HISTOLOGY OF THE URINARY SYSTEM

Kidney

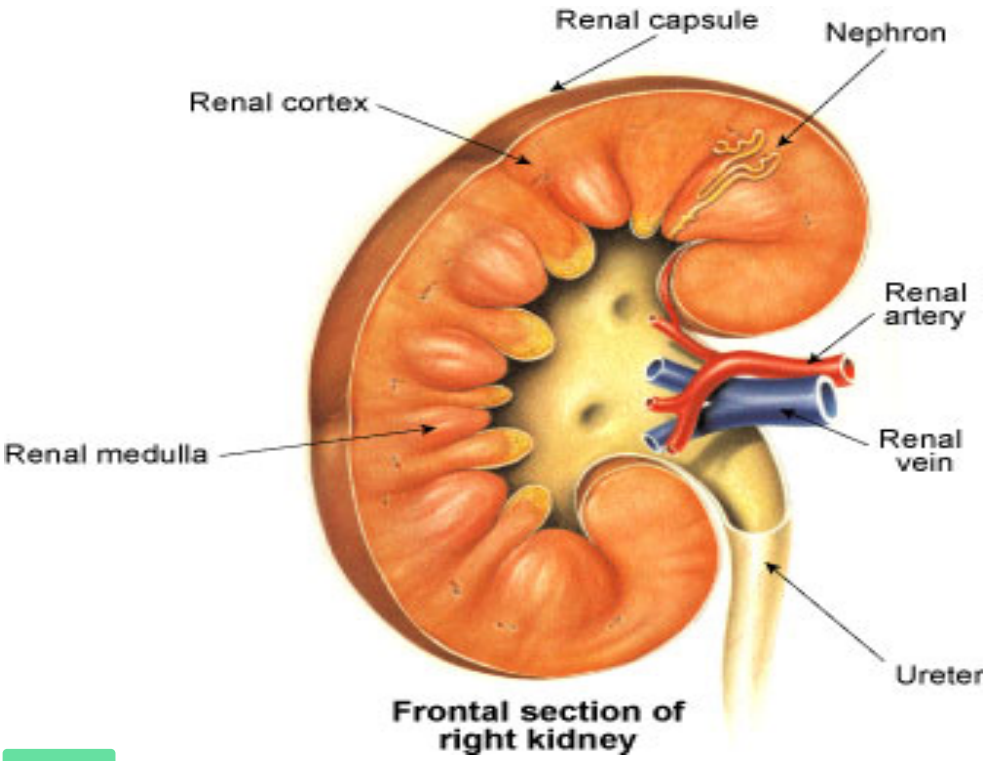
Main organ of the excretory system

Kidney is built of of little tubes called the nephrons.

At the beginning of each nephron, a web of capillaries releases much water and other molecules into the nephron.

The urine is collected in the urinary bladder and, when it fills up, it is excreted via urethra into the outside environment.

Kidney's Internal Structure



Cortex -- the outer part of the kidney;

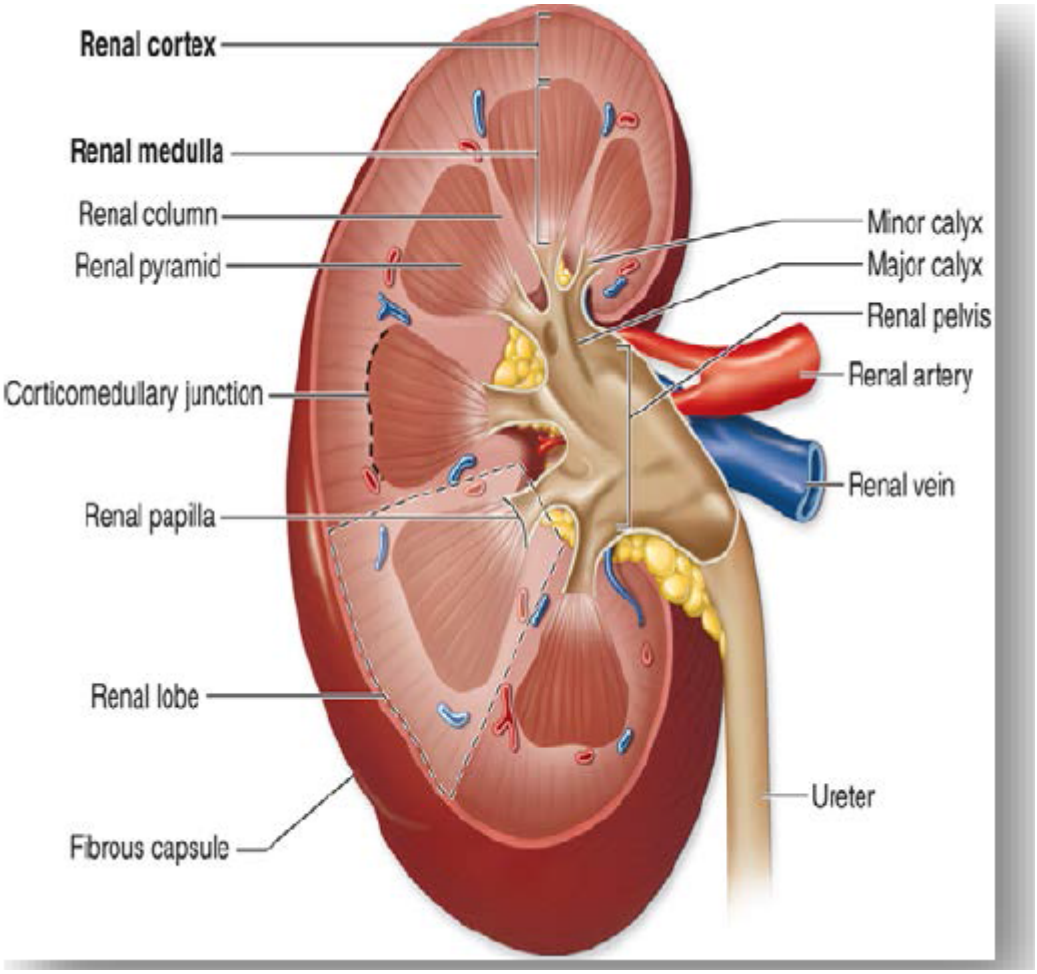
Medulla -- the inner portion of the kidney;

Pyramids -- the triangular-shaped divisions of the medulla of the kidney;

Papilla -- narrow, innermost tip of the pyramid;

Pelvis -- the kidney or renal pelvis is an extension of the upper end of the ureter (the tube that drains urine into the bladder);

Calyx -- each calyx is a division of the renal pelvis; opening into each calyx is the papilla of a pyramid.



Nephron

تعريف النيفرون مهم

basic structural and functional unit of the kidney.

Its chief function is to regulate the concentration of water and soluble substances like sodium salts by filtering the blood, reabsorbing what is needed and excreting the rest as urine.

A nephron eliminates wastes from the body, regulates blood volume and blood pressure, controls levels of electrolytes and metabolites, and regulates blood pH.

nephron, have 2 main parts,

1- renal corpuscle (Bowman's capsule with glomerulus)

2-renal tubule.

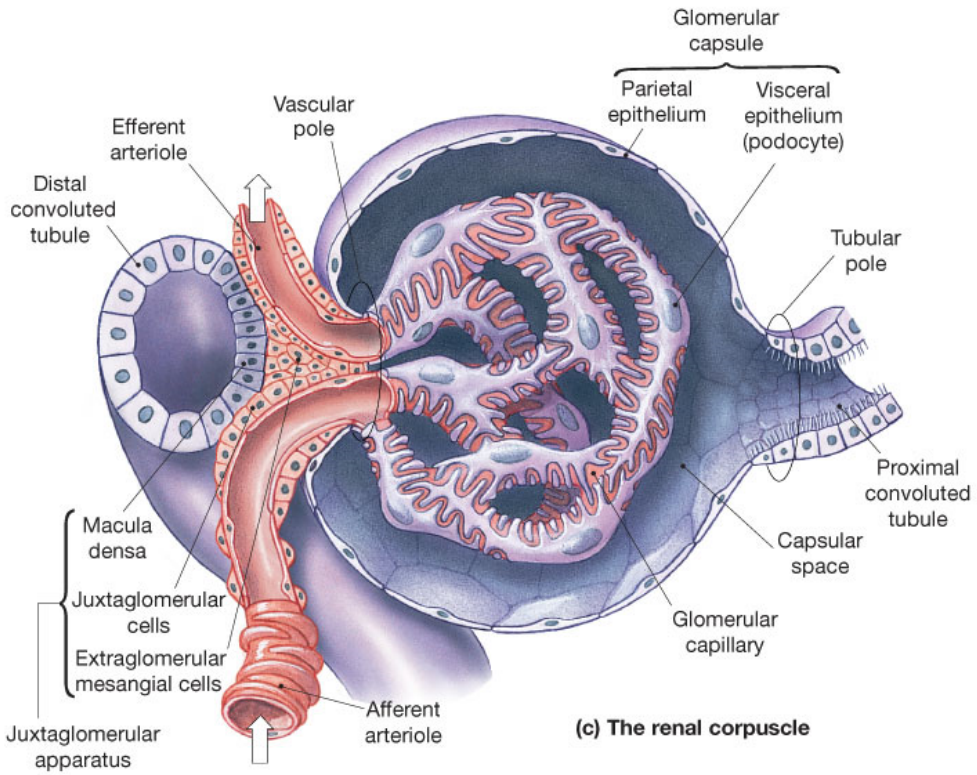
Renal corpuscl e أشرح /س

RENAL CORPUSCLE

glomeruli surrounded by Bowman's capsules.

Bowman's capsule -- the cup-shaped top of a nephron. It is the sack-like Bowmans's capsule that surrounds the glomerulus.

Glomerulus -- a network of blood capillaries tucked into Bowman's capsule.



التعريف مهم

Juxtaglomerular apparatus

The juxtaglomerular apparatus is a microscopic structure in the kidney , which regulates the function of each nephron.

There are three cellular components of the apparatus;

- macula densa,
- extraglomerular mesangial cells,
- juxtaglomerular cells (also known as granular cells).

٥٤٥م Histology Bowman's capsule

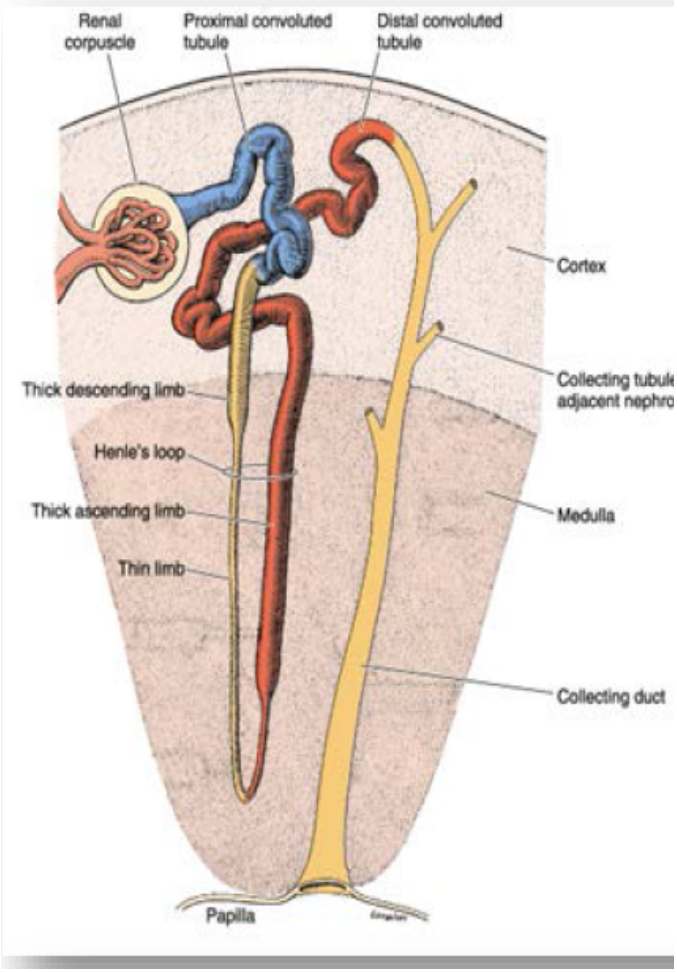
Cells of the outer or parietal layer of Bowman's capsule form a simple squamous epithelium.

Cells of the inner layer, podocytes in the visceral layer, are extremely complex in shape. Small foot-like processes, pedicles, of their cytoplasm form a fenestrated epithelium around the fenestrated capillaries of the glomerulus.

The openings between the pedicles are called filtration slits.

The basal lamina and the slit membranes form the glomerular filtration barrier, which prevents some large molecules from entering the capsular space between the outer and inner epithelial layers of Bowman's capsule.

Mesangial cells in the glomerulus form the connective tissue that gives structural support to podocytes and vessels.



يريد معرفة النسيج لكل طبقة

RENAL TUBULE

Proximal convoluted tubule -- the first segment of a renal tubule, called proximal because it lies nearest the tubule's origin from Bowman's capsule, and convoluted because it has several bends in it.

Histo: proximal tubule

- walls - cuboidal epithelium.
- The eosinophilic cells of the epithelium have a wide brush border and are active in endocytosis.

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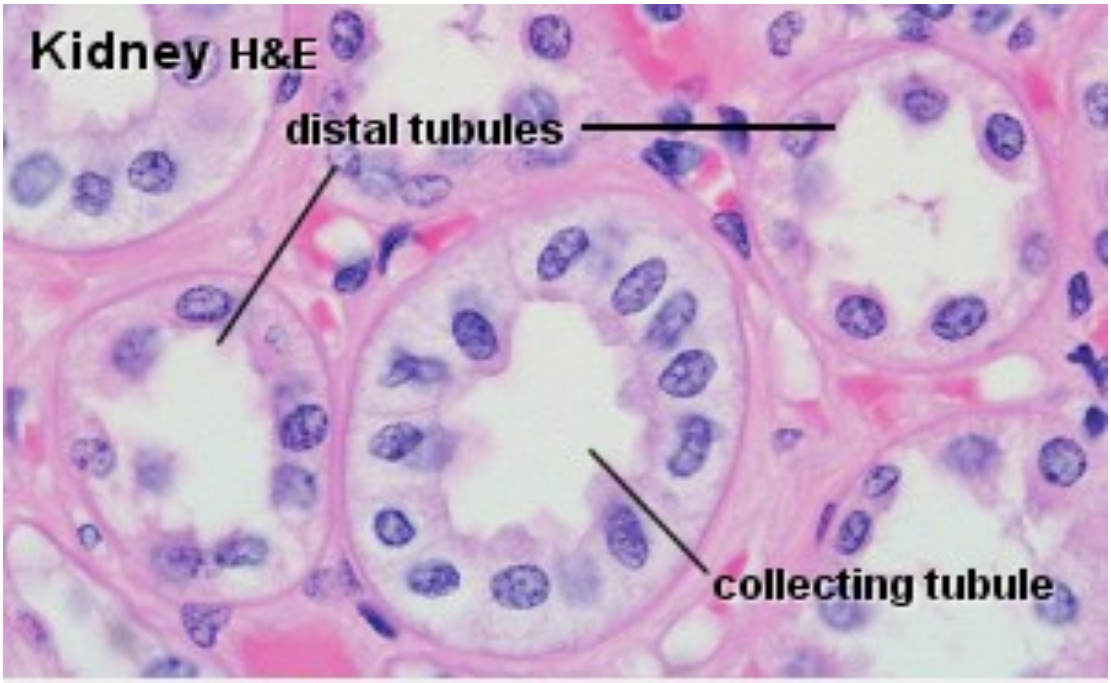
Loop of Henle -- the extension of the proximal tubule; observe that the loop of Henle consists of a straight descending (directed downward) limb, a loop, and a straight ascending limb (directed upwards).

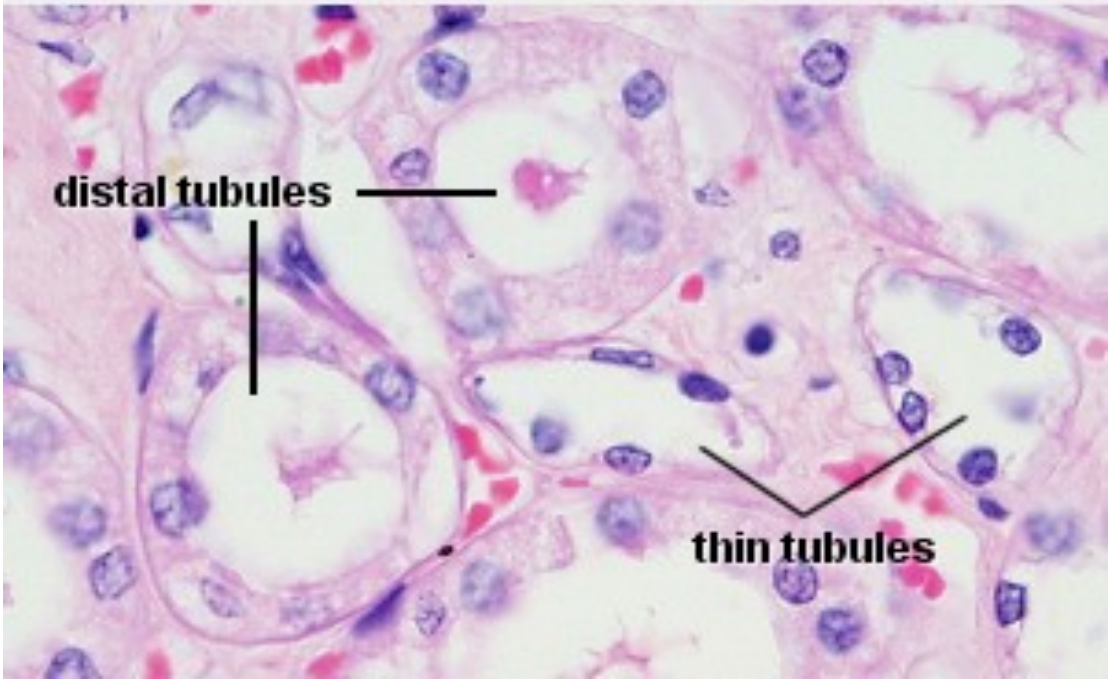
- It is 'U' shaped and has descending and ascending segments.
- Thin descending segment has *flattened epithelium(squamous)*. It is permeable to water but not solutes.

Distal convoluted tubule -- the part of the tubule distal to the ascending limb of Henle. It is the extension of the ascending limb of Henle.

- straight part of the DCT is formed by the low cuboidal cells without a brush border. The diameter of the tubule gradually expands to about 35 microns.
- convoluted part and comes in contact with the Glomerulus forming the Macula Densa.

Collecting tubule -- a straight (not convoluted) part of a renal tubule; distal tubules of several nephrons join to form a single collecting tubule





	characteristic

هذا الجدول أختصار لصفحة السابقة

Nephron structure	
Renal corpusle	Capillary ball covered by podocyte & surrounded by simple squamous epithelial capsule,capsular space.
Proximal convulated	Lined with simple cubodial epithelium & prominent brush border
Loop of Henle	Tubule that form a loop, there are thick & thin ascending & desecnding portion; the most distal part of the loop often extends into the medulla. Thick limb are lined with simple squamous/ cuboidal epithelium Thin limb are lined with simple squamous epithelium
Distal convulated	Lined with simple cuboidal with only sparse brush border; cytoplasm of cells tend to be paler than that of proximal convulated

Ureter

The wall of the ureter is made *3 layers*. From inside outwards they are :

Mucosa- which is made up of epithelium & lamina propria

Muscular coat – made of smooth muscles

Fibrosa – made of fibrous connective tissue

Mucosa- is thrown into folds and thus gives the appearance of star shaped lumen.

Transitional epithelium. 3-5 layers thickness.

Lamina propria- dense, irregular layer of fibroelastic connective tissue

The epithelium is separated from the lamina propria by a basal lamina

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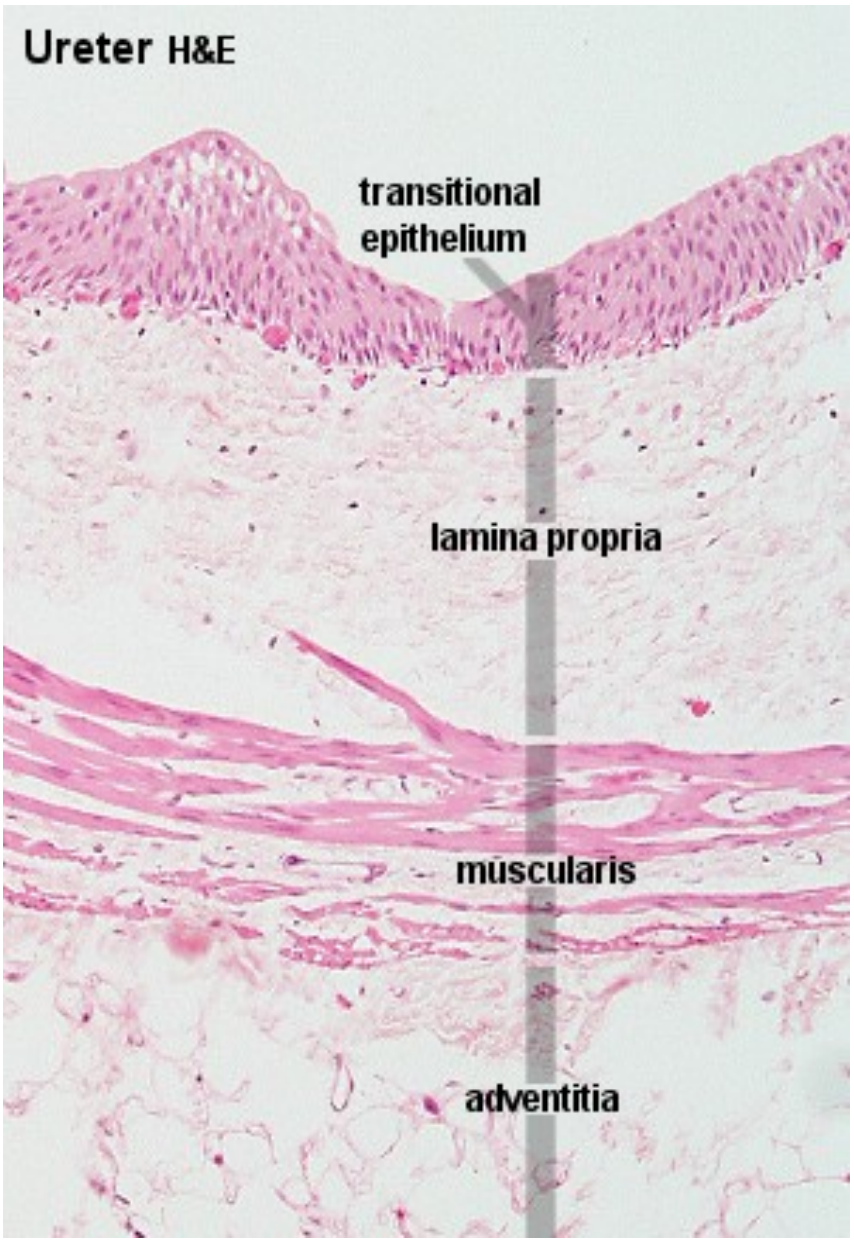
أهم شي طبقتين , lower upper

Muscular layer – Upper 2/3 of the ureter is made of two layers of smooth muscle cells.

Inner longitudinal and outer circular layer .

Lower 1/3 of the ureter has a third outer layer of longitudinal muscles(inner longitudinal, middle circular, outer longitudinal.

Fibrous coat – is made up of fibrous connective tissue

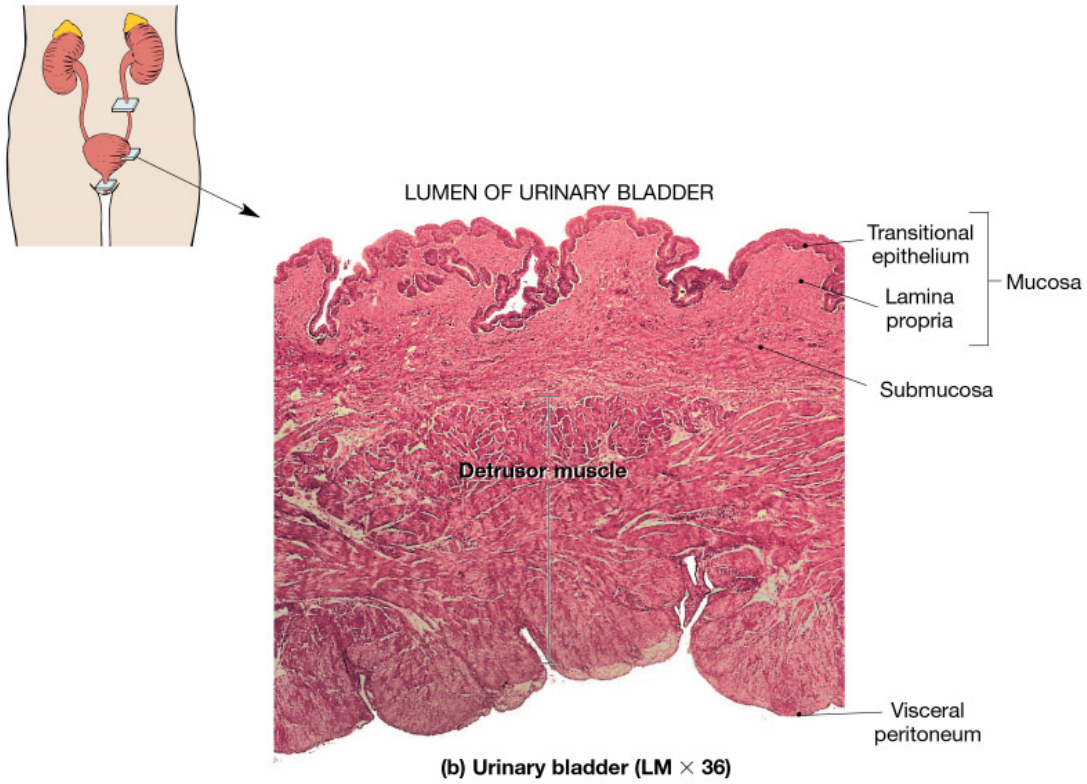


تعريف مهم

Histology of the bladder

mucosa of transitional epithelium, Submucosa, and thick muscular layer know as the detrusor muscle

Transitional epithelium in empty bladder exhibits about six layers of cells ,When stretched, transitional epithelium appears stratified squamous



(b) Urinary bladder (LM × 36)