THE CARDIOVASCULAR SYSTEM: TRANSPORT AND SUPPLY

LEARNING OBJECTIVES

_identify structures and functions of the cardiovascular system_
_trace the blood flow through the vessels and chambers of the heart_
_explain the coronary circulation of the heart_
_describe the contraction of the heart and the conduction system_
_differentiate between arteries, veins, and capillaries_

_list the major components of blood and their functions_
_discuss the importance of blood typing_
_explain the process of blood clotting_
_explain regulation of blood pressure_
_describe various cardiovascular diseases_
TEACHING STRATEGIES

1. Help students to trace the flow of blood as well as the flow of the electrical impulse through the heart. Students should learn to associate

FACTOIDS

1. A simple and inexpensive test for elevated WBC counts could be used as a predictor of impending heart attacks in women. Inflammation

ETHICAL DILEMMAS

1. You’re invited to a friend’s house for Thanksgiving dinner. After dinner, your friend’s father complains of “heartburn,” saying his left

ANSWERS TO TEST YOUR KNOWLEDGE

Test Your Knowledge 13–1 Answers, p. 300

1. d
2. d
3. d
4. left ventricle
5. right

Test Your Knowledge 13–2 Answers, p. 305
1. b
2. b
3. c
4. b

Test Your Knowledge 13–3 Answers, p. 310
1. a
2. b
3. b
4. albumin
5. mononuclear agranulocytes

Test Your Knowledge 13–4 Answers, p. 314
1. a
2. a
3. b
4. c

Test Your Knowledge 13–5 Answers, p. 319
1. c
2. d
3. d
4. tunica interna; tunica media; tunica externa
5. tunica media

ANSWERS TO THE CASE STUDY, P. 326
a. I would suspect the patient is either having a heart attack or angina and is at least in the early stages of COPD.
b. The patient needs a complete physical to find out what is going on. Perhaps medication could prevent a more serious heart condition from developing. Most of my suggestions would involve lifestyle changes. He needs to exercise and lose some weight, give up smoking, and eat better.

ANSWERS TO REVIEW QUESTIONS, P. 326
Multiple Choice
1. c, 2. b, 3. a, 4. b, 5. c, 6. b, 7. c, 8. b
Fill in the Blank

1. a. help maintain body's fluid balance
   b. assist cardiovascular system in distributing nutrients and oxygen, hormones, and removal of waste products
   c. help prevent infection and disease
2. ischemia
3. sphincters
4. Vitamin K
5. Septum
6. increase
7. increase
8. red blood cells

Short Answer

1. Blood pressure is controlled by controlling cardiac output, peripheral resistance, and blood volume. Cardiac output, a combination of heart rate and stroke volume, is influenced by the autonomic nervous system, by ions, and by temperature. Peripheral resistance, the resistance to flow in a blood vessel, is controlled by changing blood vessel diameter. Smaller diameter causes higher pressure. Sympathetic innervation of the tunica media controls blood vessel diameter. Blood volume is a function of fluid volume. Fluid volume is generally controlled by hormones, which control urination.
2. Blood flows from the right atrium through the tricuspid valve into the right ventricle; from the right ventricle through the pulmonary valve into the pulmonary arteries; from the pulmonary arteries into the lungs; from the lungs through the pulmonary veins back to the left atrium; from the left atrium through the bicuspid (mitral) valve and into the left ventricle; from the left ventricle through the aortic valve and into the aorta.
3. Type A blood has A antigens and anti-B antibodies, type B blood has B antigens and anti-A antibodies, Type O blood has no antigens and both anti-A and anti-B antibodies and type AB has both A and B antigens and no antibodies.
4. When a wound is bleeding, blood loss must be controlled. First the vessels constrict. Then platelets are activated, becoming sticky and forming a water soluble plug in the wound. Then fibrinogen is converted to fibrin during clotting, make the platelet plug insoluble and forming a clot.
5. There are three types of formed elements: red blood cells, white blood cells and platelets. Red blood cells transport oxygen, white blood cells fight infection, and platelets form clots to prevent blood loss.
6. Iron is important in your diet because you need iron to make hemoglobin, the molecule responsible for transporting oxygen in your blood.
7. The direction of the wave of contraction is important because the wave must allow the atria to contract before the ventricles so
that the atria can pump blood into the ventricles. The wave also
must travel from the apex of the ventricles toward the base of
the heart so that blood is pushed up toward the vessels exiting
the ventricles, like pushing toothpaste toward the opening of the tube.