

The Kidney Dissection

(photos courtesy of Murray Jensen at UMN)

BACKGROUND INFORMATION

The human urinary system consists of two kidneys, two ureters, one urinary bladder, and one urethra. This system has two basic functions, both of which occur in the kidneys. The first function is to remove nitrogenous wastes (such as creatine, urea, and uric acid) from the body. The second function is to maintain the electrolyte, acid-base, and fluid balances of the blood.

One product of these processes is urine, which -- generally -- is a pale yellow fluid containing water, urea, sodium, potassium, phosphate, sulfate ions, creatine, uric acid, calcium, magnesium, and bicarbonate ions.

Urine moves from the kidneys to the urinary bladder in the ureters, which, for the purposes of this lab, are extensions of the renal pelvis. Urine is stored in the urinary bladder until it leaves the body via the urethra.

BASIC KIDNEY ANATOMY

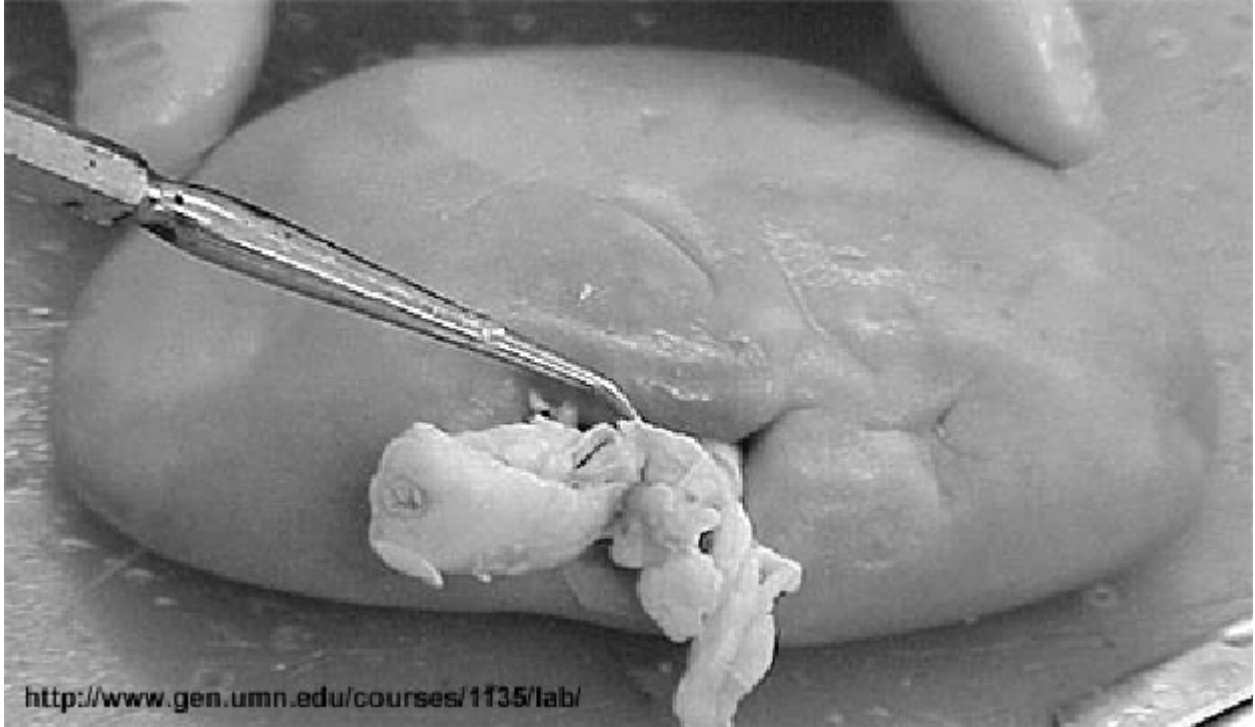
There are four primary components to a kidney:

1. Renal Capsule: A smooth semitransparent membrane that adheres tightly to the outer surface of the kidney.
2. Renal Cortex: The region of the kidney just below the capsule. When your kidney is dissected then you should be able to see blue and red specks scattered through the cortex. These are specks of injected latex that illustrate the rich vascular supply of the cortex.
3. Medullary Region (renal medulla): The region just deep to the cortex that is segregated into triangular and columnar regions. The triangular regions are the renal pyramids, which should be striated (or striped) in appearance due to the collecting ducts running through them. The columnar regions between the pyramids are the renal columns. These renal columns are where the interlobar arteries are located.
4. Renal Pelvis: A cavity within the kidney that is continuous with the ureter, which exits from the hilus. The pelvis has portions that extend towards the apexes of the renal pyramids. The primary (large) extensions are the major calyces and the smaller extensions are the minor calyces.

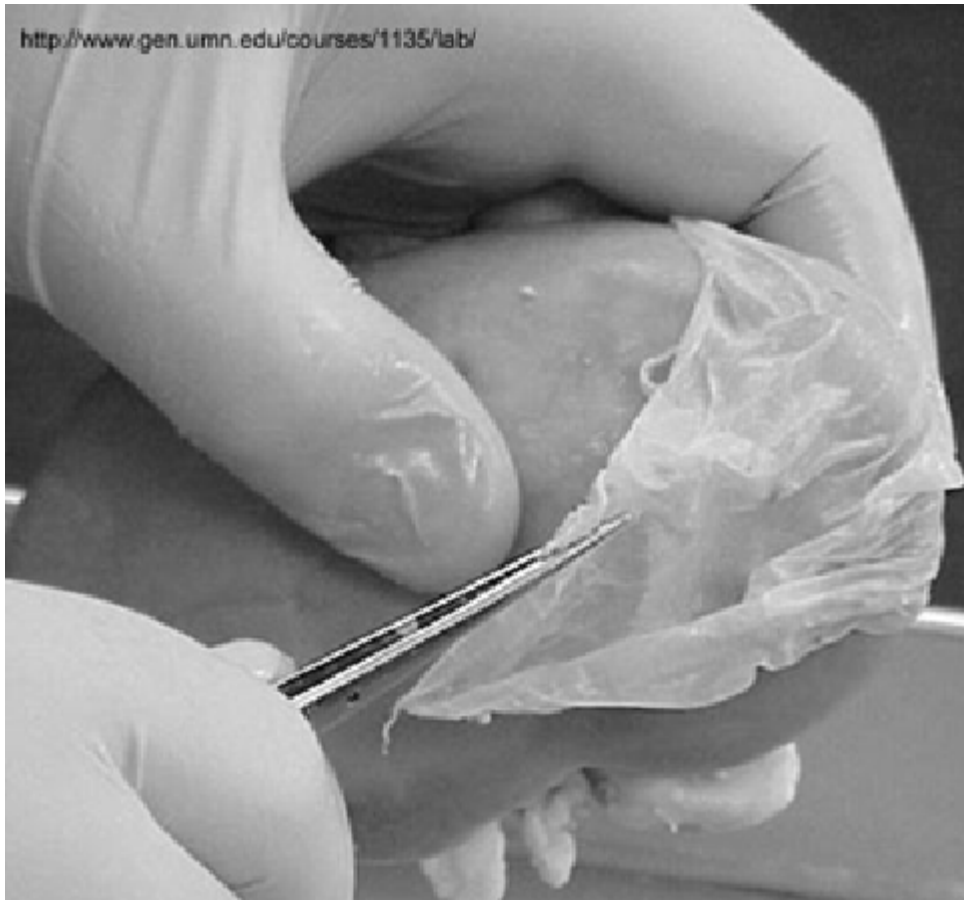
PROCEDURE

1. Collect your dissecting tools and tray. Obtain a preserved sheep kidney.
2. You should notice adipose tissue (remnants of the adipose capsule) clinging to the the renal capsule.

3. You should also notice a “pinched-in” area where the renal blood vessels and ureter are attached to the kidney. This is the renal hilus.



4. Remove the renal capsule.



5. Once the renal capsule is removed, you will be looking at the renal cortex (if you would remove the renal cortex then you would see the renal medulla).
6. Separate the renal blood vessels from one another and from the ureter. Generally, the tube with the most adipose around it is the ureter.

* Notice the histological differences (and similarities) between the renal arteries, renal veins, and ureter.

7. Make a frontal (coronal) section through the kidney. Identify the renal pyramids (and parts of the pyramids), the renal columns, the renal pelvis, renal cortex, ureter and any blood vessels that are present.

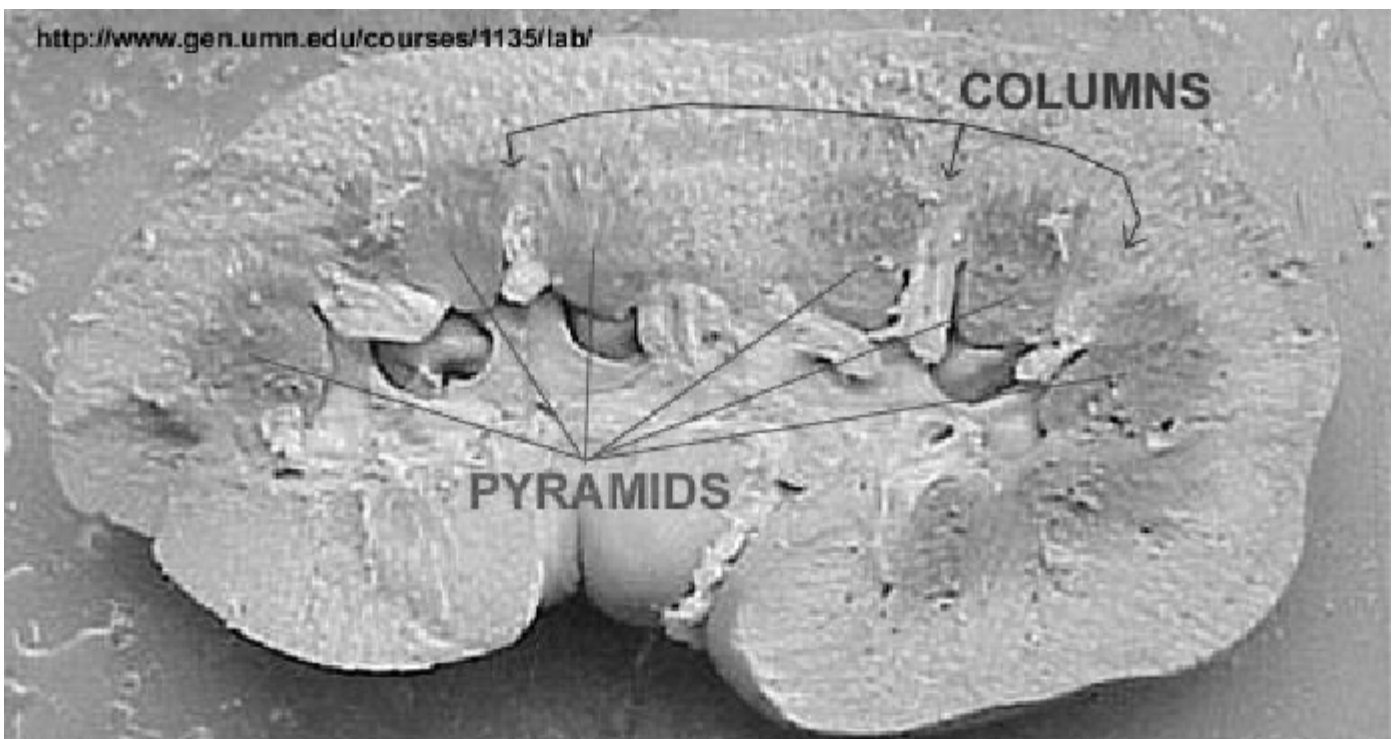


WARNING: Do Not Cut the kidney on your hand!!



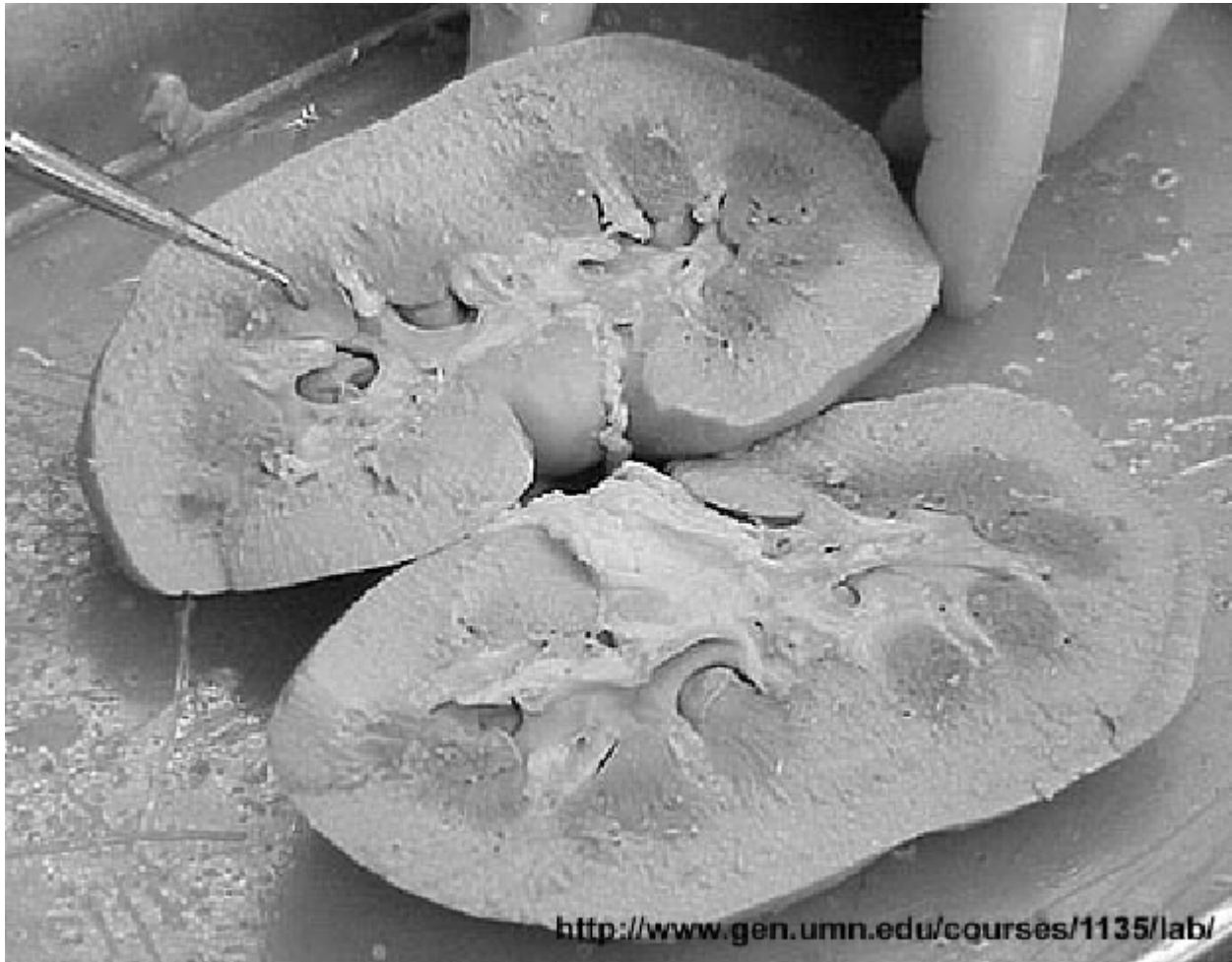
8. If you have your kidney available, then identify the following structures in situ:

- a) calyx (calyces)
- b) cortex
- c) hilus
- d) medulla
- e) renal columns
- f) renal papilla
- g) renal pelvis
- h) renal pyramids
- i) ureter (if present)



REVIEW QUESTIONS

- i. During micturition, urine moves out of the the urinary bladder via this structure.
- ii. What portion of the kidney contains the renal pyramids?
- iii. What blood vessels function to carry blood from the aorta to the segmental arteries?



1. What is the smooth semitransparent membrane that adheres tightly to the outer surface of the kidney?
2. What blood vessel receives blood from the renal veins? What are the two primary functions of the urinary system?
3. What structures allow urine to move from the kidneys to the urinary bladder?
4. What is the smooth muscular layer of the renal artery called?
5. What region of the kidney is between the capsule and the medulla?
6. What usually attaches the kidneys to the retroperitoneum (the space behind the peritoneum)?
7. What are the areas between the renal pyramids called (where the interlobar arteries are located)?
8. What is the cavity within the kidney that is continuous with the ureter?
9. What is the area of the kidney where the renal blood vessels and ureter are attached to the kidney.
10. What are the calyces?
11. When you remove the renal capsule from a kidney, what portion of the kidney becomes clearly visible?

TASK:

1. Draw a kidney and label structures 8a-i.
2. Answer review questions i-iii
3. Answer review questions #1-11
4. Hand in one set of answers per lab group