

11

The Cardiovascular System

The major structures of the cardiovascular system, the heart and blood vessels, play a vital role in human physiology. The major function of the cardiovascular system is transportation. Using blood as the transport vehicle, the system carries nutrients, gases, wastes, antibodies, electrolytes, and many other substances to and from body cells. Its propulsive force is the contracting heart.

The anatomy and location of the heart and blood vessels and the important understandings of cardiovascular physiology (for example, cardiac cycle, ECG, and regulation of blood pressure) are the major topics of this chapter.

CARDIOVASCULAR SYSTEM: THE HEART

1. Complete the following statements by inserting your answers in the answer blanks.

- _____ 1. The heart is a cone-shaped muscular organ located within the _____ (1). Its apex rests on the _____ (2), and its base is at the level of the _____ (3) rib. The coronary arteries that nourish the myocardium arise from the _____ (4). The coronary sinus empties into the _____ (5). Relative to the roles of the heart chambers, the _____ (6) are receiving chambers, whereas the _____ (7) are discharging chambers. The membrane that lines the heart and also forms the valve flaps is called the _____ (8). The outermost layer of the heart is called the _____ (9). The fluid that fills the pericardial sac acts to decrease _____ (10) during heart activity.
- _____ 2. The heart muscle, or myocardium, is composed of a specialized type of muscle tissue called _____ (11).
- _____ 3.
- _____ 4.
- _____ 5.
- _____ 6.
- _____ 7.
- _____ 8.
- _____ 9.
- _____ 10.
- _____ 11.

2. The heart is called a double pump because it serves two circulations.

Trace the flow of blood through both the pulmonary and systemic circulations by writing the missing terms in the answer blanks. Then, color regions transporting O₂-poor blood blue and regions transporting O₂-rich blood red on Figure 11-1. Finally, identify the various regions of the circulation shown in Figure 11-1 by labeling them using the key choices.

- _____ 1. From the right atrium through the tricuspid valve to the (1),
 _____ 2. through the (2) valve to the pulmonary trunk to the right
 _____ 3. and left (3), to the capillary beds of the (4), to the (5),
 _____ 4. to the (6) of the heart through the (7) valve, to the
 _____ 5. (8) through the (9) semilunar valve, to the (10), to the
 _____ 6. systemic arteries, to the (11) of the body tissues, to the
 _____ 7. systemic veins, to the (12) and (13), which enter the right
 _____ 8. atrium of the heart.

- _____ 5.
 _____ 6.
 _____ 7.
 _____ 8.
 _____ 9.
 _____ 10.
 _____ 11.
 _____ 12.
 _____ 13.

Key Choices

- A. Vessels serving head and upper limbs
 B. Vessels serving body trunk and lower limbs
 C. Vessels serving the viscera
 D. Pulmonary circulation
 E. Pulmonary "pump"
 F. Systemic "pump"

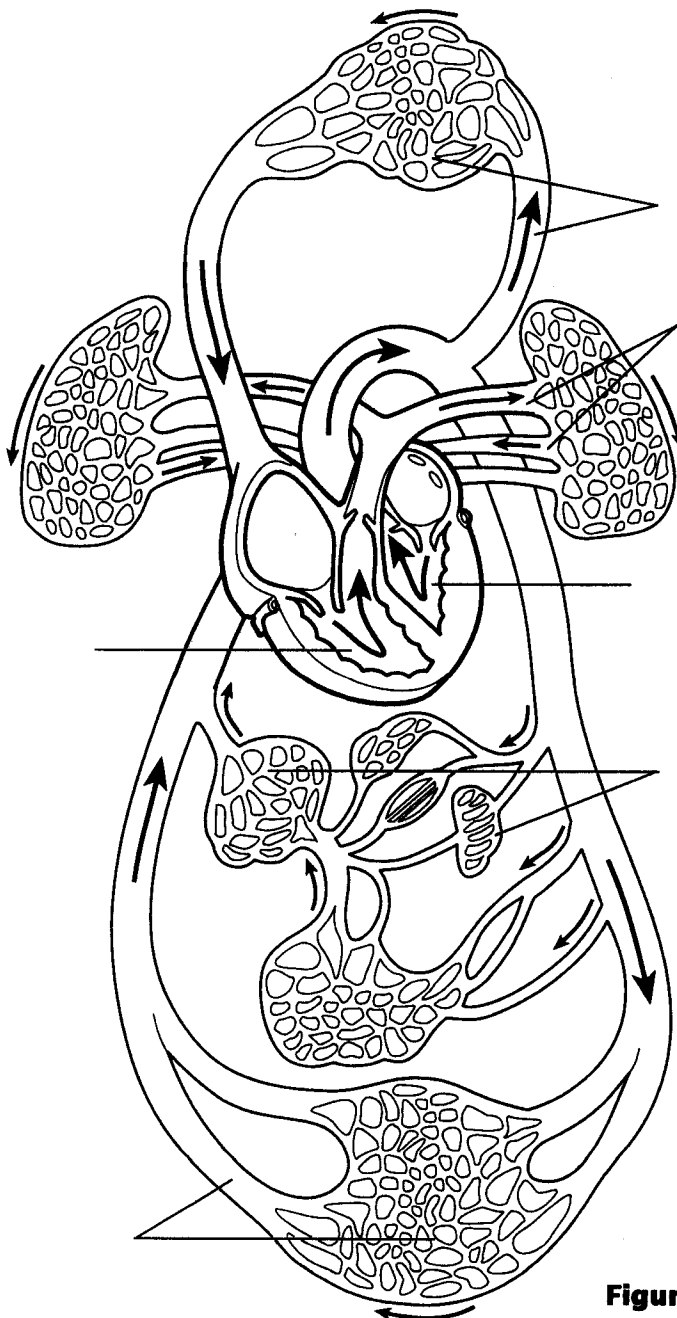


Figure 11-1

3. Figure 11-2 is an anterior view of the heart. Identify each numbered structure and write its name in the corresponding numbered space below the figure. Then, select different colors for each structure provided with a color-coding circle, and use them to color the coding circles and corresponding structures on the figure.

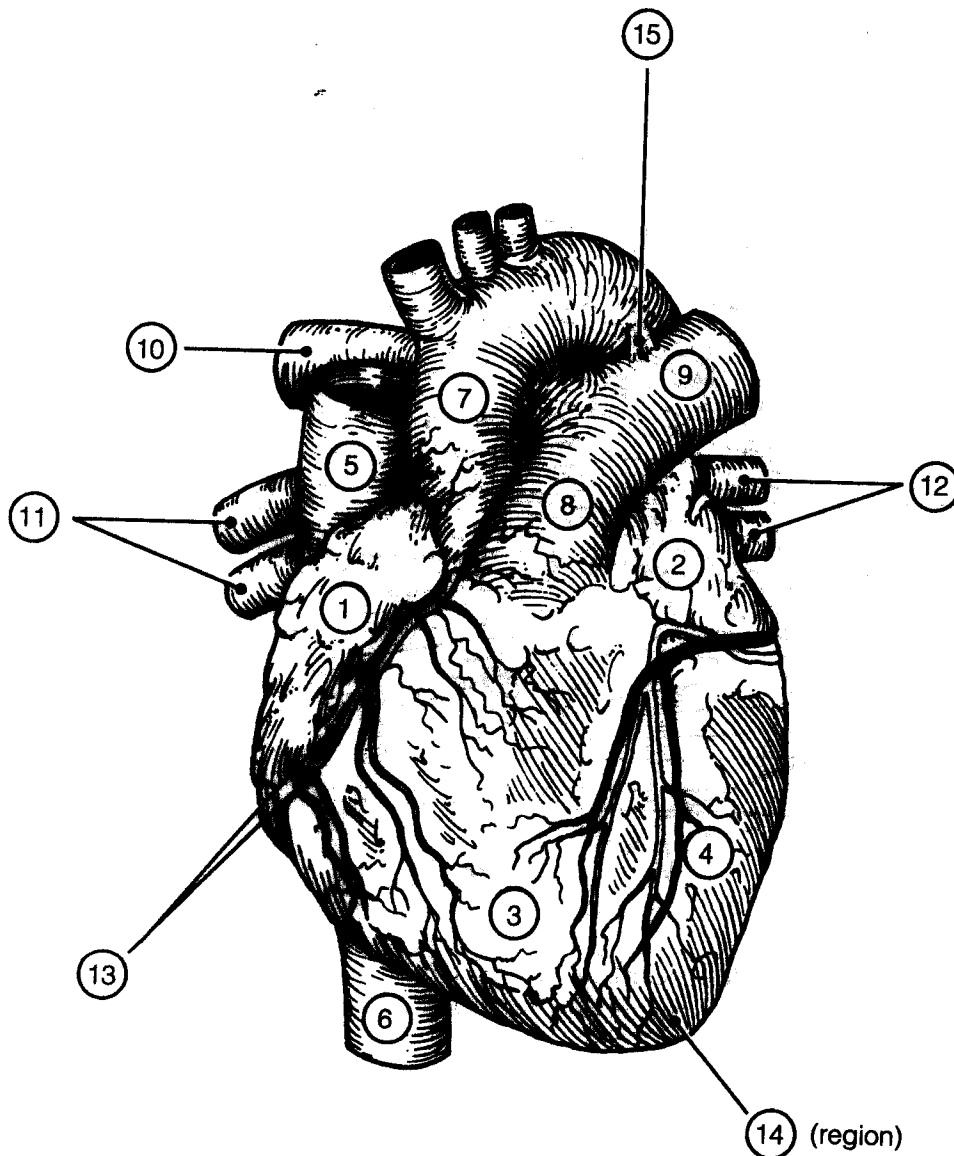


Figure 11-2

- | | | |
|------------|------------|-------------|
| ○ _____ 1. | ○ _____ 6. | ○ _____ 11. |
| ○ _____ 2. | ○ _____ 7. | _____ 12. |
| ○ _____ 3. | ○ _____ 8. | _____ 13. |
| ○ _____ 4. | _____ 9. | _____ 14. |
| _____ 5. | _____ 10. | ○ _____ 15. |

4. Figure 11-3 is a schematic drawing of the microscopic structure of cardiac muscle. Using different colors, color the coding circles of the structures listed below and the corresponding structures on the figure.

- ☐ Nuclei (with nucleoli) ☐ Muscle fibers
☐ Intercalated discs ☐ Striations

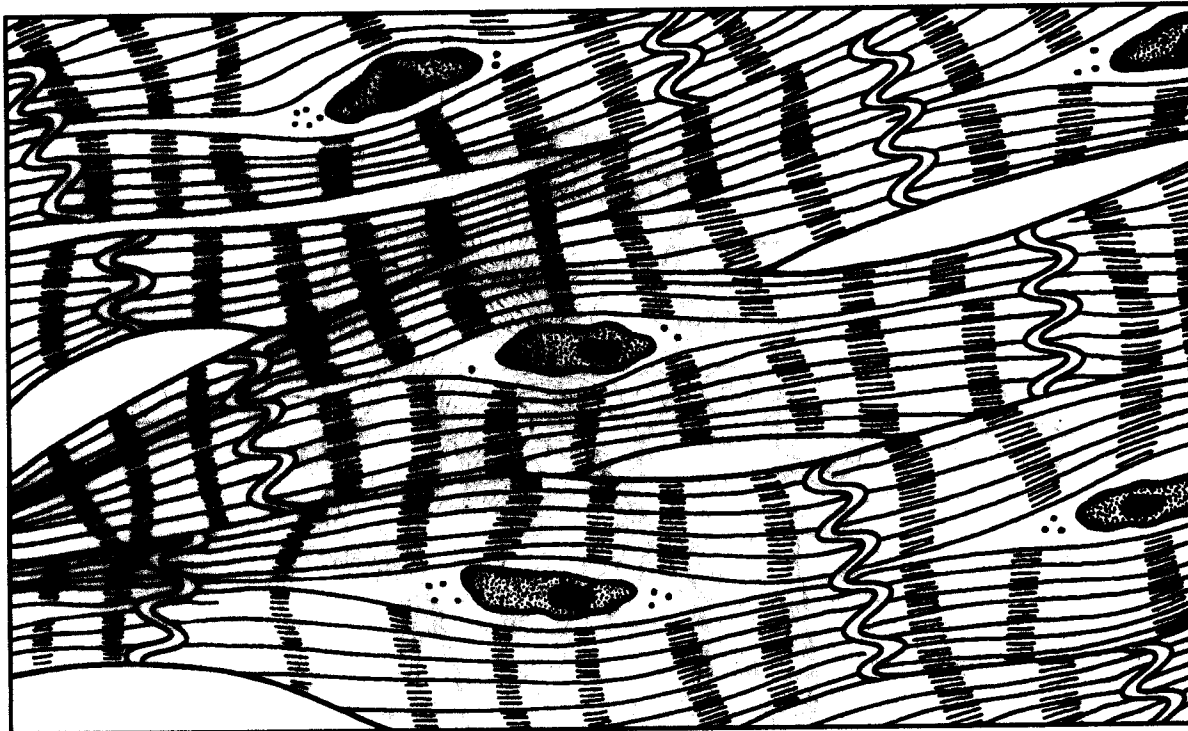


Figure 11-3

5. The events of one complete heartbeat are referred to as the cardiac cycle. Complete the following statements that describe these events. Insert your answers in the answer blanks.

- _____ 1. The contraction of the ventricles is referred to as (1), and the period of ventricular relaxation is called (2). The
- _____ 2. monosyllables describing heart sounds during the cardiac cycle are (3). The first heart sound is a result of closure of
- _____ 3. the (4) valves; closure of the (5) valves causes the second heart sound. The heart chambers that have just been
- _____ 4. filled when you hear the first heart sound are the (6), and the chambers that have just emptied are the (7). Immediately
- _____ 5. after the second heart sound, the (8) are filling with blood, and the (9) are empty. Abnormal heart sounds, or
- _____ 6. (10), usually indicate valve problems.
- _____ 7. _____ 9.
- _____ 8. _____ 10.