

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Anatomy & Embryology Review File

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Embryology
436

Pituitary Gland

Pituitary Gland		
Position		Middle cranial fossa, protected in sella turcica (hypophyseal fossa) of body of sphenoid
Relations	Anteriorly	Optic chiasma
	Posteriorly	Mamillary bodies
	Superior	Diaphragma sellae
	Inferior	Sphenoidal air sinuses
	Lateral	Cavernous sinus
Subdivisions	Anterior Lobe	Posterior Lobe
	<ul style="list-style-type: none"> • Adenohypophysis • <u>Secretes</u> hormones • Vascular connection to hypothalamus by hypophyseal portal system (from superior hypophyseal artery) 	<ul style="list-style-type: none"> • Neurohypophysis • <u>Stores</u> hormones • Neural connection to hypothalamus by hypothalamo-hypophyseal tract from supraoptic and paraventricular nuclei.
Arterial Supply		Branches of internal carotid artery : <ul style="list-style-type: none"> • Superior hypophyseal artery → anterior lobe + infundibulum* • Inferior hypophyseal artery → posterior lobe
Venous Drainage		Hypophyseal veins drains into cavernous sinuses

*Also called pituitary stem / stalk

Thyroid and Parathyroid Glands

Deep cervical fascia of the neck is divided into 3 layers:

1. Investing layer.
2. Pretracheal layer.
3. Prevertebral layer

Thyroid Gland

Consists of 2 lobes: right & left lobes connected to each other by a narrow isthmus.

The **isthmus** extends across the midline in front of the **2nd, 3rd, & 4th** tracheal rings.

Each lobe's **apex** reaches up to the **oblique** line of thyroid cartilage.

Its **base** lies at the level of **4th** or **5th** tracheal rings.

The gland is surrounded by 2 membranes:

1) a facial sheath derived from the **pretracheal** layer of the deep cervical fascia.

2) Inside the pretracheal facial capsule, there is another **C.T** (connective tissue) **capsule**.

Relations

Anterolaterally (4s)	Posteriorly	Medially	
		Above	Below
1. Sternohyoid . 2. Sternothyroid 3. Superior belly of omohyoid 4. Sternomastoid	Carotid sheath and its contents: 1- common carotid artery 2- internal carotid artery 3- internal jugular vein 4- vagus nerve (CN X)	1- Larynx 2- Pharynx	1- Trachea 2- Esophagus 3- Recurrent laryngeal nerve 4- Cricothyroid muscle 5- External laryngeal nerve

Arterial supply	Branch of:
1. Superior thyroid artery	<ul style="list-style-type: none"> A branch of the external carotid artery related to the external laryngeal nerve.
2. Thyroidea ima artery	<ul style="list-style-type: none"> it arises from aortic arch or from the brachiocephalic artery
3. Inferior thyroid artery	<ul style="list-style-type: none"> From thyrocervical trunk of the 1st part of the subclavian artery. The recurrent laryngeal nerve crosses either in front or behind it

Venous supply	Tributary of :
Superior thyroid vein	internal jugular vein
Middle thyroid vein	internal jugular vein
Inferior thyroid vein	left brachiocephalic vein

Lymph nodes
1- Deep cervical lymph nodes 2- Paratracheal lymph nodes

Innervation
Sympathetic: cervical sympathetic trunk Parasympathetic: branches of vagus n.

Parathyroid glands

<ul style="list-style-type: none"> • small ovoid bodies, They lie within the facial capsule of the gland, • 2 superior parathyroid has a constant position at the middle of the posterior border of the gland. • 2 inferior parathyroid usually at the level of the inferior pole. • They lie within the thyroid tissue or sometimes outside the facial capsule 	Supply	
	Superior & inferior thyroid arteries.	<i>Sympathetic Trunk:</i> Superior & middle cervical sympathetic ganglia (vasomotor).
	Superior, middle and inferior thyroid veins.	1- Deep cervical and 2- Paratracheal lymph nodes

Development of thyroid and parathyroid

head and neck regions develops from **pharyngeal apparatus** : It is formed of:

1- Pharyngeal arches

2- Pharyngeal clefts or grooves (externally)

3- Pharyngeal pouches or membranes (internally)

pharyngeal apparatus

Pharyngeal arches:

- The mesoderm in the head and neck regions divided into six cubical masses called the **6 pharyngeal or branchial arches**
- Each arch is formed of a **Core of mesoderm**, Covered externally by **ectoderm**
- The space between 2 arches from outside is called **cleft or groove**.
- Each arch is lined from inside by **endoderm**
- the space between the 2 arches from inside is called **pouch**.

Pharyngeal Pouches:

- **These are pairs of pouches develop in a craniocaudal sequence between the arches internally.**
- The first pair of pouches lies between the first and second pharyngeal arches.
- There are four pairs of pharyngeal pouches.
- **The fifth pair of pouches is absent or rudimentary.**

Development of thyroid

It is the first endocrine gland to develop.

- It develops from the **endoderm of the floor of the primitive pharynx** , at the junction of the anterior 2/3rd and posterior 1/3rd of the tongue, (foramen cecum).
- It develops from the (Thyroid primordium)
- As the tongue grows, the developing thyroid gland **descends downward in the neck.**
- **It descends anterior to the developing hyoid bone and laryngeal cartilages.**
- The thyroid is connected to the developing tongue by a narrow tube, called the **thyroglossal duct.**
- the thyroid primordium is **hollow**, but soon it becomes **solid** then, it's divided into **2 lobes and an isthmus.**

the upper end of the duct

persists in the dorsum of the tongue as **the foramen cecum.**

The distal part of the duct

1- may persists in 50% of people to form **the pyramidal lobe**

2- **other 50% the duct will fibroses and degenerate**

- **The pyramidal lobe** may be attached to the **hyoid bone** by fibrous or smooth muscle called the **Levator glandulae thyroidae.**

24th day after fertilization	- The thyroid gland begins its development
7th week (50th day)	- The gland takes its final shape and position. - The thyroglossal duct begins to fibrose and degenerates

Development of parathyroid

6th week (42th day)	Dorsal 3rd pouch	Inferior parathyroid bud
	Ventral 3rd pouch	Thymus gland primordium
	Dorsal 4th pouch	Superior parathyroid bud
	Ventral 4th pouch	Ultimopharyngeal body.

Congenital Anomalies

1-Thyroglossal duct cyst.	2-Ectopic thyroid gland	3-Congenital hypothyroidism	4-Accessory thyroid tissue	5-Persistence of thyroglossal duct	6-Agenesis of the thyroid gland
1-Thyroglossal duct cyst.	1- thyroglossal duct sinus		2-lingual and cervical thyroglossal duct cysts.		
1-Thyroglossal duct cyst.	- Most of thyroglossal duct cysts are located just inferior and anterior to hyoid bone .				
2-Ectopic thyroid gland	Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax.				

Adrenal Gland

Adrenal (Suprarenal) Glands

- It is a component of the hypothalamic-pituitary -suprarenal axis.
- They are yellowish **retroperitoneal** organs, At the level of the last thoracic vertebra (**T12**).
- It has an outer yellow cortex and an inner dark brown medulla.
- It is enclosed **within the renal fascia** with the kidney but in a separate compartment.
- It is separated from the kidney by the **perirenal fat**.

The right suprarenal gland:

- pyramidal.
- **Relations:**
Anterior: right lobe of the liver and **inferior vena cava**.
Posterior: **diaphragm**.
Medial: **Celiac plexus and ganglia**

The left suprarenal gland:

- crescentic.
- **Relations:**
Anterior: pancreas, lesser sac, and stomach
Posterior: **diaphragm**.
Medial : **Celiac plexus and ganglia**

Arterial Supply	<ul style="list-style-type: none"> - Superior suprarenal from inferior phrenic artery. - Middle suprarenal from abdominal aorta. - Inferior suprarenal from renal artery.
Venous Drainage	single vein drains into: inferior vena cava on the <u>right</u> side and left renal vein on the <u>left</u> side.
Nerve Supply	Preganglionic sympathetic fibers derived from the splanchnic nerves
Lymph nodes	lateral aortic lymph nodes .

Development of adrenal gland

Part :	Cortex	Medulla
Origin:	Mesodermal	Ectodermal
Develops from:	the coelomic epithelium of the posterior abdominal wall	the Sympathetic ganglion
Derived from:	The mesenchymal cells between dorsal mesentery and developing gonads	Neural crest cells
Information	----	It forms a mass medial to the fetal cortex .
General information	<ul style="list-style-type: none"> - The suprarenal glands of the fetus is 10-20 times larger than the adult glands relative to: <ol style="list-style-type: none"> 1- the body weight 2- are large compared with the kidney This is because of the extensive size of fetal cortex. 	
Permanent cortex:	A <u>second wave</u> of mesenchymal cells arise from the mesothelium	

important Date	6th Week	<u>First Appear</u> Of Cortex and Medulla
	late fetal period	<u>Differentiation</u> Of The Characteristic Suprarenal Cortical <u>Zones</u> . اقدر اميز بين طبقات الكورتكس
	present at birth	<u>Zona Glomerulosa & Zona Fasciculata</u>
	Present at the end of 3rd year.	Zona Reticularis يعني بعد 3 سنوات تتكون الطبقة الثالثة وبكذا تتكون عندي كل 3 طبقات كاملة
	At the first 2-3 weeks* after birth	Suprarenal Glands Rapidly Become Smaller , due the rapid regression of fetal cortex نلاحظ هنا ان في هذه الفترة الفيتال كورتكس تبدأ تختفي
		* the cortex is friable and susceptible to trauma at birth leading to severe hemorrhage.
	First year of life	The Involution Of Fetal Cortex <u>Completed</u> الفيتال كورتكس اختفت بالكامل
	<u>The medulla</u> remains relatively small until after birth .	

Congenital Anomalies In Adrenal Cortex

- Congenital adrenal hyperplasia (CAH):

- An abnormal increase in **the cortical cells** results in **excessive androgen production**; during the fetal period.

In females

1-musculization of external genitalia

2- enlargement of clitoris

In males

1- undetected in early infancy.

Later in childhood

in both sexes, androgen excess may lead to **rapid growth and accelerated skeletal maturation**.

Pancreas

Location of the pancreas:

- It is a **Retro-Peritoneal** structure.
- It lies on the posterior abdominal wall in the: **Epigastrium & Left upper quadrant of the abdomen.**
- It extends in a transverse oblique direction at **the transpyloric plane (1st lumbar vertebral)** from the concavity of the duodenum on the right to the spleen on the left.

Part of Pancreas

Head of pancreas	<ul style="list-style-type: none">• And Lies within the concavity of the duodenum, and related to the 2nd and 3rd portions of the duodenum.• On the left, it emerges into the neck.• On the right, it Includes Uncinate Process: (an extension of the lower part of the head behind the superior mesenteric vessels) Structures Posterior to the Head: <ol style="list-style-type: none">1. Bile Duct runs downwards and may be embedded in it.2. IVC runs upwards.						
Neck of Pancreas	<ul style="list-style-type: none">• It is the constricted portion connecting the head & body of pancreas						
	<table><tbody><tr><td>It lies in front of:</td><td>Its antero-superior surface supports:</td><td>From its inferior border emerge:</td></tr><tr><td><ol style="list-style-type: none">1. Aorta,2. Origin of Superior Mesenteric artery3. confluence of the Portal Vein</td><td><ol style="list-style-type: none">1. the pylorus of the stomach</td><td><ol style="list-style-type: none">1. The superior mesenteric vessels emerge</td></tr></tbody></table>	It lies in front of :	Its antero-superior surface supports:	From its inferior border emerge:	<ol style="list-style-type: none">1. Aorta,2. Origin of Superior Mesenteric artery3. confluence of the Portal Vein	<ol style="list-style-type: none">1. the pylorus of the stomach	<ol style="list-style-type: none">1. The superior mesenteric vessels emerge
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Body of Pancreas	<ul style="list-style-type: none">• It runs upward and to the left, and is triangular in cross section.						
	<table><tbody><tr><td>Posterior surface:</td><td>Along the upper border of the pancreas:</td></tr><tr><td><ol style="list-style-type: none">1. The Splenic Vein is embedded</td><td><ul style="list-style-type: none">• The Splenic Artery runs to the left</td></tr></tbody></table>	Posterior surface:	Along the upper border of the pancreas:	<ol style="list-style-type: none">1. The Splenic Vein is embedded	<ul style="list-style-type: none">• The Splenic Artery runs to the left		
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Tail of pancreas	<ul style="list-style-type: none">• A narrow, short segment ends within the splenic hilum.• It lies in the Splenicorenal ligament, and may be injured during Splenectomy . <p>Anteriorly related to: splenic flexure of colon.</p>						

Supply of Pancreas

Arterial supply	<ul style="list-style-type: none"> • Head and neck supplied by <ol style="list-style-type: none"> 1. the superior pancreaticoduodenal artery (branch of celiac) 2. the inferior pancreaticoduodenal artery (branch of superior mesenteric) • Body and tail are supplied by splenic artery
Venous supply	<ul style="list-style-type: none"> • Anterior and posterior arcades drain head and the body, • Splenic vein drains the body and tail • Ultimately, ends into Portal Vein.
Nerve supply	<ul style="list-style-type: none"> • Sympathetic: from the splanchnic nerves, they have a predominantly <u>inhibitory</u> effect • Parasympathetic: from the Vagus, they <u>stimulate</u> both exocrine and endocrine secretions
Lymphatic drainage	<ul style="list-style-type: none"> • Rich network drains into nodes along the upper border of the pancreas, Ultimately the efferent vessels drain into the Celiac nodes. • Lymph vessels from the region of the Head pass to Superior Mesenteric nodes

Anterior to (body & tail):	Posterior to (body & tail) :
<ol style="list-style-type: none"> 1. Stomach separated from by lesser sac 2. Transverse colon & 3. transverse mesocolon 	<ol style="list-style-type: none"> 1. Left Psoas muscle 2. Left Adrenal gland 3. Left Renal vessels 4. Upper 1/3rd of Left kidney 5. Hilum of the spleen

