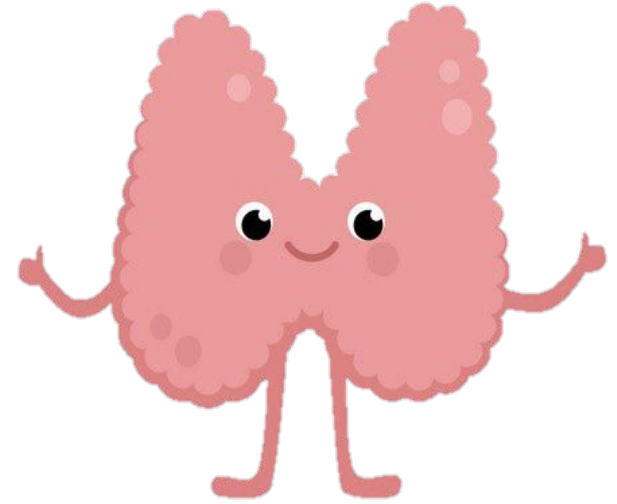


Anatomy & Embryology of Adrenal Glands

Endocrine block-Anatomy-Lecture 3

Editing file

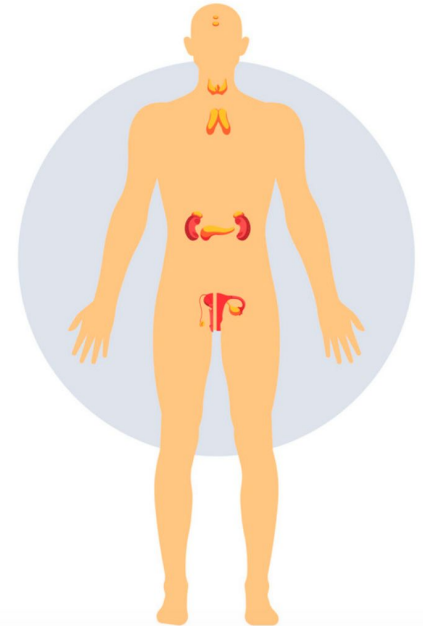


Objectives

Color guide :
Only in boys slides in **Green**
Only in girls slides in **Purple**
important in **Red**
Notes in **Grey**

 **At the end of the lecture, students should be able to:**

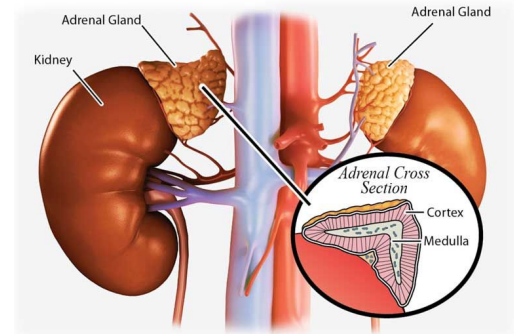
- Location, shape and relations of the right and left adrenal glands.
- Blood supply, lymphatic drainage and nerve supply of right and left adrenal glands
- Parts of adrenal glands and function of each part.
- Development of adrenal gland and common anomalies.



Suprarenal Glands

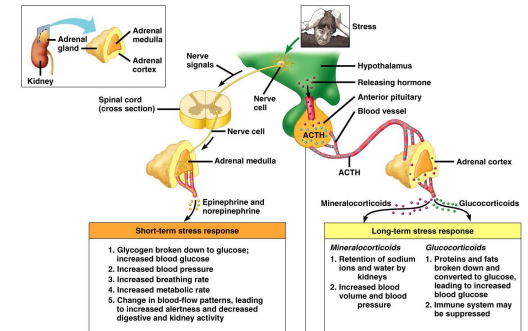
Structure

- They are yellowish **retroperitoneal** organs located at the upper poles of each kidney **at the level of T12**
- They are surrounding by **renal fascia** with kidney and separated from the kidney by **perirenal fat** (kidney is covered by 4 layers: capsule, perirenal fat, renal fascia and pararenal fat.)
- Each gland is composed of an **outer yellow cortex** and an **inner dark brown medulla**



Function

- 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:
 - 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



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Suprarenal Glands: Shape, location and Relations

1

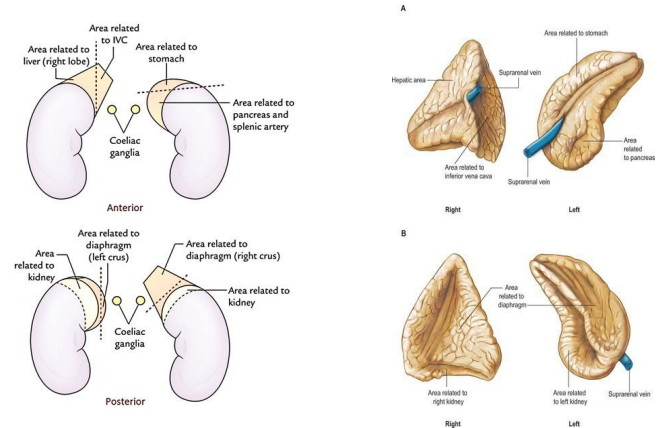
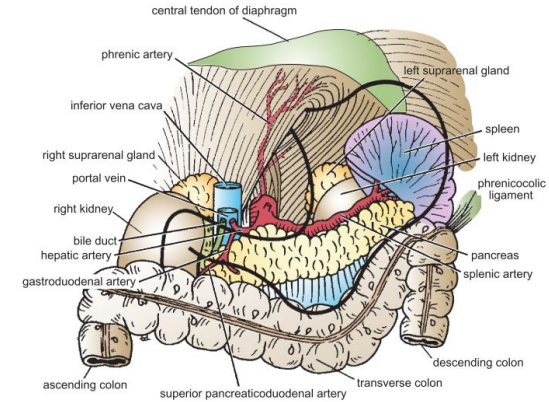
Right Suprarenal Gland

- **Shape:** Pyramidal or triangular
- **Location:** caps the upper pole of the right kidney
- **Relations:**
 - **Anterior:** right lobe of the liver and IVC
 - **Posterior:** diaphragm
 - **Medial:** celiac plexus and ganglia

2

Left Suprarenal Gland

- **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
 - **Medial:** celiac plexus and ganglia

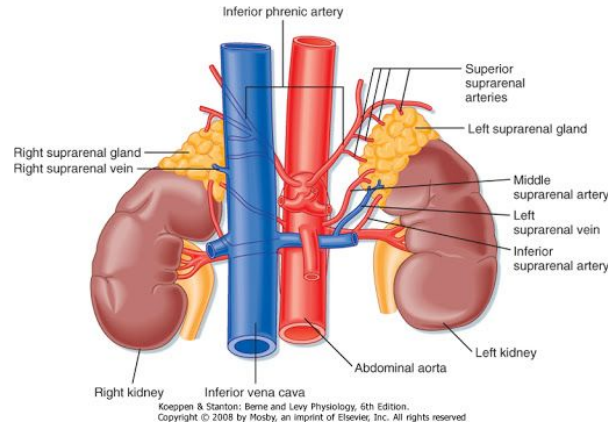


Suprarenal Glands: Supply

Arterial Supply

Each gland is supplied by three arteries

- **Superior suprarenal artery**
 - origin: inferior phrenic a branch from abdominal aorta
- **Middle suprarenal artery**
 - origin: abdominal aorta single branch
- **Inferior suprarenal artery**
 - origin: renal arteries



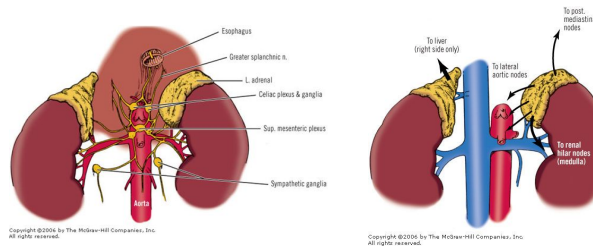
Venous Drainage

A single vein emerges from the hilum of each gland

- **Right Suprarenal vein**
 - drain into: inferior vena cava
- **Left suprarenal vein**
 - drain into: left renal vein

Nerve Supply

- **Sympathetic: preganglionic sympathetic fiber**
 - derived from: splanchnic nerves
 - Most of the nerves end (postganglionic) in the medulla



Lymph Drainage

- drains into: lateral aortic lymph nodes

Origin of Adrenal Glands

Adrenal Glands

- The two parts of the adrenal gland develop from two different origins

1

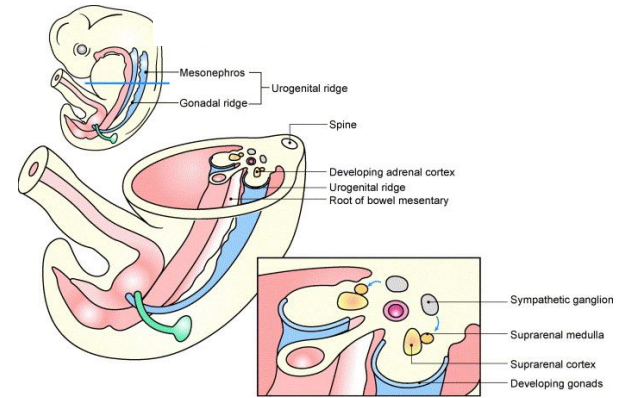
Adrenal Cortex:

- is mesodermal in origin
- Develops from the coelomic epithelium from the posterior abdominal wall

2

Adrenal Medulla:

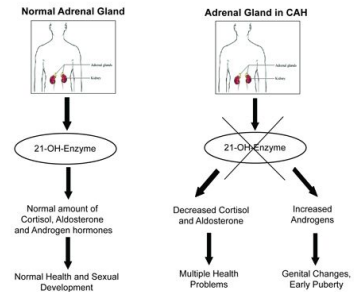
- is ectodermal in origin
- Develops from the neural crest cells (chromaffin cells)



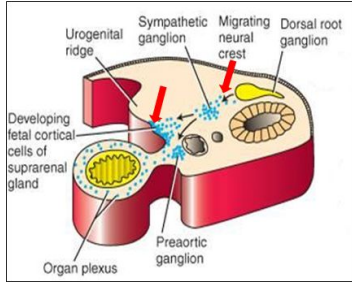
Congenital Disorders

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 enlarged clitoris
- In males, it may remain undetected in early infancy
- In both sexes, **later in childhood**, this may lead to → rapid growth and **accelerated skeletal maturation**



Development of Adrenal Gland

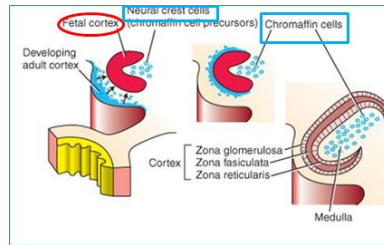


- Derived from the **neural crest cells** of the adjacent sympathetic ganglia
- it forms a mass **medial to the fetal cortex** (fetal cortex is C-shaped)

The Medulla

The cortex

- 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**



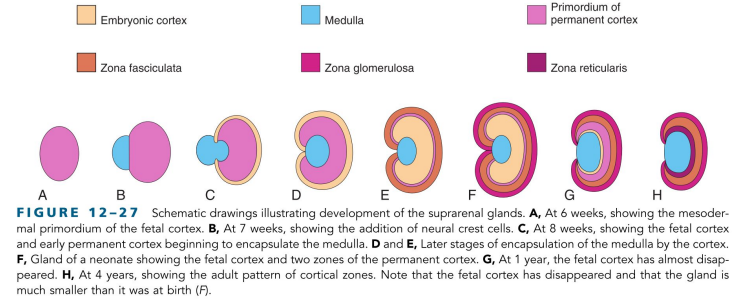
Permanent cortex

- A **second wave** of mesenchymal cells arise from the mesothelium
- This **encloses the fetal cortex** forming a **thinner permanent (definitive) cortex**

Differentiation

- **Differentiation** begins mainly during the **late fetal period**
- The cortex differentiate into 2 zones:
 - Zona glomerulosa
 - Zona fasciculata
- These 2 zones are presented **at birth** while a **3rd zone appears at the end of the third year** called:
 - Zona reticularis

is not recognizable until the end of 3rd year



Clinical notes

1

- The suprarenal gland is enclosed within the renal fascia with the kidney but in a **separate compartment**
- This allows the two organs to be separated easily during surgery

2

- The suprarenal gland of the fetus is 10-20 times larger than the adult's glands relative to the body weight, and are large compared with the kidneys
- This is due to the extensive size of the fetal cortex (**The medulla remains relatively small until after birth**)
- The glands size rapidly **decreases during the first 2-3 weeks** after birth due to the regression of the fetal cortex

3

- It's involution (shrinkage) is largely completed in the first year of life
- During this process, the cortex is **very susceptible to trauma** at birth leading to severe hemorrhage

QUIZ

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
B	A	B	D	B	A	C	D

Q1: Which of the following structures lies anterior to the Right Adrenal gland ?

- A. abdominal aorta
- B. Right lobe of the liver
- C. diaphragm
- D. superior vena cava

Q2: Nerve fibers that are supplying the adrenal gland are?

- A. Preganglionic sympathetic
- B. Postganglionic parasympathetic
- C. Preganglionic parasympathetic
- D. Postganglionic sympathetic

Q3: The suprarenal gland is separated from the kidney by:

- A. Adrenal fascia
- B. Perirenal fat
- C. Peritoneal fat
- D. renal fascia

Q4: Adrenal gland is derived from _____

- A. Endoderm
- B. Mesoderm
- C. Endoderm ,Ectoderm and mesoderm
- D. Ectoderm and mesoderm

Q5: postganglionic fiber that supply adrenal gland end in

- A. coeliac gangila
- B. medulla
- C. cortex
- D. the hilum of the adrenal

Q6: Which of the following structures lies posterior to the Left Adrenal gland ?

- A. diaphragm
- B. lumbar vertebra
- C. right lobe of the liver
- D. celiac plexus and ganglia

Q7: Adrenal Medulla Develops from

- A. posterior abdominal wall
- B. coelomic epithelium
- C. neural crest
- D. neural tube

Q8: adrenal gland supplied by

- A. suprascapular arteries
- B. superior phrenic
- C. splenic artery
- D. abdominal aorta



Members board



Team leaders

- **Abdulrahman Shadid**

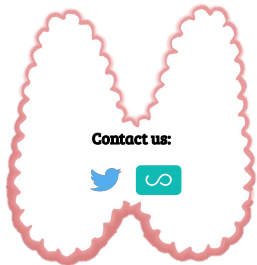
Boys team:

-  **Mohammed Al-huqbani**
- **Salman Alagla**
- **Ziyad Al-jofan**
- **Ali Aldawood**
- **Khalid Nagshabandi**
- **Sameh nuser**
- **Abdullah Basamh**
- **Alwaleed Alsaleh**
- **Mohaned Makkawi**
- **Abdullah Alghamdi**

- **Ateen Almutairi**

Girls team :

- **Ajeed Al Rashoud**
- **Taif Alotaibi**
- **Noura Al Turki**
- **Amirah Al-Zahrani**
- **Alhanouf Al-haluli**
- **Sara Al-Abdulkarem**
- **Renad Al Haqbani**
- **Nouf Al Humaidhi**
- **Jude Al Khalifah**
- **Nouf Al Hussaini**
- **Danah Al Halees**
- **Rema Al Mutawa**
- **Maha Al Nahdi**
- **Razan Al zohaifi**
- **Ghalia Alnufaei**



Contact us:

