

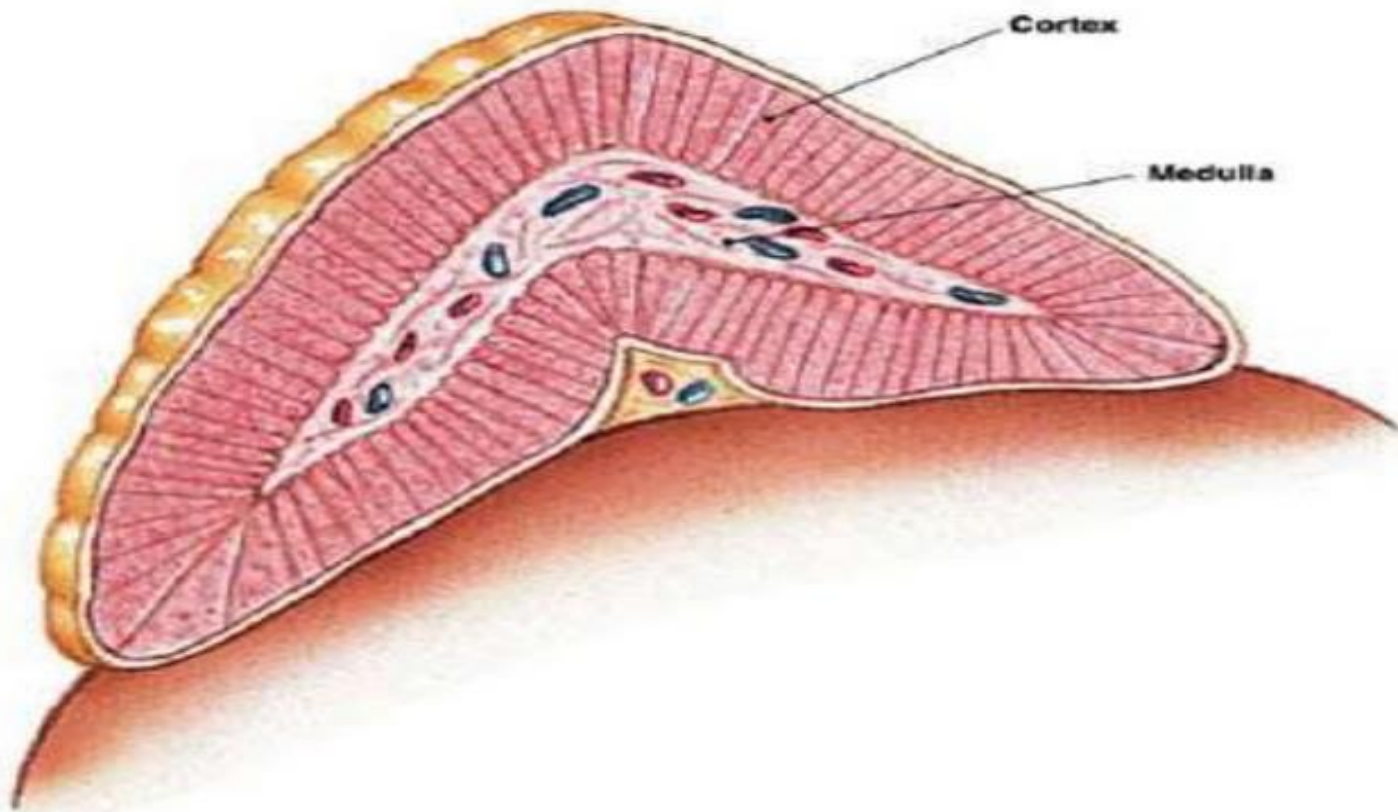
ADRENAL GLANDS

ANATOMY AND HISTOLOGY

DR. VND.(M.D.)

ANATOMY

Adrenal



Anatomy was first described in 1563

They are paired retroperitoneal organs composed of a cortex and medulla

Contained in its own sub-compartment within Gerota's fascia

Gross examination reveals

- Cortex = spiculated, mustard yellow colour
- Medulla = central, brown colour

Weight ~ 4 - 5 g each

Size

- Length = 4 - 6 cm
- Width = 2 - 3 cm

Right adrenal gland is triangular in shape

Left adrenal gland is crescent shaped

They may sit either immediately superior to kidney, "capping" the upper pole, or superio-medially to upper pole, "cradled" by kidney just above renal vessels.

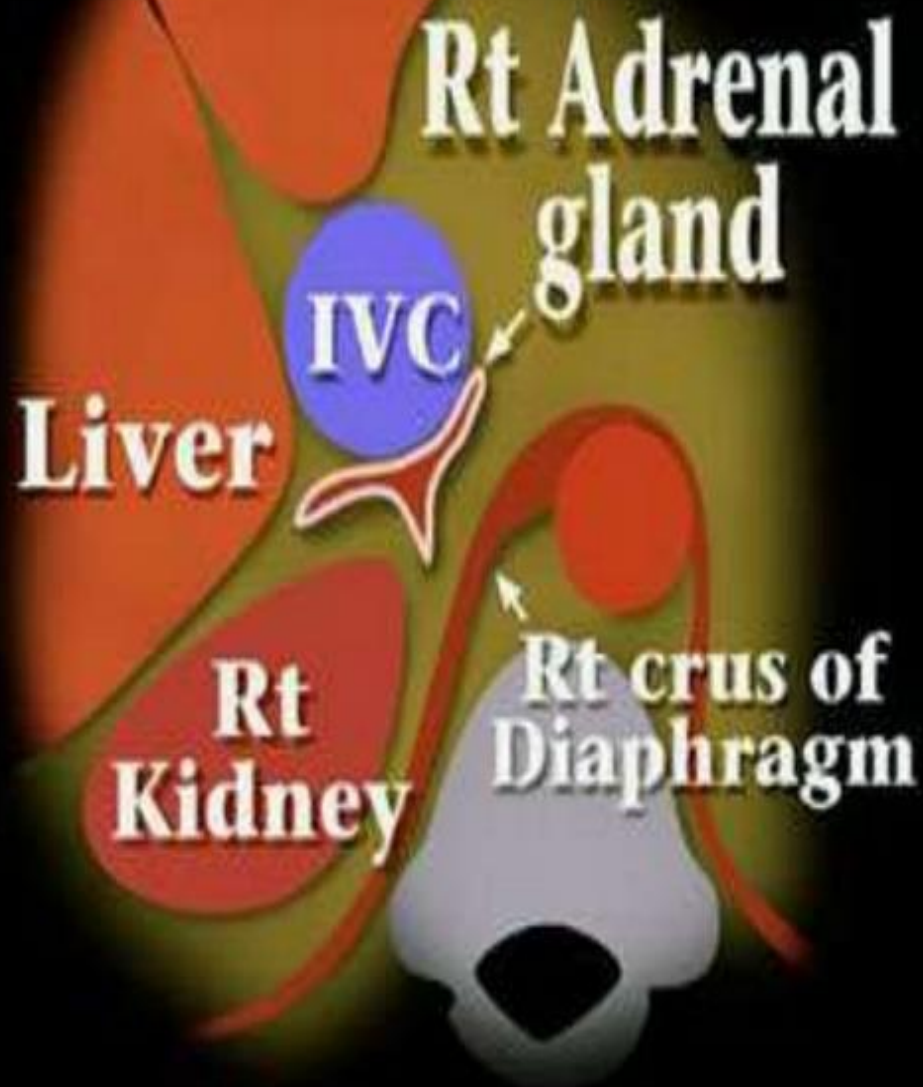
Relations

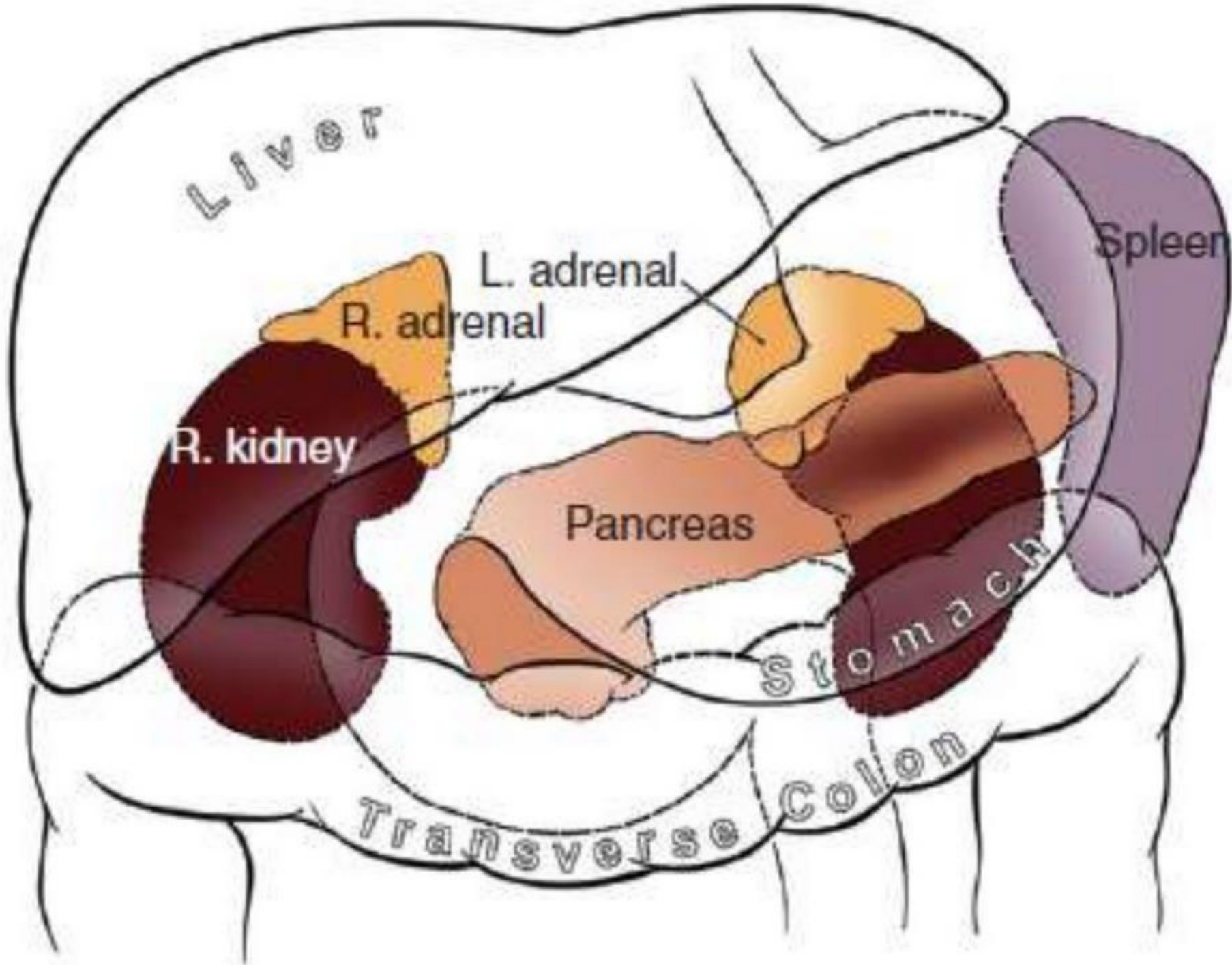
- ❑ Located within Gerota fascia at level of 11th and 12th ribs
- ❑ Gerota's fascia connects them to upper pole of kidney
- ❑ Located cephalad to upper pole of kidneys and anterior to crus of diaphragm
- ❑ The right adrenal gland tends to lie more cephalad than the left adrenal gland
- ❑ Right adrenal is bounded
 - ❑ Anteriorly = Liver
 - ❑ Posterior = Diaphragm
 - ❑ Superior = Diaphragm
 - ❑ Inferio-laterally = Right Kidney
 - ❑ Medially = IVC
 - ❑ Medial aspect of the gland is often retrocaval
 - ❑ Right adrenal vein enters IVC in a posterolateral position

Left adrenal gland is bounded

- Anteriorly = Stomach, Pancreas (Body), Splenic Vessels
- Posteriorly = Diaphragm
- Superiorly = Spleen
- Inferiorly = Kidney
- Medially = Aorta
- Left adrenal is more elongated than right and will lie in a more superomedial position to the kidney. This tends to place the gland closer to the left renal hilum and these structures must be accounted for during dissection.

Close juxtaposition of these organs to adrenal explains why lesions of adjacent organs, such as leiomyomas of greater curvature of stomach, may be confused for an adrenal mass.





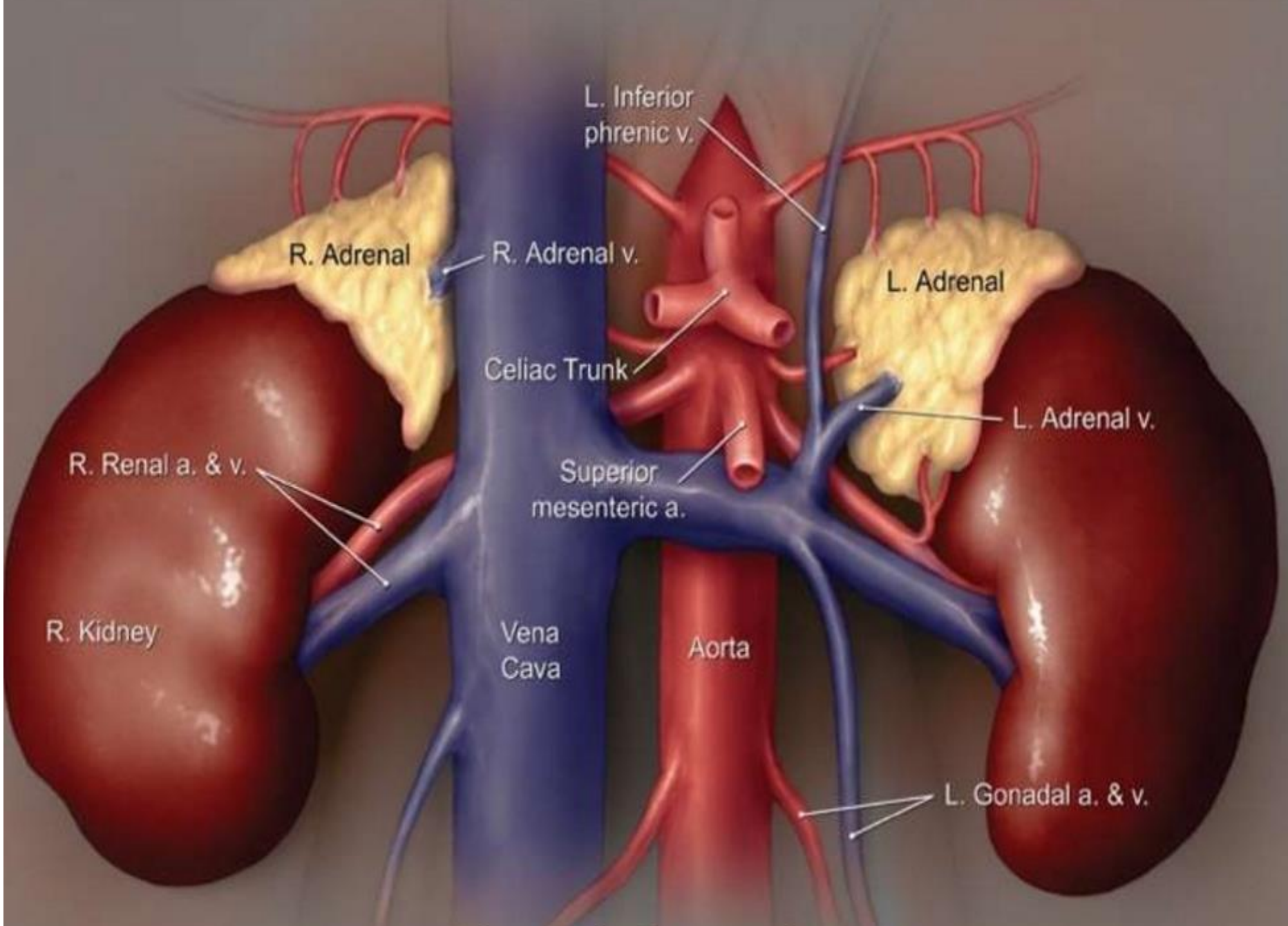
Blood supply

Arterial Supply

- Receives blood @ 7cc/gm/min
- 3 arterial sources of flow: (**IPS-ARMI**)
 - ▣ Branches from **Inferior Phrenic Artery** → **Superior Adrenal A.**
 - ▣ Direct visceral branches from **Aorta** → **Middle Adrenal A.**
 - ▣ Branches from I/L **Renal Artery** → **Inferior Adrenal A.**
- The main adrenal arteries → branch to form a subcapsular plexus
- From subcapsular plexus
 - ▣ Some branches continue directly → to medulla
 - ▣ Others form sinusoids → to cortex

Venous Drainage:

- Medullary veins coalesce to form adrenal vein
- Adrenal vein is surrounded by medullary tissue within the gland.
- Single main vein on each side
- Most important surgical structure
- Right adrenal vein
 - Short
 - Drains directly into post IVC
- Left adrenal vein
 - Long as compared to right adrenal vein
 - Joined by Inferior Phrenic vein prior to draining into Left Renal Vein
- The overlapping of both arterial and venous anatomy makes partial adrenalectomy possible with little risk of subsequent adrenal infarction



L. Inferior
phrenic v.

R. Adrenal

R. Adrenal v.

L. Adrenal

L. Adrenal v.

Celiac Trunk

Superior
mesenteric a.

R. Renal a. & v.

Vena
Cava

Aorta

R. Kidney

L. Gonadal a. & v.

Blood Supply

Nerve Supply

- Sympathetic

- ▣ Medulla

- Preganglionic sympathetic fibers from sympathetic trunk directly to chromaffin cells

- ▣ Cortex

- Postganglionic fibers from splanchnic ganglia

- Parasympathetic to adrenal cortex and medulla

- ▣ Not well defined

- ▣ Branches from Vagus nerve **may be** present

Lymphatics

- Right → Para-caval Lymph Nodes
- Left → Para-aortic Lymph Nodes
- ?lateral aortic

Is divided into 3 zones in the adult gland:

- ▣ Zona Glomerulosa
- ▣ Zona Fasciculata
- ▣ Zona Reticularis

Is divided onto 4 zones in the fetal gland:

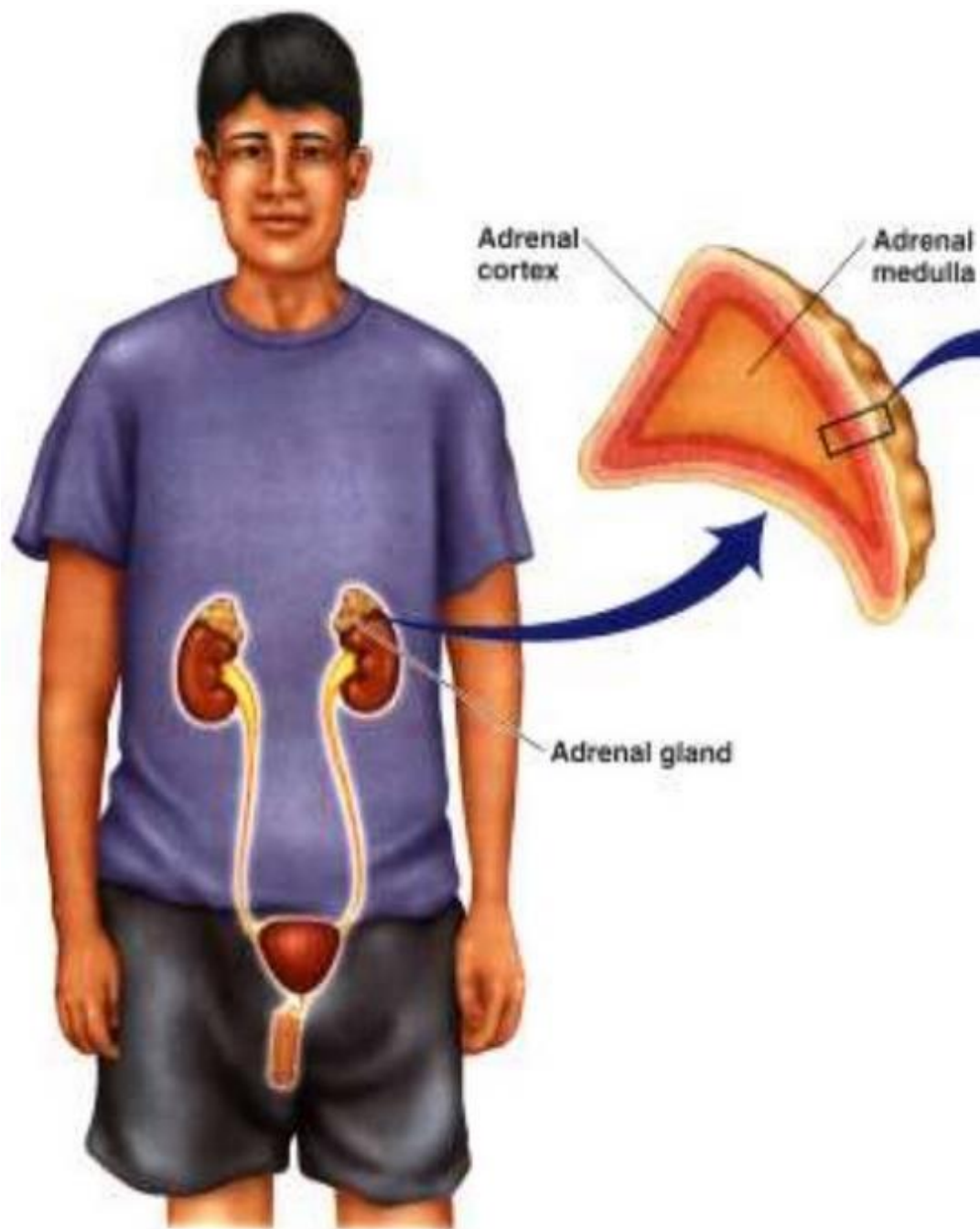
- ▣ The three zones of the permanent adult cortex constitutes only 20% of the fetal gland's size.
- ▣ The remaining zone (fetal cortex) comprises up to 80% of gland's size during fetal life.

- Each adrenal gland is enclosed within a fibrous capsule
- Directly beneath the capsule is the cortex, which comprises three zones:
 - Zona Glomerulosa (Outermost Layer)
 - Small polyhedral cells with scant eosinophilic cytoplasm and dark round nuclei.
 - Zona Fasciculata
 - Broad layer of large pale cells arranged in vertical columns beneath glomerulosa
- Zona Reticularis (Innermost layer)
 - Round dark staining cells

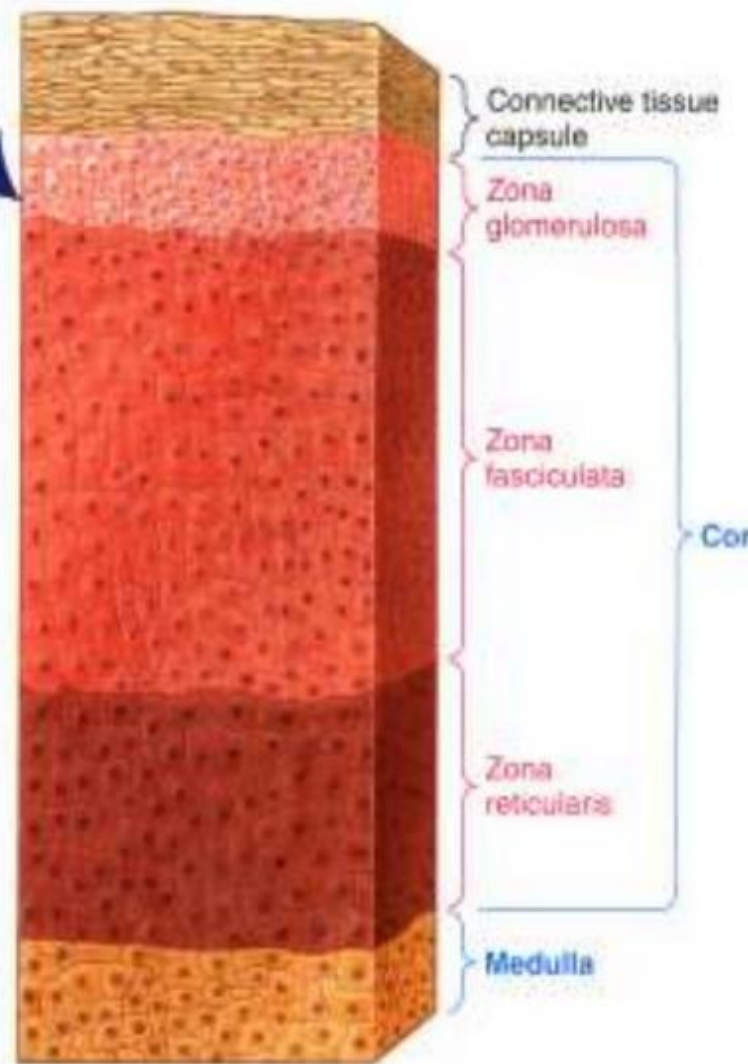
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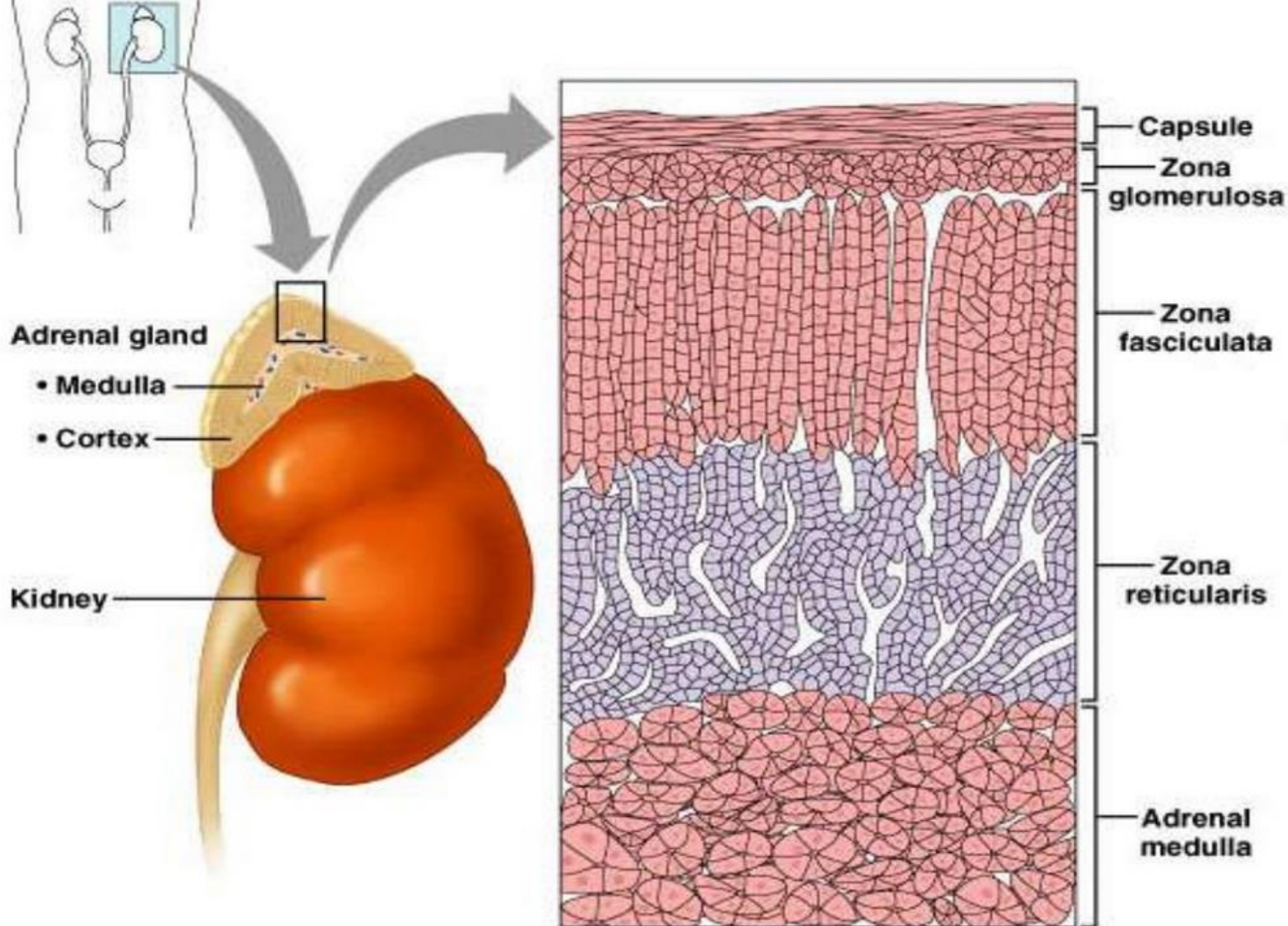
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(a)



(b)



(a)

Adrenal Histology

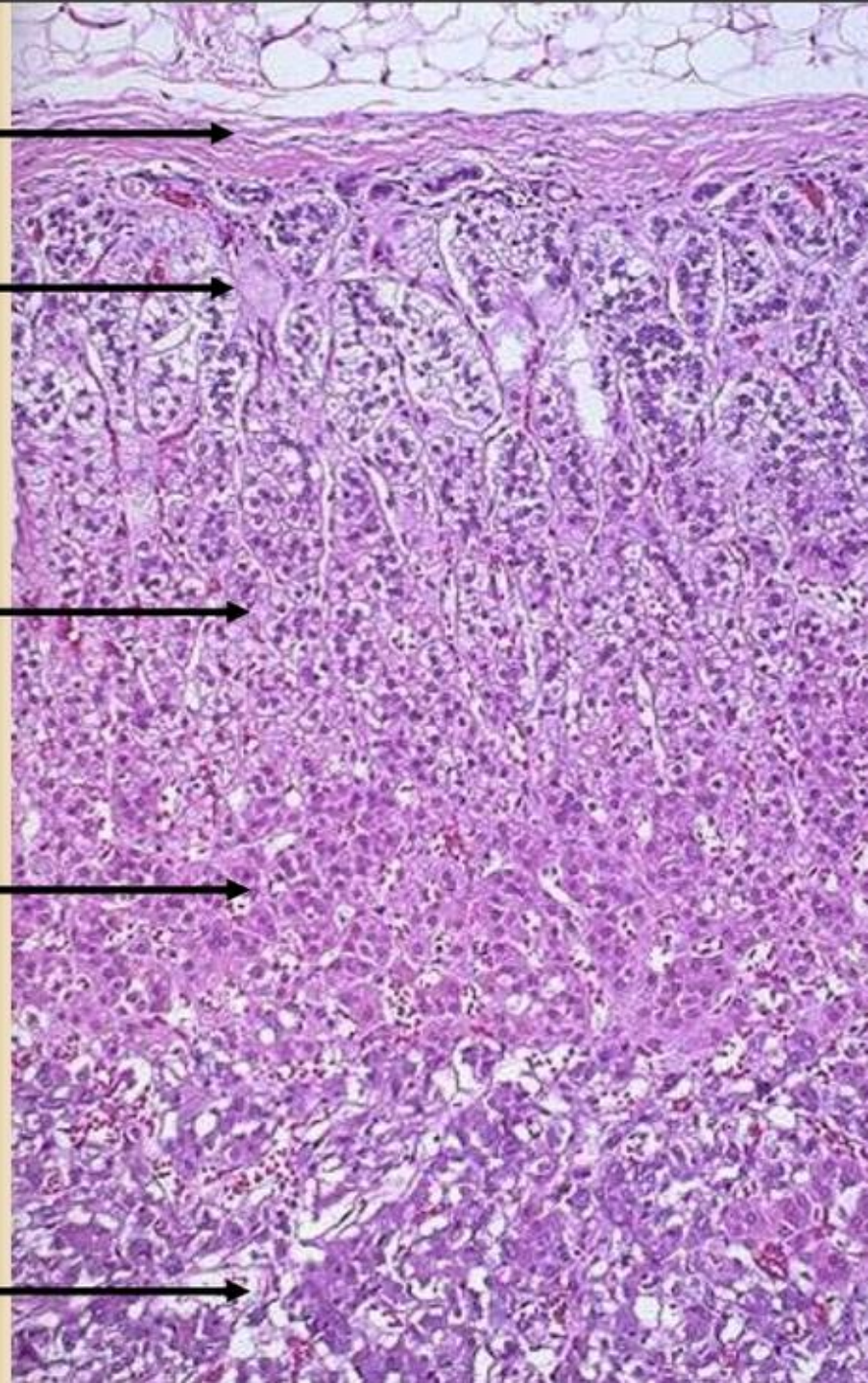
Capsule

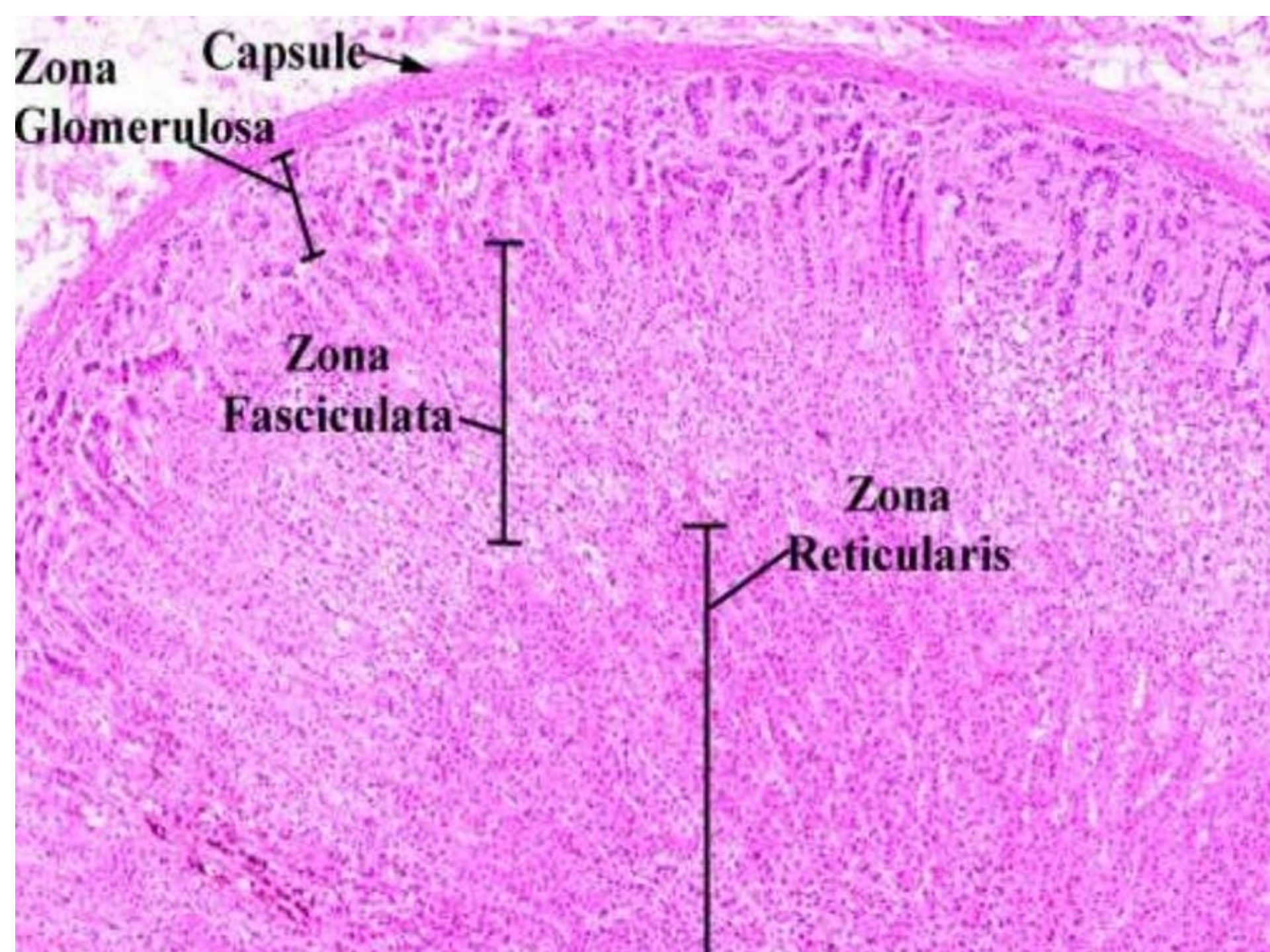
Glomerulosa

Fasiculata

Reticularis

Medulla





Zona
Capsule
Glomerulosa

Zona
Fasciculata

Zona
Reticularis

Layers of Adrenal Gland

