



HISTICS

Endocrine System

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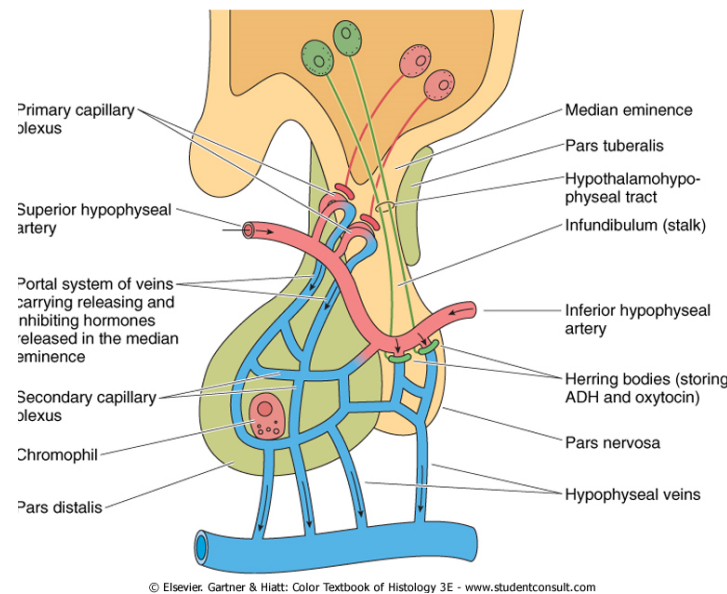
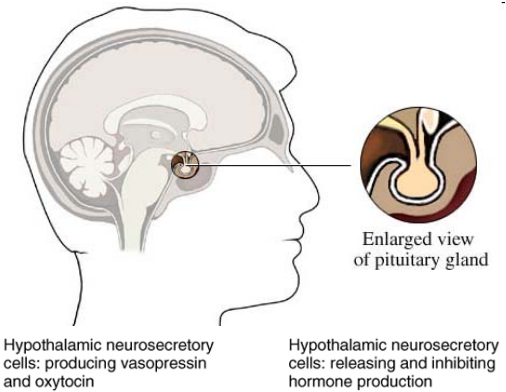
Rayan AlBalla (427)

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PITUITARY GLAND

- ❖ The pituitary gland, or **hypophysis**, is an endocrine gland that produces several hormones that are responsible for regulating growth, reproduction, and metabolism
- ❖ **Location:** below hypothalamus, which is connected to it
- ❖ It has a rich vascular supply
- ❖ It has two subdivisions, each has various regions having specialized cells that release different hormones:
 - **Adenohypophysis** (anterior pituitary)
 - **Pars distalis (pars anterior)**
 - Pars intermedia
 - Pars tuberalis
 - **Neurohypophysis** (posterior pituitary)
 - Median eminence
 - Infundibulum
 - **Pars nervosa**



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PARS NERVOSA

- ❖ **Location:** it is part of neurohypophysis (posterior pituitary)
- ❖ **Function:** stores hormones secreted by the hypothalamus.
- ❖ **Contents:**
 - Axons of secretory neurons
 - **paraventricular nerves:** secrete oxytocin
 - **supraoptical nerves:** secrete ADH
 - Their cell bodies lie in the hypothalamus
 - They are unmyelinated
 - No schwann cells (obviously as it is in CNS)
 - Store hormones
 - 40% in axon terminal
 - DS60% in lateral sacculations called herring bodies)
 - Fenestrated blood capillaries
 - Pituicytes (*neuroglial-like cells*)
 - No secretory cells
 - No cell bodies of neurons (*just axons of neurons of which the cell bodies are located in the hypothalamus*)

PARS DISTALIS

- ❖ Covered by a fibrous capsule
- ❖ Formed of clusters or cords of cells separated by reticular fibers, which also surround sinusoidal capillaries
- ❖ have secondary capillary plexuses which the endothelial is fenestrated
- ❖ Three types of cells: **chromophils**, **chromophobes**, **Folliculostellate Cells**
- 1. Chromophobes:**
 - Small pale cells that have no affinity to stain
 - Represent undifferentiated cells (stem cells), degranulated cells or dead (degenerated) cells

2. **Chromophils:** Have the affinity to be stained.
 - (a) **Acidophils** (most abundant) include:
 - **Mammotrophs** (secrete prolactin)
 - **Somatotrophs** (secrete growth hormone, *or stromatotropin*)
 - (b) **Basophils** include:
 - **Thyrotrophs** (secrete TSH, *control the thyroid*)
 - **Corticotrophs** (secrete ACSH, *control adrenal cortex*)
 - **Gonadotrophs** (secrete FSH, LH)
3. **Folliculostellate cells:** unclear function, although plays a part in support, have long processes.

OTHER PARTS OF ADENOHYPHYSIS

PARS INTERMEDIA

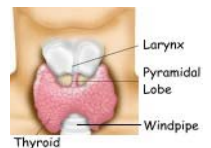
- ❖ Contains cysts full of colloid, lined with cuboidal epithelium (rathke's cysts)
- ❖ May contain cords of basophils that secrete melanin stimulating hormone

PARS TUBERALIS

- ❖ Surrounds the hypophyseal stalk of neurohypophysis
- ❖ Mostly basophilic *gonadotrophic* cells
 - Arranged in cords separated by blood capillaries of the portal system
- ❖ Pia arachnoid like C.T. separates pars tuberalis from the infundibular stalk

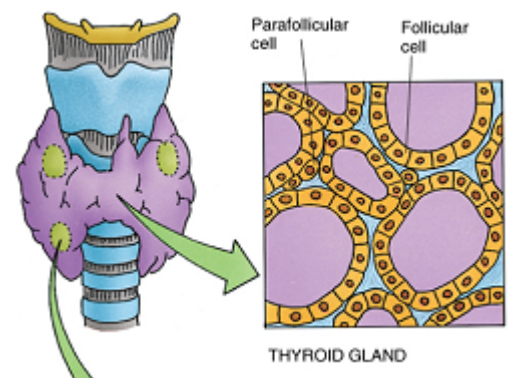
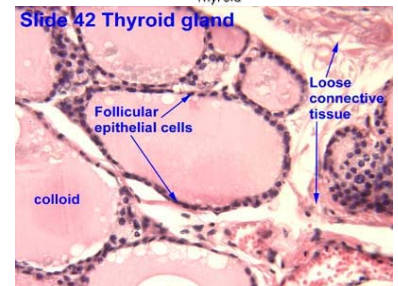
THYROID GLAND

- ❖ Surrounded by dense irregular collagenous connective tissue which sends septa to subdivide the gland into lobules
- ❖ Composed of two lobes (right and left) connected by isthmus (*Some people have an additional lobe called **pyramidal lobe***)



CELLULAR ORGANIZATION

- ❖ Made up of follicles that stores secretory substances.
 - Composed of **follicular cells** which are *simple cuboidal* epithelium surrounding colloid-filled lumen.
 - Colloid مزيج : rich in protein called thyroglobulin.
 - Thyroglobulin bound to hormones T3 and T4
 - When the hormones are needed, the cells release thyroglobulin, which is endocytosed and hormones are cleaved.
- ❖ Between the follicles are **parafollicular cells** (*C cells*)
 - Very few in number (99%), but larger than follicular cells
 - Lie singly or in clusters.
 - Do not reach the lumen of the follicle.
 - Larger than follicular cells.
 - Secretes **calcitonin**.
 - Round nucleus, Golgi apparatus, RER, Elongated mitochondria, Secretory granules



- ❖ Connective tissue surrounds the follicle.
 - Connective tissue contents:
 - Reticular fibers
 - Rich capillary plexuses
 - Separated from the cells by basal lamina.
 - Sometimes the basal lamina is absent in case of the cells become in contact with each other

PARATHYROID GLAND

- ❖ **Location:** attached to the posterior surface of the thyroid gland.
- ❖ **Number:** usually 4, 2 on each thyroid lobe.
- ❖ Enclosed in a C.T. capsule (each)
- ❖ Contains several adipose cells
- ❖ Parathyroid cells are present in clusters of epithelial cells around *fenestrated capillaries*, supported by reticular fibers.
- ❖ **Function:** Secrete parathyroid hormone (PTH) which maintains Ca^{2+} levels, acting on:
 - Bone
 - Kidney
 - Intestine

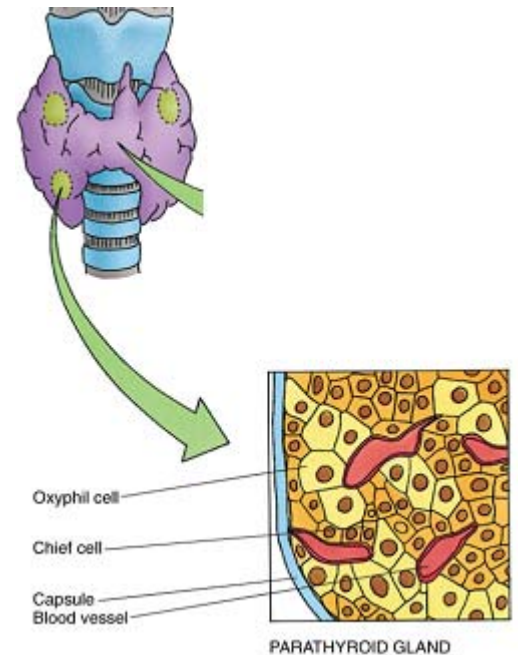
TWO TYPES OF CELLS PRESENT

1. CHIEF CELLS

- Numerous
- Acidophilic variable-sized cytoplasm
- Large nuclei
- Glycogen
- Secretory granules (containing PTH)

2. OXYNTIC CELLS

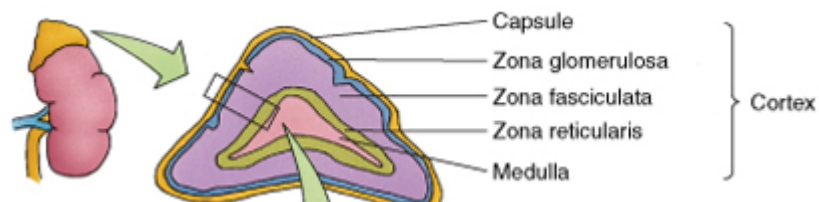
- Fewer and larger than chief cells.
- Pale acidophilic, more deeply stained with eosin than chief cells.
- Abundant mitochondria
- Formed of degenerated, regenerated or degranulated cells.



ADRENAL (SUPRARENAL) GLAND

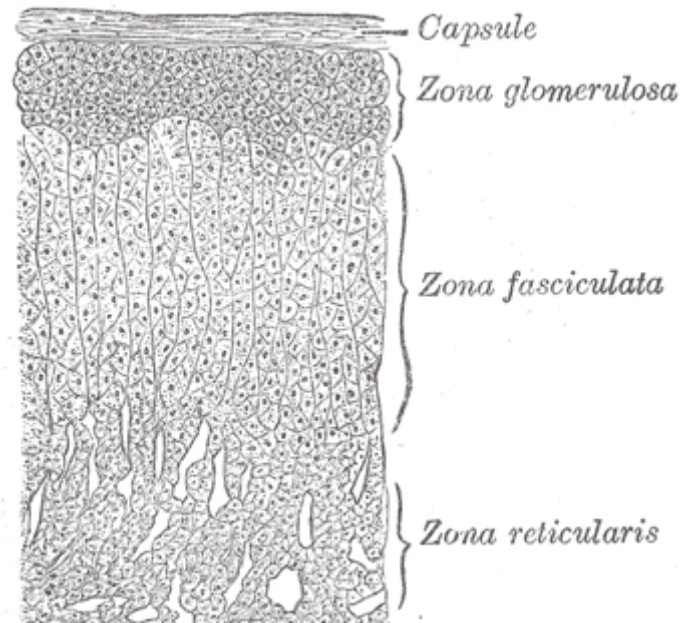
- ❖ **Number:** 2 (left and right)
- ❖ **Location:** on the superior pole of each kidney.
- ❖ **Surroundings:**
 - Embedded in adipose tissue
 - Covered by a capsule of C.T. (irregular dense fibrous)
- ❖ **Parts:**
 - Cortex on the outside
 - Medulla on the inside

Different histologically and functionally (both are endocrine, but each performs a different role)



ADRENAL CORTEX

- ❖ Consists of **3 zones**:-
 - **Zona Glomerulosa:** (outermost layer, thickest, forms the identifying feature of the cortex)
 - **Zona Fasciculata** (thickest layer, lies in the middle)
 - **Zona Reticularis** (innermost layer, forms the boundary between the cortex and the medulla)
- ❖ **Function of cortex cells:** synthesize & secrete steroid hormones (under control of ACTH)
- ❖ Cortex cells have the features of steroid secreting cells (including all zones)
 - Acidophilic (lighter in fasciculata, darker in reticularis)
 - Mitochondria with *tubular cisternae*
 - Rounded nucleus
 - Extensive SER, but no abundant RER
 - No secretory granules (vesicles)
 - Lipid droplets in cytoplasm (more in fasciculata)



ZONA GLOMERULOSA

- ❖ Outermost and thinnest layer of the adrenal cortex
- ❖ Composed of small columnar cells:-
 - Dark nuclei
- ❖ cells are arranged in clusters or cords.
- ❖ **Secrete:** mineralocorticoids (e.g. aldosterone)

ZONA FASCICULATA

- ❖ Largest zone of the cortex
- ❖ **Spongiocytes:** Polyhedral cells that are arranged in straight radial columns, separated by CT and capillaries.
 - **Many** lipid droplets in the cytoplasm
- ❖ Spongiocytes are larger than those in glomerulosa
- ❖ Contains sinusoidal capillaries
- ❖ **Secrete:** *glucocorticoids* (e.g. cortisol)

ZONA RETICULARIS

- ❖ Innermost zone of the cortex
- ❖ Cells are smaller than those of fasciculata, and they form anastomosing cords.
- ❖ **Secrete:** *sex hormones* (e.g. androgens)
 - may secrete small amounts of glucocorticoids.
- ❖ **Two types of cells:** → **Dark:** degenerating → **Pale:** active

ADRENAL MEDULLA

- ❖ Not separated from cortex by C.T.
- ❖ Cells have the features of **protein-secreting cells**
- ❖ Fenestrated Capillaries
- ❖ Two types of cells: **chromaffin** and **sympathetic ganglion**.
 - **Chromaffin Cells:** Modified sympathetic ganglion cells, lacking dendrites and axons.
 - Arranged in **clusters** or small cords.
 - **Function:** synthesize and store *epinephrine* and *norepinephrine* in cytoplasmic granules
 - Granules stain brown in with chromic acid and salts
 - **Sympathetic ganglion cells:**
 - ◆ May accumulate lipofuscin pigments in aging