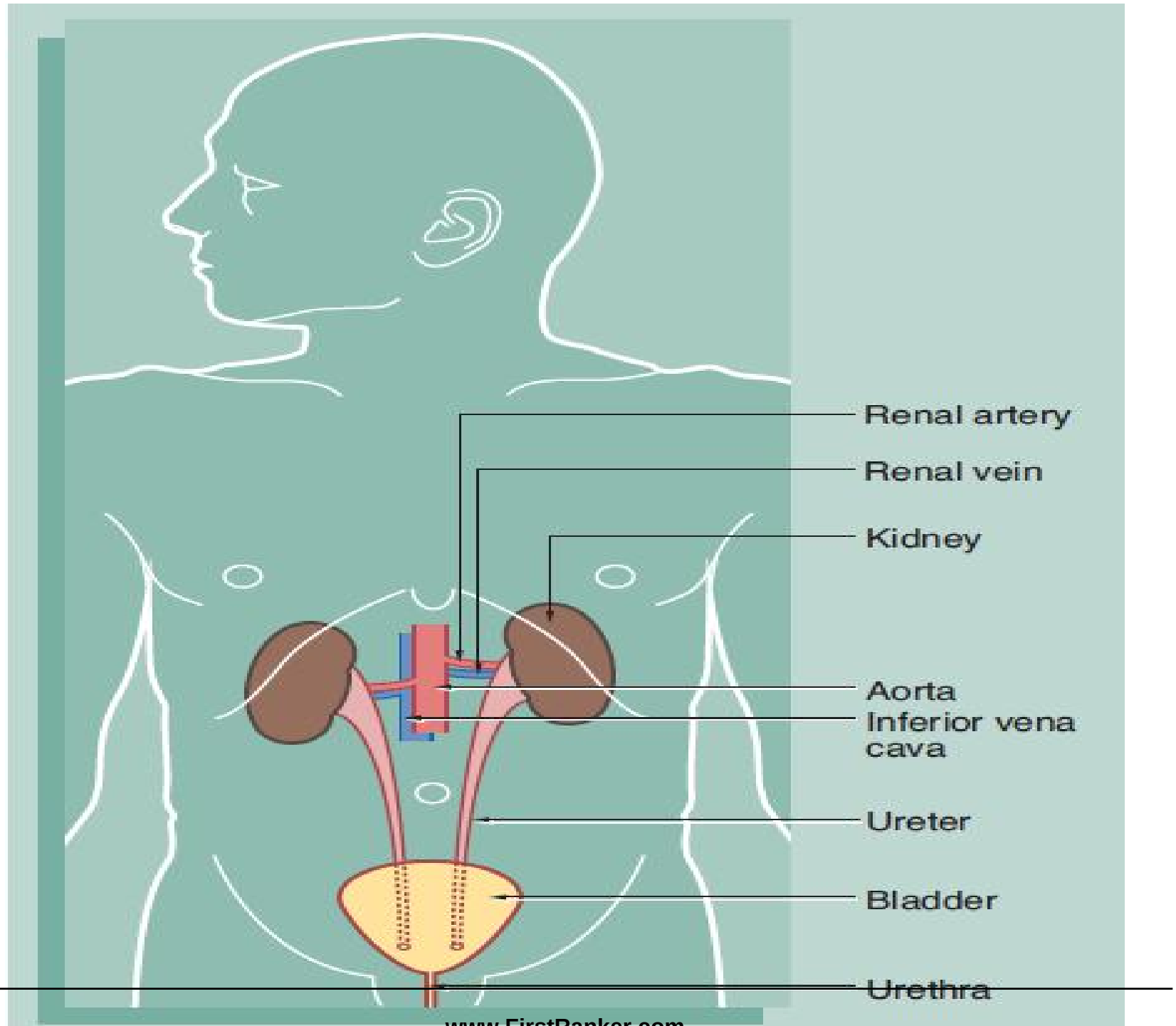
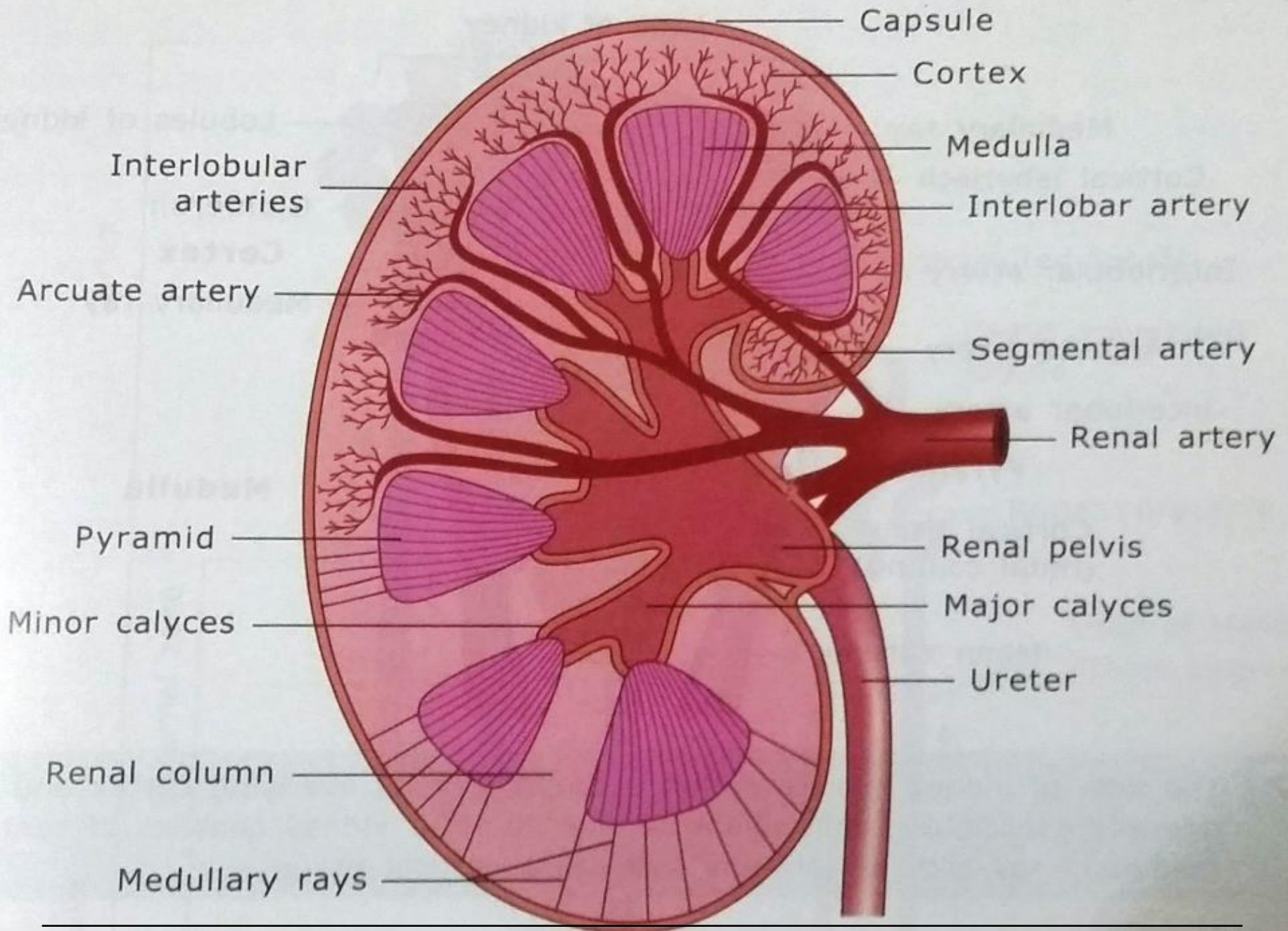


URINARY SYSTEM

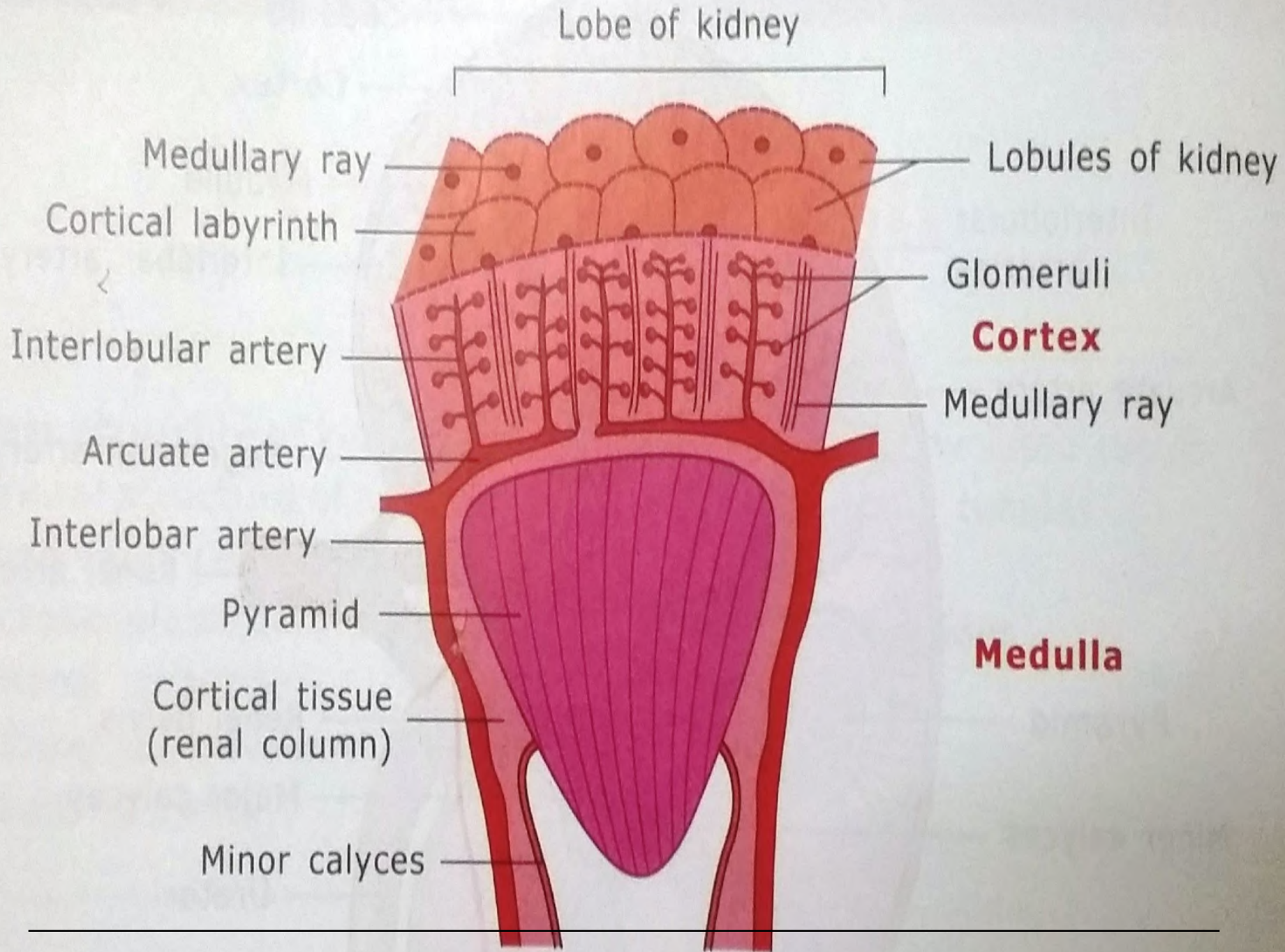


GROSS STRUCTURE OF KIDNEY

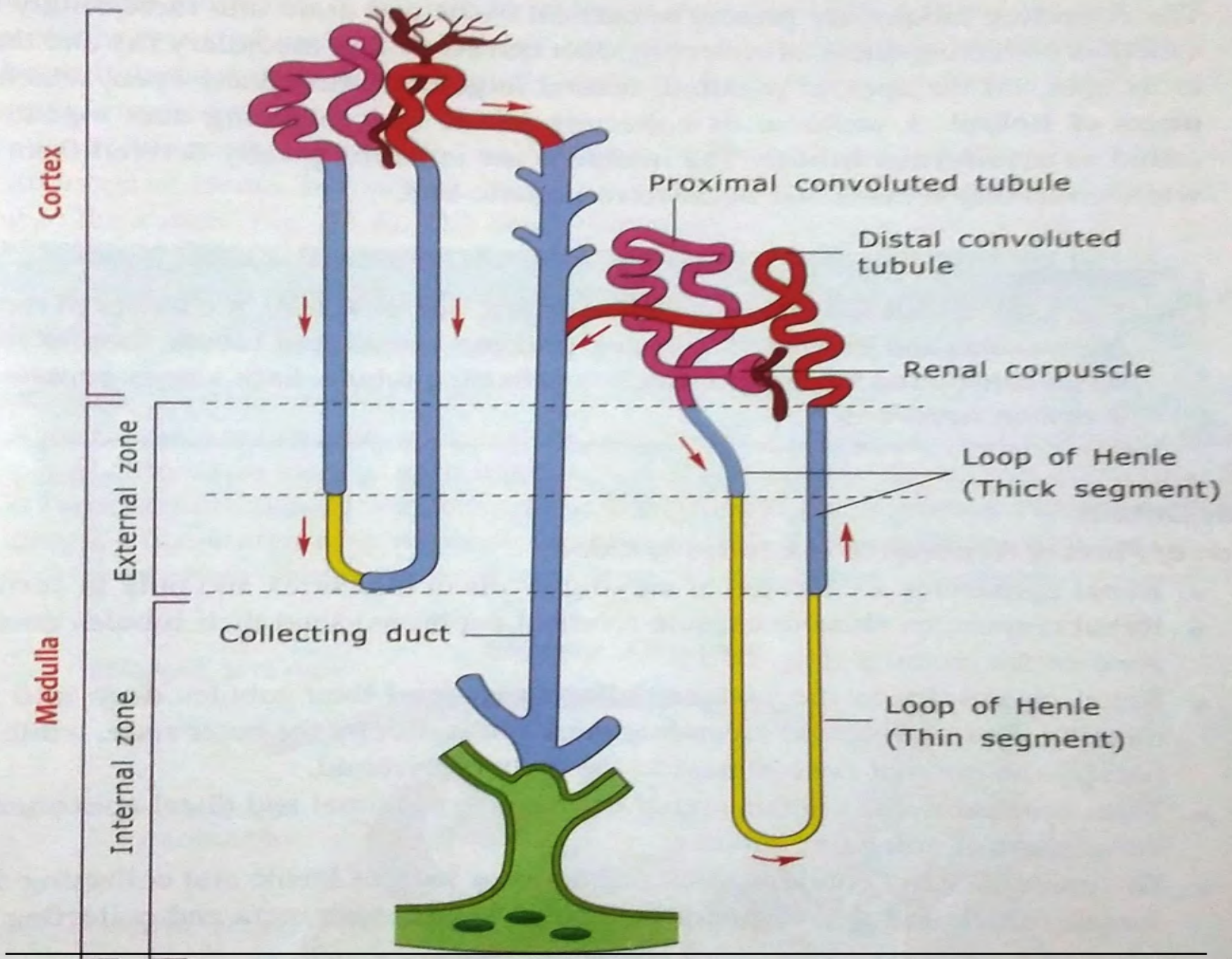
- Hemisection of kidney shows—
- **Cortex**—outer
- **Medulla**—inner
- ▶ **Pyramids** -- the triangular-shaped divisions (8-12) of the medulla
- ▶ **Papilla** -- narrow, innermost tip of the pyramid;
- **Calyx**—*minor* (8-12) and *major* (2-3) calyces.
- **Pelvis** --Renal pelvis is an extension of the upper end of the ureter.



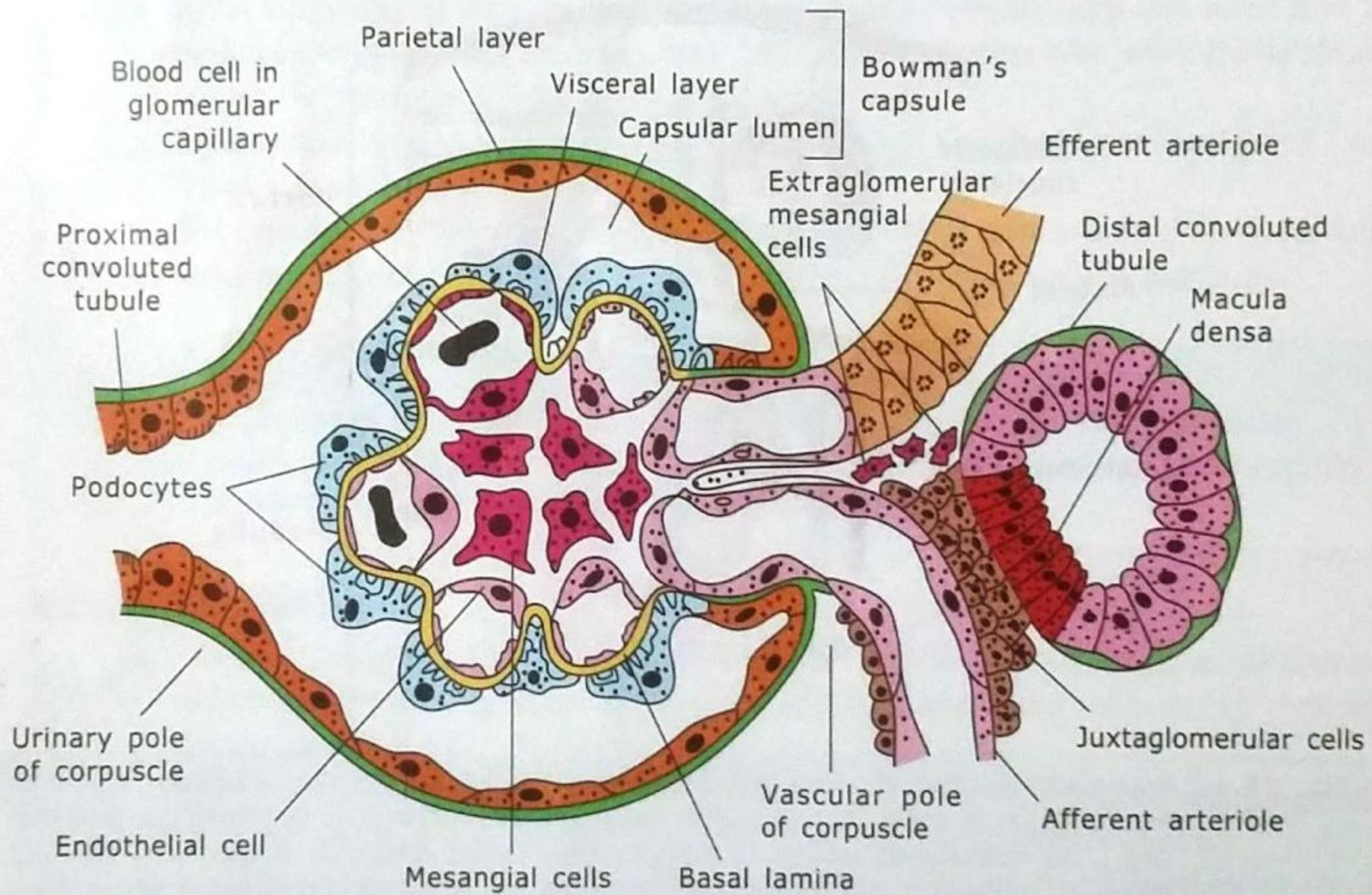
- ***Renal columns***—Cortex at the margin of each pyramid extends inward.
- ***Medullary rays***—Collection of straight tubules and collecting ducts extending in cortex.
- ***Lobes of kidney***—Renal pyramid with its overlying cortex and renal columns.
- ***Kidney lobule***—Centrally placed medullary ray with its laterally placed cortical area.
- **Kidney lobules = medullary rays = 20,000**
- Cortex of kidney consists of ***2-3 million tubular structure called nephrons.***



- ***NEPHRONS—***
- Functional unit of kidney
- ***Cortical nephron***—located in the **cortex**
- ***Juxtamedullary nephron***—located in the **corticomedullary junction**
- **Parts—**
- ***Renal corpuscles***
- ***Proximal convoluted tubules***
- ***Loop of Henle***
- ***Distal convoluted tubules***

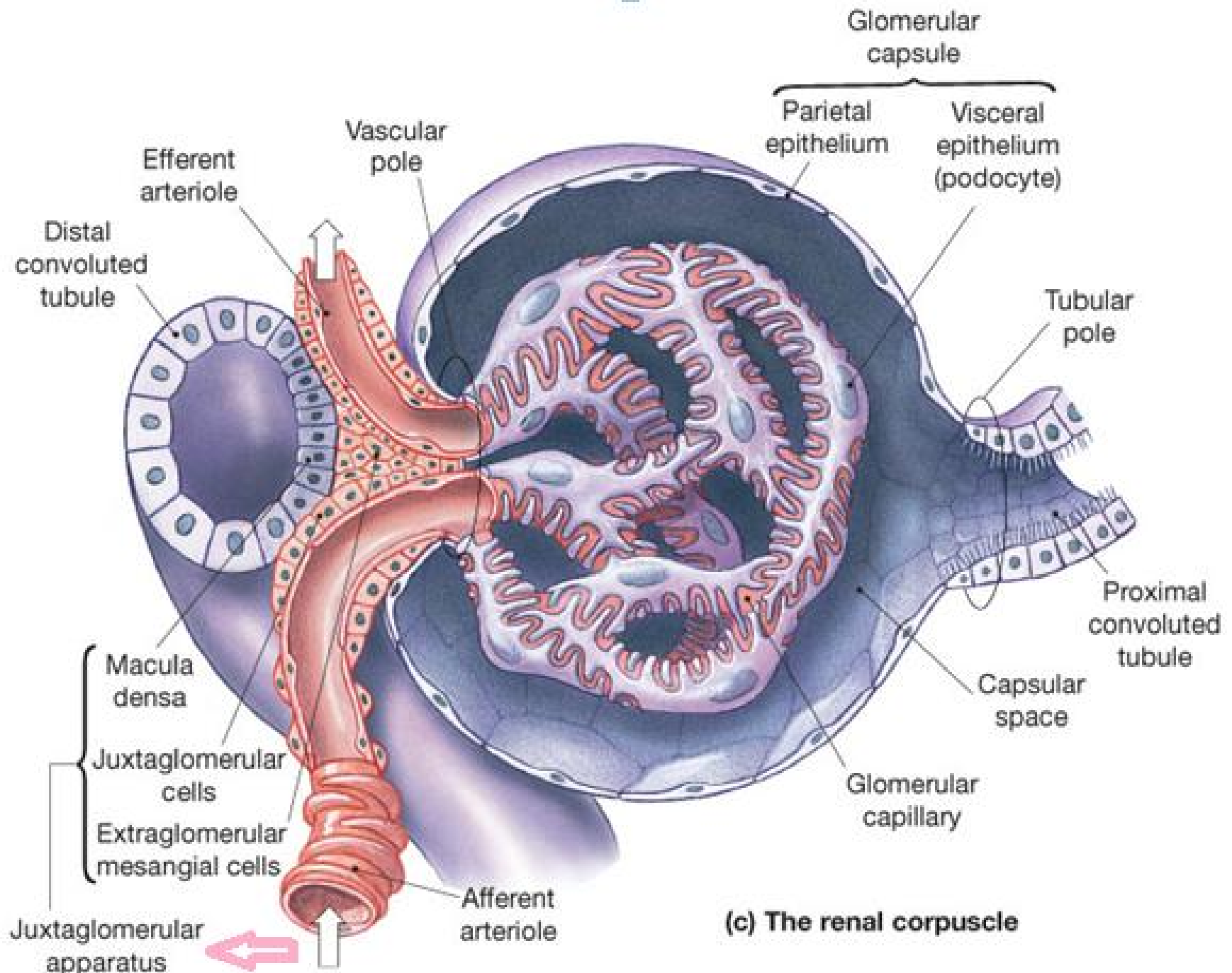


- ***RENAL CORPUSCLE (Malpighian Corpuscle)***
- *Glomeruli surrounded by Bowman's capsules*
- **Bowman's capsule** -- the cup-shaped top of a nephron. It is the sack-like that surrounds the glomerulus.
- **Glomerulus** -- a network of blood capillaries (afferent & efferent arteriole) tucked into Bowman's capsule.
- Renal corpuscles has two poles— *vascular pole* and *urinary pole*

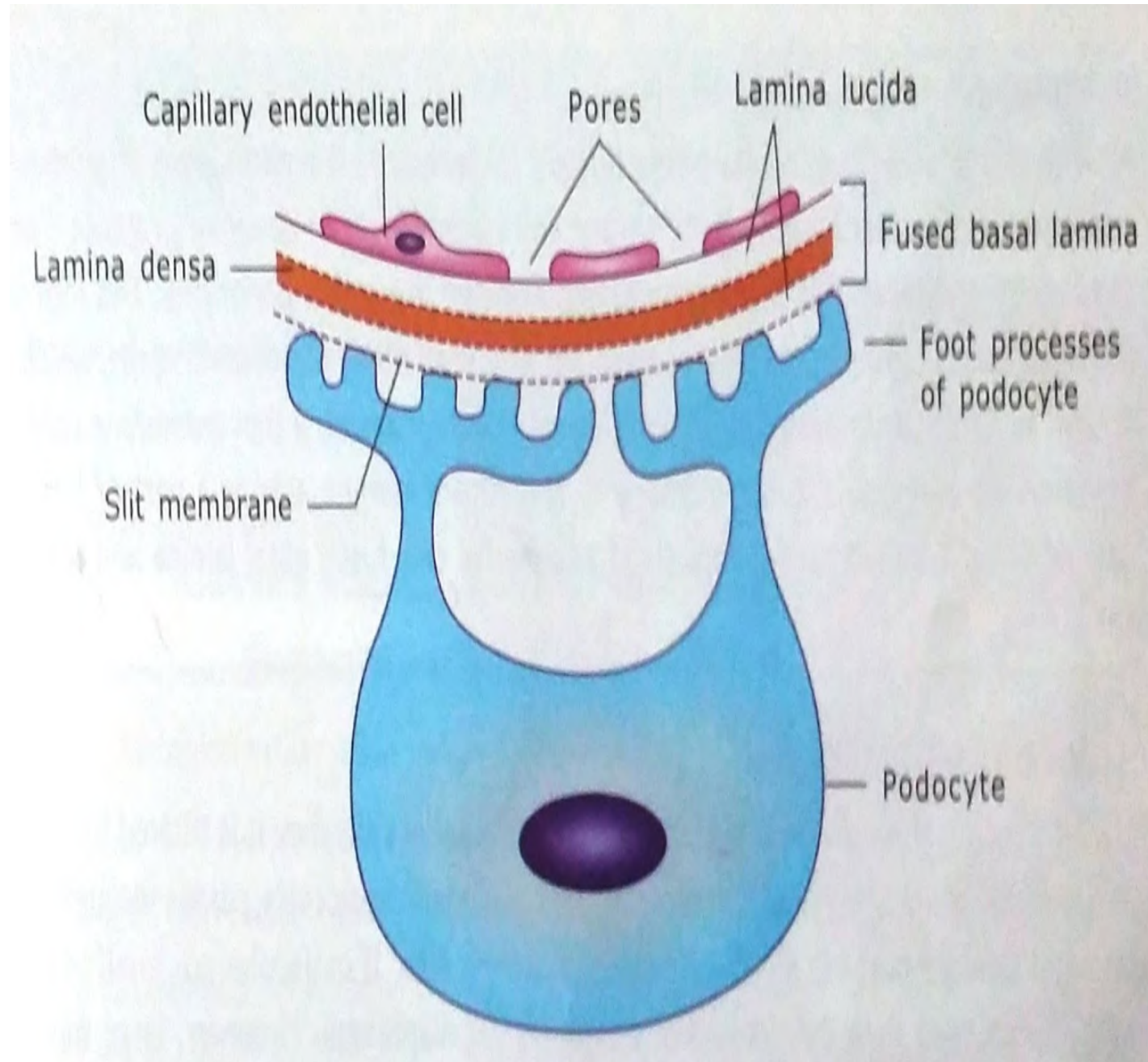


- ***Juxtaglomerular Apparatus***
- Present near the vascular pole of renal corpuscle.
- There are three cellular components of the apparatus which are the—
 - 1. Macula densa***
 - 2. Extra mesangial cells***
 - 3. Juxtaglomerular cells***

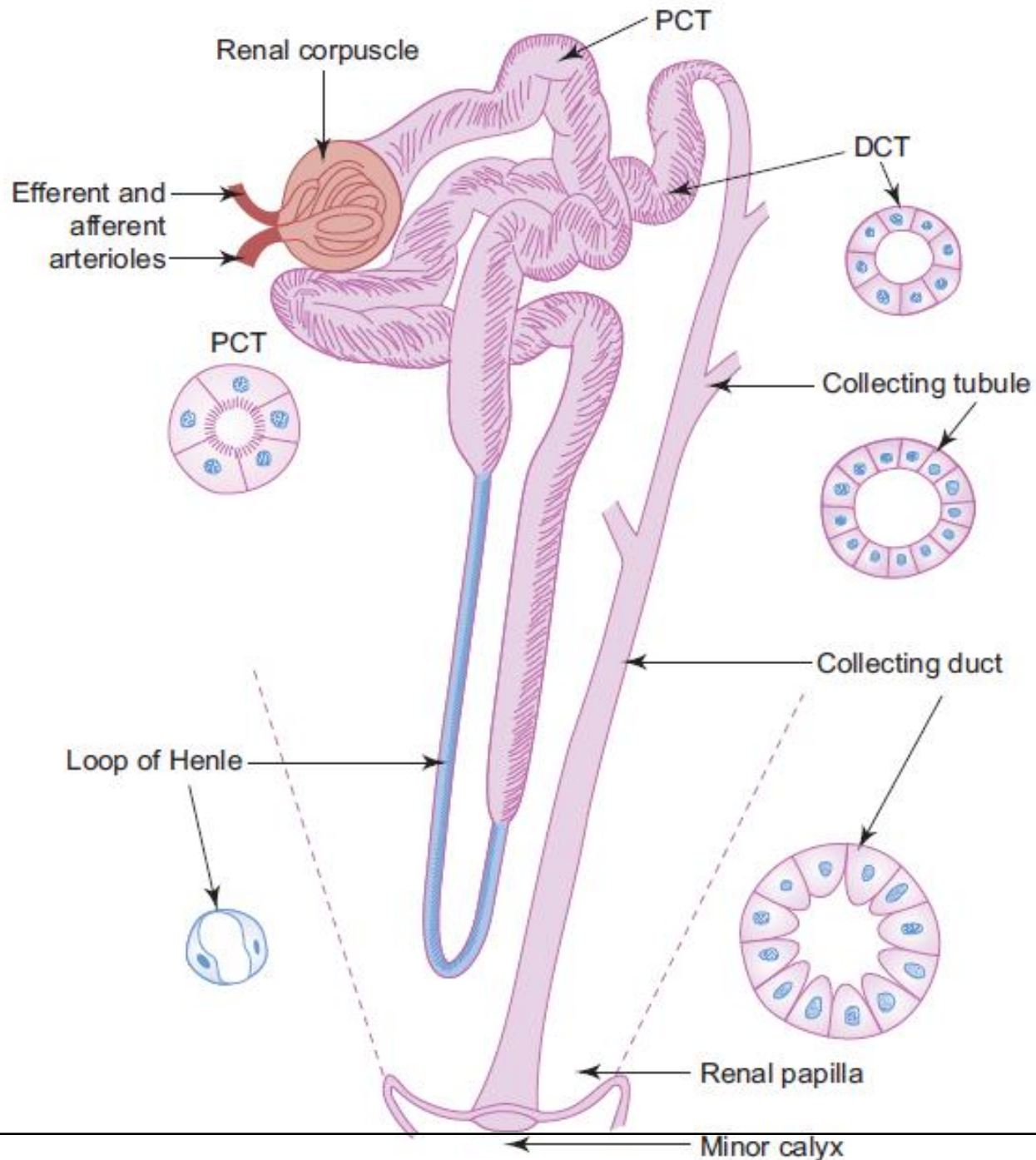
- **Macula densa** → Specialized cells in the beginning of DCT that lie adjacent to afferent and efferent arterioles.
- **Extra mesangial cells** → Present in the space between distal tubule, afferent and efferent arterioles.
- **Juxtaglomerular cells** → modification of smooth muscle cells in the wall of afferent arteriole which lie close to macula densa.

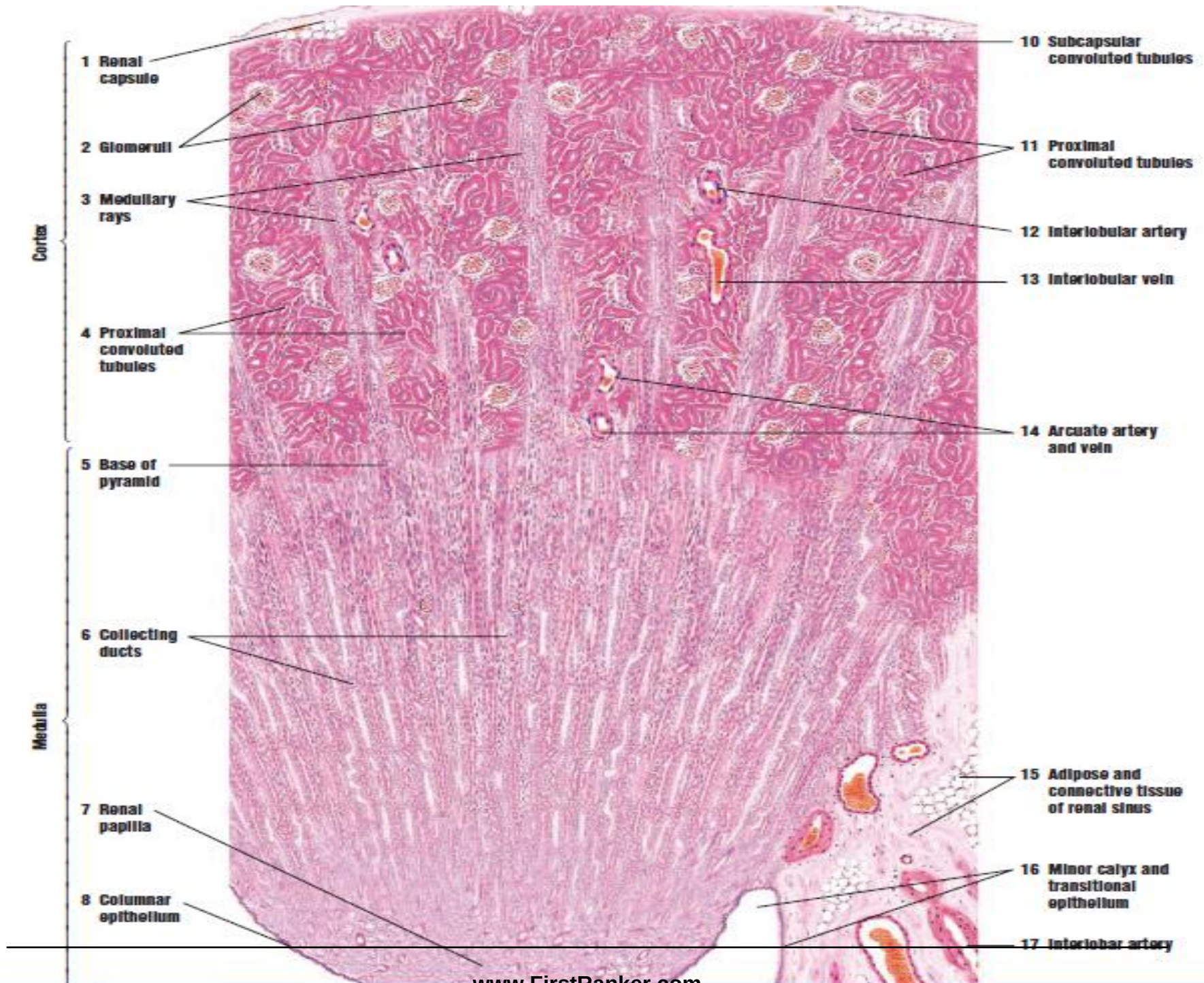


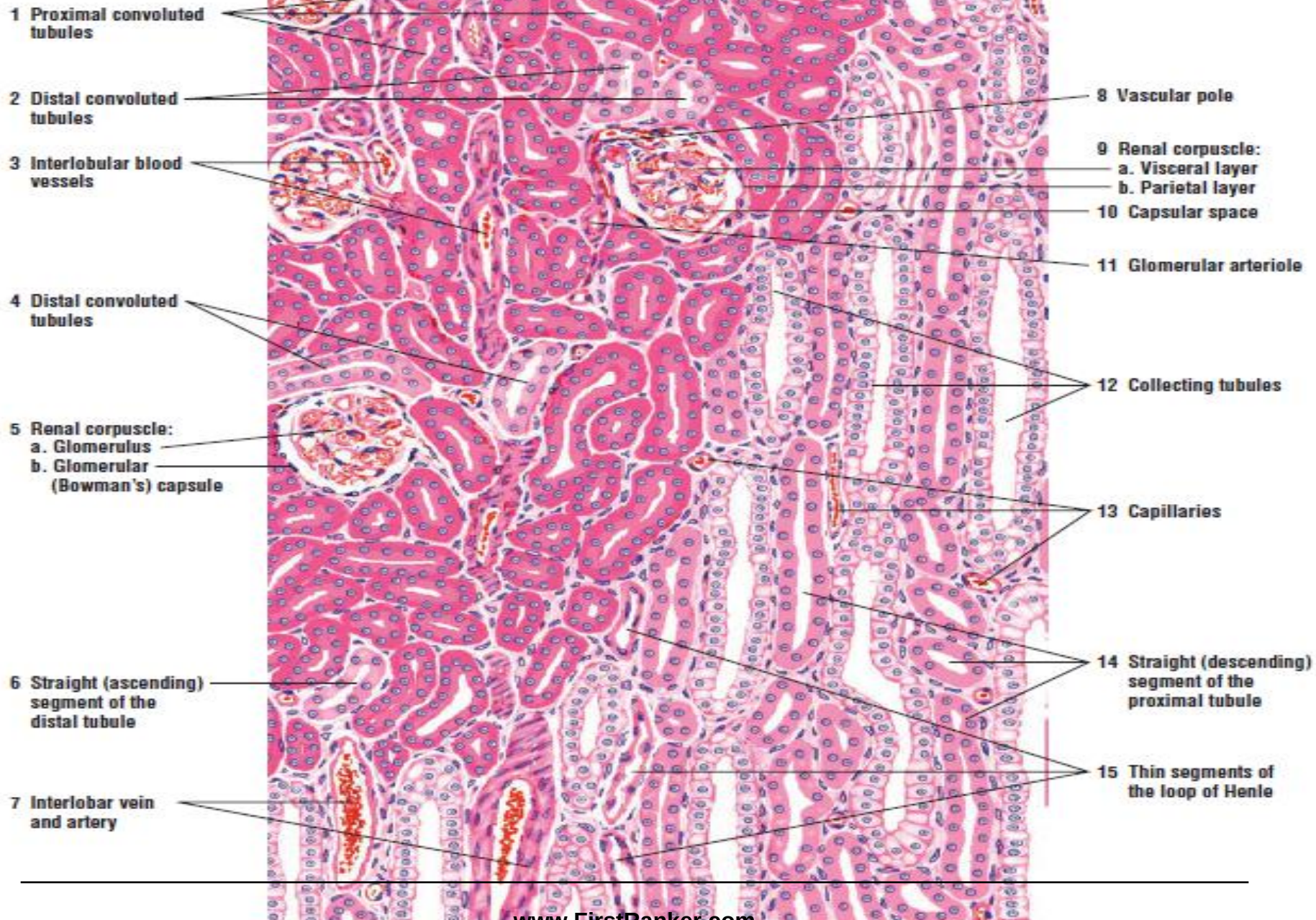
- **Glomerular filtration barrier—**
- **Endothelial cells**
- **Fused basal lamina**
- **Filtration slit**



- **Bowman's capsule**
 - Cells of the outer or parietal layer--**simple squamous epithelium.**
 - Cells of the inner layer or visceral layer--**podocytes**
- **Proximal convoluted tubule**— **Simple cuboidal epithelium with brush border**
- **Loop of henle**—
 - Descending limb* (**thick & thin**)
 - Ascending limb* (**thin & thick**)
- **Thin segment** lined by **simple squamous epithelium**
- **Distal convoluted tubule**— **simple cuboidal** (no brush border)
- **Collecting tubules and ducts**— **simple cuboidal epithelium**

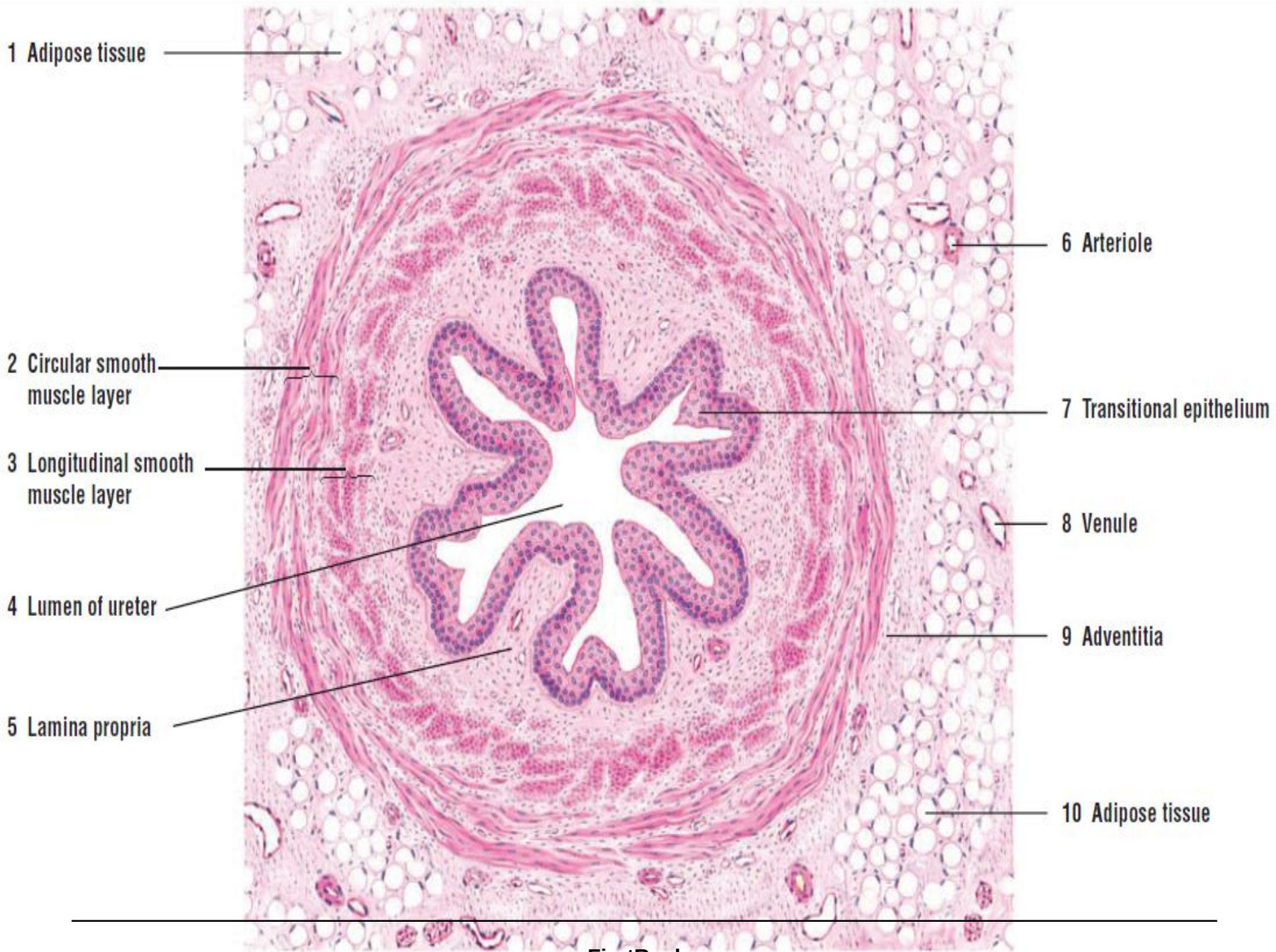






URETER

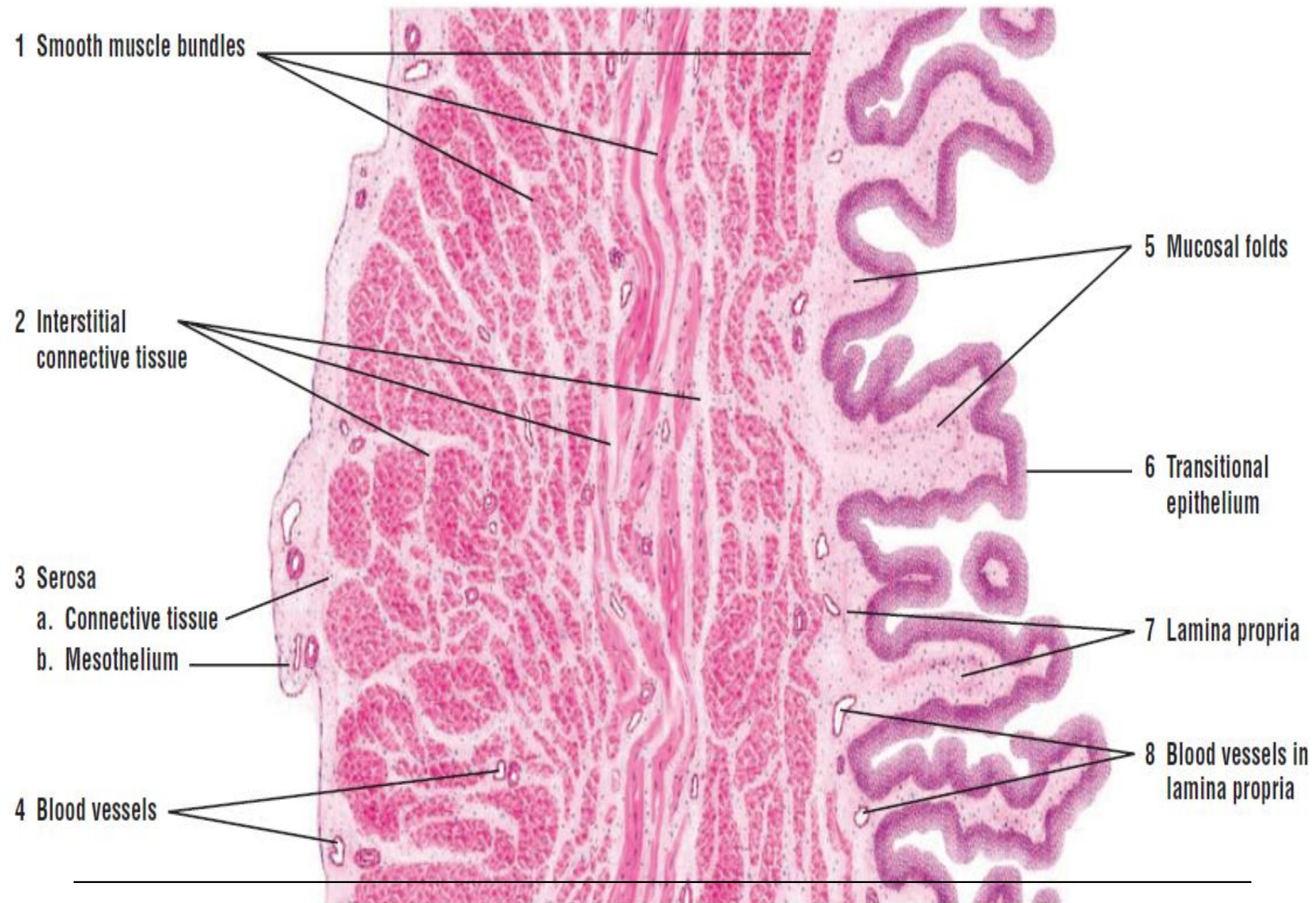
- *Tube like* structure with *star shaped lumen*.
- Conduct urine from renal pelvis to urinary bladder.
- **Layers of ureter—**
 - ***Mucosa***
 - ***Muscular layer***
 - ***Adventitia***



- **Mucosa—**
 - Lining epithelium— *transitional epithelium*
 - Lamina propria—loose connective tissue
- **Muscular layer—**
 - Inner *longitudinal* smooth muscle
 - Outer *circular* smooth muscle
 - Third outer layer of *longitudinal* (middle & lower part)
- Adventitia—loose connective tissue contains blood vessels and nerves

URINARY BLADDER

- Layers in the wall of urinary bladder—
- **Mucosa—transitional epithelium**
- **Muscular layer—thick** , smooth muscles fibres (transverse, longitudinal and oblique)
- **Serosa/adventitia**



SELF-ASSESSMENT

(DIGESTIVE SYSTEM)

1. All are true about esophagus EXCEPT

- a. Lined by stratified squamous epithelium
- b. Mucosa is thick
- c. Middle third contains both skeletal and smooth muscles
- d. Lower third contains only skeletal muscle

2. Chief Cells are found in

- a. Fundus
- b. Pit
- c. Neck
- d. Body

3. Gallbladder epithelium is

- a. Simple squamous
- b. Simple cuboidal with stereocilia
- c. Simple columnar
- d. Simple columnar with brush border

4. Which of the following does not form portal triad in liver?

- a. Hepatic artery
- b. Hepatic vein
- c. Portal vein
- d. Bile duct

5. Space of Disse is in

- a. Spleen
- b. Liver
- c. Lymph node
- d. Bone

6. Centroacinar cells are present in

- a. Pancreas
- b. Parotid gland
- c. Prostate
- d. None

7. Which of the following structures is ***not lined by stratified squamous epithelium?***

- (a) Oral cavity
- (b) Oesophagus
- (c) Stomach
- (d) Anal canal

8. Meissner's plexus is present in which layer of GIT?

- (a) lamina propria
- (b) submucosa
- (c) muscularis externa
- (d) serosa

9. Which of the following is TRUE regarding portal lobule of the liver?

- (a) It is hexagonal in shape
- (b) Central vein present in the centre
- (c) Bile flow towards the centre of lobule
- (d) all of the above

10. Peyer's patches are present in which of the following?

- (a) Stomach
- (b) duodenum
- (c) Jejunum
- (d) Ileum

- 1.(d) Lower third contains only skeletal muscle**
- 2.(a) Fundus**
- 3.(d) Simple columnar with brush border**
- 4.(b) Hepatic vein**
- 5.(b) Liver**
- 6.(a) Pancreas**
- 7.(c) Stomach**
- 8.(b) Submucosa**
- 9.(c) Bile flow towards the centre of lobule**
- 10.(d) Ileum**