Chapter 14

Maintaining the Body

Summary of Terms

- **Alveoli** The tiny sacs in the lungs where gas exchange occurs.
- **Arteries** Blood vessels that carry blood away from the heart.
- **Capillaries** Tiny, thin-walled blood vessels from which molecules are exchanged between blood and body tissues.
- **Diaphragm** The sheet of muscle that covers the bottom of the thoracic cavity; its contraction and relaxation cause inhalation and exhalation.
- **Digestion** The breakdown of food into small organic molecules that can be absorbed and used by the body.
- **Esophagus** The muscular tube that connects the mouth to the stomach.
- **Heart** The muscular organ that pumps blood through the body; consists of four chambers, the right atrium, right ventricle, left atrium, and left ventricle.
- **Hemoglobin** A protein found in red blood cells that binds to and transports oxygen.
- **Large intestine** A part of the digestive system in which water and minerals are absorbed into the body; also home to large numbers of bacteria that feed on undigested materials and play an important role in human biology.
- **Lungs** The organs in which gas exchange occurs.
- **Peristalsis** A moving wave of muscular contractions that moves food down the digestive tract.
- **Platelets** Blood cells that function in blood clotting.
- **Red blood cells** Blood cells that transport oxygen to body tissues.
- **Small intestine** The long, 20-foot organ in the digestive system that receives chyme from the stomach; here, organic molecules are further broken down and then absorbed into the body.

- **Stomach** The organ in the digestive system that receives food from the esophagus; food is digested by enzymes in gastric juice as well as a muscular churning and then sent to the small intestine.
- **Trachea** A short tube stiffened by rings of cartilage that is a part of the respiratory system and also known as the windpipe; air travels down the trachea, which branches into two bronchi that go to the lungs.
- **Veins** Blood vessels that carry blood toward the heart.
- **White blood cells** Blood cells that are part of the immune system.

Detailed Chapter Summary

The circulatory system is responsible for transporting materials around the body, such as oxygen and nutrients, wastes, and special items such as hormones and immune cells. The circulatory system includes the heart, blood vessels, and blood. The heart is a muscular pump divided into four chambers, the right and left atria and right and left ventricles. The right side of the heart pumps blood to the lungs. The left side pumps blood to body tissues. The heartbeat begins in the sinoatrial node and causes the atria to contract simultaneously. The signal continues to the atrioventricular node and then to the ventricles, which also contract simultaneously. Heart valves prevent blood from flowing backwards.

The blood vessels include arteries and arterioles that carry blood from the heart, capillaries in which molecules are exchanged between blood and body tissues, and venules and veins that return blood to the heart.

Blood follows specific paths around the body. Deoxygenated blood from the body returns to the heart and is pumped to the lungs, where it becomes oxygenated. Oxygenated blood returns from the lungs to the heart and is then pumped to body tissues.

Blood is made up of plasma and three different types of cells, red blood cells, white blood cells, and platelets. Hemoglobin is the protein found in red blood cells that carries oxygen. Each hemoglobin molecule is made up of four subunits. Each subunit includes a heme group with an iron atom that binds to oxygen.

Respiration allows the body to obtain oxygen, which is needed for cellular respiration, and to get rid of carbon dioxide, a waste produce of cellular respiration. Air enters through the nostrils, moves through the nasal passages, and continues through the pharynx and larynx and down the windpipe. Air then enters the two bronchi (left and right) and continues into smaller and smaller tubules until it reaches the alveoli. The lungs contain numerous alveoli, each surrounded by a net of capillaries. Oxygen diffuses from the air in the alveoli into the capillaries, and carbon dioxide diffuses from the capillaries into the alveoli. Inhalation occurs when the muscles of the diaphragm and rib muscles contract. Exhalation occurs when these muscles relax.

During digestion, food is broken down into small molecules that can be absorbed and used by the body. Digestion begins in the mouth, where food is chewed and digestive enzymes in saliva begin to break down starches. Food is swallowed and moves down the esophagus to the stomach. Food moves through the digestive system through muscular contractions known as peristalsis. The epiglottis closes off the trachea during swallowing to prevent choking. In the stomach, gastric juice includes digestive enzymes as well as hydrochloric acid that helps to kill bacteria or other swallowed organisms. The stomach also churns the food with powerful muscle contractions. Food is converted to chyme and enters the small intestine. In the first foot of the small intestine, proteins, fats, carbohydrates, and nucleic acids continue to be broken

down. Digestive enzymes active there are made by the small intestine itself or come from the pancreas. The small intestine also receives bile, an emulsifier that is made by the liver and stored in the gall bladder. The rest of the small intestine is responsible for absorbing nutrients into the body. Villi and microvilli are structures that aid in this process by increasing the small intestine's surface area. In the large intestine, water and minerals are absorbed. Feces, composed of indigestible materials and bacteria, are eliminated from the body through the anus.