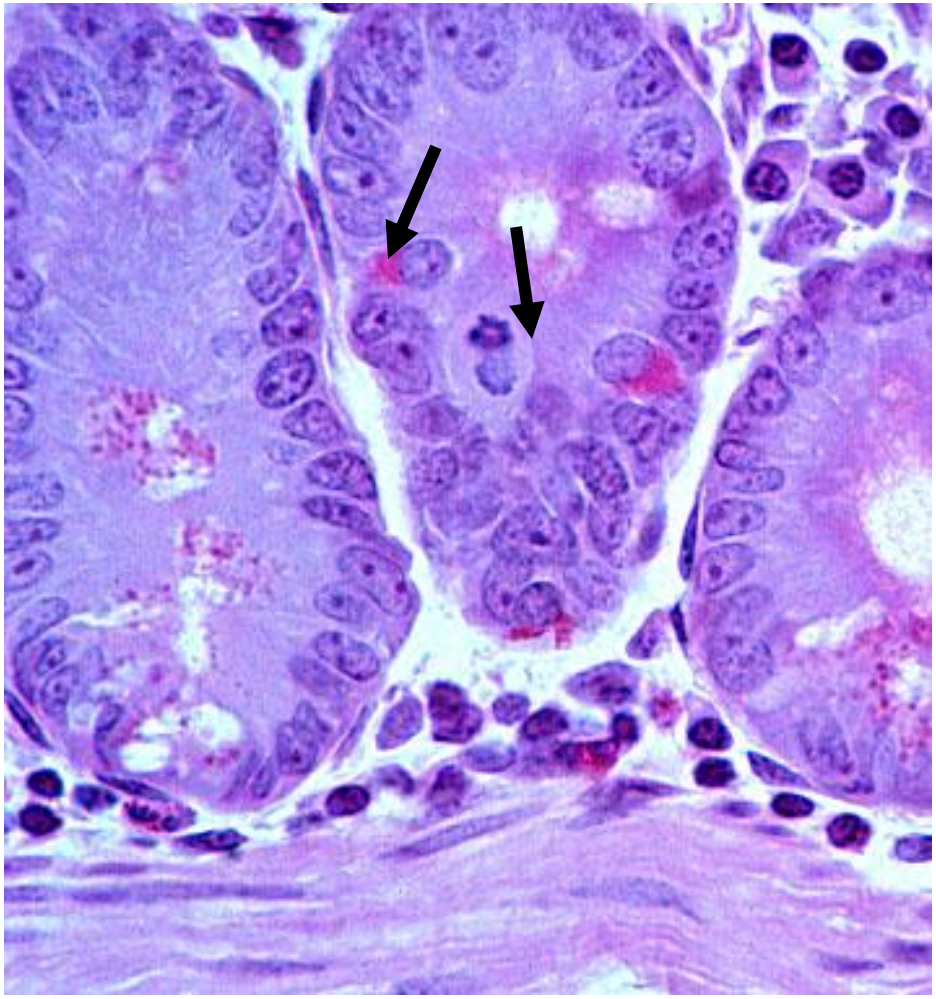
Closed type

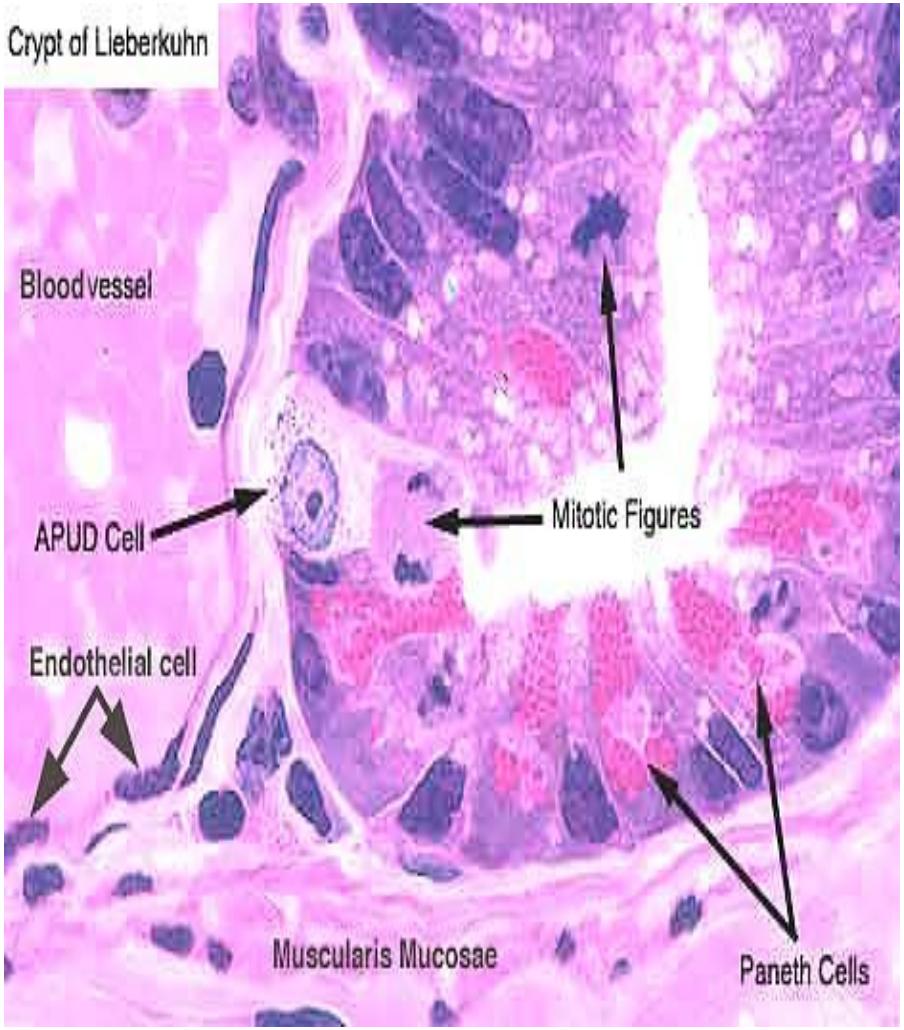
Open type



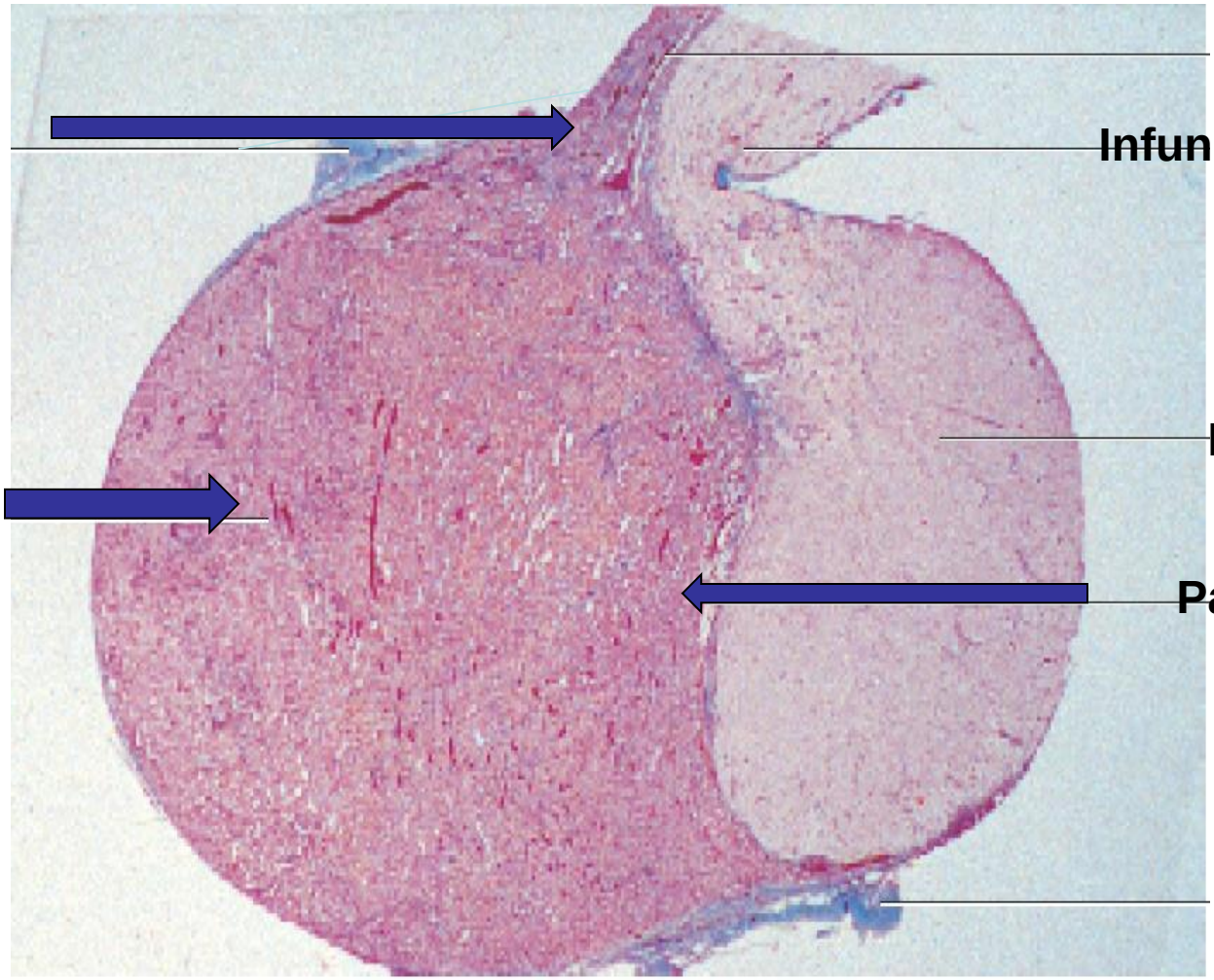


Enteroendocrine cells

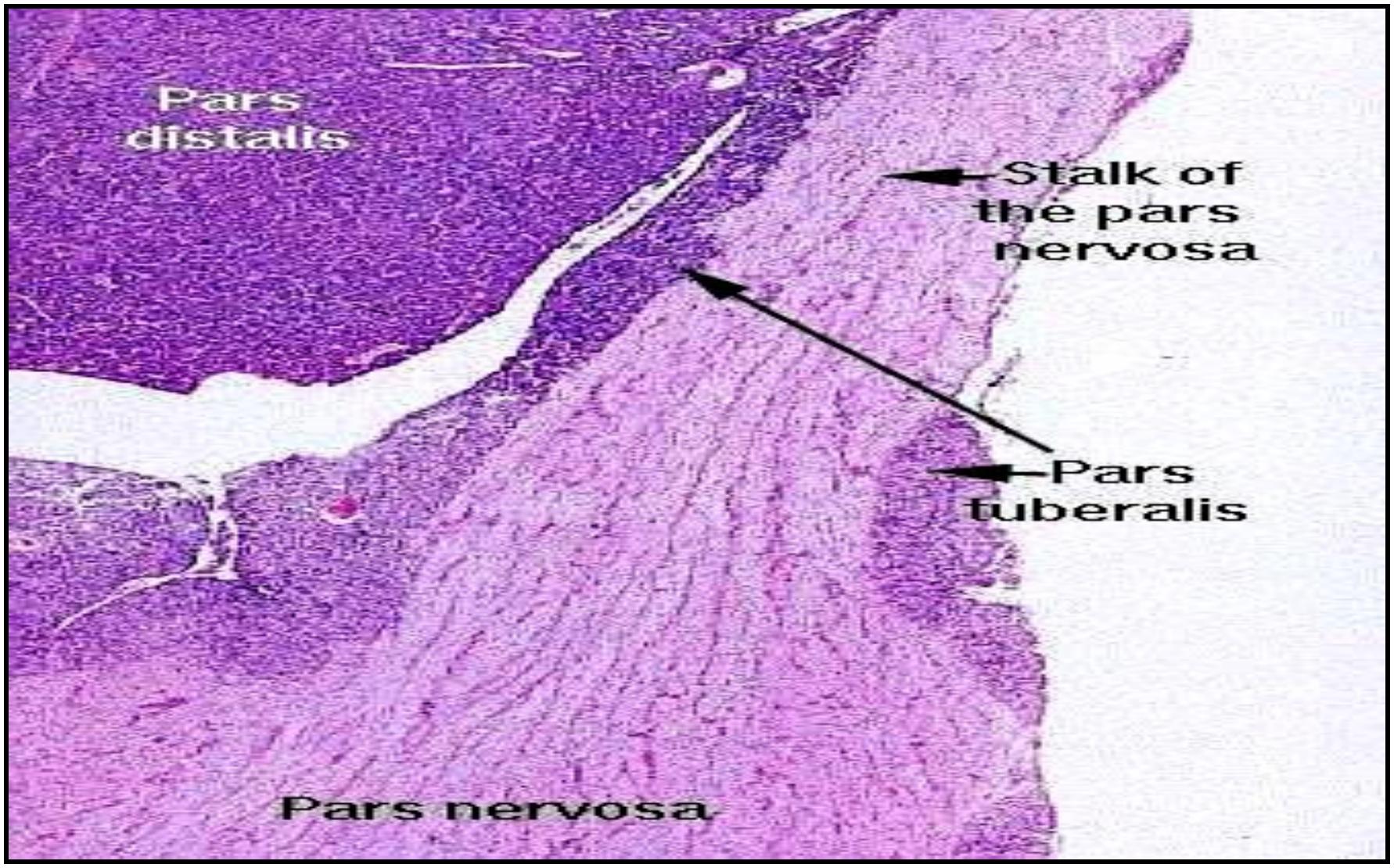




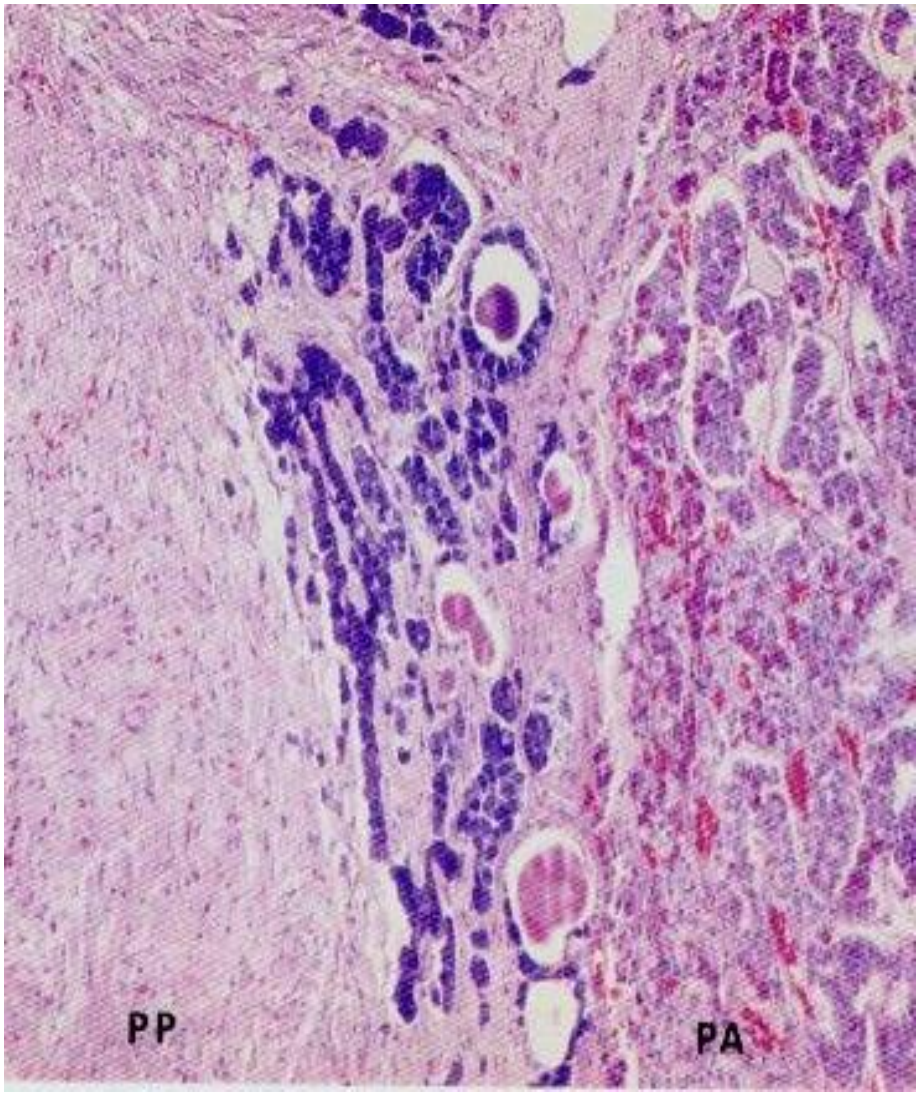
PITUITARY GLAND



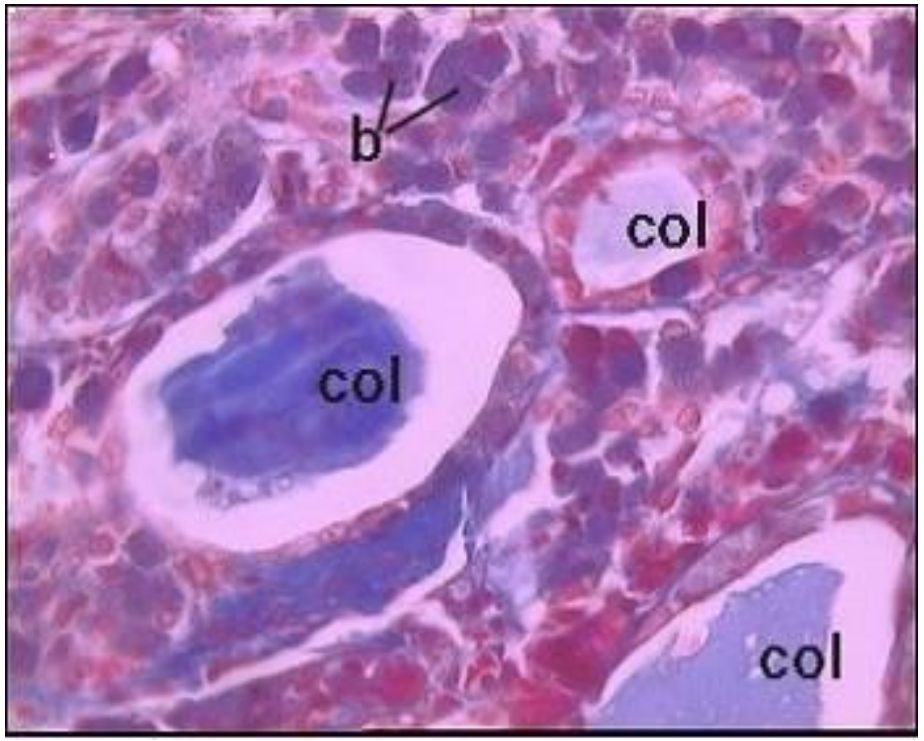
PITUITARY GLAND



Pars Intermedia



- Human/ **unclear function**
- animals / the basophilic cells produce melanocyte stimulating hormone (**MSH**



Pars distalis

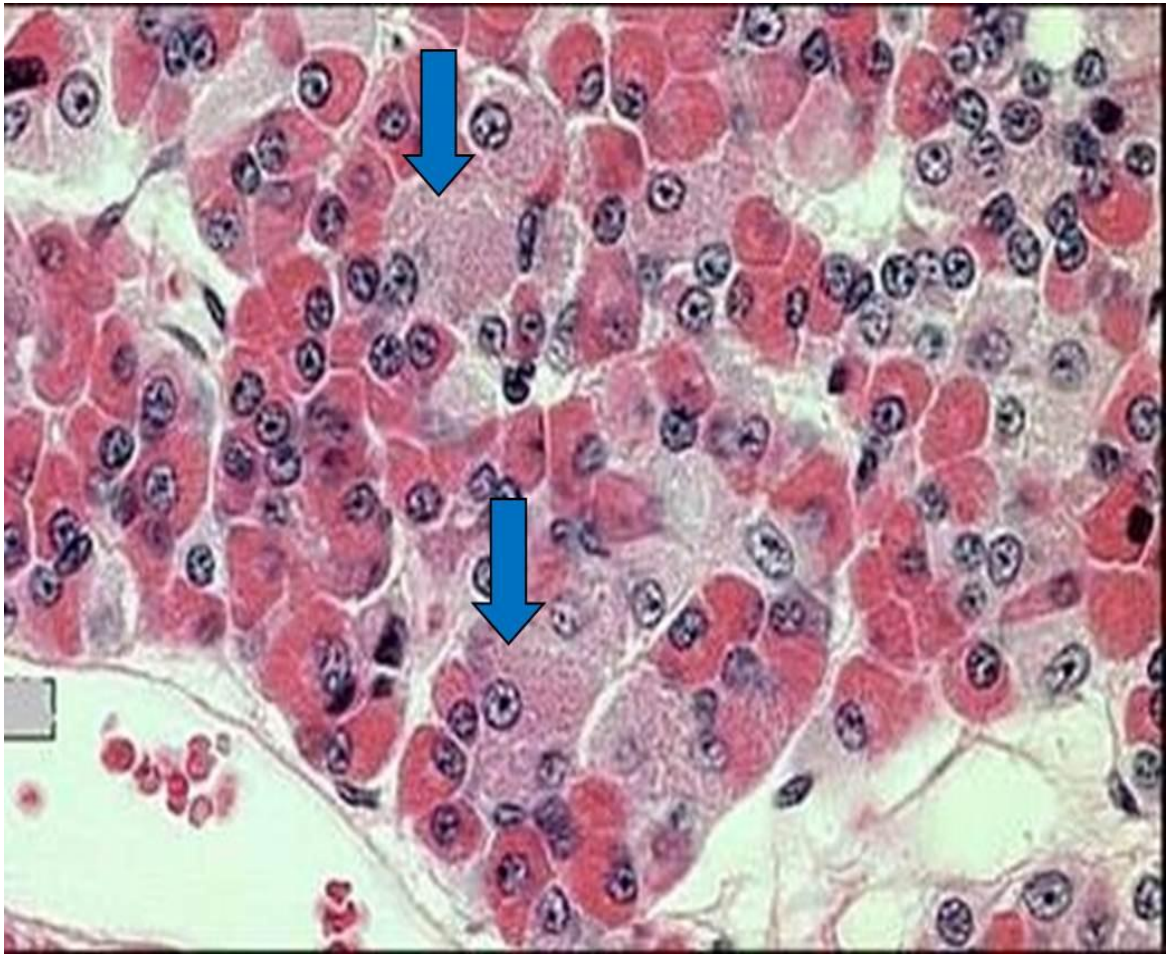
Chromophils

1- Acidophils 37%

2- Basophils 11%

3- Chromophobes 52%

4- Fenestrated sinusoids

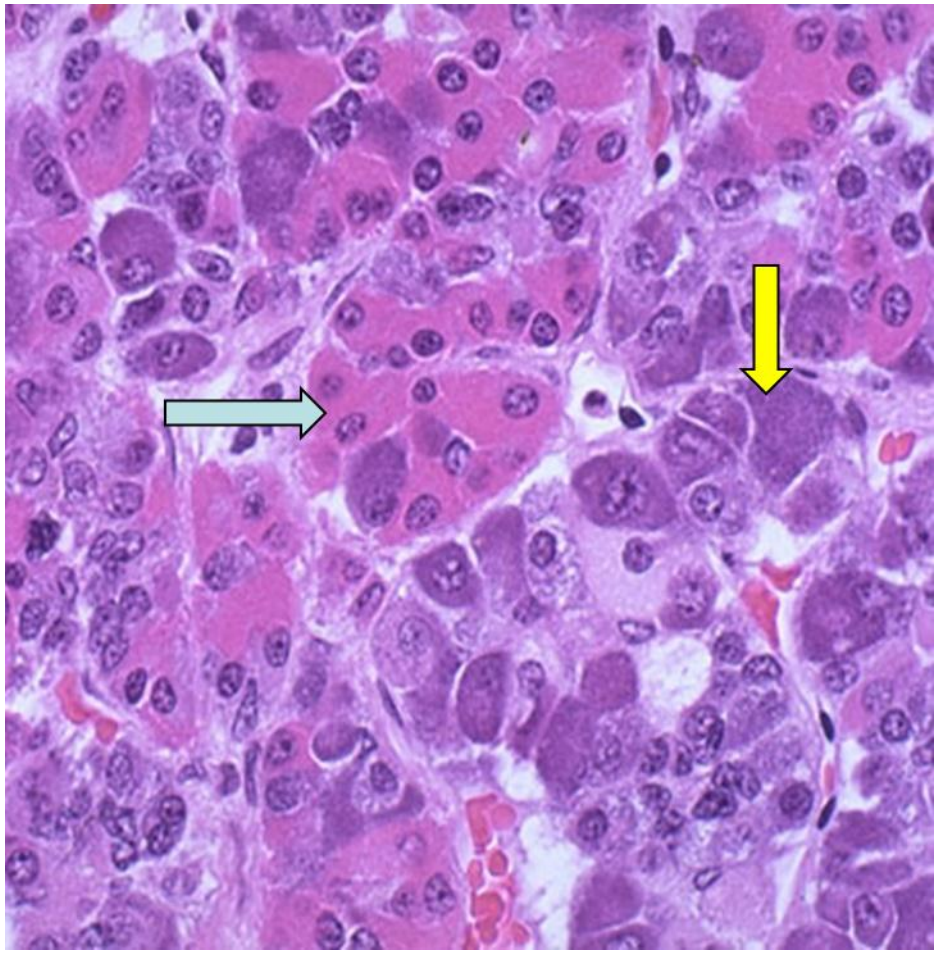


Acidophils

- **Somatotrophs**
- Growth H.
- **Mammotrophs**
- Prolactin

- Small in ♂and non preg ♀
- Large irregular in pregnant and lactating ♀**(Erdheim cells)**
- **Crinophagy:**

when suckling is terminated, lysosomes eliminate the excess secretory granules

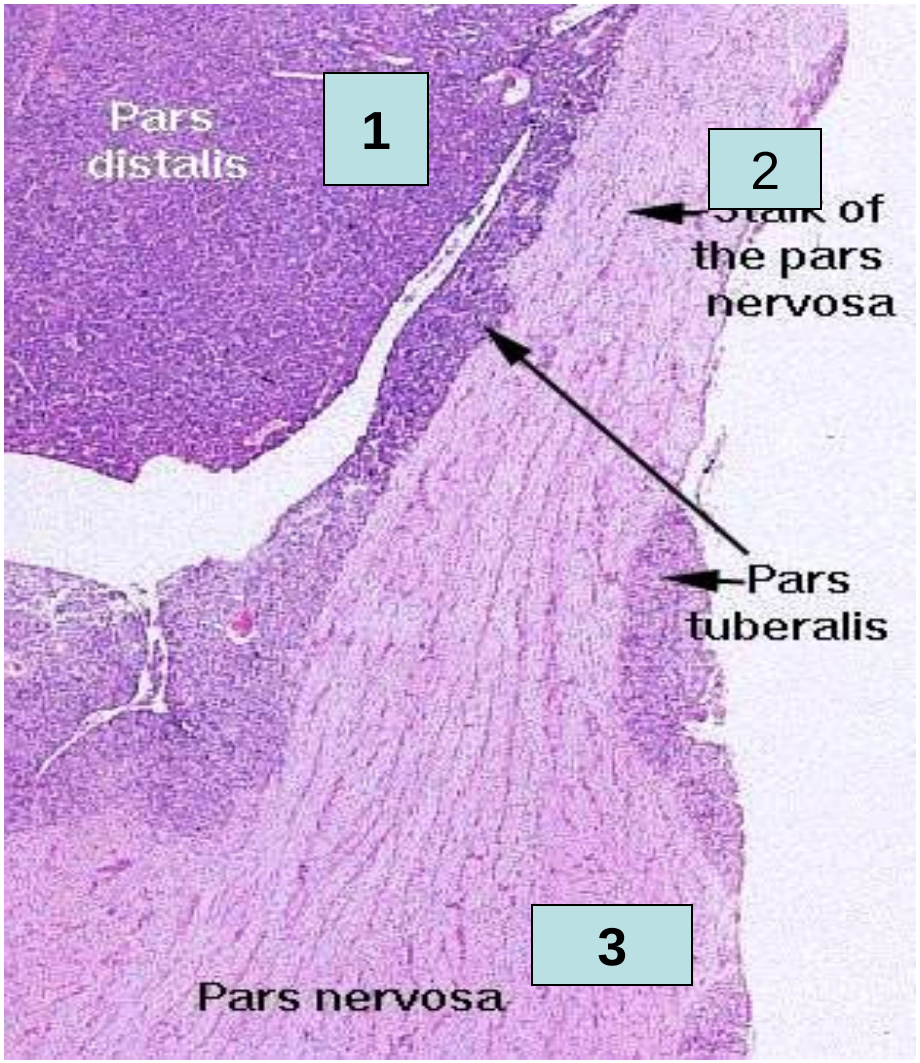


Basophils :

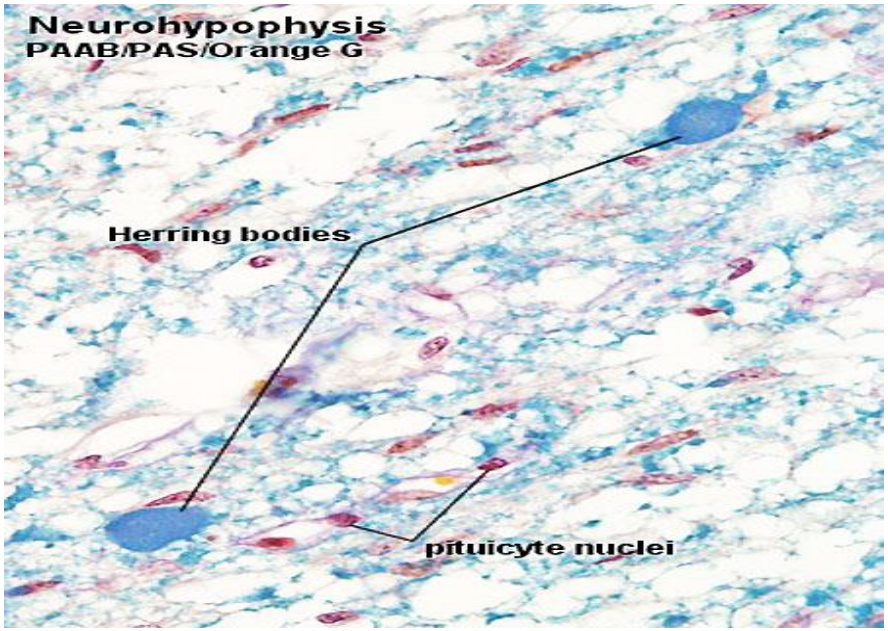
- **TSH**
- **FSH,LH**
- **ACTH**

Where is oxytocin stored ?

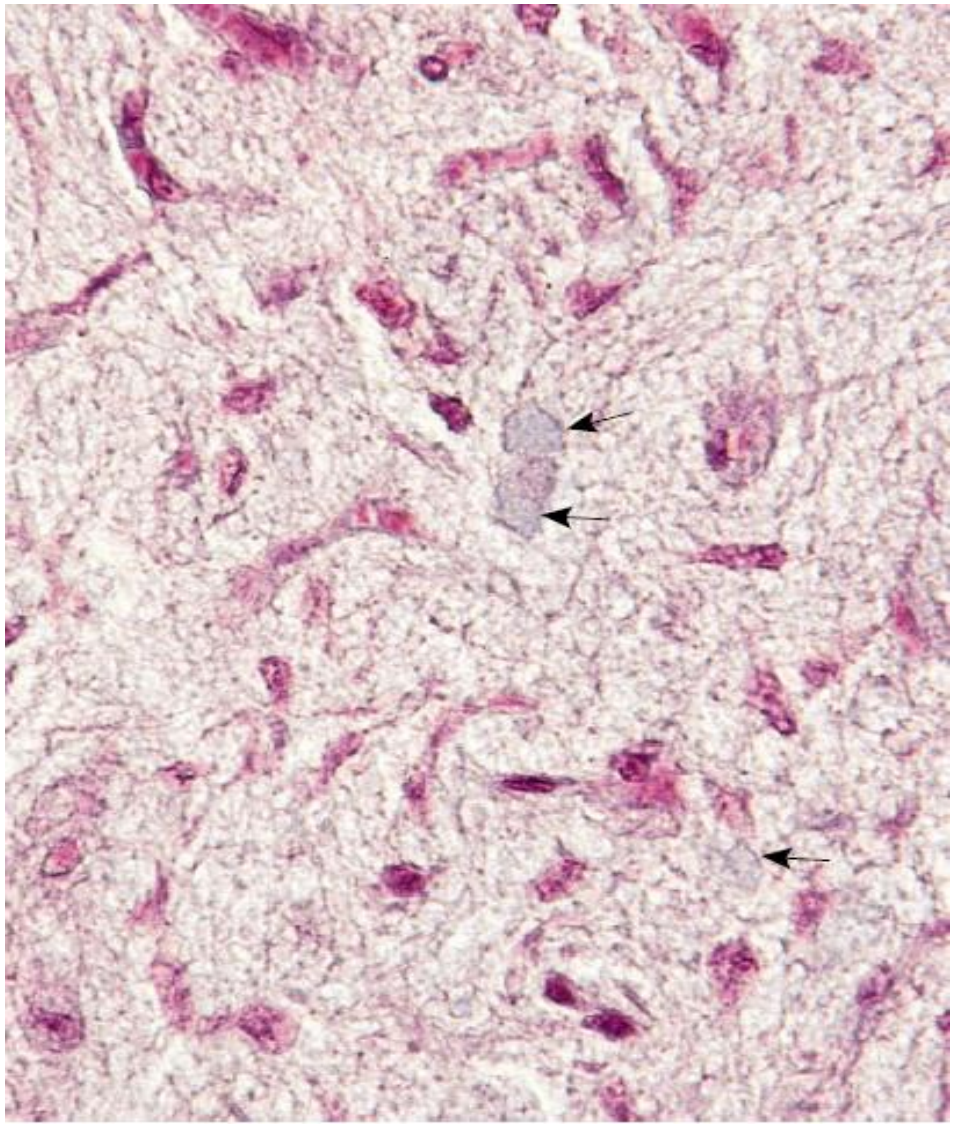
a. Pars intermedia
b. Pars tuberalis
c. Infundibulum
d. Pars distalis
e. Pars nervosa



Neurohypophysis

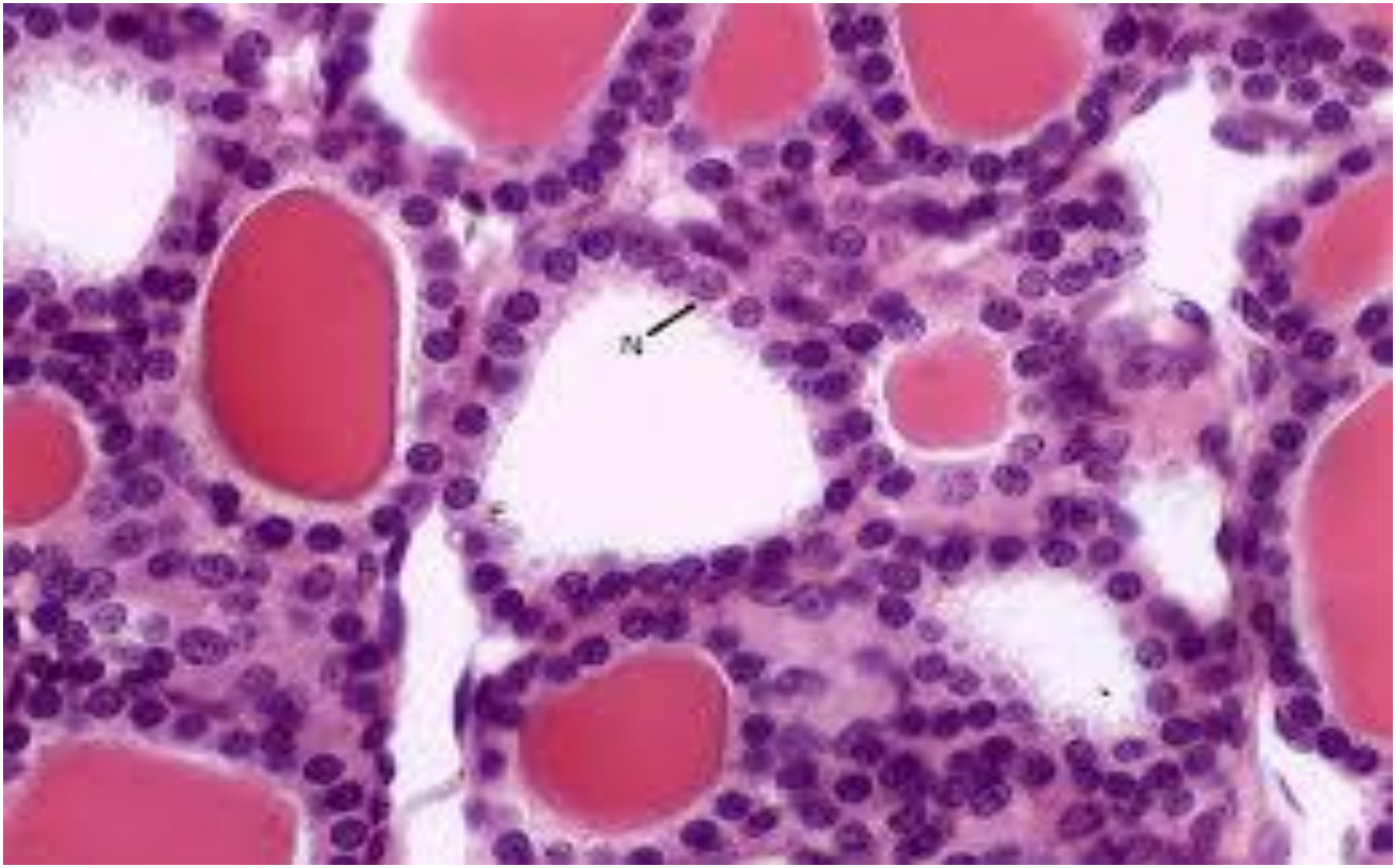


1. Unmyelinated axons
2. Herring bodies (ADH, Oxytocin)
3. Pituicytes.
4. Rich blood capillary plexus

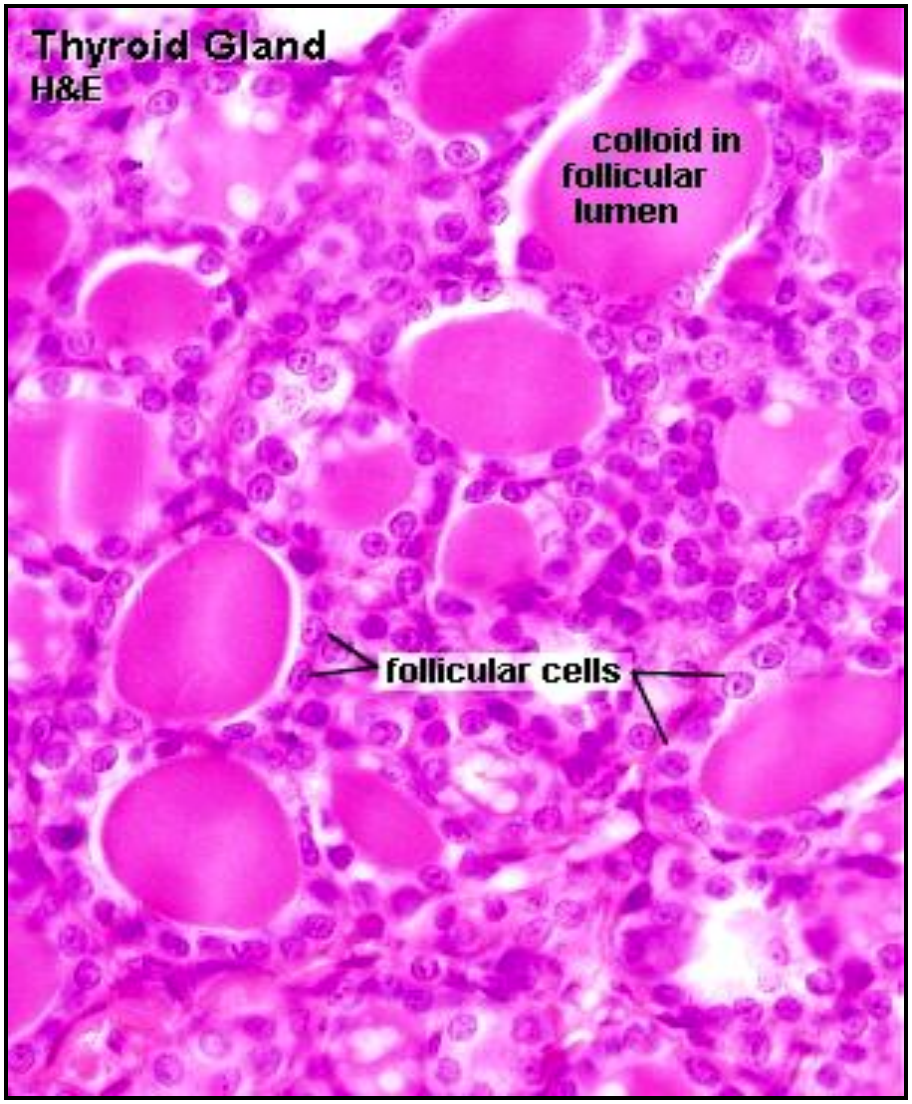


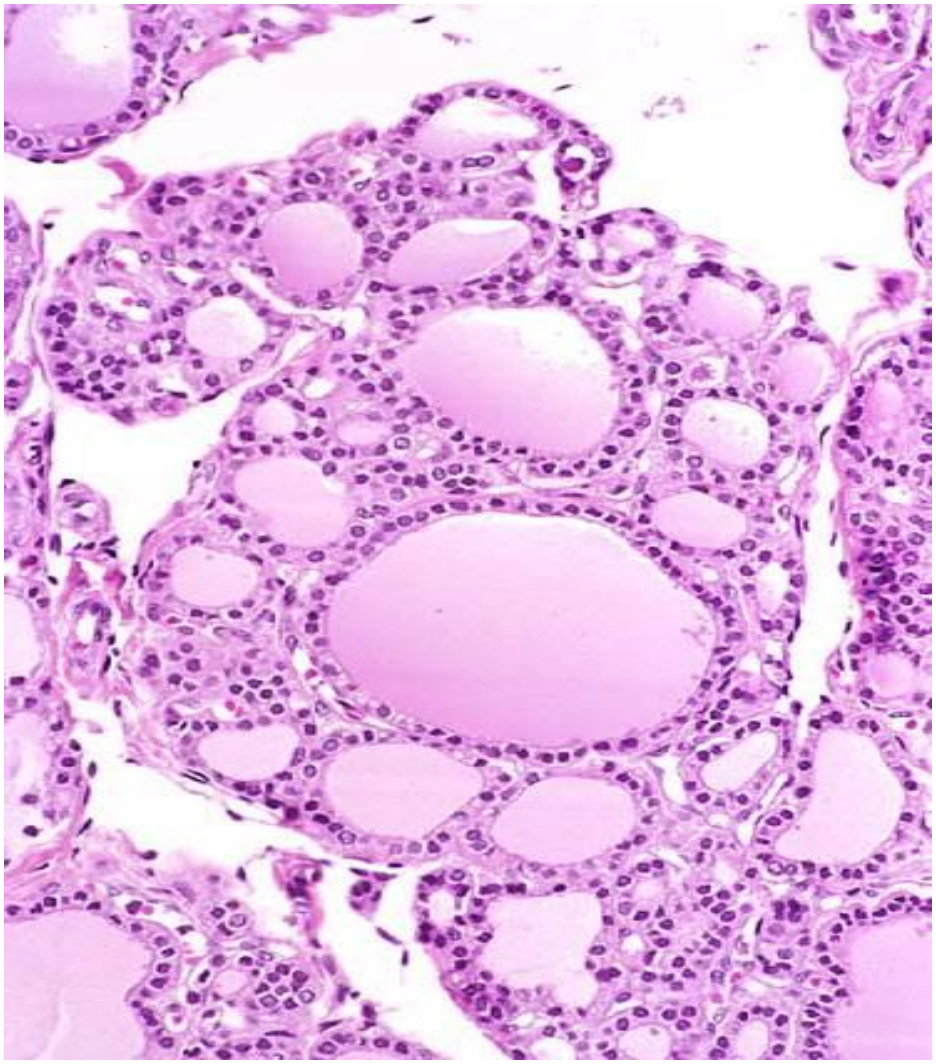
1.Follicular cells
2. Parafollicular (clear) cells
3. Interfollicular cell

Thyroid



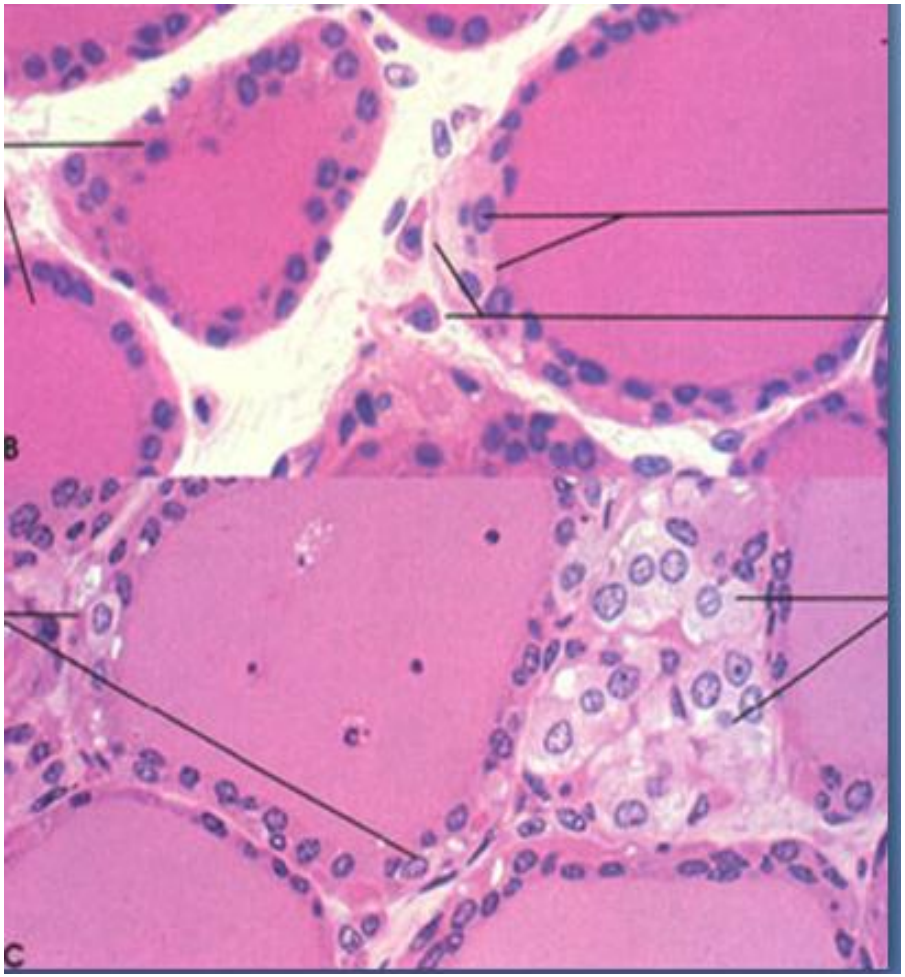
Thyroid


Thyroid Gland
H&E
colloid in follicular lumen
follicular cells

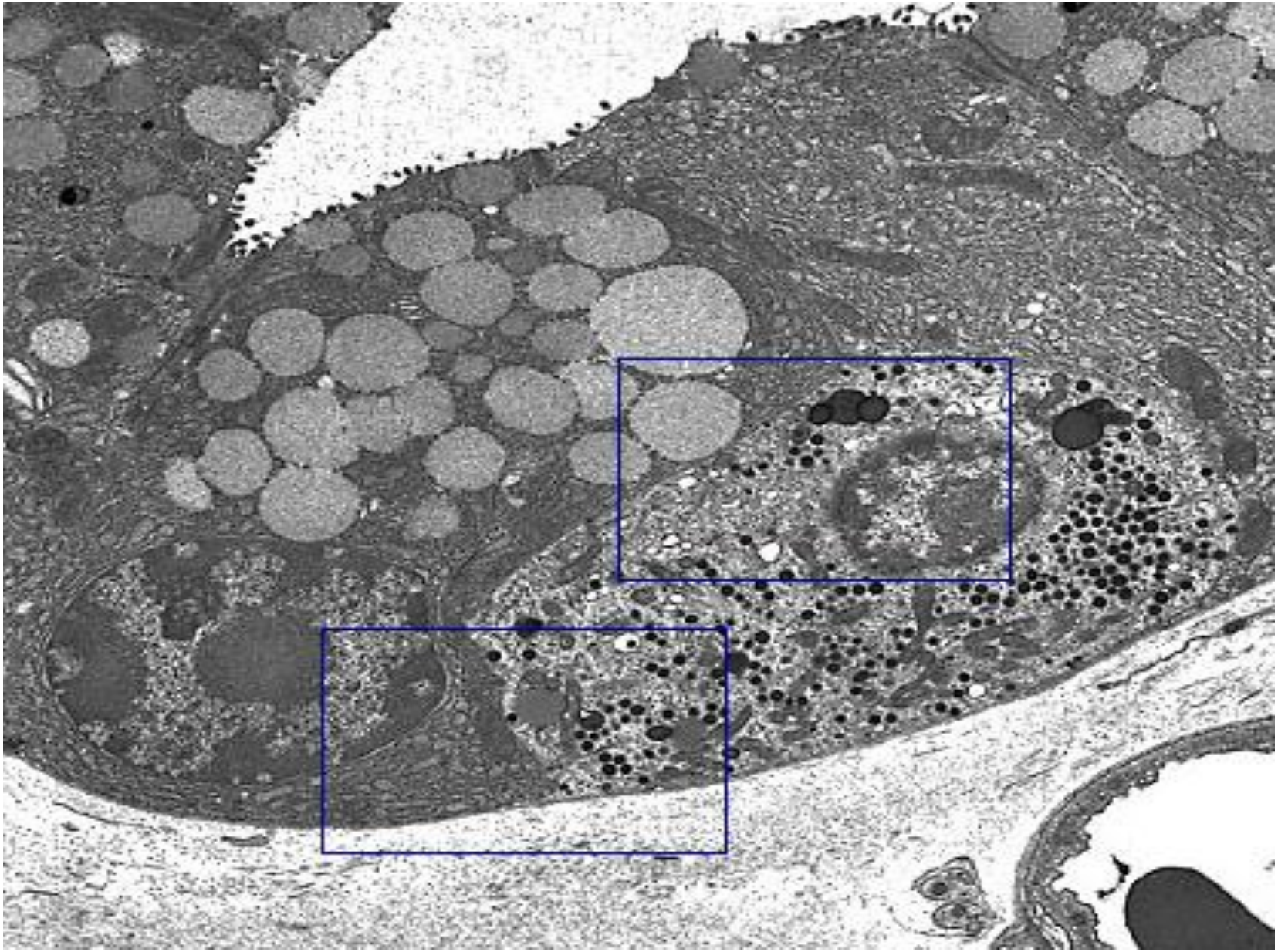


Thyroid

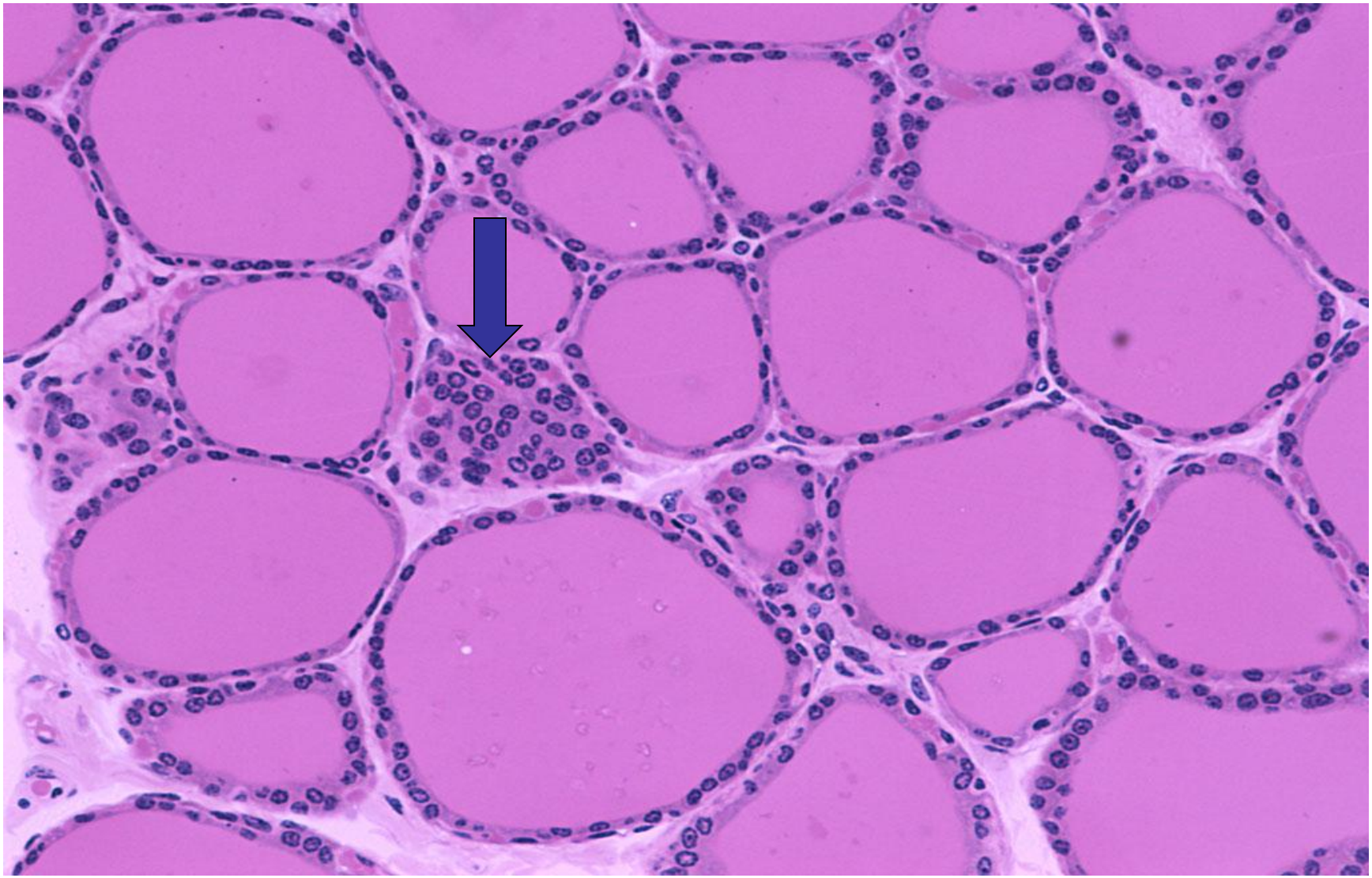
1. Follicular cells
   - Interfollicular cells
2. Parafollicular (clear) cells



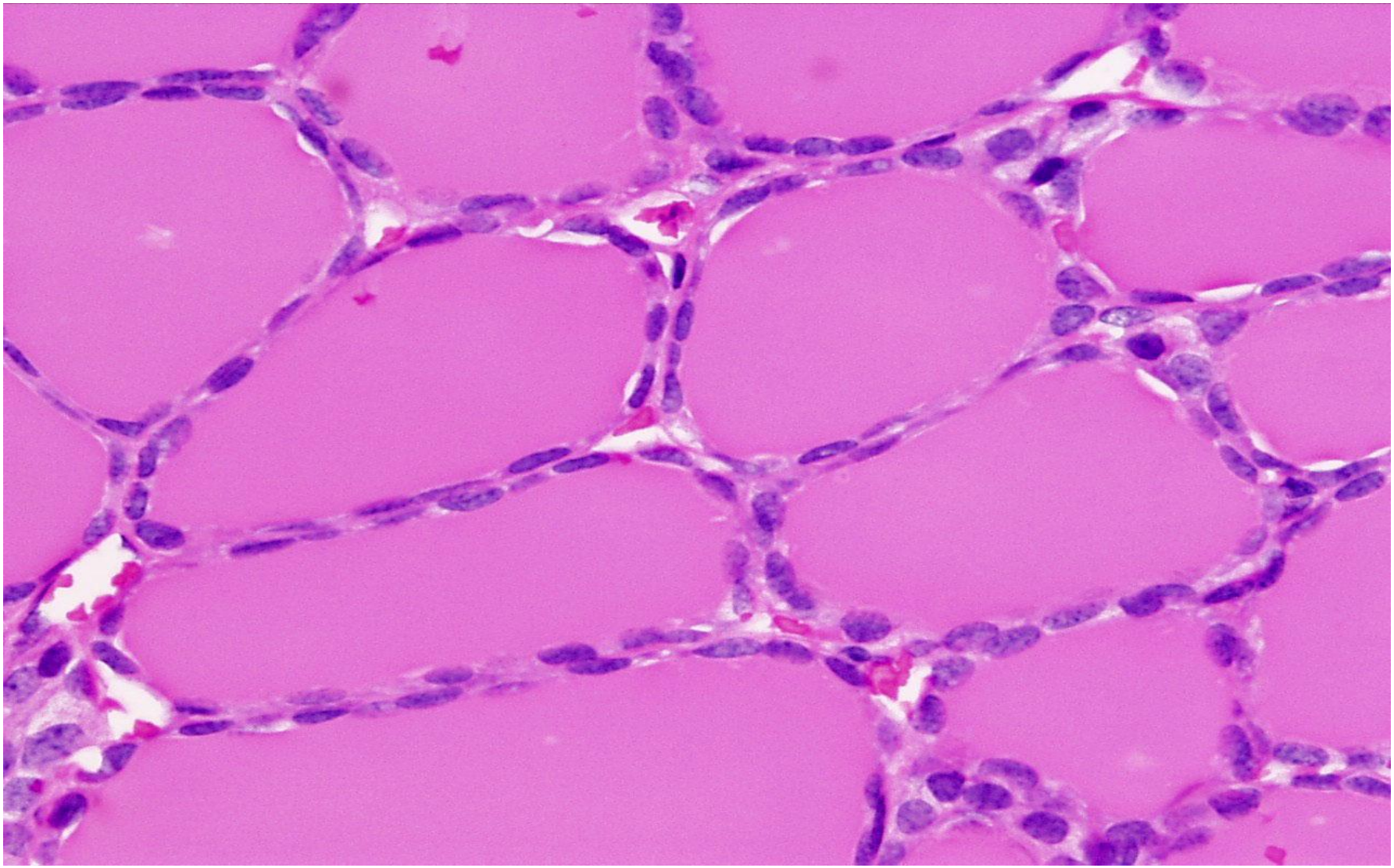
EM of thyroid follicle



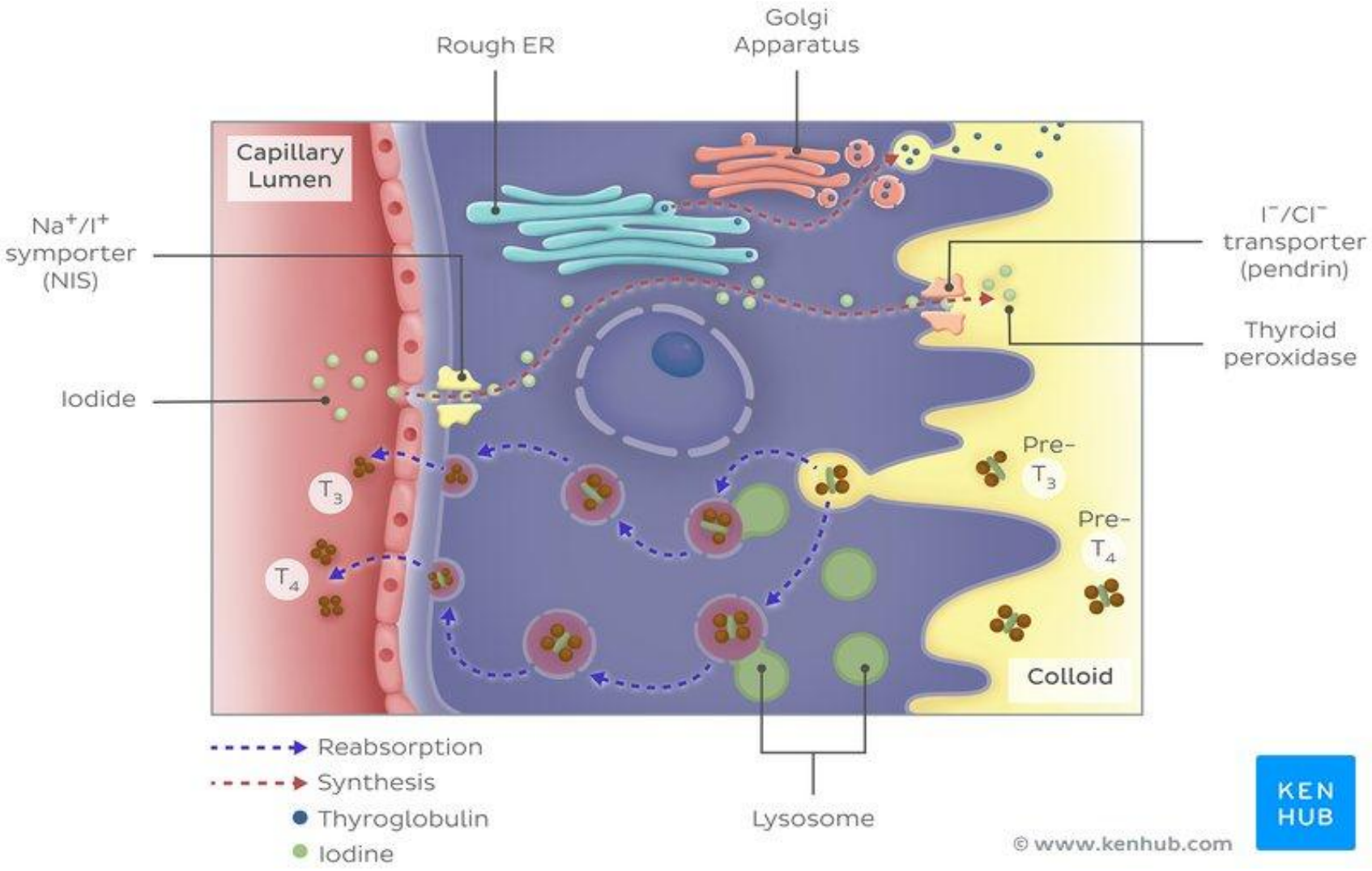
Interfollicular cells



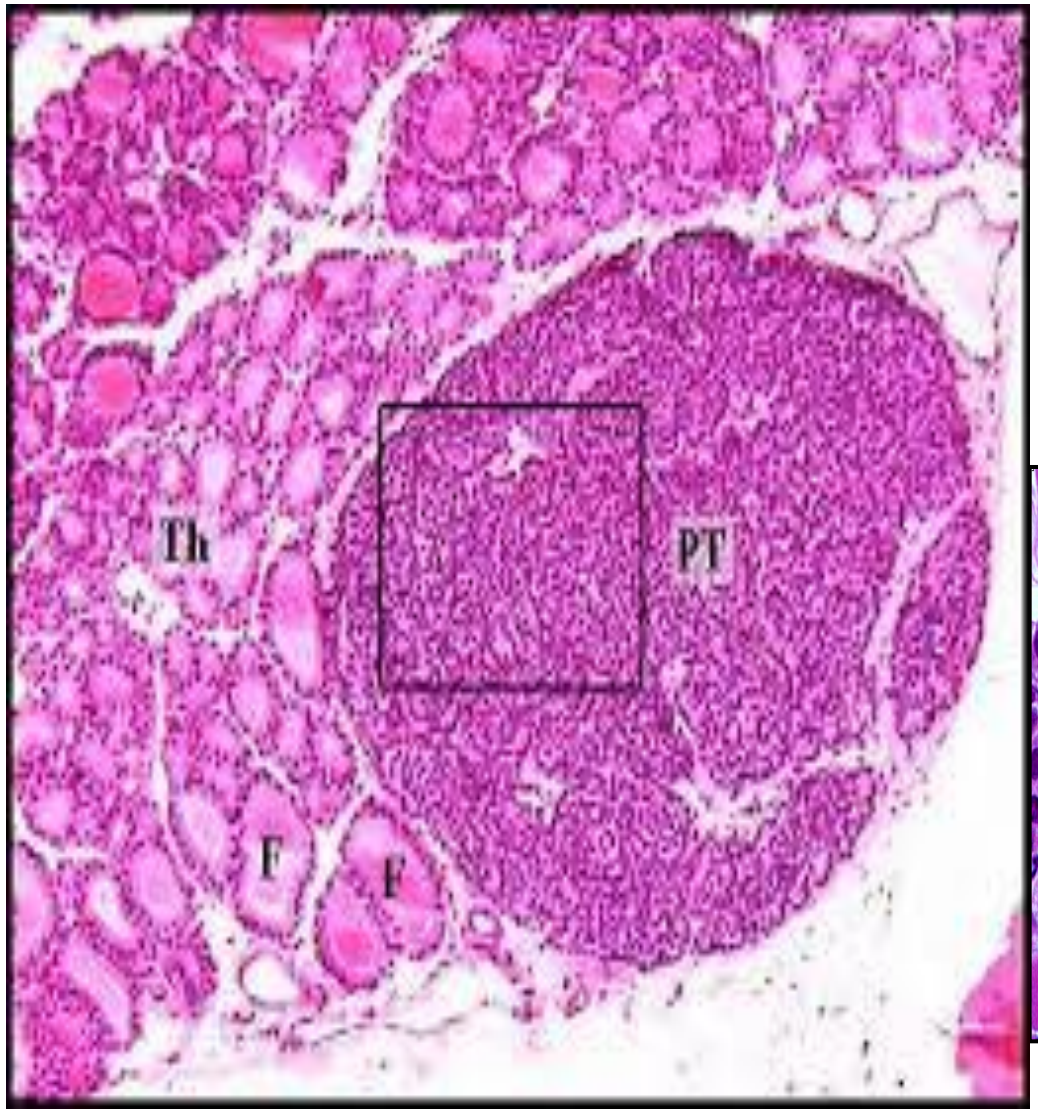
Thyroid



Formation of thyroid hormones

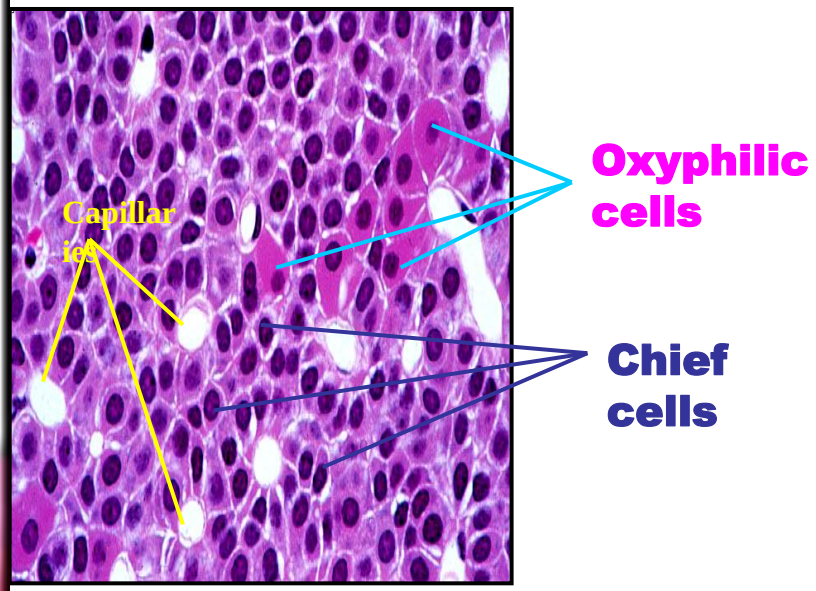


Parathyroid gland

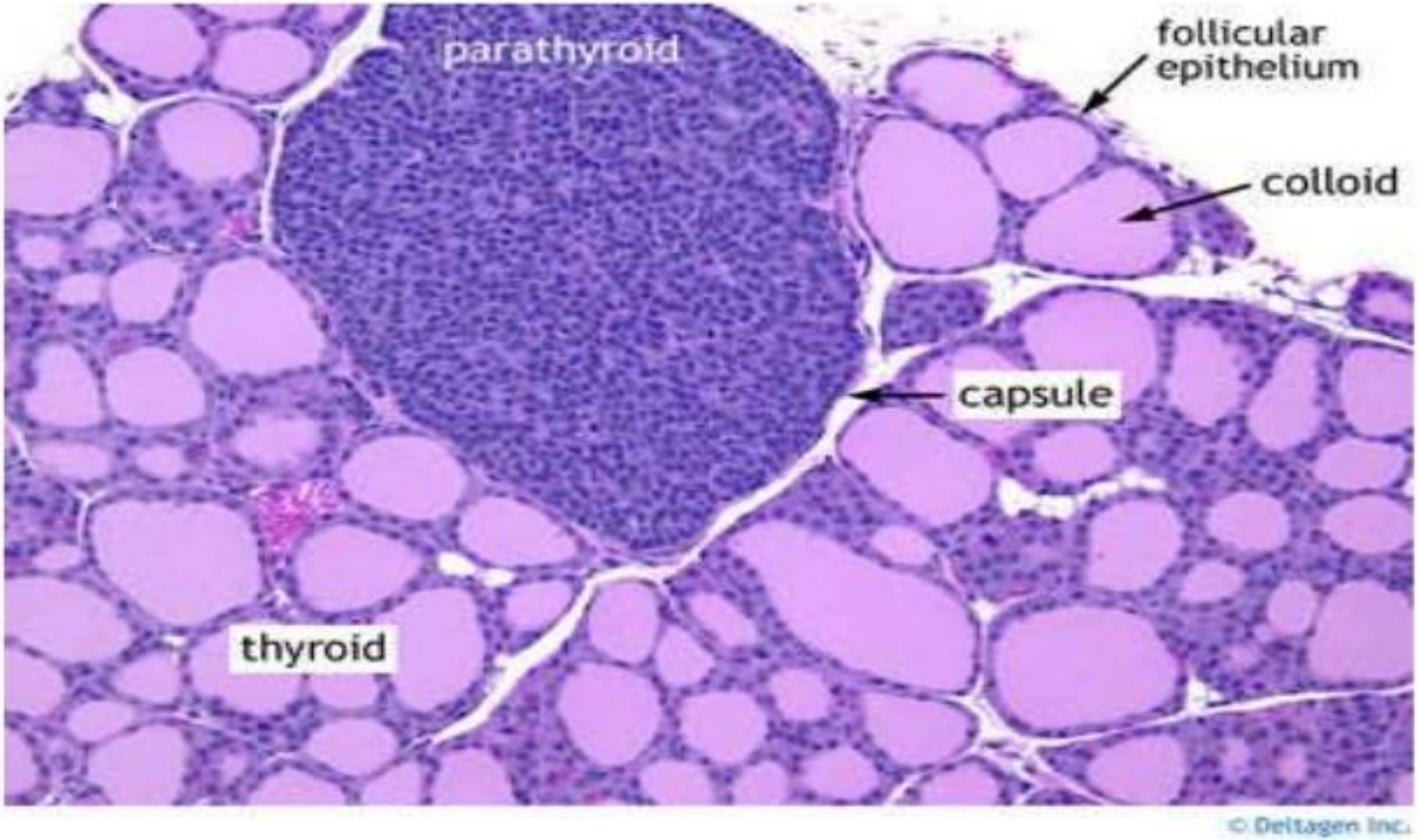


- Two types of cells:

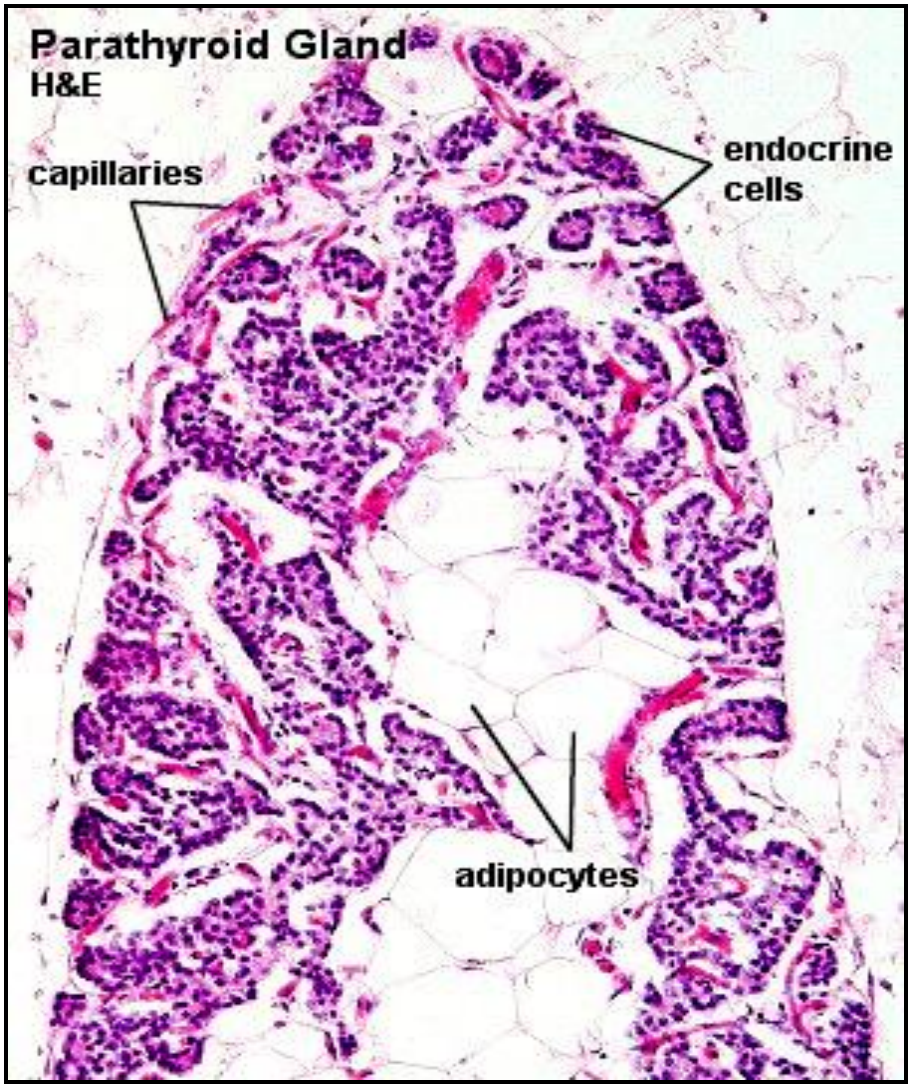
1. Chief cells
2. Oxyphil cells

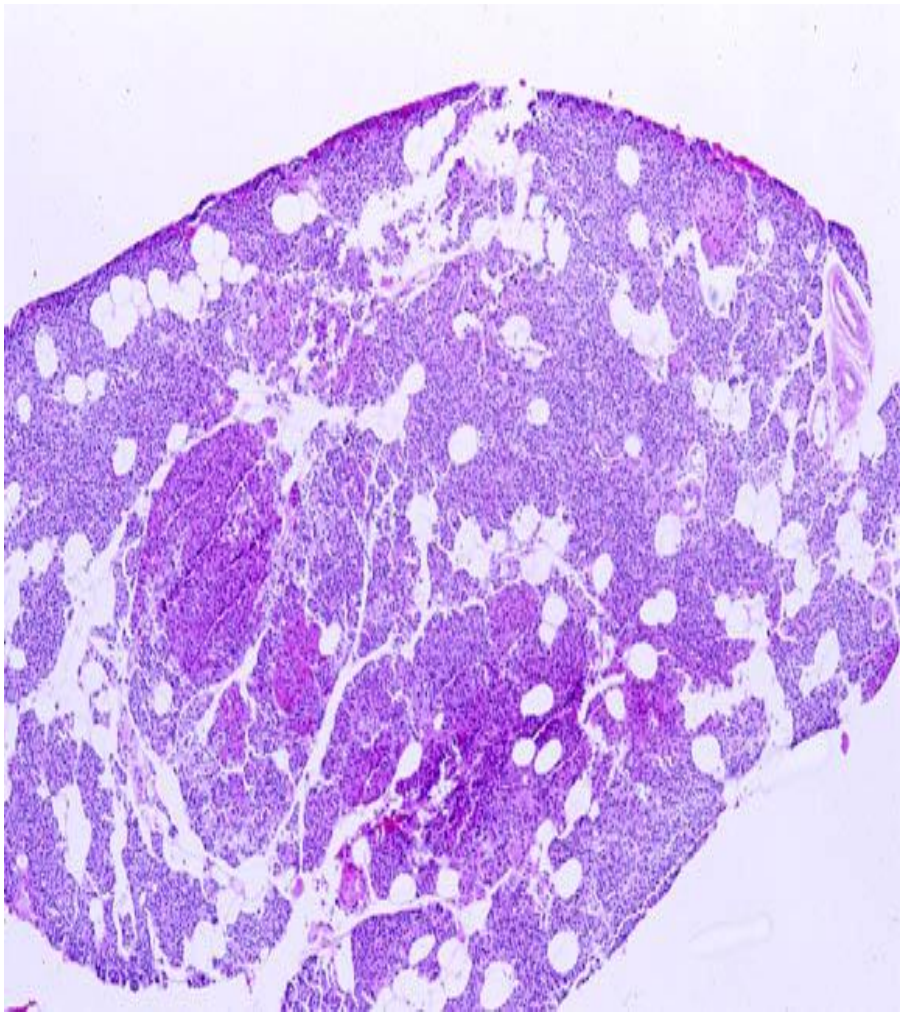


Parathyroid gland



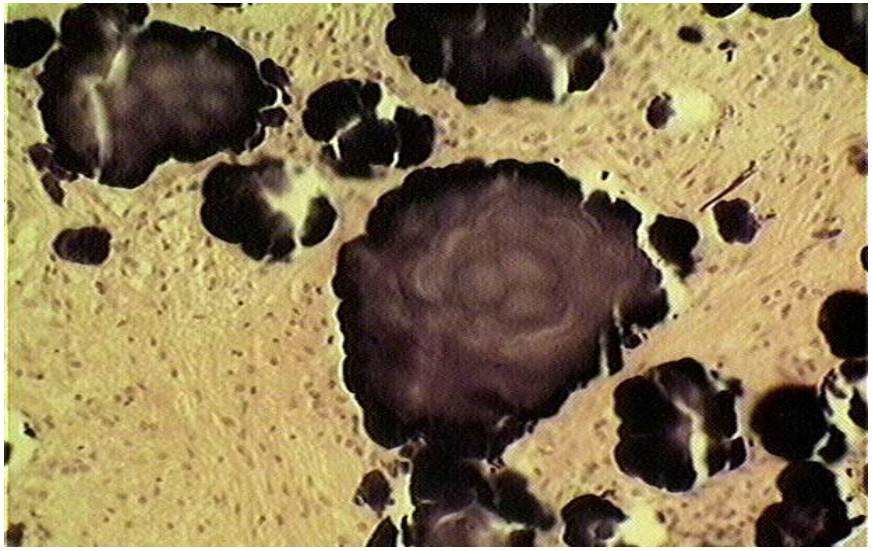
Parathyroid gland in old people

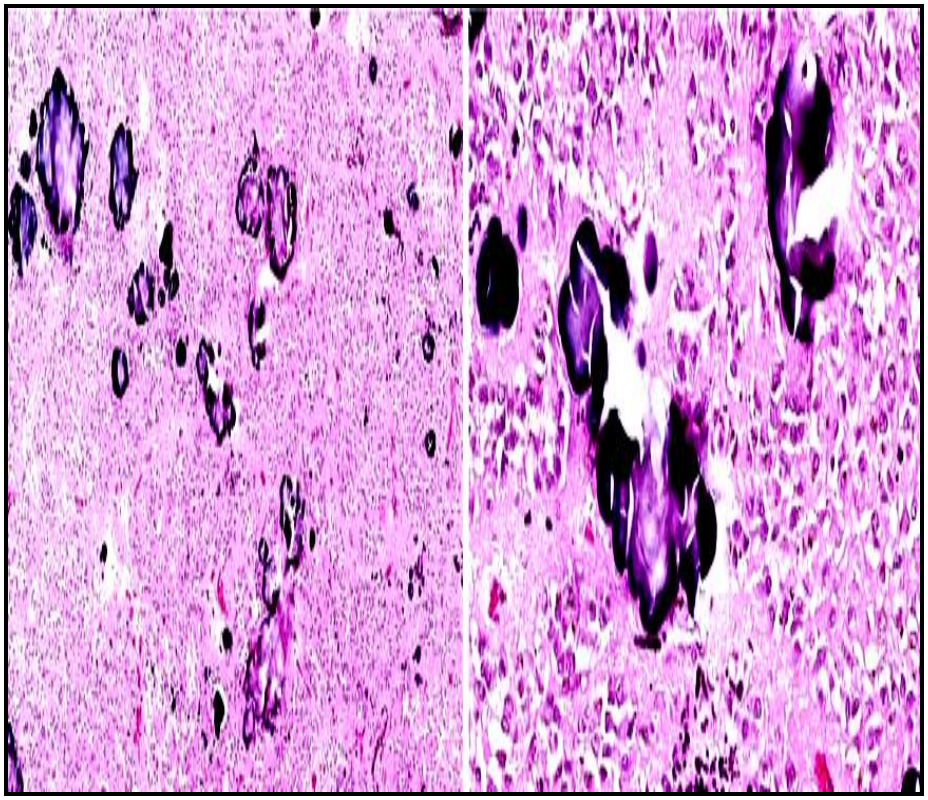


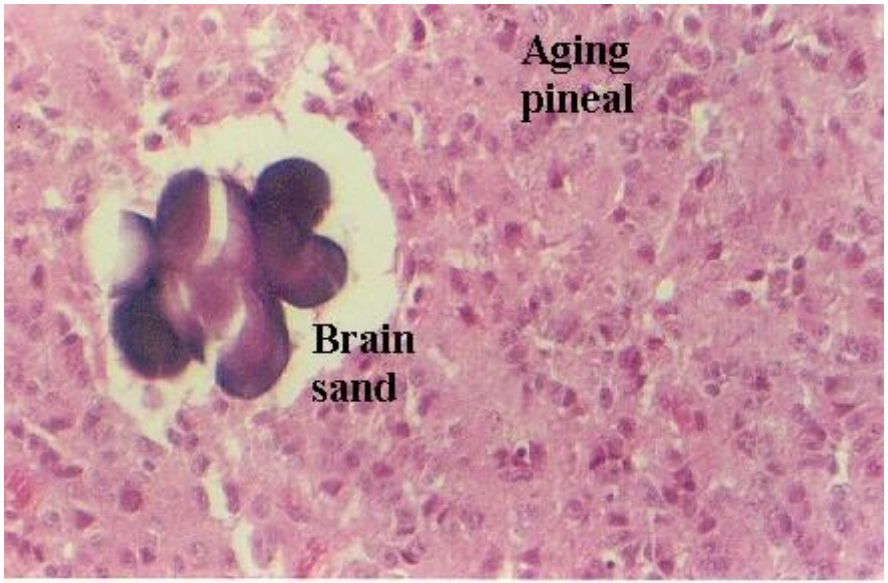


Pineal gland (Epiphysis cerebri)

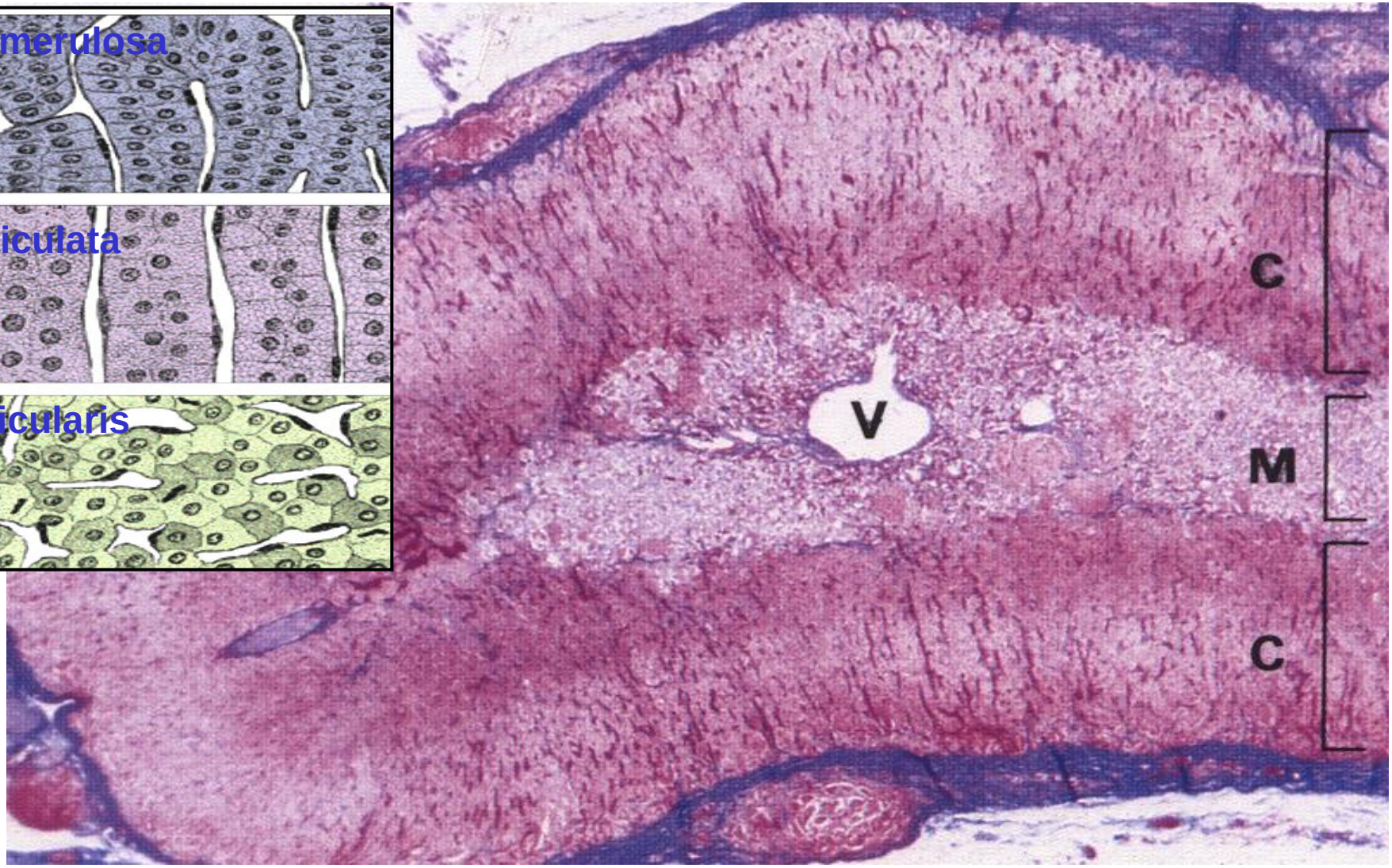
1- pinealocytes
2- Astrocytes
3- Blood vessel
- **Brain sand with old age**



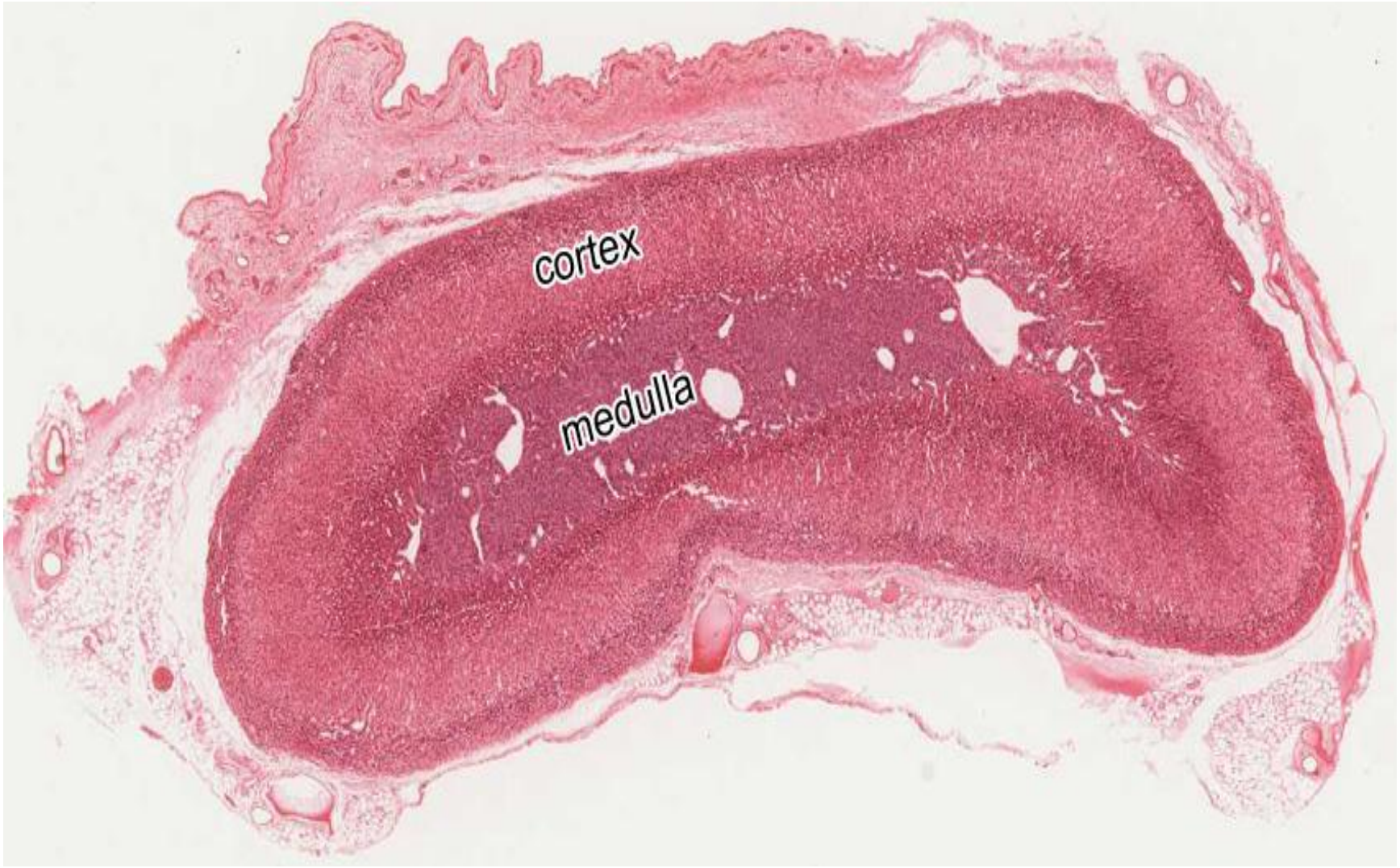




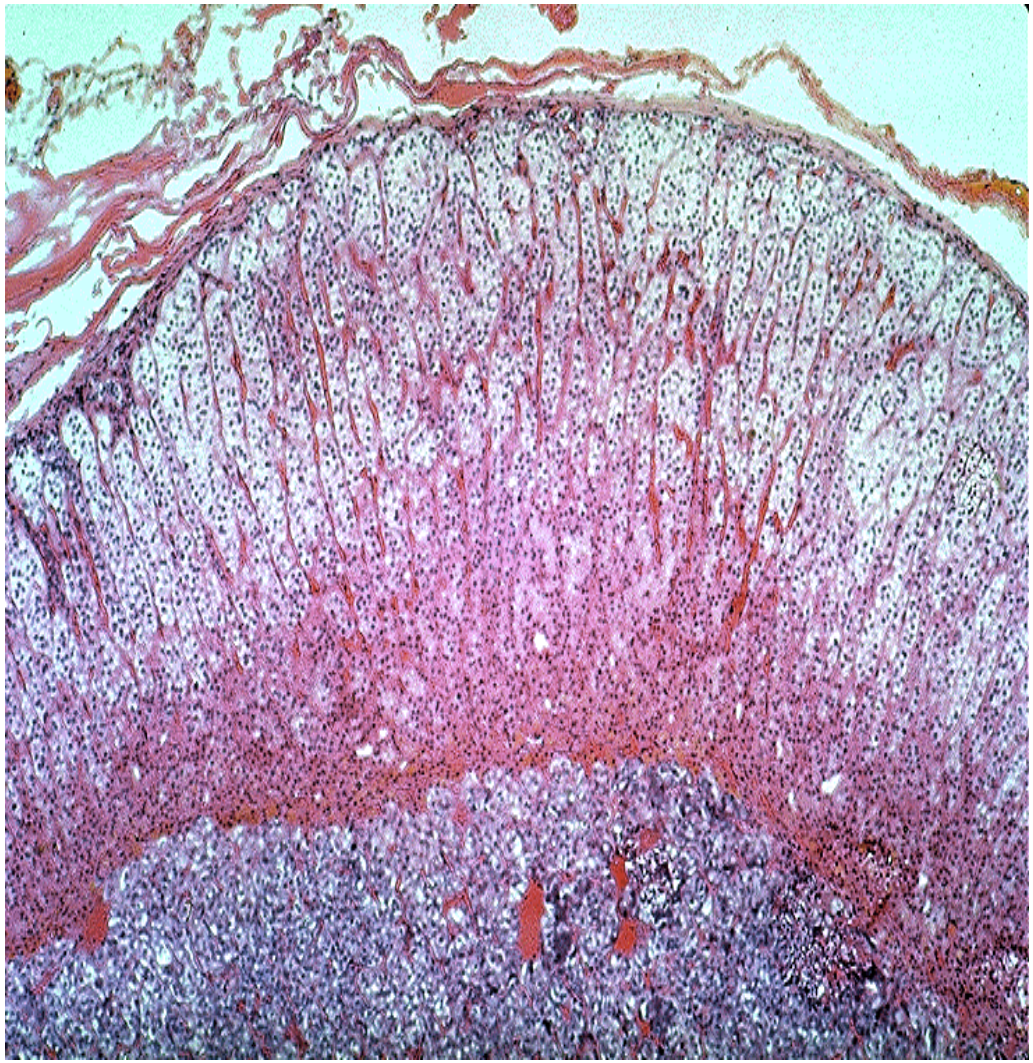
Suprarenal gland

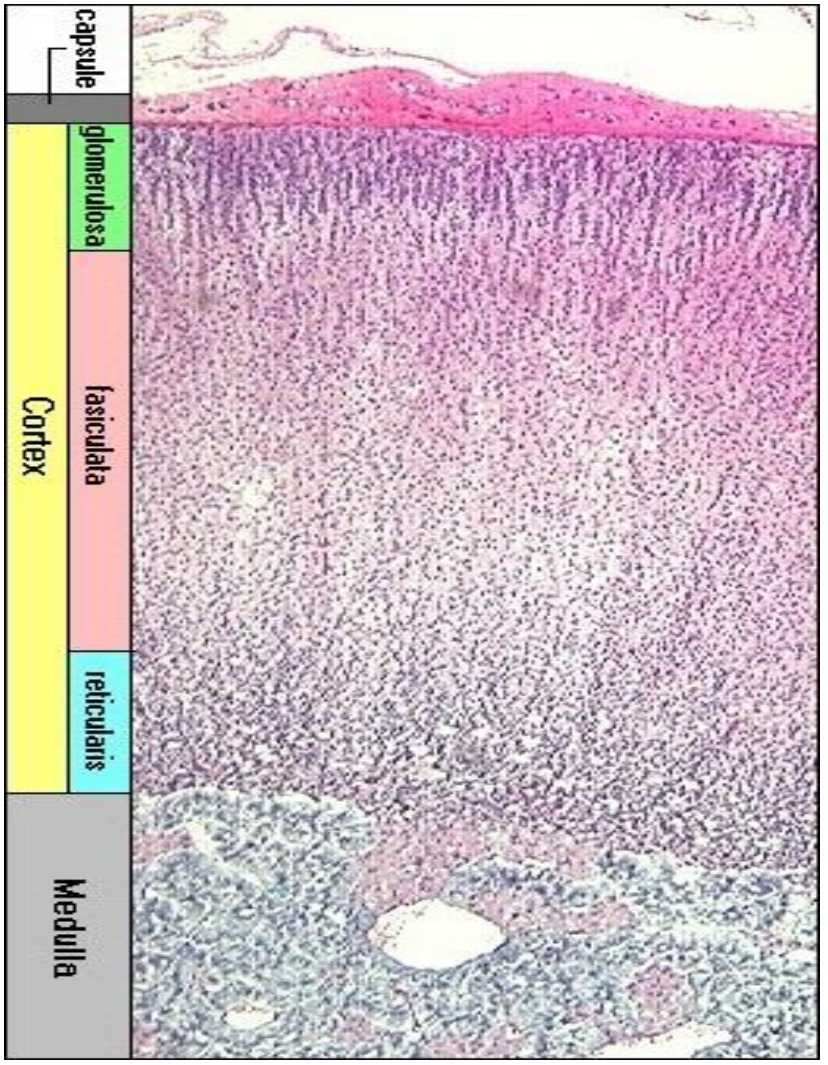


Suprarenal gland



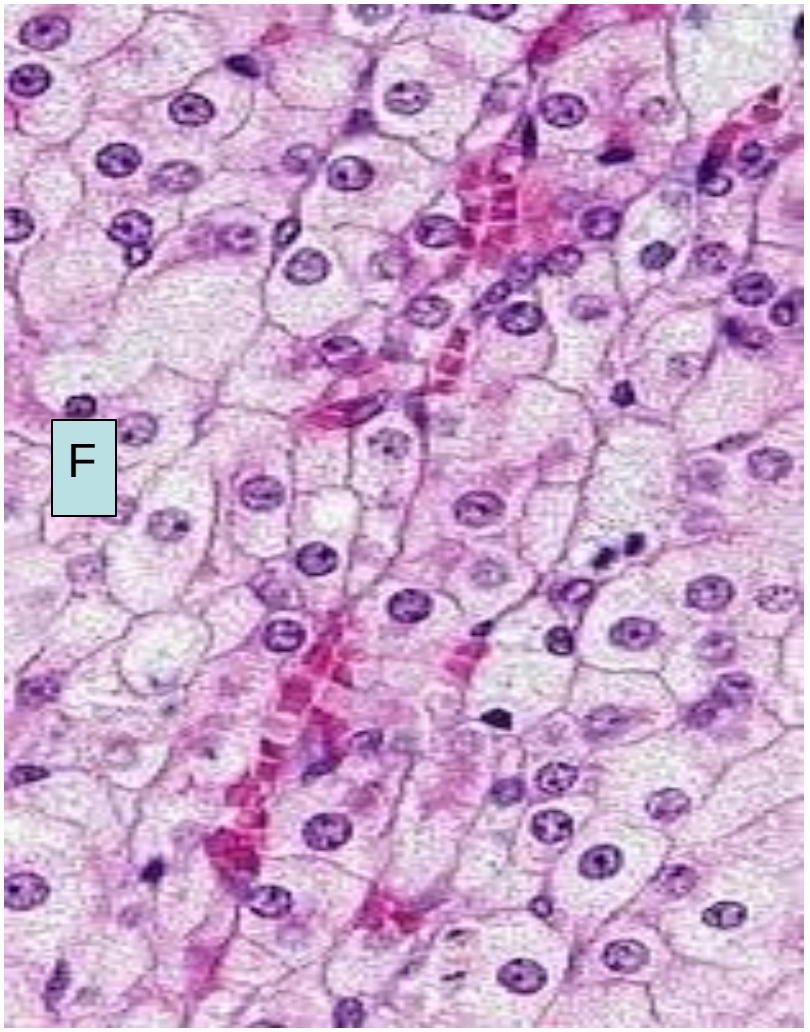
Suprarenal gland



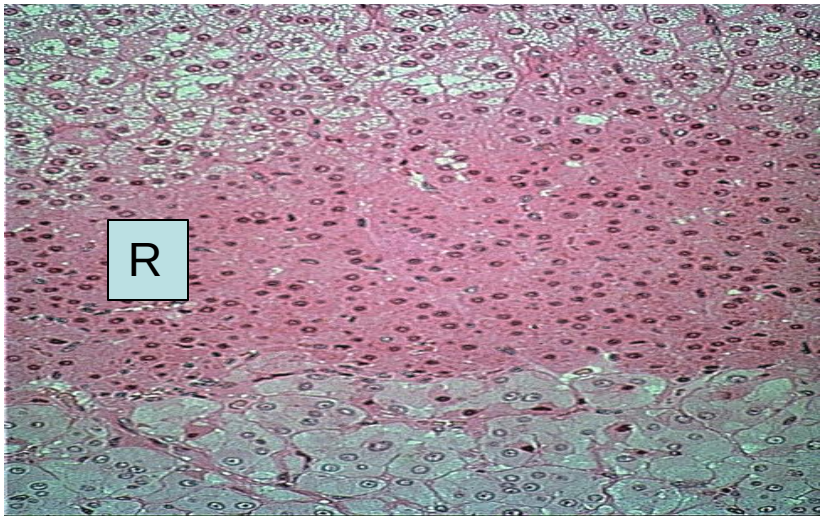


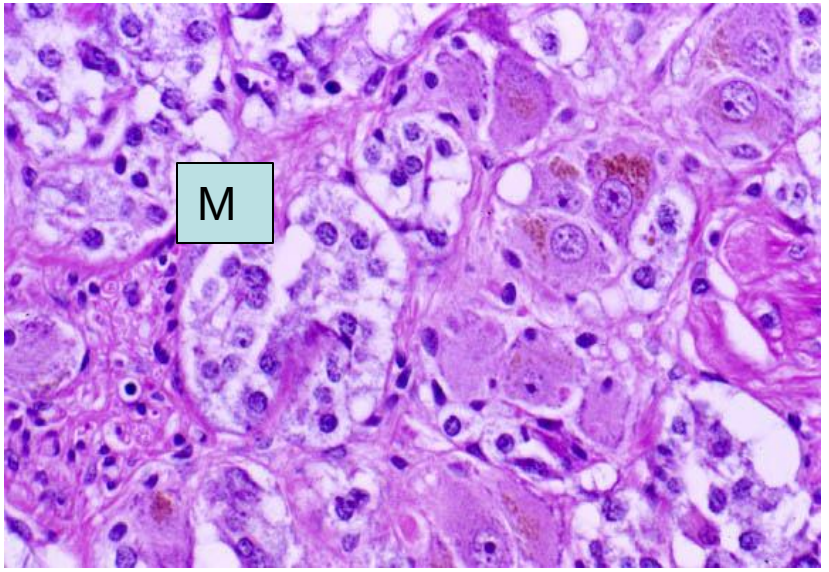
Suprarenal gland

Suprarenal gland



Suprarenal gland





Thank you