Renal Block

Histology Team

Histology of the Urinary Passage

By:
Rana Al Ohaly
Mohammad Adel

Objectives:

By the end of this lecture, the student should be able to describe:

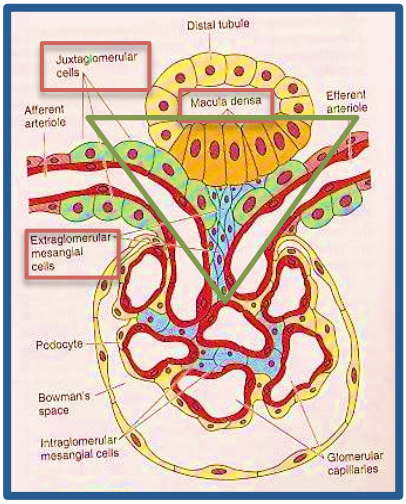
1. The microscopic structure of the Renal pelvis and ureter.
2. The microscopic structure of the urinary bladder and male and female urethra

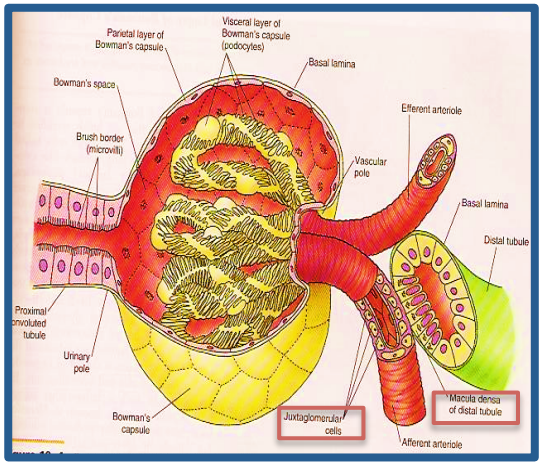
Black = Slides
Green= Additional notes
The work contains everything in the slides

432histologyteam@gmail.com

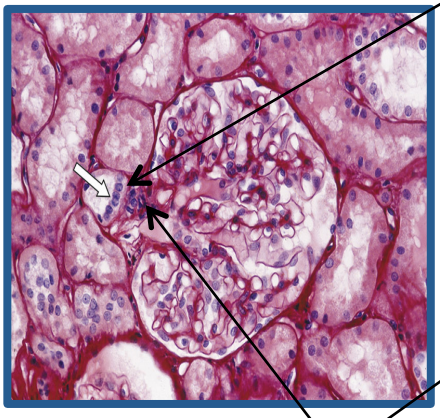
Juxtaglomerular Apparatus

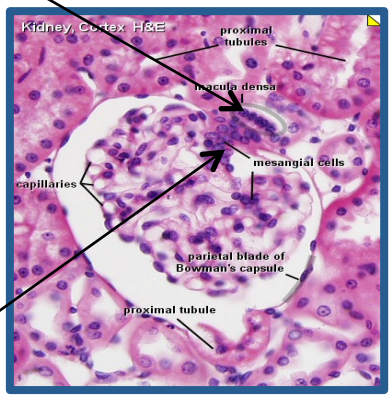
Macula Densa	Juxtaglomerular Cells	Extraglomerular Mesangial Cells
• Found in the first part of the **distal tubules** on the side that is adjacent to the afferent and efferent arteriole • Tall narrow cells • Centrally-placed nuclei • They are like cuboidal cells that have been condensed	• Found in the afferent glomerular arteriole (very few are found in the efferent as well) • (They are **modified smooth muscle cells** of the **tunica media**) • (Instead of being spindle-shaped like normal smooth muscle cells they are cuboidal) • Nuclei are round • Granular cytoplasm (representing secretions) • They secrete Renin and Angiotensin	





Macula densa (most prominent and easily identifiable component)



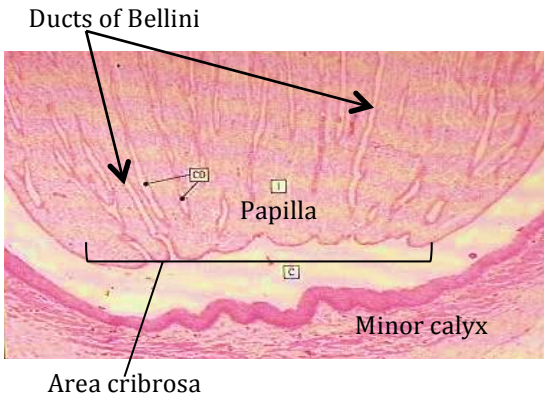


Juxtaglomerular cells and **Extraglomerular mesangial cells**
(it is hard to differentiate between them in slides)

432histologyteam@gmail.com

Renal Calyces

- Each calyx accepts urine from the renal papilla of the renal pyramid
- They are lined with:
  - **Transitional Epithelium** (the epithelium of the urinary tract) (this type of epithelium extends from the minor calyces until the upper part of urethra)
  - Lamina propria
  - Few Smooth muscle (not well developed)
- Minor calyces merge to form major calyces (with the same lining tissue as minor calyces)
- Major calyces open into renal pelvis



Renal pyramid ➔ renal papilla ➔ minor calyx ➔ major calyx ➔ renal pelvis

Ureter

1) **Mucosa** folded to increase surface area
   Formed of:
   - Transitional epithelium
   - Lamina propria

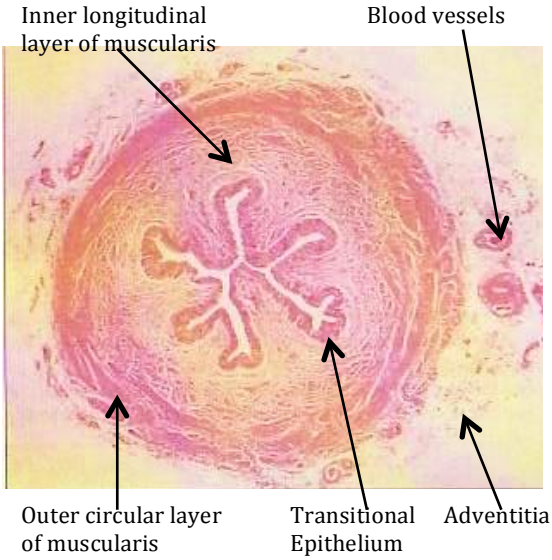
2) **Muscularis** (muscle coat)

   Upper 2/3 of Ureter is formed of 2 layers (see picture on the right)**:**
   - Inner longitudinal
   - Outer circular

   Lower 1/3 of Ureter is formed of 3 layers:
   - Inner longitudinal
   - Middle circular
   - Outer Longitudinal

3) **Adventitia**
   Fibrous connective tissue covering

NB: No serosa



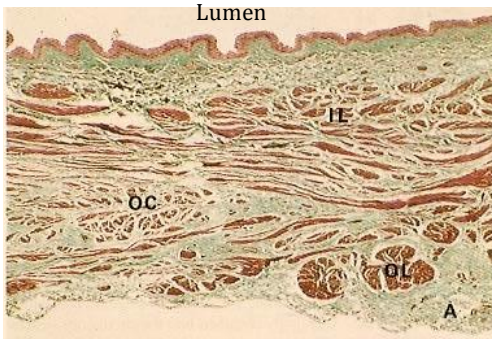
NB: The ureter is extremely thin so we can make a slide that contains the whole cross section whereas the urinary bladder is much bigger and so when we make a slide it can only fit a sector of the bladder. That is how we can tell them apart even though they have similar structures.

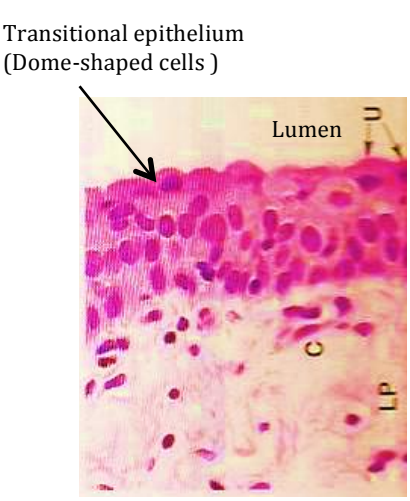
NB: When an organ is covered by a serous membrane (in this case the peritoneum) then in the section we will be able to see a layer of mesothelium covering the connective tissue surrounding the organ. We call this Serosa.

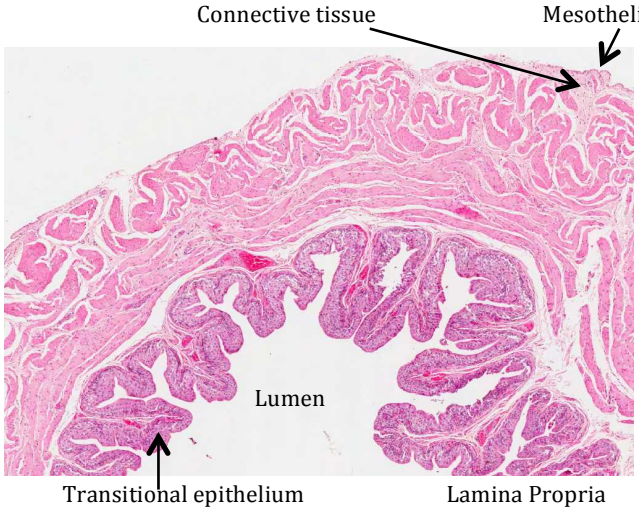
Urinary Bladder

- It has the same structure as the lower third of the ureter
- Superficial layer of transitional epithelium has dome-shaped cells (in empty bladder)
- It has 3 layers of smooth muscle:
    - Inner longitudinal (thin)
    - Outer longitudinal (thin)
    - Middle circular (thick)

  NB: there is a lot of connective tissue between the smooth muscle cells to allow stretching
- It's outer covering is:
    - Adventitia (posteriorly where there is no peritoneum covering it)
    - Serosa (anteriorly where there is peritoneum covering it)







Reminder: Lamina propria is the connective tissue under the epithelium and its basement membrane in wet areas of the body

432histologyteam@gmail.com

Urethra

Female Female urethra is short and **lined by**:	Male It is long and **divided into 3 regions**:
a) **Epithelium:** 1. Transitional epithelium (near the bladder) 2. Pseudostratified columnar epithelium 3. Stratified squamous non-keratinized epithelium (just before urethral orifice)	1. **Prostatic Urethra** (names so because it is surrounded by the prostate gland) Lined with: • Transitional epithelium
b) **Sub-epthelial Fibroelastic Connective Tissue** • Contains glands of Littre (mucus-secreting glands) they are found in both males and females to maintain the epithelium wet and moist to prevent exfoliation (exfoliation: detachment of the epithelium because of dryness)	2. **Membranous Urethra** Lined with: • Stratified columnar epithelium • Patches of pseudostratified columnar epithelium
c) **Smooth Muscle** (not well developed except at sphincter) • Inner longitudinal layer • Outer circular layer	3. **Penile (spongy) Urethra** Lined with: • Stratified columnar epithelium • Patches of pseudostratified columnar epithelium **NB:** **Navicular fossa (enlarged terminal portion)** Lined with: Stratified squamous non-keratinized epithelium **NB:** The lamina propria contains mucus-secreting glands of Littre The male urethra also contains smooth muscle which is not well developed except at sphincter