

The adrenal gland (Suprarenal

By

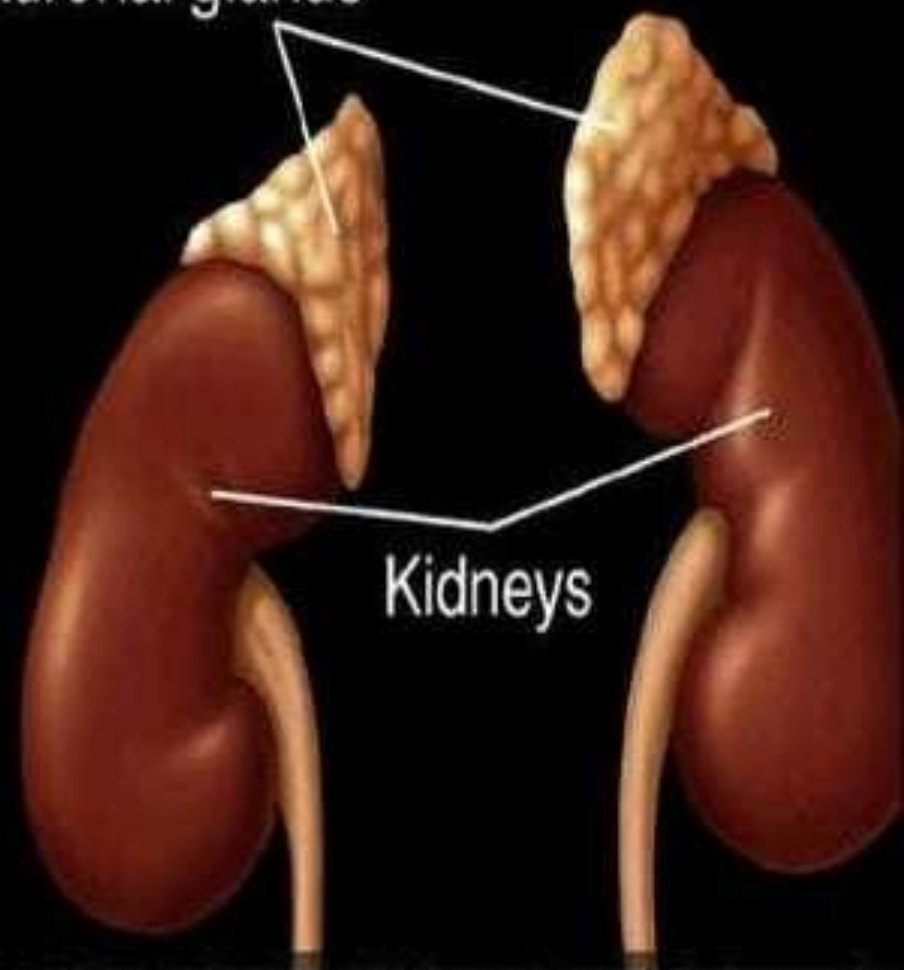
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Position and location

- The adrenal glands located on the upper poles of each kidney on the right and left sides
- They are covered by peritoneum on the posterior abdominal wall they are embedded into pre renal fat
- The left one is larger and higher than the right

- Location:
 - Rest superiorly to kidneys
- Hormones Produced:
 - ~30 steroid hormones!

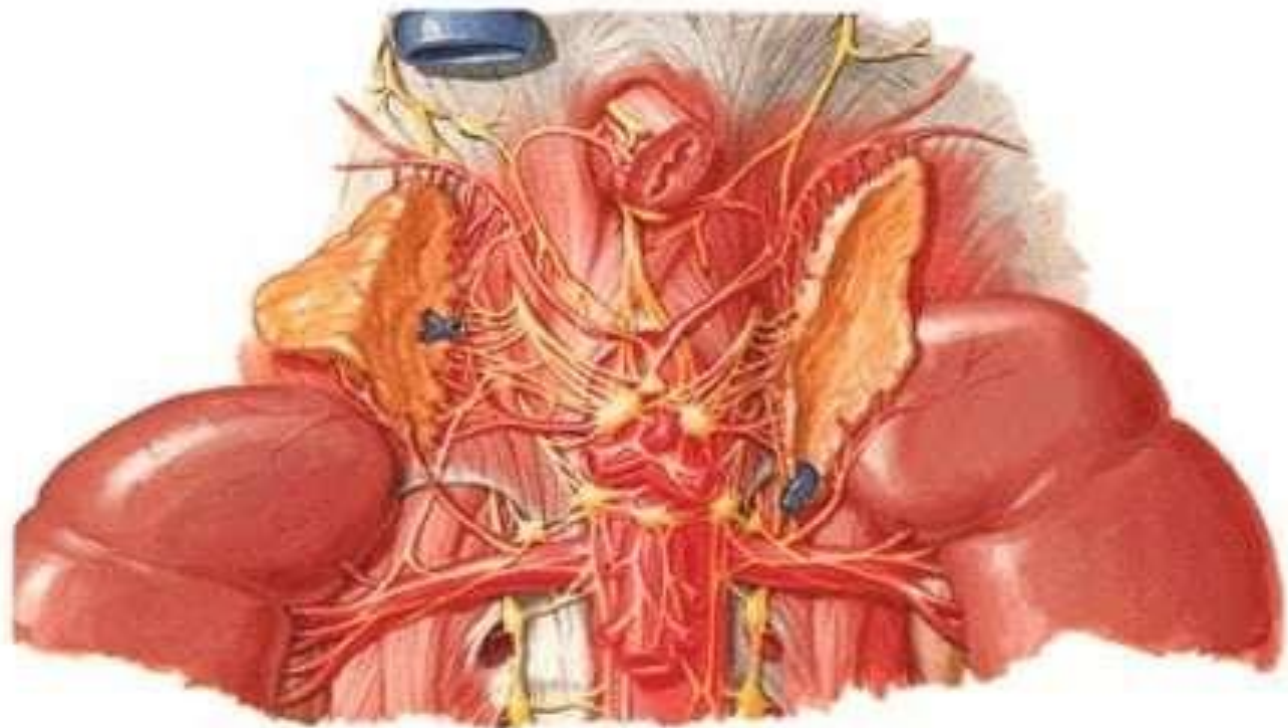
Adrenal glands



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Adrenal gland position & location

Nerves of Suprarenal Glands Dissection

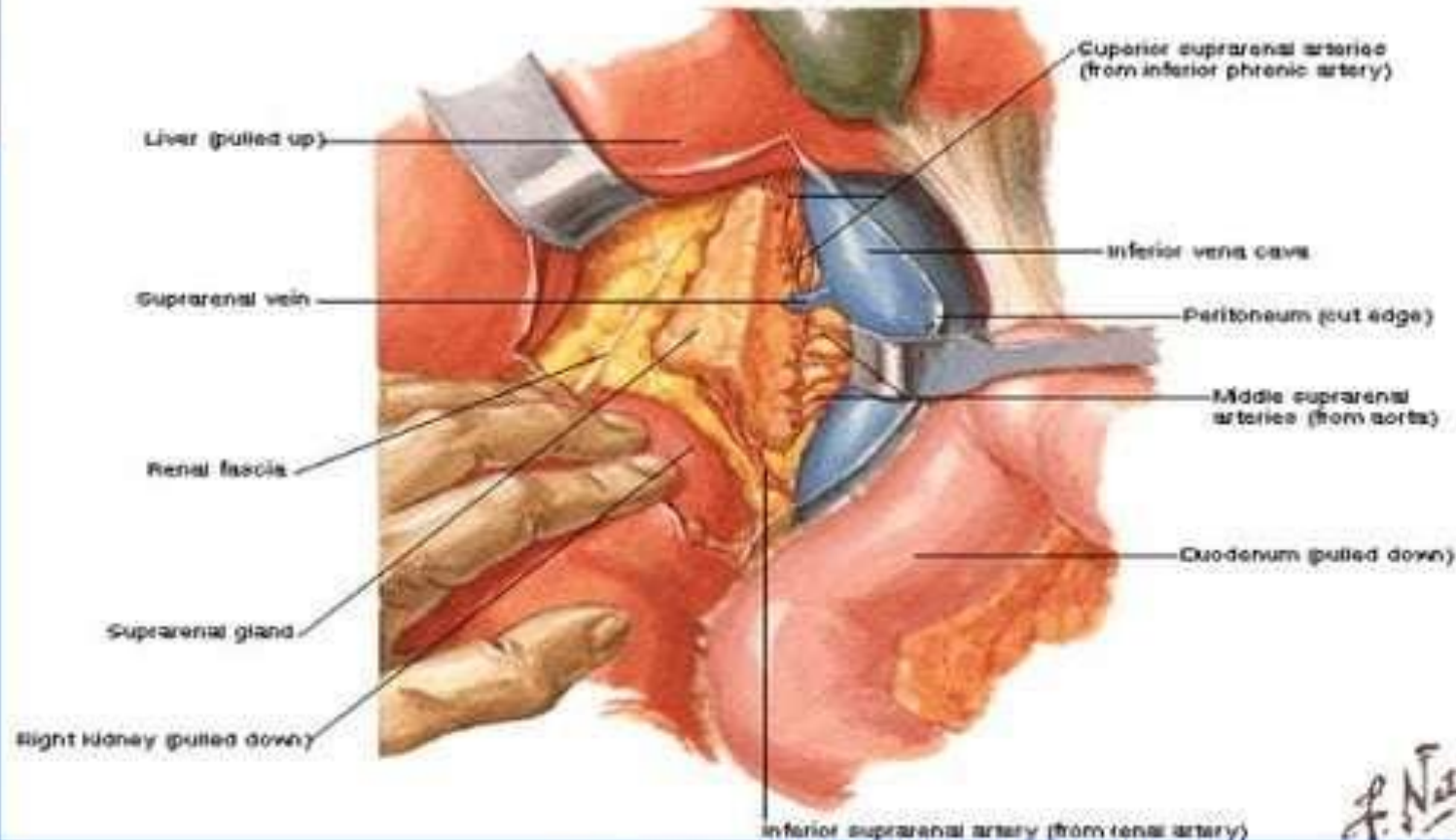


The right adrenal gland

- It is triangular in shape located on the upper pole of the right kidney behind the inferior vena cava
- It is related anterior to the inferior vena cava and the right lobe of the liver
- Posterior it is related to the right cruse of diaphragm

Relation of the right gland

Arteries and Veins of Right Suprarenal Gland in Situ

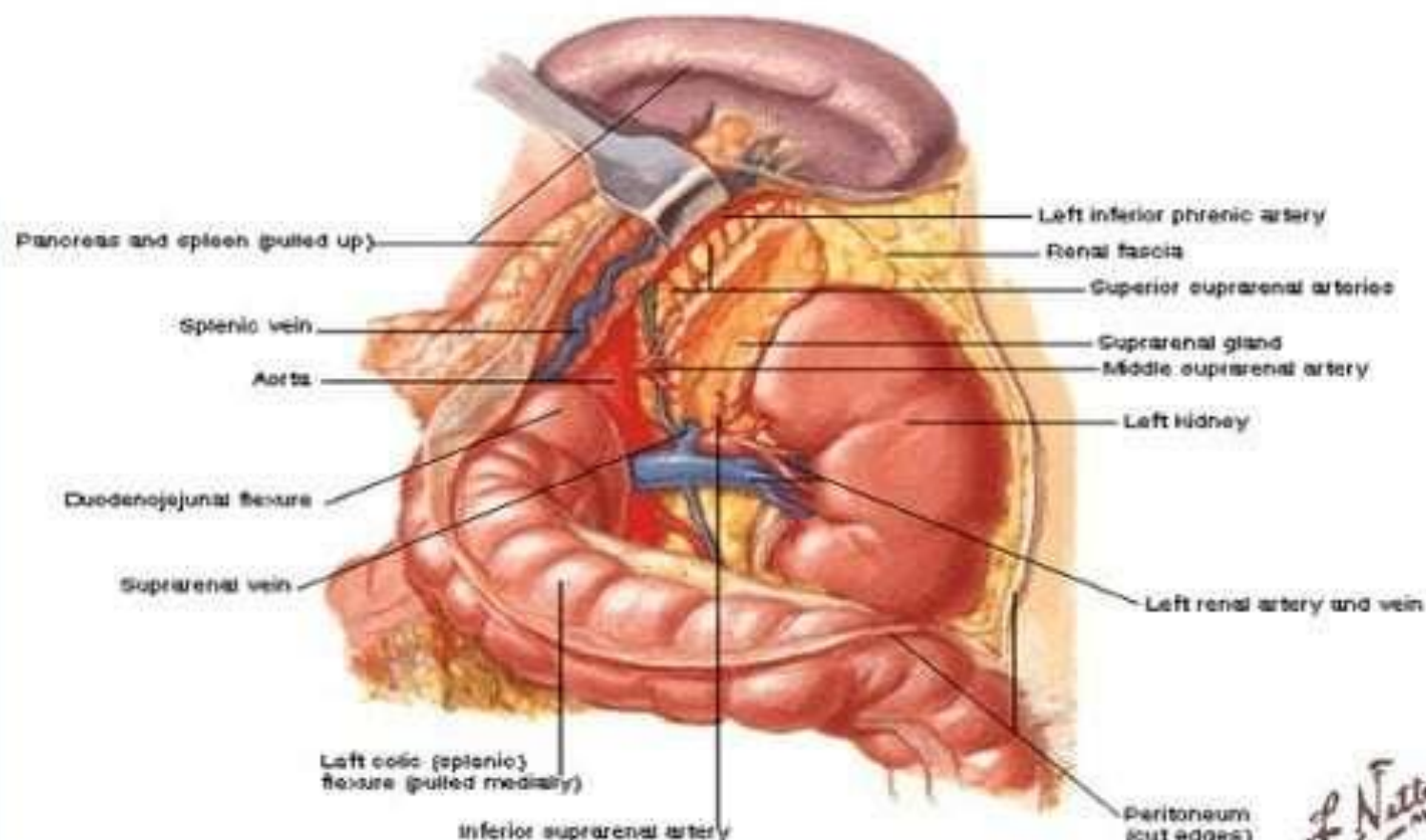


The left adrenal gland

- It is crescent in shape located on the upper pole of the left kidney behind the stomach
- Anterior it is related to the stomach, the tail of pancreas and the lesser sac
- Posterior it is related to the left cruse of diaphragm

Relation of the left gland

Arteries and Veins of Left Suprarenal Gland in Situ



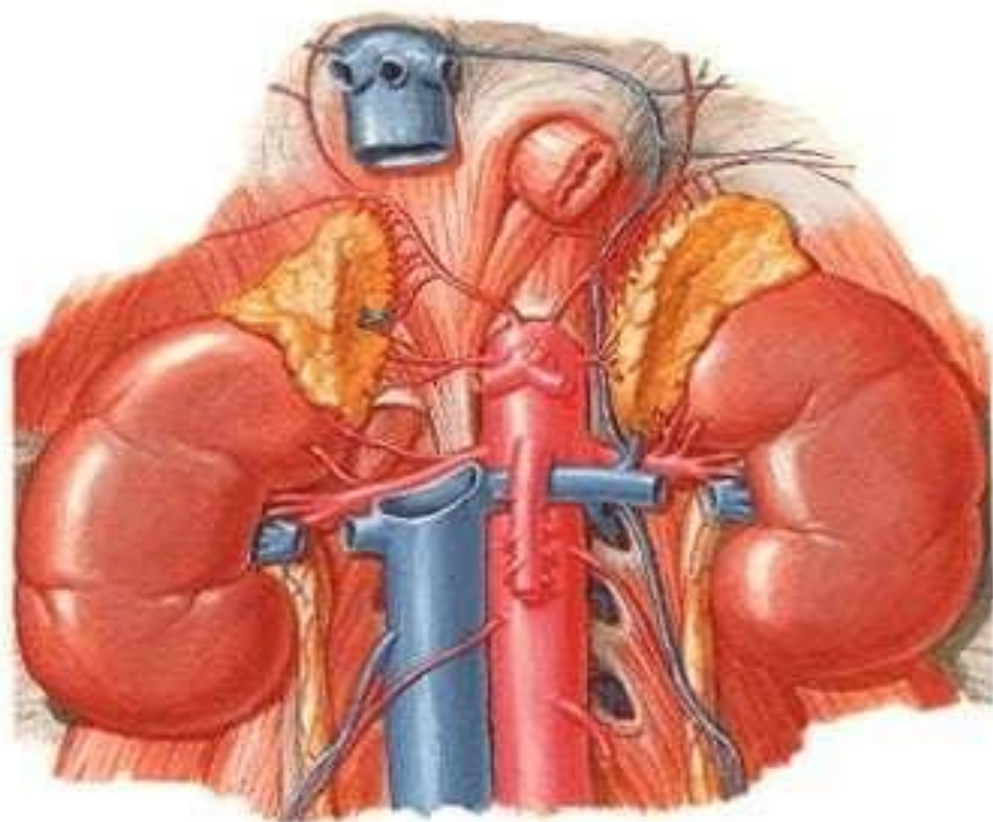
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M.D.

The blood supply

- Each adrenal gland supply by three arteries superior, middle and inferior supra renal arteries
- The superior supra renal artery branch from inferior phrenic artery which is branch from the aorta, the middle supra renal artery branch from the aorta and the inferior supra renal artery branch from the renal artery
- The venous drainage by the supra renal vein on the right side at the inferior vena cava and on the left side at the left renal vein

Arterial supply

Renal Artery and Vein in Situ



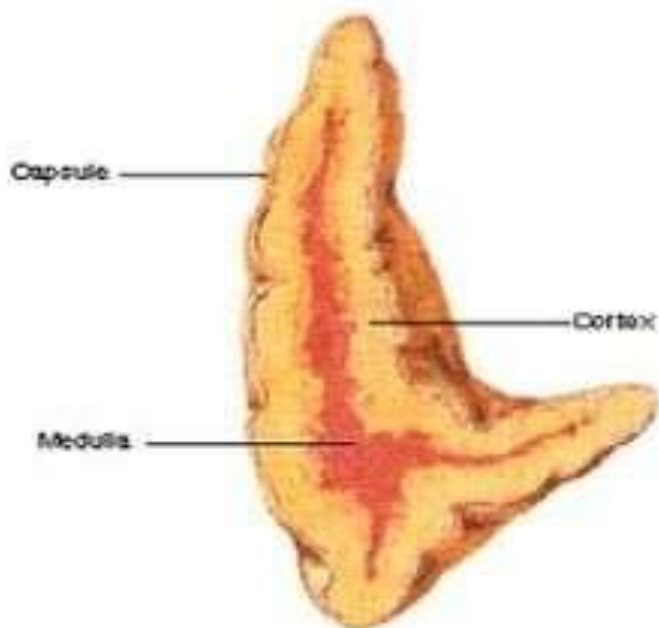
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Structure of adrenal gland

- The adrenal gland formed of outer cortex which is yellow forming the main mass of the gland and inner medulla completely enclosed by the cortex except at the hilum the gland enclosed by capsule of connective tissue
- The cortex has mesoderm development while the medulla developed from the neural crest

The cortex and capsule

Cross Section through Suprarenal Gland



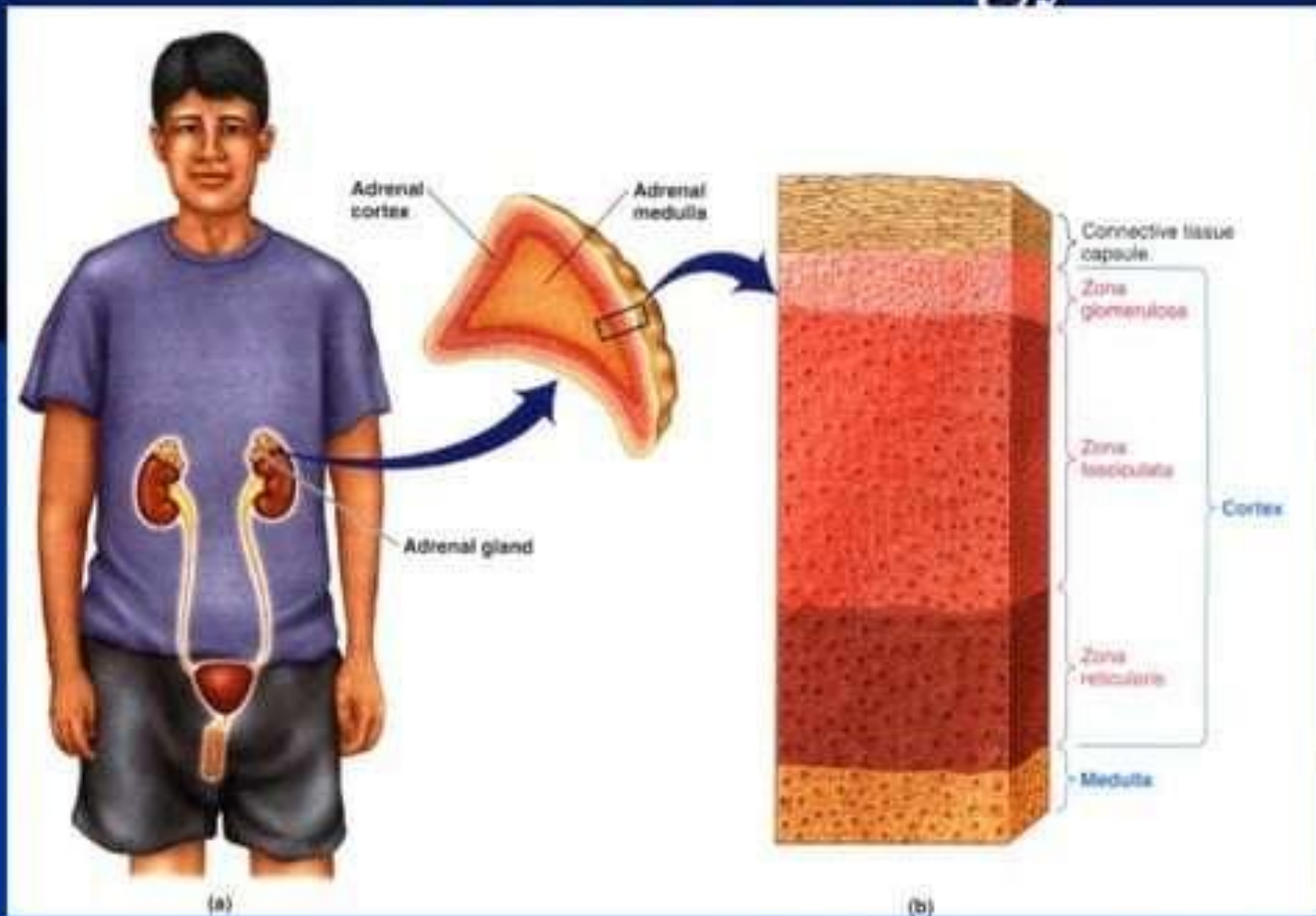
The adrenal cortex

- The cortex of the adrenal cortex consist of three layers arranged from outer to inner the zona glomerulosa, fasciculata, and reticularis
- **Zona glomerulosa** : it is the outer layer located close to the capsule .
- it is cells stimulated by ACTH and angiotensin 2 to secret minralocorticoids hormones which are the aldesterone and deoxycorticosterone they control the fluid and electrolytes balance in the body by affecting the renal tubules

Zona fasciculata

- It is the middle largest layer of the cortex
- the cells of this layer secrete the glucocorticoids which are the cortisol and hydrocortisone which maintain the carbohydrate balance

Adrenal Histology



Adrenal cortex

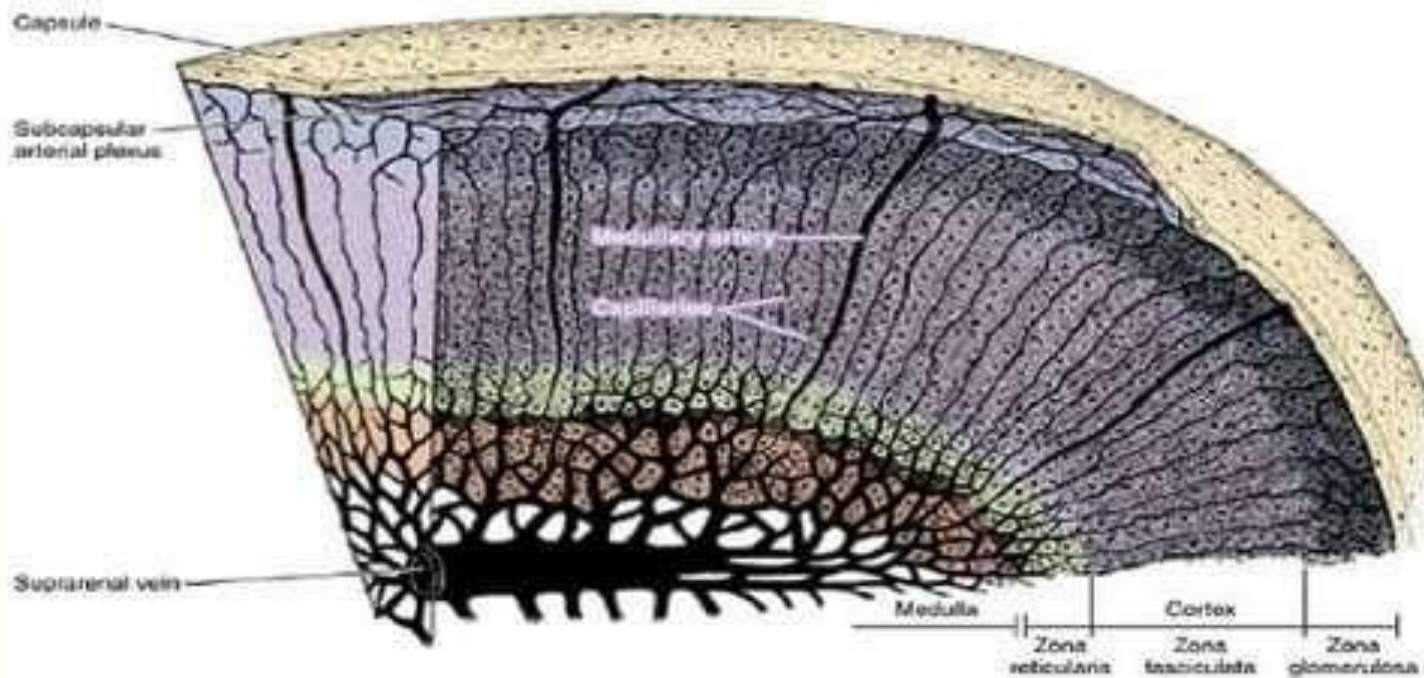


Figure 21—2. General architecture and blood circulation of the adrenal gland.



Structure of the cortex

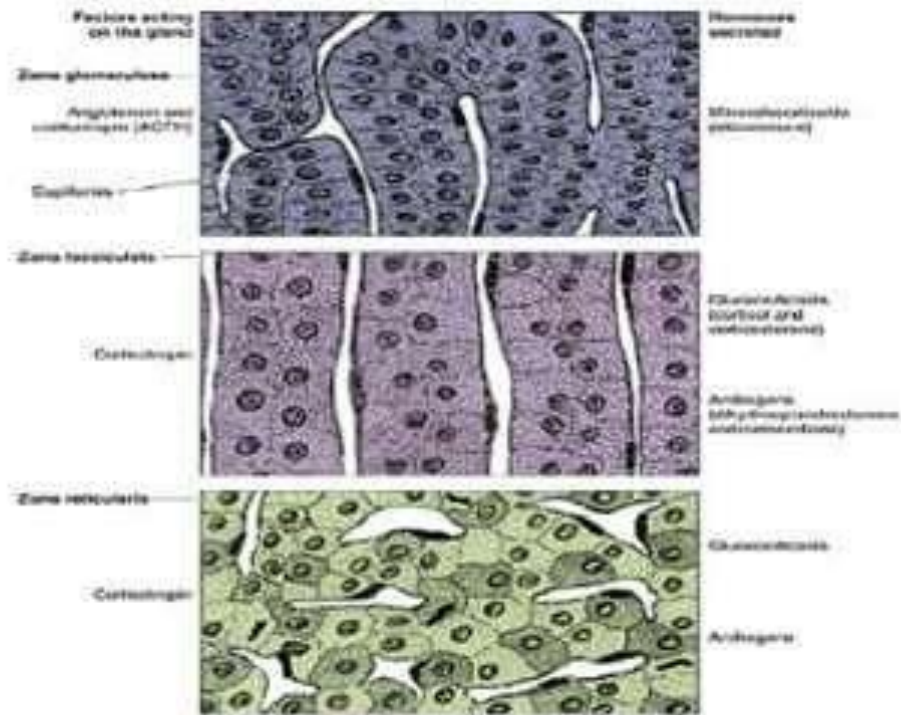
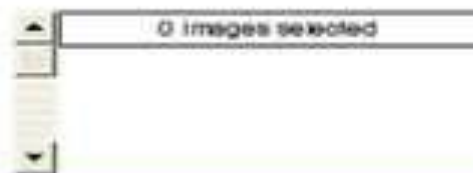
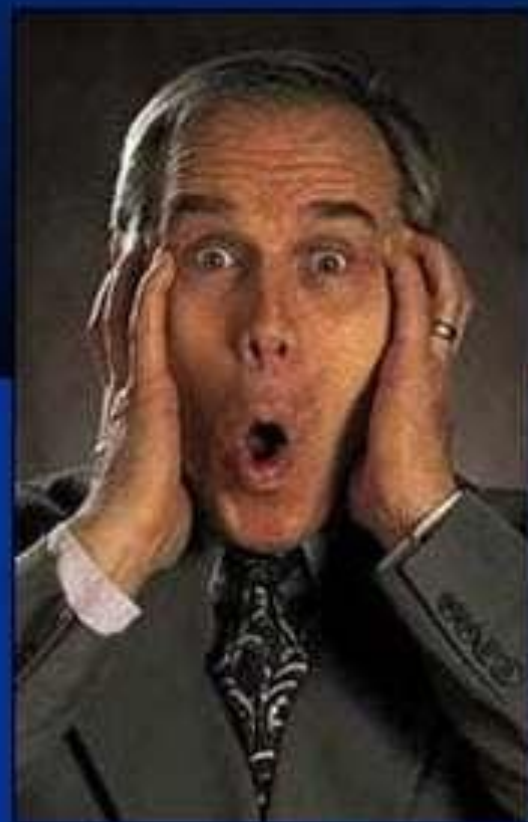


Figure 21—5. Structure and physiology of the adrenal cortex.



Steroids produced by the :Adrenals

1. Aldosterone
2. Cortisol
3. Epinephrine (Adrenaline)
4. Androgen



Aldosterone

- Target Cell:
 - Kidneys!
 - Exocrine Glands
- Effect of Hormone:
 - Maintains balance of Na^+ in the bloodstream
 - ↑ aldosterone → conservation of Na^+

Cortisol

- Produced when ACTH levels are high!
- Act as negative feedback for the pituitary gland
- Converts adipose tissue to glucose!
- Occurs during high stress periods
 - Emotional distress
 - Physical distress (exercise, hemorrhage)



Zona reticularis

- It is the inner layers it is cells secret the gonadocorticoids hormone which are the estrogen and androgen which supplemented the sex hormones

Androgens

- “male” sex hormone
- Converted (mostly) to Testosterone in Males !
- Converted (mostly) to Estrogen in Females!



Adrenal medulla

- The adrenal medulla developed from the neural crest it is formed of group and columns of cells called chromaffin cells
- The chromaffin cells secreted the adrenalin and noradrenalin which they activated the sympathetic stimulation

Chromaffin cell

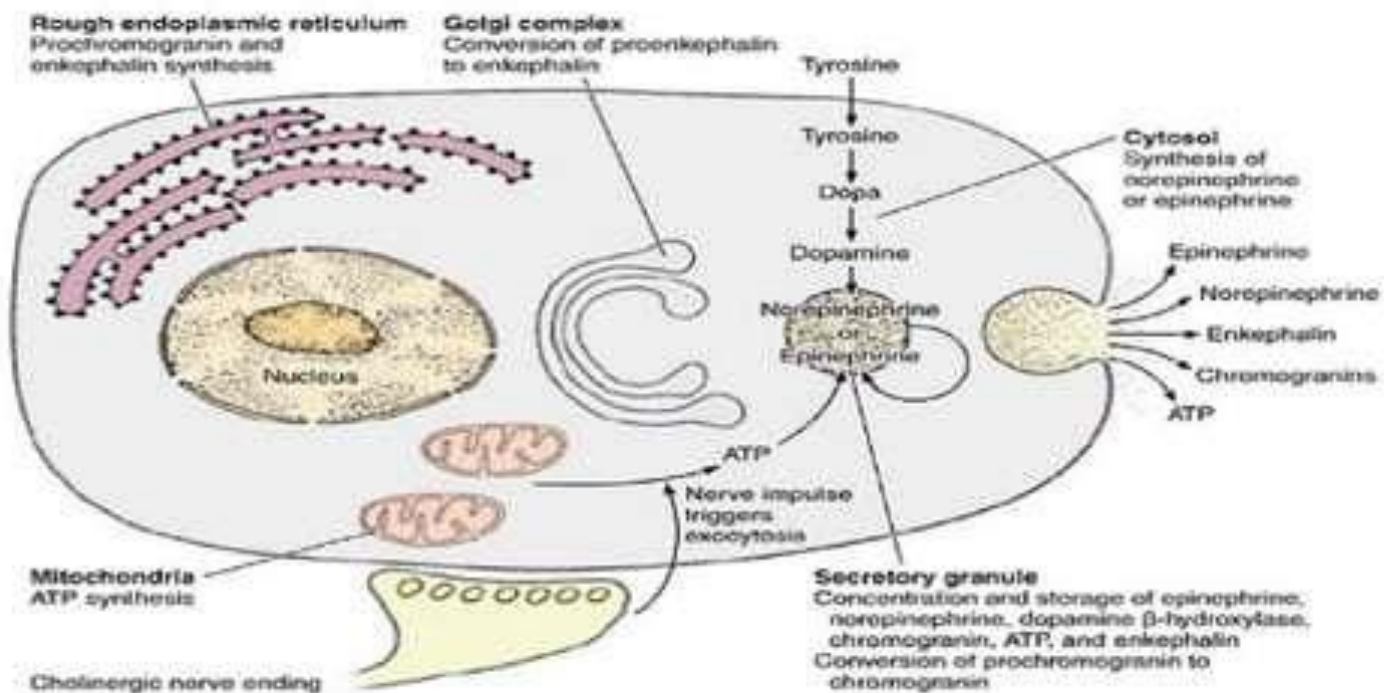





Figure 21—8. Diagram of an adrenal medullary cell showing the role of several organelles in synthesizing the constituents of secretory granules. Synthesis of norepinephrine and conversion to epinephrine take place in the cytosol.



Epinephrine

- Stimulated by Sympathetic Nervous System to initiate “fight or flight” response!
- Stored in adrenal gland until needed!
- Effects of Epinephrine
 -  blood sugar
 -  heart rate
 -  blood flow to brain, heart, muscles

Clinical problems

- Various clinical condition due to the lesion of the adrenal cortex or medulla affect the secretion of the adrenal hormone hyper secretion of the hormones of the adrenal cortex result in Cushing syndrome which characterized by redistribution of fat the spindle limbs, swollen face, diabetes mellitus and slow of wound healing the
- Hypo secretion cause the Addison disease which is characterized by weight loss muscular weakness and hypoglycemia, low blood pressure and dehydration
- The hypo secretion of gonad corticoids cause condition called adrenogenital syndrome

Thank You