

Chapter 5

Cardiology

Cardiovascular System

Cardiology (KAR-dee-AW-loh-jee) is the medical specialty that studies the anatomy and physiology of the cardiovascular system and uses laboratory and diagnostic procedures, medical and surgical procedures, and drugs to treat cardiovascular diseases.

Learning Outcomes

After you study this chapter, you should be able to

- 5.1 Identify structures of the cardiovascular system.
- 5.2 Describe the processes of circulation and a heartbeat.
- 5.3 Describe common cardiovascular diseases, laboratory and diagnostic procedures, medical and surgical procedures, and drugs.
- 5.4 Form the plural and adjective forms of nouns related to cardiology.
- 5.5 Give the meanings of word parts and abbreviations related to cardiology.
- 5.6 Divide cardiology words and build cardiology words.
- 5.7 Spell and pronounce cardiology words.
- 5.8 Research sound-alike and other cardiology words.
- 5.9 Analyze the medical content and meaning of cardiology reports.

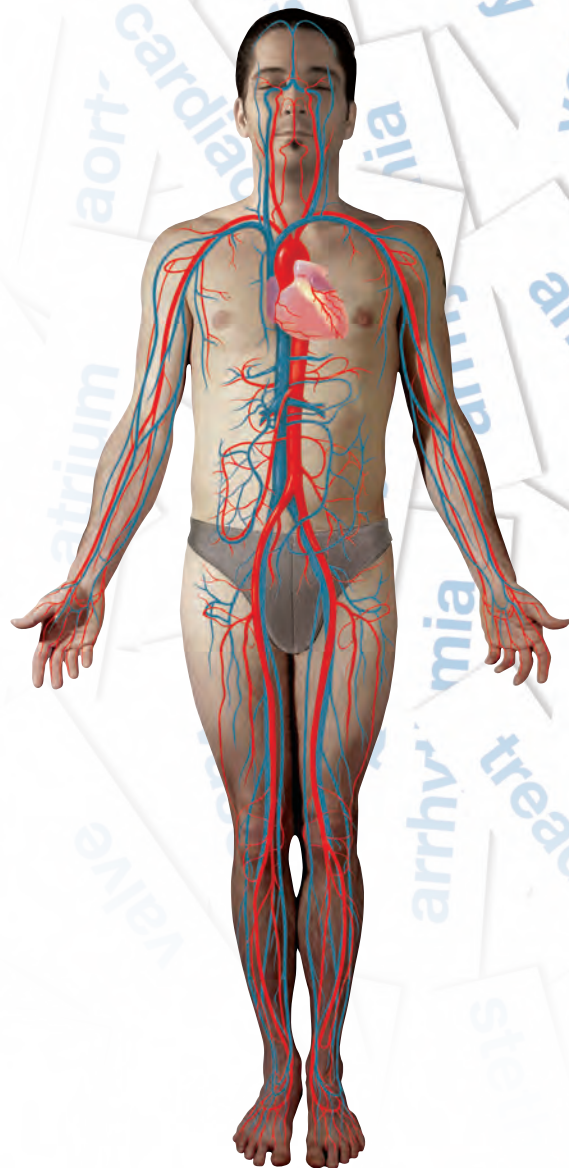


FIGURE 5-1 ■ Cardiovascular system.

The cardiovascular system consists of the heart and blood vessels connected in a continuous, circular pathway that carries blood to and from all parts of the body.

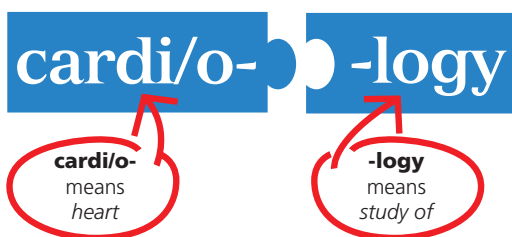
Source: Pearson Education

Medical Language Key

To unlock the definition of a medical word, break it into word parts. Give the meaning of each word part. Put the meanings of the word parts in order, beginning with the meaning of the suffix, then the prefix (if present), then the combining form(s).

	Word Part	Word Part Meaning
Suffix	-logy	study of
Combining Form	cardi/o-	heart

Cardiology ▶ Study of (the) heart (and related structures).



Anatomy and Physiology

The **cardiovascular system** is a continuous, circular body system that includes the heart and the **vascular** structures (blood vessels such as arteries, capillaries, and veins) (see Figure 5-1 ■). It is also known as the **circulatory system**. To study the cardiovascular system, you can begin with the heart or you can begin with the capillaries, the tiniest blood vessels in the farthest parts of the body. Beginning at either starting point, you can go through every part of the cardiovascular system and arrive back where you began. The purpose of the cardiovascular system is to move (circulate) the blood to every part of the body as it transports oxygen, carbon dioxide, nutrients, and wastes. The blood is discussed in “Hematology and Immunology,” Chapter 6.

Anatomy of the Cardiovascular System

Heart

The **heart** is perhaps the best-known organ in the body and certainly one of the most important. It is a muscular organ that contracts at least once every second to pump blood throughout the body. It also has an extensive electrical system that initiates and coordinates its contractions.

HEART CHAMBERS The heart contains four chambers, two on the top and two on the bottom (see Figures 5-2 ■ and 5-3 ■). Each small upper chamber is an **atrium**. Each large lower chamber is a **ventricle**. The **septum**, a central wall, divides the heart into right and left sides. The inferior tip of the heart is the **apex**.

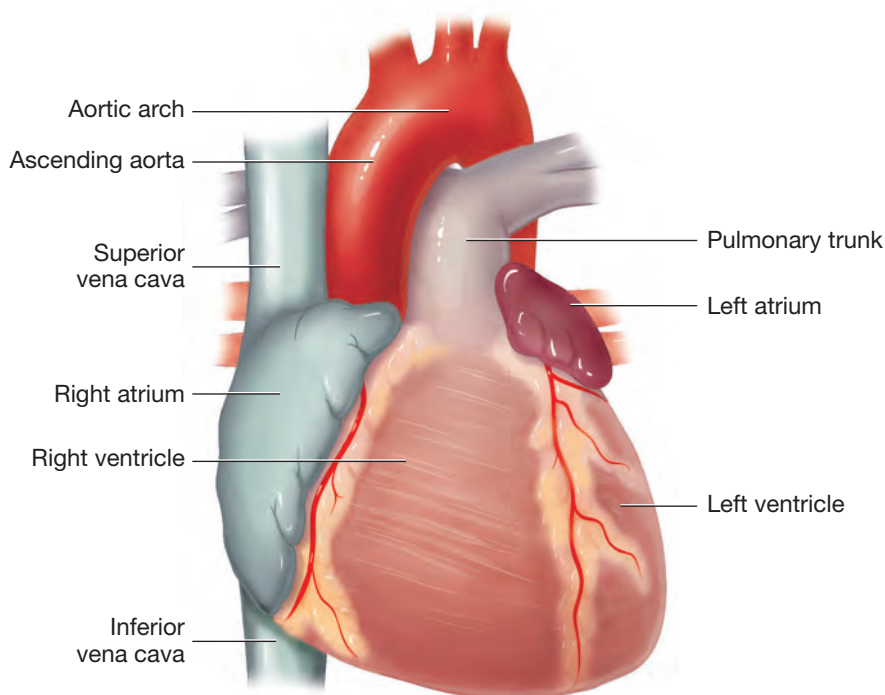


FIGURE 5-2 ■ Surface of the heart.

The boundaries of the internal chambers of the heart can be seen on the surface of the heart as elevated mounds and grooves that are filled with fat, blood vessels, and nerves.

Source: Pearson Education

Pronunciation/Word Parts

cardiovascular (KAR-dee-oh-VAS-kyoo-lar)

cardi/o- heart

vascul/o- blood vessel

-ar pertaining to

vascular (VAS-kyoo-lar)

vascul/o- blood vessel

-ar pertaining to

The combining form **angi/o-** means *blood vessel; lymphatic vessel*. The combining form **vas/o-** means *blood vessel; vas deferens*.

circulatory (SIR-kyoo-lah-TOR-ee)

circulat/o- movement in a circular route

-ory having the function of

cardiac (KAR-dee-ak)

cardi/o- heart

-ac pertaining to

Cardiac is the adjective for *heart*. The Latin word *cor*, which means *heart*, is used in medical reports. The combining form **card/i-** also means *heart*.

atrium (AA-tree-um)

atria (AA-tree-ah)

Atrium is a Latin singular noun. Form the plural by changing *-um* to *-a*.

atrial (AA-tree-al)

atri/o- atrium; chamber that is open at the top

-al pertaining to

ventricle (VEN-trih-kl)

ventricular (ven-TRI-h-kyoo-lar)

ventricul/o- chamber that is filled; ventricle

-ar pertaining to

septum (SEP-tum)

septal (SEP-tal)

sept/o- dividing wall; septum

-al pertaining to

apex (AA-peks)

apical (AP-ih-kal)

apic/o- apex; tip

-al pertaining to

WORD ALERT**Sound-Alike Words**

The prefix *inter-* means *between*. The prefix *intra-* means *within*.

interventricular (adjective) Pertaining to *between* the two ventricles
Example: The interventricular septum is the dividing wall between the right and left ventricles.

intraventricular (adjective) Pertaining to *within* the ventricle
Example: Intraventricular blood is found within the right and left ventricles.

HEART VALVES Four **valves** control the flow of blood through the heart. They are the tricuspid valve, pulmonary valve, mitral valve, and aortic valve (see Figure 5-3).

The **tricuspid valve** is between the right atrium and right ventricle. It has three triangular cusps (leaflets). As the right atrium contracts, the tricuspid valve opens to allow blood to flow into the right ventricle. Then it closes to prevent blood from flowing back into the right atrium.

The **pulmonary valve** is between the right ventricle and the pulmonary trunk. As the right ventricle contracts, the pulmonary valve opens to allow blood to flow into the pulmonary trunk and pulmonary arteries. Then it closes to prevent blood from flowing back into the right ventricle.

The **mitral valve** is between the left atrium and left ventricle. It has two cusps and is also known as the **bicuspid valve**. As the left atrium contracts, the mitral valve opens to allow blood to flow into the left ventricle. Then it closes to prevent blood from flowing back into the left atrium.

The **aortic valve** is between the left ventricle and the aorta (see Figure 5-4 ■). As the left ventricle contracts, the aortic valve opens to allow blood to flow into the aorta. Then it closes to prevent blood from flowing back into the left ventricle.

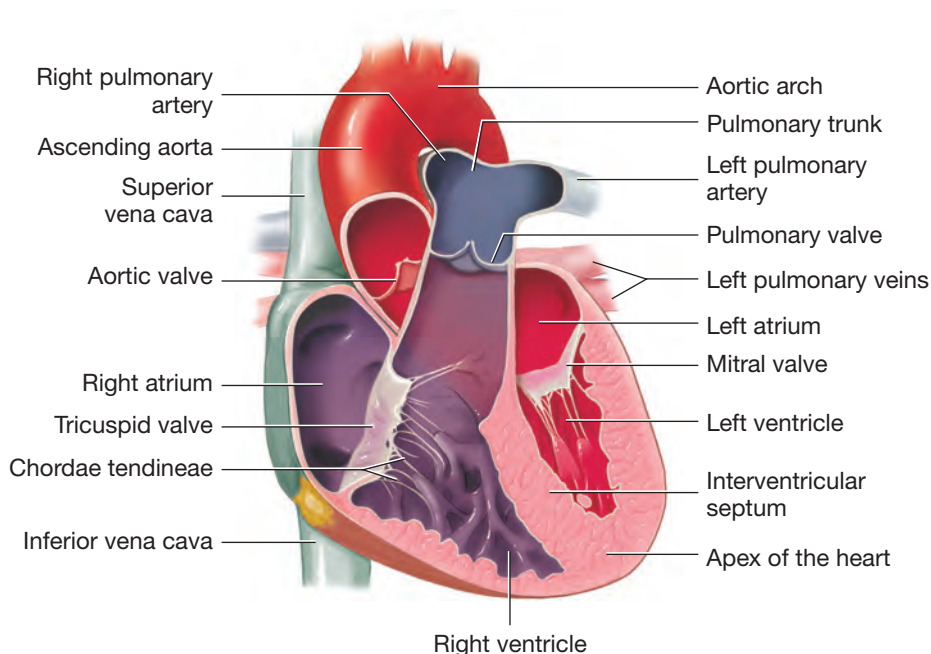


FIGURE 5-3 ■ Chambers and valves of the heart.

The heart has four chambers: right atrium, right ventricle, left atrium, and left ventricle. The heart has four valves: tricuspid valve, pulmonary valve, mitral valve, and aortic valve.

Source: Pearson Education

Pronunciation/Word Parts

valve (VALV)

valvular (VAL-vyoo-lar)

valvul/o- valve

-ar pertaining to

The combining form **valv/o-** also means valve.

tricuspid (try-KUS-pid)

tri- three

cuspid/o- point; projection

-id origin; resembling; source

pulmonary (PUL-moh-NAIR-ee)

pulmon/o- lung

-ary pertaining to

mitral (MY-tral)

mitr/o- structure like a tall hat with two points

-al pertaining to

bicuspid (by-KUS-pid)

bi- two

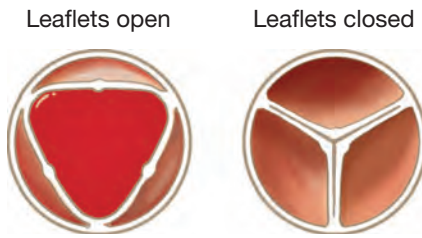
cuspid/o- point; projection

-id origin; resembling; source

aortic (aa-OR-tik)

aort/o- aorta

-ic pertaining to

**FIGURE 5-4 ■ Aortic valve.**

With the three valve leaflets open, blood flows freely through the valve. When the valve leaflets close, their edges seal tightly against one another, preventing the backflow of blood.

Source: Pearson Education

Pronunciation/Word Parts

chordae tendineae

(KOR-dee TEN-dih-nee-ee)

The tricuspid and mitral valves have **chordae tendineae**, rope-like strands attached to their valve leaflets (see Figure 5-3). The other end of the chordae tendineae is anchored to small muscles on the wall of the ventricles. When the ventricles contract, these small muscles also contract and pull on the chordae tendineae. This stabilizes the valve leaflets and keeps them firmly sealed together to keep blood from flowing back into the atria, even during the strong force of a ventricular contraction.

The sounds of the valves closing are commonly known as “lubb-dupp” (a phonetic approximation of the actual sounds). The “lubb” is made as the tricuspid and mitral valves close. This first heart sound is abbreviated as S_1 . The “dupp” is made as the pulmonary and aortic valves close. This second heart sound is abbreviated as S_2 .

HEART MUSCLE The **myocardium** is the muscular layer of the heart (see Figure 5-5 ■ and Table 5-1 ■). The myocardium is composed of cardiac muscle. Its muscle fibers (muscle cells) respond to electrical impulses generated by a node within the right atrium. This process is discussed in a later section.

myocardium (MY-oh-KAR-dee-um)

my/o- muscle

cardi/o- heart

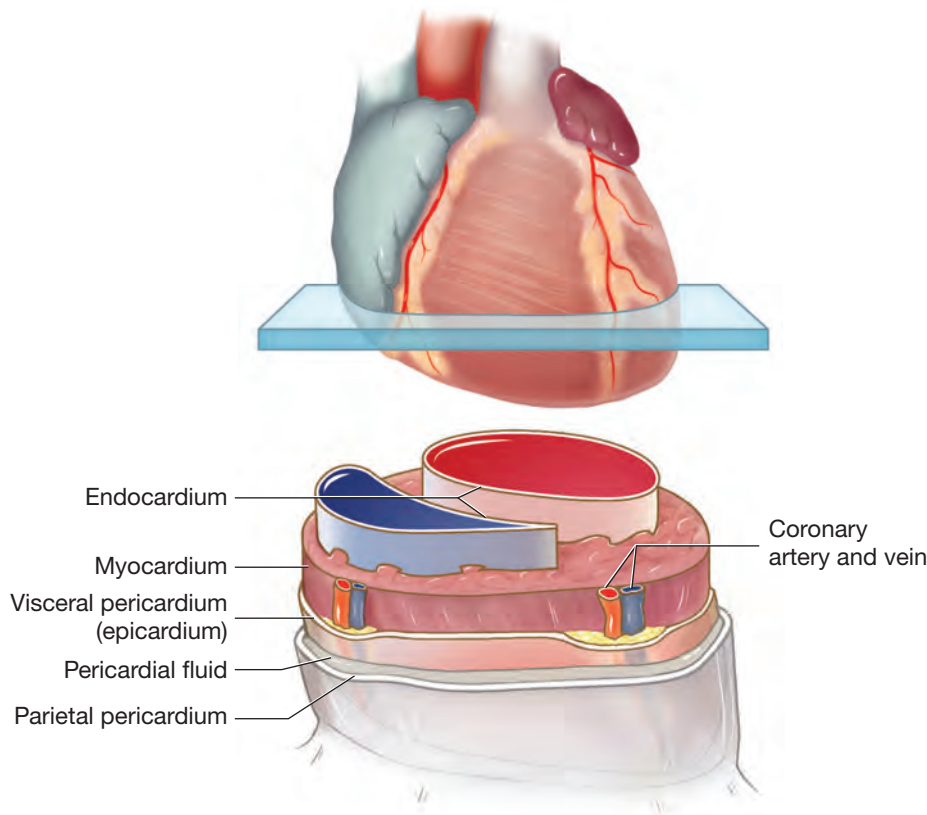
-um period of time; structure

myocardial (MY-oh-KAR-dee-al)

my/o- muscle

cardi/o- heart

-al pertaining to

**FIGURE 5-5 ■ Layers and membranes of the heart.**

The endocardium lines the four chambers and valves inside the heart. The myocardium is the muscular layer of the heart. The pericardium is the membrane around the pericardial sac that contains pericardial fluid.

Source: Pearson Education

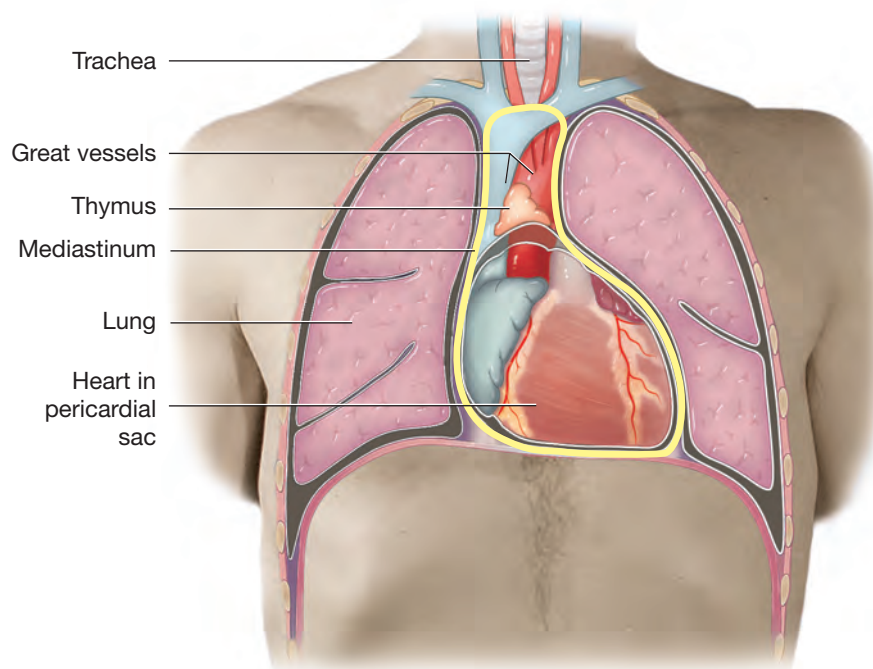
Table 5-1 Layers and Membranes of the Heart

endocardium	Innermost layer that lines the atria, ventricles, and heart valves. (<i>Note:</i> This layer also extends into the blood vessels where it is known as the <i>endothelium</i> or <i>intima</i> .)
myocardium	Muscular layer of the heart
pericardium	Outermost layer. This membrane surrounds the heart as the pericardial sac and secretes pericardial fluid. The pericardial sac is U-shaped, and the heart is within the U. The part of the membrane that is next to the surface of the heart is the visceral pericardium or epicardium because it is upon the heart. The part that is the outer wall of the pericardial sac is the parietal pericardium . Pericardial fluid is a slippery, watery fluid that allows the two membranes to slide past each other as the heart contracts and relaxes.

The myocardium contracts in a coordinated way to pump blood. First the myocardium around the two atria contracts, forcing blood into the two ventricles. Then the myocardium around the two ventricles contracts. The blood in the right ventricle goes into the pulmonary trunk and the pulmonary arteries (that go to the lungs). The blood in the left ventricle goes into the aorta (that goes to the entire body). The myocardium is thickest on the left side of the heart because it is the left ventricle that must work the hardest to pump blood to the entire body.

Thoracic Cavity and Mediastinum

The **thoracic cavity** contains the lungs and the **mediastinum**, an irregularly shaped central area between the lungs (see Figure 5-6 ■). The mediastinum contains the heart and parts of the **great vessels** (aorta, superior vena cava, inferior vena cava, pulmonary arteries and veins), as well as the thymus, trachea, and the esophagus. The word **cardiothoracic** reflects the close relationship between the heart and the thoracic cavity.

**FIGURE 5-6 ■ Mediastinum.**

The mediastinum holds the heart and pericardial sac, parts of the great vessels, as well as the thymus, trachea, and esophagus in place within the thoracic cavity.

Source: Pearson Education

Pronunciation/Word Parts

endocardium (EN-doh-KAR-dee-um)
endo- innermost; within
cardi/o- heart
-um period of time; structure

pericardium (PAIR-ih-KAR-dee-um)
peri- around
cardi/o- heart
-um period of time; structure

pericardial (PAIR-ih-KAR-dee-al)
peri- around
cardi/o- heart
-al pertaining to

visceral (VIS-er-al)
viscer/o- large internal organs
-al pertaining to

epicardium (EP-ih-KAR-dee-um)
epi- above; upon
cardi/o- heart
-um period of time; structure

parietal (pah-RY-eh-tal)
pariet/o- wall of a cavity
-al pertaining to

thoracic (thor-AS-ik)
thorac/o- chest; thorax
-ic pertaining to

mediastinum (MEE-dee-ah-STY-num)

mediastinal (MEE-dee-ah-STY-nal)
mediastin/o- mediastinum
-al pertaining to

cardiothoracic (KAR-dee-OH-thor-AS-ik)
cardi/o- heart
thorac/o- chest; thorax
-ic pertaining to

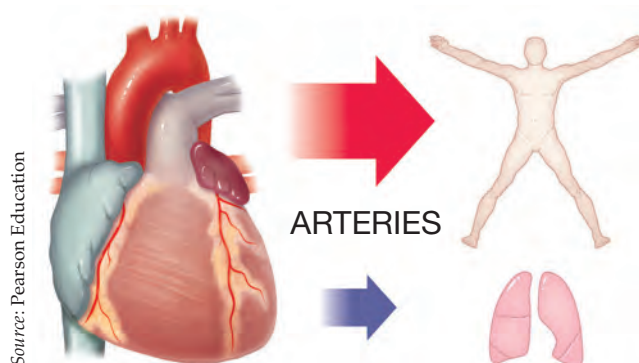
Blood Vessels

The blood vessels are vascular channels through which blood circulates in the body. **Vasculature** refers to the blood vessels associated with a particular organ. Blood vessels have a central opening or **lumen** through which the blood flows. Blood vessels are lined with **endothelium**, a smooth inner lining that promotes the flow of blood. This layer is also known as the **intima**.

There are three kinds of blood vessels: arteries, capillaries, and veins. Each performs a different function in the circulatory system.

ARTERIES **Arteries** are large blood vessels that branch into smaller **arterioles**. All arteries share some important characteristics and functions.

1. All arteries carry blood away from the heart to the body or to the lungs.



2. Most arteries carry bright red blood that has a high level of oxygen. The pulmonary arteries from the heart to the lungs carry dark red-purple blood that has a low level of oxygen.
3. Most arteries lie deep beneath the skin. A few, however, lie near the surface. Their walls bulge each time the heart contracts, and this can be felt as a **pulse** (see Figure 5-27).
4. All arteries have smooth muscle in their walls. When the smooth muscle contracts, the lumen of the artery decreases in size (**vasoconstriction**), and the pressure of the blood in the artery increases (see Figure 5-7 ■). When the smooth muscle relaxes, the lumen of the artery increases in size (**vasodilation**), and the pressure of the blood in the artery decreases.

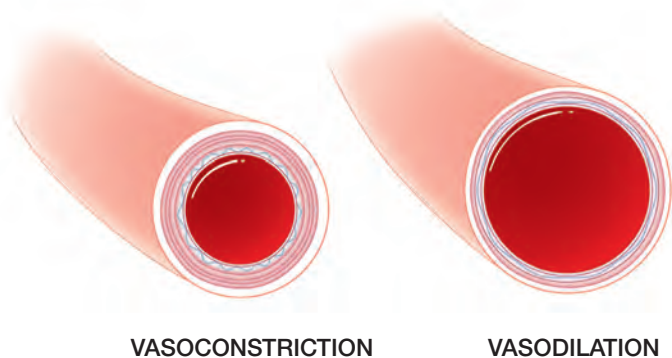


FIGURE 5-7 ■ Vasoconstriction and vasodilation.

Vasoconstriction and vasodilation of the arteries are important ways in which the body regulates the blood pressure.

Source: Pearson Education

Pronunciation/Word Parts

vasculature (VAS-kyoo-lah-CHUR)

vascul/o- blood vessel

-ature system composed of

lumen (LOO-men)

endothelium (EN-doh-THÉE-lee-um)

endo- innermost; within

theli/o- cellular layer

-um period of time; structure

intima (IN-tih-mah)

artery (AR-ter-ee)

arterial (ar-TEER-ee-al)

arteri/o- artery

-al pertaining to

The combining form **arter/o-** also means artery.

arteriole (ar-TEER-ee-ohl)

arteri/o- artery

-ole small thing

arteriolar (ar-TEER-ee-OH-lar)

arteriol/o- arteriole

-ar pertaining to

pulse (PULS)

vasoconstriction

(VAY-soh-con-STRIK-shun)

vas/o- blood vessel; vas deferens

constrict/o- drawn together; narrowed

-ion action; condition

vasodilation (VAY-soh-dy-LAY-shun)

vas/o- blood vessel; vas deferens

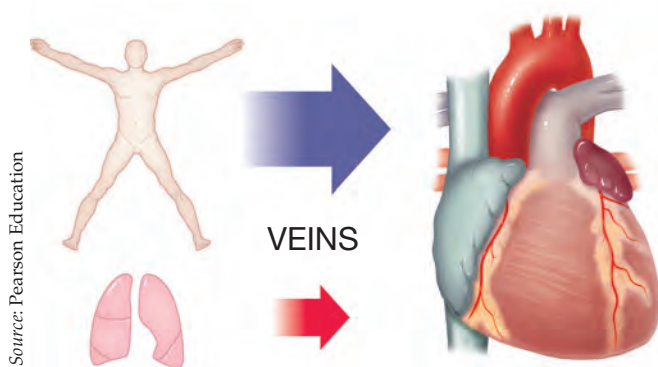
dilat/o- dilate; widen

-ion action; condition

CAPILLARIES **Capillaries** are the smallest blood vessels in the body. The lumen of a capillary is so small that blood cells must pass through in single file. A network of capillaries connects the arterioles and venules. An arteriole branches into a network of capillaries that reaches each cell in the body and then the capillaries merge into a venule.

VEINS Small veins, known as **venules**, combine to form a large **vein**. All veins share some important characteristics and functions.

1. All veins carry blood from the body and lungs to the heart.



2. Most veins carry dark red-purple blood that has a low level of oxygen. The pulmonary veins from the lungs to the heart carry bright red blood that has just picked up oxygen in the lungs.
3. The largest veins have valves that keep the blood flowing in one direction—back toward the heart (see Figure 5-8 ■).
4. Many veins are near the surface of the body and can be seen just under the skin as bluish, sometimes bulging lines.

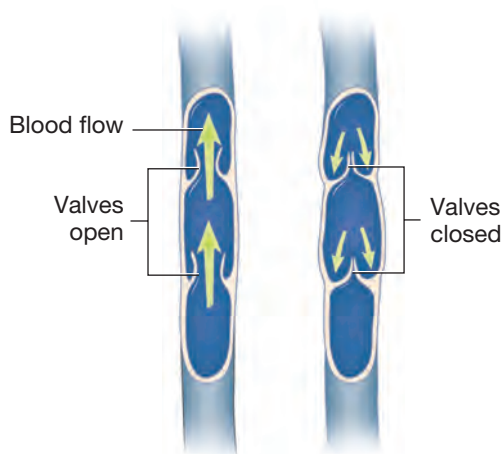


FIGURE 5-8 ■ Valves in a vein.

The heart pumps blood through the arteries, but not through the veins. As the large muscles in an arm or leg contract, they compress the vein and this moves blood through the vein. Valves in the vein then close to prevent gravity from pulling the blood back to its original location.

Source: Pearson Education

Pronunciation/Word Parts

capillary (KAP-ih-LAIR-ee)

capill/o- capillary; hair-like structure

-ary pertaining to

venule (VEN-yool)

ven/o- vein

-ule small thing

vein (VAYN)

venous (VEE-nus)

ven/o- vein

-ous pertaining to

The combining form **phleb/o-** also means vein.

Blood Vessel Names and Locations

The names of many arteries and veins come from the names of nearby anatomical structures, such as bones or muscles. Capillaries are not named.

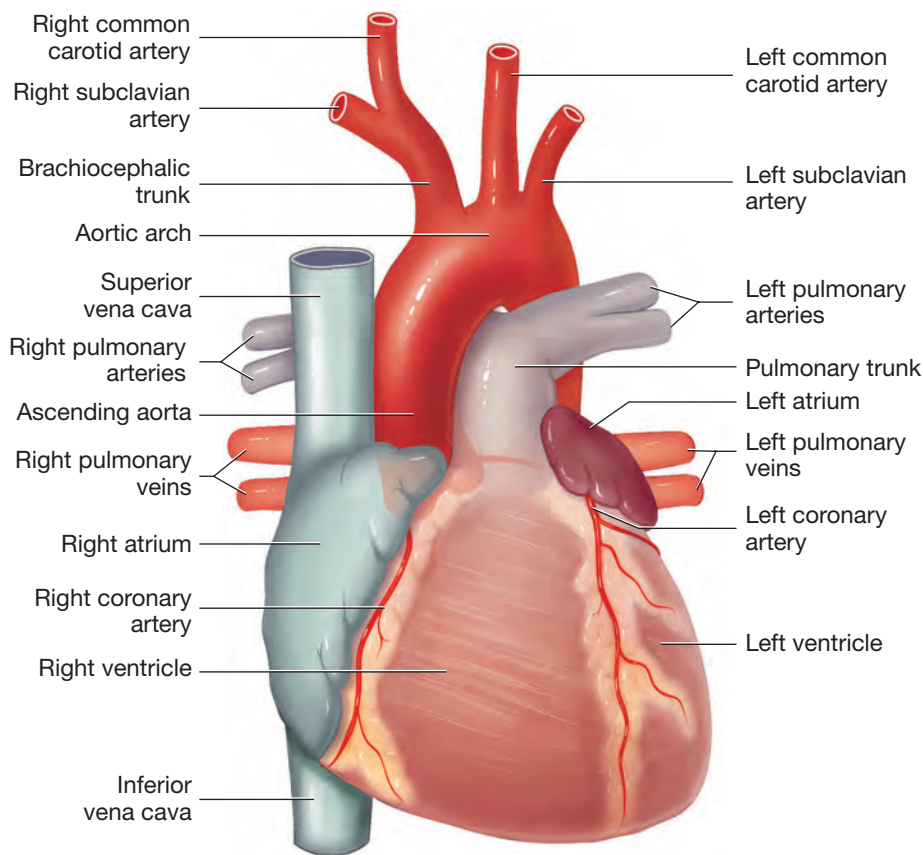


FIGURE 5-9 ■ Arteries and veins around the heart.

The aorta is the largest artery in the body. The coronary arteries to the heart are the first to receive oxygenated blood directly from the aorta. The aortic arch contains the first three major branches of arteries. The superior vena cava and inferior vena cava are the largest veins in the body.

Source: Pearson Education

ASCENDING AORTA AND ARTERIAL BRANCHES The **aorta** is the largest artery in the body (see Figures 5-9 ■ and 5-10 ■). It receives oxygenated blood from the left ventricle of the heart. The **ascending aorta** travels from the heart in a superior direction. The **coronary arteries** to the myocardium are the first arteries to branch off from the ascending aorta.

DID YOU KNOW?

Even though the chambers of the heart are filled with blood, the myocardium cannot use this blood. It must get its oxygen from blood that flows through the coronary arteries. Before oxygenated blood goes to any other part of the body, it goes through the coronary arteries to the myocardium. This is because of the primary role that the heart muscle plays in maintaining life.

The ascending aorta then becomes the **aortic arch**, an inverted, U-shaped segment. Three major arteries branch off from the aortic arch (see Figure 5-9): the brachiocephalic trunk (that branches into the right common carotid artery and right subclavian artery), the left common carotid artery, and the left subclavian artery. The **carotid arteries** bring oxygenated blood to the neck, face, head, and brain (see Figure 5-10). The **subclavian arteries** bring oxygenated blood to the shoulders. Each subclavian artery goes underneath the clavicle (collar bone) and then continues as the **axillary artery** (in the area of

Pronunciation/Word Parts

aorta (aa-OR-tah)
coronary (KOR-oh-NAIR-ee)
coron/o- structure that encircles like a crown
-ary pertaining to
aortic (aa-OR-tik)
aort/o- aorta
-ic pertaining to
carotid (kah-RAW-tid)
carot/o- sleep; stupor
-id origin; resembling; source
subclavian (sub-KLAY-vee-an)
sub- below; underneath
clav/o- clavicle; collar bone
-ian pertaining to
axillary (AK-zih-LAIR-ee)
axill/o- armpit
-ary pertaining to

Pronunciation/Word Parts

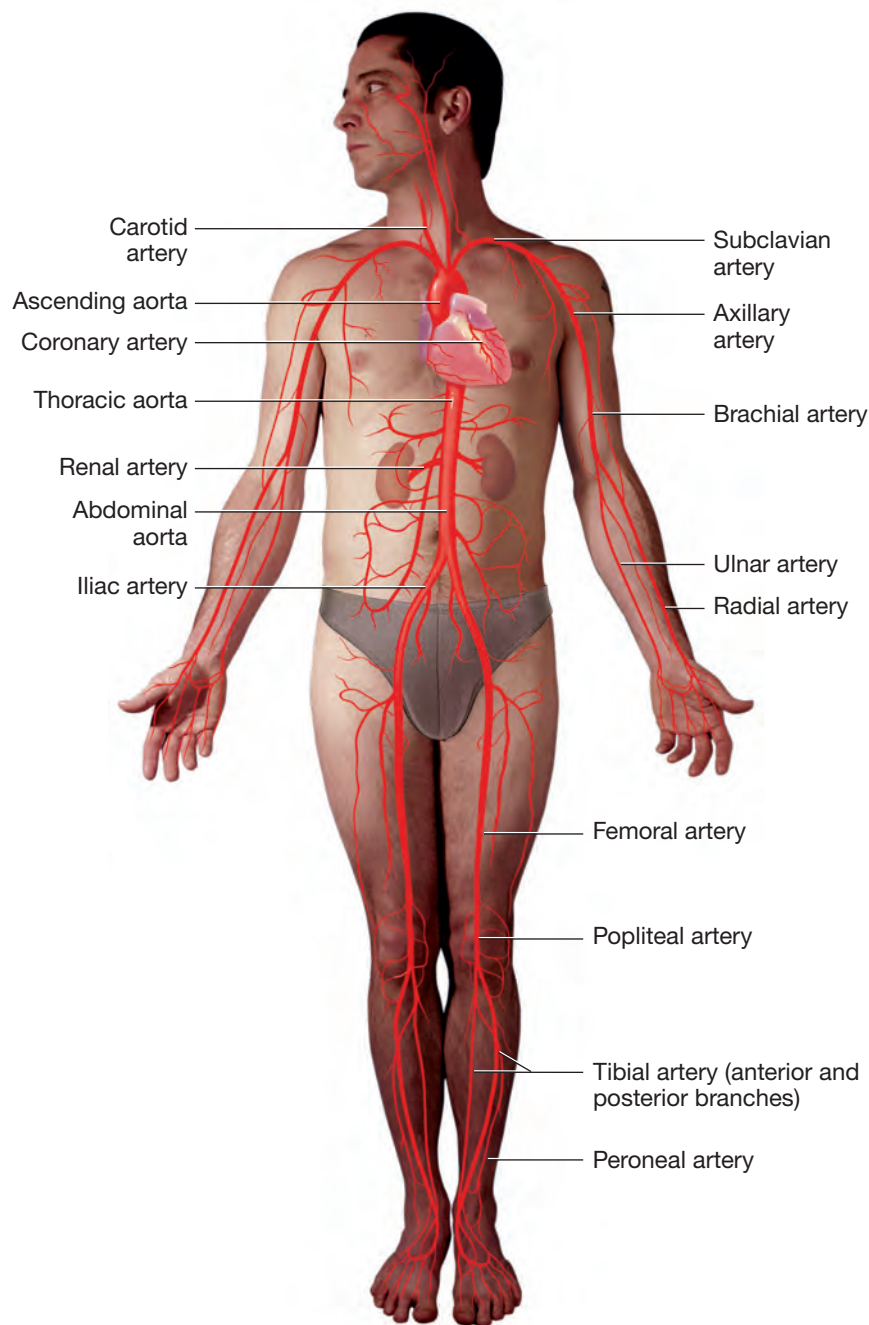


FIGURE 5-10 ■ Arteries in the body.

Arteries branch off from the aorta and carry oxygenated blood to the head, arms, chest, abdomen, pelvis, and legs.

Source: Pearson Education

the armpit). The axillary artery divides into the **brachial artery**, which brings oxygenated blood to the upper arm, and then into the **radial artery**, which bring oxygenated blood to the thumb side of the lower arm, and the **ulnar artery**, which brings oxygenated blood to the little finger side.

DID YOU KNOW?

The brachial artery takes its name from the biceps brachii muscle of the upper arm. The radial and ulnar arteries take their names from the radius (the bone on the thumb side of the lower arm) and the ulna (the bone on the little finger side of the lower arm).

brachial (BRAY-kee-al)

brachi/o- arm

-al pertaining to

radial (RAY-dee-al)

radi/o- forearm bone; radiation; x-rays

-al pertaining to

Select the correct combining form meaning to get the definition of *radial*: *pertaining to the forearm bone*.

ulnar (UL-nar)

uln/o- forearm bone; ulna

-ar pertaining to

THORACIC AORTA AND ARTERIAL BRANCHES The **thoracic aorta** travels inferiorly through the thoracic cavity (see Figure 5-10). It branches into arteries that bring oxygenated blood to the esophagus, muscles between the ribs, diaphragm, upper spinal cord, and back.

ABDOMINAL AORTA AND ARTERIAL BRANCHES As the thoracic aorta goes through the diaphragm, it becomes the **abdominal aorta** (see Figure 5-10). The abdominal aorta brings oxygenated blood to organs in the abdominopelvic cavity. These include the stomach, liver, gallbladder, pancreas, spleen, small intestine, large intestine, adrenal glands, kidneys (the **renal arteries**), ovaries (in a woman), testes (in a man), and the lower spinal cord.

In the pelvic cavity, the abdominal aorta ends and splits in two (a bifurcation) to form the inverted Y of the right and left iliac arteries (see Figure 5-10). The **iliac arteries** bring oxygenated blood to the hip and groin. Each iliac artery continues as the **femoral artery**, which brings oxygenated blood to the upper leg. Near the knee joint, the femoral artery becomes the **popliteal artery**. The popliteal artery then divides into the **tibial artery**, which brings oxygenated blood to the front and back of the lower leg, and the **peroneal artery**, which brings oxygenated blood to the little toe side of the lower leg along the fibula bone.

DID YOU KNOW?

The femoral artery takes its name from the femur (the bone in the upper leg). The popliteal artery takes its name from the popliteus, a small muscle at the back of the knee. The tibial artery takes its name from the tibia (the main bone in the lower leg). The peroneal artery goes along the fibula (the smaller bone in the lower leg). *Peroneal* is the adjective for *fibula*.

PULMONARY ARTERIES The **pulmonary arteries** originate from the pulmonary trunk, which comes from the right ventricle of the heart (see Figure 5-9). They carry deoxygenated blood to the lungs.

VENAE CAVAE AND VEINS The two major veins of the body are the superior vena cava and inferior vena cava (see Figure 5-9). The **superior vena cava** carries blood from the head, neck, arms, and chest to the right atrium. The **inferior vena cava** carries blood from the rest of the body (abdomen, pelvis, and legs, but not the lungs) to the right atrium. The **pulmonary veins** carry oxygenated blood from the lungs to the left atrium of the heart. Other major veins include the **jugular vein** (that carries blood from the head to the superior vena cava), the **portal vein** (that carries blood from the intestines to the liver), and the **saphenous vein** and **femoral vein** (that carry blood from the leg to the groin).

DID YOU KNOW?

The jugular vein takes its name from a Latin word that means *neck*. The portal vein takes its name from the porta hepatis, the Latin phrase for the portal or site where the vein enters the liver. (*Hepatis* is a Latin word meaning *of the liver*.) The saphenous vein takes its name from a Latin word that means *clearly visible*, as this vein often can be seen through the skin of the posterior lower leg.

Pronunciation/Word Parts

thoracic (thor-AS-ik)
thorac/o- chest; thorax
-ic pertaining to

abdominal (ab-DAW-mih-nal)
abdomin/o- abdomen
-al pertaining to

renal (REE-nal)
ren/o- kidney
-al pertaining to

iliac (IL-ee-ak)
ili/o- hip bone; ilium
-ac pertaining to

femoral (FEM-oh-ral)
femor/o- femur; thigh bone
-al pertaining to

popliteal (pop-LIT-ee-al) (POP-lih-TEE-al)
poplite/o- back of the knee
-al pertaining to

tibial (TIB-ee-al)
tibi/o- shin bone; tibia
-al pertaining to

peroneal (PAIR-oh-NEE-al)
perone/o- fibula; lower leg bone
-al pertaining to

pulmonary (PUL-moh-NAIR-ee)
pulmon/o- lung
-ary pertaining to

vena cava (VEE-nah KAY-vah)
Vena is a Latin singular noun. Form the plural by changing -a to -ae. Example: The superior and inferior venae cavae.

jugular (JUG-yoo-lar)
jugul/o- jugular; throat
-ar pertaining to

portal (POR-tal)
port/o- point of entry
-al pertaining to

saphenous (sah-FEE-nus)
saphen/o- clearly visible
-ous pertaining to

Circulation

Circulation of the blood occurs through two different pathways (see Figure 5-11 ■): the systemic circulation and the pulmonary circulation.

1. **Systemic circulation.** Arteries, arterioles, capillaries, venules, and veins everywhere in the body, except in the lungs.
2. **Pulmonary circulation.** Arteries, arterioles, capillaries, venules, and veins going to, within, and coming from the lungs. The word **cardiopulmonary** reflects the close connection between the heart and the lungs.

Now let's trace the route that blood takes as it travels through the systemic and pulmonary circulations to complete one trip through the whole body.

Pronunciation/Word Parts

circulation (SIR-kyoo-LAY-shun)

circulat/o- movement in a circular route
-ion action; condition

systemic (sis-TEM-ik)

system/o- body as a whole
-ic pertaining to

cardiopulmonary

(KAR-dee-oh-PUL-moh-NAIR-ee)

cardi/o- heart
pulmon/o- lung
-ary pertaining to

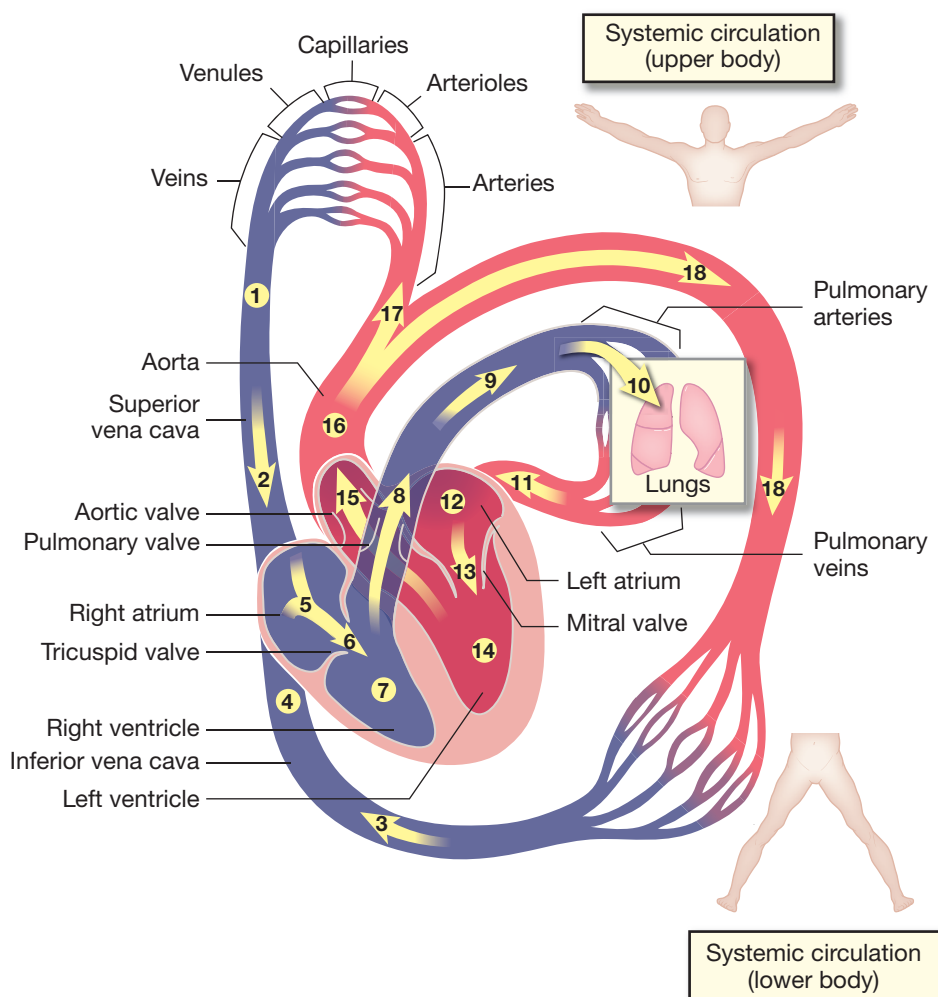


FIGURE 5-11 ■ Circulation of the blood.

Blood low in oxygen in veins from the upper body (1) and the lower body (3) comes into the heart via the superior vena cava (2) and the inferior vena cava (4). Each time the heart contracts, it pumps blood from the right atrium (5), through the tricuspid valve (6), into the right ventricle (7), then through the pulmonary valve (8), pulmonary trunk (9) and the pulmonary arteries (10) to the lungs. At the same time, the heart receives oxygenated blood from the lungs via the pulmonary veins (11). This blood comes into the left atrium (12), goes through the mitral valve (13) and into the left ventricle (14) and then goes through the aortic valve (15), into the aorta (16) to the upper body (17) and to the lower body (18).

Source: Pearson Education

SYSTEMIC CIRCULATION THROUGH THE VEINS Blood coming from the cells is dark red-purple in color because it has a low level of oxygen. Blood coming from cells in the upper body (1) travels through capillaries, venules, and veins to the superior vena cava (2). Blood coming from cells in the lower body (3) travels through capillaries, venules, and veins to the inferior vena cava (4). Then this blood travels through the right atrium (5), tricuspid valve (6), and right ventricle (7).

PULMONARY CIRCULATION At this point, the blood enters the pulmonary circulation. The blood travels through the pulmonary valve (8), pulmonary trunk (9), and pulmonary arteries (10) and arterioles to the capillaries in the lungs. In a capillary beside an alveolus, the blood releases carbon dioxide, picks up oxygen, and becomes bright red in color. The blood then travels through the pulmonary veins (11) to the left atrium (12) of the heart.

SYSTEMIC CIRCULATION THROUGH THE ARTERIES At this point, the blood is back in the systemic circulation. From the left atrium (12), the blood travels through the mitral valve (13) and left ventricle (14). The blood then travels through the aortic valve (15) and into the aorta (16) to the upper body (17) and the lower body (18). The arteries, arterioles, and capillaries distribute this oxygenated blood to every part of the body. In a capillary beside a body cell, the blood releases oxygen, and picks up carbon dioxide, and becomes dark red-purple in color. This completes one trip around the circulatory system.

Pronunciation/Word Parts

CLINICAL CONNECTIONS

Neonatology. The fetal heart begins to beat just 4 weeks after conception. The circulation of blood in a fetus is different from that of an adult. The fetus receives oxygenated blood and nutrients from the mother through the placenta, via arteries in the umbilical cord that merge with the inferior vena cava of the fetus. The fetal heart has two unique structures that allow this oxygenated blood to bypass the (not-yet functioning) lungs and go directly to the body. The **foramen ovale**, a small, oval opening in the septum between the atria, allows some of the oxygenated blood to enter the left side of the heart where it is immediately pumped out to the body. The **ductus arteriosus**, a connecting blood vessel between the pulmonary trunk and the aorta, allows the rest of the oxygenated blood to go into the right ventricle and pulmonary trunk but then diverts it to the aorta. These two unique structures in the fetal heart close automatically within 24 hours after birth.

foramen ovale (foh-RAY-men oh-VAL-ee)

ductus arteriosus
(DUK-tus ar-TEER-ee-OH-sus)

DID YOU KNOW?

The normal heart rate for a newborn is 110–150 beats per minute. The normal heart rate for an adult is 70–80 beats per minute. A well-trained athlete can have a resting heart rate lower than 60 beats per minute.

Physiology of a Heartbeat

The heart contracts and relaxes in a regular rhythm that is coordinated by the **conduction system** of the heart (see Figure 5-12 ■). The **sinoatrial node (SA node)** (in the wall of the right atrium), is the pacemaker of the heart. It initiates the electrical impulse that begins each heartbeat. This impulse causes both atria to contract simultaneously.

conduction (con-DUK-shun)
conduct/o- carrying; conveying
-ion action; condition

sinoatrial (sy-noh-AA-tree-al)
sin/o- channel; hollow cavity
atri/o- atrium; chamber that is open at the top
-al pertaining to

node (NOHD)

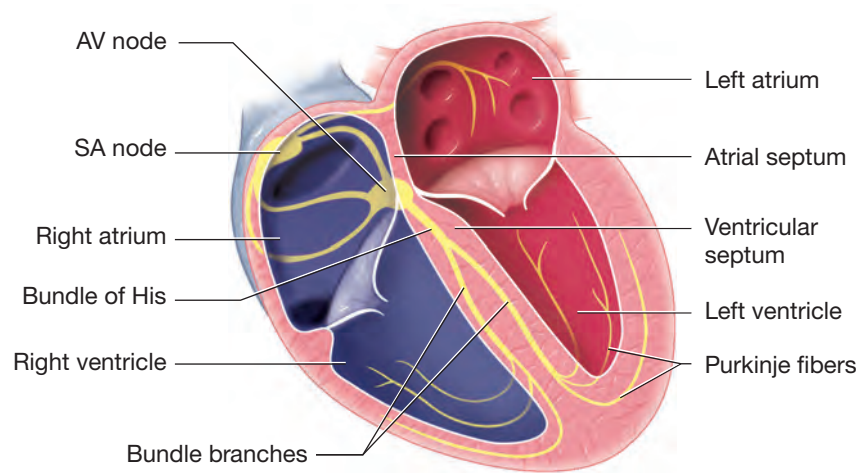


FIGURE 5-12 ■ Conduction system of the heart.

The SA node (pacemaker) initiates an electrical impulse that travels through the AV node, the bundle of His, the right and left bundle branches, and then to the Purkinje fibers, causing the atria and then the ventricles to contract.

Source: Pearson Education

The electrical impulse then travels through the **atrioventricular node (AV node)** (in the right atrium near the septum), through the **bundle of His**, and into the right and left **bundle branches** that end in a network of nerves (the **Purkinje fibers**). Then both ventricles contract simultaneously. A contraction is known as **systole**, and the resting period between contractions is known as **diastole**.

Pronunciation/Word Parts

atrioventricular

(AA-tree-oh-ven-TRIH-kyoo-lar)

atri/o- atrium; chamber that is open at the top

ventricul/o- chamber that is filled; ventricle

-ar pertaining to

bundle of His (HISS)

Purkinje (per-KIN-jee)

systole (SIS-toh-lee)

systolic (sis-TAW-lik)

systol/o- contracting

-ic pertaining to

diastole (dy-AS-toh-lee)

diastolic (py-ah-STAW-lik)

diastol/o- dilating

-ic pertaining to

epinephrine (EH-pih-NEF-rin)

CLINICAL CONNECTIONS

Neurology. The heart rate is controlled by the SA node, as well as by the parasympathetic and sympathetic divisions of the nervous system. The SA node continually generates an impulse of 80–100 beats each minute, but this is faster than the body needs. So the parasympathetic division (through the vagal nerve) releases the neurotransmitter acetylcholine; this slows the heart to its normal resting heart rate of 70–80 beats each minute. The sympathetic division (through spinal cord nerves) releases the neurotransmitter norepinephrine to increase the heart rate. So, fine adjustments in the heart rate are possible from moment to moment. When the heart needs to beat much faster during exercise (see Figure 5-13 ■) or to escape danger (the “fight-or-flight” response), the sympathetic division stimulates the adrenal gland to secrete the hormone **epinephrine**. It travels through the blood to the heart, overrides the normal sinus rhythm, and causes the heart to beat much faster.



FIGURE 5-13 ■ Exercise increases the heart rate.

During exercise, epinephrine secreted by the adrenal glands increases the heart rate, constricts the arteries to increase the blood pressure, and dilates the bronchi to increase the flow of air into the lungs.

Source: Peter Bernick/Shutterstock

When the SA node controls the heart beat, the heart is in **normal sinus rhythm (NSR)**. Besides the SA node, several other areas in the atria and ventricles can produce electrical impulses on their own. These impulses are usually too weak to override the SA node. However, if the SA node fails to produce impulses, if the SA node impulses are blocked, or if these other areas become hyperexcited (from excessive amounts of caffeine or smoking), then these **ectopic** sites can take over and produce an abnormal heart rhythm.

sinus (SIGH-nus)

The SA node is in a sinus (a recessed area or channel) in the right atrium.

ectopic (ek-TAW-pik)

ectop/o- outside

-ic pertaining to

A CLOSER LOOK

Electrical Activity of the Heart. On a molecular level, an elegant and intricate system allows the heart to contract tirelessly, approximately 100,000 times each day. An electrical impulse from the SA node changes the permeability of a myocardial cell. Sodium ions (Na^+) outside the cell move through the cell membrane, followed by calcium ions (Ca^{++}). This gives the inside of the cell a positive electrical charge, which triggers the release of calcium ions stored inside the cell. This process is known as **depolarization** because it reverses the normal, slightly negative electrical state of the cell. The calcium ions cause the myocardial cell to contract. As one cell depolarizes and contracts, it triggers the next myocardial cell to do the same.

A contraction ends when potassium ions (K^+) move out of the cell, while tiny molecular pumps move sodium ions and some calcium ions out of the cell and move the rest of the calcium ions back into storage within the cell. This process is known as **repolarization**. This restores the normal, slightly negative electrical state of a resting myocardial cell. The myocardial cell is now ready for another impulse from the SA node.

A myocardial cell cannot respond to another electrical impulse from the SA node until the full cycle of depolarization and repolarization is complete. This very short period of unresponsiveness is known as the **refractory period**.

Pronunciation/Word Parts

depolarization (dee-POH-lar-ih-ZAY-shun)

de- reversal of; without

polar/o- negative state; positive state

-ization process of creating; process of inserting; process of making

repolarization (ree-POH-lar-ih-ZAY-shun)

re- again and again; backward;

unable to

polar/o- negative state; positive state

-ization process of creating; process of inserting; process of making

refractory (ree-FRAK-tor-ee)

re- again and again; backward;

unable to

fract/o- bend; break up

-ory having the function of

Select the correct prefix meaning to get the definition of *refractory*: having the function of (being) unable to break up.

WORD ALERT

cardia (noun) Small region of the stomach where the esophagus enters
Example: The cardia is the first part of the stomach to receive food from the esophagus.

cardiac (adjective) Pertaining to the heart
Example: During a cardiac arrest, the heart stops beating.

cardiac valve (noun) Structure between two chambers of the heart (or between a heart chamber and a blood vessel). It opens and closes to regulate the flow of blood.

Example: A stethoscope allows you to hear the sound that a cardiac valve makes as it opens and closes.

Vocabulary Review

Anatomy and Physiology		
Word or Phrase	Description	Combining Forms
cardiopulmonary	Pertaining to the heart and lungs	cardi/o- heart pulmon/o- lung
cardiothoracic	Pertaining to the heart and thoracic cavity	cardi/o- heart thorac/o- chest; thorax
cardiovascular system	Body system that includes the heart and the blood vessels (vascular structures)	cardi/o- heart vascul/o- blood vessel
circulatory system	Continuous, circular pathway that the blood takes as it moves through the body. Circulation is the process of moving the blood through the system. The circulatory system consists of the systemic circulation and the pulmonary circulation.	circulat/o- movement in a circular route
mediastinum	Irregularly shaped, central area in the thoracic cavity that lies between the lungs. It contains the heart, parts of the great vessels, as well as the thymus, trachea, and esophagus.	mediastin/o- mediastinum thorac/o- chest; thorax
pulmonary circulation	The arteries, arterioles, capillaries, venules, and veins going to, within, and coming from the lungs	pulmon/o- lung
systemic circulation	The arteries, arterioles, capillaries, venules, and veins everywhere in the body, except in the lungs	system/o- body as a whole
Heart		
aortic valve	Heart valve between the left ventricle and the aorta	aort/o- aorta valvul/o- valve
atrium	Each of the two upper chambers of the heart	atri/o- atrium; chamber that is open at the top
chordae tendineae	Rope-like strands that support the tricuspid and mitral valve leaflets and keep them tightly closed when the ventricles are contracting	
ductus arteriosus	Temporary blood vessel in the fetal heart that connects the pulmonary trunk to the aorta. It closes within 24 hours after birth.	
endocardium	Innermost layer that lines the atria, ventricles, and valves of the heart	cardi/o- heart
foramen ovale	Temporary, oval-shaped opening in the interatrial septum of the fetal heart. It closes within 24 hours after birth.	
heart	Organ that pumps blood throughout the body. It contains four chambers, the septum (a center wall), and four valves. The lower tip of the heart is the apex . The adjective for <i>heart</i> is <i>cardiac</i> .	cardi/o- heart card/i- heart sept/o- dividing wall; septum apic/o- apex; tip
mitral valve	Heart valve between the left atrium and the left ventricle. It is also known as the bicuspid valve . It has two (<i>bi-</i>) leaflets or cusps .	mitr/o- structure like a tall hat with two points valvul/o- valve cusps/o- point; projection
myocardium	Muscular layer of the heart	my/o- muscle cardi/o- heart

Word or Phrase	Description	Combining Forms
pericardium	Membrane that surrounds the heart as the pericardial sac and is filled with pericardial fluid . The part of the membrane next to the surface of the heart is the visceral pericardium or epicardium . The part in the outer wall of the pericardial sac is the parietal pericardium .	cardi/o- heart viscer/o- large internal organs pariet/o- wall of a cavity
pulmonary valve	Heart valve between the right ventricle and the pulmonary trunk	pulmon/o- lung valvul/o- valve
tricuspid valve	Heart valve between the right atrium and right ventricle. It has three (<i>tri-</i>) leaflets or cusps .	cuspal/o- point; projection valvul/o- valve
valve	Structure that opens and closes to control the flow of blood. Heart valves include the tricuspid valve, pulmonary valve, mitral valve, and aortic valve. There are also valves in some of the large veins to prevent backflow of blood.	valvul/o- valve valv/o- valve
ventricle	Each of the two large, lower chambers of the heart	ventricul/o- chamber that is filled; ventricle

Blood Vessels

aorta	Largest artery. It receives oxygenated blood from the left ventricle. It includes the ascending aorta , the aortic arch , the thoracic aorta , and the abdominal aorta .	aort/o- aorta thorac/o- chest; thorax abdomin/o- abdomen
arteriole	Smallest branch of an artery	arteriol/o- arteriole
artery	Blood vessel that carries oxygenated blood away from the heart to the body. This bright red blood has a high level of oxygen. (The pulmonary arteries carry blood from the heart to the lungs. They carry dark red-purple blood with a low level of oxygen.)	arteri/o- artery arter/o- artery
axillary artery	Artery that carries oxygenated blood to the axilla (armpit) area	axill/o- armpit
blood vessels	Large and small channels through which the blood circulates throughout the body. These include arteries, arterioles, capillaries, venules, and veins that are also known as vascular structures . The lumen is the central opening inside a blood vessel through which the blood flows.	angi/o- blood vessel; lymphatic vessel vascul/o- blood vessel vas/o- blood vessel; vas deferens
brachial artery	Artery that carries oxygenated blood to the upper arm	brachi/o- arm
capillary	Smallest blood vessel in the body. A capillary network connects the arterioles to the venules. The exchange of oxygen and carbon dioxide takes place in the capillaries.	capill/o- capillary; hair-like structure
carotid artery	Artery that carries oxygenated blood to the neck, face, head, and brain. If these arteries are compressed, the lack of blood to the brain will cause a person to become unconscious.	carot/o- sleep; stupor
coronary artery	Artery that carries oxygenated blood to the myocardium (heart muscle)	coron/o- structure that encircles like a crown
endothelium	Smooth layer that lines the inner wall of a blood vessel. It is also known as the intima .	theli/o- cellular layer
femoral artery	Artery that carries oxygenated blood to the upper leg	femor/o- femur; thigh bone
great vessels	Collective phrase for the aorta (the largest artery), the superior and inferior venae cavae (the largest veins), and the pulmonary trunk, pulmonary arteries, and pulmonary veins	

Word or Phrase	Description	Combining Forms
iliac artery	Artery that carries oxygenated blood to the hip and groin area	ili/o- <i>hip bone; ilium</i>
jugular vein	Vein that carries blood from the head to the superior vena cava	jugul/o- <i>jugular; throat</i>
peroneal artery	Artery that carries oxygenated blood to the little toe side of the lower leg (along the fibula bone)	perone/o- <i>fibula; lower leg bone</i>
popliteal artery	Artery that carries oxygenated blood to the back of the knee and then branches into the tibial and peroneal arteries	poplite/o- <i>back of the knee</i>
portal vein	Vein that carries blood from the intestines to the liver	port/o- <i>point of entry</i>
pulmonary artery	Artery that carries blood away from the heart to the lungs. The pulmonary artery is the only artery that carries blood that has a low level of oxygen.	pulmon/o- <i>lung</i>
pulmonary vein	Vein that carries oxygenated blood from the lungs to the heart. The pulmonary vein is the only vein that carries blood that has a high level of oxygen.	pulmon/o- <i>lung</i>
pulse	The bulging of the wall of an artery located near the surface as blood is pumped by the heart	
radial artery	Artery that carries oxygenated blood to the thumb side of the lower arm (along the radius bone)	radi/o- <i>forearm bone; radiation; x-rays</i>
renal artery	Artery that carries oxygenated blood to the kidney	ren/o- <i>kidney</i>
saphenous vein	Vein that carries blood from the leg to the groin	saphen/o- <i>clearly visible</i>
subclavian artery	Artery that carries oxygenated blood to the shoulder. It goes underneath (<i>sub-</i>) the clavicle (collar bone).	clav/o- <i>clavicle; collar bone</i>
tibial artery	Artery that carries oxygenated blood to the front and back of the lower leg	tibi/o- <i>shin bone; tibia</i>
ulnar artery	Artery that carries oxygenated blood to the little finger side of the lower arm (along the ulna bone)	uln/o- <i>forearm bone; ulna</i>
vasculature	Blood vessels associated with a particular organ	vascul/o- <i>blood vessel</i>
vasoconstriction	Constriction of smooth muscle in the wall of a blood vessel that causes the lumen to decrease in size	vas/o- <i>blood vessel; vas deferens</i> constrict/o- <i>drawn together; narrowed</i>
vasodilation	Relaxation of smooth muscle in the wall of a blood vessel that causes the lumen to increase in size	vas/o- <i>blood vessel; vas deferens</i> dilat/o- <i>dilate; widen</i>
vein	Blood vessel that carries blood from the body back to the heart. This blood has a low level of oxygen and a high level of carbon dioxide and waste products of cellular metabolism from the cells. The exception is the pulmonary veins that carry blood that has a high level of oxygen from the lungs back to the heart.	ven/o- <i>vein</i> phleb/o- <i>vein</i>
venae cavae	The two major veins. The superior vena cava carries blood from the head, neck, arms, and chest back to the right atrium of the heart. The inferior vena cava carries blood from the abdomen, pelvis, and legs back to the right atrium.	
venule	Smallest branch of a vein	ven/o- <i>vein</i>

Conduction System

Word or Phrase	Description	Combining Forms
atrioventricular (AV) node	Small area of tissue between the right atrium near the septum. The AV node is part of the conduction system of the heart and receives electrical impulses from the SA node.	atri/o- atrium; chamber that is open at the top ventricul/o- chamber that is filled; ventricle
bundle branches	Part of the conduction system of the heart after the bundle of His. At the apex of the heart, the branches split into the right bundle branch to the right ventricle and the left bundle branch to the left ventricle. Then, each divides into the Purkinje fibers that spread across the ventricles.	
bundle of His	Part of the conduction system of the heart after the AV node. It splits into the right and left bundle branches.	
conduction system	System that carries the electrical impulse that makes the heart beat. It consists of the SA node, AV node, bundle of His, bundle branches, and Purkinje fibers.	conduct/o- carrying; conveying
depolarization	To begin a contraction of the heart, an impulse from the SA node changes the permeability of the myocardial cell membrane. Positive sodium ions, then positive calcium ions, outside the cell move through the cell membrane, and more calcium ions stored in the cell are released. This reverses the normally negative state in a resting myocardial cell and causes a contraction.	polar/o- negative state; positive state
diastole	Resting period between contractions	diastol/o- dilating
ectopic site	Area within the heart that can produce an electrical impulse but is not part of the conduction system. It sometimes overrides the impulse of the SA node and produces an abnormal heart rhythm.	ectop/o- outside
refractory period	Short period of time when the myocardium is unresponsive to electrical impulses	fract/o- bend; break up
repolarization	To end a contraction of the heart, positive potassium ions diffuse out of the cell, while molecular pumps move positive sodium and some calcium ions out of the cell and move the rest of the calcium ions into storage within the cell. This restores the slightly negative state of a resting myocardial cell.	polar/o- negative state; positive state
sinoatrial node	Pacemaker of the heart. Small area of tissue in the posterior wall of the right atrium. The SA node originates the electrical impulse for the entire conduction system of the heart.	sin/o- channel; hollow cavity atri/o- atrium; chamber that is open at the top
systole	Contraction of the atria or the ventricles	systol/o- contracting

Labeling Exercise

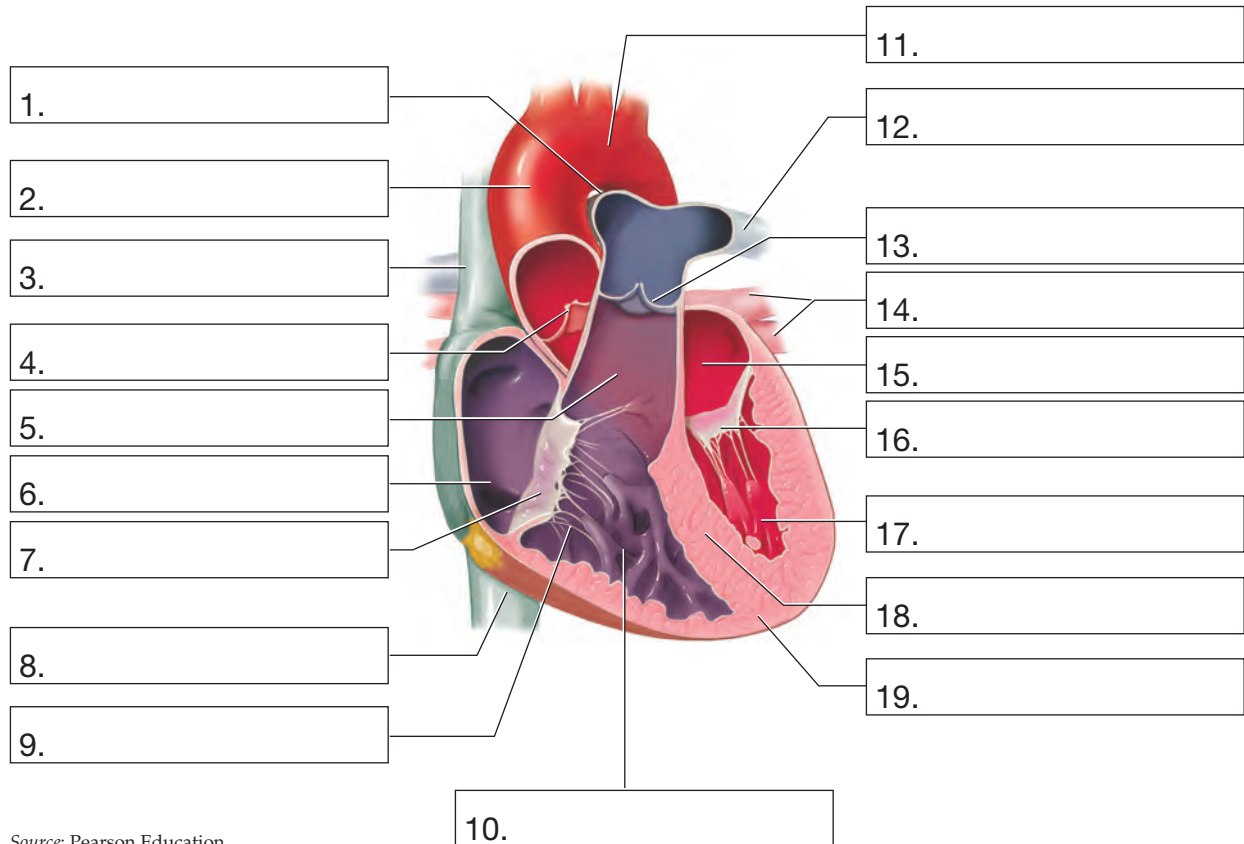
Match each anatomy word or phrase to its structure and write it in the numbered box. Be sure to check your spelling. Use the Answer Key at the end of the book to check your answers.

aortic arch
aortic valve
apex of the heart
ascending aorta
chordae tendineae

inferior vena cava
interventricular septum
left atrium
left pulmonary artery
left pulmonary veins

left ventricle
mitral valve
pulmonary trunk
pulmonary valve
right atrium

right pulmonary artery
right ventricle
superior vena cava
tricuspid valve



Source: Pearson Education

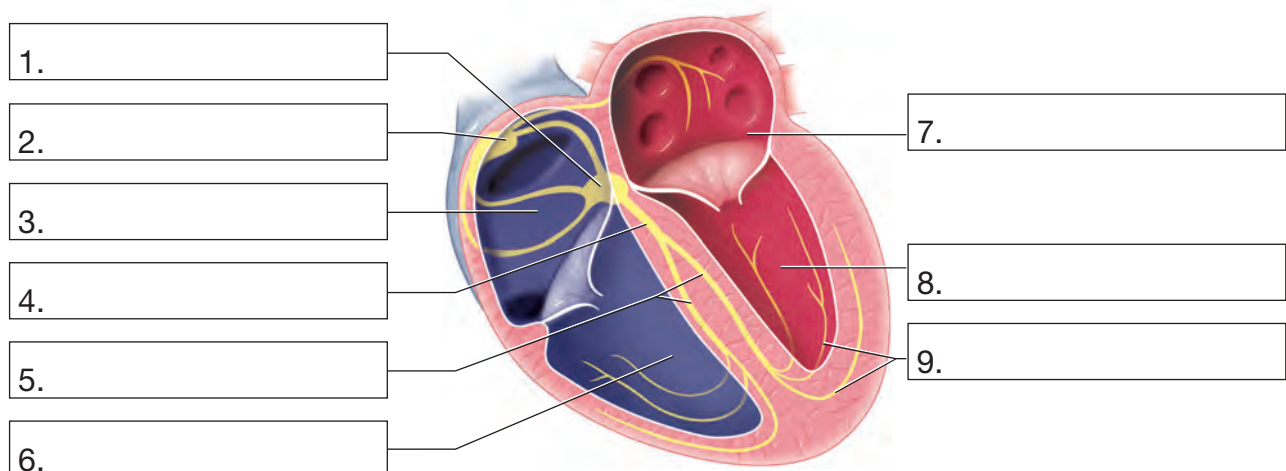
atrioventricular node
bundle branches

bundle of His
left atrium

left ventricle
Purkinje fibers

right atrium
right ventricle

sinoatrial node



Source: Pearson Education

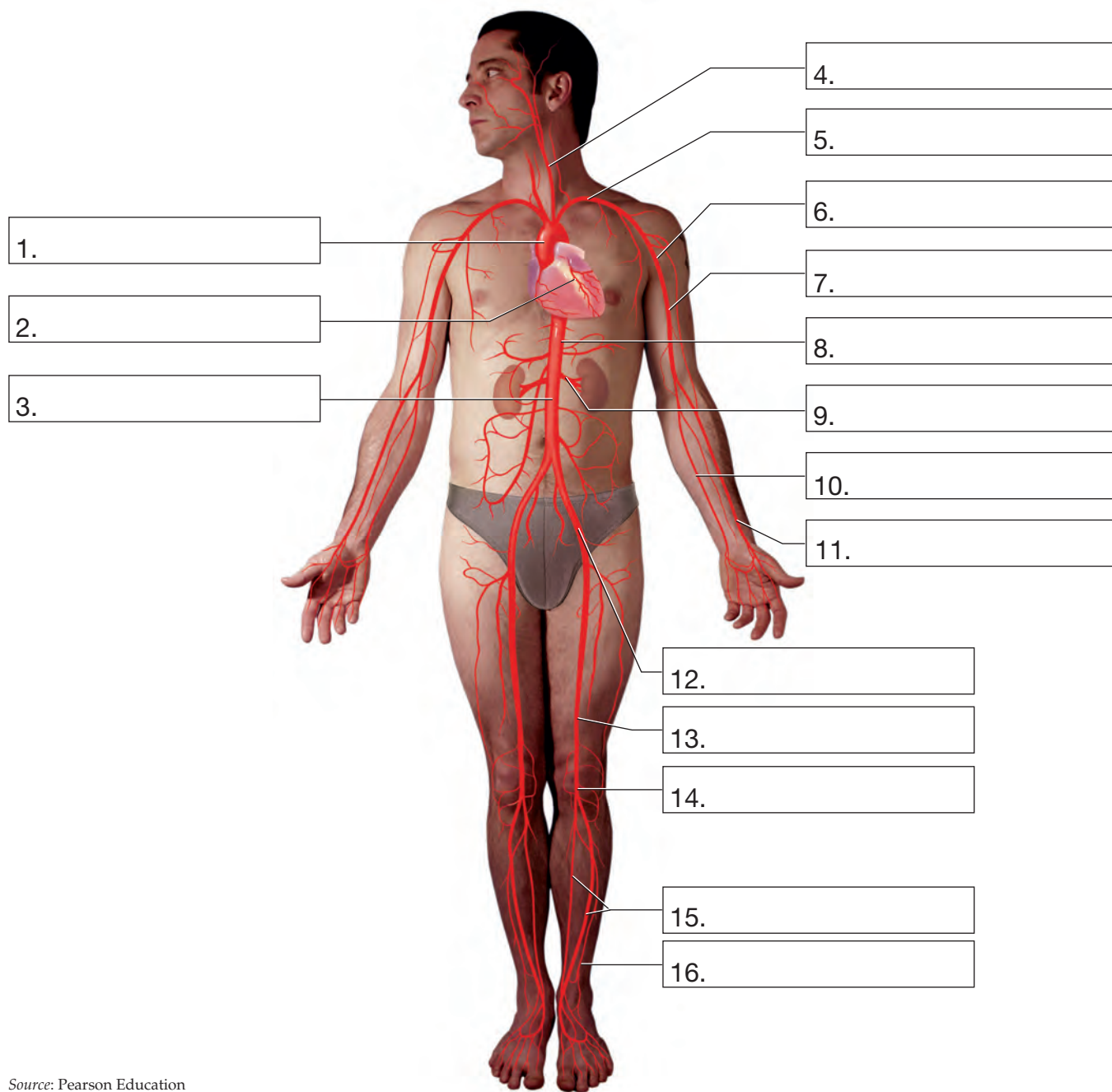
abdominal aorta
ascending aorta
axillary artery
brachial artery

carotid artery
coronary artery
femoral artery

iliac artery
peroneal artery
popliteal artery

radial artery
renal artery
subclavian artery

tibial artery
thoracic aorta
ulnar artery



Give Word Part Meanings

Use the Answer Key at the end of the book to check your answers.

Combining Forms Exercise

Next to each combining form, write its meaning. The first one has been done for you.

Combining Form	Meaning	Combining Form	Meaning
1. axill/o-	armpit	29. mitr/o-	
2. abdomin/o-		30. my/o-	
3. angi/o-		31. pariet/o-	
4. aort/o-		32. perone/o-	
5. apic/o-		33. phleb/o-	
6. arteri/o-		34. polar/o-	
7. arteriol/o-		35. poplite/o-	
8. arter/o-		36. port/o-	
9. atri/o-		37. pulmon/o-	
10. brachi/o-		38. radi/o-	
11. capill/o-		39. ren/o-	
12. card/i-		40. saphen/o-	
13. cardi/o-		41. sept/o-	
14. carot/o-		42. sin/o-	
15. circulat/o-		43. system/o-	
16. clav/o-		44. systol/o-	
17. conduct/o-		45. theli/o-	
18. constrict/o-		46. thorac/o-	
19. coron/o-		47. tibi/o-	
20. cusp/o-		48. uln/o-	
21. diastol/o-		49. valv/o-	
22. dilat/o-		50. valvul/o-	
23. ectop/o-		51. vascul/o-	
24. femor/o-		52. vas/o-	
25. fract/o-		53. ven/o-	
26. ili/o-		54. ventricul/o-	
27. jugul/o-		55. viscer/o-	
28. mediastin/o-			

Build Medical Words

Combining Form and Suffix Exercise

Read the definition of the medical word. Look at the combining form that is given. Select the correct suffix from the Suffix List and write it on the blank line. Then build the medical word and write it on the line. (Remember: You may need to remove the combining vowel. Always remove the hyphens and slash.) Be sure to check your spelling. The first one has been done for you.

SUFFIX LIST

-ac (pertaining to)	-ary (pertaining to)	-ion (action; condition)	-ous (pertaining to)
-al (pertaining to)	-ature (system composed of)	-ole (small thing)	-ule (small thing)
-ar (pertaining to)	-ic (pertaining to)	-ory (having the function of)	

Definition of the Medical Word	Combining Form	Suffix	Build the Medical Word
1. Pertaining to (the) chest (You think <i>pertaining to</i> (-ic) + <i>chest</i> (thorac/o-). You change the order of the word parts to put the suffix last. You write <i>thoracic</i> .)	thorac/o-	-ic	thoracic
2. Pertaining to (an) artery	arteri/o-		
3. Pertaining to (a) valve	valvul/o-		
4. Action (of) movement in a circular route	circulat/o-		
5. Pertaining to (the) heart	cardi/o-		
6. Pertaining to (a) hair-like structure (blood vessel)	capill/o-		
7. Pertaining to (a) vein	ven/o-		
8. Pertaining to (the) body as a whole	system/o-		
9. Pertaining to (the) atrium	atri/o-		
10. Pertaining to (the) arm	brachi/o-		
11. Small thing (that is an) artery	arteri/o-		
12. Pertaining to (a vein that is) clearly visible	saphen/o-		
13. Pertaining to (the) aorta	aort/o-		
14. System composed of blood vessel(s)	vascul/o-		
15. Pertaining to contracting	systol/o-		
16. Having the function of movement in a circular route	circulat/o-		
17. Pertaining to (the) ventricle	ventricul/o-		
18. Small thing (that is a) vein	ven/o-		

Multiple Combining Forms and Suffix Exercise


Read the definition of the medical word. Look at the correct suffix that is given. Select the two correct combining forms from the Combining Form List. Then build the medical word and write it on the line. Be sure to check your spelling. The first one has been done for you.

COMBINING FORM LIST		
atri/o- (atrium; chamber that is open at the top)	dilat/o- (dilate; widen)	vascul/o- (blood vessel)
cardi/o- (heart)	my/o- (muscle)	vas/o- (blood vessel; vas deferens)
constrict/o- (drawn together; narrowed)	pulmon/o- (lung)	ventricul/o- (chamber that is filled; ventricle)
	sin/o- (channel; hollow cavity)	

Definition of the Medical Word	Combining Form	Combining Form	Suffix	Build the Medical Word
1. Condition (of) blood vessel(s) being dilated (You think <i>condition</i> (-ion) + <i>blood vessel</i> (vas/o-) + <i>dilated</i> (dilat/o-). You change the order of the word parts to put the suffix last. You write <i>vasodilation</i> .)	vas/o-	dilat/o-	-ion	<u>vasodilation</u>
2. Pertaining to (the) heart (and) lungs	_____	_____	-ary	_____
3. Pertaining to (the) heart (and) blood vessel(s)	_____	_____	-ar	_____
4. Pertaining to (the) SA (node)	_____	_____	-al	_____
5. Condition (of) blood vessel(s) being narrowed	_____	_____	-ion	_____
6. Pertaining to (the) muscle (of the) heart	_____	_____	-al	_____
7. Pertaining to (the) atrium (and) ventricle	_____	_____	-ar	_____

Diseases

Myocardium		
Word or Phrase	Description	Pronunciation/Word Parts
acute coronary syndrome	Syndrome that includes acute ischemia of the myocardium (because of a blood clot or atherosclerosis blocking blood flow through a coronary artery) and unstable angina pectoris. Treatment: Nitroglycerin drug, thrombolytic drug, oxygen therapy.	ischemia (is-KEE-mee-ah) isch/o- block; keep back -emia condition of the blood; substance in the blood
angina pectoris	Mild-to-severe chest pain caused by ischemia of the myocardium. Atherosclerosis blocks the flow of oxygenated blood through the coronary arteries to the myocardium. Anginal pain is a crushing, squeezing, heaviness, or pressure-like sensation in the chest, with pain extending up into the jaw, teeth, neck, or down the left arm, often with extreme sweating (diaphoresis) and a sense of doom. Angina pectoris can occur during exercise, stress, after a heavy meal, or while resting. It is a warning sign of an impending myocardial infarction. Treatment: Nitroglycerin drug, oxygen therapy.	angina (AN-jih-nah) (an-JY-nah) pectoris (PEK-toh-ris) The combining form pector/o- means chest. anginal (AN-jih-nal) (an-JY-nal) angin/o- angina -al pertaining to
<p>DID YOU KNOW?</p> <p>For many years, newspaper and magazine articles described the classic symptoms of angina pectoris in order to raise public awareness and encourage those with angina to promptly seek medical help. Now it is known that those symptoms occur in men, but women most often experience angina as indigestion, nausea, anxiety, extreme fatigue, or trouble sleeping.</p>		
cardiomegaly	Enlargement of the heart, usually due to congestive heart failure. Treatment: Correct the underlying cause.	cardiomegaly (KAR-dee-oh-MEG-ah-lee) cardi/o- heart -megaly enlargement
cardiomyopathy	Any disease condition of the heart muscle that includes heart enlargement and heart failure. In dilated cardiomyopathy , the left ventricle is dilated and the myocardium is so stretched that it can no longer contract to pump blood. Idiopathic cardiomyopathy has an unknown cause. Treatment: Correct the underlying cause, if known.	cardiomyopathy (KAR-dee-OH-my-AW-pah-thee) cardi/o- heart my/o- muscle -pathy disease idiopathic (ID-ee-oh-PATH-ik) idi/o- individual; unknown path/o- disease -ic pertaining to

Word or Phrase	Description	Pronunciation/Word Parts
congestive heart failure (CHF)	<p>Inability of the heart to pump sufficient amounts of blood. It is caused by coronary artery disease or hypertension. During early CHF, the myocardium undergoes hypertrophy (enlargement). This temporarily improves blood flow, and the patient is in compensated heart failure. In the later stages of CHF, the heart can no longer enlarge. Instead, the myocardium becomes flabby and loses its ability to contract, and the patient is in decompensated heart failure. Either side or both sides of the heart may fail.</p> <p>In right-sided congestive heart failure, the right ventricle is unable to adequately pump blood. Blood backs up in the superior vena cava, causing jugular venous distention (dilated jugular veins in the neck). Blood also backs up in the inferior vena cava, causing hepatomegaly (enlargement of the liver) and peripheral edema in the legs, ankles, and feet (see Figure 5-14 ■). Lung disease and increased pressure in the lungs cause the right ventricle to become enlarged; this condition is cor pulmonale.</p> <p>In left-sided congestive heart failure, the left ventricle is unable to adequately pump blood. The blood backs up into the lungs, causing pulmonary congestion and edema that can be seen on a chest x-ray. There is also shortness of breath, cough, and an inability to sleep while lying flat. Treatment: Diuretic drug, digitalis drug, and antihypertensive drug. Severe left-sided heart failure is life-threatening; it may require surgery for a heart transplant or a left ventricular assist device (LVAD).</p>	<p>congestive (con-JES-tiv) congest/o- accumulation of fluid -ive pertaining to</p> <p>hypertrophy (hy-PER-troh-fee) hyper- above; more than normal -trophy process of development The ending <i>-trophy</i> contains the combining form troph/o- and the one-letter suffix <i>-y</i>.</p> <p>compensated (KAWM-pen-SAY-ted) compens/o- compensate; counterbalance -ated composed of; pertaining to a condition</p> <p>decompensated (dee-KAWM-pen-SAY-ted) de- reversal of; without compens/o- compensate; counterbalance -ated composed of; pertaining to a condition</p> <p>peripheral (peh-RIF-eh-ral) peripher/o- outer aspects -al pertaining to</p> <p>edema (eh-DEE-mah)</p> <p>cor pulmonale (KOR PUL-moh-NAL-ee) <i>Cor</i> is the Latin word for <i>heart</i>.</p>
		
	<p>FIGURE 5-14 ■ Peripheral edema. This patient is complaining of ankle swelling. The physician knows that fluid-filled soft tissues in the feet and lower legs can be a sign of right-sided congestive heart failure. He will also examine the neck veins to look for jugular venous distention, another sign of right-sided congestive heart failure. He will use a stethoscope to listen to the lungs to detect pulmonary edema, a sign of left-sided heart failure.</p> <p>Source: Antonia Reeve/Science Source</p>	
myocardial infarction (MI)	<p>Death of myocardial cells due to severe ischemia. The flow of oxygenated blood in a coronary artery is blocked by a blood clot or atherosclerosis. The patient may experience severe angina pectoris, may have mild symptoms similar to indigestion, or may have no symptoms at all (a silent MI). The infarcted area of myocardium has dead tissue or necrosis. If the area of necrosis is small, it will eventually be replaced by scar tissue. If the area is large, the heart muscle may be unable to contract and the patient will die. Also known as a heart attack. Treatment: Baby aspirin taken to prevent an MI or at the first sign of an MI. Thrombolytic drug to dissolve a clot during an MI.</p>	<p>myocardial (MY-oh-KAR-dee-al) my/o- muscle cardi/o- heart -al pertaining to</p> <p>infarction (in-FARK-shun) infarct/o- small area of dead tissue -ion action; condition</p> <p>necrosis (neh-KROH-sis) necr/o- dead body; dead cells; dead tissue -osis condition; process</p>

Heart Valves and Layers of the Heart

Word or Phrase	Description	Pronunciation/Word Parts
endocarditis	Inflammation and bacterial infection of the endocardium lining a heart valve. This occurs in patients who have a structural defect of the valve. Bacteria from an infection elsewhere in the body travel through the blood, are trapped by the structural defect, and cause infection. Acute endocarditis causes a high fever and shock, while subacute bacterial endocarditis (SBE) causes fever, fatigue, and aching muscles. Treatment: Antibiotic drug.	endocarditis (EN-doh-kar-DY-tis) endo- innermost; within card/i- heart -itis infection of; inflammation of The combining vowel <i>i</i> of <i>card/i-</i> is deleted before it is joined to the suffix <i>-itis</i> . subacute (SUB-ah-KYOOT)
mitral valve prolapse (MVP)	Structural abnormality in which the leaflets of the mitral valve do not close tightly. This can be a congenital condition or can occur if the valve is damaged by infection. There is regurgitation as blood flows back into the left atrium with each contraction. A slight prolapse is a common condition and does not require treatment. Treatment: Valvoplasty, mitral valve ring implant, or valve replacement surgery.	prolapse (PROH-laps) regurgitation (ree-GER-jih-TAY-shun) regurgitat/o- backward flow -ion action; condition

CLINICAL CONNECTIONS

Neonatology. Congenital abnormalities can occur in the fetal heart as it develops:

1. **Coarctation of the aorta.** The aorta is abnormally narrow.
2. **Atrial septal defect (ASD).** There is a permanent hole in the interatrial septum.
3. **Ventricular septal defect (VSD).** There is a permanent hole in the interventricular septum.
4. **Tetralogy of Fallot.** There are four defects: a ventricular septal defect, narrowing of the pulmonary trunk, hypertrophy of the right ventricle, and abnormal position of the aorta.
5. **Transposition of the great vessels.** The aorta incorrectly comes from the right ventricle, and the pulmonary trunk incorrectly comes from the left ventricle.

The following abnormalities occur at the time of birth during the change from fetal circulation to normal newborn circulation:

1. **Patent ductus arteriosus (PDA).** The ductus arteriosus fails to close.
2. **Patent foramen ovale.** The foramen ovale fails to close.

coarctation (KOH-ark-TAY-shun)
coarct/o- pressed together
-ation being; having; process

tetralogy (teh-TRAL-oh-jee)
tetr/a- four
-logy study of

Fallot (fah-LOH)

patent (PAY-tent)
pat/o- open
-ent pertaining to

Word or Phrase	Description	Pronunciation/Word Parts
murmur	Abnormal heart sound created by turbulence as blood leaks through a defective heart valve. Murmurs are described according to their volume (soft or loud), their sound, and when they occur. Functional murmurs are mild murmurs that are not associated with disease and are not clinically significant. Treatment: Surgery to correct a severely defective heart valve (valvuloplasty).	murmur (MER-mer)
<p>DID YOU KNOW?</p> <p>Heart murmurs can sound like the call of a sea gull, blowing wind, the clatter of machinery, high-pitched musical notes, or like churning, humming, or clicking.</p>		
pericarditis	Inflammation or infection of the pericardial sac with an excessive accumulation of pericardial fluid. When the fluid compresses the heart and prevents it from beating, this is cardiac tamponade . Treatment: Antibiotic drug. Surgery to remove the fluid (pericardiocentesis).	<p>pericarditis (PAIR-ee-kar-DY-tis) peri- around card/i- heart -itis infection of; inflammation of</p> <p>tamponade (tam-poh-NAYD) tampon/o- stop up -ade action; process</p>
rheumatic heart disease	Autoimmune response to a noncardiac streptococcal infection, such as strep throat. Rheumatic heart disease occurs most often in children and is known as rheumatic fever. The body makes antibodies to fight the bacteria, but the antibodies attack connective tissue in the body, particularly in the joints and/or the heart. The joints become swollen with fluid and inflamed. The mitral and aortic valves of the heart become inflamed and damaged. Vegetations (irregular collections of platelets, fibrin, and bacteria) form on the valves (see Figure 5-15 ■). The valves become scarred and narrowed, a condition known as stenosis . Treatment: Antibiotic drug to treat the initial infection. After rheumatic heart disease has occurred, a prophylactic (preventive) antibiotic drug is given prior to any dental or surgical procedure that might release bacteria that could further damage the valves. Valve replacement surgery.	<p>rheumatic (roo-MAT-ik) rheumat/o- watery discharge -ic pertaining to</p> <p>vegetation (VEJ-eh-TAY-shun) vegetat/o- growth -ion action; condition</p> <p>stenosis (steh-NOH-sis) sten/o- constriction; narrowness -osis condition; process</p>

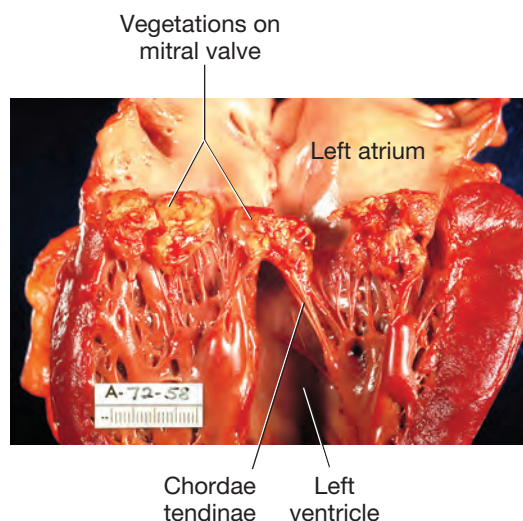


FIGURE 5-15 ■ Vegetation on the mitral valve.

There are irregular, yellow vegetations growing on the otherwise smooth surface of the mitral valve. The multiple rope-like strands below are the normal chordae tendineae that stabilize the valve leaflets.

Source: Science Source/Getty Images

Conduction System



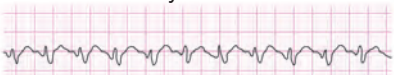
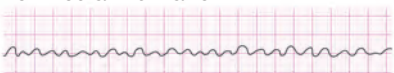

Word or Phrase	Description	Pronunciation/Word Parts
arrhythmia	<p>Any type of irregularity in the rate or rhythm of the heart. It is also known as dysrhythmia. Arrhythmias include bradycardia, fibrillation, flutter, heart block, premature contraction, sick sinus syndrome, and tachycardia. Electrocardiography is performed to diagnose the type of arrhythmia (see Figure 5-16 ■). Treatment: Antiarrhythmic drug, cardioversion, or implanting a pacemaker in the chest, depending on the type of arrhythmia.</p> <p>Bradycardia</p>  <p>Normal sinus rhythm</p>  <p>Ventricular tachycardia</p>  <p>Ventricular fibrillation</p>  <p>Asystole</p> 	<p>arrhythmia (aa-RITH-mee-ah) a- away from; without rrhythm/o- rhythm -ia condition; state; thing</p> <p>dysrhythmia (dis-RITH-mee-ah) dys- abnormal; difficult; painful rhythm/o- rhythm -ia condition; state; thing</p> <p>Select the correct prefix meaning to get the definition of <i>dysrhythmia</i>: <i>condition of an abnormal rhythm</i>. Note that <i>arrhythmia</i> is spelled with two r's, and <i>dysrhythmia</i> is spelled with one r.</p>
bradycardia	<p>Arrhythmia in which the heart beats too slowly (see Figure 5-16). A patient with bradycardia is bradycardic. Treatment: Intravenous atropine (drug). Surgery to insert a pacemaker.</p>	<p>bradycardia (BRAD-ee-KAR-dee-ah) brady- slow card/i- heart -ia condition; state; thing</p> <p>bradycardic (BRAD-ee-KAR-dik) brady- slow card/i- heart -ic pertaining to</p>
fibrillation	<p>Arrhythmia in which there is a very fast, uncoordinated quivering of the myocardium (see Figure 5-16). It can affect the atria or ventricles. Ventricular fibrillation ("V fib"), a life-threatening emergency in which the heart is unable to pump blood, can progress to cardiac arrest. Treatment: Defibrillation.</p>	<p>fibrillation (FIB-rih-LAY-shun) fibrill/o- muscle fiber; nerve fiber -ation being; having; process</p>
flutter	<p>Arrhythmia in which there is a very fast but regular rhythm (250 beats per minute) of the atria or ventricles. The chambers of the heart do not have time to completely fill with blood before the next contraction. Flutter can progress to fibrillation. Treatment: Antiarrhythmic drug; cardioversion.</p>	
heart block	<p>Arrhythmia in which electrical impulses cannot travel normally from the SA node to the Purkinje fibers. In first-degree heart block, the electrical impulses reach the ventricles but are very delayed. In second-degree heart block, only some of the electrical impulses reach the ventricles. In third-degree heart block (complete heart block), no electrical impulses reach the ventricles. In right or left bundle branch block, the electrical impulses are unable to travel down the right or left bundle of His. Treatment: Antiarrhythmic drug. Surgery to insert a pacemaker.</p>	

FIGURE 5-16 ■ Arrhythmias on an ECG tracing.

(a) Bradycardia with a heart rate of 60 beats per minute. (b) A normal heart rate at 80 beats per minute. (c) Ventricular tachycardia at 150 beats per minute. (d) Ventricular fibrillation. (e) Asystole is not an arrhythmia because there is no heartbeat.

Source: Pearson Education

Word or Phrase	Description	Pronunciation/Word Parts
arrhythmia <i>(continued)</i> premature contraction	Arrhythmia in which there are one or more extra contractions in between systole and diastole. This is also known as an extrasystole . There are two types of premature contractions: premature atrial contractions (PACs) and premature ventricular contractions (PVCs) . A repeating pattern of one premature contraction followed by one normal contraction is bigeminy . A repeating pattern of one premature contraction followed by two normal contractions is trigeminy . Two premature contractions occurring together is a couplet . Treatment: Antiarrhythmic drug. Surgery to insert a pacemaker.	contraction (con-TRAK-shun) contract/o- pull together -ion action; condition extrasystole (EKS-trah-SIS-toh-lee) extra- outside -systole contraction The ending -systole contains the combining form systol/o- and the one-letter suffix -e . bigeminy (by-JEM-ih-nee) The prefix bi- means <i>two</i> . trigeminy (try-JEM-ih-nee) The prefix tri- means <i>three</i> .
sick sinus syndrome	Arrhythmia in which bradycardia alternates with tachycardia. It occurs when the sinoatrial node and an ectopic site elsewhere in the myocardium take turns being the heart's pacemaker. Treatment: Antiarrhythmic drug. Surgery to insert a pacemaker.	
tachycardia	Arrhythmia in which there is a fast but regular rhythm (up to 200 beats/minute) (see Figure 5-16). A patient with tachycardia is tachycardic . Sinus tachycardia occurs because of an abnormality in the sinoatrial (SA) node. Atrial tachycardia occurs when an ectopic site somewhere in the atrium produces an electrical impulse that overrides the SA node rhythm. Supraventricular tachycardia occurs when an ectopic site above (superior to) the ventricles produces an electrical impulse. Paroxysmal tachycardia is an episode of tachycardia that occurs suddenly and then goes away without treatment. Treatment: Antiarrhythmic drug. Cardioversion. Surgery to insert a pacemaker.	tachycardia (TAK-ih-KAR-dee-ah) tachy- fast card/i- heart -ia condition; state; thing tachycardic (TAK-ih-KAR-dik) tachy- fast card/i- heart -ic pertaining to supraventricular (soo-prah-ven-TRIH-kyoo-lar) supra- above ventricul/o- chamber that is filled; ventricle -ar pertaining to paroxysmal (PAIR-awk-SIZ-mal)
asystole	Complete absence of a heartbeat (see Figure 5-16). This is also known as cardiac arrest . Treatment: Cardiopulmonary resuscitation (CPR).	asystole (aa-SIS-toh-lee) a- away from; without -systole contraction
palpitation	An uncomfortable sensation felt in the chest during a premature contraction of the heart. It is often described as a "thump." Treatment: None, unless it becomes an arrhythmia.	palpitation (PAL-pih-TAY-shun) palpit/o- throb -ation being; having; process

WORD ALERT

Sound-Alike Words

palpation	(noun)	A process of touching and feeling. <i>Example: Palpation allowed the physician to identify a tumor in the abdomen.</i>
palpitation	(noun)	Being or having (the heart) throb <i>Example: Her occasional palpitations concerned the patient until the physician reassured her.</i>

Blood Vessels		
Word or Phrase	Description	Pronunciation/Word Parts
aneurysm	Area of dilation and weakness in the wall of an artery (see Figure 5-17 ■). This can be congenital or where arteriosclerosis has damaged the artery. With each heartbeat, the weakened artery wall balloons outward. An aneurysm can rupture without warning. A dissecting aneurysm is one that enlarges by tunneling between the layers of the artery wall. Treatment: Placement of a metal clip on the neck (narrowest part) of a small aneurysmal dilation to occlude the blood flow. Surgical removal of a large aneurysm and replacement with a synthetic tubular graft.	aneurysm (AN-yoor-izm)
		dissecting (dy-SEK-ting) dissect/o- cut apart -ing doing
		aneurysmal (AN-yoor-IZ-mal) aneurysm/o- aneurysm; dilation -al pertaining to

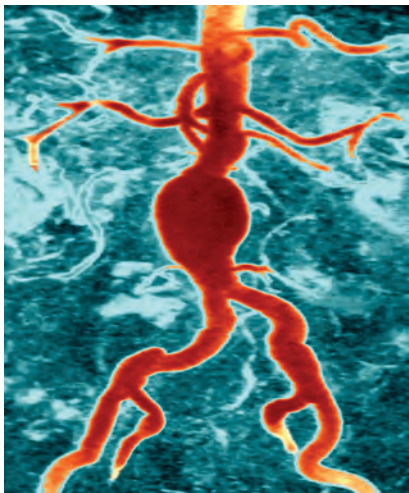
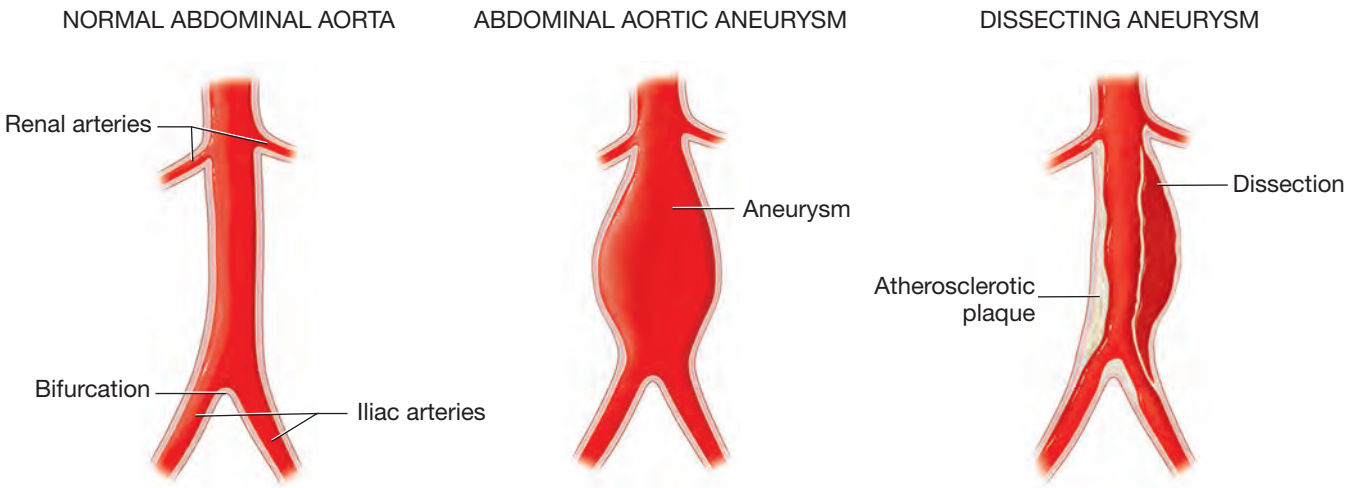


FIGURE 5-17 ■ Aneurysm.
(a) A normal abdominal aorta, a large abdominal aortic aneurysm, and a dissecting aneurysm that has tunneled between and separated the atherosclerotic plaque from the artery wall. (b) This x-ray image is an arteriogram. Contrast dye shows a large dissecting abdominal aortic aneurysm above the bifurcation where the right and left iliac arteries begin in the pelvic area.
Source: Pearson Education; Zephyr/Science Photo Library/Getty Images

Word or Phrase	Description	Pronunciation/Word Parts
arteriosclerosis	<p>Progressive degenerative changes that produce a narrowed, hardened artery. The process begins with a small tear in the endothelium caused by chronic hypertension. Then low-density lipoproteins (LDLs) in the blood deposit cholesterol and form an atheroma or atheromatous plaque inside the artery (see Figure 5-18 ■). Collagen fibers form underneath the plaque, so that the artery wall becomes hard and nonelastic. An artery with arteriosclerosis is said to be arteriosclerotic. This is also known as arteriosclerotic cardiovascular disease (ASCVD).</p> <p>Fatty plaque deposits enlarge more rapidly in patients who eat high-fat diets, have diabetes mellitus, or have a genetic predisposition (family history). As plaque grows on an artery wall, it makes the lumen narrower and narrower (see Figure 5-19 ■). This condition is atherosclerosis. Pieces of atheromatous plaque easily break off, travel through the blood, and block other arteries. The rough edges of the plaque can trap red blood cells and form a blood clot.</p> <p>Severe atherosclerosis completely blocks the artery (see Figure 5-19). In the carotid arteries to the brain, this can cause a stroke. In the coronary arteries to the heart muscle, this can cause angina pectoris and a myocardial infarction. In the renal arteries to the kidney, this can cause kidney failure. Treatment: Lipid-lowering drug. Surgery: Angioplasty or stent to press down the plaque or endarterectomy to remove the plaque.</p>	arteriosclerosis (ar-TEER-ee-OH-skleh-ROH-sis) arteri/o- artery scler/o- hard; sclera of the eye -osis condition; process
		atheroma (ATH-eh-ROH-mah) ather/o- soft, fatty substance -oma mass; tumor
		atheromatous (ATH-eh-ROH-mah-tus) atheromat/o- fatty deposit; fatty mass -ous pertaining to
		plaque (PLAK)
		arteriosclerotic (ar-TEER-ee-OH-skleh-RAW-tik) arteri/o- artery scler/o- hard; sclera of the eye -tic pertaining to

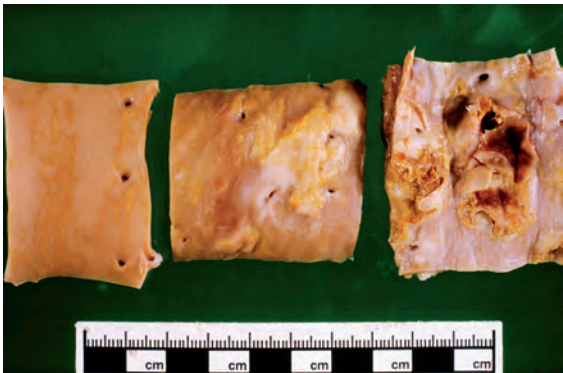


FIGURE 5-18 ■ Mild, moderate, and severe atheromatous plaque. These segments of aorta show varying degrees of plaque formation. The dark openings are where arteries branch off from the aorta, bringing oxygenated blood to the body. In the middle specimen, moderate plaque narrows these artery openings. In the specimen on the right, severe plaque formation occludes these openings and decreases blood flow through the aorta itself.
Source: Biophoto Associates/Science Source/Getty Images

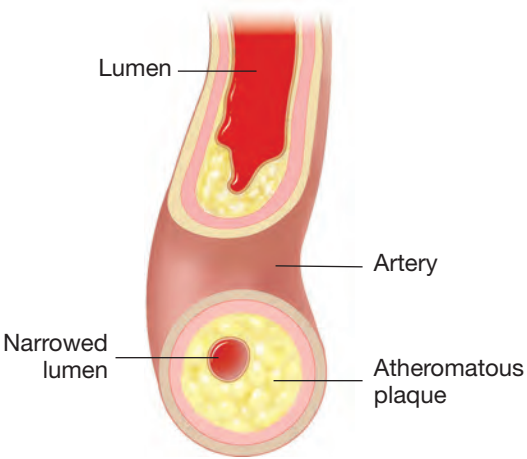


FIGURE 5-19 ■ Severe atherosclerotic plaque in an artery. The lumen of the artery is so narrow that little blood can flow through it.
Source: Pearson Education

Word or Phrase	Description	Pronunciation/Word Parts
arteriosclerosis <i>(continued)</i>	<p>CLINICAL CONNECTIONS</p> <p>Dietetics. The body produces its own supply of cholesterol to make bile, neurotransmitters, and male and female sexual hormones. The diet contains additional cholesterol in foods from animal sources. An excessive amount of animal fat in the diet increases the cholesterol level in the blood. An excessive amount of sugar in the diet is converted by the body to triglycerides, and this causes an increased triglyceride level in the blood and increased storage as adipose tissue (fat).</p> <p>Lipoproteins are carrier molecules produced in the liver. They transport lipids (fats such as cholesterol and triglycerides) in the blood. There are three types of lipoproteins. High-density lipoprotein (HDL) carries cholesterol to the liver where it is excreted in the bile. HDL is known by laypersons as “good cholesterol,” and an increased level of HDL is beneficial. Low-density lipoprotein (LDL) carries cholesterol but deposits it on the walls of the arteries, and so it is known as “bad cholesterol.” Very low-density lipoprotein (VLDL) carries triglycerides and deposits them on the walls of the arteries.</p>	
bruit	A harsh, rushing sound made by blood passing through an artery narrowed and roughened by atherosclerosis. The bruit can be heard when a stethoscope is placed over the artery. Treatment: Correct the underlying cause.	bruit (BROO-ee)
coronary artery disease (CAD)	Arteriosclerosis of the coronary arteries. They are filled with atheromatous plaque, and their narrowed lumens cannot carry enough oxygenated blood to the myocardium. This results in angina pectoris. Severe atherosclerosis (or a blood clot that forms on an atherosclerotic plaque) can completely block the lumen of a coronary artery. This causes a myocardial infarction. Treatment: Lipid-lowering drug. Surgery: Percutaneous transluminal coronary angioplasty (PTCA) or coronary artery bypass grafting (CABG).	
	<p>CLINICAL CONNECTIONS</p> <p>Public Health. There are many factors that contribute to the development of coronary artery disease. These are known as cardiac risk factors. They include demographic factors (heredity, gender, age), medical factors (hypertension, hypercholesterolemia, diabetes mellitus, obesity), and lifestyle factors (smoking, lack of exercise, poor diet, stress, alcoholism).</p>	
hyperlipidemia	Elevated levels of lipids (fats) in the blood. Lipids include cholesterol and triglycerides. Hypercholesterolemia is an elevated level of cholesterol in the blood. Hypertriglyceridemia is an elevated level of triglycerides in the blood. Normal levels are below 200 mg/dL for cholesterol and below 150 mg/dL for triglycerides. Treatment: Lipid-lowering drug.	<p>hyperlipidemia (HY-per-LIP-ih-DEE-mee-ah) hyper- above; more than normal lipid/o- fat; lipid -emia condition of the blood; substance in the blood</p> <p>hypercholesterolemia (HY-per-koh-LES-ter-awl-EE-mee-ah) hyper- above; more than normal cholesterol/o- cholesterol -emia condition of the blood; substance in the blood</p> <p>hypertriglyceridemia (HY-per-try-GLIS-eh-ry-DEE-mee-ah) hyper- above; more than normal triglycerid/o- triglyceride -emia condition of the blood; substance in the blood</p>

Word or Phrase	Description	Pronunciation/Word Parts
hypertension (HTN)	Elevated blood pressure. A normal blood pressure reading in an adult is less than 120/80 mm Hg. Readings between 120/80 mm Hg and 140/90 mm Hg are categorized as prehypertension . Blood pressures above 140/90 mm Hg are categorized as hypertension, and the patient is said to be hypertensive . Several blood pressure readings, not just one, are needed to make a diagnosis. Essential hypertension, the most common type of hypertension, is one in which the exact cause is not known. Secondary hypertension has a known cause, such as kidney disease. Treatment: Lifestyle changes (decreased salt intake, increased exercise, weight loss) followed by an antihypertensive drug.	<p>hypertension (HY-per-TEN-shun) hyper- above; more than normal tens/o- pressure; tension -ion action; condition</p> <p>prehypertension (pree-HY-per-TEN-shun) pre- before; in front of hyper- above; more than normal tens/o- pressure; tension -ion action; condition</p> <p>hypertensive (HY-per-TEN-siv) hyper- above; more than normal tens/o- pressure; tension -ive pertaining to</p>
<p>DID YOU KNOW?</p> <p>Some people have increased blood pressure readings just because they are nervous about being in a doctor's office. This is known as <i>white-coat hypertension</i>. This is not a true hypertension because as soon as they leave the doctor's office, their blood pressure returns to normal.</p>		
hypotension	Blood pressure lower than 90/60 mm Hg, usually because of a loss of blood volume. A patient with hypotension is hypotensive . Orthostatic hypotension is the sudden, temporary, but self-correcting decrease in systolic blood pressure that occurs when the patient changes from a lying to a standing position and experiences lightheadedness. Treatment: Change positions slowly to avoid dizziness.	<p>hypotension (HY-poh-TEN-shun) hypo- below; deficient tens/o- pressure; tension -ion action; condition</p> <p>hypotensive (HY-poh-TEN-siv) hypo- below; deficient tens/o- pressure; tension -ive pertaining to</p> <p>orthostatic (OR-thoh-STAT-ik) orth/o- straight stat/o- standing still; staying in one place -ic pertaining to</p>
peripheral artery disease (PAD)	Atherosclerosis of the arteries in the legs. Blood flow (perfusion) to the extremities is poor, and there is ischemia of the tissues. While walking, the patient experiences pain in the calf (intermittent claudication). In severe PAD, the feet and toes remain cool and cyanotic and may become necrotic as the tissues die. Treatment: Lipid-lowering drug. Surgery: Angioplasty and stent in the iliac or femoral artery. Possible amputation of the foot.	<p>peripheral (peh-RIF-eh-ral) peripher/o- outer aspects -al pertaining to</p> <p>perfusion (per-FYOO-zhun) per- through; throughout fus/o- pouring -ion action; condition</p> <p>claudication (KLaw-dih-KAY-shun) claudicat/o- limping pain -ion action; condition</p> <p>necrotic (neh-KRAW-tik) necr/o- dead body; dead cells; dead tissue -tic pertaining to</p>
peripheral vascular disease (PVD)	Any disease of the arteries of the extremities. It includes peripheral artery disease as well as Raynaud's disease. Treatment: See <i>peripheral artery disease</i> and <i>Raynaud's disease</i> .	<p>peripheral (peh-RIF-eh-ral) peripher/o- outer aspects -al pertaining to</p>

Word or Phrase	Description	Pronunciation/Word Parts
phlebitis	Inflammation of a vein, usually accompanied by infection. The area around the vein is painful, and the skin overlying the vein may show a red streak. A severe inflammation can partially occlude the vein and slow the flow of blood. Thrombophlebitis is phlebitis with the formation of a thrombus (blood clot). Treatment: Analgesic drug for pain, anti-inflammatory drug for inflammation. Antibiotic drug. Thrombolytic drug to dissolve a blood clot.	<p>phlebitis (fleh-BY-tis) phleb/o- vein -itis infection of; inflammation of</p> <p>thrombophlebitis (THRAWM-boh-fleh-BY-tis) thromb/o- blood clot phleb/o- vein -itis infection of; inflammation of</p>
Raynaud's disease	Sudden, severe vasoconstriction and spasm of the arterioles in the fingers and toes, often triggered by cold or emotional upset. They become white or cyanotic and numb for minutes or hours until the attack passes. This can lead to necrosis. Treatment: Vasodilator drug.	Raynaud (ray-NO)
varicose veins	<p>Damaged or incompetent valves in a vein that allow blood to flow backward and collect in the preceding section of vein. The vein becomes distended with blood, twisting and bulging under the surface of the skin (see Figure 5-20 ■). There is pain and aching; the legs feel heavy and leaden. Varicose veins can be caused by phlebitis, injury, long periods of sitting with the legs crossed, or occupations that require constant standing. Also, during pregnancy, pressure from the enlarging uterus restricts the flow of blood in the lower extremities and can cause varicose veins. There is a family tendency to develop varicose veins. Treatment: Injecting a sclerosing solution or foam to harden and occlude the vein (sclerotherapy). Laser or radiowaves to destroy the vein. These procedures redirect the blood into deeper veins.</p> <div data-bbox="345 1081 581 1478" data-label="Image"> </div> <p>FIGURE 5-20 ■ Severe varicose veins in the leg. Superficial, protruding varicose veins are unsightly and easily injured. Patients often have varicose veins treated for an improved cosmetic appearance, but this also helps decrease the chance of injury and thrombophlebitis. Source: Audie/Shutterstock</p>	<p>varicose (VAIR-ih-kohs) varic/o- varicose vein; varix -ose full of</p>

CLINICAL CONNECTIONS

Gastroenterology (Chapter 3). Varicose veins of the esophagus and stomach are known as esophageal and gastric *varices*. Varicose veins of the rectum are known as *hemorrhoids*.

Laboratory and Diagnostic Procedures

Blood Tests		
Word or Phrase	Description	Pronunciation/Word Parts
cardiac enzymes	Test to measure the levels of enzymes that are released into the blood when myocardial cells die during a myocardial infarction. (These enzymes are not released during angina pectoris.) The higher the levels, the more severe the myocardial infarction and the larger the area of infarct. Creatine kinase (CK) is found in all muscle cells, but a specific form of it (CK-MB) is only found in myocardial cells. The CK-MB level begins to rise 2–6 hours after a myocardial infarction. It is also known as creatin phosphokinase (CPK) . Lactate dehydrogenase (LDH) is found in many different cells, including the heart. The LDH level begins to rise 12 hours after a myocardial infarction. An elevated LDH can support the CK-MB results but cannot be the only basis for a diagnosis of myocardial infarction. Cardiac enzymes are measured every few hours for several days. This test is done in conjunction with troponin.	<p>enzyme (EN-zime) The suffix -ase means <i>enzyme</i>.</p> <p>creatin kinase (KREE-ah-teen KY-nays)</p> <p>creatin phosphokinase (KREE-ah-teen FAWs-foh-KY-nays)</p> <p>lactate dehydrogenase (LAK-tayt dee-HY-droh-JEH-nays)</p>
C-reactive protein (CRP)	Test to measure the level of inflammation in the body. Inflammation from sites other than the cardiovascular system (such as inflammation of the gums or from a chronic urinary tract infection) can produce inflammation of the walls of the blood vessels. This can lead to blood clot formation and a myocardial infarction. The high-sensitivity CRP test can detect a lower blood level of CRP and is used to predict a healthy person's risk of developing cardiovascular disease.	
homocysteine	Test included as part of a cardiac risk assessment. This amino acid damages the blood vessel walls. An elevated level increases the patient's risk of arteriosclerosis and a blood clot that can cause a heart attack or stroke.	homocysteine (HOH-moh-SIS-teen)
lipid profile	Test that provides a comprehensive picture of the blood levels of cholesterol and triglycerides and their lipoprotein carriers (HDL, LDL, VLDL).	<p>lipid (LIP-id) lip/o- fat; <i>lipid</i> -id origin; resembling; source</p> <p>lipoprotein (LIH-poh-PROH-teen)</p>
troponin	Test to measure the level of two proteins that are released into the blood when myocardial cells die. Troponin I and troponin T are only found in the myocardium. The troponin levels begin to rise 4–6 hours after a myocardial infarction. More importantly, they remain elevated for up to 10 days, so they can be used to diagnose a myocardial infarction many days after it occurred. Troponin levels are done in conjunction with cardiac enzyme levels.	troponin (troh-POH-nin)
Diagnostic Procedures		
cardiac catheterization	Procedure performed to study the anatomy and pressures in the heart. During a right heart catheterization, a catheter is inserted into the femoral or brachial vein and threaded to the right atrium. The catheter is used to record right heart pressures. Then a radiopaque contrast dye is injected through the catheter to outline the chambers of the heart to diagnose congenital heart defects. During a left heart catheterization, a catheter is inserted into the femoral or brachial artery and threaded to the left atrium. Then radiopaque contrast dye is injected to outline the coronary arteries and show narrowed or blocked areas. If blockage of a coronary artery is present, an angioplasty can be performed at that time. This procedure is also referred to as a <i>cardiac cath</i> .	<p>catheterization (KATH-eh-TER-ih-ZAY-shun) catheter/o- catheter -ization process of creating; process of inserting; process of making</p>



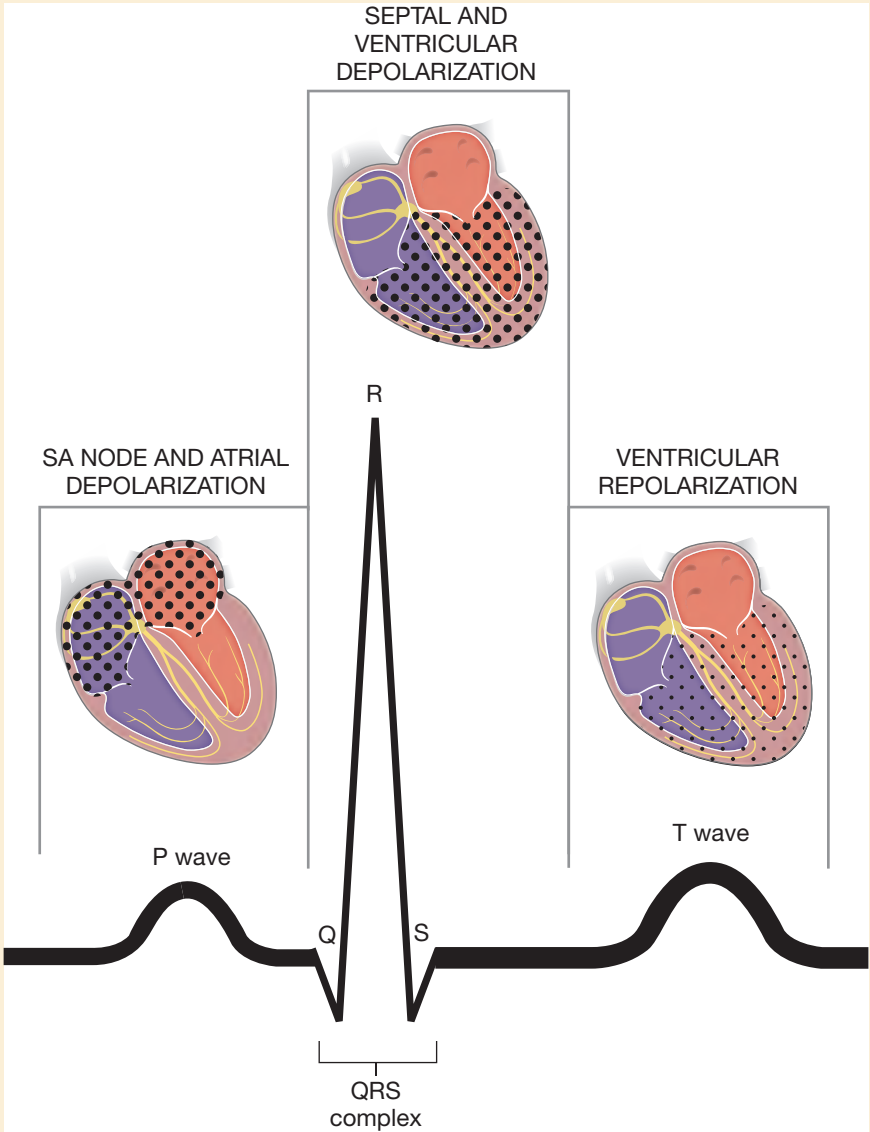
Word or Phrase	Description	Pronunciation/Word Parts
cardiac exercise stress test	<p>Procedure performed to evaluate the heart's response to exercise in patients with chest pain, palpitations, or arrhythmias (see Figure 5-21 ■). The patient walks on a motorized treadmill (treadmill exercise stress test) or rides a stationary bicycle while an ECG is performed. The speed of the treadmill and the steepness of its incline (or the resistance of the bicycle) are gradually increased while the patient's heart rate, blood pressure, and ECG are monitored. The procedure is stopped if the patient complains of angina, palpitations, shortness of breath, or tiredness, or if the ECG pattern becomes abnormal. The patient's resting heart rate and maximum heart rate are compared to standards for other people of the same age and sex. Any abnormality in the ECG pattern is analyzed.</p> 	<p>FIGURE 5-21 ■ Treadmill exercise stress test. This patient is exercising on a treadmill. Electrode patches on his chest pick up the electrical impulses of the heart. The cardiologist watches the computer screen for any arrhythmias. The nurse periodically checks the patient's blood pressure. <i>Source: Brownie Harris/Flirt/Corbis</i></p>
electrocardiography (ECG, EKG)	<p>Procedure that records the electrical activity of the heart (see Figure 5-22 ■). Electrodes (metal pieces in adhesive patches) are placed on the limbs (both arms and one leg) to send the electrical impulses of the heart to the ECG machine. These are the three limb leads (leads I–III). Electrodes placed on the chest are known as the precordial leads (V_1–V_6). A 12-lead ECG records the electrical activity between different combinations of electrodes to give an electrical picture of the heart from 12 different angles. Samples of each of these 12 tracings are printed out and mounted on a backing for an electrocardiogram. A longer sample of just a single lead tracing (usually lead II) is known as a <i>rhythm strip</i>.</p> 	<p>electrocardiography (ee-LEK-troh-KAR-dee-AW-grah-fee) electr/o- electricity cardi/o- heart -graphy process of recording</p> <p>electrocardiogram (ee-LEK-troh-KAR-dee-oh-GRAM) electr/o- electricity cardi/o- heart -gram picture; record</p>

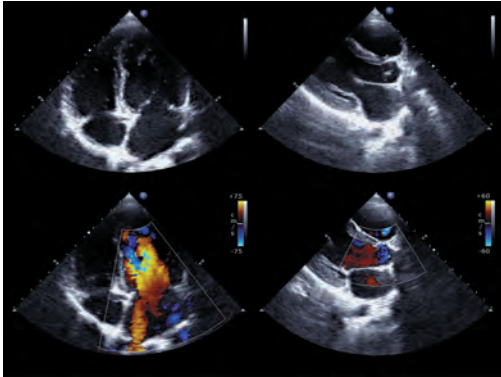

FIGURE 5-22 ■ Electrocardiography.
This portable ECG machine has been brought to the patient's bedside. Electrode patches attached to wire leads pick up the electrical impulses of the heart. Interpretation of an ECG includes the heart rate and rhythm and identifying abnormalities in the shape of the electrical pattern.
Source: Antonia Reeve/Science Source

Word or Phrase	Description	Pronunciation/Word Parts
electrocardiography (ECG, EKG) <i>(continued)</i>	<p>A CLOSER LOOK</p> <p>ECG Interpretation. The electrical image generated by the contraction and relaxation of the heart has a characteristic pattern of waves and a spike (see Figure 5-23 ■). The P wave corresponds to depolarization of the SA node and contractions of both atria. The QRS complex corresponds to depolarization of the septum and contractions of both ventricles. The T wave corresponds to repolarization of the ventricles. (<i>Note:</i> The wave that corresponds to repolarization of the atria is hidden by the QRS complex.)</p>  <p>FIGURE 5-23 ■ ECG tracing. On an ECG, a normal tracing shows a P wave, QRS complex, and T wave that correspond to depolarization (large dots) and repolarization (small dots) changes going on in the heart. These are so named to create a simple and universal reference.</p> <p><i>Source:</i> Pearson Education</p>	
	<p>DID YOU KNOW?</p> <p>The <i>K</i> in the abbreviation <i>EKG</i> comes from the Greek word <i>kardia</i> (heart).</p>	
electrophysiologic study (EPS)	<p>Procedure to map the heart's conduction system in a patient with an arrhythmia. While an ECG is performed, catheters are inserted into the femoral vein and subclavian vein. X-rays are used to guide the catheters to the heart. The catheters send out electrical impulses to stimulate the heart and try to cause an arrhythmia to pinpoint the ectopic site where the arrhythmia is coming from.</p>	<p>electrophysiologic (ee-LEK-troh-FIZ-ee-oh-LAW-jik)</p> <p>electr/o- electricity physi/o- physical function log/o- study of; word -ic pertaining to</p>

Word or Phrase	Description	Pronunciation/Word Parts
Holter monitor	Procedure during which the patient's heart rate and rhythm are continuously monitored as an outpatient for 24 hours. The patient wears electrodes attached to a small portable ECG monitor (carried in a vest or placed in a pocket). The patient also keeps a diary of activities, meals, and symptoms. A Holter monitor procedure is used to document infrequently occurring arrhythmias and to link them to activities or symptoms such as chest pain.	Holter (HOL-ter)
pharmacologic stress test	Procedure performed instead of a cardiac stress test for patients who cannot exercise vigorously. The vasodilator drug dipyridamole (Persantine) is given to cause normal coronary arteries to dilate. Occluded arteries cannot dilate, and this stresses the heart and causes angina in a way that is similar to an exercise stress test.	pharmacologic (FAR-mah-koh-LAW-jik) pharmac/o- drug; medicine log/o- study of; word -ic pertaining to
telemetry	Procedure to monitor a patient's heart rate and rhythm in the hospital. The patient wears electrodes connected to a device that continuously transmits an ECG tracing to a central monitoring station in the coronary care unit or intensive care unit. A nurse at the station constantly watches all of the patients' cardiac monitors.	telemetry (teh-LEM-eh-tree) tele/o- distance -metry process of measuring

Radiology and Nuclear Medicine Procedures

angiography	<p>Procedure in which radiopaque contrast dye is injected into a blood vessel to fill and outline it. In arteriography, it is injected into an artery to show blockage, narrowed areas, or aneurysms (see Figure 5-17). In venography, it is injected into a vein to show weakened valves and dilated walls. The x-ray image is an angiogram or, more specifically, an arteriogram or venogram.</p> <p>In coronary angiography, a catheter is inserted into the femoral artery and threaded to the aorta. The radiopaque contrast dye is injected to outline the coronary arteries and show narrowing or blockage. The x-ray is a coronary angiogram.</p> <p>In rotational angiography, multiple x-rays are taken as the x-ray machine goes around the patient. This technique is particularly helpful in documenting tortuous blood vessels in three dimensions.</p> <p>Digital subtraction angiography (DSA) combines two x-ray images, one taken without radiopaque contrast dye and a second image taken after radiopaque contrast dye has been injected to outline the blood vessel. A computer compares the two images and digitally "subtracts" or removes the soft tissues, bones, and muscles, leaving just the image of the arteries.</p>	<p>angiography (AN-jee-AW-grah-fee) angi/o- blood vessel; lymphatic vessel -graphy process of recording</p> <hr/> <p>arteriography (ar-TEER-ee-AW-grah-fee) arteri/o- artery -graphy process of recording</p> <hr/> <p>venography (vee-NAW-grah-fee) ven/o- vein -graphy process of recording</p> <hr/> <p>angiogram (AN-jee-oh-GRAM) angi/o- blood vessel; lymphatic vessel -gram picture; record</p> <hr/> <p>arteriogram (ar-TEER-ee-oh-GRAM) arteri/o- artery -gram picture; record</p> <hr/> <p>venogram (VEE-noh-gram) ven/o- vein -gram picture; record</p>
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Word or Phrase	Description	Pronunciation/Word Parts
echocardiography	<p>Procedure that uses a transducer to produce ultra high-frequency sound waves (ultrasound) that are bounced off the heart to create an image.</p> <p>Two-dimensional echocardiography (2-D echo) creates a real-time picture of the heart and its chambers and valves as it contracts and relaxes. The image is an echocardiogram (see Figure 5-24 ■)</p>	<p>echocardiography (EK-oh-KAR-dee-AW-grah-fee) ech/o- <i>echo of a sound wave</i> cardi/o- <i>heart</i> -graphy <i>process of recording</i></p>
		<p>echocardiogram (EK-oh-KAR-dee-oh-GRAM) ech/o- <i>echo of a sound wave</i> cardi/o- <i>heart</i> -gram <i>picture; record</i></p>
	<p>Transesophageal echocardiography (TEE) may be ordered when a standard echocardiogram has a poor-quality image. For a TEE, the patient swallows an endoscopic tube that contains a tiny, sound-emitting transducer. This is positioned in the esophagus directly behind, and closer to, the heart.</p> <p>Doppler ultrasonography images the flow of blood in an artery or vein (see Figure 5-25 ■). The two-dimensional ultrasound image shows blockages or clots in the blood vessel. Doppler technology shows how fast blood is traveling in that artery or vein. Doppler technology is also used in automatic blood pressure machines, in hand-held devices that give the heart rate if placed on the skin over an artery, and in fetal monitors that, when placed on the mother's abdomen, give the heart rate of the fetus. Color flow duplex ultrasonography combines the ultrasound image with a color-coded Doppler image. Variations in blood flow and turbulence are shown, with faster flow in red and slower flow in blue. Color flow duplex ultrasonography is the “gold standard” for evaluating tortuous varicose veins.</p>	<p>transesophageal (TRANS-eh-SAW-fah-JEE-al) trans- <i>across; through</i> esophag/o- <i>esophagus</i> -eal <i>pertaining to</i></p>
		<p>Doppler (DAW-pler)</p> <p>ultrasonography (UL-tra-h-soh-NAW-grah-fee) ultra- <i>beyond; higher</i> son/o- <i>sound</i> -graphy <i>process of recording</i></p> <p>duplex (DOO-pleks)</p>
	<p>FIGURE 5-24 ■ Echocardiogram. These images were taken while a two-dimensional echocardiography produced real-time, moving images of the heart on the display screen. Echocardiography uses sound waves to create images. Source: Kalewa/Shutterstock</p>	
	<p>FIGURE 5-25 ■ Doppler ultrasonography. This radiologic technologist has positioned an ultrasound transducer over the left carotid artery in the patient's neck. He moves the transducer to obtain the clearest image on the computer screen and then records this permanent image for the electronic patient record. Source: Ouellette Theroux/Publiphoto/ Science Source</p>	

Word or Phrase	Description	Pronunciation/Word Parts
multiple-gated acquisition (MUGA) scan	Nuclear medicine procedure that uses the radioactive tracer technetium-99m. First, pyrophosphate is injected intravenously to allow red blood cells to bind with technetium-99m. Then technetium-99m is injected. A gamma camera records gamma rays emitted by the technetium-99m bound to red blood cells. The camera is coordinated (gated) with the patient's ECG so that images of the heart chambers (with blood—and red blood cells—in them) are taken at various times. A MUGA scan also calculates the ejection fraction (how much blood the ventricle can eject with one contraction). The ejection fraction is the most accurate indicator of overall heart function. This procedure is also known as a radionuclide ventriculography (RNV) or gated blood pool scan .	radionuclide (RAY-dee-oh-NOO-klide) radi/o- forearm bone; radiation; x-rays nucle/o- nucleus of an atom; nucleus of a cell -ide chemically modified structure
myocardial perfusion scan	Nuclear medicine procedure that combines a cardiac exercise stress test with intravenous injections of a radioactive tracer. The radioactive tracer collects in those parts of the myocardium that have the best perfusion (blood flow). A gamma camera records gamma rays emitted by the radioactive tracer and creates a two-dimensional image of the heart. Areas of decreased uptake (“cold spots”) indicate poor perfusion from a blocked coronary artery. The artery must be about 70% blocked before any abnormality is evident on the image. Areas of no uptake indicate dead tissue from a previous myocardial infarction. Technetium-99m is joined to a synthetic molecule (sestamibi). The combination of technetium-99m with sestamibi is the drug Cardiolite, so this test is also known as a Cardiolite stress test . In a thallium stress test , thallium-201 is the radioactive tracer, or thallium-201 and technetium-99m can be used. Myocardial perfusion PET scans are used to image the metabolism of the heart.	perfusion (per-FYOO-zhun) per- through; throughout fus/o- pouring -ion action; condition Cardiolite (KAR-dee-oh-LITE) thallium (THAL-ee-um)
single-photon emission computed tomography (SPECT) scan	Procedure that is a variation of a myocardial perfusion scan or a MUGA scan. Instead of being stationary above the patient's chest, the gamma camera is moved in a circle around the patient. The computer creates many individual images or “slices” (tomography) and compiles them into a three-dimensional image of the heart.	photon (FOH-tawn) A photon is another name for a gamma ray. tomography (toh-MAW-grah-fee) tom/o- cut; layer; slice -graphy process of recording

Medical and Surgical Procedures

Medical Procedures		
Word or Phrase	Description	Pronunciation/Word Parts
auscultation	Procedure that uses a stethoscope to listen to the heart sounds. The stethoscope is placed at the point of maximum impulse (PMI) , which is at the apex of the heart. Auscultation can determine the heart rate and detect arrhythmias and murmurs.	auscultation (AWS-kul-TAY-shun) auscult/o- listening -ation being; having; process stethoscope (STETH-oh-skohp) steth/o- chest -scope instrument used to examine

Word or Phrase	Description	Pronunciation/Word Parts
cardiopulmonary resuscitation (CPR)	Procedure to circulate the blood and ventilate the lungs after a patient has stopped breathing and the heart has stopped. This procedure was already described in Chapter 4 Pulmonology.	cardiopulmonary (KAR-dee-oh-PUL-moh-NAIR-ee) cardi/o- heart pulmon/o- lung -ary pertaining to
cardioversion	<p>Procedure to treat an arrhythmia (atrial flutter, atrial fibrillation, or ventricular tachycardia) that cannot be controlled with antiarrhythmic drugs. Two large, hand-held paddles are placed on either side of the patient's chest. The machine generates an electrical shock coordinated with the QRS complex of the patient's heart to restore the heart to a normal rhythm. For a patient with ventricular fibrillation, the same machine is used (it is now called a defibrillator) to give a much stronger electrical shock (see Figure 5-26 ■).</p> <p>An automatic implantable cardioverter/defibrillator (AICD) is a small device that is implanted in a patient who is at high risk for developing a serious arrhythmia. The AICD is implanted under the skin of the chest. It has leads (wires) that go to the heart, sense its rhythm, and deliver an electrical shock, if needed. An automatic external defibrillator (AED) is a portable computerized device kept on emergency response vehicles and in public places such as airports. It analyzes the patient's heart rhythm and delivers an electrical shock to stimulate the heart in cardiac arrest. An AED is designed to be used by nonmedical persons.</p>	cardioversion (KAR-dee-oh-VER-zhun) cardi/o- heart vers/o- travel; turn -ion action; condition defibrillator (dee-FIB-rih-LAY-tor) de- reversal of; without fibrill/o- muscle fiber; nerve fiber -ator person who does; person who produces; thing that does; thing that produces
sclerotherapy	<p>Procedure in which a sclerosing drug (liquid or foam) is injected into a varicose vein. The drug causes irritation and inflammation that later becomes fibrosis that occludes the vein. The blood flow is redirected to another, deeper vein, and the varicose vein is no longer distended.</p>	sclerotherapy (SKLAIR-oh-THAIR-ah-pee) scler/o- hard; sclera of the eye -therapy treatment Add words to make a complete definition of sclerotherapy : <i>treatment (to make a vein) hard(en)</i> .



FIGURE 5-26 ■ Defibrillation.

This emergency medical technician has applied defibrillator paddles to the patient's chest to convert a life-threatening ventricular fibrillation. The defibrillator unit and an emergency drug box are on the ground next to the patient.

Source: Mika/Comet/Corbis

Word or Phrase	Description	Pronunciation/Word Parts
vital signs	<p>Procedure during a physical examination to measure the temperature, heart rate (pulse), and respirations (TPR) as well as the blood pressure (BP). Sometimes an evaluation of pain is included and it is known as the fourth vital sign.</p> <p>The heart rate is measured by counting the pulse. The pulse can be felt in several different parts of the body (see Figure 5-27 ■). Pulse points include the carotid pulse in the neck, apical pulse on the anterior chest, axillary pulse in the armpit, brachial pulse at the inner elbow, radial pulse at the wrist, femoral pulse in the inguinal area (groin), popliteal pulse at the back of the knee, posterior tibial pulse at the back of the lower leg, and the dorsalis pedis pulse on the dorsum of the foot. The radial pulse in the wrist is the most commonly used site. In an emergency, the carotid pulse is used (see Figure 5-28 ■) because, if the patient is in shock, there is less blood flowing to the extremities. The apical pulse (at the apex of the heart) can be heard with a stethoscope and is also used to evaluate the heart rhythm and heart sounds. The presence of peripheral vascular disease can be determined by comparing the strength of the pulse in the right leg to the same pulse on the left.</p>	

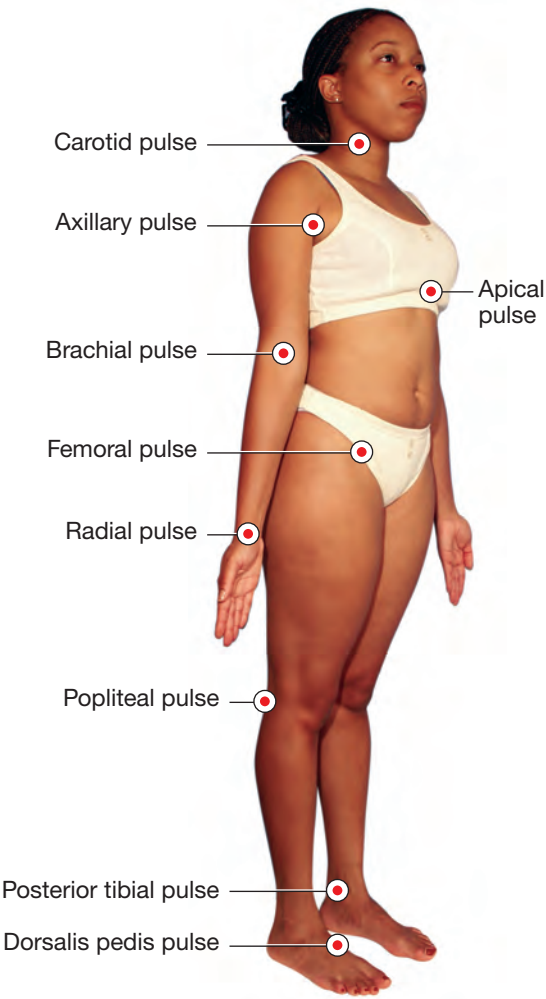


FIGURE 5-27 ■ Pulse points.
A pulse point is where the pulse of an artery can be felt on the surface of the body. Pulse points are used to determine the heart rate and the amount of flow through the artery.
Source: Pearson Education



FIGURE 5-28 ■ Carotid pulse.
The pulse of the carotid artery can be felt easily in the neck. This emergency medical technician is using this site to quickly assess a patient's heart rate.
Source: Pearson Education

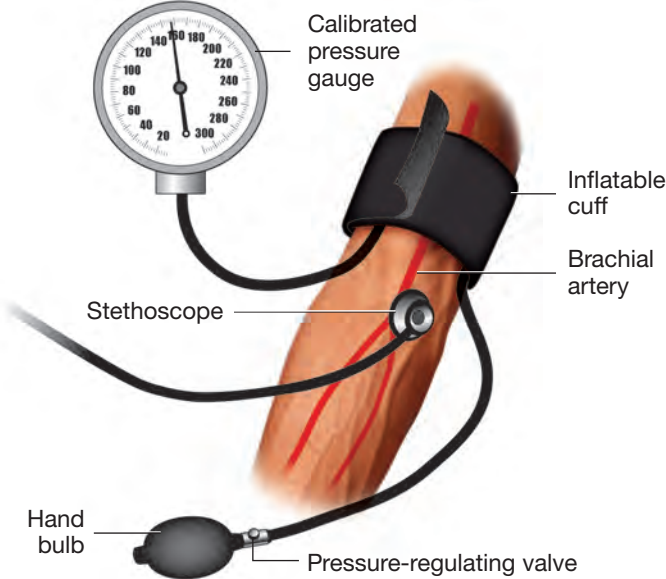
Word or Phrase	Description	Pronunciation/Word Parts
vital signs <i>(continued)</i>	<p>The blood pressure is measured with a sphygmomanometer and a stethoscope. The sphygmomanometer consists of a thin, inflatable cuff that wraps around the arm (or leg), a hand bulb that is pumped to increase the pressure in the cuff, a regulating valve that is opened to slowly release pressure from the cuff, and a calibrated gauge to read the pressure (see Figure 5-29 ■). The stethoscope is placed at the inner elbow over the brachial pulse. As pressure increases in the cuff, it cuts off the flow of blood. The cuff pressure is decreased. When the cuff pressure is lower than the pressure in the artery, the blood spurts through and creates the first sound. This is the systolic pressure, the top number in a blood pressure reading, which represents the force of the contraction of the ventricles. When the cuff pressure reaches the resting pressure in the artery, this is the diastolic pressure. A blood pressure measurement is recorded as two numbers: the systolic pressure over the diastolic pressure. Blood pressure is measured in millimeters of mercury (example: 120/80 mm Hg). Blood pressure cuffs come in several different sizes to accommodate very thin to very large arms. There are even blood pressure cuffs for newborn and premature infants. The correct size blood pressure cuff must be used or the blood pressure reading will be either too high or too low.</p> 	<p>sphygmomanometer (SFIG-moh-mah-NAW-meh-ter) sphygm/o- pulse man/o- frenzy; thin -meter instrument used to measure</p> <p>Add words to make a complete definition of <i>sphygmomanometer</i>: instrument used to measure (the pressure of the) pulse (by using a) thin (inflatable cuff).</p> <hr/> <p>systolic (sis-TAW-lik) systol/o- contracting -ic pertaining to</p> <hr/> <p>diastolic (DY-ah-STAW-lik) diastol/o- dilating -ic pertaining to</p>
Surgical Procedures		
aneurysmectomy	<p>Procedure to remove an aneurysm and repair the defect in the artery wall. If an aneurysm involves a large segment of artery, a flexible, tubular synthetic graft is used to replace the segment.</p>	<p>aneurysmectomy (AN-yoor-iz-MEK-toh-mee) aneurysm/o- aneurysm; dilation -ectomy surgical removal</p>

FIGURE 5-29 ■ Measuring the blood pressure.

A sphygmomanometer and a stethoscope are used to measure the blood pressure. This is most commonly done at the brachial artery.

Source: Pearson Education

Word or Phrase	Description	Pronunciation/Word Parts
cardiopulmonary bypass	Procedure used during open heart surgery (see Figure 5-30 ■) in which the patient's blood is rerouted through a cannula in the femoral vein to a heart-lung machine. There, the blood is oxygenated, carbon dioxide and waste products are removed, and the blood is pumped back into the patient's body through a cannula in the femoral artery. Cardiopulmonary bypass takes over the functions of the heart and lungs during the surgery.	cardiopulmonary (KAR-dee-oh-PUL-moh-NAIR-ee) cardi/o- heart pulmon/o- lung -ary pertaining to

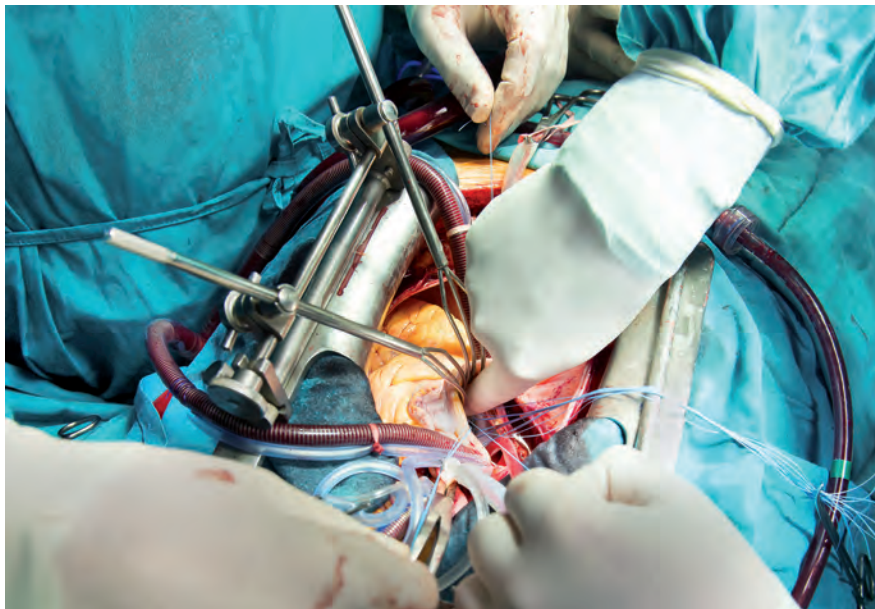

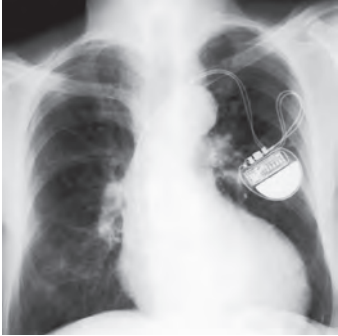
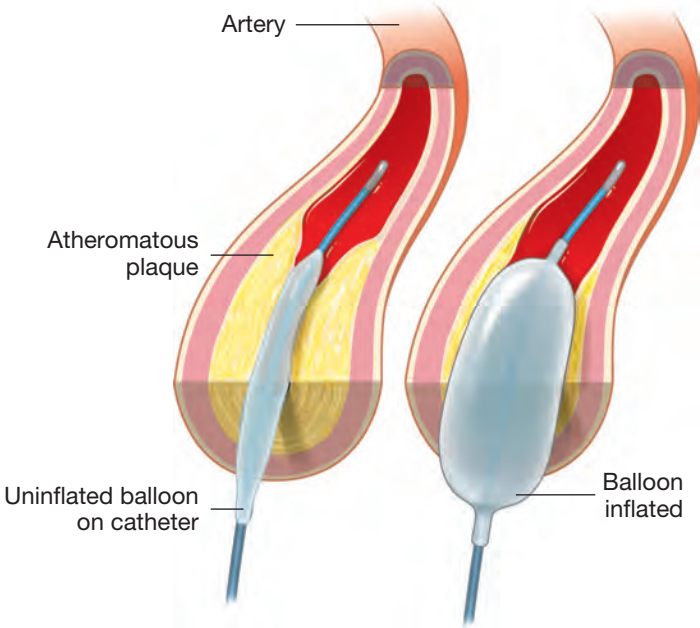
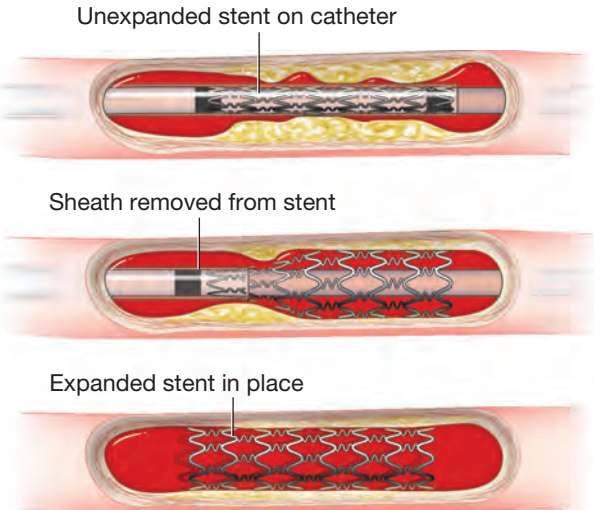


FIGURE 5-30 ■ Open heart surgery.

To perform open heart surgery, the sternum is cut in half lengthwise. Metal retractors are used to pull the two halves apart to create an operative field that allows access to the heart.

Source: pirke/Fotolia LLC

carotid endarterectomy	Procedure to remove plaque from an occluded carotid artery. It is used to treat carotid stenosis due to atherosclerosis.	endarterectomy (END-ar-ter-EK-toh-mee) endo- innermost; within arter/o- artery -ectomy surgical removal The <i>o</i> in <i>endo-</i> is deleted when the word parts are combined.
coronary artery bypass graft (CABG)	Procedure to bypass an occluded coronary artery and restore blood flow to the myocardium. A blood vessel (either the saphenous vein from the leg or the internal mammary artery from the chest) is used as the bypass graft. If the saphenous vein is used, it must be placed in a reversed position so that its valves will not obstruct the flow of blood. The suturing of one blood vessel to another is an anastomosis . Oxygenated blood flows through the graft, around the blockage in the coronary artery, and back into the coronary artery. The abbreviation CABG is pronounced “cabbage.”	anastomosis (ah-NAS-toh-MOH-sis) anastom/o- create an opening between two structures -osis condition; process
heart transplantation	<p>Procedure to remove a severely damaged heart from a patient with end-stage heart failure and insert a new heart from a donor (a person who has recently died). The patient is matched by blood type and tissue type to the donor. Heart transplant patients must take immunosuppressant drugs for the rest of their lives to keep their bodies from rejecting the foreign tissue of their new heart. Some patients receive an artificial heart made of plastic, metal, and other synthetic materials.</p> <p>While awaiting a donor heart, the patient may have a left ventricular assist device (LVAD) temporarily implanted. This battery- or pneumatic-powered pump is placed in the abdomen and connected by tubes to the left ventricle and the aorta. In some patients, it becomes a permanent solution.</p>	transplantation (TRANS-plan-TAY-shun) transplant/o- move something across and put in another place -ation being; having; process donor (DOH-nor)

Word or Phrase	Description	Pronunciation/Word Parts
pacemaker insertion	<p>Procedure in which an automated device is implanted to control the heart rate and rhythm in a patient with an arrhythmia (see Figure 5-31 ■). A pacemaker uses a wire positioned on the heart to coordinate the heartbeat with an electrical impulse.</p> <div><div><p>(a)</p></div><div><p>(b)</p></div></div> <p>FIGURE 5-31 ■ Pacemaker. (a) This pacemaker (programmable pulse generator) is placed under the skin of the anterior chest. (b) This chest x-ray shows the position of an implanted pacemaker and the pacemaker wires on the heart. <i>Source:</i> Picsfive/Shutterstock; Dario Sabljak/Shutterstock</p>	
percutaneous transluminal coronary angioplasty (PTCA)	<p>Procedure to reconstruct a coronary artery that is narrowed because of atherosclerosis. A catheter is inserted into the femoral artery and threaded to the site of the stenosis. Also known as percutaneous coronary intervention (PCI). During a balloon angioplasty, a balloon within the catheter is inflated. It compresses the atheromatous plaque and widens the lumen of the artery. Then the balloon is deflated and the catheter is removed (see Figure 5-32 ■). Alternatively, an intravascular stainless steel mesh stent (unexpanded) can be inserted on the catheter (see Figure 5-33 ■). The stent is expanded, the catheter is removed, and the expanded stent remains in the artery.</p> <div></div>	<p>percutaneous (PER-kyoo-TAY-nee-us) per- through; throughout cutane/o- skin -ous pertaining to</p> <p>transluminal (trans-LOO-mih-nal) trans- across; through lumin/o- lumen; opening -al pertaining to</p> <p>angioplasty (AN-jee-oh-PLAS-tee) angi/o- blood vessel; lymphatic vessel -plasty process of reshaping by surgery</p>
	<div></div>	
	<p>FIGURE 5-32 ■ Balloon angioplasty. The inflated balloon compresses atheromatous plaque in the artery to open the lumen and increase the blood flow. Then the balloon is deflated and the catheter is withdrawn. <i>Source:</i> Pearson Education</p>	<p>FIGURE 5-33 ■ Stent. A stent is expanded inside the artery to compress the atheromatous plaque and increase the blood flow. The stent is left in place as the catheter is withdrawn. It provides continuing support to keep the lumen of the artery open over time. <i>Source:</i> Pearson Education</p>

Word or Phrase	Description	Pronunciation/Word Parts
pericardiocentesis	Procedure that uses a needle to puncture the pericardium and withdraw inflammatory fluid accumulated in the pericardial sac. It is used to treat pericarditis and cardiac tamponade.	pericardiocentesis (PAIR-ih-KAR-dee-OH-sen-TEE-sis) peri- around cardi/o- heart -centesis procedure to puncture
radiofrequency ablation (RFA)	Procedure to destroy ectopic areas in the heart that are emitting electrical impulses and producing arrhythmias. A catheter is inserted into the heart. Radiofrequency electrical current is used to produce enough heat to kill the cells causing the arrhythmia. Radiofrequency catheter occlusion uses heat to collapse and seal large varicose veins.	ablation (ah-BLAY-shun) ablat/o- destroy; take away -ion action; condition occlusion (oh-KLOO-zhun) occlus/o- close against -ion action; condition
valve replacement	Procedure to replace a severely damaged or prolapsed heart valve with an artificial valve, or prosthesis (see Figure 5-34 ■). There are several types of prosthetic heart valves that can be used. If the replacement heart valve comes from an animal, it is known as a xenograft .	prosthesis (praws-THÉE-sis) prosthetic (praws-THET-ik) prosthet/o- artificial part -ic pertaining to xenograft (ZEN-oh-graft) xen/o- foreign -graft tissue for implant; tissue for transplant

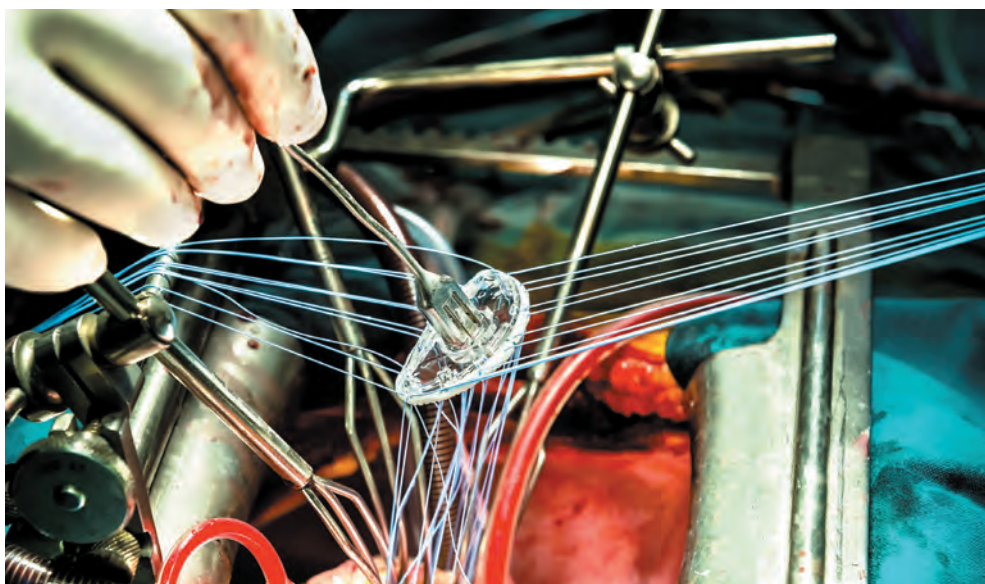


FIGURE 5-34 ■ Surgery for mitral valve regurgitation.

A white artificial ring is implanted in the heart to encircle the mitral valve and pull the two leaflets together. Many sutures are used to attach the ring so that blood will not leak around the edges. In other cases, the entire valve is replaced.

Source: Pirke/Fotolia

valvoplasty	Procedure to reconstruct a heart valve to correct stenosis or prolapse. A valvulotome is used to cut the valve. This procedure is also known as a valvuloplasty .	valvoplasty (VAL-voh-PLAS-tee) valv/o- valve -plasty process of reshaping by surgery valvulotome (VAL-vyoo-loh-TOHM) valvul/o- valve -tome area with distinct edges; instrument used to cut valvuloplasty (VAL-vyoo-loh-PLAS-tee) valvul/o- valve -plasty process of reshaping by surgery
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Drugs

These drug categories and drugs are used to treat cardiovascular diseases. The most common generic and trade name drugs in each category are listed.

Category	Indication	Examples	Pronunciation/Word Parts
ACE (angiotensin-converting enzyme) inhibitor drugs	Treat congestive heart failure and hypertension. ACE inhibitor drugs produce vasodilation and decrease the blood pressure by blocking an enzyme that converts angiotensin I to angiotensin II (a vasoconstrictor).	captopril (Capoten), lisinopril (Prinivil, Zestril), trandolapril (Mavik)	angiotensin (AN-jee-oh-TEN-sin) angi/o- blood vessel; lymphatic vessel tens/o- pressure; tension -in substance
antiarrhythmic drugs	Treat arrhythmias	Intravenous atropine for heart block, intravenous lidocaine (Xylocaine) for ventricular fibrillation. Some beta-blocker drugs and calcium channel blocker drugs are used to treat ventricular tachycardia.	antiarrhythmic (AN-tee-aa-RITH-mik) anti- against a- away from; without rrhythm/o- rhythm -ic pertaining to
anticoagulant drugs	Prevent a blood clot from forming in patients with arteriosclerosis, atrial fibrillation, previous myocardial infarction, or an artificial heart valve	heparin, warfarin (Coumadin), clopidogrel (Plavix)	anticoagulant (AN-tee-koh-AG-yoo-lant) (AN-tih-koh-AG-yoo-lant) anti- against coagul/o- clotting -ant pertaining to
antihypertensive drugs	Treat hypertension	See ACE inhibitor drugs, beta-blocker drugs, calcium channel blocker drugs, and diuretic drugs.	antihypertensive (AN-tee-HY-per-TEN-siv) anti- against hyper- above; more than normal tens/o- pressure; tension -ive pertaining to
aspirin	Prevents heart attacks. Prevents blood clots from forming by keeping platelets from sticking together.	aspirin (81 mg)	
beta-blocker drugs	Treat angina pectoris and hypertension. Beta-blocker drugs decrease the heart rate and dilate the arteries by blocking beta receptors.	atenolol (Tenormin), nadolol (Corgard), propranolol (Inderal), metoprolol (Lopressor)	
calcium channel blocker drugs	Treat angina pectoris and hypertension. These drugs block the movement of calcium ions into myocardial cells and smooth muscle cells of the artery walls, causing the heart rate and blood pressure to decrease.	amlodipine (Norvasc), diltiazem (Cardizem), nifedipine (Adalat, Procardia), verapamil (Calan)	

Category	Indication	Examples	Pronunciation/Word Parts
digitalis drugs	Treat congestive heart failure. Digitalis drugs decrease the heart rate and strengthen the heart's contractions (see Figure 5-35 ■).	digoxin (Lanoxin)	digitalis (DJ-ih-TAL-is)



FIGURE 5-35 ■ The Starry Night.

Vincent van Gogh's "The Starry Night" (1889) is believed by some physicians to show evidence of digitalis toxicity in the way the Dutch painter depicted yellow-green halos around the stars. Van Gogh (1853–1890) suffered from mania and epilepsy and may have been given digitalis for lack of a more specific drug therapy. Digitalis can easily reach a toxic level in the blood. Symptoms of toxicity include nausea and vomiting, decreased heart rate, and sometimes visual halos. Van Gogh may simply have painted what he actually saw because of digitalis toxicity.

SOURCE: Vincent van Gogh (1853–1890), "The Starry Night." 1889. Oil on canvas, 29 × 36 1/4" (73.7 × 92.1 cm). Acquired through the Lillie P. Bliss Bequest. (472.1941). The Museum of Modern Art, New York, NY, U.S.A. /Digital Image © The Museum of Modern Art/Licensed by SCALA/Art Resource, NY.

DID YOU KNOW?

Digitalis drugs come from *Digitalis* (foxglove plant). Its flowers were thought to resemble fingerlike projections or digits.



Source: Susan Turley

diuretic drugs	Block sodium from being absorbed from the tubule (of the nephron of the kidney) back into the blood. As the sodium is excreted in the urine, it brings water and potassium with it because of osmotic pressure. This process is known as <i>diuresis</i> . This decreases the volume of blood and is used to treat hypertension and congestive heart failure. Laypersons call these drugs "water pills."	furosemide (Lasix), hydrochlorothiazide (HCTZ)	diuretic (DY-yoor-EH-tik) dia- complete; completely through ur/o- urinary system; urine -etic pertaining to The a in <i>dia-</i> is dropped when the word is formed.
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Category	Indication	Examples	Pronunciation/Word Parts
drugs for cardiac arrest	Treat a nonbeating heart (asystole) by stimulating it to contract	intracardiac epinephrine (Adrenalin)	
drugs for hyperlipidemia	Treat hypercholesterolemia. They are often referred to as “statin drugs” because of the common ending of the generic drug names.	atorvastatin (Lipitor), lovastatin (Mevacor), rosuvastatin (Crestor), simvastatin (Zocor)	
nitrate drugs	Treat angina pectoris. Nitrate drugs dilate the veins (to decrease the amount of work that the heart must do) and dilate the arteries (to decrease the blood pressure)	isosorbide (Isordil), nitroglycerin (Nitro-Dur)	nitrate (NY-trayt)
<p>DID YOU KNOW?</p> <p>In the mid-1890s, physicians observed that the pain of angina pectoris seemed to be relieved in patients who worked in dynamite and gunpowder factories where nitroglycerin was an ingredient. This led to the practice of prescribing nitroglycerin for angina pectoris.</p>			
thrombolytic drugs	Treat a blood clot that is blocking blood flow through an artery. Thrombolytic drugs lyse (break apart) a clot.	alteplase (Activase)	thrombolytic (THRAWM-boh-LIT-ik) thromb/o- blood clot lyt/o- break down; destroy -ic pertaining to

Abbreviations

AAA	abdominal aortic aneurysm	LVH	left ventricular hypertrophy
ACE	angiotensin-converting enzyme	MI	myocardial infarction
ACS	acute coronary syndrome	mm Hg	millimeters of mercury
AED	automatic external defibrillator	MR	mitral regurgitation
AI	aortic insufficiency; apical impulse	MUGA	multiple-gated acquisition (scan) (pronounced "MUG-ah")
AICD	automatic implantable cardiac defibrillator; automatic implantable cardioverter-defibrillator	MVP	mitral valve prolapse
AMI	acute myocardial infarction	NSR	normal sinus rhythm
AS	aortic stenosis	P	pulse (rate)
ASCVD	arteriosclerotic cardiovascular disease	PAC	premature atrial contraction
ASD	atrial septal defect	PAD	peripheral artery disease
ASHD	arteriosclerotic heart disease	PCI	percutaneous coronary intervention
AV	atrioventricular	PDA	patent ductus arteriosus
BP	blood pressure	PMI	point of maximum impulse
BPM, bpm	beats per minute	PTCA	percutaneous transluminal coronary angioplasty
CABG	coronary artery bypass graft (pronounced "cabbage")	PVC	premature ventricular contraction
CAD	coronary artery disease	PVD	peripheral vascular disease
CCU	coronary care unit	RA	right atrium
CHF	congestive heart failure	RBBB	right bundle branch block
CK-MB	creatinine kinase-MB (band)	RFA	radiofrequency ablation
CPK-MB	creatinine phosphokinase-MB (band)	RNV	radionuclide ventriculography
CPR	cardiopulmonary resuscitation	RV	right ventricle
CRP	C-reactive protein	S₁	first heart sound
CV	cardiovascular	S₂	second heart sound
DSA	digital subtraction angiography	S₃	third heart sound
ECG	electrocardiogram; electrocardiography	S₄	fourth heart sound
EKG	electrocardiogram; electrocardiography	SA	sinoatrial
HDL	high-density lipoprotein	SBE	subacute bacterial endocarditis
HTN	hypertension	SPECT	single-photon emission computerized tomography
JVD	jugular venous distention	SVT	supraventricular tachycardia
LA	left atrium	TEE	transesophageal echocardiogram; transesophageal echocardiography
LBBB	left bundle branch block	TPR	temperature, pulse, and respiration
LDH	lactic dehydrogenase	V fib	ventricular fibrillation (short form)
LDL	low-density lipoprotein	VLDL	very low-density lipoprotein
LV	left ventricle	VSD	ventricular septal defect
LVAD	left ventricular assist device	V tach	ventricular tachycardia (short form)

WORD ALERT

Abbreviations

Abbreviations are commonly used in all types of medical documents; however, they can mean different things to different people and their meanings can be misinterpreted. Always verify the meaning of an abbreviation.

AI means *aortic insufficiency* and *apical impulse*, but it also means *artificial insemination* and *artificial intelligence*.

RA means *right atrium*, but it also means *rheumatoid arthritis* or *room air*.

Do not confuse the abbreviation *CPR* (cardiopulmonary resuscitation) with *CRP* (C-reactive protein).

IT'S GREEK TO ME!

Did you notice that some words have two different combining forms? Combining forms from both Greek and Latin remain a part of medical language today.

Word	Greek	Latin	Medical Word Examples
blood vessel	angi/o-	vas/o-, vascul/o-	angiography, vasoconstriction, vasodilator vascular, vasculature
heart	card/i-, cardi/o-	[cor, Latin word]	bradycardia, endocarditis, cor pulmonale, cardiac, cardiopulmonary
vein	phleb/o-	ven/o-	phlebitis, thrombophlebitis, venous, venography

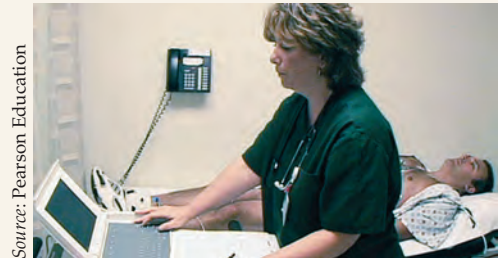
CAREER FOCUS

Meet Laurie, a cardiac stress test technologist in a hospital

"Cardiology is a very important department. I use medical terminology during all aspects of my job. My daughter was born with a heart defect. Wanting to know more information about what was happening to her, I started to take a class here and a class there, and then I just wound up in a certificate program. The most rewarding part of my job is if I can get a patient through the test and at the end of the test they say, 'You made that so much easier for me.'"

Cardiac stress test technologists are allied health professionals who perform ECGs, Holter monitor tests, and cardiac stress tests in a hospital setting or a cardiologist's office.

Cardiologists are physicians who practice in the medical specialty of cardiology. They diagnose and treat patients with diseases of the heart and circulatory system. When cardiologists perform surgery, they are known as heart surgeons, cardiothoracic surgeons, or cardiovascular surgeons. Physicians can take additional training and become board certified in the subspecialty of pediatric cardiology. Cancerous tumors of the heart or blood vessels are treated medically by an oncologist or surgically by a cardiothoracic or cardiovascular surgeon.



Source: Pearson Education

technologist (tek-NAW-loh-jist)

techn/o- technical skill

log/o- study of; word

-ist person who specializes in

cardiologist (KAR-dee-AW-loh-jist)

cardi/o- heart

log/o- study of; word

-ist person who specializes in

MyMedicalTerminologyLab™

To see Laurie's complete video profile, log into [MyMedicalTerminologyLab](#) and navigate to the Multimedia Library for Chapter 5. Check the Video box, and then click the Career Focus - Cardiac Stress Tech link.

CHAPTER REVIEW EXERCISES

Test your knowledge of the chapter by completing these review exercises. Use the Answer Key at the end of the book to check your answers. Note: Each of the numbered exercise headers corresponds to a numbered learning outcome on the first page of the chapter. Headers that include a number with an A or with a B after it show that there are two different parts to that learning outcome.

5.1 Identify Anatomical Structures

5.2 Describe Physiology

MATCHING EXERCISE

Match each word or phrase to its description.

- | | |
|-----------------------|---|
| 1. mediastinum | _____ Another name for the <i>mitral valve</i> |
| 2. pericardium | _____ Network of blood vessels related to a particular organ |
| 3. myocardium | _____ Dividing wall between the atria and ventricles |
| 4. ventricle | _____ Double-layered membrane around the heart |
| 5. tricuspid valve | _____ Bottom chamber of the heart |
| 6. septum | _____ Area between the lungs that contains the heart |
| 7. aortic valve | _____ Valve between the right atrium and right ventricle |
| 8. vasculature | _____ Heart muscle |
| 9. bicuspid valve | _____ Valve that blood flows through as it leaves the left ventricle |
| 10. chordae tendineae | _____ Rope-like strands that strengthen the tricuspid and mitral valves |

TRUE OR FALSE EXERCISE

Indicate whether each statement is true or false by writing T or F on the line.

1. _____ The aorta is the largest vein in the body.
2. _____ The adrenal glands secrete epinephrine, which increases the heart rate and blood pressure.
3. _____ Blood flows from the inferior vena cava to the right atrium to the right ventricle and to the pulmonary veins to the lungs.
4. _____ The refractory period is the time during which the ventricles contract.
5. _____ The smallest veins are known as *capillaries*.
6. _____ The interventricular septum is within a ventricle.
7. _____ The epicardium is the part of the pericardium that lies on the surface of the heart.
8. _____ All arteries carry blood away from the heart.
9. _____ The subclavian artery carries blood to the leg.
10. _____ The peroneal artery carries blood to the lateral aspect of the lower leg in the area of the fibula bone.
11. _____ The blood in most veins is a dark red–purple color because it has a low level of oxygen.
12. _____ The systemic circulation carries blood to the whole body with the exception of the lungs.
13. _____ Vasodilation is the opposite of vasoconstriction.
14. _____ The electrical impulse of a heart beat travels through the AV node and then into the diastole.

SEQUENCING EXERCISE

Beginning with blood entering the right atrium, write each structure of the circulatory system in the order in which blood moves through it.

Structure

aortic valve and aorta
 arteries and arterioles
 capillaries
 left atrium
 left ventricle
 lungs
 mitral valve
 pulmonary valve, pulmonary trunk, and pulmonary arteries
 pulmonary veins
 right atrium
 right ventricle
 superior and inferior venae cavae
 tricuspid valve
 venules and veins

Correct Order

1. right atrium
 2. _____
 3. _____
 4. _____
 5. _____
 6. _____
 7. _____
 8. _____
 9. _____
 10. _____
 11. _____
 12. _____
 13. _____
 14. _____

CIRCLE EXERCISE

Circle the correct word from the choices given.

- The great vessels include the superior and inferior venae cavae and the (**aorta**, artery, mediastinum).
- The vascular structures of the body include all of the following *except* (arteries, **capillaries**, heart valves, veins).
- Listening to a patient's heart sounds with a stethoscope is known as (**auscultation**, diastole, repolarization).
- What unique structure is found only in the fetal heart? (**apex**, foramen ovale, vasculature).
- This vein brings blood from the head to the superior vena cava: (**jugular**, portal, saphenous).
- The (**AV node**, Purkinje fiber, **SA node**) is the pacemaker of the heart.
- Depolarization involves the movement of sodium and (**calcium**, epinephrine, electrical) ions into the myocardial cell.
- Which of these can take over and produce its own abnormal heart rhythm? (**foramen ovale**, ectopic site, intima)

5.3A Describe Diseases

FILL IN THE BLANK EXERCISE

Fill in the blank with the correct word from the word list.

arrhythmia	cardiomegaly	necrosis	tetralogy of Fallot
asystole	claudication	palpitation	thrombus
atheroma	coarctation		

- Calf pain caused by peripheral artery disease _____
- Fatty deposit on the wall of an artery _____
- Another name for a *dysrhythmia* _____
- Chest sensation during a premature contraction _____
- Cell death _____
- Cardiac arrest with no heart activity seen on an ECG _____
- Blood clot _____

8. Abnormal narrowing of the aorta in the fetal heart _____
9. Enlargement of the heart _____
10. Set of four different defects in the fetal heart _____

CIRCLE EXERCISE

Circle the correct word from the choices given.

1. (**Asystole**, Bradycardia, Fibrillation) is an abnormally slow heart rate.
2. Narrowing of an artery is known as (**arteriosclerosis**, endocarditis, stenosis).
3. A weakness in the wall of an artery is known as a/an (**aneurysm**, couplet, varicose vein).
4. (**Patent foramen ovale**, Heart block, Aneurysm) is a congenital heart defect.

TRUE OR FALSE EXERCISE

Indicate whether each statement is true or false by writing T or F on the line.

1. _____ Angina pectoris is chest pain that means that myocardial cells have died.
2. _____ Prolapse of a valve is when the cusps do not close completely.
3. _____ Raynaud's disease is severe vasoconstriction of the extremities triggered by cold or emotional stress.
4. _____ Hyperlipidemia includes both hypercholesterolemia and hypertriglyceridemia.
5. _____ Regurgitation is an infection of the heart caused by bacteria.
6. _____ To check for atherosclerosis in the arteries of the legs, you would feel the pulse in the radial artery.
7. _____ Auscultation is using a stethoscope to listen to the heart sounds.
8. _____ S₁ and S₂ are abnormal heart sounds.
9. _____ In a patient with right-sided congestive heart failure, the neck may show signs of jugular venous distention.
10. _____ A sphygmomanometer measures the blood pressure in millimeters of mercury (mm Hg).

5.3B Describe Laboratory, Radiology, Surgery, and Drugs

LABORATORY TEST EXERCISE

You need to order the following laboratory tests to be done for a cardiology patient. Find each of these tests on the laboratory form and put a checkmark in the box next to it.

C-reactive protein	digoxin drug level	lipid panel	venipuncture
cholesterol	HDL lipoprotein	triglycerides	VLDL lipoprotein
creatinine kinase, MB	LDL lipoprotein	troponin	

CPT CODE	PANELS AND PROFILES		
80047	Metabolic Panel, Basic	82247	Bilirubin, Total
80051	Electrolyte Panel	82310	Calcium, Total Blood
80053	Metabolic Panel, Comprehensive	82375	Carboxyhemoglobin
80055	Obstetric Panel	82378	Carcinoembryonic Antigen (CEA)
80061	Lipid Panel	82435	Chloride
80069	Renal Function Panel	82465	Cholesterol
80076	Hepatic Function Panel	82553	Creatine Kinase, MB
80100	Drug Screening Panel	82565	Creatinine, Blood
		82575	Creatinine Clearance
		82947	Glucose, Fasting
		82951	Glucose Tolerance Test (GTT)
		83036	Hemoglobin A1c
		83550	Iron, TIBC
CPT CODE	BLOOD TESTS		
80162	Digoxin Drug Level		
82040	Albumin		
82055	Blood Alcohol (ETOH)		

CPT CODE	PANELS AND PROFILES		
83655	Lead, Blood	85014	Hematocrit (HCT)
83661	Fetal Lung Maturity (L/S Ratio)	85018	Hemoglobin (Hgb)
83718	HDL Lipoprotein	85025	Complete Blood Count (CBC)
83719	VLDL Lipoprotein	85049	Platelet Count
83721	LDL Lipoprotein	85610	Prothrombin Time (PT)
83735	Magnesium	85730	Partial Thromboplastin Time (PTT)
84075	Alkaline Phosphatase	86038	Antinuclear Antibody (ANA)
84144	Progesterone	86140	C-Reactive Protein
84146	Prolactin	86592	Syphilis Blood Test (VDRL or RPR)
84152	Prostate-specific Antigen (PSA)	86762	Rubella Antibody
CPT CODE	BLOOD TESTS	86812	Human Leukocyte Antigen (HLA) Typing
84295	Sodium	86900	Blood Type
84443	Thyroid-stimulating Hormone (TSH)	87340	Hepatitis B Surface Antigen
84436	Thyroxine (T4), Total	CPT CODE	OTHER TESTS AND PROCEDURES
84450	Aspartate Transaminase (AST)	36415	Venipuncture
84460	Alanine Transaminase (ALT)	81001	Urinalysis, Automated
84478	Triglycerides	82270	Stool Occult Blood
84480	Triiodothyronine (T3), Total	87040	Blood Culture
84484	Troponin	87045	Stool Culture
84520	Blood Urea Nitrogen (BUN)	87086	Urine Culture
84550	Uric Acid	87177	Ova and Parasites
84702	Human Chorionic Gonadotropin (hCG), Serum	89220	Sputum Analysis
85004	White Blood Cell (WBC) Count with Differential	89300	Semen Analysis

TRUE OR FALSE EXERCISE

Indicate whether each statement is true or false by writing T or F on the line.

- _____ Antiarrhythmic drugs are used to treat hypertension.
- _____ Thrombolytic drugs break apart blood clots.
- _____ An artificial valve is also known as a *prosthesis*.
- _____ A stent is inserted during a MUGA scan.
- _____ Sclerotherapy is used to treat arteriosclerosis (hardening of the arteries).
- _____ Auscultation of the heart uses a stethoscope.
- _____ Cardiopulmonary bypass is used during open heart surgery.
- _____ A sphygmomanometer is used to perform a heart transplantation.

5.4 Form Plurals and Adjectives

PLURAL NOUN AND ADJECTIVE EXERCISE

Read the noun and write its plural form and/or adjective form. Be sure to check your spelling. The first one has been done for you.

Singular Noun	Plural Noun	Adjective Form	Singular Noun	Plural Noun	Adjective Form
1. pericardium		<u>pericardial</u>	7. valve	_____	_____
2. artery	_____	_____	8. aorta	_____	_____
3. atrium	_____	_____	9. vein	_____	_____
4. ventricle	_____	_____	10. heart	_____	_____
5. septum	_____	_____	11. arteriole	_____	_____
6. myocardium	_____	_____	12. diastole	_____	_____

5.5A Give Word Part Meanings

WORD PARTS EXERCISE

Next to each word part, write its meaning. The first one has been done for you.

Word Part	Meaning
1. angin/o-	angina
2. a-	
3. abdomin/o-	
4. ablat/o-	
5. -ac	
6. -ade	
7. -al	
8. anastom/o-	
9. aneurysm/o-	
10. angi/o-	
11. anti-	
12. aort/o-	
13. apic/o-	
14. -ar	
15. arteri/o-	
16. arteriol/o-	
17. arter/o-	
18. -ary	
19. -ase	
20. -ated	
21. ather/o-	
22. atheromat/o-	
23. -ation	
24. -ator	
25. atri/o-	
26. -ature	
27. auscult/o-	
28. axill/o-	
29. bi-	
30. brachi/o-	
31. brady-	
32. capill/o-	
33. card/i-	
34. cardi/o-	
35. carot/o-	
36. catheter/o-	
37. -centesis	
38. cholesterol/o-	
39. circulat/o-	
40. claudicat/o-	
41. clav/o-	

Word Part	Meaning
42. coagul/o-	
43. coarct/o-	
44. compens/o-	
45. conduct/o-	
46. congest/o-	
47. constrict/o-	
48. contract/o-	
49. coron/o-	
50. cusp/o-	
51. cutane/o-	
52. de-	
53. dia-	
54. diastol/o-	
55. dilat/o-	
56. dissect/o-	
57. dys-	
58. -eal	
59. ech/o-	
60. -ectomy	
61. ectop/o-	
62. electr/o-	
63. -emia	
64. endo-	
65. -ent	
66. epi-	
67. -etic	
68. extra-	
69. femor/o-	
70. fibrill/o-	
71. fract/o-	
72. fus/o-	
73. -graft	
74. -gram	
75. -graphy	
76. hyper-	
77. hypo-	
78. -ia	
79. -ian	
80. -ic	
81. -id	
82. idi/o-	

Word Part**Meaning**

83. ili/o-	_____
84. -in	_____
85. infarct/o-	_____
86. -ion	_____
87. isch/o-	_____
88. -ist	_____
89. -itis	_____
90. -ive	_____
91. -ization	_____
92. jugul/o-	_____
93. lipid/o-	_____
94. lip/o-	_____
95. log/o-	_____
96. -logy	_____
97. lumin/o-	_____
98. lyt/o-	_____
99. man/o-	_____
100. mediastin/o-	_____
101. -megaly	_____
102. -meter	_____
103. -metry	_____
104. mitr/o-	_____
105. my/o-	_____
106. necr/o-	_____
107. occlus/o-	_____
108. -ole	_____
109. -oma	_____
110. -ory	_____
111. -ose	_____
112. -osis	_____
113. -ous	_____
114. palpit/o-	_____
115. pariet/o-	_____
116. path/o-	_____
117. -pathy	_____
118. pat/o-	_____
119. pector/o-	_____
120. per-	_____
121. peri-	_____
122. peripher/o-	_____
123. perone/o-	_____
124. pharmac/o-	_____
125. phleb/o-	_____
126. physi/o-	_____
127. -plasty	_____
128. polar/o-	_____

Word Part**Meaning**

129. poplite/o-	_____
130. port/o-	_____
131. pre-	_____
132. prosthet/o-	_____
133. pulmon/o-	_____
134. radi/o-	_____
135. re-	_____
136. regurgitat/o-	_____
137. ren/o-	_____
138. rheumat/o-	_____
139. rrhythm/o-	_____
140. saphen/o-	_____
141. scler/o-	_____
142. -scope	_____
143. sept/o-	_____
144. sin/o-	_____
145. son/o-	_____
146. sphygm/o-	_____
147. sten/o-	_____
148. sub-	_____
149. supra-	_____
150. system/o-	_____
151. -systole	_____
152. systol/o-	_____
153. tachy-	_____
154. tampon/o-	_____
155. techn/o-	_____
156. tele/o-	_____
157. tens/o-	_____
158. tetr/a-	_____
159. theli/o-	_____
160. -therapy	_____
161. thorac/o-	_____
162. thromb/o-	_____
163. tibi/o-	_____
164. -tic	_____
165. -tome	_____
166. tom/o-	_____
167. trans-	_____
168. transplant/o-	_____
169. tri-	_____
170. triglycerid/o-	_____
171. -troph	_____
172. -ule	_____
173. uln/o-	_____
174. ultra-	_____

Word Part**Meaning**

175. -um	_____
176. ur/o-	_____
177. valv/o-	_____
178. valvul/o-	_____
179. varic/o-	_____
180. vas/o-	_____
181. vascul/o-	_____

Word Part**Meaning**

182. vegetat/o-	_____
183. ven/o-	_____
184. ventricul/o-	_____
185. vers/o-	_____
186. viscer/o-	_____
187. xen/o-	_____

RELATED COMBINING FORMS EXERCISE

Write the combining forms on the line provided. (Hint: See the *It's Greek to Me* feature box.)

- Three combining forms that mean *blood vessel*.
- Two combining forms that mean *heart*.
- Two combining forms that mean *vein*.

5.5B Define Abbreviations**MATCHING EXERCISE**

Match each abbreviation to its description.

- | | | |
|----------|-------|--|
| 1. LVAD | _____ | "Good cholesterol," a high-density lipoprotein |
| 2. AAA | _____ | High blood pressure |
| 3. SBE | _____ | Bacterial infection inside the heart |
| 4. CRP | _____ | Type of aneurysm |
| 5. mm Hg | _____ | Test to detect inflammation in the heart |
| 6. HTN | _____ | Hole in the septum between the ventricles |
| 7. TPR | _____ | Vital signs |
| 8. TEE | _____ | Measurement of blood pressure |
| 9. VSD | _____ | Heart test that goes into the esophagus |
| 10. HDL | _____ | May be used instead of heart transplantation |

5.6A Divide Medical Words**DIVIDING WORDS EXERCISE**

Separate these words into their component parts (prefix, combining form, suffix). Note: Some words do not contain all three word parts. The first one has been done for you.

Medical Word	Prefix	Combining Form	Suffix	Medical Word	Prefix	Combining Form	Suffix
1. circulation	_____	<u>circulat/o-</u>	<u>-ion</u>	6. bradycardia	_____	_____	_____
2. depolarization	_____	_____	_____	7. aneurysmal	_____	_____	_____
3. ischemia	_____	_____	_____	8. hyperlipidemia	_____	_____	_____
4. endocarditis	_____	_____	_____	9. angioplasty	_____	_____	_____
5. arrhythmia	_____	_____	_____	10. transluminal	_____	_____	_____

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on its right side, suggesting it's resting on a surface.

PREFIX EXERCISE

Read the definition of the medical word. Look at the medical word or partial word that is given (it already contains a combining form and a suffix). Select the correct prefix from the Prefix List and write it on the blank line. Then build the medical word and write it on the line. Be sure to check your spelling. The first one has been done for you.

PREFIX LIST

a- (away from; without)
brady- (slow)
de- (reversal of; without)
endo- (innermost; within)

hyper- (above; more than normal)
hypo- (below; deficient)
peri- (around)
supra- (above)

tachy- (fast)
trans- (across; through)

Definition of the Medical Word	Prefix	Word or Partial Word	Build the Medical Word
1. Substance in the blood (of a) more than normal (level of) cholesterol	<u>hyper-</u>	cholesterolemia	<u>hypercholesterolemia</u>
2. Pertaining to (a) fast heart (rate)	_____	cardic	_____
3. Condition (of) more than normal pressure (of the blood)	_____	tension	_____
4. Pertaining to a condition (of) reversal of (a) compensated (heart)	_____	compensated	_____
5. Procedure to puncture (the membrane that is) around (the) heart	_____	cardiocentesis	_____
6. Pertaining to through (the) lumen (of a blood vessel)	_____	luminal	_____
7. Condition (of a) slow heart (rate)	_____	cardia	_____
8. Substance in the blood (of a) more than normal (level of) fat	_____	lipidemia	_____
9. Pertaining to (an area) above (the) ventricle	_____	ventricular	_____
10. Condition (of the heart being) without rhythm	_____	rrhythmia	_____
11. Inflammation of (the membrane that is) around (the) heart	_____	carditis	_____
12. Surgical removal (of plaque from) within (an) artery	_____	arterectomy	_____
13. Pertaining to below (normal blood) pressure	_____	tensive	_____
14. Inflammation of (or) infection of (the) innermost (lining of the) heart	_____	carditis	_____

MULTIPLE COMBINING FORMS AND SUFFIX EXERCISE

Read the definition of the medical word. Select the correct suffix and combining forms. Then build the medical word and write it on the line. Be sure to check your spelling. The first one has been done for you.

SUFFIX LIST

-al (pertaining to)
-graphy (process of recording)
-ic (pertaining to)
-ion (action; condition)
-itis (infection of; inflammation of)
-meter (instrument used to measure)
-osis (condition; process)
-pathy (disease)

COMBINING FORM LIST

arteri/o- (artery)
ather/o- (soft, fatty substance)
cardi/o- (heart)
ech/o- (echo of a sound wave)
electr/o- (electricity)
idi/o- (individual; unknown)
lyt/o- (break down; destroy)
man/o- (frenzy; thin)
my/o- (muscle)
path/o- (disease)
phleb/o- (vein)
scler/o- (hard; sclera of the eye)
sphygm/o- (pulse)
thromb/o- (blood clot)
vers/o- (travel; turn)

Definition of the Medical Word

1. Condition (of the) artery (with) hard(ness)
2. Pertaining to (the) muscle (of the) heart
3. Process of recording (the) echo of a sound wave (from the) heart
4. Pertaining to (a drug that takes a) blood clot (and) breaks down and destroys (it)
5. Condition (of a) soft, fatty substance (as well as) hard(ness in an artery)

Build the Medical Word

arteriosclerosis

Definition of the Medical Word

6. Process of recording (the) electrical (impulses of the) heart
7. Inflammation of (or) infection of (a) blood clot (in a) vein
8. Disease (of the) heart muscle
9. Instrument used to measure (the) pulse (of the blood pressure using a) thin (cuff)
10. Pertaining to (an) unknown (cause of a) disease
11. Action (done to the) heart (to) turn (it away from an arrhythmia)

Build the Medical Word

5.7A Spell Medical Words

PROOFREADING AND SPELLING EXERCISE

Read the following paragraph. Identify each misspelled medical word and write the correct spelling of it on the line provided.

The nurse used a sphigmomanometer to take the patient's blood pressure. He had hypertension in the past. He had a caroted endarterectomy because of an atherometous plaque in his artery. He has also had an arrhythmia in the past with ventricular takycardia. He just developed congestive heart failure and takes a diijitalis drug for that. We are considering this patient for an angoplasty in the future to keep him from having a myocardal infarcktion. His cardiomegalee is becoming more severe.

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

YOU WRITE THE MEDICAL REPORT

You are a healthcare professional interviewing a patient. Listen to the patient's statements and then enter them in the patient's medical record using medical words and phrases. Be sure to check your spelling. The first one has been done for you.

1. The patient says, "Last night, I had severe pain in my chest that was like a crushing sensation and bad sweating and I felt like something really bad was happening."

You write: Last night, the patient experienced severe angina pectoris with the pain feeling like a crushing sensation. He also had diaphoresis and a sense of doom.

2. The patient says, "Last year, I went to the emergency room and my heart rate was about 200. They brought this machine in and it had two paddles and they gave me a shock and then my heart rhythm was normal. Today, I could feel my heart do some "thumps" and then be okay. But the last time this happened, they did hook me up to those electrodes and took a tracing of my heart."

You write: The patient states that last year she went to the emergency room with ventricular _____ with a rate of about 200. They did a _____, and her heart rhythm returned to normal. The patient says she felt some _____ today, and so we will have an _____ done in the office today.

3. The patient says, "I know I have a history of my arteries being hard and clogged with fatty stuff, but now I have this new problem and I get on-and-off pain in the calf of my leg when I try to walk very far. My podiatrist said my one toe does not get enough blood to it and the tissue might die."

You write: The patient has a history of _____, but now she has a new problem of experiencing _____ when she tries to walk very far. Her podiatrist noted a lack of perfusion to one toe and feels it might become _____.

4. The nurse's note in the patient's medical record shows that the patient's blood pressure today is 130/88. Previous office visits have shown similar BP results. The patient says, "I am trying to stay on my low-salt diet."

You write: Based on serial blood pressure measurements today and over the past 3 months, the patient's blood pressure remains in the range of 130/88, and she now has a diagnosis of _____. She has been on a low-salt diet, and we will now add the _____ drug furosemide for treatment to lower her blood pressure.

HEARING MEDICAL WORDS EXERCISE

You hear someone speaking the medical words given below. Read each pronunciation and then write the medical word it represents. Be sure to check your spelling. The first one has been done for you.

- | | | | |
|-----------------------------|----------------|------------------------------|-------|
| 1. KAR-dee-ac | <u>cardiac</u> | 7. KAR-dee-oh-MEG-ah-lee | _____ |
| 2. AN-yoor-izm | _____ | 8. aa-RITH-mee-ah | _____ |
| 3. KAR-DEE-oh-THOR-AS-ik | _____ | 9. ATH-eh-ROH-skleh-ROH-sis | _____ |
| 4. MY-oh-KAR-dee-um | _____ | 10. EK-oh-KAR-dee-oh-GRAM | _____ |
| 5. KOR-oh-NAIR-ee AR-ter-ee | _____ | 11. AN-jee-oh-PLAS-tee | _____ |
| 6. VAY-soh-con-STRIK-shun | _____ | 12. SFIG-moh-mah-NAW-meh-ter | _____ |

5.7B Pronounce Medical Words**PRONUNCIATION EXERCISE**

Read the medical word and the syllables in its pronunciation. Circle the primary (main) accented syllable. The first one has been done for you.

- cardiac (kar-dee-ac)
- coronary (kor-oh-nair-ee)
- vasodilation (vay-soh-dy-lay-shun)
- cardiopulmonary (kar-dee-oh-pul-moh-nair-ee)
- pericarditis (pair-ee-kar-dy-tis)
- myocardial infarction (my-oh-kar-dee-al in-fark-shun)
- fibrillation (fib-rih-lay-shun)
- atherosclerosis (ath-eh-roh-skleh-roh-sis)
- auscultation (aws-kul-tay-shun)
- angioplasty (an-jee-oh-plas-tee)

5.8 Research Medical Words**SOUND-ALIKE WORDS**













Compare and contrast the meanings of these sound-alike cardiology words.

- cardiac and cardia (Chapter 3)
- stress test and nonstress test (Chapter 13)
- palpation (Chapter 2) and palpitation

5.9 Analyze Medical Reports

ELECTRONIC PATIENT RECORD #1

This is a hospital Admission History and Physical Examination report. Read the report and answer the questions.

PEARSON GENERAL HOSPITAL							
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<div> <div>            </div> </div>							
	<h4>ADMISSION HISTORY AND PHYSICAL EXAMINATION</h4> <table border="1"> <tr> <td>PATIENT NAME:</td> <td>COVINGTON, Victoria</td> </tr> <tr> <td>HOSPITAL NUMBER:</td> <td>62-700245</td> </tr> <tr> <td>DATE OF ADMISSION:</td> <td>January 21, 20xx</td> </tr> </table>	PATIENT NAME:	COVINGTON, Victoria	HOSPITAL NUMBER:	62-700245	DATE OF ADMISSION:	January 21, 20xx
PATIENT NAME:	COVINGTON, Victoria						
HOSPITAL NUMBER:	62-700245						
DATE OF ADMISSION:	January 21, 20xx						
<p>Source: Iko/Fotolia</p>							
<h4>HISTORY OF PRESENT ILLNESS</h4> <p>The patient is a 66-year-old white female who was transferred from home via ambulance to this emergency department. Apparently, the patient had just finished eating breakfast when her family noticed that she was standing in the middle of the hallway with her walker and seemed dazed. She was assisted to her bed, but rest did not improve her mental status. The family stated that she continued to be confused, incoherent, and unable to answer simple questions. At that point, the family called 911.</p>							
<h4>PAST MEDICAL HISTORY</h4> <p>The past medical history was obtained from the patient's daughter-in-law. The patient has a history of CHF, which has been slowly worsening over about the past 8 years. She also has a history of hypertension. The patient has been diagnosed with type 2 diabetes mellitus. The daughter-in-law remembers that the patient's last fasting blood sugar in the doctor's office last month was over 250. She is usually noncompliant with her diet, eating foods that are high in fat and calories. The patient does not take a pill or insulin for her diabetes. In the past week, the patient has had no appetite, has eaten little, but reportedly gained 2 pounds anyway. The daughter-in-law does not know the names of all of the patient's medications, except for Lasix. The patient smokes 1 pack of cigarettes per day and has done so for the past 40+ years. The patient has no known allergies.</p>							
<h4>PHYSICAL EXAMINATION</h4> <p>The patient is an obese female, lying in bed. She is stuporous, opening her eyes to commands but she is unable to answer questions. Heart: Regular rate and rhythm. The neck veins are slightly distended. The breath sounds reveal congestion in both lungs bilaterally. The abdomen is soft with hypoactive bowel sounds. Physical examination of the lower extremities shows severe edema in both feet and legs.</p>							
<h4>COURSE IN THE EMERGENCY DEPARTMENT</h4> <p>The patient was placed on a cardiac monitor and given a stat dose of intravenous Lasix. Labs were sent for CBC with WBC differential, electrolytes, CK-MB, troponin, and glucose. An arterial blood gas was drawn. Portable chest x-ray in the emergency department showed cardiomegaly with LVH. There was significant pulmonary congestion. While awaiting the results of the blood chemistries, the patient suddenly went into cardiac arrest. CPR was initiated. She responded to aggressive drug intervention, and we were able to establish a normal sinus rhythm. The patient was then transferred to the intensive care unit in critical condition, intubated, and on a ventilator.</p>							
<p><i>Alfred P. Molina, M.D.</i></p> <hr/> <p>Alfred P. Molina, M.D.</p> <p>APM:mtt D: 01/21/xx T: 01/21/xx</p>							

1. What is the medical abbreviation for hypertension? _____
2. The patient has hypertension. If you wanted to use the adjective form of *hypertension*, you would say, "The patient is _____."
3. What do these abbreviations stand for?
 - a. CHF _____
 - b. CK-MB _____
 - c. CPR _____
 - d. LVH _____
4. Divide *vascular* into its two word parts and give the meaning of each word part.

Word Part**Meaning**

5. Divide *cardiomegaly* into its two word parts and give the meaning of each word part.

Word Part**Meaning**

6. These medical words were not covered in this chapter, but you need to know their meanings in order to understand this medical report. Research these words and write their definitions.

Word**Meaning**

bilaterally

incoherent

stuporous

7. What is the normal range of the heart rate in beats per minute for an adult?

8. Besides hypertension, what other two diagnoses did the patient have before this hospitalization?

a. _____

b. _____

9. Resuscitation was used to treat what condition? (Circle one)

cardiomegaly**hypertension****cardiac arrest****diabetes mellitus**

10. Circle the two lab tests that were done to check to see if the patient had had a myocardial infarction.

troponin**portable chest x-ray****blood glucose****CK-MB****intubation**

11. The patient had a cardiac arrest. What is the medical word for having no heartbeat?

12. The severe edema in the patient's lower extremities reflected backup of blood due to failure of which side of the heart?

13. The pulmonary congestion seen on the chest x-ray reflected failure of which side of the heart?












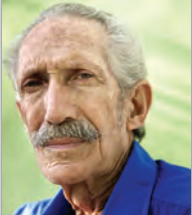
14. Lasix is a diuretic drug that removes fluid from the body by excreting it in the urine. For which of the patient's medical conditions was this drug prescribed? (Circle one)

congestive heart failure**lack of appetite****obesity****confusion**

15. If the patient ate little food in the past week, why did she gain 2 pounds?

ELECTRONIC PATIENT RECORD #2

This is an Office Visit SOAP Note. Read the note and answer the questions.

PEARSON FAMILY PRACTICE ASSOCIATES	
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<div>            </div>	
	<div> OFFICE VISIT SOAP NOTE </div> <div> PATIENT NAME: CARLOS-PINA, Joseph </div> <div> DATE OF VISIT: 11/19/20xx </div>
<p>SUBJECTIVE: The patient is a 85-year-old Hispanic male who drove himself to our office and is complaining of chest discomfort since last evening. He lives alone and is a widower. He has a past history of an episode of asystole and 6 years ago was resuscitated by the paramedics doing CPR.</p> <p>OBJECTIVE: Temperature 98.8 F, respiratory rate 30, blood pressure 150/100. The heart rate is irregular with runs of atrial fibrillation. The patient is alert and oriented, but in some distress.</p> <p>ASSESSMENT: Atrial fibrillation and hypertension.</p> <p>PLAN: An ambulance was called, and the patient was sent to the Emergency Department. His family was notified and will join him there.</p>	

Source: Diego Cervo/Fotolia

1. What is the medical description of atrial fibrillation?
2. Which vital sign reading led to a diagnosis of hypertension?
3. What is the medical description of asystole and how is it treated medically?
4. What does the abbreviation *CPR* mean?

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