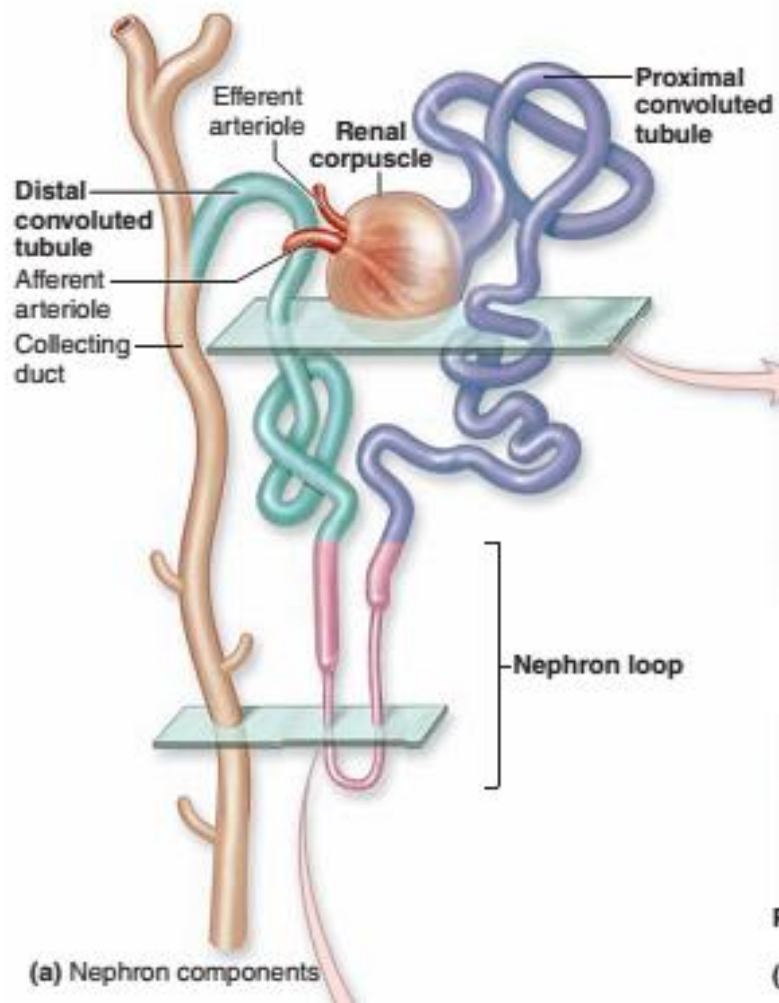


Kidney histology 2

By

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A/P Anatomy kgmc

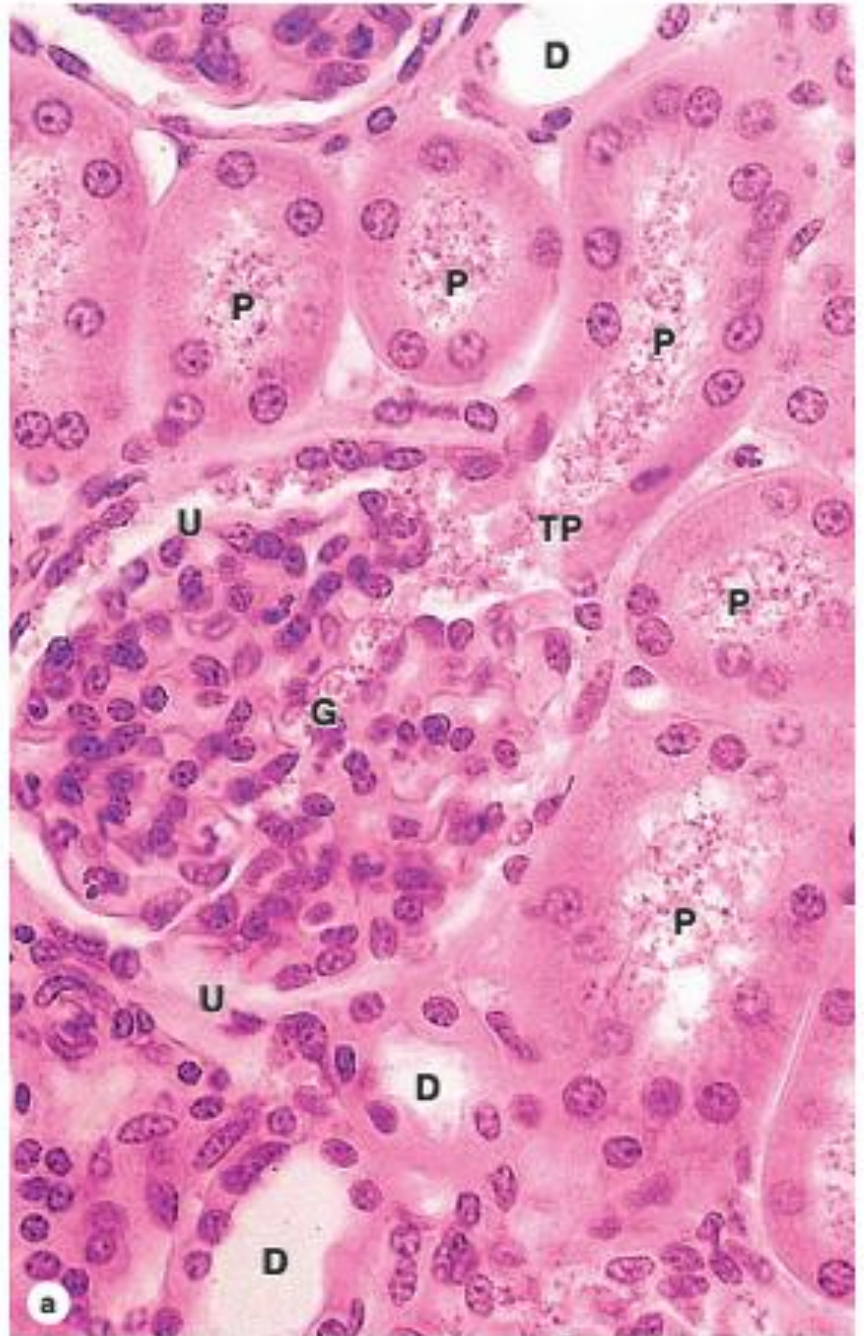


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At the tubular pole of the renal corpuscle.

The simple squamous epithelium of the capsule's parietal layer is continuous with the simple cuboidal epithelium of the proximal convoluted tubule (PCT) .

These long, tortuous tubules fill most of the cortex. PCT cells are specialized for both reabsorption and secretion.



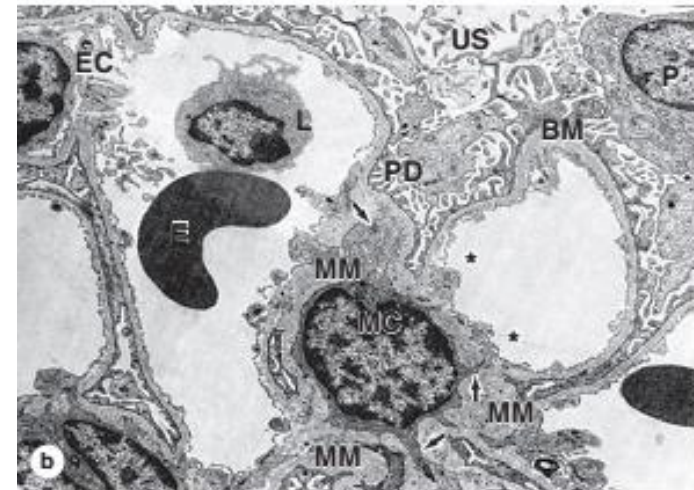
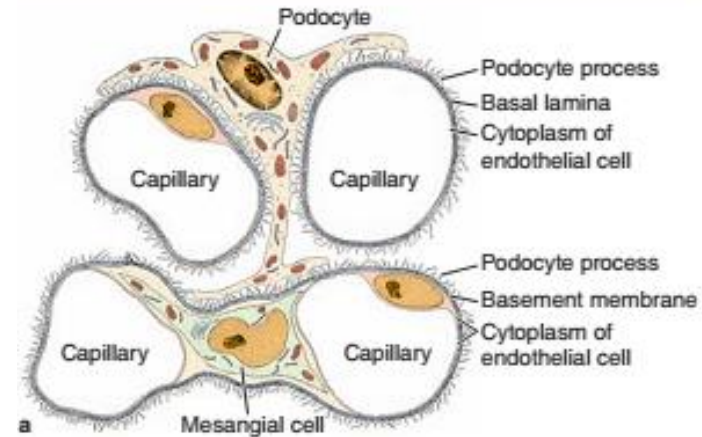
Mesangial cells in renal corpuscles

Are located between capillaries

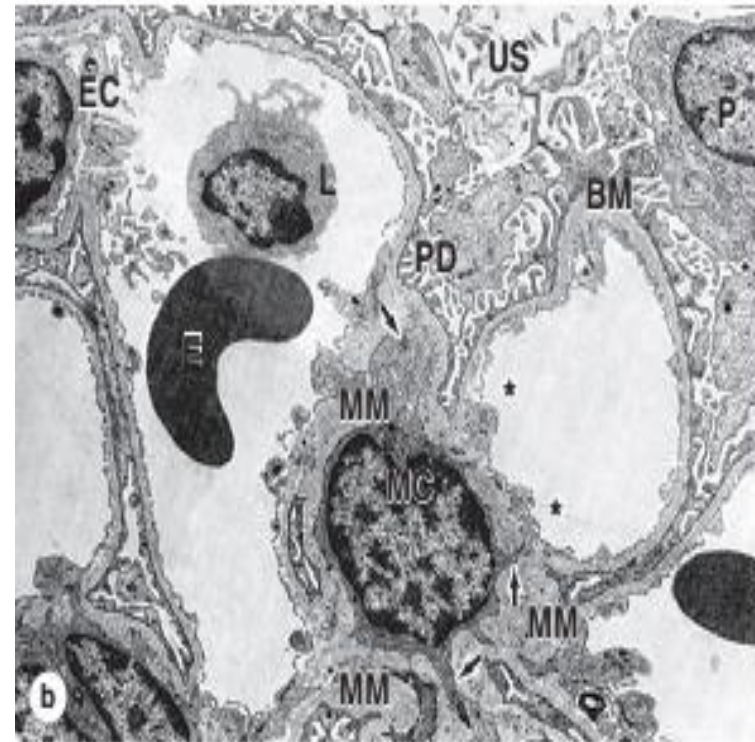
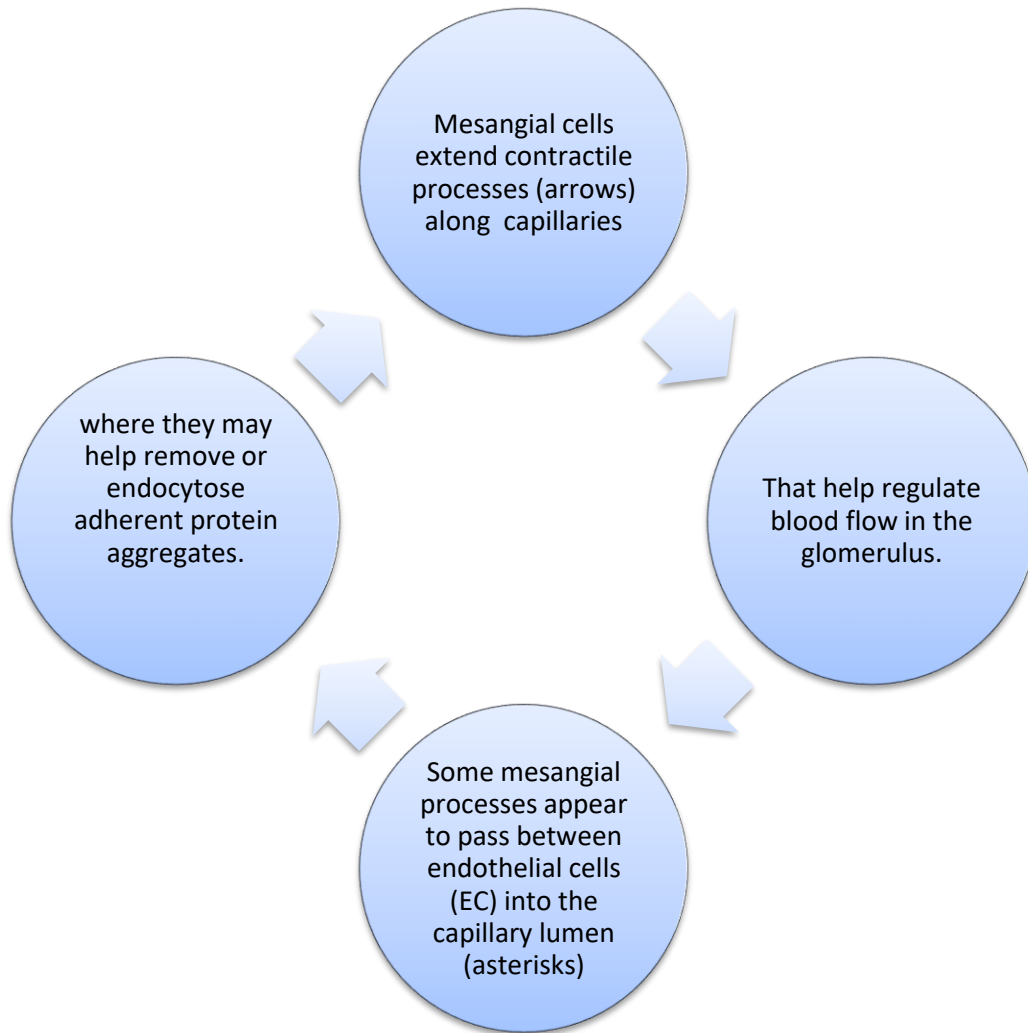
Cover those capillary surface not covered by podocyte processes.

The TeM shows one mesangial cell (MC) and the surrounding mesangial matrix (MM).

This matrix appears similar to and in many places continuous with basement membrane (BM) and supports capillaries .



Mesangial cell functions



Cells of the proximal tubules



Have central nuclei

Very acidophilic cytoplasm because of the abundant mitochondria.

The cell apex has very many long microvilli

That form a prominent brush border in the lumen that facilitates reabsorption

The proximal tubule also perform hydroxylation of vitamin D and release to the capillaries.

Interstitial cells in cortical areas near the proximal tubules produce erythropoietin



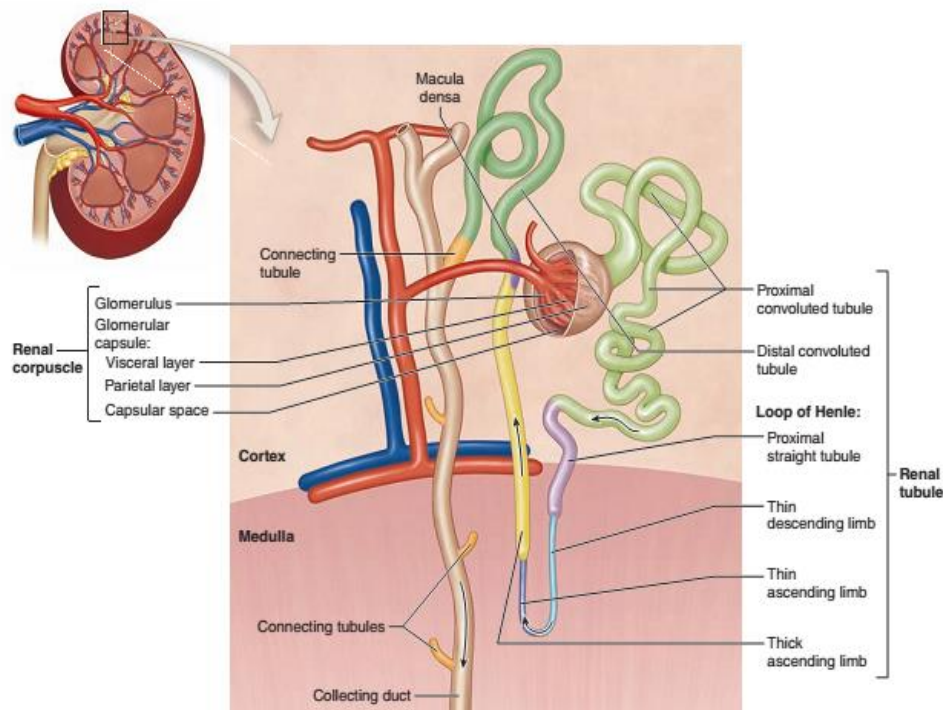
Loop of Henle

PCT continues with the much shorter proximal straight tubule

That enters the medulla

continues with the nephron's as loop of Henle .

A thin descending limb and thin ascending limb, both composed of simple squamous epithelia.

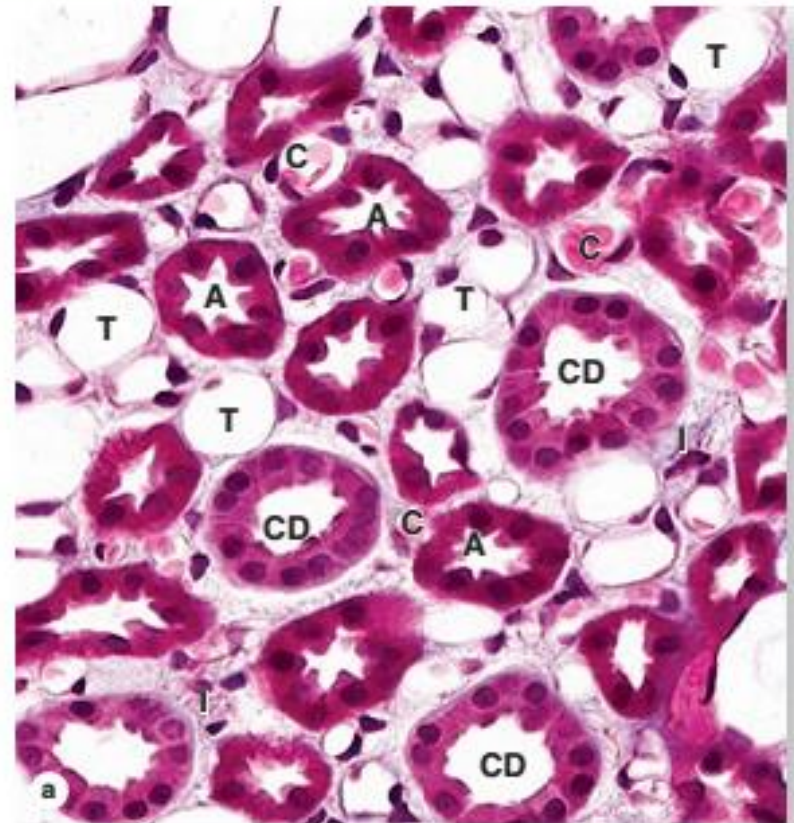
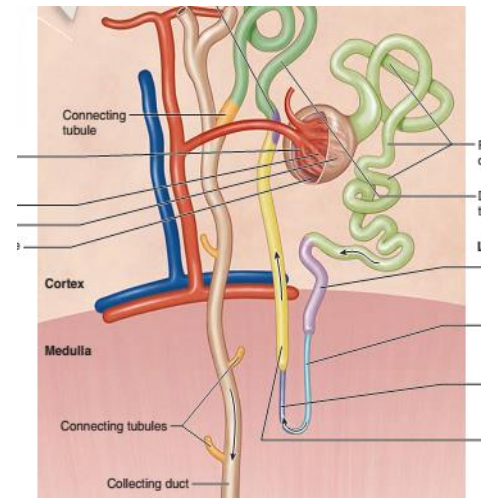


Loop of Henle

The thin ascending limb of the loop becomes the thick ascending limb (TAL), with simple cuboidal epithelium and many mitochondria

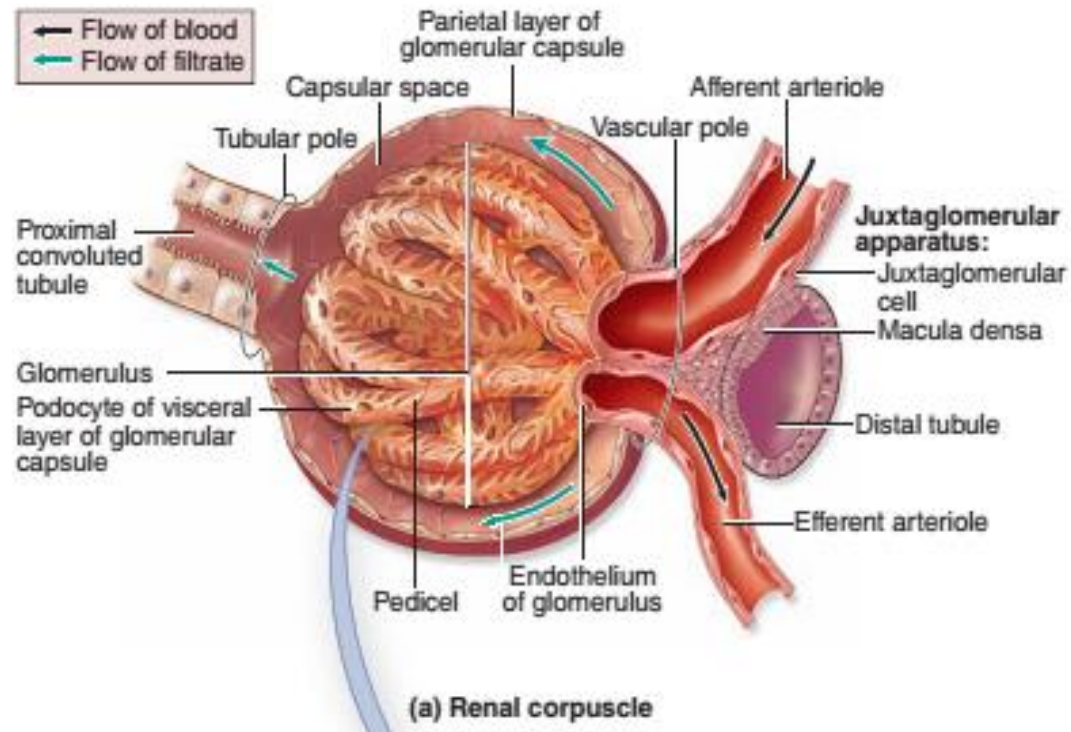
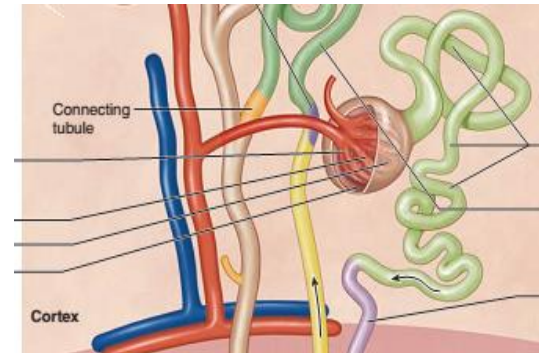
This change of epithelium occur in the outer medulla and extends as far as the macula densa near the nephron's glomerulus.

The loops of Henle and surrounding interstitial connective tissue are involved in further adjusting the salt content.



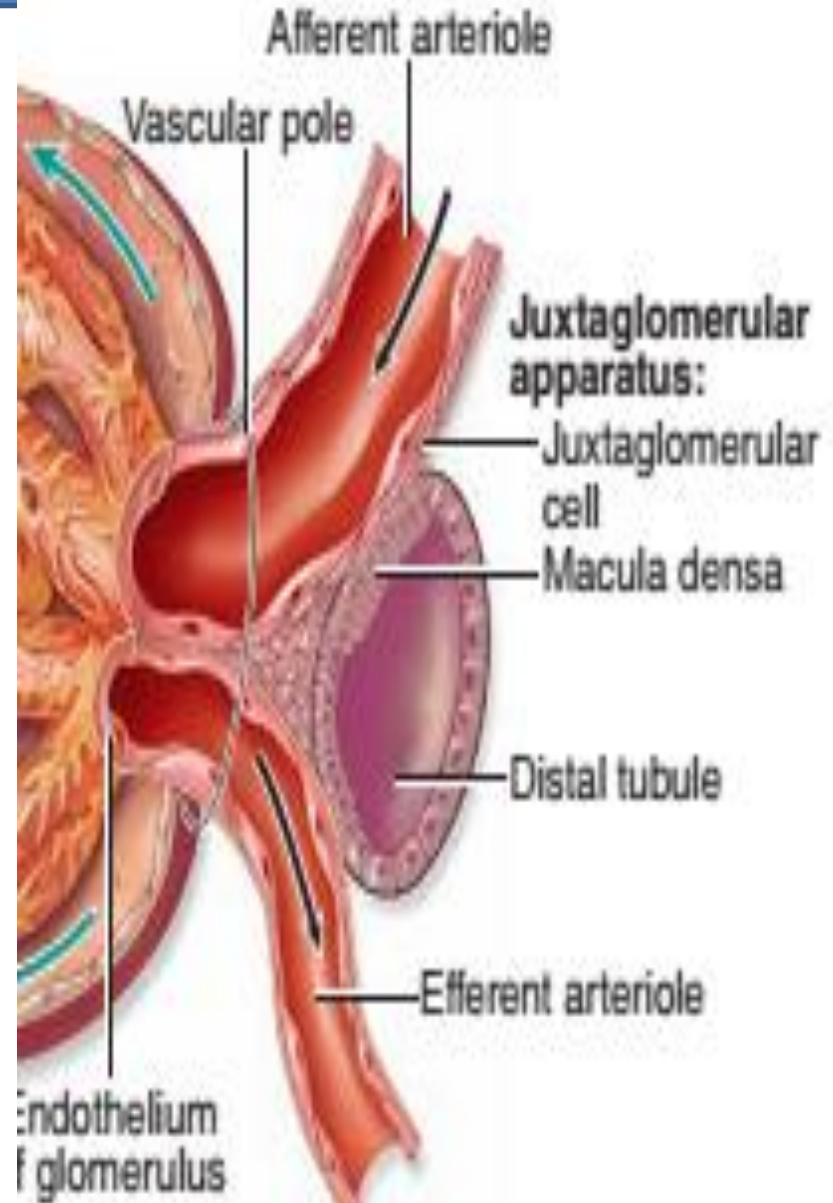
Distal Convoluted Tubule & Juxtaglomerular Apparatus

- The ascending limb of the nephron is straight as it enters the cortex .
- Contacts the arterioles at the vascular pole of the renal corpuscle of its parent nephron,
- Its cells become more columnar and closely packed, forming the macula densa
- And a specialized sensory structure, the juxtaglomerular apparatus (JGA) .
- That utilizes feedback mechanisms to regulate glomerular blood flow.
- And keep the rate of glomerular filtration relatively constant .



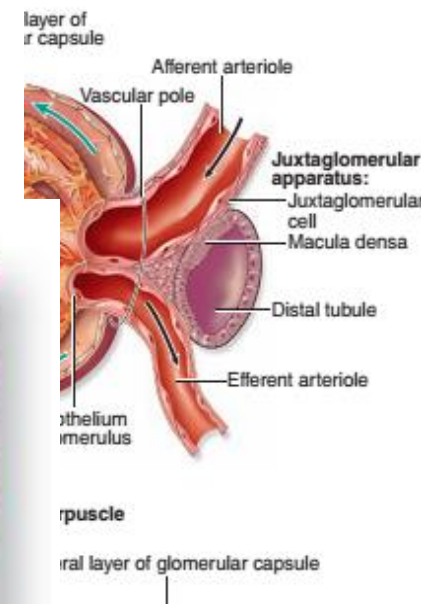
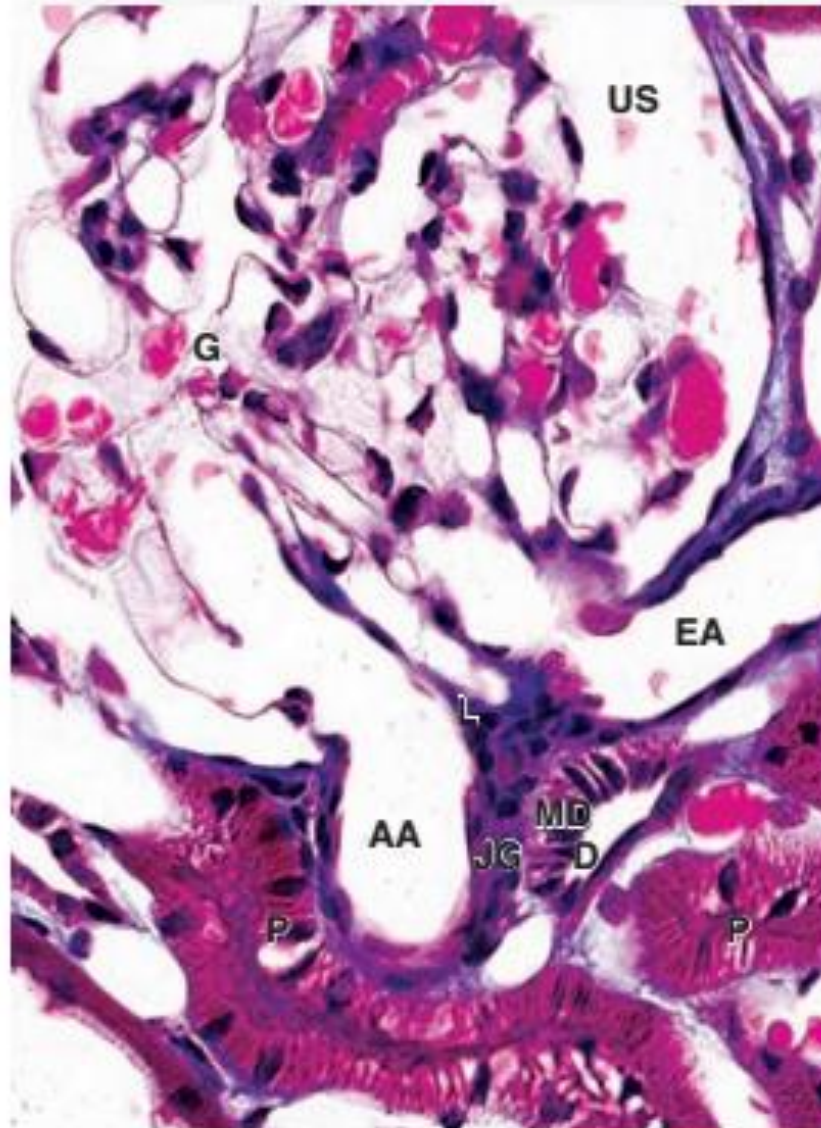
Cells of the macula densa

- Macula Densa typically have apical nuclei, basal Golgi complexes
- System of ion channels and transporters.
- Adjacent to the macula densa, the tunica media of the afferent arteriole is also Modified



Juxtaglomerular Apparatus

- The smooth muscle cells in the arteriole are modified as juxtaglomerular granular (JG) cells,
- With a secretory phenotype including more rounded nuclei, rough ER, Golgi complexes, and zymogen granules with renin .
- Also at the vascular pole are lacis cells (Fr. *laci s*, lacework),
- which are extraglomerular mesangial cells
- That have many of the same supportive, contractile and defensive functions .



Macula Densa

When there is decrease in Na^+ ultra filtrate.

Macula densa do two things:-

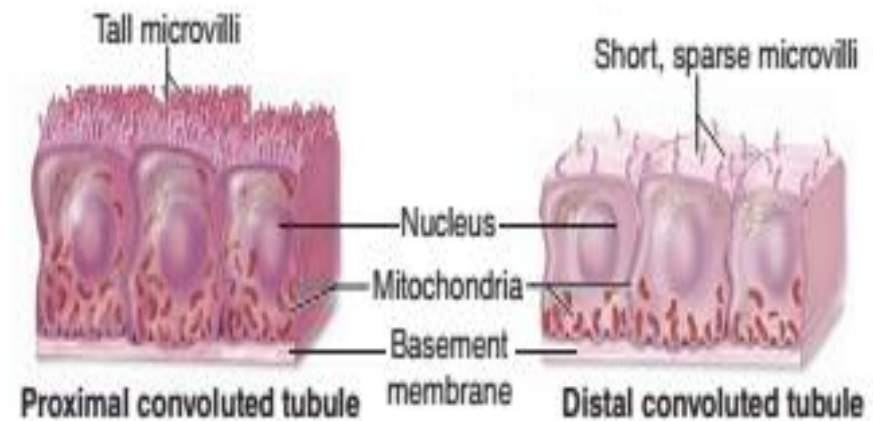
- Dilatation of the afferent arterioles
- Instruct JGA to release Renin

Renin convert angiotensinogen to angiotensin -1 (Mild Vasoconstrictor)

Angiotensin -1 convert to angiotensin -II by ACE (Potent vasoconstrictor) and
Constrict efferent arterioles

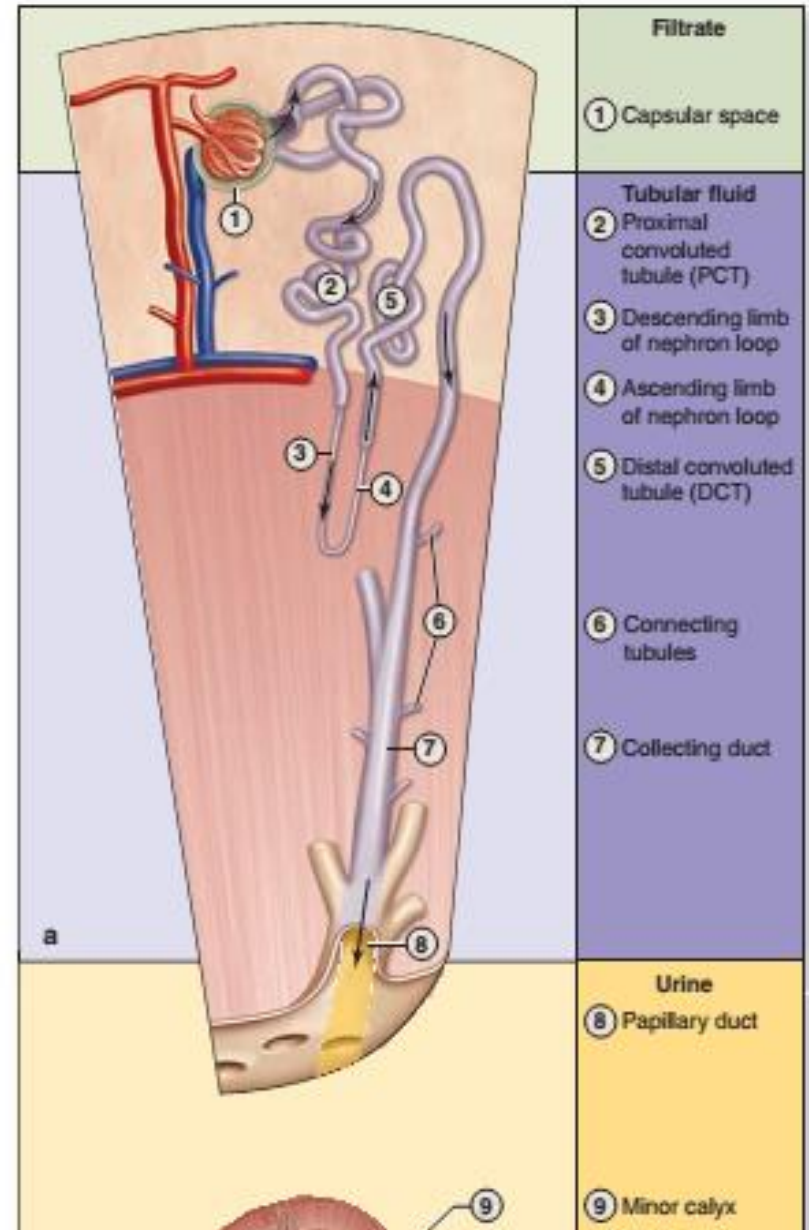
Comparison of cells b/w PCT with DCT

- Epithelium height of distal tubules different from those of the proximal tubules
- Distal tubules Smaller.
- Having no brush border and More empty lumens .
- More nuclei are typically seen in sections of distal tubules
- Cells of the DCT also have fewer mitochondria
- Much less tubular reabsorption occurs in distal tubules than in the proximal tubule.
- Making them less acidophilic.



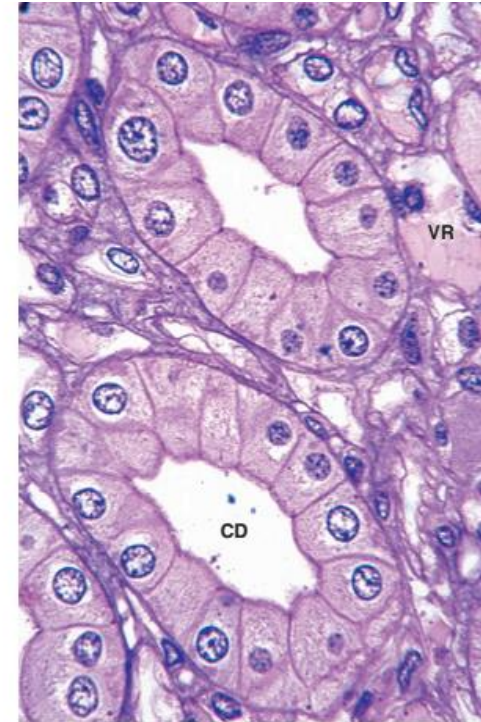
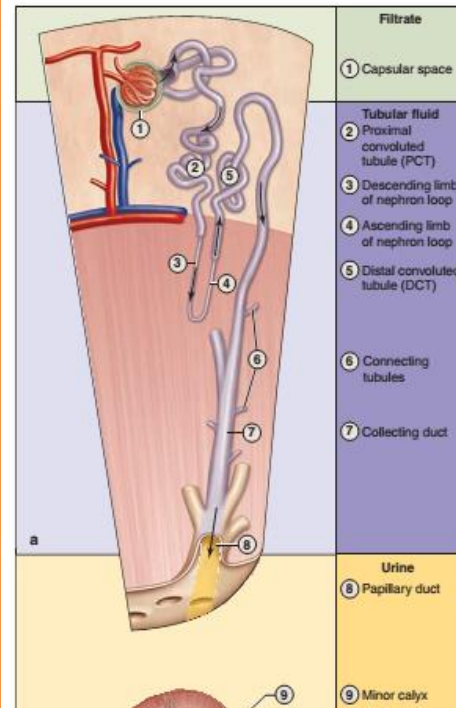
Collecting Ducts

- The last part of each nephron
- Connecting tubule carries the filtrate into a collecting system
- That transports it to a minor calyx and in which more water is reabsorbed if needed by the body.,



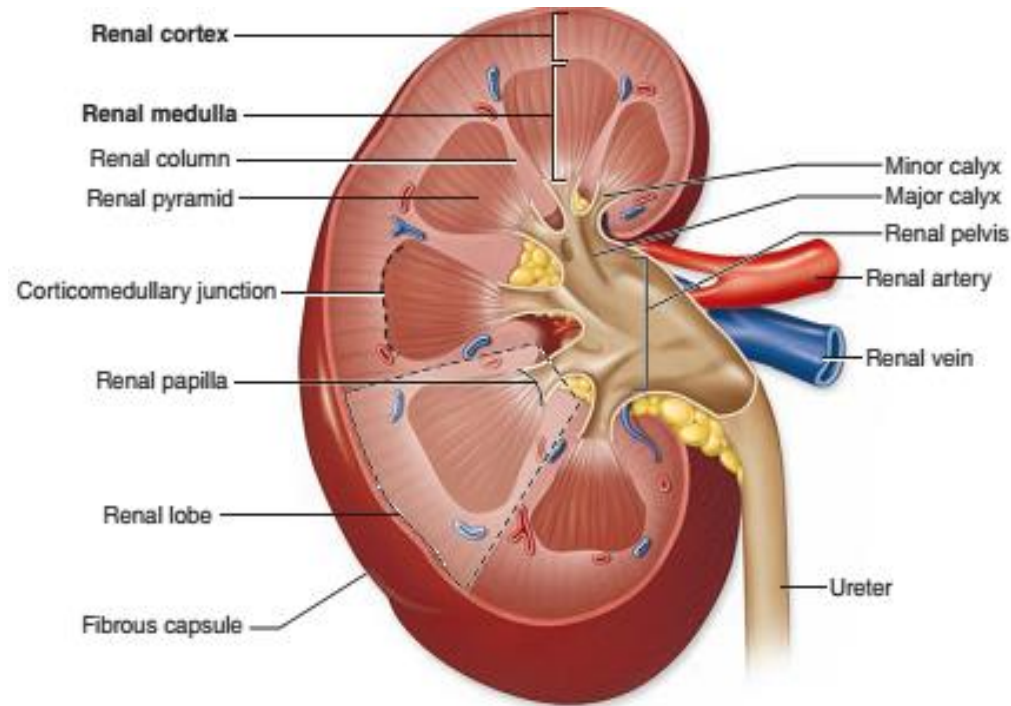
Collecting Ducts

- A connecting tubule extends from each nephron.
- Several join together in the cortical medullary to form collecting ducts of simple cuboidal epithelium.
- In the medulla
 - These merge further as larger, straight collecting ducts (of Bellini),
 - which run to the tips of the medullary pyramids with increasingly columnar cells



Bacterial infections of the urinary tract

- Can lead to inflammation of the renal pelvis and calyces, or are also called pyelonephritis.
- In **Acute pyelonephritis** Bacteria often move from one or more minor calyx into the associated renal papilla,
- Causing accumulation of neutrophils in the collecting ducts.



Polycystic kidney disease

Is an inherited disorder

In which normal cortical organization of both kidneys is lost due to the formation of multiple, large, fluid-filled cysts.

The cysts may arise from any epithelial cells of the nephron

Can lead to gross kidney enlargement and loss of renal function

Ureter Obstruction

A common problem

involving the ureters is their obstruction by renal calculi (kidney stones) formed in the renal pelvis or calyces,

Usually from calcium salts (oxalate or phosphate) or uric acid.

While urate stones are usually smooth and small,

Calcium stones can become large and irritate the mucosa.

The Ureter Obstruction

Most kidney stones are asymptomatic,

But besides causing an obstruction that can lead to renal problems,

Movement of stones from the renal pelvis into the ureter can cause extreme pain on the affected side of the body.

Problems caused by such stones can be corrected

By either surgical removal of the stone

or its disintegration using focused ultrasonic shock waves in a procedure called lithotripsy,



Thanks