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Gland

**Def.**
It is a modified type of epithelial tissue specialized in production of secretions.

**Types**
1- Exocrine Glands.
2- Endocrine Glands.
3- Mixed Glands.
Exocrine Glands

A modified type of epithelial tissue specialized in production of secretions via ducts.
Mammary glands

- Duct system (inactive)
- Adipose tissue
- Lactiferous sinus
- Lactiferous duct
- Terminal interlobular duct
- Lobule
- Muscles and ribs
Lacrimal glands
Exocrine Glands

<table>
<thead>
<tr>
<th>Gland Type</th>
<th>Location</th>
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<tbody>
<tr>
<td>Salivary glands (Mucous &amp; Serous secretion.)</td>
<td>Mouth</td>
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<td>Mammary glands (Milk S.)</td>
<td>Skin</td>
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<tr>
<td>Sweat glands</td>
<td>Skin</td>
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<tr>
<td>Sebaceous glands (Oily S.)</td>
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<td>Tarsal glands (Oily S.)</td>
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<td>Ceruminous glands (Waxy S.)</td>
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<td>Lacrimal glands (watery s.)</td>
<td>Eye fornix's</td>
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<td>Tears</td>
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The Endocrine Glands

• Def. A modified type of epithelial tissue specialized in production of \textbf{Hormones} directly into the blood
  i.e (\textbf{Ductless Glands})

Types:
1- Pituitary Gland
2- Thyroid & parathyroid Glands
3- Suprarenal Glands
4- pineal body Gland
5- Ovaries
• It is ovoid in shape (1, 1.5, 0.5 cm)

• It is located in a bony depression (sella turcica) attached to the brain by the pit. Stalk.
Anatomical lobes of The Pituitary Gland:

- **anterior lobe** (Pars distalis. + Pars tuberalis)
- **Posterior lobe** (Pars intermedia, Pars nervosa + pituitary stalk)
**Pars distalis**

- It consists of* stroma (Capsule, trabeculae & reticular fiber.)

  *Parenchyma (irregular anastomosing cords of cells surrounded with extensive fenestrated sinusoidal capillaries)

- Cells of pars distalis classified according to **Haematoxlin & Eosin stains** into:

  *Chromophobes (52%)

  - Acidophils (37%) ☁ Somatotrophs ☁ Mammotrophs

  - Basophils (11%) ⭐️ Thyrotrophs ⭐️ Corticotrophs ⭐️ Gonadotrophs
Somatotrophs (Somatotropic)

- LM:
  _Shape: rounded
  _Size: medium
  - Nucleus: eccentric in position
  _Stains (H&E),
    -ve pAS (protein in nature)
- EM
  _Organelles: rER, mit., Golgi apparatus
  _Granules: 300-350nm
- Functions: GH

Impaired Func. - before puberty
  - Dwarfism
  - after puberty
    - Gigantism
    - Acromegaly
Acromegaly

Gigantism

dwarfism
Mammotrophs (Lactotrophs)

- **LM:**
  - Shape: fusiform
  - Size: Medium
  - Nucleus: eccentric.
  - Staine: H & E, -ve PAS (H. is protein in nature)
- **EM**
  - Organells: rER, mit., Golgi
  - Granules: (200 n)
- **Functions:** Secretion of \textbf{prolactin H}
- **Pregnancy & Lactation** Size of granules reach (600 n)
**Thyrotrophs (Beta basophil)**

- **LM:**
  - Shape: polygonal or angular
  - Size: large
  - Nucleus: eccentric.
  - Stain: Hx.
  - Stain: +PAS (H. is glycoprotein in nature)

- **EM**
  - Organelles: rER, mit., Golgi, sER
  - Granules: 140-160 (v. small)

- **Functions:** TSH

- **Impaired Functions:**
  - Thyroidectomy ♠ TSH
  - Thyrotoxicosis adminstration. ▼ TSH
**Corticotrophs**

- **LM:**
  - Shape: oval or rounded
  - Size: large
  - Stain: Hx.
    - +PAS (H. is glycoprotein in nature)

- **EM**
  - Organelles: rER, mit., Golgi, sER
  - Granules: 100-200

- **Functions:** (ACTH)

- **Impaired functions:**
  - Adrenalectomy → corticotrophs

- prolonged cortisol adm. → corticotrophs
**Gonadotrophs (Delta basophil)**

- **LM:**
  - Shape: rounded
  - Size: large
  - Stain: Hx.
    - +PAS (H. glycoprotein in nature)
- **EM**
  - Organelles: rER, mit., Golgi, sER
  - Granules: 200-400nm heterogeneous & of variable electron density.
- **Functions:** FSH & LH ☺ ♀ & FSH & ICSH ♀ ♂
- **Impaired Functions:** Childhood ▼ Gonadotropine H.
  - Castration ▲ Gonadotropine H.
**Chromophobes Cells**

- **LM**: 52%
  - Site: all over *Pars distalis* in gps
  - Shape: rounded
  - Size: small
  - Stains: lack affinity to stains
- **EM**
  - Organelles: sparse or free
  - Granules: sparse or free
- **Functions**: deregulated cells
  - Undifferentiated cells
**Pars intermedia**

- It is **poorly vascularized** & richly innervated by **dopamine fibers**
  - It is lined by multilayered **basophilic. epith. Cs**,
  - **Rathkes cyst** (cubical ciliated epith. & contain colourless colloid)

**Functions:** **MSH**

*(Melanocyte Stim. H.)*
**Pars Nervosa**

- It consists of

1- **Pituicyte** (irreg. Branch.cell form 3D network around the axons, lipid & lipochrome pig.) (Neuralgia Cs ie Supportive Cs.)

2- **Nerve f.** (unmyl.axons have numerous dilat. along their length contain neurosec. G. ☺ of neurosecretory.neurons in hypothalamus

3- Herring bodies: irreg. masses of basoph. hyaline material (accumulat. Of neuro-sec. In terminal bulbs of Nerve fibers )

4- Fenestrated capillaries

5- Neuroglia cells

6- **Reticular fibres:** around capillaries ☀ No nerve cells in Pars Nervosa
pituicyte

Herring body

Nerve f.

Cap.
Pars Nervosa

1- Oxytocin:
* Cont. of smooth M. Of the uterus (child birth)
* Cont. Myoepithelial cells around mammary G. alveoli → ejection of milk

2- Vasopressin (ADH)

☀ Cont. smooth M. Of the bl. V. → V.C → hypertension
☀ ↑ water reab. from Collecting T of kidney).

↓ ADH → DI
It is the master control of most of End. Gls. & body tissue
A-Stroma (capsules, Fine fibrous septa, Reticular F. bl. capillaries, lymphatic V. & nerves

B- parenchyma

1-Thyroid follicles
2-Inter-follicular cells
1-Thyroid follicle

- They are the structural & functional unit of thyroid G.
- **Number**: 30 million
- **Shape**: Spherical or oval &
  - **Size**: 0.02—0.9 um (variable in diameter)
- **Wall**: lined by two type of cells:
  - Follicular cells (98%) & C-cells (2%).
- **Lumen**: containing gelatinous sub. in their lumen (Colloid)

• Is a homogenous acidophilic material formed of thyroglobulin (a glycoprotein containing various iodinated amino acids; T4 & T3).
-2-Inter-follicular cells

- They are **masses of cells** present in-between the follicles.
- They represent **tangentially cut follicles**.
- They consist of **follicular cells & C-cells**
• **A-The follicular cells**
  - They constitute (98%).

  **LM**: Shape: cubical cells
  - **cytoplasm**: basophilic
  - **Nucleus**: central rounded

  **E/M**: - well developed rER,
  - mitochondria,
  - supra-nuclear Golgi,
  - lysosomes,
  - fine droplet of colloid.

  - The free border reveals short microvilli projecting in the lumen.
1 - Function of the follicular cells

They synthesize and release the thyroxine hormones (T4 & T3)

** Function of Thyroid hormones

- Development
- Growth
- Functional activities
- Metabolic activities

of many tissues & organs
Hypo-thyroidism_ ttt by T3&T4
Enlarged thyroid gland (Goitre)
Hyper-thyroidism
B- The para-follicular cells (C cells or light cells or clear cells):

- They develop from the 5th pharyngeal pouch.

**LM**
- **NO:** (2%) cells lining the thyroid follicles.
- **Site:** They do not abut on the lumen of the follicle and is enclosed between the follicular cells and the basement membrane surrounding the follicle.
- **Size:** larger than the follicular cells.
- **Shape:** rounded or oval in shape
- **Cytoplasm:** paler
- **N:** rounded

**E/M** small rER, long mitochondria, and abundant spherical secretory granules (100-200nm).

**Function:** secrete calcitonin; a hormone which lowers the blood calcium level by inhibiting bone resorption.
parathyroid gland
- Structure
  • I. Stroma:
    • Connective tissue **capsule** surrounds the gland and separates it from the thyroid gland.
    • Delicate connective tissue **septae** divide the gland into poorly defined lobules & **Reticular fibres** support the parenchyma.
  • II- The parenchyma:
    • It consists of anatomising cords of cells separated by blood capillaries.
    • Two types of cells are present in the gland of adults: **chief cells, oxyphil cells** and transitional cells
Function: parathormone Hormone Sec.)
Low concentration of calcium in blood

Release of parathyroid hormone (PTH)

Osteoclasts activity
Impaired Function of chief Cs

- Removal of parathyroid glands or hypo function → tetany and death due to diminished calcium level in blood.

- Hyper function of parathyroid → Ca level increases, P. level decreases and calcium deposits in several organs e.g.: kidney, arteries etc.. The bone matrix is decalcified and the bone fractures easily (osteitis fibrosa cystica).
Suprarenal Gland

Medulla Cortex
Aldosterone
Gluco-corticoids
Sex hormones

Gluco-corticoids

Zona reticularis
Adrenaline & Noradrenaline
**N.B:**

- Hypofunction of SRG ➤ Addison’s disease.
- Hyperfunction of Z. G. (↑ aldosterone) ➤ Conn's syndrome
  - Hyperfunction of the Z.F (↑ **Glucocorticoids**) ➤ Cushing syndrome.
  - Tumours of SR medulla ➤ pheochromocytoma.
Cushing syndrome

• Addison’s disease.
The pineal body

Third Eye of the brain
The pineal body (epiphysis_cerebri)
**structure**

- stroma
  * capsule covered (pia mater)
  * trabeculae

- parenchyma $\uparrow$ **infancy** puberty $\downarrow$

1- pinealocytes

   😊 **Melatonin** at night which inh. $\downarrow$ GTH until puberty

   $\downarrow$ **Melato**----precocious puberty

   ☼ **serotonin** at day

2- Glial cells

3- Corpora arenacea (Brain sand) ♡ clinical importance $\rightarrow$ X-ray landmark

4- non fenestrated capillaries

*The pineal body is under control of hypothalamus*
Pineal Gland

N – neuroglia

P – pinealocytes

S – Brain Sand
Mixed Gland
THE PANCREAS

2-Islets of Langerhans

1. Pancreatic acini produce secretion via Duct system
1- Exocrine Functions.

- Share in the digestion of carbohydrates, lipids, proteins, nucleoproteins and phospholipids.
- The bicarbonate content of the pancreatic juice neutralizes the acidic contents coming from the stomach to the duodenum.

2- Endocrine Functions. (Islets of Langerhans)

- A (α) cells ........ Glucagon H.
- B (β) cells ........ Insulin H.
- D (δ) cells......... somatostatin
- F (PP) cells ...... pancreatic polypeptide H.
Kidney
1- Renin hormone
2- Erythropoietin hormone
1- Endocrine functions of the liver are:

**A- Protein synthesis**
- The liver cell produces various plasma proteins like albumin, prothrombin, fibrinogen and lipoproteins and continuously release them into the blood stream.

**B- Secretion of immunoglobulins**: (IgA & IgM) into the blood stream.
2. The exocrine function of the liver is Bile secretion.
THANK YOU