

Histology Team 431



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Kidney

Pyramids are separated by cortical columns of **Bertin = cortical columns**

The base of pyramid is toward the cortex (cortico-medullary border)

The apex (renal papilla) toward the hilum, it is perforated by 12 openings of the ***ducts of Bellini** in region called area cribrosa .

Renal artery

Renal vein

The apex is surrounded by a **minor calyx**.

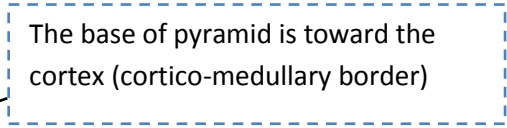
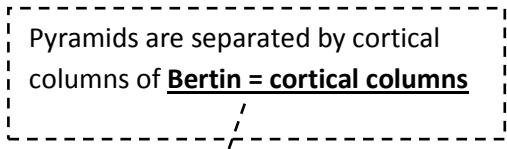
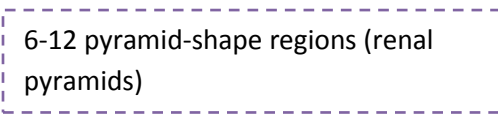
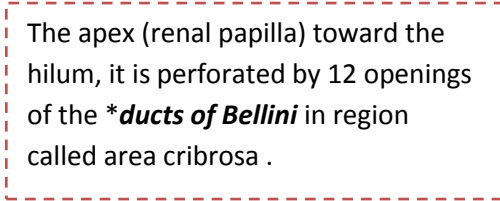
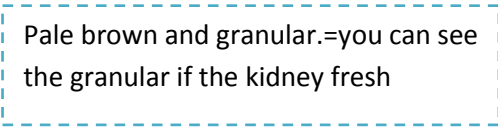
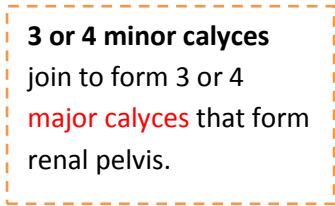
Medulla

6-12 pyramid-shape regions (renal pyramids)

3 or 4 minor calyces join to form 3 or 4 **major calyces** that form renal pelvis.

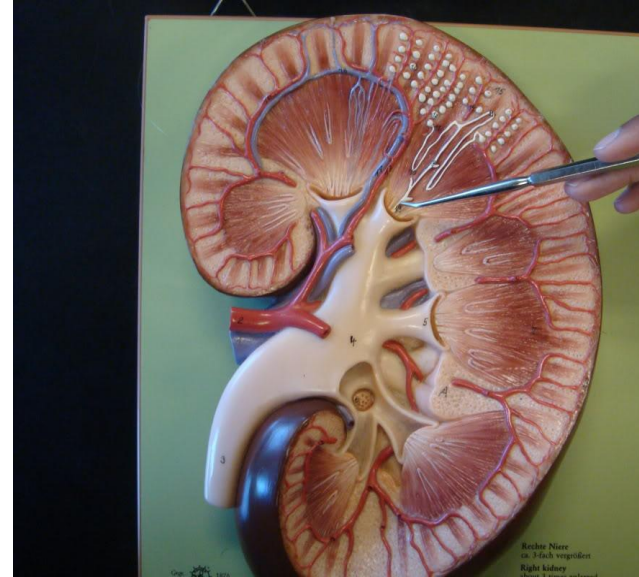
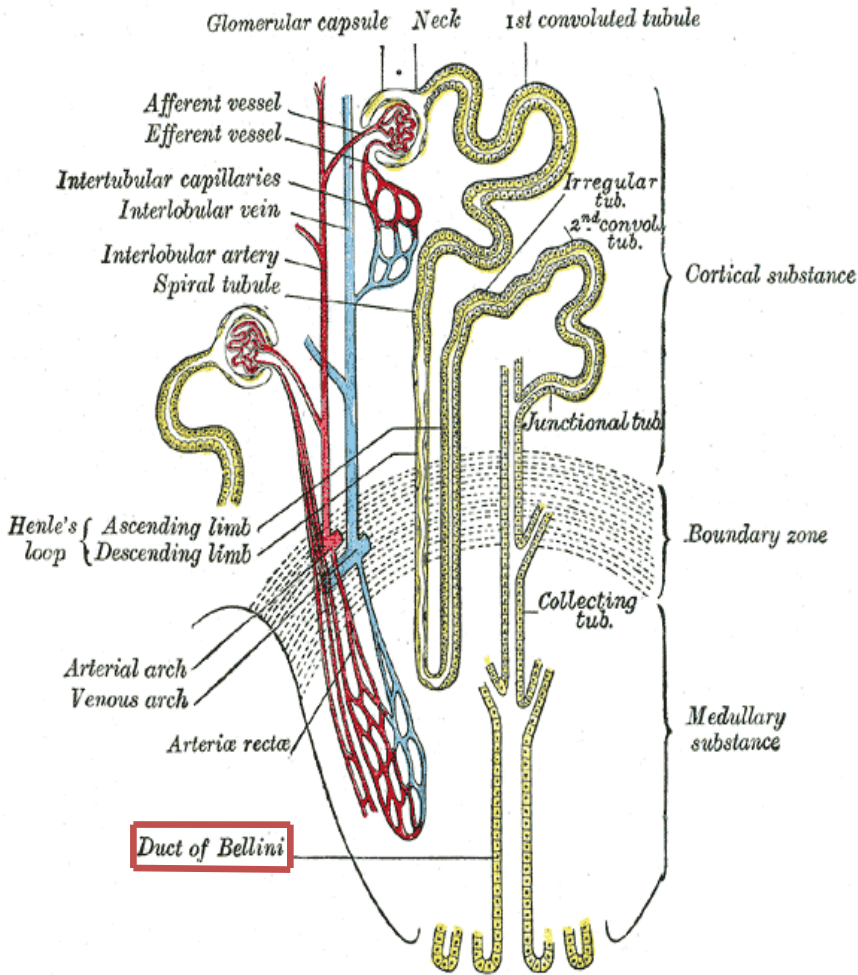
Cortex

Pale brown and granular.=you can see the granular if the kidney fresh



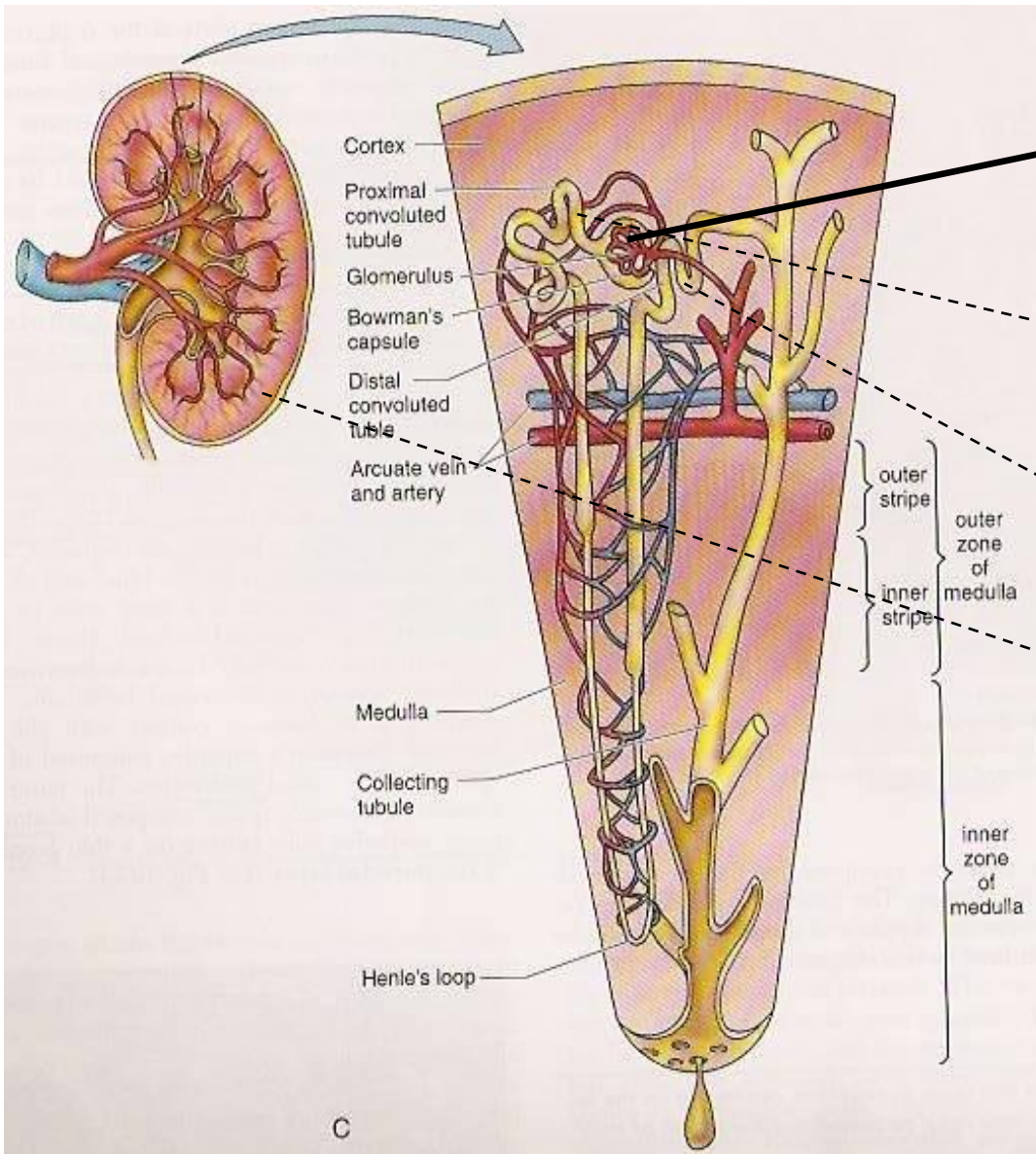
Extra for your information.

The **duct of Bellini** is an anatomical structure of the kidneys, also known as **papillary (collecting) duct**.



Papillary duct

Cortical arch



Renal corpuscles (red dots).

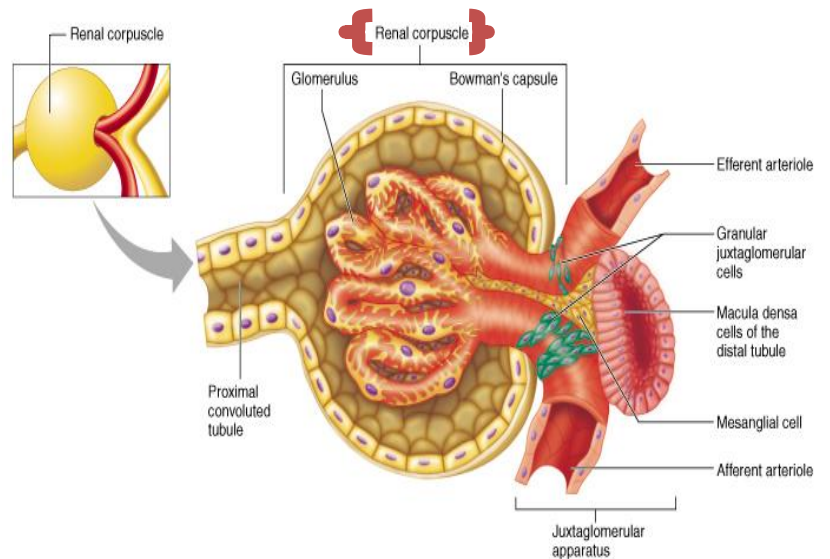
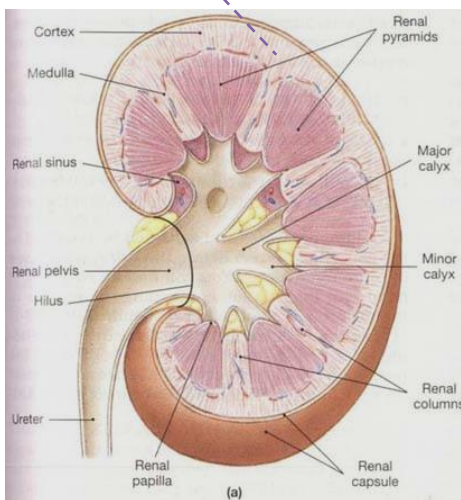
Convolved tubule-Proximal

Convolved tubule-distal

Medullary rays (cortical continuation of pyramids) = white lines

*Cortical arch = The portion of the cortex overlying the base of each pyramid

Cortical arch

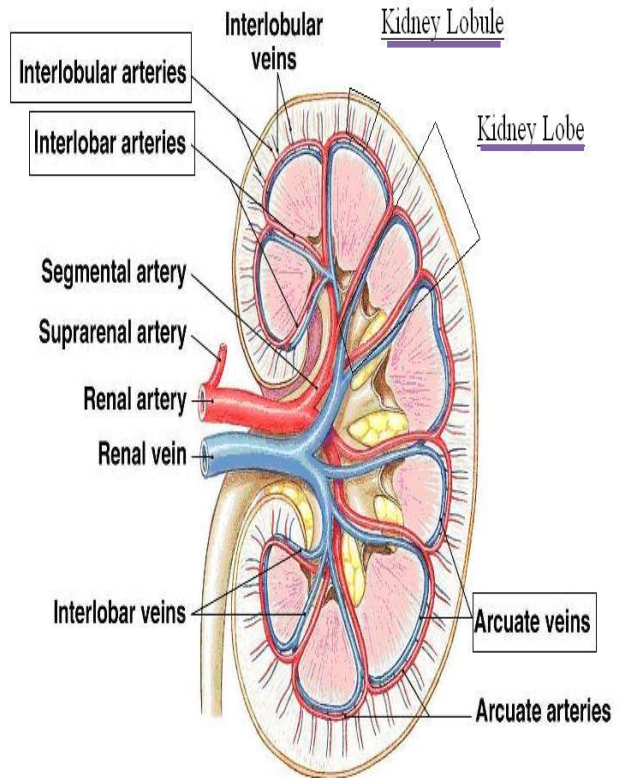


Lobe of the kidney is formed of:

- a- Renal pyramid.
- b-Cortical columns.
- c-Cortical arch

i.e. Cortical arch is a part of the lobe

*Each medullary ray with part of the cortical labyrinth surrounding it form ***kidney lobule.***



Uriniferous tubule

It is the functional unit of the kidney.

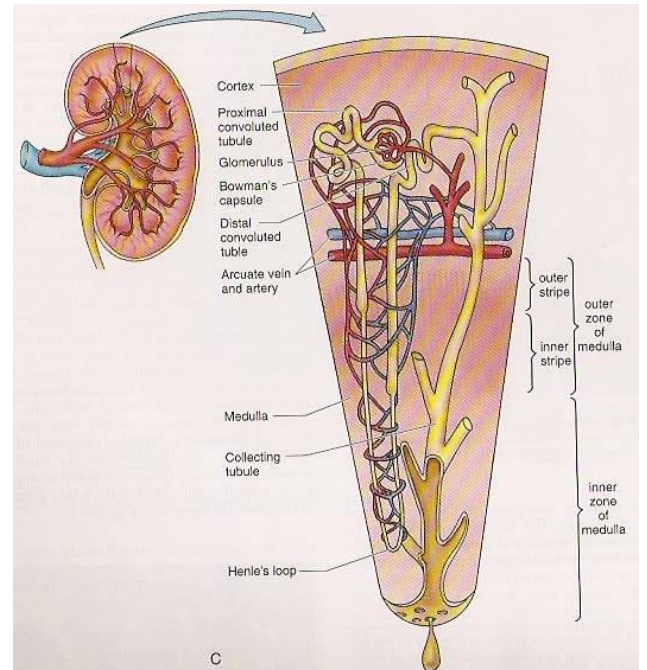
Is formed of:

1- Nephron.

2-Collecting tubule.

*The tubules are densely packed.

*The tubules are separated by thin stroma and basal lamina.



Nephron

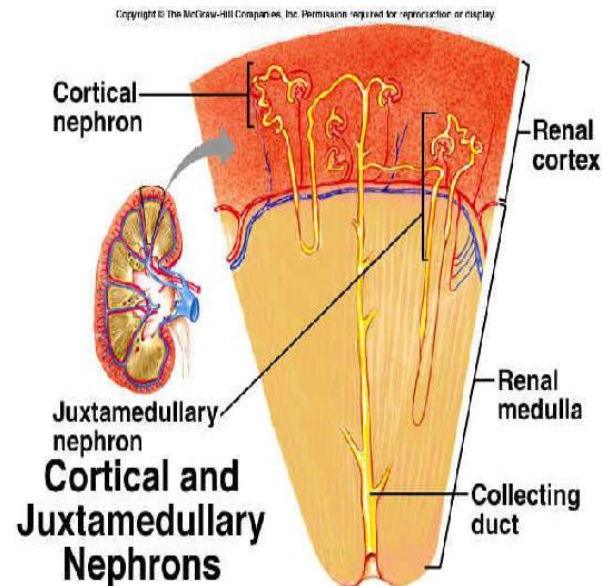
There are 2 types of nephrons:

a- Cortical nephrons.

b- Juxtamedullary nephrons.= **JUXTA**
mean near to.

It is formed of :

- 1-Renal corpuscle.
- 2-Proximal tubule.
- 3-Thin limbs of Henle's loop.
- 4-Distal tubule

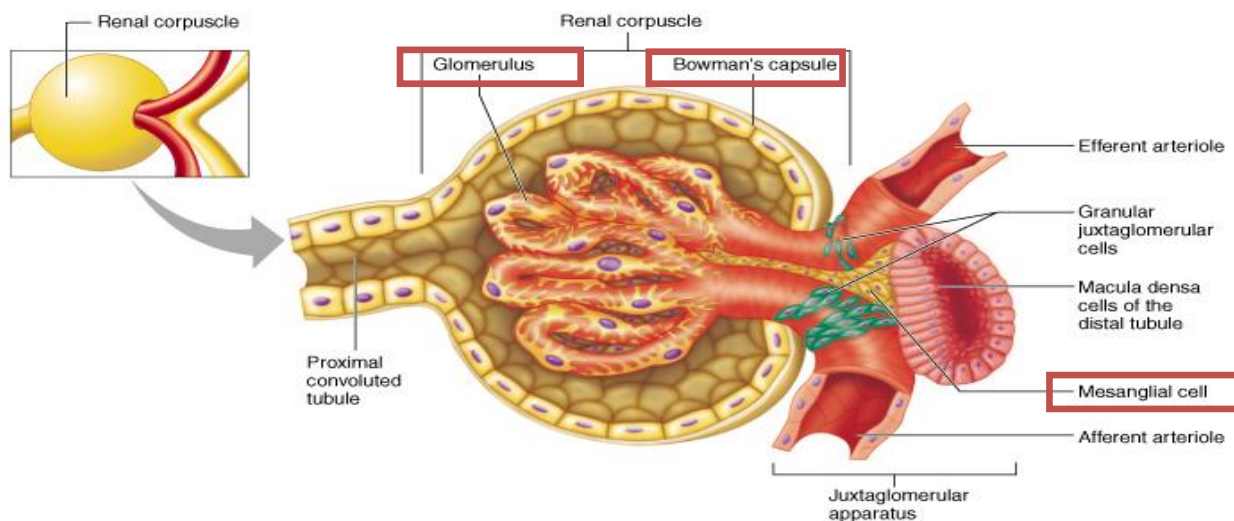


1-Renal corpuscle

Glomerulus; (tuft of fenestrated capillaries "without diaphragm")

Bowman's capsule; (Parietal layer, urinary space and visceral layer or podocytes).

Mesangial cells; (intra-glomerular cells)= Located between the endothelium & the basal lamina of the glomerular capillaries.



EXTRA INFORMATION

*The glomerulus filters the fluid expressed from the bloodstream. The subsequent tubular portions of the nephron (i.e., the proximal tubule, the thin limbs of Henle's loop, and the distal tubule) modify the filtrate (FINE TUNING) to form urine.

*Bowman capsule is consist of two layer:

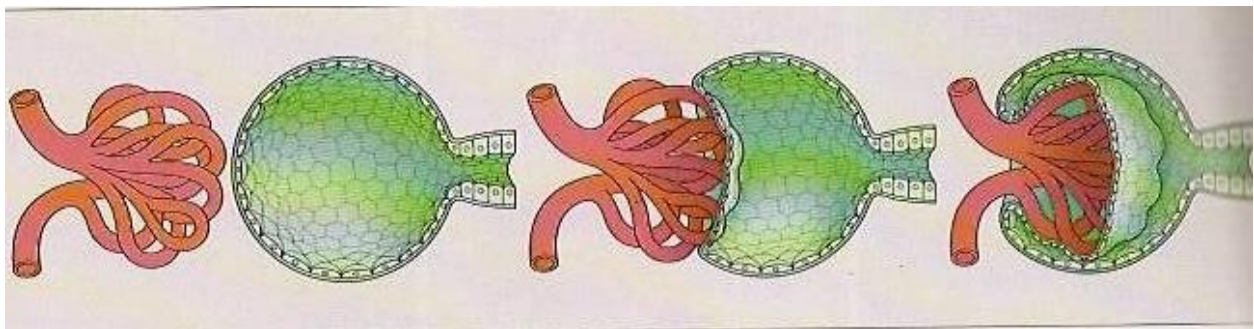
1- the outer is simple squames epithelium “praital layer of Bowman capsule”

2- the “inner” Visceral layer of Bowman capsule “podocytes or glomular epithelium” modified simple squamous.

*The capillary of the glomular is fenestrated without diaphragm

*The glomerulus is in intimate contact with the **visceral layer of Bowman's capsule, composed of modified epithelial cells called podocytes**

*The outer wall surrounding Bowman's space, composed of simple squamous epithelial cells (sitting on a thin basal lamina), is the **parietal layer**



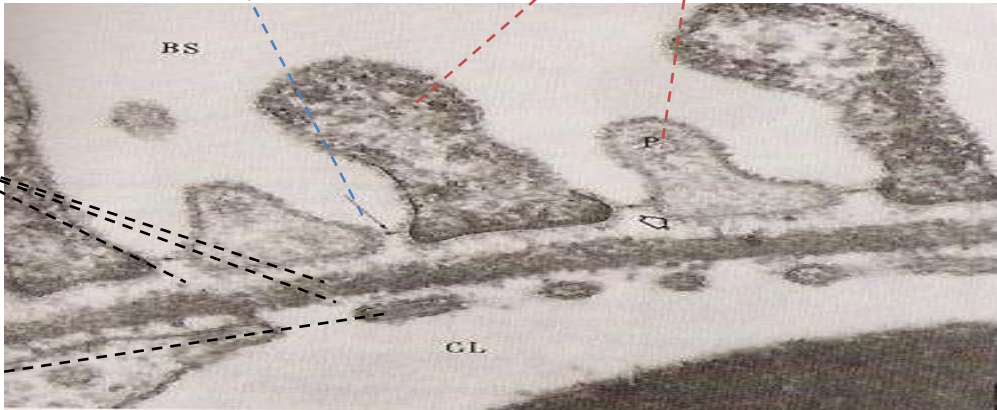
Glomerular Filtration Barrier

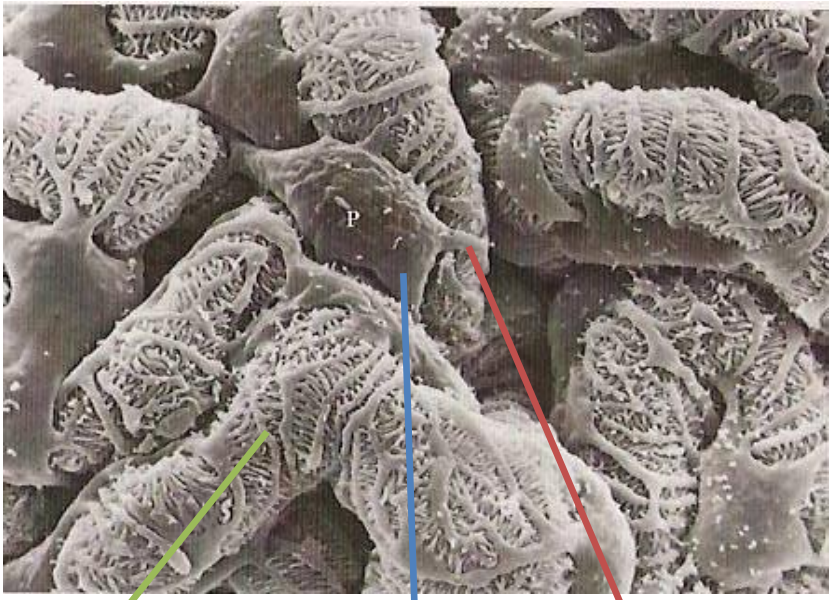
Between pedicles (on the surface of capillaries) there are **filtration slits** that have **filtration slit diaphragms**

Visceral layer of Bowman's capsule (**podocytes**)=Podocytes have primary (major) processes and secondary (minor) processes (pedicles).in the picture it is minor processes

The glomerular basal lamina (inner and outer laminae rarae (pale) and middle lamina densa).

Endothelial wall of the glomerular capillaries.=fenestrated without diaphragm

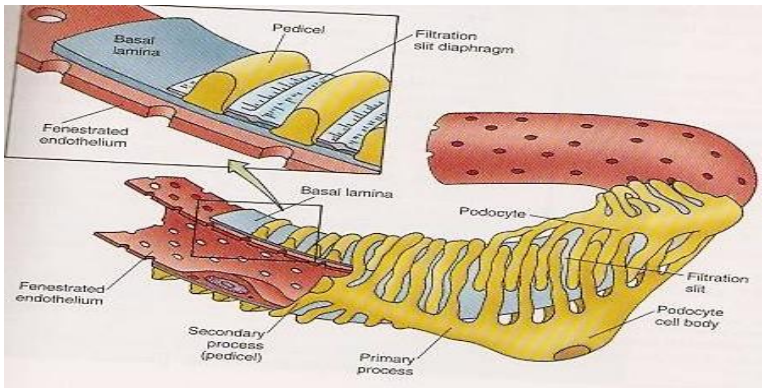




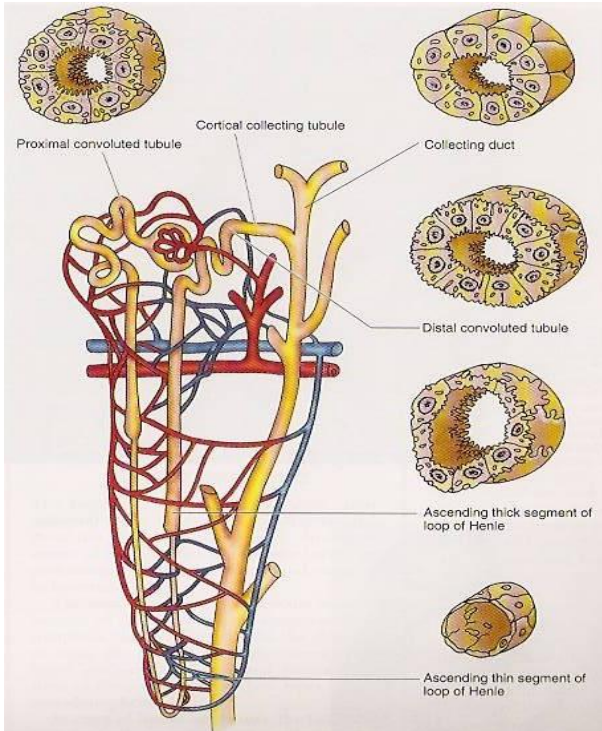
Capillaries

Podocyte

Process

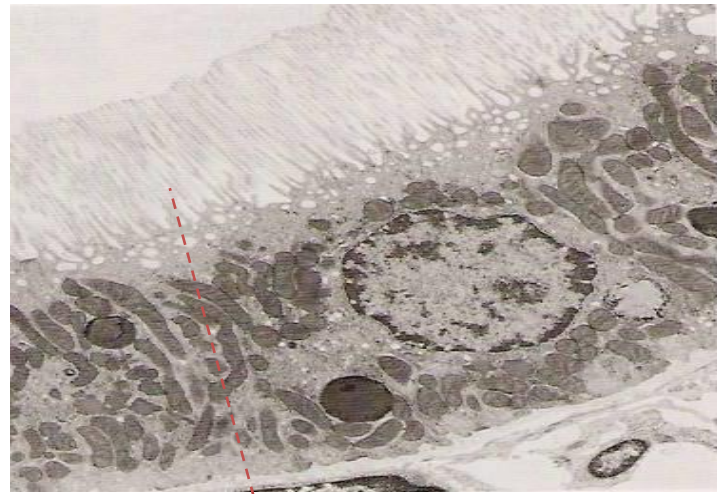
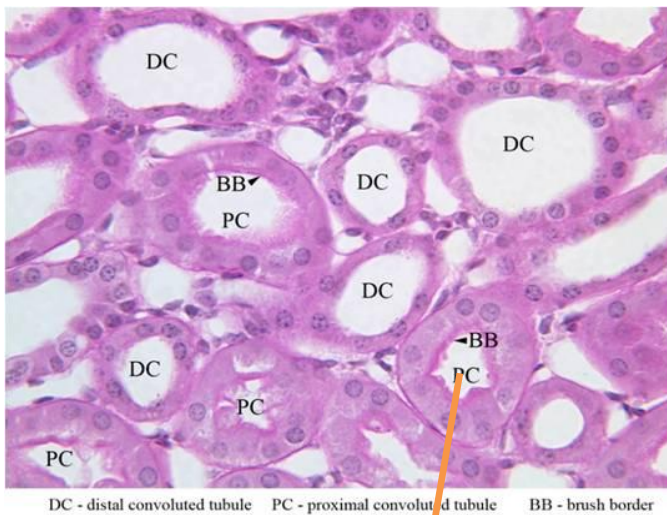


Renal tubules



All tubules are simple cuboidal except ***Thin limbs of Henle's loop*** which is simple squamous epithelium

2-Proximal convoluted tubule



Rich in microvilli because most of reabsorption(70%) happen in proximal tubule .

- ❖ It is composed of simple cuboidal epith. with acidophilic cytoplasm. The cells have striated or brush border and lateral inter-digitations.
- ❖ They have well-defined basal lamina

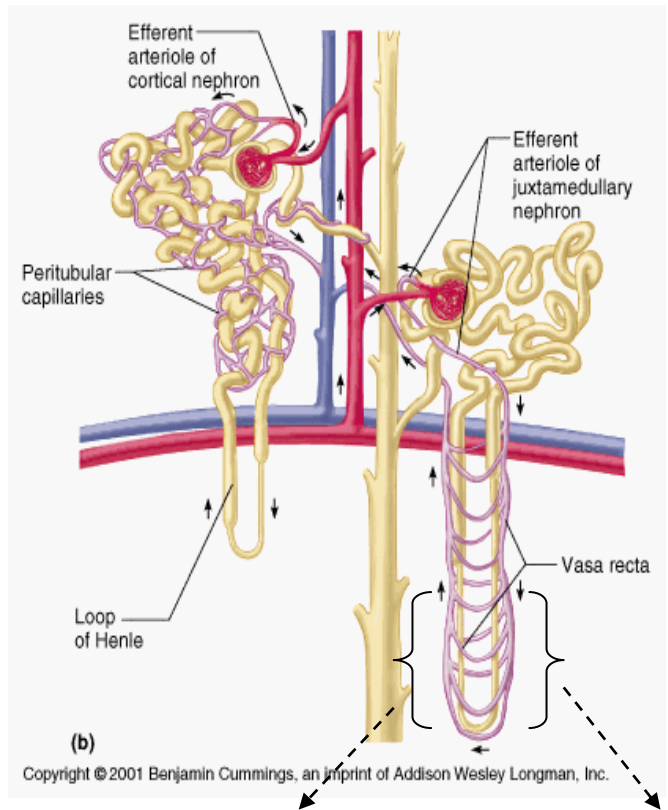
Under microscope it will appear with brush border .

3-Thin limbs of Henle's loop

It has three regions:

- 1-Descending thin limb.
- 2-Crest of Henle's loop.
- 3-Ascending thin limb.

NB. It is longer in juxta-medullary nephron than in cortical nephron.



3

1

4-Distal convoluted tubules

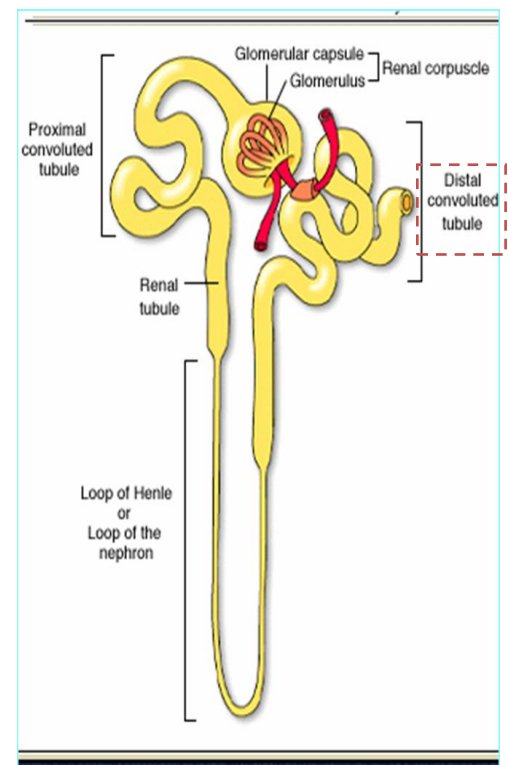
It starts at the macula densa.

macula densa (tall columnar & narrow cells).

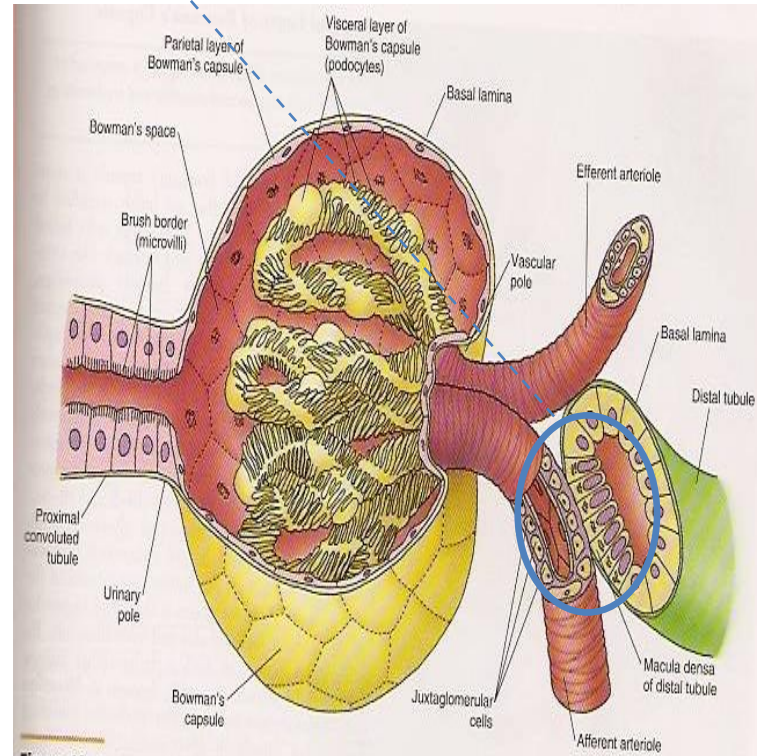
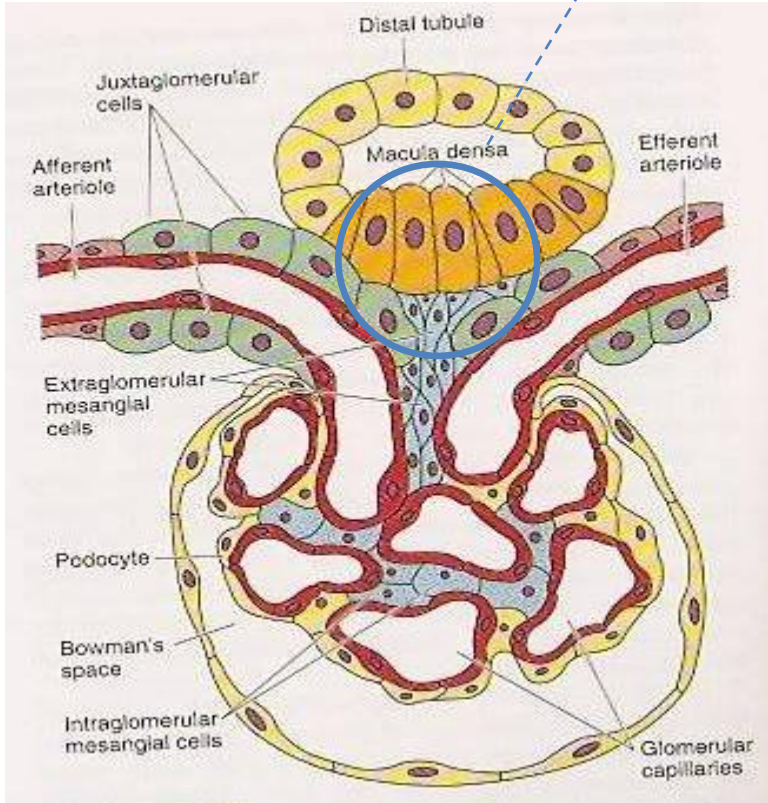
The Distal convoluted tubule is formed of low cuboidal epithelium.

*Distal tubules drain into collecting tubules.

N.B. Because distal convoluted tubules are much shorter than proximal convoluted tubules, any section of renal cortex presents many more sections of proximal convoluted tubules.



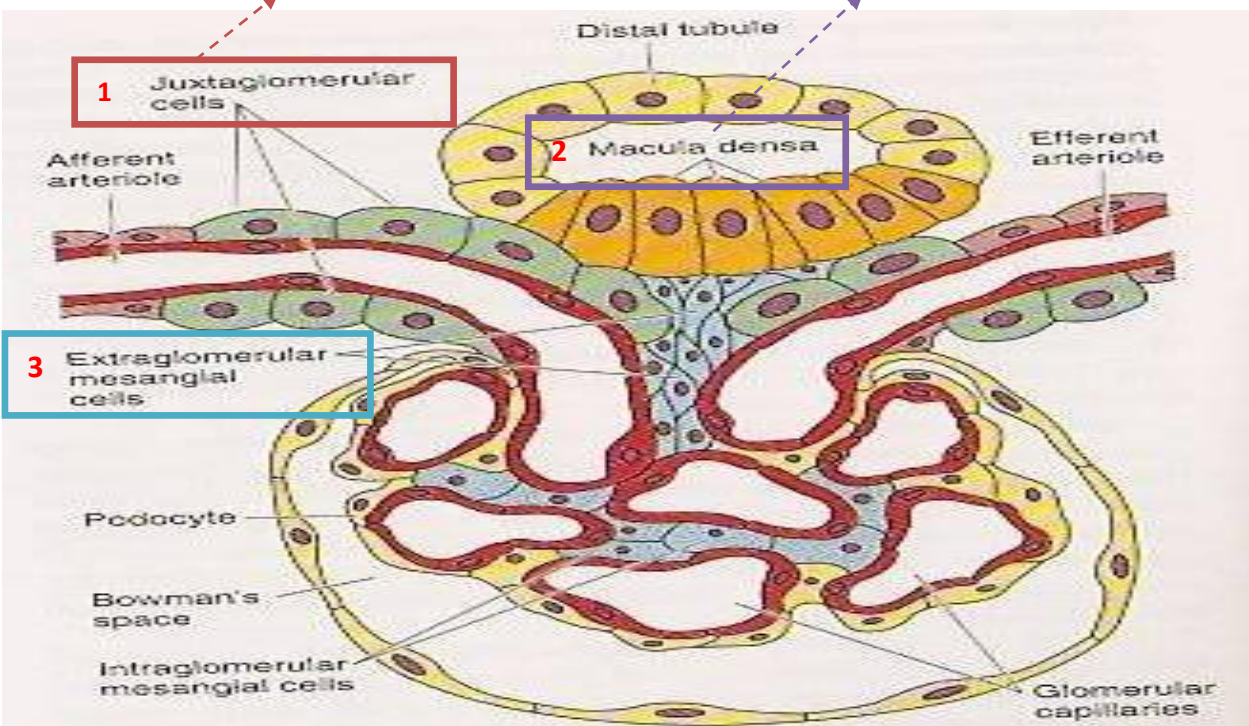
Juxtaglomerular apparatus



HAVE 3 COMPONENTS

The cells of the afferent glomerular arteriole they secrete rennin and angiotensin

The cells of the distal tubules



Collecting Tubule

** They are not part of the nephron.

*Composed of simple cuboidal epithelium

**they have 3 regions:

1-cortical

Simple cuboidal epithelium

2-Medullary

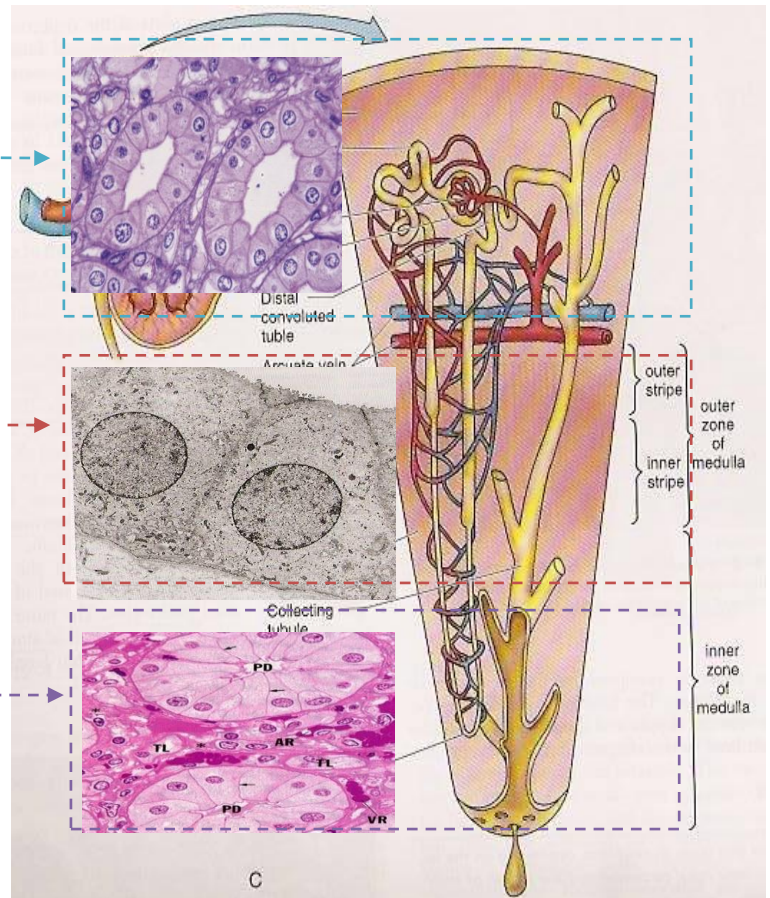
Simple cuboidal epithelium

3-Papillary ducts (ducts of bellini)

*Simple columnar epithelium

*They are 12 openings that opens in the area cribrosa

They are impermeable to water except in the presence of ADH



Renal interstitium

It is a very flimsy or weak, few amount of CT contains:

1-Fibroblasts.

2-Macrophages.

3-Interstitial cells: They secrete medullipin I, which is converted in the liver into medullipin II, that lowers blood pressure.

Summary of the layers..

