

Chapter 15

The Excretory System

*The only limit to our realization of tomorrow
will be our doubts of today.*

Franklin D. Roosevelt

15-1 The Human Excretory System

1. In your opinion, why must certain substances be excreted from the body?

Objective

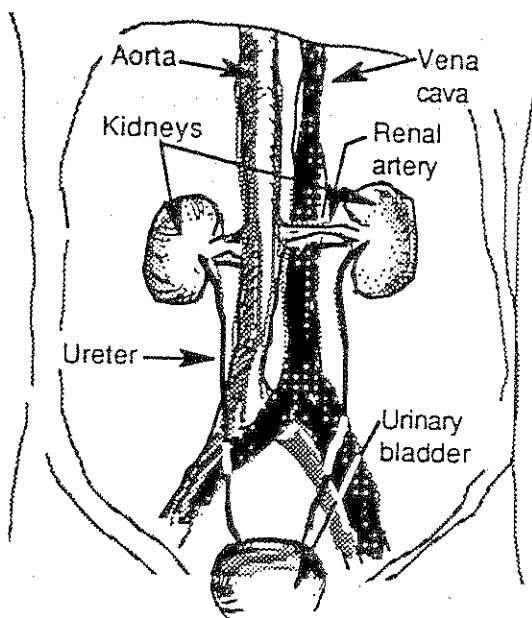
You will be expected to define excretion and list the excretory system's structures and their functions. You should also be able explain how the kidney functions as a homeostatic organ.

The human excretory system, which at times gets a bad reputation, is nevertheless an important system. If it fails, you will die. The general function of the excretory system is to **remove substances from the body that are poisonous or in excess.**

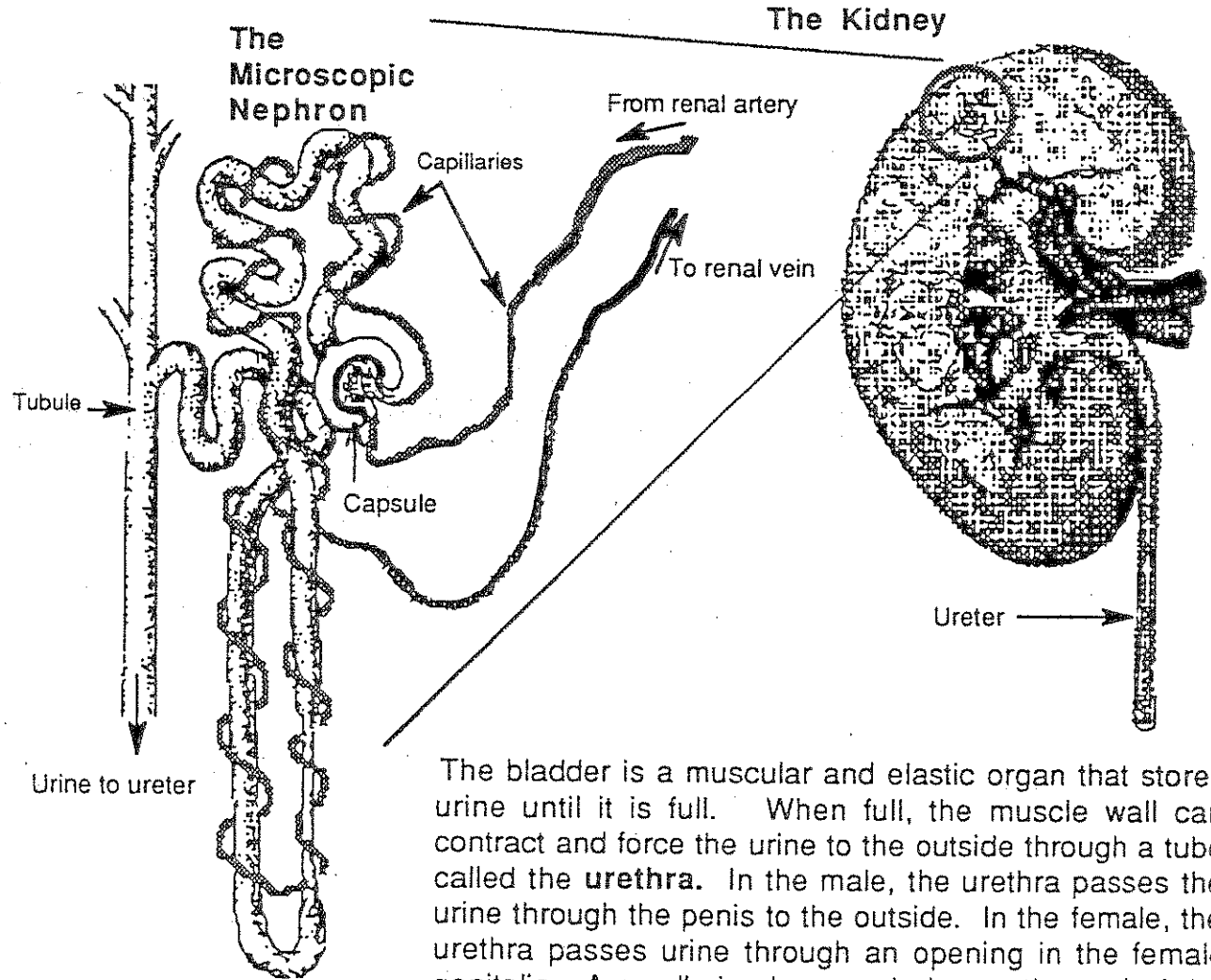
System Structure and Function

Examine the diagram of the excretory system at the right and learn the names of the structures labeled.

The two **kidneys** receive blood from the aorta. The blood passes through the kidney and returns to the vena cava which takes the blood back to the heart. As the blood passes through the kidneys, waste substances, along with water, are removed. Substances in excess of that required to maintain homeostasis are also removed. The water containing these dissolved substances, now known as urine, passes out of



the kidneys through tubes called **ureters**. The functional unit of the kidney is the **nephron**, which is microscopic. Materials in the blood diffuse into the capsule of the nephron. Some molecules are transported back to the blood. The nephron tubules carry urine to a collecting area within the kidney that forms the ureter. The ureters carry the urine out of the kidney to the **urinary bladder**.



The bladder is a muscular and elastic organ that stores urine until it is full. When full, the muscle wall can contract and force the urine to the outside through a tube called the **urethra**. In the male, the urethra passes the urine through the penis to the outside. In the female, the urethra passes urine through an opening in the female genitalia. A small circular muscle keeps the end of the urethra closed until urination, when it relaxes to allow the liquid to flow.

The kidney maintain **homeostasis**. Different substances in the blood must be maintained at constant levels. All living things carry out homeostasis, which is the processes of keeping the internal environment the same. If you eat too much salt, the excess salt will be removed by the kidney. If you drink a lot of water or liquid, the excess will be removed by the kidney and the volume of urine will increase. If we do not drink enough liquid, the urine volume will be below normal. Many soluble substances eaten in excess will be excreted.

The kidney also removes poisonous substances. Where do the poisons come from? As amino acids link together to form protein during normal cellular processes, molecules of **ammonia** (NH_3) are by-products. Ammonia is a very poisonous substance. If allowed

to remain in the body it would do damage. In the liver, the ammonia is combined with carbon dioxide to form a less poisonous substance called **urea**. The urea can circulate in the body for a few days and cause no harm. It is eventually removed by the kidney along with other poisonous substances.

Other Excretory Functions

In our study of the **digestive system**, you learned how undigested food is expelled from the body. This process qualifies as excretion. In one sense the **lungs** perform an excretory function. They exhale carbon dioxide which if allowed to remain in the system, would cause severe damage.

2. Make a chart by placing the names of all the excretory organs in a column on the left. Place their functions opposite in the right column.
3. Define the process of excretion.
4. List all substances that are excreted from the body and list the system that removes each substance.
5. Explain how the kidney qualifies as a homeostatic organ.