Adrenal (Suprarenal) Glands

Anatomy & Embryology

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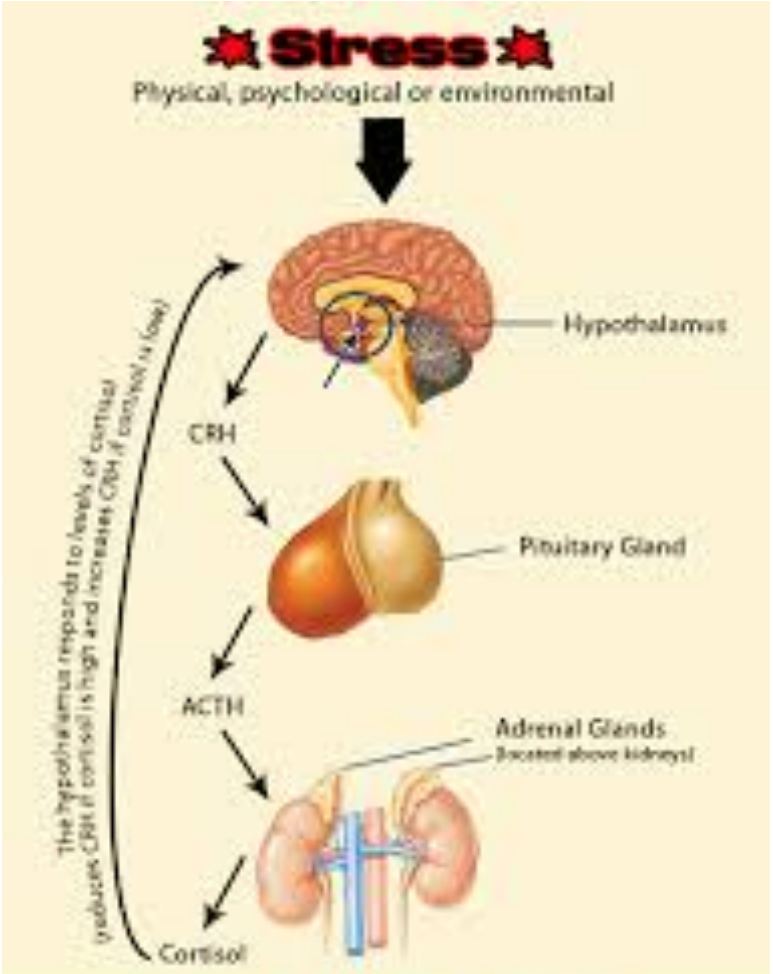
Objectives

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

- The **suprarenal (adrenal) gland** is a component of the **hypothalamic-pituitary-suprarenal axis** that is responsible for coordinating **stress response** and **metabolism**.

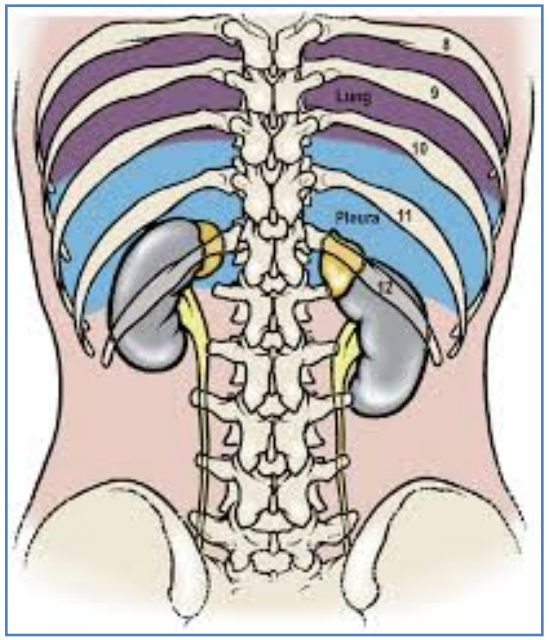


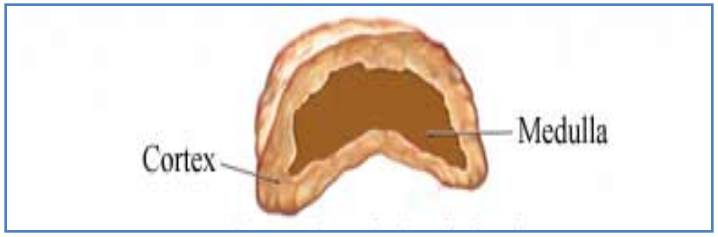
Suprarenal Glands

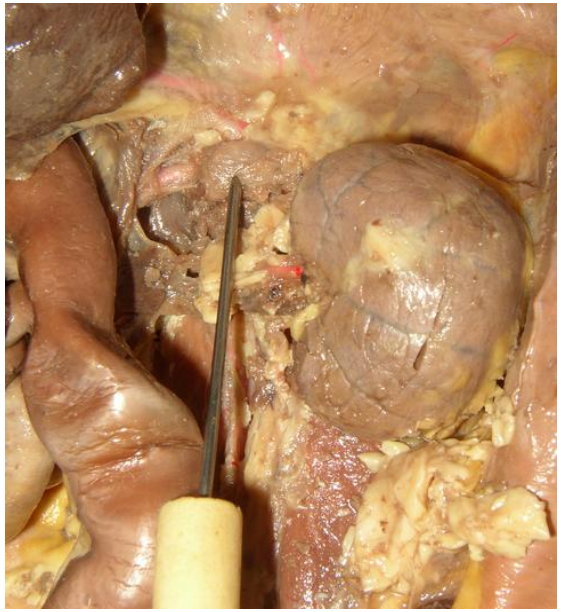
They are yellowish retroperitoneal organs that lie on the upper poles of the kidneys,

At the level of the last thoracic vertebra (T12).

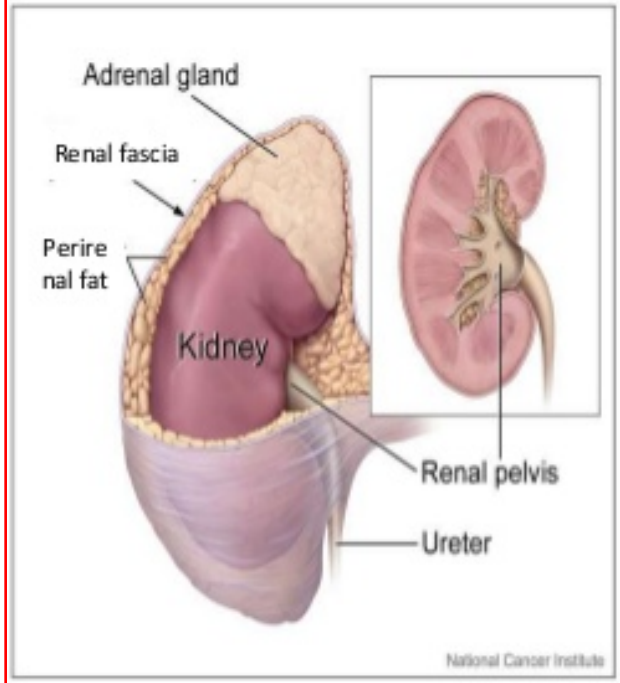
Each gland has an outer yellow cortex and an inner dark brown **medulla.**







- The suprarenal gland is enclosed within the **renal fascia** with the kidney but in a separate compartment, that allow the two organs to be separated easily during surgery.
- It is separated from the kidney by the **perirenal fat**



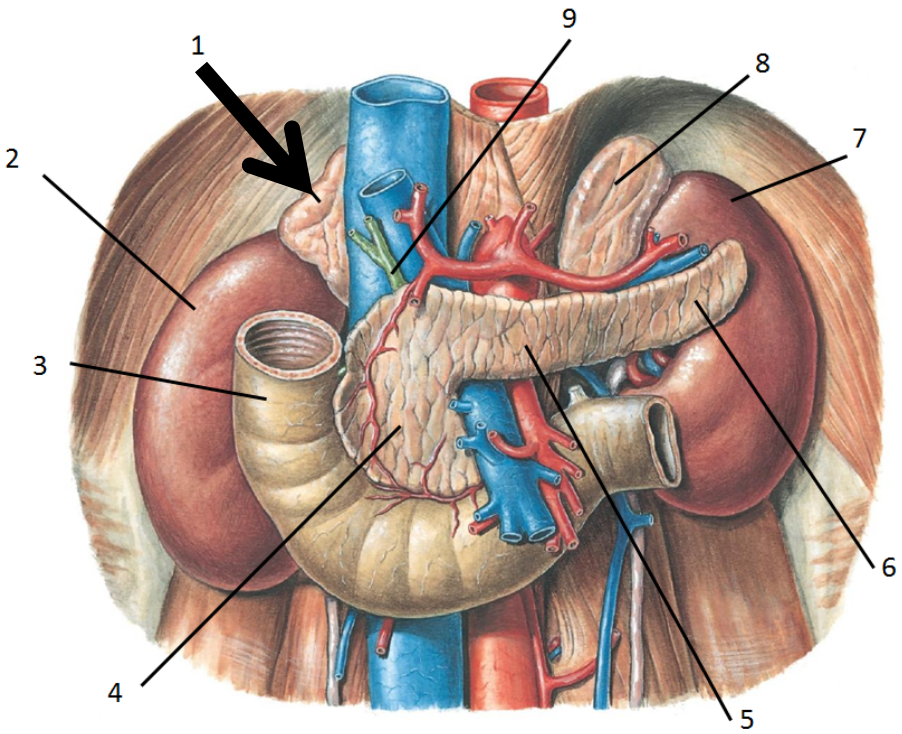
- Is **pyramidal in** shape.
- Caps the upper pole of the right kidney.

•Relations:

- **•Anterior:** right lobe of the liver and inferior vena cava.
- **•Posterior:** diaphragm.
- **Medial :**

  Celiac plexus and ganglia

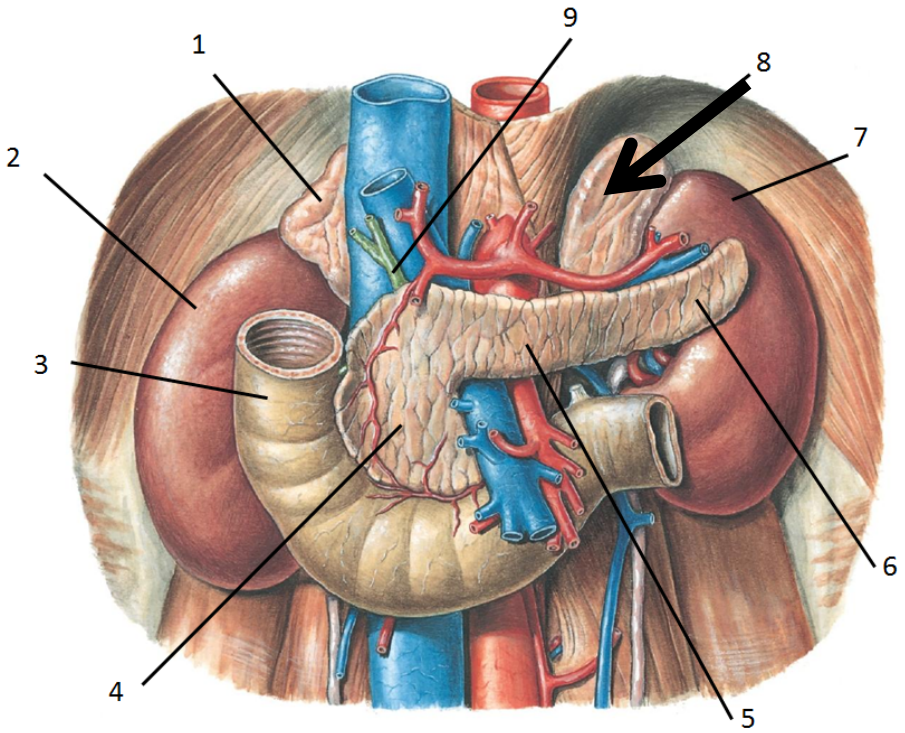
The right suprarenal gland



- Is **crescentic** in shape
- Extends along the medial border of the left kidney from the upper pole to the hilus.
- **Relations:**
  - **Anterior:** pancreas, lesser sac, and stomach
  - **Posterior:** diaphragm.
  - **Medial :**

    Celiac plexus and ganglia

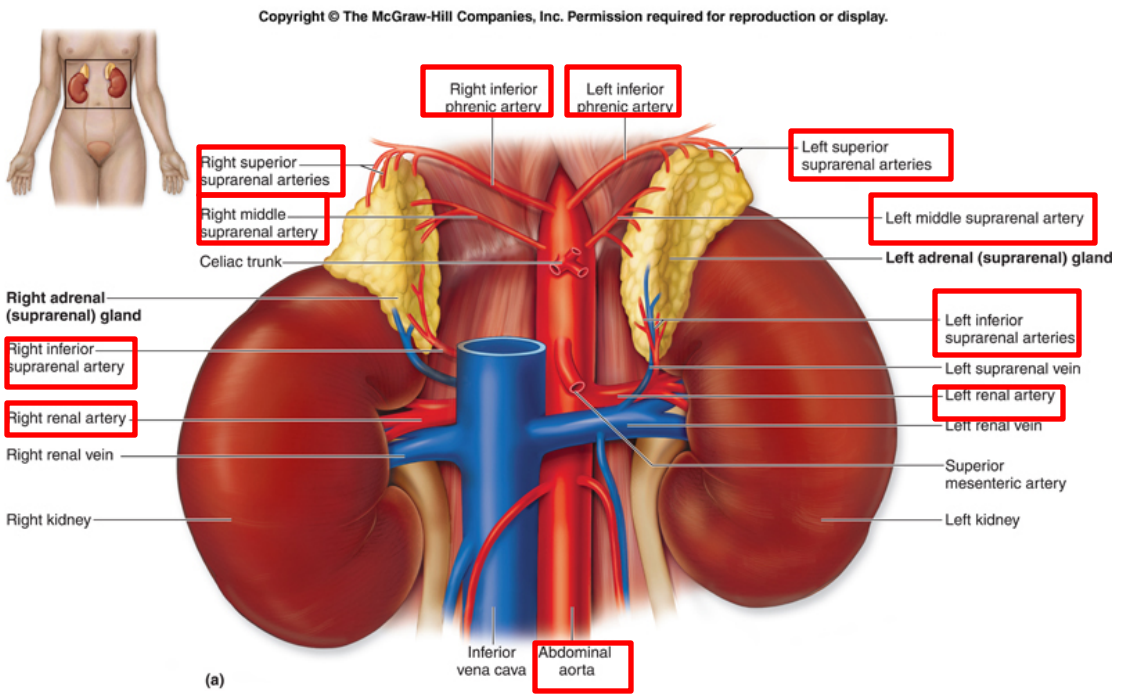
The left suprarenal gland



Blood supply

❑Arteries:

- The arteries supplying each gland are **three** in number:
- **Superior suprarenal from inferior phrenic artery.**
- **Middle suprarenal from abdominal aorta**
- **Inferior suprarenal from renal artery.**



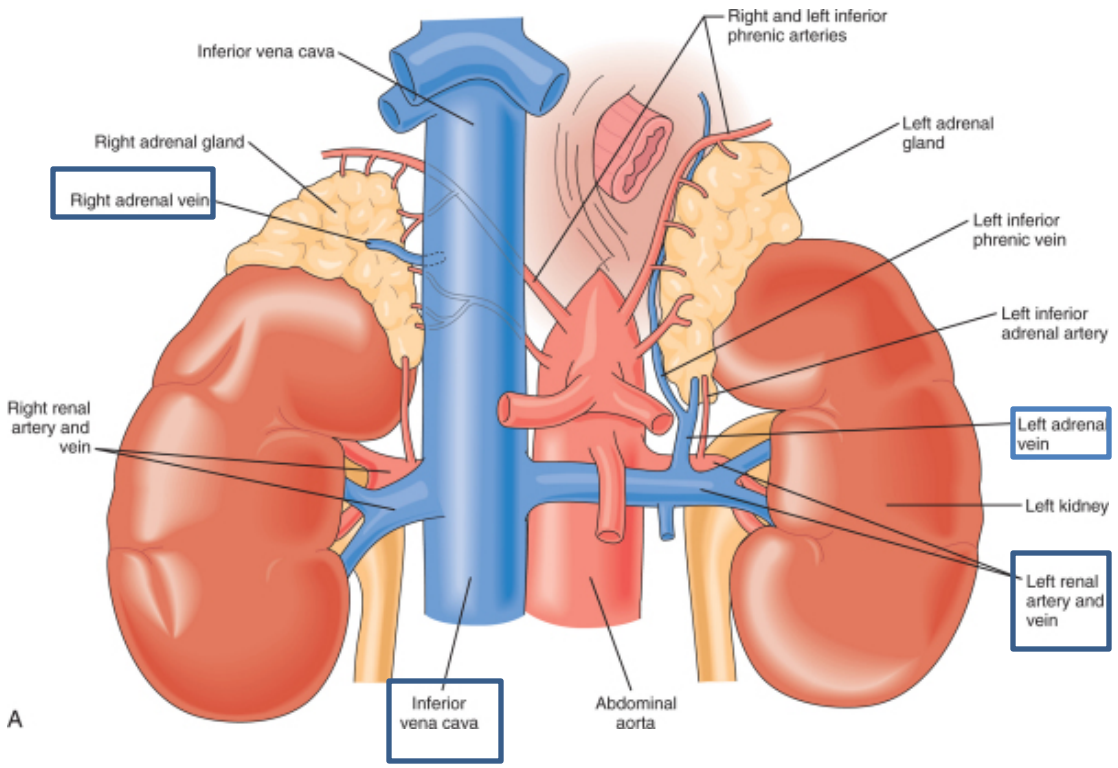
Venous Drainage

- A **single vein** emerges from the hilum of each gland and drains

into

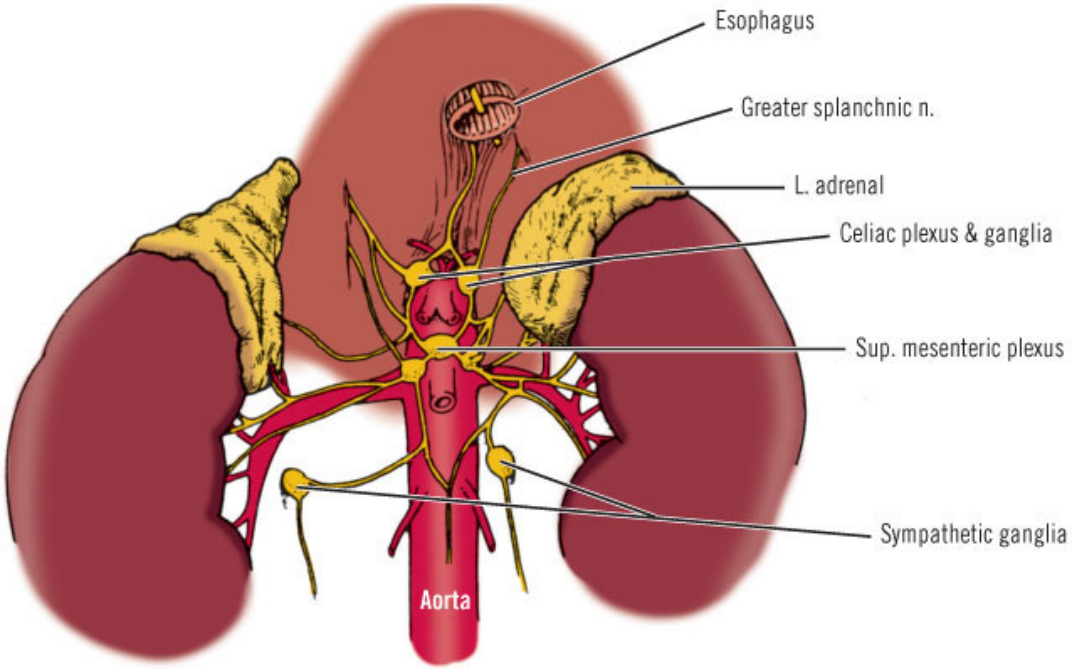
the **inferior vena cava on the right side** and

the **left renal vein on the left side.**



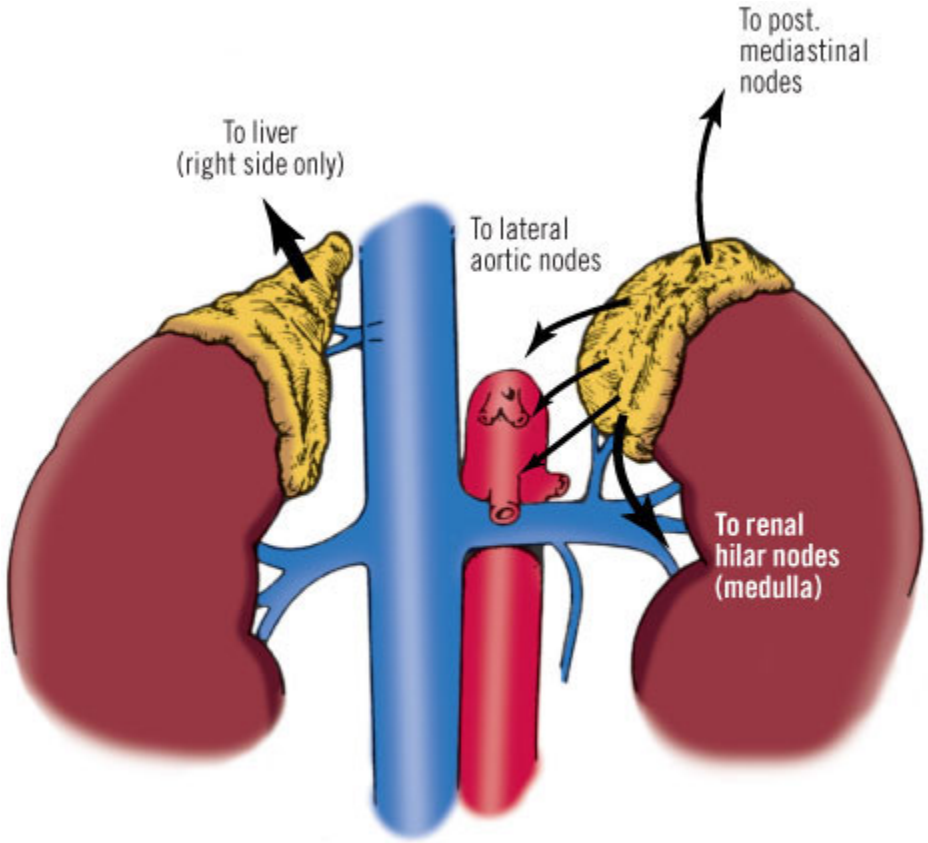
Nerve Supply

- **Preganglionic sympathetic fibers**
- derived from the **splanchnic nerves** supply the glands.
- Most of the nerves end in the **medulla** of the gland.

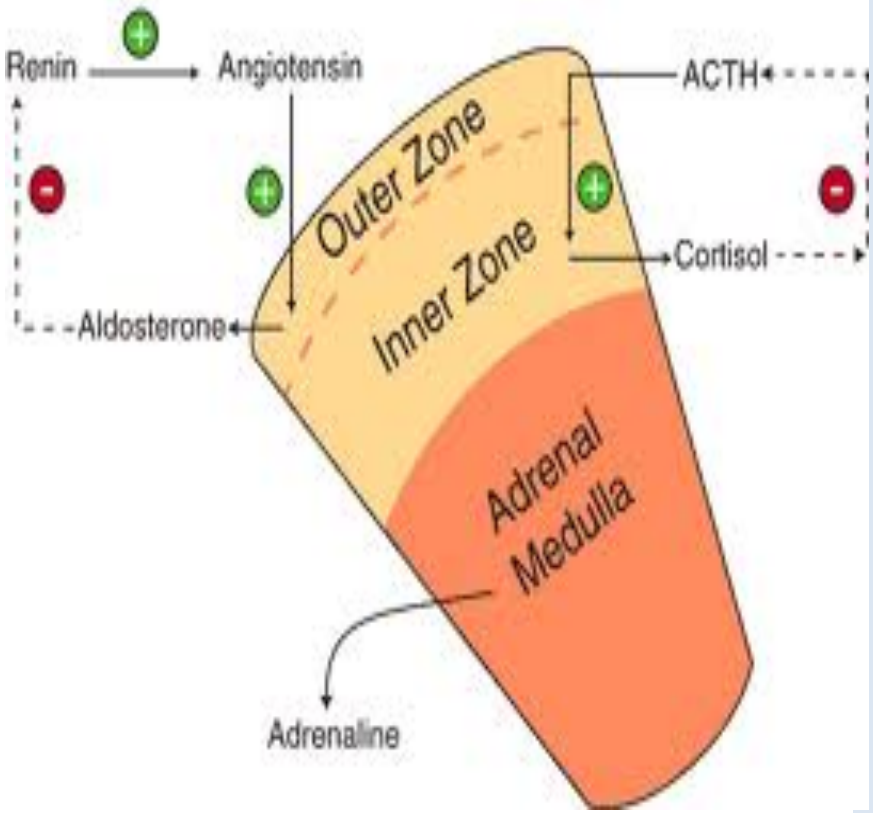


Lymph Drainage

- The lymph drains into the **lateral aortic lymph nodes.**



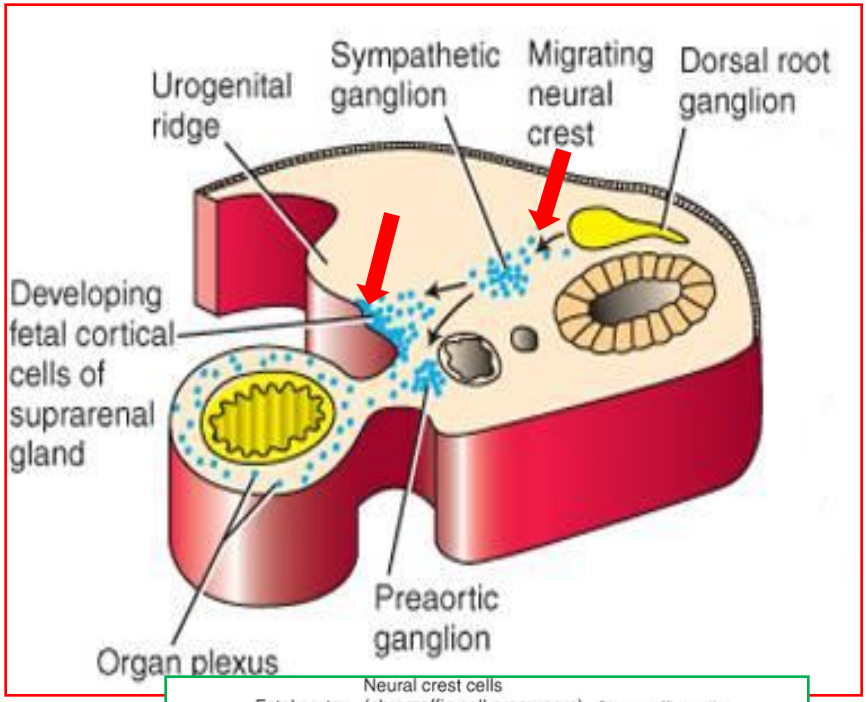
Functions

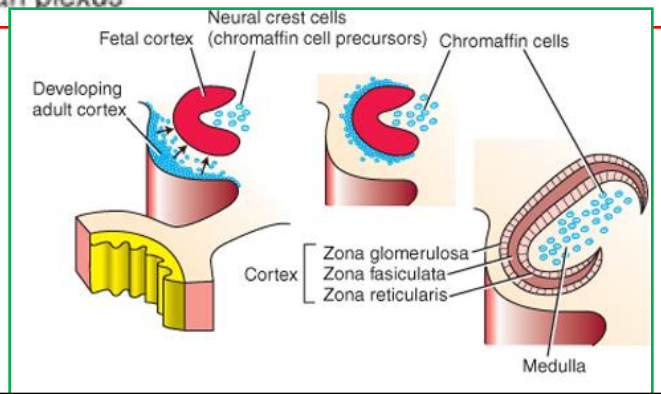


- The **Cortex** of the suprarenal glands secretes hormones that include:
  - **Mineral corticoids**, which are concerned with the control of **fluid and electrolyte balance**
  - **Glucocorticoids**, which are concerned with the control of the **metabolism** of carbohydrates, fats, and proteins
  - Small amounts of **Sex hormones**, which probably play a role in the **prepubertal development** of the sex organs.
- The **Medulla** of the suprarenal glands secretes the **catecholamines: epinephrine and norepinephrine**

Development of the Adrenal Glands

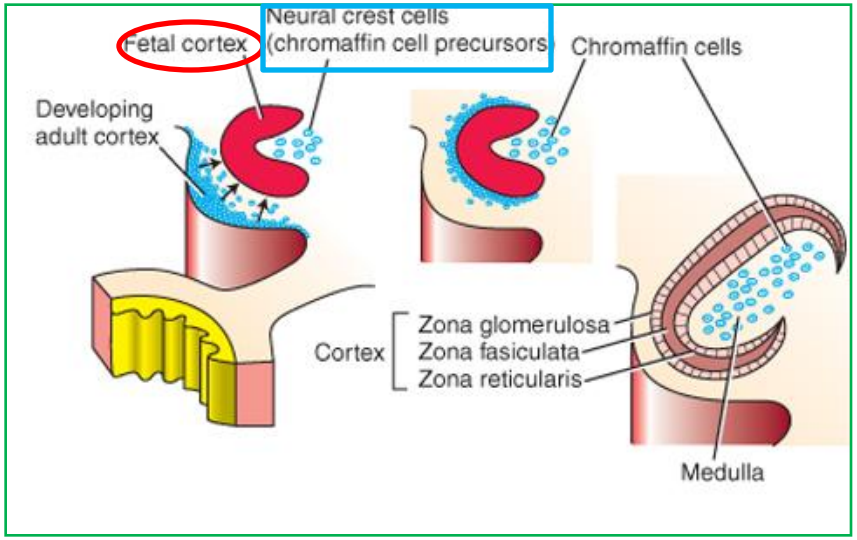
- The two parts of the adrenal gland (the cortex and the medulla) develop from two different sources.
  - **Cortex:**
    - **Mesodermal** in origin;
    - develops from the **celomic epithelium of the posterior abdominal wall.**
- It appears during the **6th week** of development, by aggregation of the mesenchymal cells between **dorsal mesentery** and **developing gonads**.

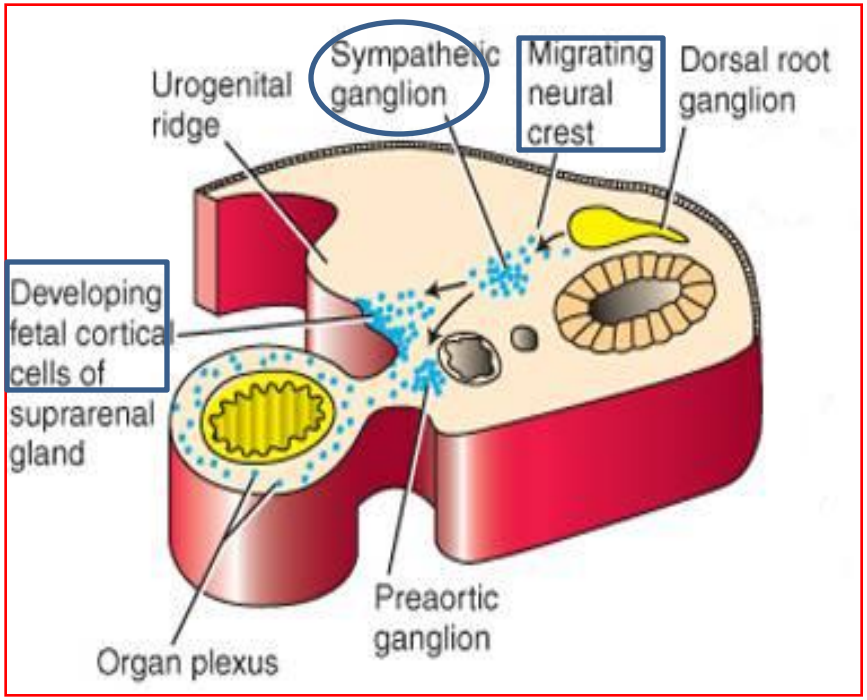




➢ **The Medulla:**

- **Ectodermal** in origin;
- develops from the adjacent **Sympathetic ganglion;**
- derived from **Neural crest cells.**
- It forms a mass medial to the fetal cortex





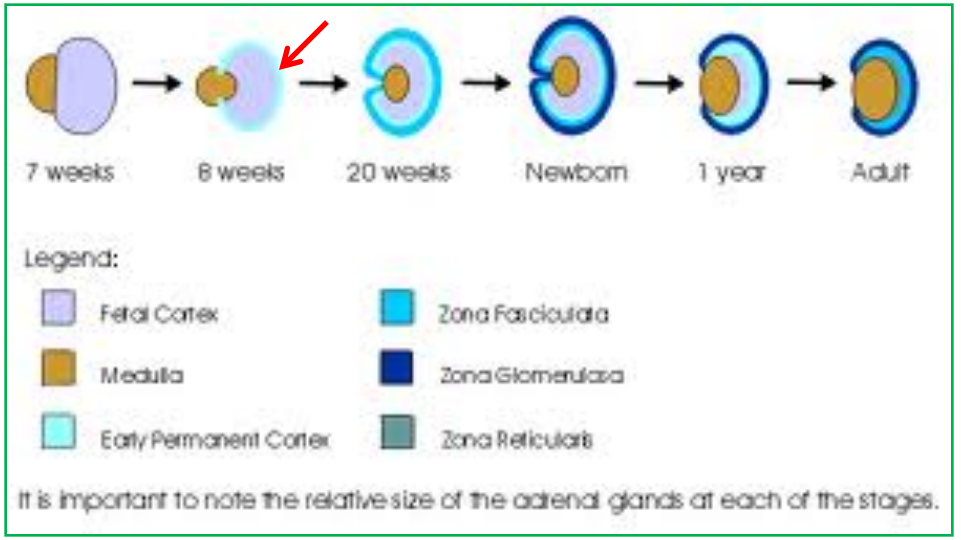
Permanent cortex

- A second wave of mesenchymal cells

arise from the mesothelium,

enclose the fetal cortex.

- forms a thinner definitive **(permanent)** cortex.

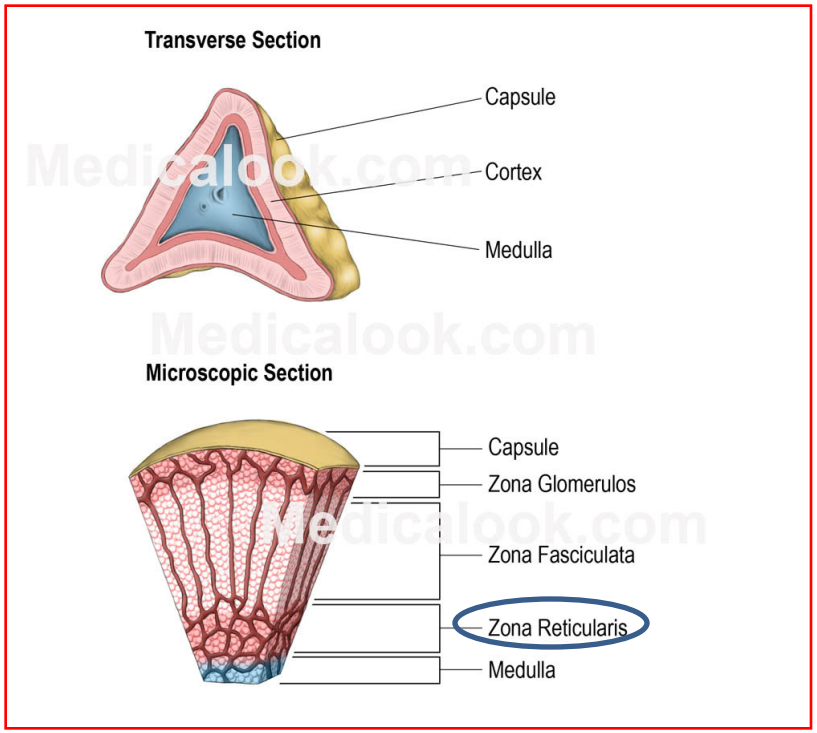


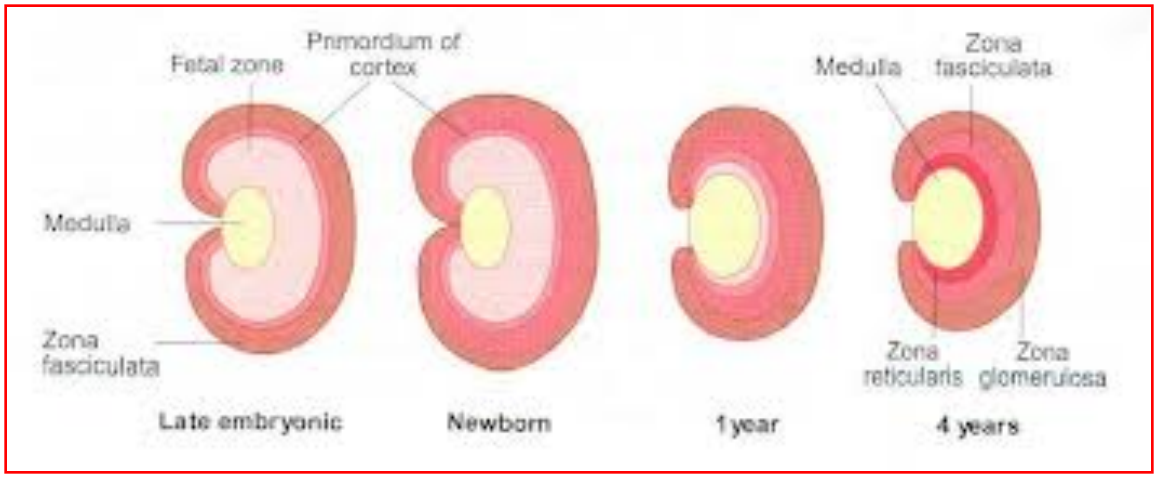
- **Differentiation** of the characteristic suprarenal cortical zones begins during the **late fetal period.**
- **Zona glomerulosa &**
- **zona fasciculata**

are present **at birth**, but

- **zona reticularis**

is not recognizable until **the end of third year.**





- **The suprarenal glands of the fetus** is 10-20 times larger than the adult glands relative to the body weight, and are large compared with the kidneys. This is because of the extensive size of the fetal cortex. The medulla remains relatively small until after birth.
- The suprarenal glands rapidly become smaller during the first 2-3 weeks after birth, due to the rapid regression of the **fetal cortex**.
- Its involution is largely completed in the first year of life.
- During the process of involution, the cortex is friable and susceptible to trauma at birth leading to severe hemorrhage.

Congenital adrenal hyperplasia (CAH)

- An abnormal increase in the cortical cells results in excessive androgen production; during the fetal period.
- **In females**, it may lead to musculization of external genitalia and enlargement of clitoris.
- **In males**, it may remain undetected in early infancy.
- Later in childhood, in both sexes, androgen excess may lead to rapid growth and accelerated skeletal maturation.

Thank you