



Be able to locate each structure on the lab models listed here:

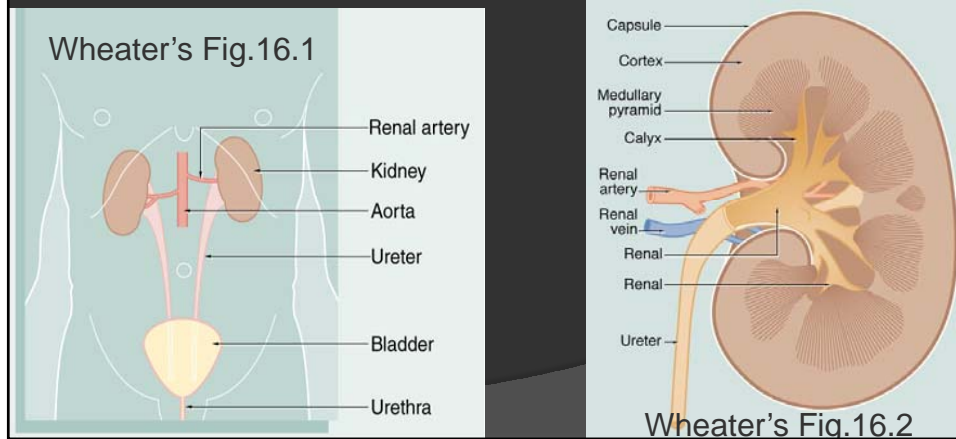
- **Kidney**
- **Ureter**
- **Bladder**
- **Urethra**
- **Inferior Vena Cava**
- **Abdominal Aorta**
- **Renal Artery**
- **Renal Vein**

Kidney-Nephron-Glomerulus

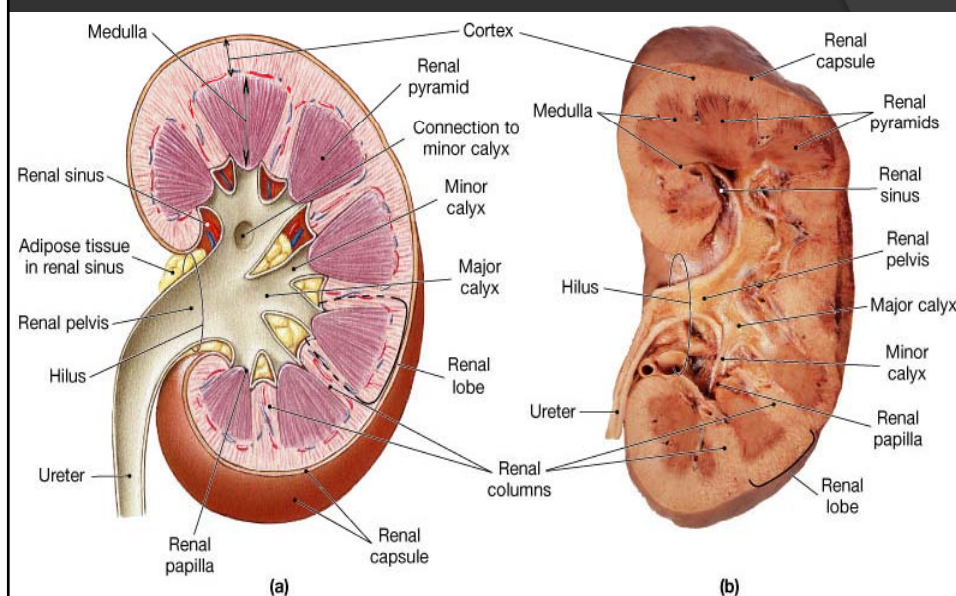
- Renal Artery
 - Segmental Artery
 - Interlobar Artery
 - Arcuate Artery
 - Interlobular Artery
 - Afferent arteriole
 - Efferent Arteriole
 - peritubular capillaries
 - vasa recta
 - Interlobular vein
 - arcuate vein
 - interlobar vein
 - renal vein
- Renal capsule (not visible on model)
 - Renal Cortex
 - Renal Medulla
 - Renal Pyramids
 - Minor Calyx
 - Major Calyx
 - Renal Pelvis
 - Ureter
- Kidney-Nephron-Glomerulus
 - Renal Corpuscle
 - Glomerulus
 - Bowmans Capsule (glomerular capsule)
 - Proximal Convolutud Tubule
 - Descending Limb(loop of Henle)
 - Loop of Henle
 - Ascending Limb (of the loop of Henle)
 - Distal Convolutud Tubule
 - Collecting Duct

Urinary System

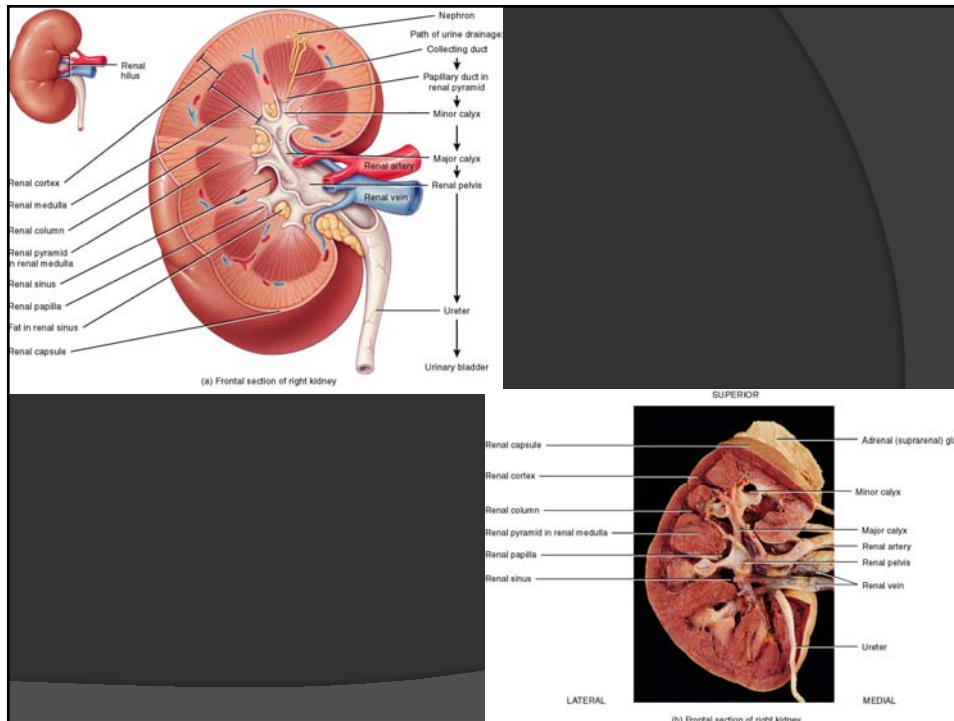
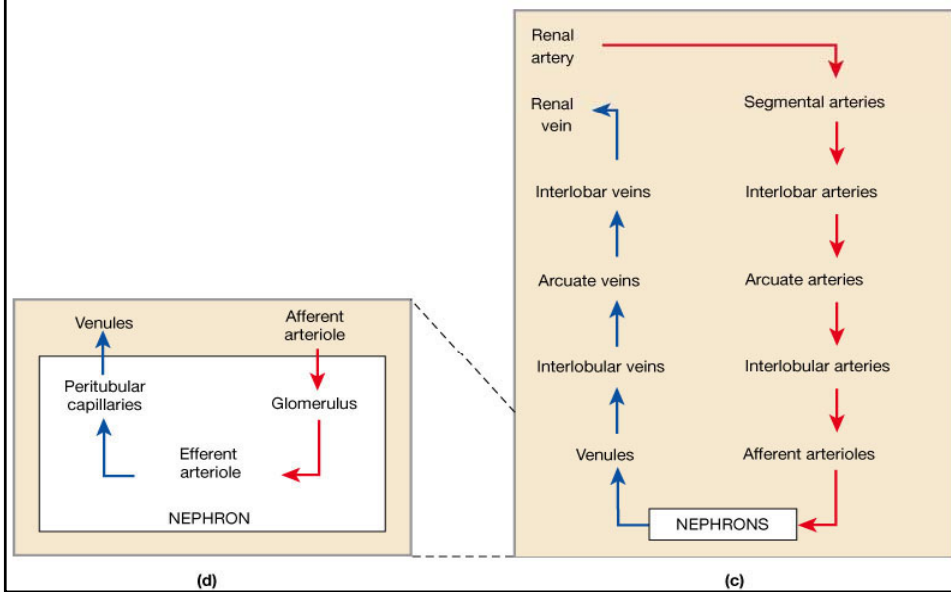
The urinary system consists of the two kidneys and the excretory passages, which convey urine from the kidneys to the exterior of the body. Excretory passages include the minor calyces, major calyces, renal pelvis (one for each kidney), the two ureters, the urinary bladder, and the urethra.

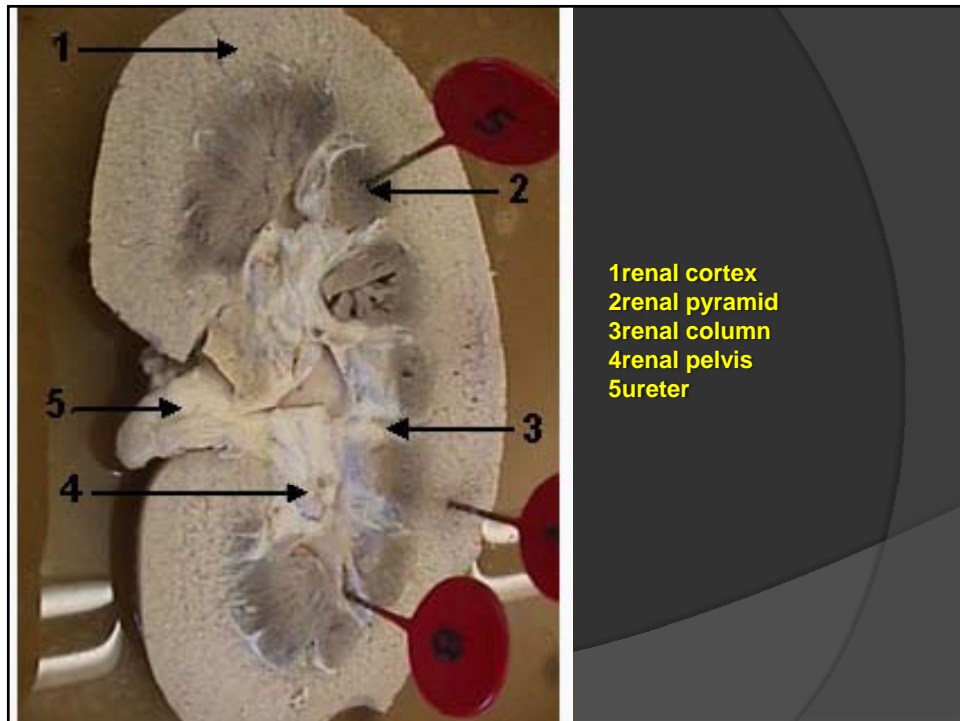
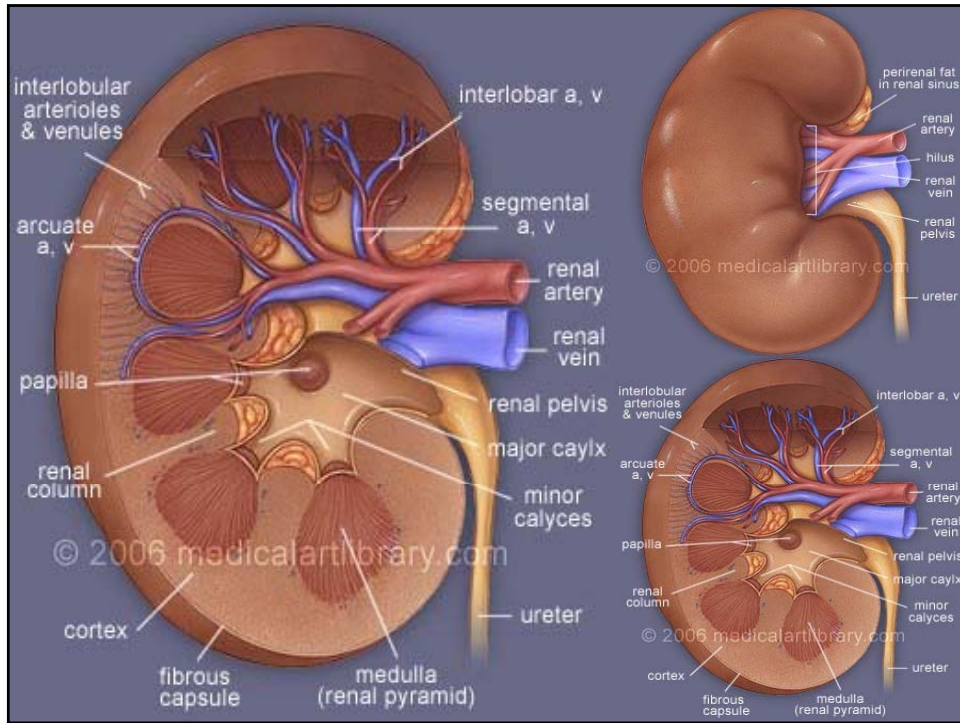


The Structure of the Kidney

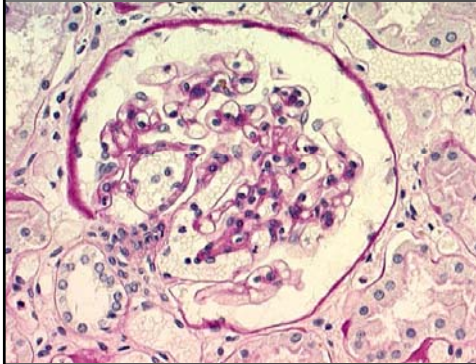


The Blood Supply to the Kidneys

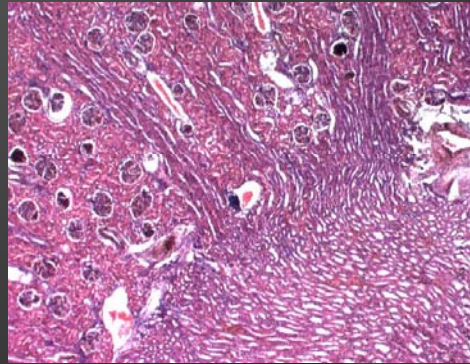




URINARY SYSTEM LAB SUPPLEMENT



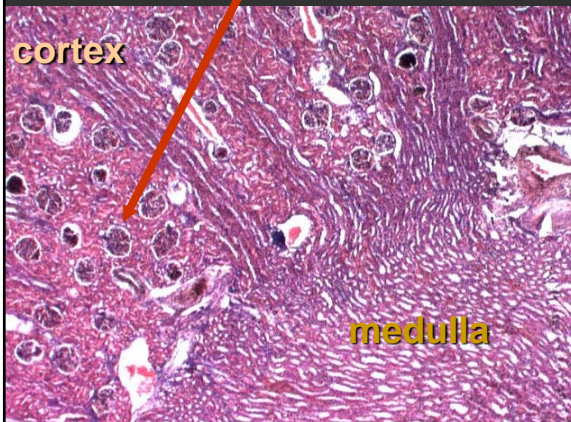
A Renal Corpuscle



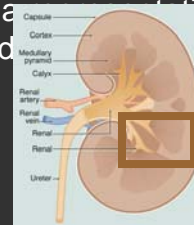
Medulla vs. Cortex

Parts of the Kidney

Within the kidney, utilize the diagram on the right to identify the **capsule**, **cortex**, **renal corpuscles**, and **medulla**, which has no renal corpuscles. The slide on the left is a **transverse** section from this part of the kidney.



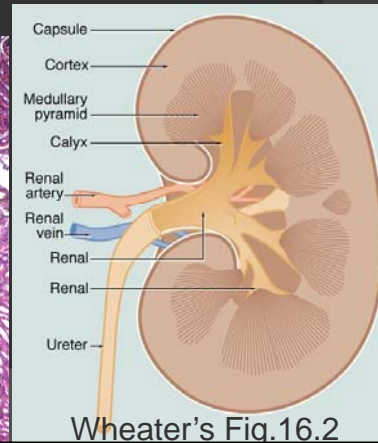
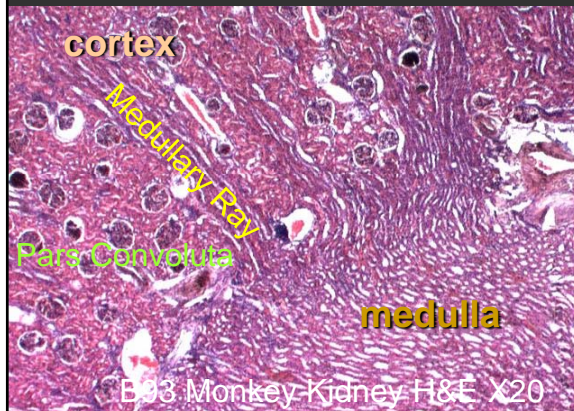
Slide B93 Monkey Kidney H&E X20



Wheater's Fig.16.2

Parts of the Kidney

On the left, locate an area in the cortex where tubules run parallel to one another and are cut longitudinally. This is a **pars radiata** or **medullary ray**. On either side is a **pars convoluta**, which contains renal corpuscles and coiled tubules.



Kidney: Cortex versus Medulla

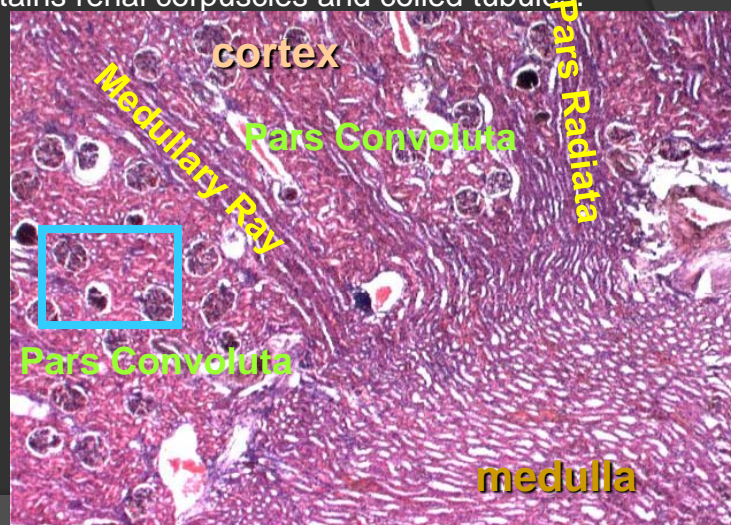
With the same image, note the **medullary rays** are composed of collecting tubules. On either side is a **pars convoluta**, which contains renal corpuscles and coiled tubules.

Slide B93

Monkey
Kidney

H&E X20

Next, we will look at a higher magnification of this area of the **pars convoluta**.



Kidney: Convolved Tubules

Within the **pars convoluta**, identify **proximal convoluted tubules (PCT)** and **distal convoluted tubules (DCT)**. The **PCT** is more than twice as long as the **DCT**, so the majority of tubules are **PCT**.

DISTINGUISHING CHARACTERISTICS

PCT

- star-shaped lumen
- debris in lumen
- highly eosinophilic tall cuboidal cells
- more cells per lumen
- clear lumen (no debris)
- no or minimal brush border
- less eosinophilic cells
- normal cuboidal epithelium

DCT

- clear lumen
- fewer cells per lumen
- normal cuboidal epithelium

Slide B92 Human Kidney PAS X200

Kidney: PCT versus DCT

The diameter of the **distal convoluted tubules (DCT)** is much smaller than the **proximal convoluted tubules (PCT)**, although the luminal diameter of the two tubules are approximately the same.

DISTINGUISHING CHARACTERISTICS

PCT

- star-shaped lumen is due to the pull of the brush border
- Fewer nuclei appear in cross-section and cell boundaries are indistinct
- Basal infoldings due to mitochondria

DCT

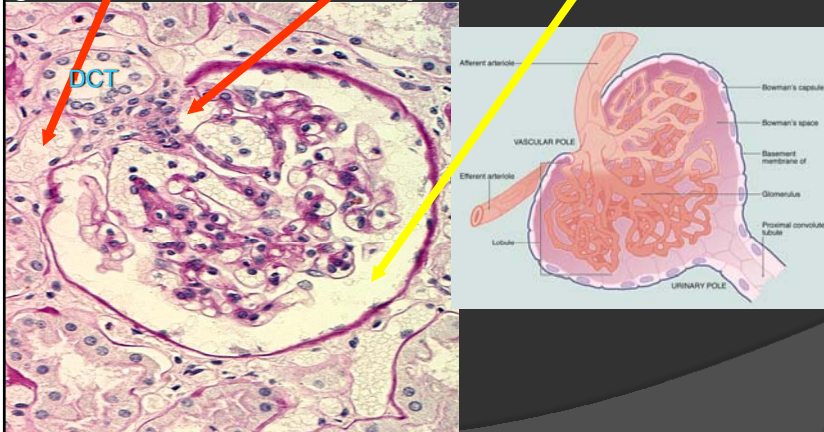
- no precipitate in lumen
- more nuclei with distinct cell boundaries
- paler cytoplasm

renal corpuscle

Slide B90 Human Kidney H&E X400

Kidney: Renal Corpuscle

Note the schematic of the renal corpuscle (glomerulus) on the right and how it is suspended in the **urinary (Bowman's) space**. The **afferent** and **efferent arterioles** enter and leave the glomerulus at the **vascular pole**.

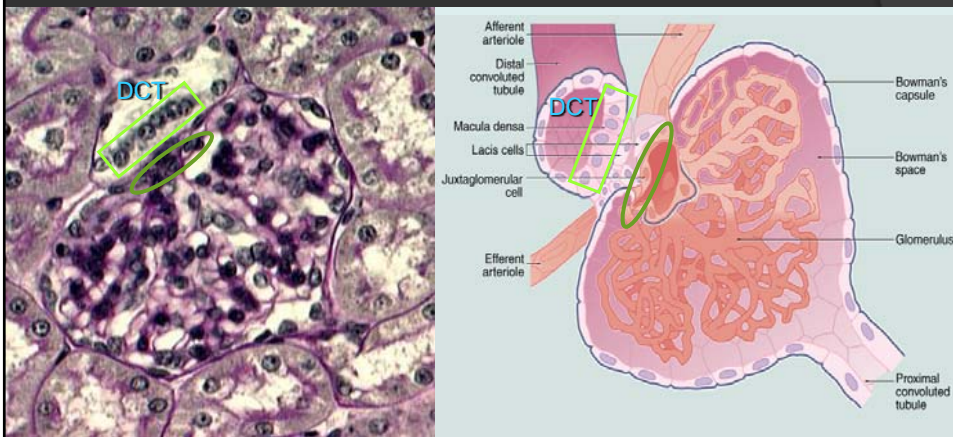


Slide B92 Human Kidney PAS X200

Wheater's Fig.16.7

Kidney: Vascular Pole

Search for an area within the **renal corpuscle** where a **distal convoluted tubule** makes contact with the vascular pole of the renal corpuscle. Note the **macula densa** and **juxtaglomerular cells**.

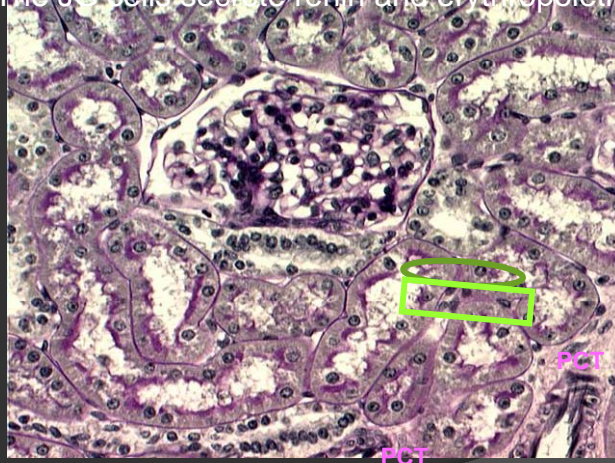


Slide B94 Rabbit Kidney PAS X200

Wheater's Fig.16.18b

Kidney: Vascular Pole

The **macula densa** of the **distal convoluted tubule** and the **juxtaglomerular (JG) cells** constitute a **juxtaglomerular apparatus (JGA)**. The JG cells secrete renin and erythropoietin.



Slide B94 Rabbit
Kidney PAS X200

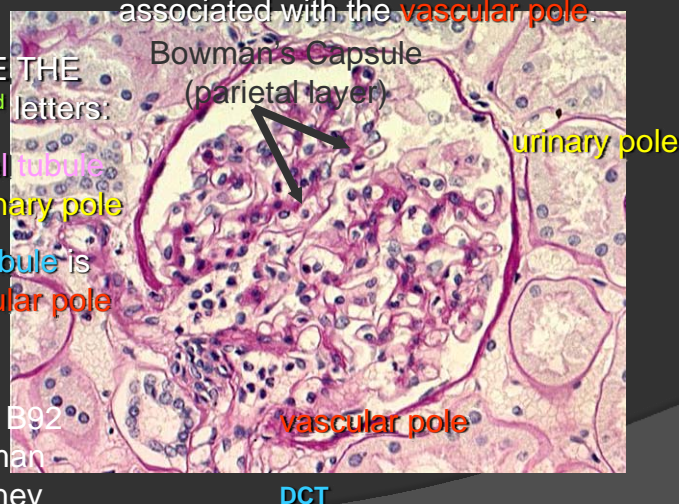
Kidney: Glomerulus Reminder

Remember the **proximal convoluted tubules (PCT)** is associated with the **urinary pole** and the **distal convoluted tubules (DCT)** is associated with the **vascular pole**.

NOTICE THE
2nd & 3rd letters:

proximal tubule
is at **urinary pole**

distal tubule is
at **vascular pole**

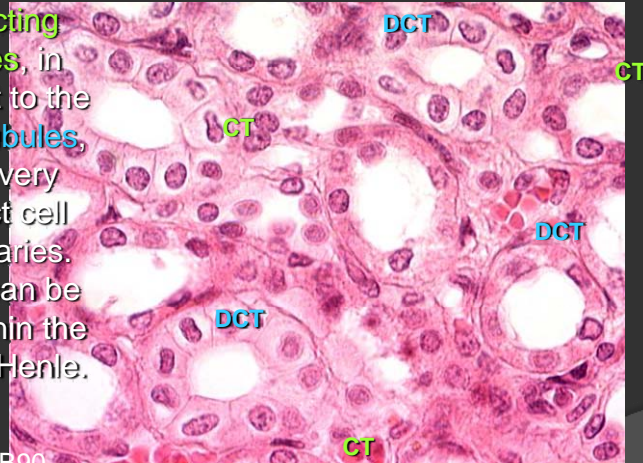


Slide B92
Human
Kidney
PAS X200

Kidney: Collecting Tubules

Photo of renal medulla with three **collecting tubules (CT)** consisting of cuboidal and some columnar cells.

Collecting tubules, in contrast to the **distal tubules**, have very distinct cell boundaries. **DCTs** can be thin within the loop of Henle.



Slide B90
Human Kidney
H&E X200

Kidney: Collecting Ducts

Photo of **renal papilla** projecting into **renal calyx**. The apex of the papilla contains openings, the **collecting ducts (of Bellini)**. These ducts deliver urine from the renal pyramid to the minor calyx.

Collecting tubules, widen to form **collecting ducts** (columnar epithelium). The outer portion of the **minor calyx** is lined with transitional epithelium.



renal calyx

collecting ducts (of Bellini).

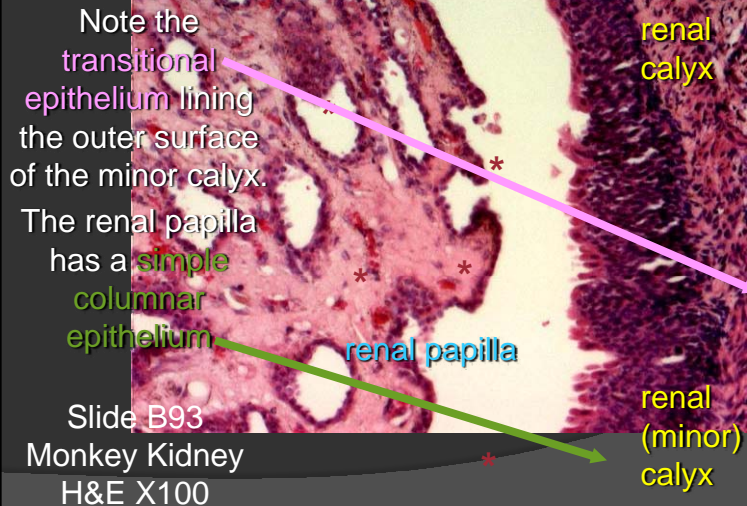
renal papilla

renal (minor) calyx

Slide B93 Monkey
Kidney H&E X20

Kidney: Renal Papilla

Higher magnification photo of renal papilla projecting into renal calyx. The openings seen within the papilla are the collecting ducts (of Bellini).



REF

- Medical Cell and Tissue Biology
- Dr. H. Wayne Lambert
- April 14th, 2003 (11:00AM)