



Anatomy & Embryology Summary File

Editing File

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Color index:

	Girls' slides		Boys' slides
	Main content		Extra
	Important		Very Important



MED439
KING SAUD UNIVERSITY



Anatomy Team
MED 439

Anatomy

Pituitary Gland

Intro	<ul style="list-style-type: none"> It is referred to as the master of endocrine gland. It is a small oval structure of 1 cm in diameter. It doubles its size during pregnancy. 				
Relations	Anterior	Posterior	Superior	Inferior	Lateral
	Optic chiasma	Mammillary bodies	Diaphragma sellae	Sphenoidal air sinuses	Cavernous sinuses
Position	<ul style="list-style-type: none"> Lies in middle cranial fossa in the hypophyseal fossa of the body of sphenoid bone. It is well protected in sella turcica (hypophyseal fossa) of body of sphenoid. A fold of dura mater (diaphragma sellae) covers the pituitary gland & has an opening for passage of infundibulum (pituitary stalk) connecting the gland to hypothalamus. 				
Parts	Anterior Lobe		Posterior Lobe		
	<ul style="list-style-type: none"> Adenohypophysis Hormone-releasing & inhibiting factors produced by hypothalamus use hypophyseal portal system (from superior hypophyseal artery) to reach the anterior lobe of pituitary gland. 		<ul style="list-style-type: none"> Neurohypophysis Receives a nerve supply from some of the hypothalamic nuclei (supraoptic & paraventricular) Connected to hypothalamus through hypothalamo - hypophyseal tract, stores hormones secreted by hypothalamic nuclei. Axons of these nuclei convey their neurosecretion to posterior lobe through hypothalamo-hypophyseal tract then it. Will pass into the bloodstream. 		
Arterial	<ul style="list-style-type: none"> Branches of internal carotid artery. Superior hypophyseal artery : supplies Infundibulum & Anterior Lobe of pituitary gland. Inferior hypophyseal artery: supplies Posterior Lobe of pituitary gland. 				
Venous	<ul style="list-style-type: none"> Hypophyseal veins drain into cavernous sinuses. 				

Anatomy

	Thyroid Gland	Parathyroid Gland				
Note	<ul style="list-style-type: none"> 2 lobes are connected to each other by a narrow isthmus, which overlies the 2nd, 3rd & 4th tracheal rings. Apex reaches up to the oblique line of thyroid cartilage. Its base lies at the level of 4th or 5th tracheal rings. 	4 small ovoid bodies lie within the facial capsule of the gland between the 2 membranes				
Covering	<ul style="list-style-type: none"> Inside the pretracheal of the deep cervical fascia. Another C.T capsule . It's surrounded by 2 membranes. 	They lie within the thyroid tissue or sometimes outside the facial capsule .				
Relation	Antero-laterally <ol style="list-style-type: none"> Sternothyroid. Sternohyoid. Sternomastoid. Superior belly of omohyoid. 	—				
	Posteriorly <p>Carotid sheath & its contents.</p>					
	Medially <table border="1"> <tr> <td>Above</td> <td> <ol style="list-style-type: none"> Larynx Pharynx Cricothyroid muscle External laryngeal nerves </td> </tr> <tr> <td>Below</td> <td> <ol style="list-style-type: none"> Trachea Esophagus Recurrent laryngeal nerve in between Cricothyroid muscle External laryngeal nerves </td> </tr> </table>		Above	<ol style="list-style-type: none"> Larynx Pharynx Cricothyroid muscle External laryngeal nerves 	Below	<ol style="list-style-type: none"> Trachea Esophagus Recurrent laryngeal nerve in between Cricothyroid muscle External laryngeal nerves
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Posterior Border <ol style="list-style-type: none"> The superior & inferior Parathyroid glands. Anastomosis between superior & inferior thyroid arteries. 						
Arterial	<ul style="list-style-type: none"> Superior thyroid Artery from the external carotid It descends to the upper pole of the lobe, with the external laryngeal nerve. Thyroidea ima artery from aortic arch <u>or</u> from brachiocephalic artery. Inferior thyroid artery From the thyrocervical trunk of 1st part of subclavian artery. It ascends behind the gland to the level of cricoid cartilage (at level of C6 vertebra) 	<ul style="list-style-type: none"> Superior thyroid arteries. Inferior thyroid arteries 				
Venous	<ul style="list-style-type: none"> Superior thyroid vein → internal jugular vein Middle thyroid vein → internal jugular vein Inferior thyroid vein → left brachiocephalic vein 					
Lymphatic	<ul style="list-style-type: none"> Deep Cervical lymph nodes Paratracheal lymph nodes. 					
Innervation	<ul style="list-style-type: none"> Sympathetic: Cervical Sympathetic Trunk. Parasympathetic: Branches of Vagus 	Sympathetic Trunk : Superior & middle cervical sympathetic ganglia (vasomotor).				
Clinical notes	<p style="text-align: center;">During thyroidectomy</p> <ul style="list-style-type: none"> External laryngeal nr close to → superior thyroid a → lesion will cause hoarseness of voice Recurrent laryngeal nr close to → inferior thyroid a → lesion results in impaired breathing & speech. 					

Embryology

<p>Pharyngeal apparatus:</p>	<ul style="list-style-type: none"> ○ 6 cubicle pharyngeal or branchial arches. ○ The core(mesoderm), Inner (endoderm), Outer(ectoderm) ○ The space between 2 arches from outside is called cleft or groove & from inside is called pouch. 		
<p>Development of thyroid gland</p>	<p>24th day after fertilization</p>	<p>The thyroid gland begins its development (Thyroid primordium)</p>	
	<p>By 7th week (50th day)</p>	<p>The gland takes its final shape & position, and the thyroglossal duct begins to fibrose and degenerate.</p>	
<p>Development of thyroid gland</p>	<p>By the 6th week :</p>	<p>dorsal part of the 3rd pouch</p>	<p>inferior parathyroid bud</p>
		<p>dorsal part of the 4th pouch</p>	<p>superior parathyroid bud.</p>
		<p>ventral part of the 3rd pouch</p>	<p>thymus gland primordium</p>
		<p>ventral part of the 4th pouch</p>	<p>Ultimopharyngeal body</p>
<p>Congenital Anomalies of Thyroid gland</p>	<p>Cervical thyroglossal duct cyst</p>	<p>Most of thyroglossal duct cysts are located just anterior or inferior to the hyoid bone.</p>	
	<p>Ectopic thyroid tissue</p>	<p>Ectopic : Descent of the thyroid could be arrested at any point, or extends down behind the sternum in the thorax.</p>	
	<p>Accessory thyroid tissue</p>	<p>—</p>	
	<p>Agenesis of thyroid gland</p>	<p>—</p>	
	<p>Persistence of thyroglossal duct</p>	<p>—</p>	
<p>Congenital hypothyroidism</p>	<p>—</p>		
<p>Thyroglossal duct</p>	<ul style="list-style-type: none"> - The upper end of duct persists in the dorsum of the tongue as the foramen cecum. - The distal part of the duct may persists in 50% of people to form the pyramidal lobe. - It may be attached to the hyoid bone by fibrous or smooth muscle; the Levator glandulae thyroideae. 		

Anatomy

Adrenal glands

Structure	<ul style="list-style-type: none"> They are yellowish retroperitoneal organs located at the upper poles of each kidney at the level of T12. They are surrounded by renal fascia with kidney and separated from the kidney by perirenal fat that allow the two organs separated easily during surgery Each gland is composed of an outer yellow cortex and an inner dark brown medulla. <p style="text-align: right; font-size: small;">CNS = 12h Renal → CNS RENAL = adRENAL</p>
Function	<ul style="list-style-type: none"> It is a component of the hypothalamic-pituitary-suprarenal axis that is responsible for coordinating stress response and metabolism. The cortex secretes hormones that include: <ul style="list-style-type: none"> → mineralocorticoids: concerned in fluid and electrolyte balance. → glucocorticoids: concerned in metabolism of carbohydrates, fats and proteins. → sex hormones: Small amounts, play a role in the prepubertal development of the sex organs. The medulla secretes the catecholamines: epinephrine and norepinephrine.

Right suprarenal gland	Left suprarenal gland
<ul style="list-style-type: none"> Shape: Pyramidal or triangular Location: caps the upper pole of the right kidney : Relations: Anterior: right lobe of the liver and IVC Posterior : Diaphragm (Same on both glands) Medial : Celiac plexus and ganglia (Same on both glands) 	<ul style="list-style-type: none"> Shape: crescentic or semilunar Location: Extends along the medial border of the left kidney from the upper pole to the hilum Relations: Anterior : pancreas, stomach and lesser sac Posterior : Diaphragm (Same on both glands) Medial : Celiac plexus and ganglia (Same on both glands)

Arterial	Venous	Innervation	Lymph
Superior suprarenal artery Origin: Inferior phrenic artery Middle suprarenal artery Origin: Abdominal aorta Inferior suprarenal artery Origin : Renal artery	Inferior Vena Cava (on right side) Left Renal Vein (on left side)	Preganglionic sympathetic fibers Derivatives of the Splanchnic nerves to supply the glands	Drains Into Lateral Aortic Lymph nodes

Origin of adrenal glands

(Start to **develop** at the **6th week** & rapidly become **smaller** during the **first 2-3 weeks after birth**)

Adrenal Cortex	Adrenal Medulla
<ul style="list-style-type: none"> Is mesodermal in origin Develops from coelomic epithelium from the posterior abdominal wall 	<ul style="list-style-type: none"> Is ectodermal in origin Develops from the neural crest cells (chromaffin cells) Sympathetic ganglia gives rise to it

Congenital Adrenal Hyperplasia (CAH)

- Abnormal increase in cortical cells resulting in excessive androgen production during fetal period
- In females, it may lead to muscularization of external genitalia and clitoris
- In males, it may remain undetected in early infancy
- In both sexes, later in childhood, this may lead to rapid growth an accelerated skeletal maturation

Cortex (6 letters = 6th week)	Medulla	Permanent cortex	Differentiation
During 6th week of development, mesenchymal tissue aggregate forming the fetal cortex The fetal cortex is derived from mesothelium tissue between the developing gonads (gonadal ridge) and the dorsal mesentery	Derived from the neural crest cells of the adjacent sympathetic ganglia it forms a mass medial to the fetal cortex	A second wave of mesenchymal cells arise from the mesothelium This encloses the fetal cortex forming a thinner permanent (definitive) cortex	the suprarenal cortical zones complete their differentiation at the end of the third year Its involution is largely completed in the first year of life
			Differentiation begins mainly during the late fetal period the cortex differentiate into 2 zones: -Zona glomerulosa (begin to appear during the late fetal period) -Zona fasciculata These 2 zones are presented at birth while a 3rd zone appears at the end of the third year called: -Zona reticularis (develops after birth) Zona reticularis = the 3rd and last layer = end of the third year End = Last layer Third year = 3rd layer

Anatomy

Pancreas

<p>Note</p>	<p>Retroperitoneal structure, in posterior abdominal wall(Epigastrium & Left upper quadrant of the abdomen). from the concavity of the duodenum on the right to the spleen on the left. extends in a transverse oblique direction at the transpyloric plane (L1)</p>			
<p>Parts</p>	<p>Head</p> <p>Disc shaped lies on On the 2nd & 3rd parts of duodenum</p>	<p>Neck</p> <p>Narrow</p>	<p>Body</p> <p>runs upward and to the left</p>	<p>Tail</p> <p>Lies in the Splenorenal ligament</p>
<p>Levels</p>	<p>L1</p>		<p>T12 (T with T)</p>	
<p>Relations</p>	<p>Posterior surface:</p> <ul style="list-style-type: none"> -Bile Duct(embedded in it) -IVC(runs upwards) 	<p>In front of:</p> <p>Aorta, Origin of Sup.Mes.artery, the confluence of the Portal Vein.</p>	<p>Posterior:</p> <p>Splenic Vein</p> <p>Upper border:</p> <p>Splenic Artery</p>	<p>Anterior:</p> <p>splenic flexure of colon</p>
	<p>Uncinate process:</p> <p>behind the superior mesenteric vessels</p>	<p>Inferior border:</p> <p>superior mesenteric Vessels</p> <p>Antero-superior supports the pylorus of the stomach.</p>	<p>Anterior:</p> <p>Stomach separated by the lesser sac Transverse colon & transverse mesocolon</p> <p>Posterior:</p> <p>Left Psoas muscle ,Left Adrenal gland, Left Renal vessels ,Upper 1/3rd of Left kidney, Hilum of the spleen</p>	
<p>Arterial</p>	<ol style="list-style-type: none"> Celiac trunk → common hepatic → gastroduodenal → superior pancreaticoduodenal artery along head of the pancreas Superior mesenteric to Inferior Pancreaticoduodenal 		<p>Splenic artery (main artery) through about 8-10 branches</p>	
<p>Venous</p>	<p>Anterior and posterior arcades drain that form superior and inferior pancreaticoduodenal veins which follow the corresponding arteries</p>		<p>Splenic vein drains which is a tributary of the portal vein</p>	
<p>Lymphatic</p>	<p>Rich network drains into nodes along the upper border of the pancreas called</p> <ol style="list-style-type: none"> Pyloric Hepatic Splenic nodes <p>Ultimately the efferent vessels drain into</p> <ol style="list-style-type: none"> celiac. superior mesenteric lymph nodes. <p>Lymph vessels from the region of the Head pass to Superior Mesenteric nodes</p>			
<p>Innervation</p>	<p>Sympathetic fibers: from the thoracic splanchnic nerves they have a predominantly inhibitory effect. Parasympathetic fiber: from the Vagus. they stimulate both exocrine and endocrine secretions.</p>			
<p>Ducts</p>	<p>Main duct: Joins common bile duct & they open into a hepatopancreatic ampulla in the duodenal wall (Ampulla of Vater). it opens into the lumen of the duodenum through (Major Duodenal Papilla).</p>		<p>Accessory duct (Santorini) Drains superior portion of the head,It empties separately into 2nd portion of duodenum at (minor duodenal papilla).</p>	