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Note: this sheet includes everything in slides. Notes are preceded by **#.**

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Sub-system: **Anatomy**

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**THE ENDOCRINE SYSTEM**

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**#** The anterior part of the foregut is just behind the oropharyngeal membrane where the tongue develops(inside the oral cavity).

**#**Hard palate, teeth , gums and the anterior two thirds of the tongue >> they all originate from ectoderm **but** the posterior third of the tongue is originated from endoderm.

 #Anterior to the oropharynx there is the oropharyngeal isthmus (where the buccopharyngeal membrane exists) . Anterior to the oropharyngeal isthmus من جهة الفم)) is ectodermal but posterior is endodermal .

**#** The tongue is divided into dorsal and ventral surfaces , and the dorsal surface is divided into anterior two thirds & posterior third by sulcus terminalis (on the dorsal surface of tongue) .At the apex of sulcus terminalis there is a pit (defect) called foramen cecum.

\*\* oropharyngeal membrane = buccopharyngeal membrane .

**Development of thyroid gland**

****-**Thyroid gland is the first endocrine gland to develop.**

 -By the end of the **4th week**, gland **primordium** appears as a small endodermal thickening in the floor of primitive pharynx.

-The developing thyroid migrates

 down (#from foramen cecum) to its final site as **the thyroglossal duct**, ventral to the hyoid and larynx.

-By the end of the **5th week**, thyroglossal duct degenerates and the isolated thyroid, now consisting of 2 lobes connected by isthmus. It continues to migrate, reaching its final position in **the 7th week**.

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#Remember that in the beginning it was one bud then divided into 2 buds giving the lobes.

# Parathyroid glands precede and reach its position in the 6thweek.



Usually, **thyroglossal duct** degenerates and its only remnant is the foramen cecum. Occasionally, a portion of the duct persists as an enclosed **thyroglossal cyst** or as a **thyroglossal sinus** which opens on the surface of the neck .

**#**It happens when the duct loses it’s program because of sick or malnourished mother, hereditary factors ,or exposure to radiation..etc.

**ECTOPIC THYROID GLAND**

 -Infrequently, an **ectopic thyroid** is located along the normal path of its descent from the tongue.

- In 90% of cases this represented by **lingual thyroid glandular tissue.**

-Incomplete descent of thyroid results in **a sublingual thyroid** that appears high in the neck, at or just inferior to the hyoid bone.

- In 70% of cases, an ectopic sublingual thyroid is the only thyroid tissue present.?!**Care should be taken to prevent accidental surgical removal of the only thyroid tissue present.**

# It could be also cervical , retrosternal or thoracic.

# One of ectopic thyroid gland signs is when baby open his mouth appears as frog mouth.

# Extra note from the doctor:

-Oogenesis is initiated in the embryonic stage .

 -The oocyte is the causal of chromosomal abnormalities because it stays arrested in metaphase of meiosis 2 until fertilization by sperm .So it stays for long time and it is more prone to harm.

**Pituitary gland**

-Pea-shaped gland, located within the hypophyseal fossa.( #it weighs about 5 grams).

-Below hypothalamus to which it is connected by neural pathways. (#in the center of the skull).

-Produce hormones that regulates growth, development, metabolism and homeostasis.

- Composed of **two** parts :

1. **Anterior pituitary, adenohypophysis** (glandular part), ~75% of the gland. Three parts in adults:

\* **Pars distalis** is the larger portion,

\***Pars tuberalis** that forms a partial coat around the infundibular stalk.

 (# It is a sleeve like extension of the anterior pituitary .).

\* **Pars intermedia** . (# Extra note: It is the boundary between anterior and posterior pituitary and has unknown function )

2**. Posterior pituitary ,Neurohypophysis**, composed of neural tissue and nerve fibers from hypothalamic area.

 Consist of 3 parts:

**\* Median eminence**

**\* Pars nervosa**

**\*Infundibular stalk .**

**Hypophyseal Portal System**

# Note: Internal carotid artery passes through cavernous sinuses on both sides of the hypophyseal fossa and gives 2 superior & 2 inferior hypophyseal arteries .

 -Hypothalamic hormones that release or inhibit anterior pituitary hormones reach the anterior pituitary through arteries.

 - In **hypophyseal portal system**, blood flows from one capillary plexus in the hypothalamus into a portal veins, then into another capillary plexus of anterior Pituitary.

- At the junction of the median eminence and the infundibulum, **the superior hypophyseal arteries** divide into a capillary network called the **1ry plexus of hypophyseal portal system**. **(#arterial plexus )**

-From the 1ry plexus, blood drains into the **hypophyseal portal veins** that descend external to the infundibulum.

- In post pituitary, hypophyseal portal veins divide again and form **2ry plexus of hypophyseal portal system. (#venous plexus)**

 #The secondary plexus now contain blood rich hormones which willgoes to anterior hypophyseal veins .

#Hormones are concentrated in the glands but in the general circulation are diluted .

# The portal system is mainly related to the anterior pituitary (the glandular part ).

# Both primary and secondary plexuses consist of fenestrated capillaries .

**# Extra note :**

The **hypophyseal portal system** is a **system** of blood vessels in the microcirculation at the base of the brain, connecting the hypothalamus with the anterior **pituitary**. Its main **function** is to quickly transport and exchange hormones between the hypothalamus arcuate nucleus and anterior **pituitary** gland.

**Development of Pituitary Gland**

-Develops from **two** ectodermal sources.

- During the **3rd week, Rathke’s pouch** develops as a dorsal upgrowth from the ectoderm of the **roof of** **the stomodeum** .

(# this will form the glandular “anterior pituitary”)

-Concurrently( # at the same time ), the **neural diverticulum** develops as a ventral downgrowth from the **floor of the diencephalon** .

(# this will form the neural “posterior pituitary”)

-**By 5th week**, glandular diverticulum elongates, loses its connection with the stomodeum and forms a separate sac that contacted with the neural **infundibulum** .

 #infundibulum grows ventrally

 # the glandular part and the neural part will meet each other at the hypophyseal fossa ).

-Pituitary develops from stomodeum forms the **adenohypophysis** that divides into: **\*Pars anterior.**

 **\* Pars tuberalis.**

 **\*Pars intermedia.**

- Pituitary from the hypothalamus forms the **neurohypophysis** that divides into: **\*Pars nervosa.**

**\* Median eminence.**

**\*Infundibular stem.**

**Suprarenal glands (Adrenal gland)**

-Are 2 retroperitoneal organs lying on the upper pole of each kidney.

- Surrounded by the **perirenal fat** and the **renal fascia** but separated from the kidneys by the **perirenal fat**.

(#perirenal fat acts as shock absorbent and renal fascia is important for fixation of suprarenal in its position .)

 -**Right suprarenal**: pyramidal in shape and caps upper pole of the right kidney

 - Lies **behind** right lobe of the liver and the IVC.

 - Rests posteriorly on the diaphragm.

 **- Left suprarenal:** crescent in shape and extends along medial border of the left kidney from the upper pole to the hilus.

 - Lies behind pancreas lesser sac and the stomach , and posteriorly on the diaphragm.

(# diaphragm is posterior to both right and left suprarenal glands.)

Arterial supply:

#suprarenal glands are highly vascularized.

Three arteries usually supply each adrenal gland:

1. The superior suprarenal artery, a branch of the inferior phrenic artery(which is a branch from aorta above the celiac trunk) .

2)The middle suprarenal artery, a direct branch of the abdominal aorta.

3)The inferior suprarenal artery, a branch of the renal artery.

Venous drainage :

The venous drainage of the adrenal (suprarenal) glands is typically comprised of a single vein draining each adrenal gland:

1) left suprarenal vein drains into the left renal vein.

2) right  suprarenal vein drains directly into the inferior vena cava.