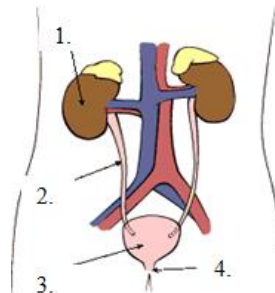


## Section A: Urinary System Intro

The principal function of the urinary system is to maintain the volume and composition of body fluids within normal limits. To do this, the kidneys filter the cellular waste products from the blood. The urinary system also maintains an appropriate fluid volume by regulating the amount of water that is excreted in the urine. Other aspects of its function include regulating the concentrations of various electrolytes in the body fluids and maintaining normal pH of the blood.

In addition to maintaining fluid homeostasis in the body, the urinary system controls red blood cell production by secreting the hormone erythropoietin. The urinary system also plays a role in maintaining normal blood pressure by secreting the enzyme renin. The urinary system consists of the kidneys, ureters, urinary bladder, and urethra. The kidneys form the urine and account for the other functions attributed to the urinary system. The ureters carry the urine away from kidneys to the urinary bladder, which is a temporary reservoir for the urine. The urethra is a tubular structure that carries the urine from the urinary bladder to the outside. <http://training.seer.cancer.gov/anatomy/urinary/>

1. What is the main function(s) of the urinary system? \_\_\_\_\_
2. How do the kidneys regulate fluid level? \_\_\_\_\_
3. The enzyme renin is secreted by the kidneys. What is the function of renin? \_\_\_\_\_
4. What organs make up the urinary system? \_\_\_\_\_
5. What is the function of the ureters? \_\_\_\_\_
6. What is the function of the bladder? \_\_\_\_\_
7. What is the function of the urethra? \_\_\_\_\_



## Section B: Urinary System Functions

1. Label the diagram.

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_
- (3) \_\_\_\_\_
- (4) \_\_\_\_\_

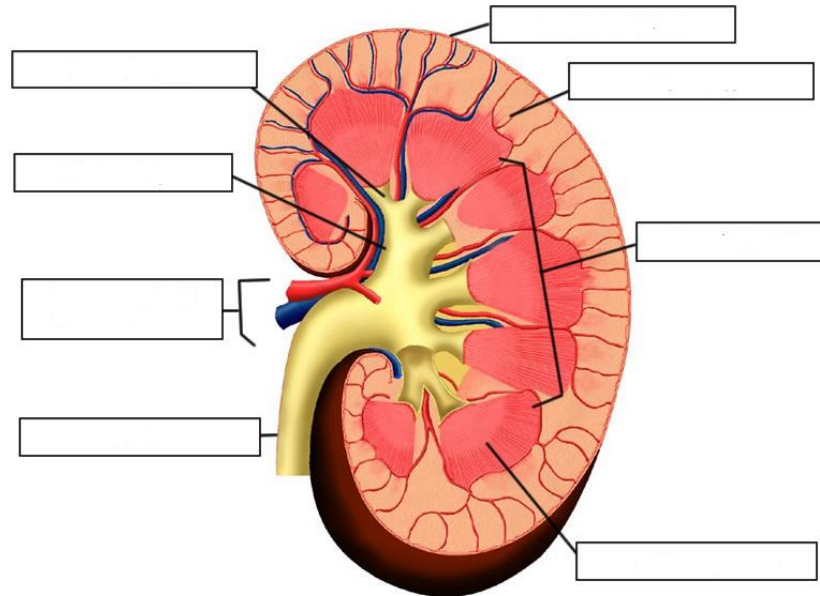
2. Your urinary system is responsible for several functions. List the 5 functions.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_

3. What would be the result of erythropoietin overproduction by the kidneys? \_\_\_\_\_
4. Why do the kidneys produce renin? \_\_\_\_\_
5. What would happen to your blood pressure if your kidneys could not regulate the production of renin? \_\_\_\_\_
6. What is the function of the bladder? \_\_\_\_\_
7. What is the function of the ureter and urethra? \_\_\_\_\_

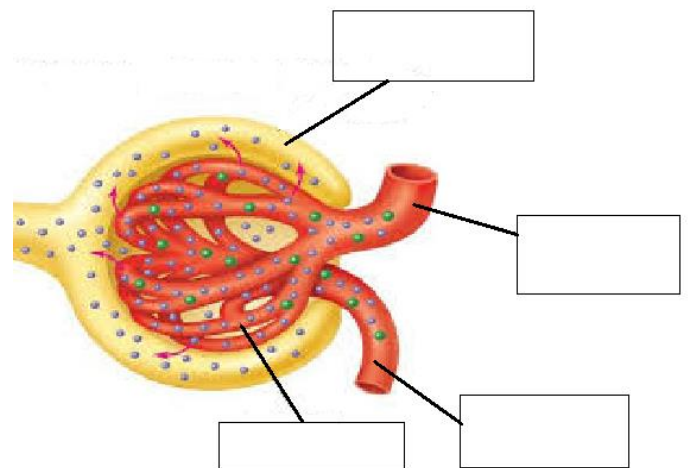
## Section C: The Kidneys

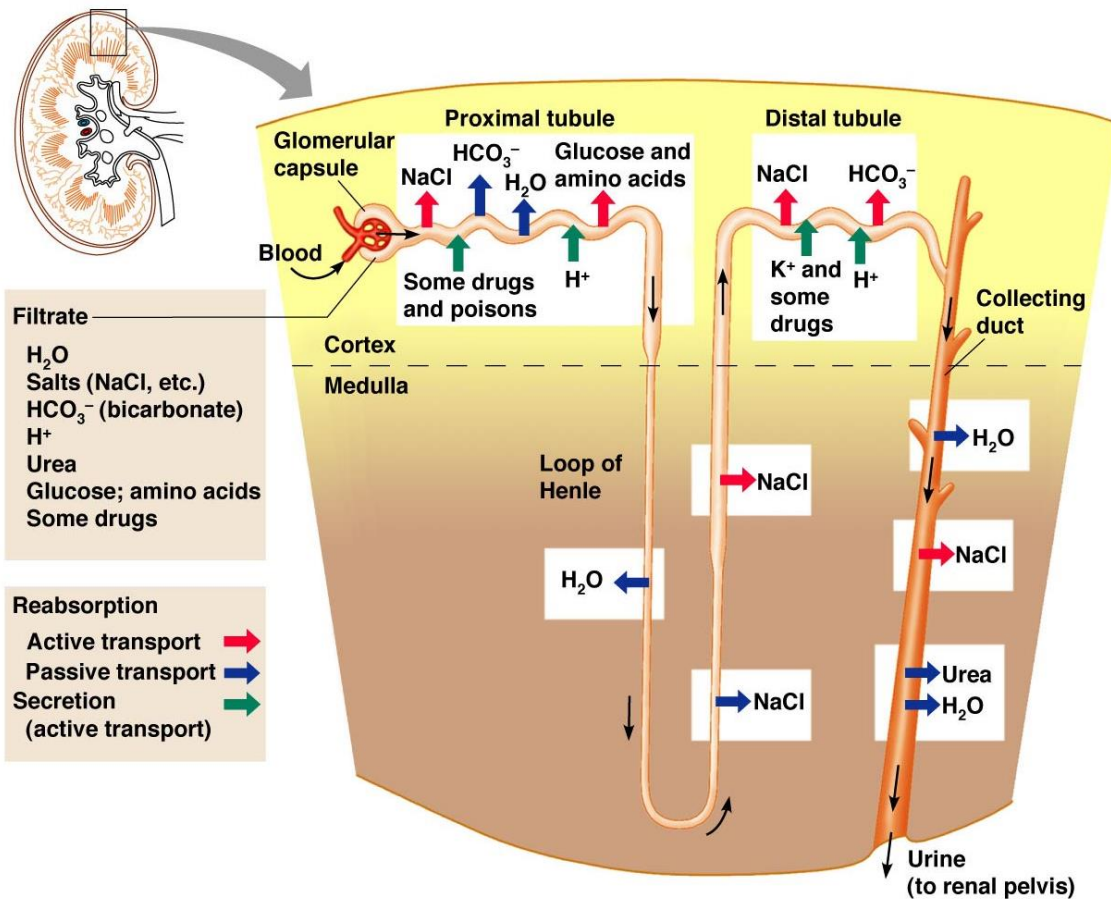
1. Where are the kidneys located in the body? \_\_\_\_\_
2. What is the medial indentation on the kidneys called? \_\_\_\_\_
3. What glands sit on top of the kidneys? \_\_\_\_\_
4. What tissue is found in the renal capsule? \_\_\_\_\_
5. What is the function of the renal capsule? \_\_\_\_\_
6. What are the 3 regions that make up a kidney? \_\_\_\_\_
7. What vessel branches off the aorta and brings blood into the kidneys? \_\_\_\_\_
8. What vessel returns filtered blood to the inferior vena cava? \_\_\_\_\_
9. Label the kidney.



## Section D: The Nephron

1. What is the structural and functional unit of the kidney? \_\_\_\_\_
2. What 3 processes occur so the nephron can regulate the concentration of water and soluble substances to form urine? \_\_\_\_\_
3. What are the 2 structures that make up a nephron? \_\_\_\_\_
4. Which structure in a nephron is a knot of capillaries? \_\_\_\_\_
5. What are the 4 parts of the renal tubules? \_\_\_\_\_
6. The renal artery brings blood into the kidney to be filtered and continues to branch into smaller arteries. Which arteriole brings blood into the glomerulus? \_\_\_\_\_
7. Where is the glomerulus located in the kidney? \_\_\_\_\_
8. Almost any molecule smaller than 3 nm can pass freely through the capsule membrane. What is the process called by which water and dissolved particles are forced through the capillary walls into the Bowman's Capsule? \_\_\_\_\_
9. What materials are found in filtrate? \_\_\_\_\_
10. Label the diagram – efferent arteriole, afferent arteriole, bowman's capsule, glomerulus
11. Which vessel receives blood from the glomerulus after it's been filtered? \_\_\_\_\_





12. Concentrated filtrate moves into the other parts of the renal tubules. List in order the flow of filtrate into these parts of the renal tubule. \_\_\_\_\_  
 \_\_\_\_\_
13. As urine moves from the Bowman's through the rest of the renal tubules, tubular reabsorption and secretion occurs. What are these processes?  
 a. Tubular reabsorption \_\_\_\_\_  
 \_\_\_\_\_  
 b. Tubular secretion \_\_\_\_\_  
 \_\_\_\_\_
14. From the distal convoluted tubule, urine is collected in the \_\_\_\_\_.
15. The collecting tubules carry urine to the \_\_\_\_\_, then to the \_\_\_\_\_.
16. What does the renal pelvis connect to? \_\_\_\_\_
17. Explain the route in the formation of urine.

Glomerulus → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_  
 \_\_\_\_\_ → \_\_\_\_\_ → Collecting Tubules → \_\_\_\_\_  
 \_\_\_\_\_ → \_\_\_\_\_ → ureter → \_\_\_\_\_ → \_\_\_\_\_  
 \_\_\_\_\_

## Section E: Urine, Homeostasis and Development

1. What materials are normally found in urine? \_\_\_\_\_
2. Identify the possible causes when these substances are found in urine.
  - a. Glucose \_\_\_\_\_
  - b. Proteins \_\_\_\_\_
  - c. WBC \_\_\_\_\_
  - d. RBC \_\_\_\_\_
3. Why is urine yellow? \_\_\_\_\_
4. Urine is sterile. What does this mean? \_\_\_\_\_
5. What is micturition? \_\_\_\_\_
6. When blood volume drops, ADH is released. What is the function of ADH? \_\_\_\_\_
7. Renin stimulates the secretion of aldosterone. What is the function of aldosterone? \_\_\_\_\_
8. How is the urinary system affected as one ages? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Section F: Diseases <http://www.livescience.com/27012-urinary-system.html>

- \* Urinary tract infections (UTIs) occur when bacteria enters the urinary tract and can affect the urethra, bladder or even the kidneys. While UTIs are more common in women, they can occur in men. UTIs are typically treated with antibiotics.
- \* Incontinence is the leakage of urine. It can come in the form of a pelvic prolapse, which can be the result of a vaginal delivery. Then there is the overactive bladder. A third condition involves overflow, in which the bladder does not completely empty. Some common treatments involve medications, physical therapy and pelvic mesh surgery.
- \* Interstitial cystitis (IC), also called painful bladder syndrome, is a chronic bladder condition, primarily in women, that causes bladder pressure and pain and, sometimes, pelvic pain to varying degrees. It can cause bladder scarring, and can make the bladder less elastic. While the cause isn't known, many people with the condition also have a defect in their epithelium, the protective lining of the bladder.
- \* Prostatitis is a swelling of the prostate gland and, therefore, can only occur in men. Often caused by advanced age, symptoms include urinary urgency and frequency, pelvic pain and pain during urination.
- \* Kidney stones are clumps of calcium oxalate that can be found anywhere in the urinary tract. Kidney stones form when chemicals in the urine become concentrated enough to form a solid mass. They can cause pain in the back and sides, as well as blood in the urine. Many kidney stones can be treated with minimally invasive therapy, such as extracorporeal shock wave lithotripsy, which disintegrates the kidney stones with shock waves.
- \* Kidney failure, also called renal failure and chronic kidney disease, can be a temporary (often acute) condition or can become a chronic condition resulting in the inability of the kidneys to filter waste from the blood. Other conditions, such as diabetes and hypertension, can cause chronic kidney disease. Acute cases may be caused by trauma or other damage, and may improve over time with treatment. However, renal disease may lead to chronic kidney failure, which may require dialysis treatments or even a kidney transplant.
- \* Bladder cancer is diagnosed in about 75,000 Americans each year and is more frequent in men and the elderly. The symptoms, including back or pelvic pain, difficulty urinating and urgent/and or frequent urination, mimic other diseases or disorders of the urinary system.