Cardiovascular and Lymphatic Systems

7

Chapter Outline

Objectives

After completion of this chapter you will be able to:

1. Describe the location of the main cardiovascular and lymphatic structures in the body.
2. Define terms related to the heart, the vascular system, and the lymphatic system.
3. Define combining forms, prefixes, and suffixes related to the cardiovascular and lymphatic systems.
4. Define common medical terminology related to the cardiovascular and lymphatic systems, including adjectives and related terms, symptoms and conditions, tests and procedures, surgical interventions and therapeutic procedures, medications and drug therapies, and specialties.
5. Explain abbreviations for terms related to the cardiovascular and lymphatic systems.
6. Successfully complete all chapter exercises.
7. Explain terms used in medical records and case studies involving the cardiovascular and lymphatic systems.
8. Successfully complete all pronunciation and spelling exercises, and complete all interactive exercises included with the companion Student Resources.

ANATOMY AND PHYSIOLOGY

Functions of the Cardiovascular System

- To transport blood throughout the body (Fig. 7-1)
- To deliver oxygen and nutrients to body cells through arteries and capillaries
- To remove waste products from body cells through capillaries and veins
- To pump blood through the heart with the aid of electrical conduction

Structures of the Cardiovascular System

- The heart wall consists of three tissue layers.
- The heart has four chambers aided by four valves to keep blood moving in one direction.
- The heart has specialized tissue that transmits electrical impulses.
- The heart muscle contracts in a rhythmic sequence, pushing blood through the chambers and vessels.
- The arteries carry blood away from the heart.
- The capillaries allow exchange of gasses, nutrients, and wastes between the blood and body cells.
- The veins return blood back to the heart.

Functions of the Lymphatic System

- To return lymph from body tissues to the blood (Fig. 7-1)
- To protect the body by filtering microorganisms and foreign particles from the lymph
- To maintain the body's internal fluid level
- To absorb fats from the small intestines

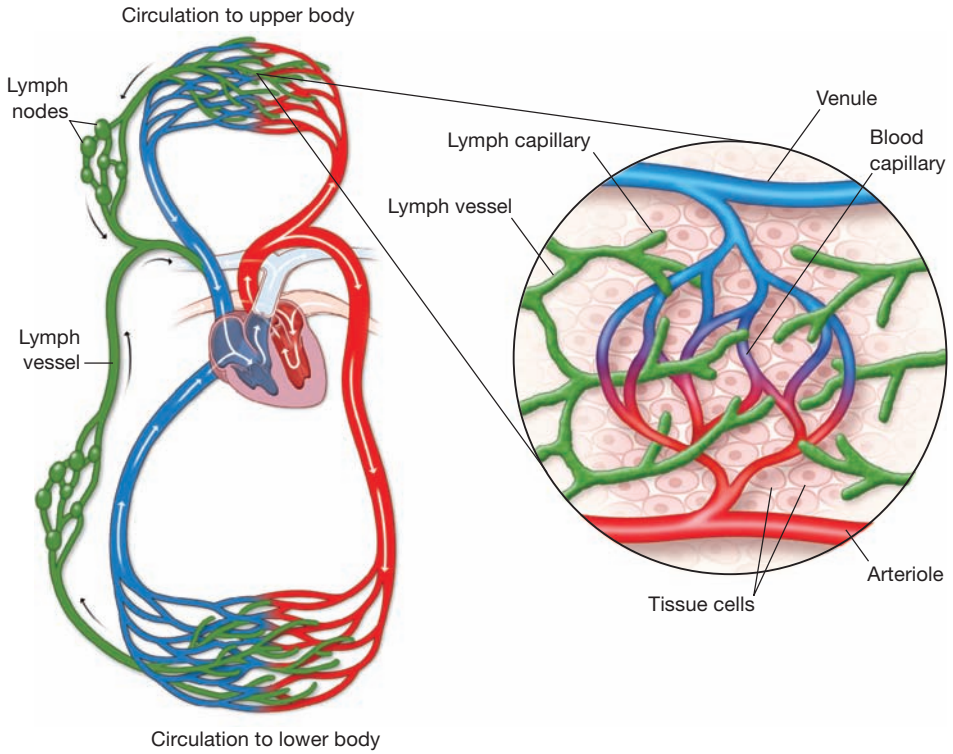

Figure 7-1 Blood and lymph flow in the cervical region.

Structures of the Lymphatic System

- The lymph is clear tissue fluid consisting of white blood cells and a few red blood cells.
- The lymph nodes filter the lymph.
- The lymph nodes are primarily concentrated in the neck, chest, armpits, and groin.
- The lymph vessels transport the lymph from the body tissues to the venous system.
- The lymph vessels have valves that facilitate one-way transport of lymph.

Terms Related to the Cardiovascular and Lymphatic Systems

Term	Pronunciation	Meaning
The Heart (Fig. 7-2)		
cardiovascular system	kahr'dē-ō-vas'kyū-lăr sis'tĕm	heart and blood vessels carrying oxygen and nutrients to the body cells and carrying away waste (Fig. 7-3)
heart	hahrt	muscular organ taking deoxygenated blood from the veins, pumping it to the lungs for oxygen, and returning it to the body through the arteries (Fig. 7-4)

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ANIMATION

View the animation *Cardiac Cycle* on the Student Resources to learn how blood flows through the heart.

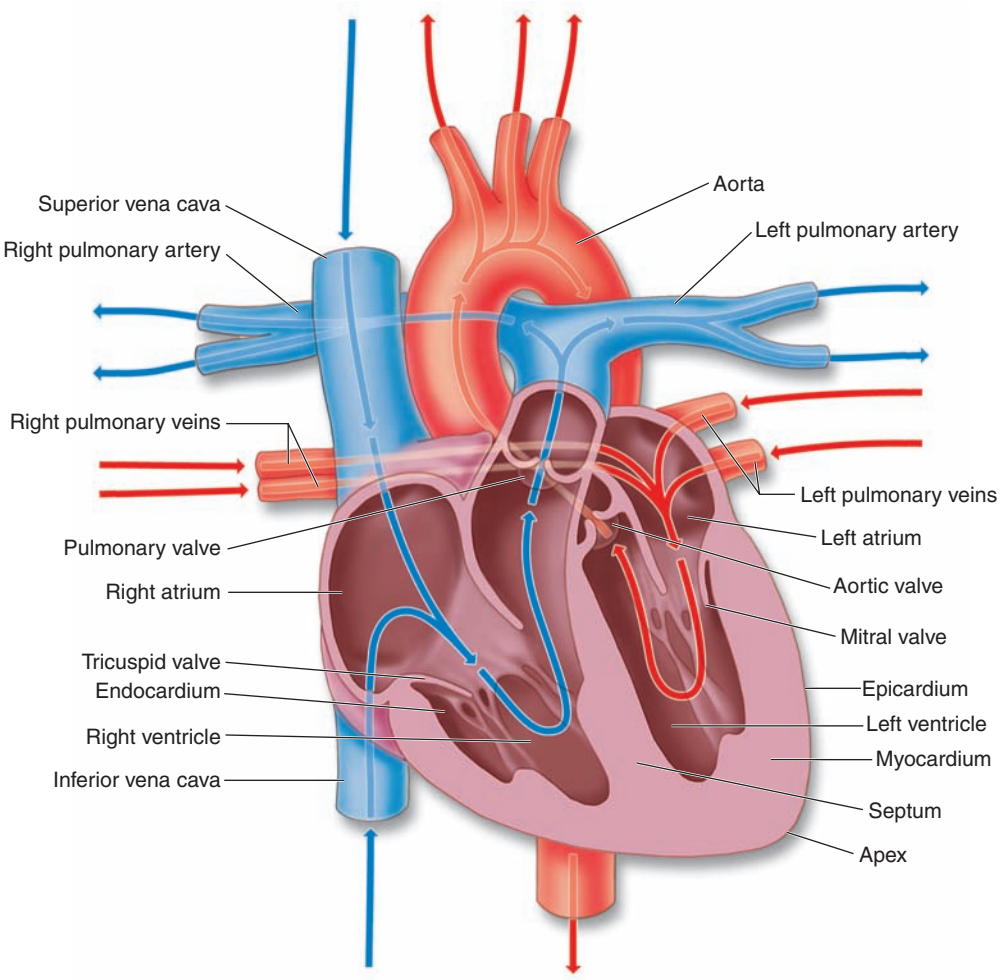

Figure 7-2 Heart and great vessels.

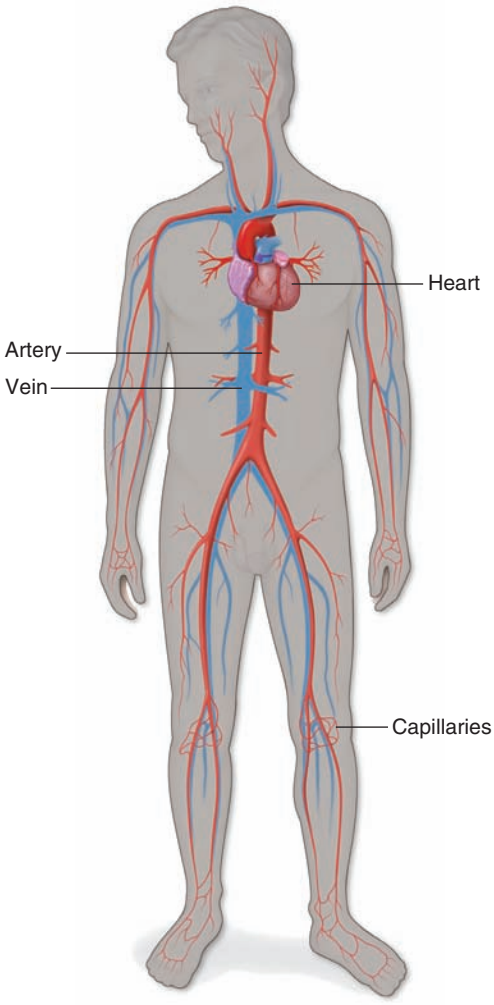

Figure 7-3 The cardiovascular system.

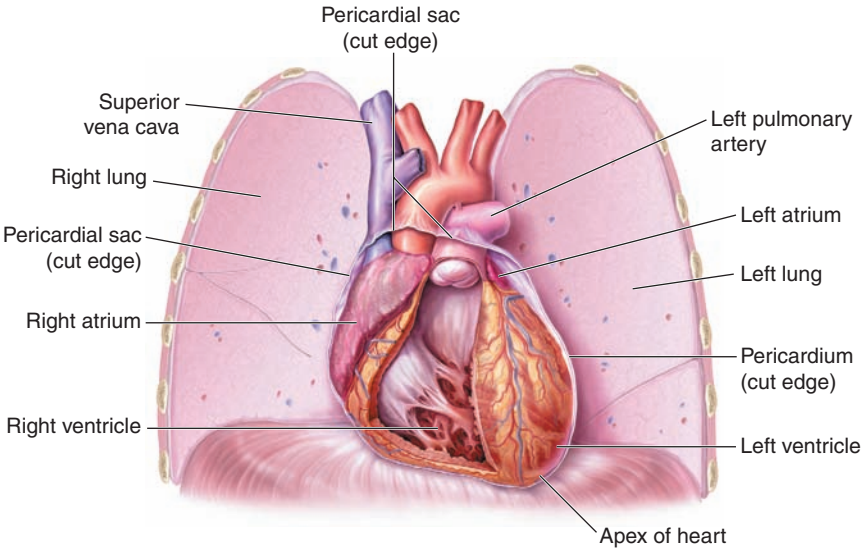

Figure 7-4 Cross-section of the heart and lungs showing the heart's relative position in the body.

Terms Related to the Cardiovascular and Lymphatic Systems *(continued)*

Term	Pronunciation	Meaning
apex	ā′peks	the lower pointed end of the heart
septum	sep′tŭm	wall of heart tissue separating the right and left sides
atrium	ā′terē-ŭm	upper receiving chamber of the heart; right and left
ventricle	ven′tri-kĕl	lower pumping chamber of the heart; right and left structures
endocardium	en′dō-kahr′dē-ŭm	inner lining of the heart
myocardium	mī′ō-kahr′dē-ŭm	middle muscular layer of heart tissue
epicardium	ep′i-kahr′dē-ŭm	outer lining of the heart
pericardium	per′i-kahr′dē-ŭm	sac around the heart that facilitates movement of the heart as it beats

(continued)

Terms Related to the Cardiovascular and Lymphatic Systems *(continued)*

Term	Pronunciation	Meaning
aortic valve	ā-ōr'tik valv	heart valve between the left ventricle and aorta
mitral valve	mī'trăl valv	heart valve between the left atrium and left ventricle; also called a bicuspid valve
pulmonary valve	pul'mŏ-nār-ē valv	heart valve between the right ventricle and the pulmonary artery; also called a semilunar valve due to the half-moon shape of its three cusps
tricuspid valve	trī-kŭs'pid valv	heart valve between the right atrium and right ventricle; also called a semilunar valve due to the half-moon shape of its three cusps
The Vascular System		
blood vessels	blŭd ves'ĕlz	structures that carry or transport blood
artery	ar'tĕr-ē	vessel carrying blood away from the heart (Fig. 7-5)
arteriole	ahr-tēr'ē-ōl	small artery

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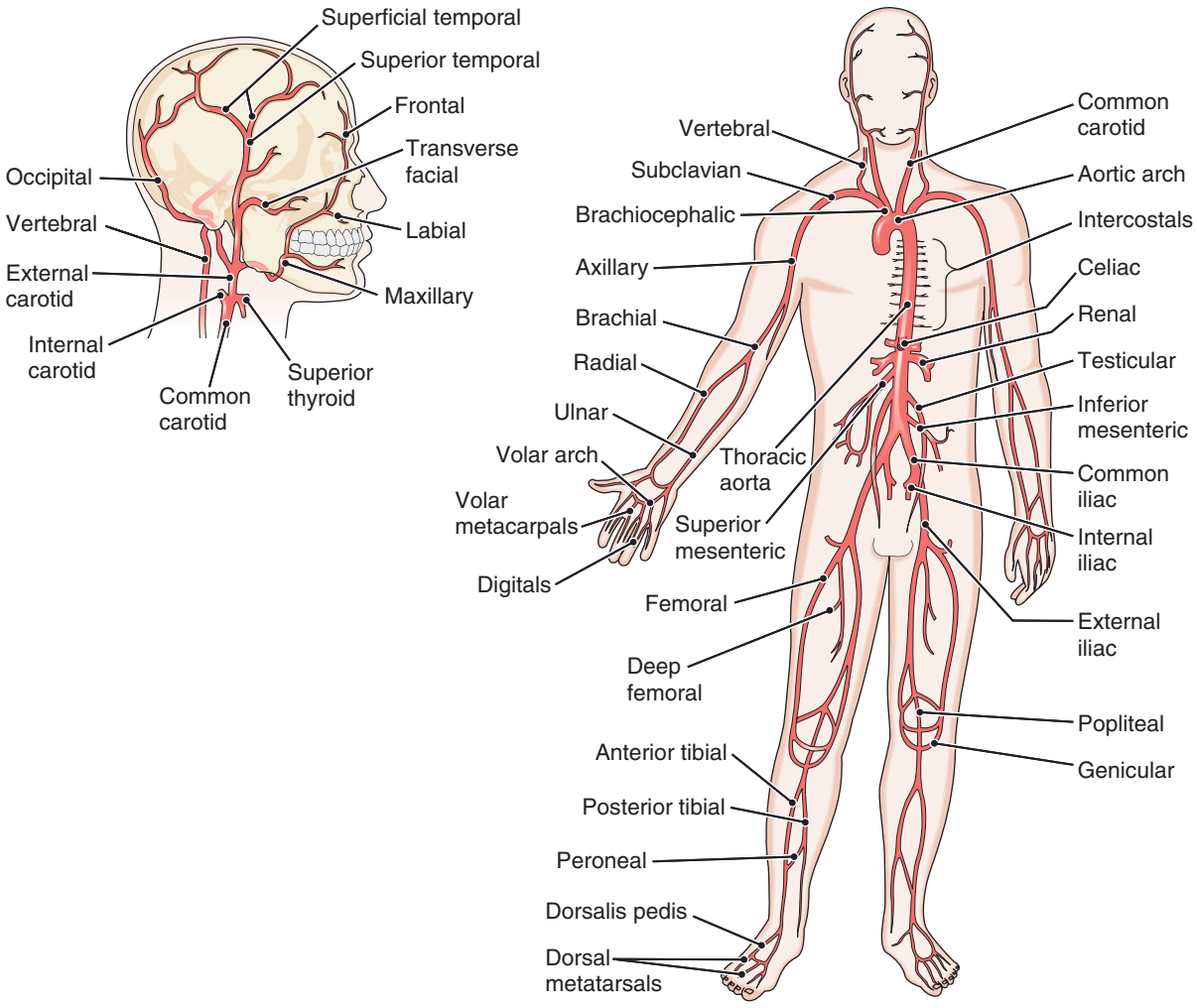

Figure 7-5 The principal arteries.

Terms Related to the Cardiovascular and Lymphatic Systems *(continued)*

Term	Pronunciation	Meaning
capillary	kap'i-lār-ē	microscopic thin-walled vessel connecting arterioles and venules where gas, nutrient, and waste exchange take place between the blood and cells of the body
lumen	lū'mĕn	interior space of a vessel
venule	ven'yūl	small vein
vein	vān	vessel carrying blood to the heart
aorta	ā-ōr'tă	largest artery that begins as an arch from the left ventricle then branches and descends through the thoracic and abdominal cavities; carries oxygenated blood away from the heart
inferior vena cava	in-fēr'ē-ŏr vē'nă kā'vă	large vein carrying blood to the heart from the lower part of the body (Fig. 7-6)
superior vena cava	sŭ-pēr'ē-ŏr vē'nă kā'vă	large vein carrying blood to the heart from the upper part of the body (Fig. 7-6)
The Lymphatic System (Fig. 7-7)		
lymph	limf	clear fluid consisting of fluctuating amounts of white blood cells and a few red blood cells that accumulates in tissue and is removed by the lymphatic capillaries
lymph nodes, *syn.* lymph glands	limf nōdz, limf glandz	small bean-shaped masses of lymphatic tissue that filter bacteria and foreign material from the lymph; located on larger lymph vessels in the axillary, cervical, inguinal, and mediastinal areas (Fig. 7-8)
lymph vessels	limf ves'ĕlz	vessels transporting lymph from body tissues to the venous system
lymph capillaries	limf kap'i-lar-ēz	microscopic thin-walled lymph vessels that pick up lymph, proteins, and waste from body tissues
lymph ducts	limf dŭkts	the largest lymph vessels that transport lymph to the venous system

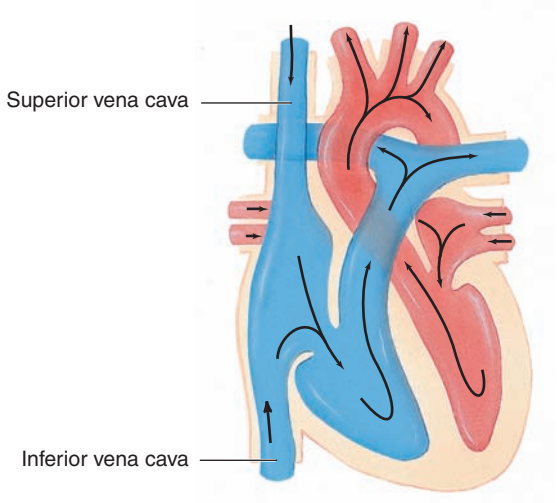

Figure 7-6 The venae cavae carry blood to the heart.

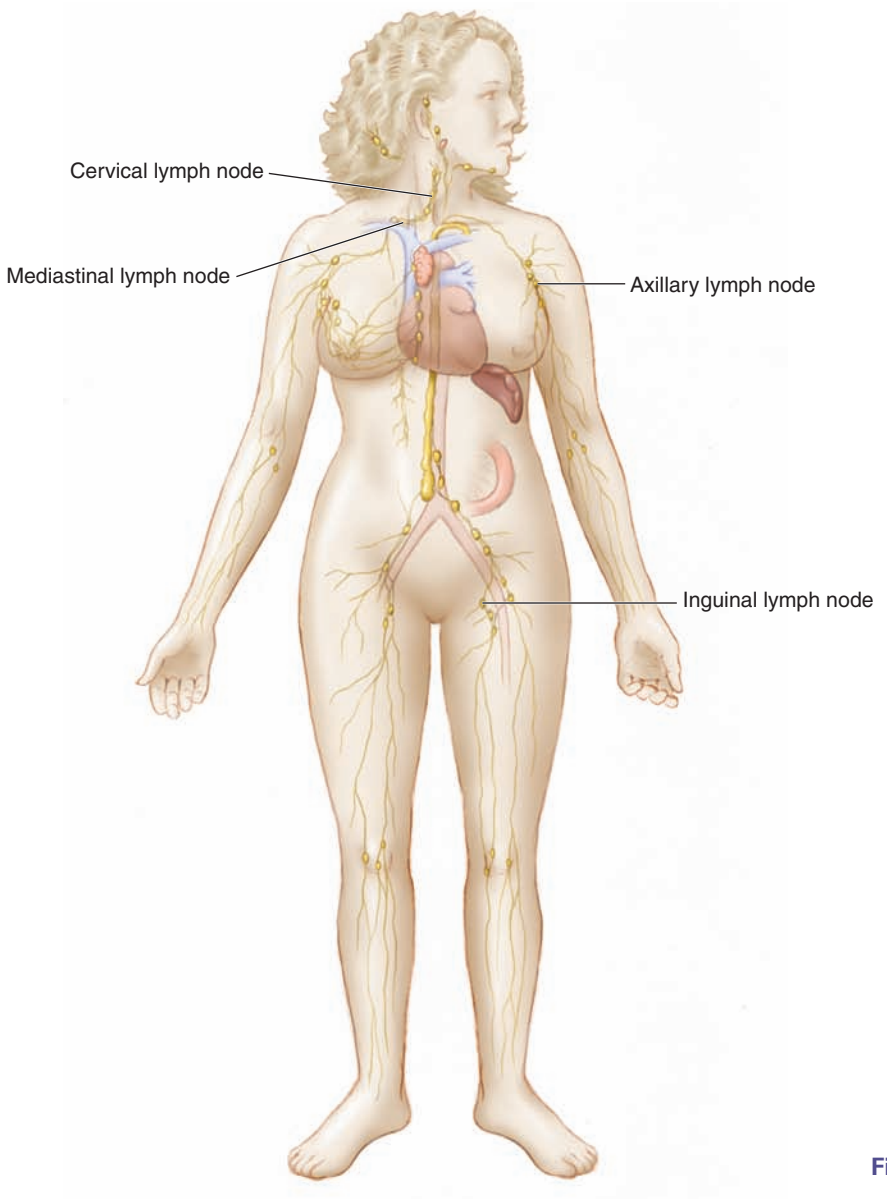

Figure 7-7 Major lymph node locations.

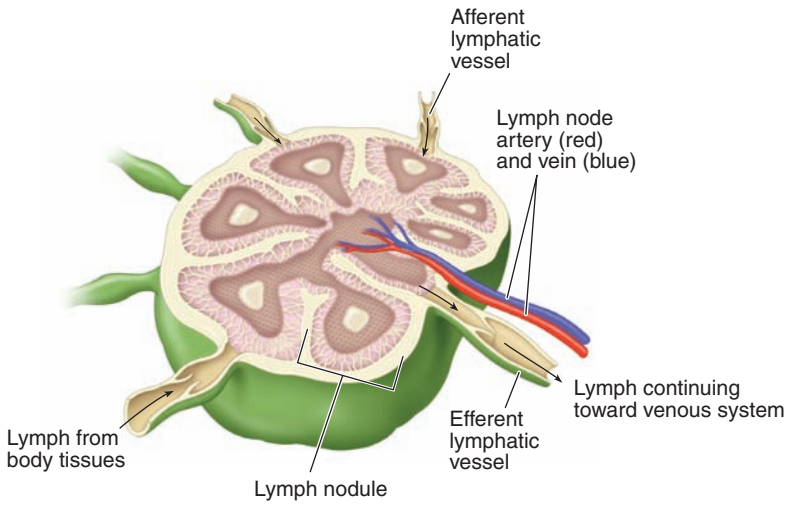

Figure 7-8 The interior of a lymph node.

Exercises: Anatomy and Physiology


SIMPLE RECALL

Exercise 1

Write the correct anatomic structure for the meaning given.

1. upper chamber of the heart _____
2. small vein _____
3. middle muscular layer of heart _____
4. valve between the left ventricle and aorta _____
5. wall of heart tissue _____
6. small artery _____
7. large veins carrying blood to the heart _____
8. muscular pumping organ _____
9. inner lining of the heart _____
10. sac around the heart _____


ADVANCED RECALL

Exercise 2

Write the meaning or function of the term given.

1. lymph _____
2. artery _____
3. vein _____
4. lymph capillaries _____
5. aorta _____
6. blood vessels _____
7. lymph vessels _____
8. lymph ducts _____
9. lymph nodes _____
10. tricuspid valve _____

Exercise 3

Circle the term that is most appropriate for the meaning of the sentence.

1. The two upper receiving chambers of the heart are called the right and left (*aortas, atria, ventricles*).
2. The epicardium is the (*inner, middle, outer*) lining of the heart.
3. The (*endocardium, myocardium, pericardium*) is the inner lining of the heart.
4. Another name for the mitral valve is the (*semilunar, bicuspid, tricuspid*) valve.
5. The largest artery in the body is the (*inferior vena cava, superior vena cava, aorta*).
6. The pulmonary valve is located between the right ventricle and the pulmonary (*vein, artery, vena cava*).
7. The lymph (*nodes, ducts, capillaries*) pick up lymph, proteins, and waste from the body cells.
8. The inferior vena cava is a large (*artery, vein, capillary*).
9. The smallest blood vessel where gas and nutrients are exchanged is a(n) (*arteriole, capillary, venule*).
10. The (*aortic, mitral, tricuspid*) valve is also referred to as a semilunar valve.
11. The mitral valve has (*one, two, three*) cusps or leaflets that open and close.
12. The (*endocardium, myocardium, pericardium*) is the sac around the heart.
13. A small artery is called a(n) (*arteriolo, arteriole, capillary*).
14. The muscular organ pumping blood through the body is the (*circulatory system, pulmonary system, heart*).

Exercise 4

Match each medical term with its meaning.

myocardium	septum	lymph
pulmonary valve	lumen	apex

Meaning	**Term**
1. structure between the right ventricle and pulmonary artery	_____
2. middle muscular layer of heart tissue	_____
3. interior space of a vessel	_____
4. clear fluid that accumulates in tissues	_____

5. wall inside the heart _____

6. the lower pointed end of the heart _____

Exercise 5

Complete each sentence by writing in the correct medical term.

1. Bacteria and foreign material are filtered out of circulation by the _____.
2. The bottom chambers of the heart responsible for forcing the blood through the body are the _____.
3. The vessels that carry blood away from the heart are _____.
4. The _____ regulates the flow of blood between the left ventricle and the aorta.
5. The _____ is a sac found around the heart that facilitates movement as it beats.
6. The interior space of a vessel is called a(n) _____.
7. A microscopic vessel that picks up fluid and proteins from the cells is a lymph _____.
8. The lymph _____ are the largest lymph vessels.
9. The clear fluid that accumulates in tissue is called _____.
10. The _____ vena cava carries blood to the heart from the lower part of the body.

WORD PARTS

Note that some word parts that have been introduced earlier in the book may not be repeated here.

Combining Forms

Combining Form	Meaning
Related to the Cardiovascular System	
angi/o, vas/o, vascul/o	vessel, duct
aort/o	aorta
arteri/o	artery
ather/o	fatty paste
atri/o	atrium

(continued)

Combining Forms *(continued)*

Combining Form	Meaning
cardi/o	heart
coron/o	circle or crown
electr/o	electric, electricity
my/o	muscle
phleb/o, ven/i, ven/o	vein
pulmon/o	lung
scler/o	hard
son/o	sound, sound waves
sphygm/o	pulse
steth/o, thorac/o	thorax, chest
thromb/o	blood clot
valv/o, valvul/o	valve
varic/o	swollen or twisted vein
ventricul/o	ventricle
Related to the Lymphatic System	
aden/o	gland
lymph/o	lymph

Prefixes

Prefix	Meaning
Related to the Cardiovascular System	
brady-	slow
de-	away from, cessation, without
endo-	in, within
epi-	on, following
inter-	between
intra-	within
peri-	around, surrounding
tachy-	rapid, fast
tel-	end
trans-	across, through
tri-	three

Suffixes

Suffix	Meaning
Related to the Cardiovascular System	
-al, -ar, -ary, -ic	pertaining to
-ectasia	dilation, stretching

(continued)

Suffixes *(continued)*

Suffix	Meaning
-gram	record, recording
-graph	instrument for recording
-graphy	process of recording
-icle, -ole, -ule	small
-lytic	pertaining to destruction, breakdown, separation
-ium	tissue, structure
-stenosis	stricture, narrowing
Related to the Lymphatic System	
-oid	resembling

Exercises: Word Parts

Exercise 6

Write the meaning of the combining form given.

1. atri/o _____
2. my/o _____
3. vas/o _____
4. angi/o _____
5. ven/o _____
6. electr/o _____
7. arteri/o _____
8. cardi/o _____
9. ventricul/o _____
10. pulmon/o _____
11. coron/o _____
12. phleb/o _____
13. vascul/o _____
14. thorac/o _____
15. valvul/o _____

Exercise 7

Write the correct combining form(s) for the meaning given.

1. hard _____
2. pulse _____
3. swollen or twisted vein _____
4. lymph _____
5. valve _____
6. aorta _____
7. artery _____
8. atrium _____
9. heart _____
10. thorax, chest _____

Exercise 8

Write the meaning of the prefix or suffix given.

1. -stenosis _____
2. -ule, -icle, -ole _____
3. tachy- _____
4. trans- _____
5. intra- _____
6. inter- _____
7. endo- _____
8. -graph _____
9. brady- _____
10. epi- _____
11. peri- _____
12. -ium _____
13. -al, -ar, -ary, -ic _____

14. tri- _____

15. de- _____

16. -lytic _____

Exercise 9

Considering the meaning of the combining form from which the medical term is made, write the meaning of the medical term. (You have not yet learned many of these terms but can build their meaning from the word parts.)

Combining Form	Meaning	Medical Term	Meaning of Term
phleb/o	vein	phlebitis	**1.** _____
cardi/o	heart	cardiology	**2.** _____
my/o, cardi/o	muscle, heart	myocardium	**3.** _____
thromb/o	blood clot	thrombosis	**4.** _____
ven/o	vein	venogram	**5.** _____
ather/o	fatty paste	atherectomy	**6.** _____
lymph/o	lymph	lymphoid	**7.** _____
aort/o	aorta	aortography	**8.** _____

Exercise 10

Using the given combining form, build a medical term for the meaning given.

Combining Form	Meaning of Medical Term	Medical Term
angi/o	surgical repair or reconstruction of a vessel	**1.** _____
thorac/o	pertaining to the chest	**2.** _____
arteri/o	small artery	**3.** _____
ven/o	small vein	**4.** _____
vascul/o	pertaining to vessels, ducts	**5.** _____
aden/o	resembling a gland	**6.** _____
lymph/o	disease of the lymph vessels or nodes	**7.** _____
son/o	process of recording using sound	**8.** _____

MEDICAL TERMS

Adjectives and Other Related Terms

Term	Pronunciation	Meaning
arteriovenous (AV)	ahr-tēr′ē-ō-vē′nŭs	pertaining to both arteries and veins
atrioventricular (AV)	ā′trē-ō-ven-trik′yū-lăr	pertaining to the atria and ventricles
cardiovascular	kahr′dē-ō-vas′kyū-lăr	pertaining to the heart and blood vessels
constriction	kŏn-strik′shŭn	process of narrowing or tightening of a structure
cyanotic	sī′ă-not′ik	pertaining to a blue or purple discoloration due to deoxygenated blood
deoxygenation	dē-ok′si-jĕ-nā′shŭn	process of removing or having a lack of oxygen
diastole	dī-as′tŏ-lē	the relaxation phase of the ventricles in the heartbeat cycle
ischemic	is-kē′mik	pertaining to a lack of blood flow
oxygenation	ok′si-jĕ-nā′shŭn	process of adding oxygen
paroxysmal	par-ok-siz′măl	sudden
patent	pā′tĕnt	open or exposed
precordial	prē-kōr′dē-ăl	pertaining to the anterior left chest
sphygmic	sfig′mik	pertaining to the pulse
stenotic	sten-ot′ik	pertaining to the condition of narrowing
supraventricular	sū′pră-ven-trik′yū-lăr	pertaining to above the ventricles
systole	sis′tŏ-lē	the contraction phase of the ventricles in the heartbeat cycle
thoracic	thōr-as′ik	pertaining to the chest
thrombotic	throm-bot′ik	pertaining to a thrombus or blood clot
varicose	var′i-kōs	pertaining to swollen or twisted veins

Exercises: Adjectives and Other Related Terms

Exercise 11

Circle the term that is most appropriate for the meaning of the sentence.

1. The term supraventricular refers to (*above, below, beside*) the ventricles.
2. A sudden arrhythmia, such as an atrial tachycardia, is described as (*stenotic, precordial, paroxysmal*).
3. An open coronary artery is referred to as (*patent, stenotic, varicose*).
4. A stenotic vessel is one that is (*widened, narrowed, stretched*).
5. The medical term used to describe a blue or purple discoloration is (*pathologic, varicose, cyanotic*).

6. (*Diastole, Systole, Stenosis*) refers to the contraction phase of the ventricles in the heartbeat cycle.

7. The relaxation phase of the ventricles in the heartbeat cycle is (*diastole, stenosis, systole*).


ADVANCED RECALL

Exercise 12

Match each medical term with its meaning.

precordial	constriction	cardiovascular	cyanotic	deoxygenation
varicose	oxygenation	atrioventricular	ischemic	thoracic

Meaning	Term
1. process of narrowing or tightening	_____
2. pertaining to the heart and blood vessels	_____
3. pertaining to a blue or purple discoloration	_____
4. pertaining to the anterior left chest	_____
5. pertaining to twisted, swollen veins	_____
6. process of adding oxygen	_____
7. pertaining to the chest	_____
8. pertaining to lack of blood flow	_____
9. pertaining to atria and ventricles	_____
10. process of removing oxygen	_____


TERM CONSTRUCTION

Exercise 13

Write the combining form(s) used in the medical term, followed by the meaning of the combining form.

Term	Combining Form(s)	Combining Form Meaning(s)
1. sphygmic	_____	_____
2. cardiovascular	_____	_____
3. varicose	_____	_____
4. arteriovenous	_____	_____
5. thrombosis	_____	_____

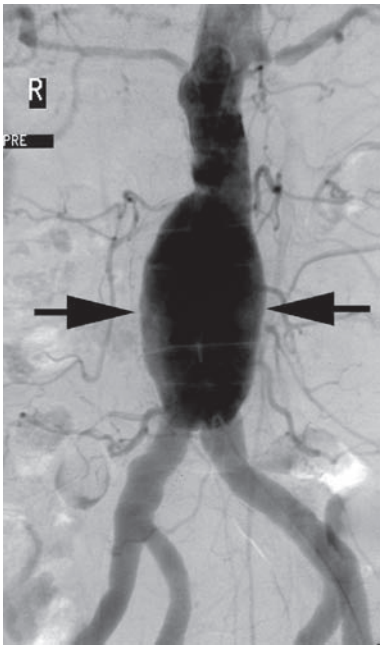

Figure 7-9 Aortic arteriogram in a 68-year-old man demonstrates an infrarenal abdominal aortic aneurysm (*arrows*).

Symptoms and Medical Conditions

Term	Pronunciation	Meaning
Related to the Cardiovascular System		
Disorders of the Heart and Arteries		
acute coronary syndrome (ACS)	ă-kyūt' kōr'ŏ-nār-ē sin'drōm	chest pain and other signs and symptoms associated with cardiac ischemia
aneurysm	an'yūr-izm	dilation of an artery; usually due to a weakness in the wall of the artery (Fig. 7-9)
angina pectoris	an'ji-nă pek'tō'ris	chest pain or pressure resulting from lack of blood flow to the myocardium
angiostenosis	an'jē-ō-stĕ-nō'sis	narrowing of a blood vessel
aortic stenosis	ā-ōr'tik stĕ-nō'sis	narrowing of the aortic valve opening (Fig. 7-10)
arteriosclerosis, *syn.* arteriosclerotic heart disease (ASHD)	ahr-tēr'ē-ō-skler-ō'sis, ahr-tēr'ē-ō-skler-ot'ik hahrt diz'ēz	hardening or loss of elasticity of the arteries

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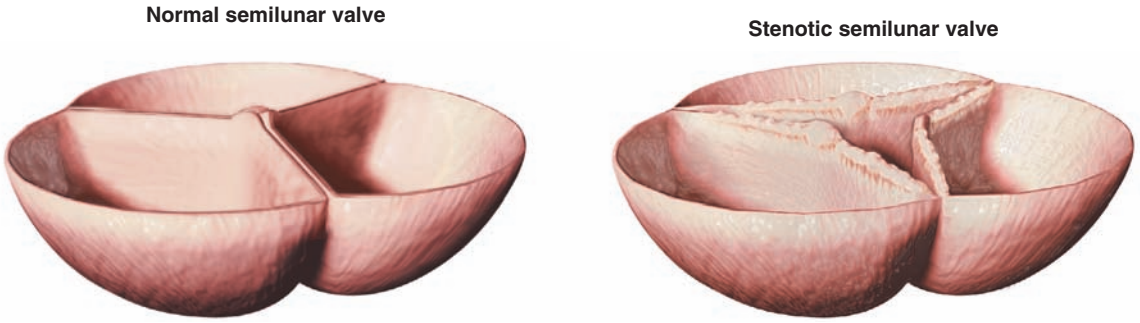


Figure 7-10 Stenosis of a semilunar valve. The aortic and pulmonary valves are semilunar valves.

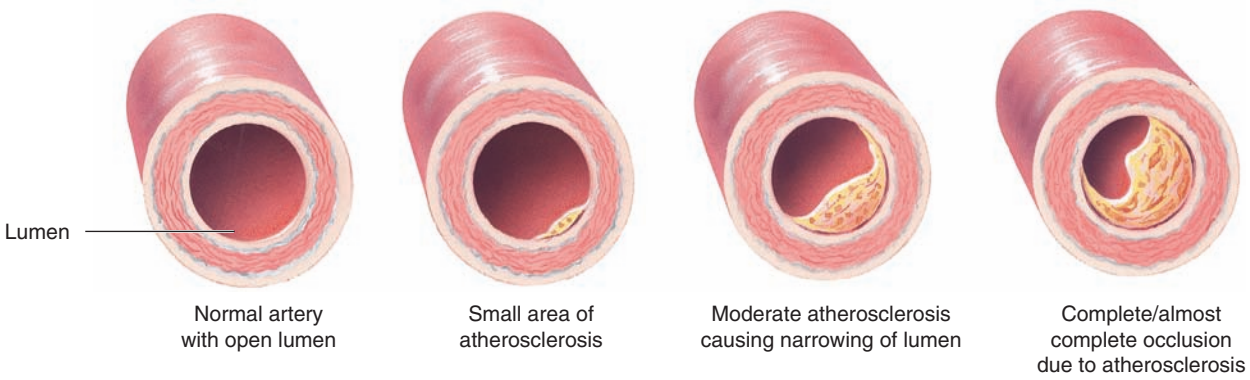


Figure 7-11 The progression of atherosclerosis.

Symptoms and Medical Conditions *(continued)*

Term	Pronunciation	Meaning
atherosclerosis	ath'ĕr-ō-skler-ō'sis	buildup of plaque or fatty paste inside arterial walls (Fig. 7-11)
cardiac arrest	kahr'dē-ak ă-rest'	complete, sudden cessation of cardiac activity
cardiac tamponade	kahr'dē-ak tam'pŏ-nahd'	compression of the heart due to an increase of fluid in the pericardium
cardiomegaly	kahr'dē-ō-meg'ă-lē	enlargement of the heart
cardiomyopathy	kahr'dē-ō-mī-op'ă-thē	disease of the heart muscles
cardiopathy	kahr'dē-op'ă-thē	any disease of the heart

RISK FACTORS FOR CARDIOPATHY Risk factors for heart disease can be placed in two categories: those that are changeable and those that cannot be changed. Risk factors that are changeable include obesity, hypertension, smoking, lack of exercise, and poor diet. Diabetes and stress are also considered changeable risk factors because they can be controlled. Unchangeable risk factors include age, gender, race, and family history.

cardiovalvulitis	kahr'dē-ō-val-vyū-lī'tis	inflammation of the valves of the heart
coarctation of the aorta	kō'ahrk-tā'shŭn ā-ōr'tă	narrowing of the aorta causing hypertension, ventricular strain, and ischemia
congestive heart failure (CHF)	kŏn-jes'tiv hahrt fāl'yŭr	inefficiency of cardiac circulation causing edema and pulmonary congestion
coronary artery disease (CAD)	kōr'ŏ-nār-ē ahr'tĕr-ē di-zēz'	narrowing of coronary arteries causing a decrease of blood flow or ischemia to the myocardium
coronary occlusion	kōr'ŏ-nār-ē ŏ-klū'zhŭn	blockage of a coronary vessel often leading to a myocardial infarction
embolus	em'bō-lŭs	vascular blockage made up of a thrombus, bacteria, air, plaque, and/or other foreign material

(continued)

Symptoms and Medical Conditions *(continued)*

Term	Pronunciation	Meaning
endocarditis	en′dō-kahr-dī′tis	inflammation of the endocardium
hypertension	hī′pĕr-ten′shŭn	persistently elevated blood pressure
hypotension	hī′pō-ten′shŭn	blood pressure that is below normal
intermittent claudication	in′tĕr-mit′ĕnt klaw′di-kā′shŭn	cramping of the lower leg muscles usually caused by lack of blood flow
ischemia	is-kē′mē-ă	lack of blood flow
mitral valve prolapse	mī′trăl valv prō′laps	backward movement of the mitral valve cusps allowing regurgitation
mitral valve stenosis	mī′trăl valv stĕ-nō′sis	narrowing of the mitral valve opening usually caused by scarring from rheumatic fever
murmur	mŭr′mŭr	abnormal heart sound
myocardial infarction (MI)	mī′ō-kahr′dē-ăl in-fahrk′shŭn	death of heart tissue usually due to coronary artery occlusion (Fig. 7-12)
myocarditis	mī′ō-kahr-dī′tis	inflammation of the heart muscle
occlusion	ŏ-klū′zhŭn	blockage or closure
pericarditis	per′i-kahr-dī′tis	inflammation of the pericardial sac around the heart
peripheral arterial disease (PAD)	pĕr-if′ĕr-ăl ahr-tēr′ē-ăl di-zēz′	any disorder of the arteries outside of, or peripheral to, the heart
plaque	plak	fat or lipid deposit on an arterial wall
polyarteritis	pol′ē-ahr-tĕr-ī′tis	inflammation of many arteries
Raynaud disease, *syn.* Raynaud syndrome	rā-nō′ diz′ēz, rā-nō′ sin′drōm	cyanosis of the fingers or toes due to vascular constriction, usually caused by cold tem peratures or emotional stress (Fig. 7-13)

(continued)

ANIMATION Learn how elevated blood pressure affects the heart and other organs of the body by viewing the animation *Hypertension* in the electronic Student Resources.

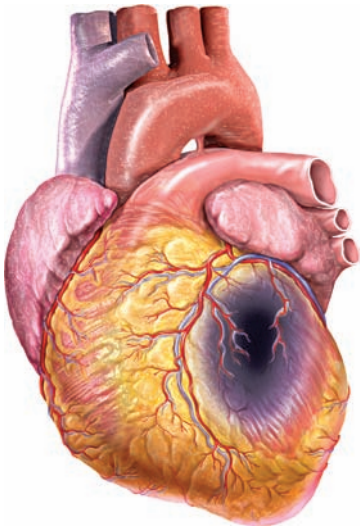


Figure 7-12 Myocardial infarction (MI) (*darkened area*).

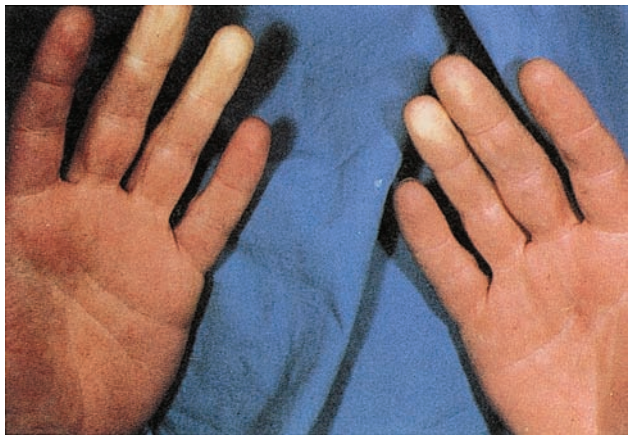


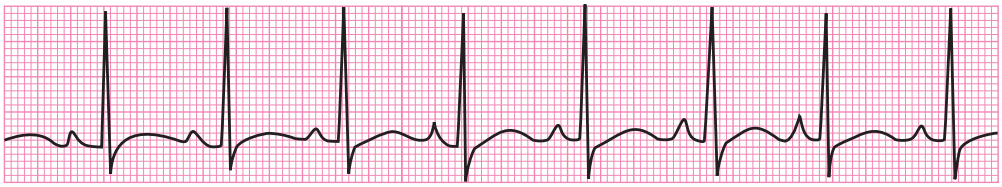
Figure 7-13 Raynaud disease as indicated by cyanosis (white areas) on the ends of the fingers.

Symptoms and Medical Conditions *(continued)*

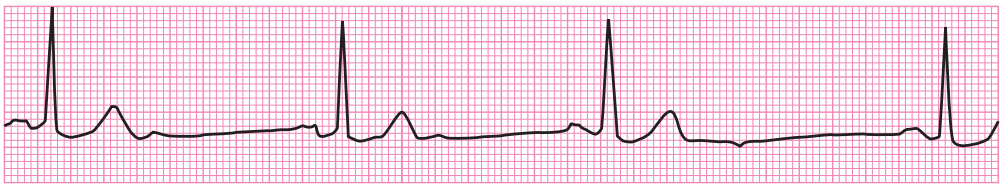
Term	Pronunciation	Meaning
rheumatic heart disease (RHD)	rū-mat'ik hahrt di-zēz'	valvular disease resulting from rheumatic fever
stenosis	stĕ-nō'sis	narrowing or stricture of a vessel
thrombus	throm'bŭs	blood clot
Heart Rhythm and Conduction Disorders		
arrhythmia	ā-ridh'mē-ă	abnormality or disturbance of heart rhythm (Fig. 7-14)
bradycardia	brad'ē-kahr'dē-ă	slow heart rate
dysrhythmia	dis-ridh'mē-ă	defective heart rhythm
fibrillation	fib'ri-lā'shŭn	rapid irregular muscular contractions of the atria or ventricles
flutter	flŭt'ĕr	rapid regular muscular contractions of the atria or ventricles
palpitation	pal-pi-tā'shŭn	forceful or irregular heart beat felt by the patient
premature ventricular contraction (PVC)	prē'mă-chŭr' ven-trik'yū-lăr kŏn-trak'shŭn	early contraction of the ventricles
tachycardia	tak'i-kahr'dē-ă	fast heart rate
Disorders of the Veins		
deep venous thrombosis (DVT)	dēp vē'nŭs throm-bō'sis	blood clot formation in a deep vein, usually of the legs or pelvic region
phlebitis	fle-bī'tis	inflammation of a vein
telangiectasia	tel-an'jē-ek-tā'zē-ă	dilation of small or terminal vessels
thrombophlebitis	throm'bō-flĕ-bī'tis	inflammation of a vein with formation of a clot
varicose vein	var'i-kōs vān	swollen and/or twisted veins, usually of the legs (Fig. 7-15)
Related to the Lymphatic System		
edema	ĕ-dē'mă	accumulation of excess fluid in intercellular spaces; can be caused by blockage of lymph vessels
elephantiasis	el'ĕ-fan-tī'ă-sis	enlargement of the lower extremities due to blockage of lymph vessels commonly caused by filarial worms (filariae) (Fig. 7-16)
filariae	fi-lar'ē-ē	small parasitic worms that are transmitted by mosquitoes; the worms invade tissues as embryos and block lymph vessels as they grow
lymphadenitis	lim-fad'ĕ-nī'tis	inflammation of the lymph nodes
lymphadenitis	lim-fad'ĕ-nī'tis	inflammation of the lymph nodes
lymphadenopathy	lim-fad'ĕ-nop'ă-thē	disease of the lymph nodes; usually causes enlargement of the nodes

(continued)

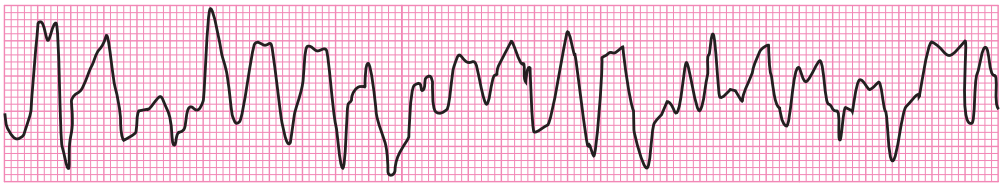
Normal sinus rhythm (NSR)



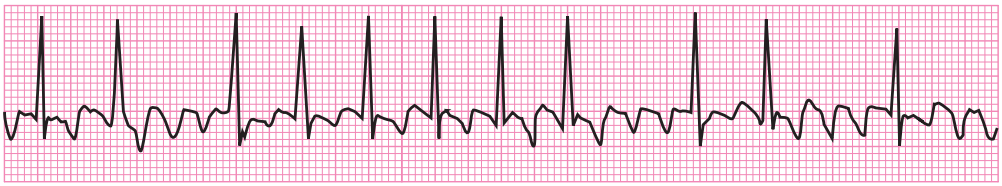
Bradycardia



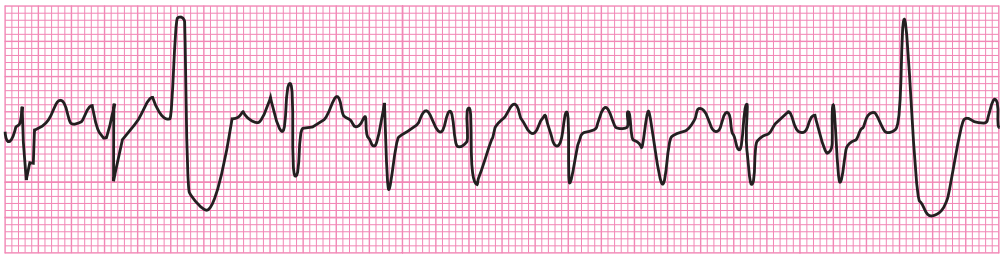
Fibrillation (ventricular)



Flutter (atrial)



Premature ventricular contraction (PVC)



Tachycardia (sinus)

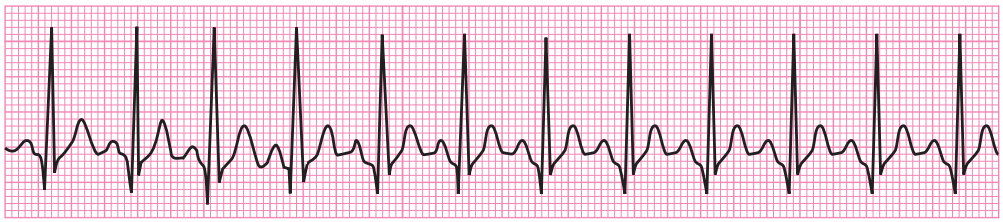


Figure 7-14 Common types of arrhythmias shown through electrocardiogram tracings.

Figure 7-15 Varicose veins.

Figure 7-16 Patient with advanced elephantiasis.

Symptoms and Medical Conditions *(continued)*

Term	Pronunciation	Meaning
lymphangiitis	lim-fan'jē-ī'tis	inflammation of a lymph vessel
lymphedema	lim'fĕ-dē'mă	edema due to a blocked lymph node or lymph vessel
pitting edema	pit'ing ĕ-dē'mă	edema that retains an indentation of a finger that had been pressed firmly on the skin (Fig. 7-17)

Arteriosclerosis vs. Atherosclerosis: To avoid confusing the meanings of the terms *arteriosclerosis* and *atherosclerosis*, focus on the combining forms. *Arteri/o* means artery, so *arteriosclerosis* refers to hardening of the arteries. *Ather/o* means fatty paste, so *atherosclerosis* refers to buildup of plaque or fatty paste, which hardens the artery walls. Atherosclerosis is actually a type of arteriosclerosis.

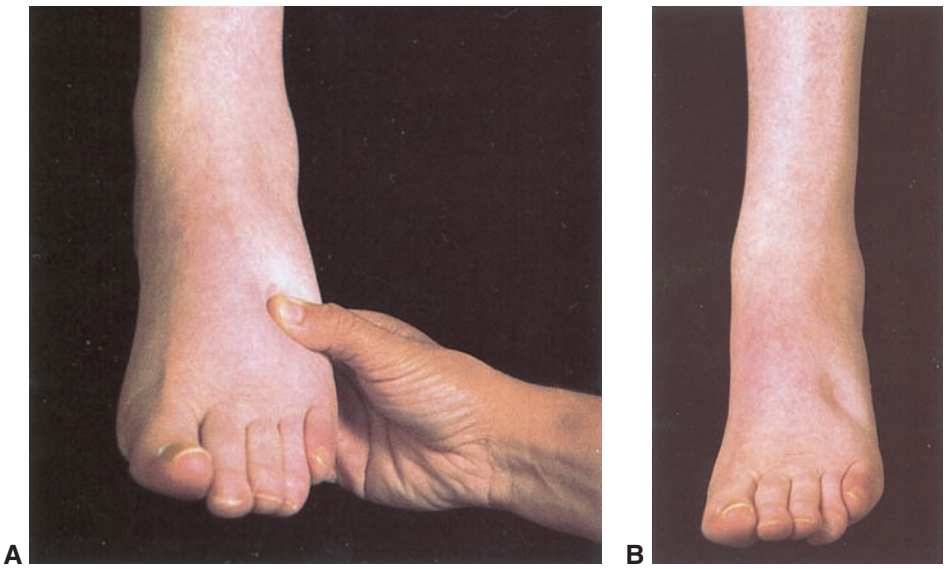


Figure 7-17 **A.** Palpation of the foot. **B.** Pitting edema.

Exercises: Symptoms and Medical Conditions

Exercise 14

Circle the word that best completes the meaning given.

1. aneurysm = (*weakening, rupture*) of an arterial wall
2. atherosclerosis = condition of fatty build-up and (*enlarging, hardening*) of blood vessels
3. hypertension = (*low, high*) blood pressure
4. hypotension = (*low, high*) blood pressure
5. aortic stenosis = (*hardening, narrowing*) of the aortic valve opening
6. myocardial infarction = (*death, pain*) of the myocardium due to lack of blood supply
7. rheumatic heart disease = damage to the heart (*ventricle, valve*) due to rheumatic fever
8. ischemia = (*lack of, increase in*) blood flow
9. fibrillation = rapid (*irregular, regular*) heart contractions
10. flutter = rapid (*irregular, regular*) heart contractions
11. premature ventricular contraction = (*early, late*) contraction of the ventricles
12. murmur = (*normal, abnormal*) heart sounds
13. elephantiasis = (*anemia, edema*) of the lower extremities due to lymph vessel blockage

14. acute coronary syndrome = (*Raynaud disease, chest pain*) and other signs and symptoms associated with cardiac ischemia

15. intermittent claudication = (*cramping, edema*) of the lower legs

16. peripheral artery disease = any disorder of the arteries (*inside, outside*) of, or peripheral to, the heart

Exercise 15

Circle the term that is most appropriate for the meaning of the sentence.

1. Mitral valve prolapse is when the blood flow moves (*backward, forward, circuitously*) through the valve.

2. Edema is the excess accumulation of intercellular (*blood, fluid, lymph*).

3. In coarctation of the aorta, the aorta is (*widened, dilated, narrowed*).

4. Small parasitic worms that invade tissues and cause elephantiasis are called (*telangiectasia, filariae, ringworm*).

5. The death of heart tissue usually due to coronary artery occlusion is called a(n) (*cardiac arrest, myocardial infarction, angina pectoris*).

6. Chest pain or pressure resulting from lack of blood flow to the myocardium is called (*cardiac arrest, myocardial infarction, angina pectoris*).

7. The medical term for when the heart stops beating is (*cardiac arrest, myocardial infarction, angina pectoris*).

8. With Raynaud disease, the fingers and toes become (*cyanotic, diaphoretic, syncopal*) due to vascular constriction.

9. Congestive heart failure is inefficiency of cardiac (*circulation, valves, pressure*) causing edema and pulmonary congestion.

10. A sudden onset of a fast heart rate is called (*tachycardia, palpitation, flutter*).

11. An inflammation of a vein is called (*phlebitis, telangiectasia, varicose vein*).

12. Coronary artery disease is a narrowing of the coronary arteries causing a(n) (*increase, decrease, leakage*) of blood flow to the myocardium.

13. A vascular blockage that is a combination of clotted blood and other foreign materials is a(n) (*regurgitation, embolus, thrombus*).

14. Deep vein thrombosis is (*plaque, fat, blood clot*) formation in a deep vein.

15. Swollen and/or twisted veins are called (*deep, varicose, phlebitis*) veins.

16. Blockage of a coronary vessel often leading to a myocardial infarction is called (*coronary stenosis, coronary occlusion, congestive heart failure*).

Exercise 16

Match each medical term with its meaning.

palpitation lymphedema angiostenosis dysrhythmia cardiomegaly
lymphadenitis occlusion plaque mitral valve stenosis arrhythmia

Meaning	Term
1. narrowing of a blood vessel	
2. forceful irregular heart beat felt by the patient	
3. abnormality or disturbance of heart rhythm	
4. edema due to blocked lymph node	
5. blockage or closure	
6. fat deposit on an arterial wall	
7. narrowing of the mitral valve opening	
8. inflammation of the lymph nodes	
9. defective heart rhythm	
10. enlargement of the heart	

Exercise 17

Build a medical term from an appropriate prefix, combining form, and suffix, given their meanings.

Prefix	Combining Form	Suffix	Term
1. slow	heart	condition of	
2. around or surrounding	heart	inflammation	
3. in, within	heart	tissue, structure	
4. between	ventricles	pertaining to	
5. around, surrounding	heart	tissue, structure	
6. rapid, fast	heart	condition of	
7. many, much	artery	inflammation	

Exercise 18

Break the given medical term into its word parts and define each part. Then define the medical term. (Note: This exercise uses some suffixes learned previously.)

For example:

pericarditis	*word parts:*	peri- /	cardi/o	/ -itis
	meanings:	around, surrounding /	heart	/ inflammation
	term meaning:	inflammation of the pericardial sac around the heart		

1. lymphangiitis

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

2. lymphadenopathy

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

3. thrombophlebitis

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

4. cardiomyopathy

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

5. endocarditis

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

6. cardiovalvulitis

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

7. myocarditis

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

8. telangiectasia

word parts: _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

Tests and Procedures

Term	Pronunciation	Meaning
Laboratory Tests Related to the Cardiovascular System		
cardiac enzyme tests	kahr′dē-ak en′zīm tests	blood tests used to measure the level of creatine kinase (CK), creatine phosphokinase (CPK), and lactate dehydrogenase (LDH) that, when such levels are increased, may indicate a myocardial infarction
cardiac troponin	kahr′dē-ak trō′pō-nin	blood test used to measure the level of a protein that is released in the blood when myocardial cells die
C-reactive protein (CRP)	sē-rē-ak′tiv prō′tēn	blood test used to measure the level of inflammation in the body; may indicate conditions that lead to cardiovascular disease
electrolyte panel	ĕ-lek′trō-līt pan′ĕl	blood test used to measure the level of sodium (Na), potassium (K), chloride (Cl), and carbon dioxide (CO_2); used to diagnose an acid-base or pH imbalance that may cause arrhythmias, muscle damage, or death
lipid panel, *syn.* lipid profile	lip′id pan′ĕl, lip′id prō′fīl	blood test to measure the level of total cholestrol, high density lipoprotein (HDL), low density lipoprotein (LDL), and triglycerides, all of which may signal an increased risk of cardiovascular disease
Diagnostic Procedures Related to the Cardiovascular System		
Imaging Studies		
angioscopy	an′jē-os′kŏ-pē	insertion of a catheter with an attached camera to visualize a structure or vessel
aortography	ā-ōr-tog′ră-fē	process of recording the aorta after injection of a dye
arteriography	ahr-ter′ē-og′ră-fē	process of recording an artery after injection of a dye
coronary angiography, *syn.* cardiac catheterization	kōr′ŏ-nār-ē an′jē-og′ră-fē, kahr′dē-ak kath′ĕ-tĕr-ī-zā′shŭn	process of recording the heart and major vessels after injection of a dye (Fig. 7-18)
magnetic resonance imaging (MRI)	mag-net′ik rez′ŏ-năns im′ăj-ing	imaging technique that uses magnetic fields and radiofrequency waves to visualize anatomic structures
magnetic resonance angiography (MRA)	mag-net′ik rez′ŏ-năns an′jē-og′ră-fē	MRI of the heart and blood vessels with an injection of dye
multiple uptake gated acquisition (MUGA) scan	mŭl′ti-pĕl-gāt′ĕd ak-wi-zi′shŭn skan	nuclear medicine technique used to assess ventricular function by producing an image of a beating heart
sonography, *syn.* ultrasonography	sŏ-nog′ră-fē, ŭl′tră-sŏ-nog′ră-fē	use of ultrasonic sound waves to visualize internal organs
Doppler sonography (DS)	dop′lĕr sŏ-nog′ră-fē	technique used to record velocity of blood flow
echocardiography	ek′ō-kahr-dē-og′ră-fē	process of recording the structure and function of the heart at rest and with exercise (Fig. 7-19)

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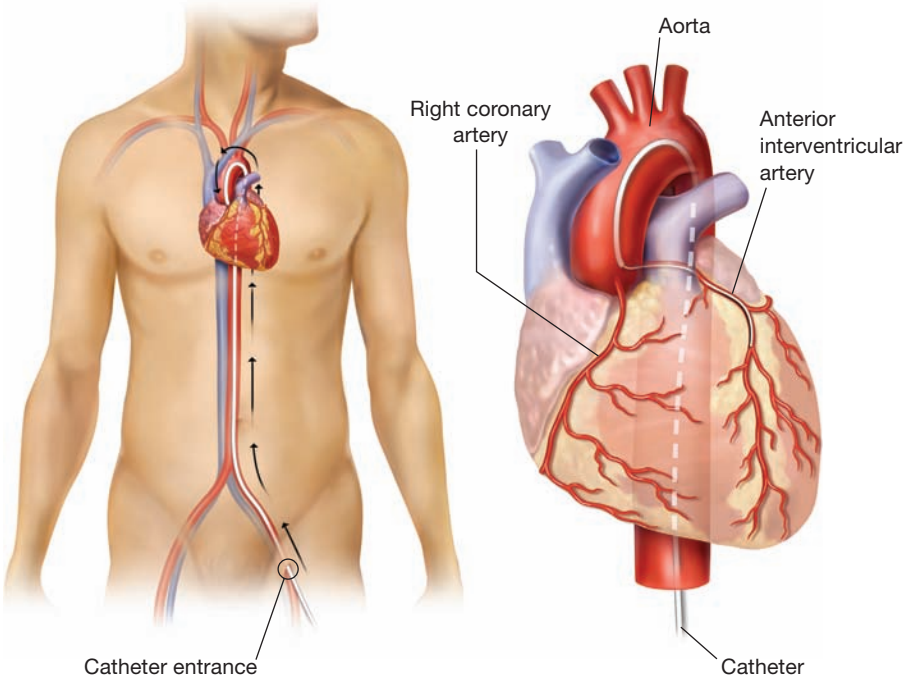

Figure 7-18 Coronary angiography.

Tests and Procedures *(continued)*

Term	Pronunciation	Meaning
transesophageal echocardiography (TEE)	tranz-ē-sō-fā′jē-ăl ek′ō-kahr-dē-og′ră-fē	placement of the ultrasonic transducer inside the patient's esophagus to assess cardiac function and examine cardiac structure
vascular sonography	vas′kyū-lăr sŏ-nog′ră-fē	placement of the ultrasound transducer at the tip of a catheter within a blood vessel to assess blood flow
single photon emission computed tomography (SPECT) scan	sing′gĕl fō′ton ē-mi′shŭn kŏm-pyūt′ĕd tŏ-mog′ră-fē skan	nuclear medicine technique used to assess ventricular function by producing a three-dimensional image of a beating heart

(continued)

Figure 7-19 Echocardiography.

Tests and Procedures *(continued)*

Term	Pronunciation	Meaning
venography	vē-nog′ră-fē	process of recording a vein after injection of a dye
ventriculography	ven-trik′yū-log′ră-fē	process of recording the heart ventricles after injection of a dye or radioactive substance (radionuclide)
Other Procedures		
auscultation	aws′kŭl-tā′shŭn	listening to body sounds with a stethoscope
blood pressure monitoring (BP)	blŭd presh′ŭr mon′i-tŏr′ing	auscultation of the systolic and diastolic arterial pressure using a stethoscope and a sphygmomanometer
electrocardiography (ECG or EKG)	ĕ-lek′trō-kahr-dē-og′ră-fē	process of recording (in a graphic format) the heart's electrical activity; the waves are labeled with the letters P, Q, R, S, and T (see Fig. 7-14)
graded exercise test (GXT), *syn.* stress electrocardiogram, exercise stress test	grād′ĕd eks′ĕr-sīz test, stres ĕ-lek′trō-kahr′dē-ō-gram, eks′ĕr-sīz stres test	electrocardiogram performed with controlled stress, usually with a treadmill or bicycle (Fig. 7-20)
Holter monitor (HM)	hōl′tĕr mon′i-tŏr	portable electrocardiographic device usually worn for 24 hours

(continued)

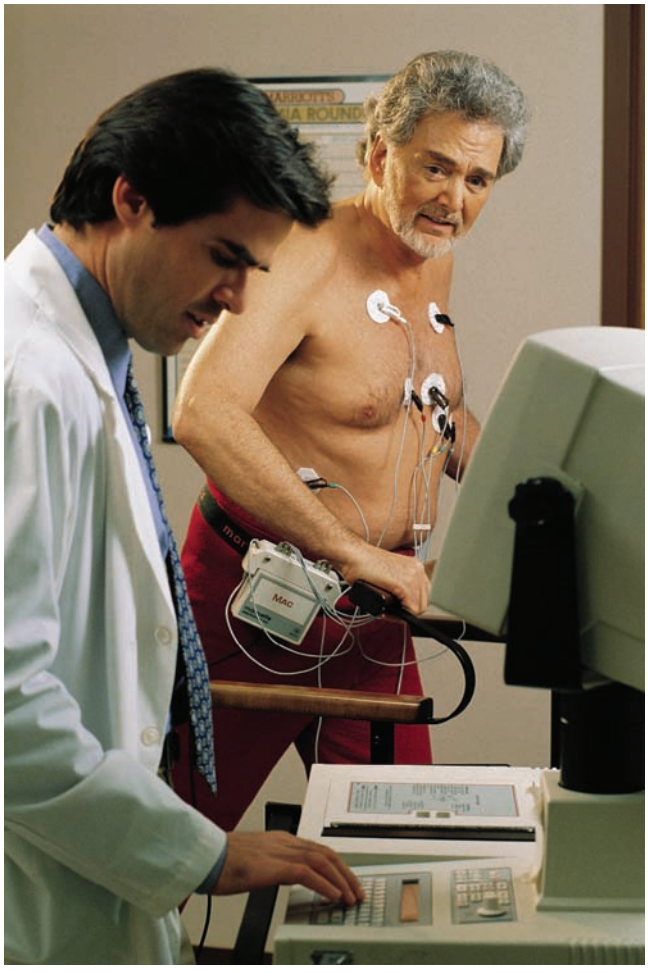

Figure 7-20 Exercise stress test.

Tests and Procedures *(continued)*

Term	Pronunciation	Meaning
percussion	pĕr-kŭsh'ŭn	physical examination method of tapping over the body to elicit vibrations and sounds to estimate the size, border, or fluid content of a cavity
pulse	pŭls	rhythmic dilation of an artery with each heart contraction, usually felt at the wrist or neck
sphygmomanometer	sfig'mō-mă-nom'ĕ-tĕr	device used for measuring blood pressure
stethoscope	steth'ŏ-skōp	instrument used for auscultation of vascular or other sounds in the body

STETHOSCOPE Did you know that the first stethoscope was invented by a French physician who rolled paper into the shape of a cylinder to listen to heart sounds? Prior to this, physicians would listen to a patient's chest by placing their ear directly on the chest wall.

Diagnostic Procedures Related to the Lymphatic System		
lymphangiography	lim-fan'jē-og'ră-fē	process of recording a lymph node or lymph vessel after injection of a dye

Exercises: Tests and Procedures

Exercise 19

Circle the term that is most appropriate for the meaning of the sentence.

1. A portable ECG monitoring device that can be worn for 24 hours is a (*graded exercise test, Holter monitor, MUGA scan*).

2. The process of recording an artery after injecting a dye or radionuclide is called (*arteriography, angiography, aortography*).

3. The process of recording a lymph vessel after injecting a dye is called (*angiography, vascular sonography, lymphangiography*).

4. Insertion of a catheter with a camera to visually assess a vessel is called (*angioscopy, fine-needle aspiration, cardiac catheterization*).

5. The process of listening to body sounds with a stethoscope is called (*echocardiography, ultrasound, auscultation*).

6. The process of recording the heart's electrical activity is called (*echocardiography, electrocardiography, sonography*).

7. A(n) (*MUGA, MRI, SPECT*) scan produces a three-dimensional image of a beating heart.

8. Doppler (*electrocardiography, venography, sonography*) is used to record the velocity of blood flow.

9. The examination method of tapping over the body to elicit vibrations and sounds is called (*percussion, auscultation, blood pressure*).

10. An MRI of the heart and blood vessels with an injection of dye is called (*magnetic resonance imaging, MUGA, magnetic resonance angiography*).

Exercise 20

Complete each sentence by writing in the correct medical term.

1. An ECG performed with controlled stress is a(n) _____.

2. The process of recording the structure and function of the heart using sonography is called _____.

3. To perform _____, an ultrasound transducer is placed inside the patient's esophagus.

4. Two examples of nuclear medicine studies that assess ventricular function are _____ and _____.

5. The process of recording the heart and major vessels after injection of a dye is called _____ or _____.

6. An echocardiogram assesses structure and function of the heart at rest and with _____.

7. A ventriculography records the _____ after injection with dye.

8. Magnetic resonance imaging uses magnetic fields and _____ to visual anatomic structures.

9. Measurement of blood pressure requires a(n) _____.

10. A stethoscope is used to _____ to body sounds.

Exercise 21

Match each type of lab test with the description of the test.

cardiac troponin	electrolyte panel	C-reactive protein
lipid panel	cardiac enzyme tests	

Description	**Term**
1. evaluation of Na, K, Cl, and CO_2	_____
2. evaluation of CK, CPK, and LDH	_____

3. evaluation of protein released when myocardial cells die _____

4. evaluation of cholesterol, HDL, LDL, and triglycerides _____

5. measurement of inflammation in the body _____

Exercise 22

Using the given suffix, build a medical term for the meaning given.

Suffix	Meaning of Medical Term	Medical Term
-graphy	process of recording using sound waves	1. _____
-graphy	process of recording a vein	2. _____
-graphy	process of recording the ventricles	3. _____
-graphy	process of recording the aorta	4. _____
-graphy	process of recording a blood vessel	5. _____

Surgical Interventions and Therapeutic Procedures

Term	Pronunciation	Meaning
Related to the Cardiovascular System		
angioplasty	an'jē-ō-plas-tē	surgical repair of a vessel
aortocoronary bypass (ACB)	ā-ōr'tō-kōr'ō-nar-ē bī'pas	attachment of a grafted vessel to the aorta to go around a damaged coronary artery
aneurysmectomy	an'yūr-iz-mek'tŏ-mē	excision of an aneurysm
atherectomy	ath'er-ek'tŏ-mē	surgical removal of fatty plaque from a vessel surgically or using catheterization
cardiac pacemaker	kahr'dē-ak pās'mā-kĕr	surgically placed mechanical device connected to stimulating leads (electrodes) on or within the heart, programmed to help maintain normal heart rate and rhythm (Fig. 7-21)
cardioversion	kahr'dē-ō-vĕr'zhŭn	use of defibrillation or drugs to restore the heart's normal rhythm
coronary artery bypass graft (CABG)	kōr'ŏ-nār-ē ahr'tĕr-ē bī'pās graft	surgical procedure in which a damaged section of a coronary artery is replaced or bypassed with a graft vessel (Fig. 7-22)

THE EVOLUTION OF CORONARY ARTERY BYPASS SURGERY Advances in technology have led to the development of several types of coronary artery bypass surgery. Traditionally, this procedure involved opening the chest via a large incision through the middle of the sternum; a heart-lung machine circulated the blood while the heart was stopped. A newer type of bypass surgery, called "off-pump," uses special agents to stabilize the heart while the surgery takes place. In addition, surgeons now perform minimally invasive bypass surgery, which uses small incisions in the side of the chest and special instruments for the operation.

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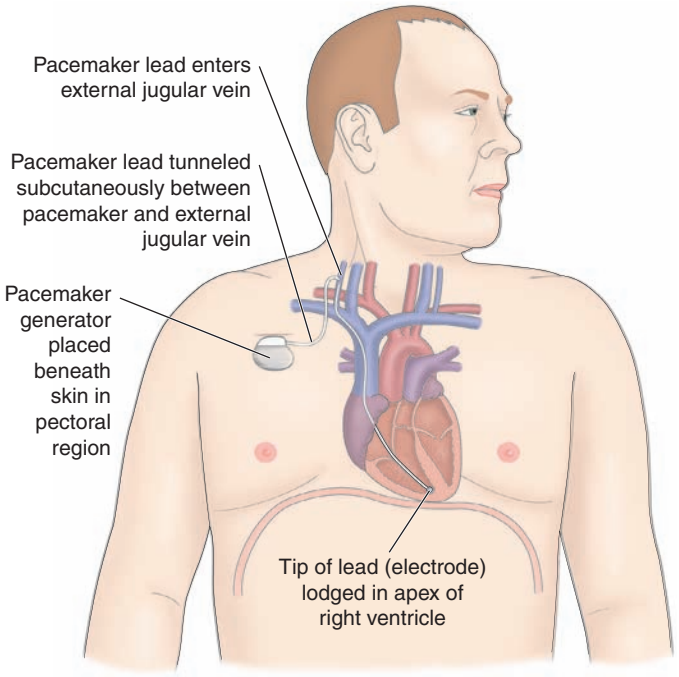


Figure 7-21 Insertion of a pacemaker.

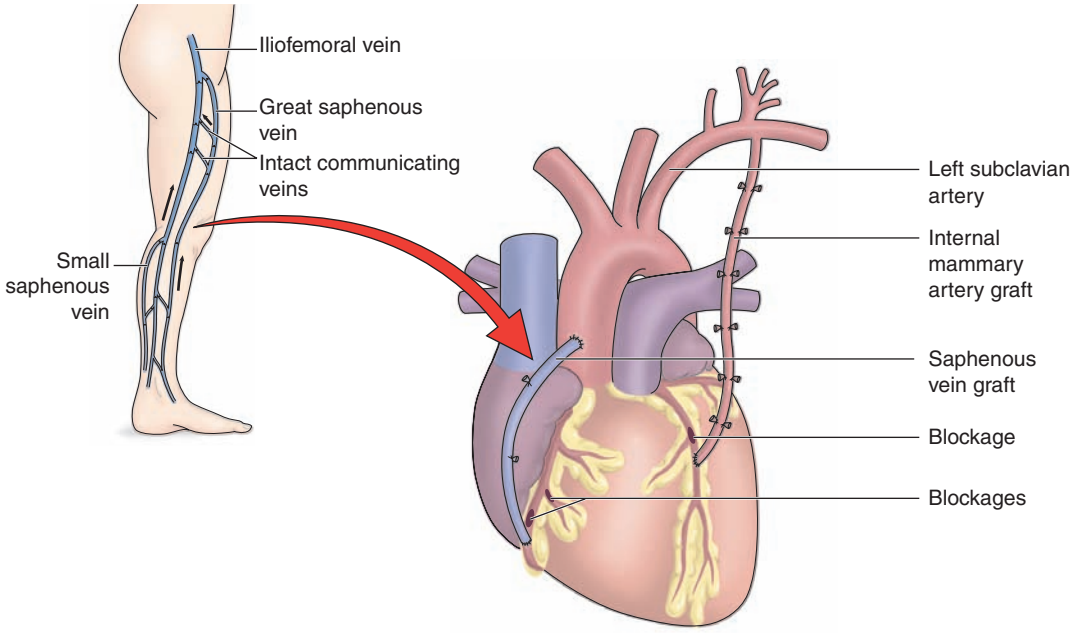


Figure 7-22 Coronary artery bypass graft (CABG).

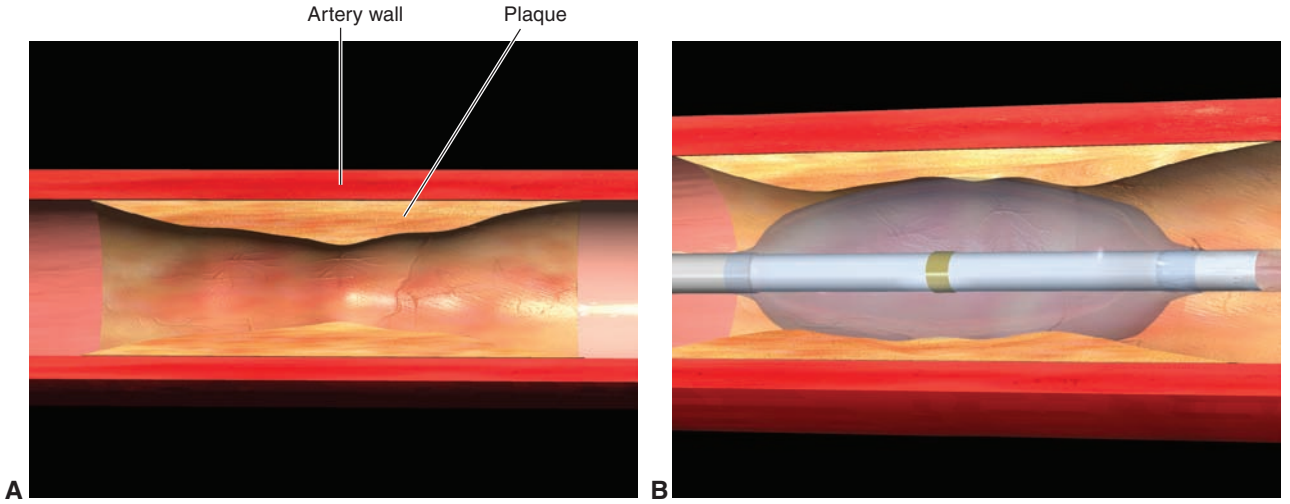


Figure 7-23 Coronary angioplasty (PTCA). **A.** Plaque buildup in an artery. **B.** Balloon inserted and inflated, thus enlarging the lumen.

Surgical Interventions and Therapeutic Procedures *(continued)*

Term	Pronunciation	Meaning
defibrillation	dē-fib'ri-lā'shŭn	use of an electric shock to stop fibrillation or cardiac arrest
embolectomy	em'bō-lek'tŏ-mē	surgical removal of an embolus or blood clot, usually with a catheter
endarterectomy	end'ahr-tĕr-ek'tŏ-mē	surgical removal of atheromatous deposits, usually in a coronary or carotid artery
pericardiocentesis	per'i-kahr'dē-ō-sen-tē'sis	surgical puncture to aspirate fluid from the pericardium
percutaneous transluminal coronary angioplasty (PTCA)	pĕr'kyū-tā'nē-ŭs trans-lū'mĕn-ăl kōr'ŏ-nār-ē an'jē-ō-plas-tē	advancement of a cardiac catheter with a balloon attachment that can be inflated at the site of stenosis, thereby enlarging the lumen (Fig. 7-23)
phlebectomy	fle-bek'tō-mē	excision of a vein
stent	stent	intravascular insertion of a hollow mesh tube designed to keep a vessel open or patent (Fig. 7-24)

(continued)

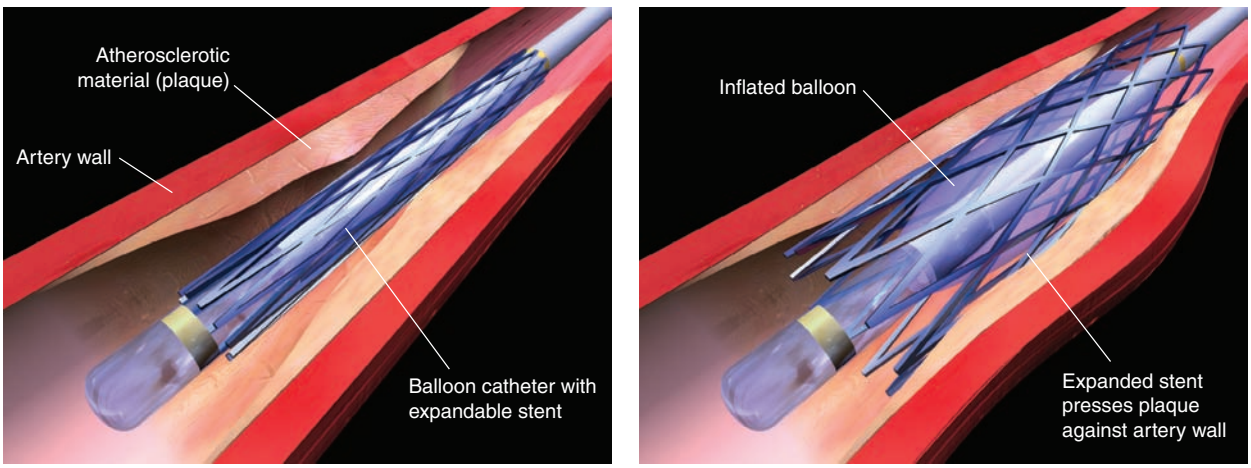


Figure 7-24 Arterial stent.

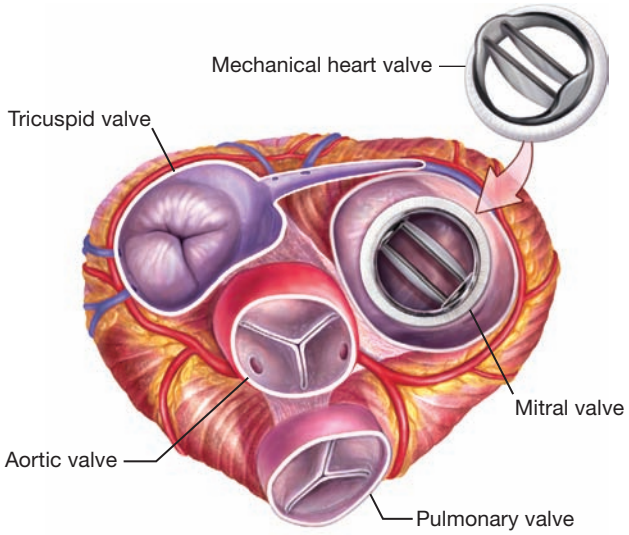


Figure 7-25 Mitral valve prosthesis.

Surgical Interventions and Therapeutic Procedures *(continued)*

Term	Pronunciation	Meaning
valve replacement	valv rē-plās'mĕnt	surgical replacement of a valve with a biologic or mechanical device (Fig. 7-25)
valvotomy	val-vot'ŏ-mē	incision into a valve
valvuloplasty	val'vyū-lō-plas-tē	surgical repair of a valve
Related to the Lymphatic System		
adenectomy	ad'ĕ-nek'tŏ-mē	excision of a gland
lymphadenectomy	lim-fad'ĕ-nek'tŏ-mē	excision of a lymph node
lymphadenotomy	lim-fad'ĕ-not'ŏ-mē	incision into a lymph node

Exercises: Surgical Interventions and Therapeutic Procedures

Exercise 23

Write the correct medical term for the meaning given.

1. excision of a gland _____
2. inflation of a balloon catheter in a coronary artery _____
3. surgical removal of an embolus or blood clot _____
4. surgical repair of a valve _____
5. surgical removal of fatty plaque _____

6. excision of a lymph node _____

7. incision into a lymph node _____

Exercise 24

Circle the correct term that is appropriate for the meaning of the sentence.

1. Dr. Johansson explained to Mr. Curren that his (*valvuloplasty, valve replacement, atherectomy*) would be with a biologic or mechanical device.

2. A(n) (*angioplasty, cardioversion, valve replacement*) was performed on Mrs. Campbell to correct her irregular and fast heart rate.

3. Mr. Torres had a(n) (*endarterectomy, embolectomy, stent*) to surgically remove the fatty buildup in his carotid artery.

4. After having several syncopal episodes due to bradycardia, Mr. DeHaan was scheduled for implantation of a (*cardiac pacemaker, valve replacement, stent*) to help maintain normal heart rate and rhythm.

5. Dr. LaPenna decided to do a(n) (*ACB, PTCA, CABG*) to open Mr. Thompson's narrowed coronary artery using a catheter with a balloon attachment.

6. A (*pacemaker, PTCA, stent*) was inserted in Ms. Andretti's coronary artery to help keep it open.

7. After documenting the restenosis of his coronary arteries by angiography, Dr. Ayerdi advised Mr. Johnson to have a(n) (*CABG, cardioversion, adenectomy*).

8. Dr. Nowak grafted the saphenous vein to the aorta in a procedure called a(n) (*aortocoronary bypass, endarterectomy, PTCA*).

Exercise 25

Using the given suffix, build a medical term for the meaning given.

Suffix	Meaning of Medical Term	Medical Term
-plasty	surgical repair of a blood vessel	1. _____
-ectomy	excision of an aneurysm	2. _____
-centesis	puncture to aspirate fluid from the pericardium	3. _____
-ectomy	excision of a gland	4. _____
-tomy	incision into a valve	5. _____

Exercise 26

Break the given medical term into its word parts and define each part. Then define the medical term.

For example:
carditis
word parts: cardi/o / -itis
meanings: heart / inflammation
term meaning: inflammation of the heart

1. valvuloplasty
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

2. angioplasty
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

3. atherectomy
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

4. phlebectomy
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

5. valvotomy
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

Medications and Drug Therapies

Term	Pronunciation	Meaning
anticoagulant	an′tē-kō-ag′yŭ-lănt	drug used to prolong clotting time
antiarrhythmic agent	an′tē-ā-ridh′mik ā′jĕnt	drug used to suppress fast or irregular heart rhythms
hemostatic agent	hē′mō-stat′ik ā′jĕnt	drug that stops the flow of blood within vessels
hypolipidemic agent	hī′pō-lip′id-ē-mĭc a′jĕnt	drug used to lower cholesterol levels
nitroglycerin	nī′trŏ-glĭs-er-in	vasodilator used for angina pectoris
thrombolytic therapy	throm′bō-lit′ik thār′ă-pē	administration of an intravenous drug to dissolve a blood clot
vasoconstrictor	vā′sō-kŏn-strik′tŏr	drug that decreases the size of blood vessels
vasodilator	vā′sō-dī′lā-tŏr	drug that increases the size of blood vessels

Exercise: Medications and Drug Therapies

Exercise 27

Write the correct medication or drug therapy term for the meaning given.

1. drug that decreases the size of blood vessels _____
2. drug that prolongs clotting time _____
3. administration of an IV drug to dissolve a clot _____
4. drug that increases the size of blood vessels _____
5. drug that stops the flow of blood _____
6. drug that suppresses fast or irregular heart rhythms _____
7. drug used for angina pectoris _____
8. drug used to lower cholesterol _____

Specialties and Specialists

Term	Pronunciation	Meaning
cardiology	kahr′dē-ol′ŏ-jē	medical specialty concerned with diagnosis and treatment of heart disease
cardiologist	kahr′dē-ol′ŏ-jist	physician who specializes in cardiology
cardiac electrophysiology	kahr′dē-ak ĕ-lek′trō-fiz′ē-ol′ŏ-jē	medical speciality concerned with the electrical activities of the heart
cardiac electrophysiologist	kahr′dē-ak ĕ-lek′trō-fiz′ē-ol′ŏ-jist	physician who specializes in cardiac electrophysiology
lymphedema therapy	lim′fĕ-dē′mă thār′ă-pē	medical specialty concerned with the treatment of lymphedema
lymphedema therapist	lim′fĕ-dē′mă thār′ă-pist	one who specializes in lymphedema therapy

Exercise: Specialties and Specialists

Exercise 28

Match each medical specialist or specialty with its description.

cardiac electrophysiology
cardiologist
cardiology
lymphedema therapy
lymphedema therapist
cardiac electrophysiologist

1. study of heart disease _____
2. specialty related to the treatment of lymphedema _____
3. physician who specializes in heart disease _____

4. specialty related to the heart's electrical activities _____

5. one who specializes in lymphedema therapy _____

6. physician specialized in the heart's electrical activities _____

Abbreviations

Abbreviation	Meaning
Related to the Cardiovascular System	
ACB	aortocoronary bypass
ACS	acute coronary syndrome
ASHD	arteriosclerotic heart disease
AV	arteriovenous, atrioventricular
BP	blood pressure
CABG	coronary artery bypass graft
CAD	coronary artery disease
CHF	congestive heart failure
DS	Doppler sonography
DVT	deep venous thrombosis
ECG or EKG	electrocardiography
GXT	graded exercise test
HM	Holter monitor
HTN	hypertension
MI	myocardial infarction
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging
MUGA	multiple uptake gated acquisition
PAD	peripheral arterial disease
PTCA	percutaneous transluminal coronary angioplasty
PVC	premature ventricular contraction
RHD	rheumatic heart disease
SPECT	single photon emission computed tomography
TEE	transesophageal echocardiography

Exercises: Abbreviations

Exercise 29

Write the meaning for the following abbreviations.

1. CHF _____

2. ACB _____

3. SPECT _____
4. ASHD _____
5. DVT _____
6. PVC _____
7. BP _____
8. ACS _____
9. HTN _____
10. CABG _____

Exercise 30

Write the meaning of each abbreviation used in these sentences.

1. Dr. Erickson ordered a **HM** for Mr. Hadley to investigate his complaints of irregular heartbeats.

_____

2. Mrs. Cuthbert underwent a **PTCA** to enlarge the lumen of her stenotic artery.

_____

3. The cardiologist ordered an **MRA** of the brain to locate the blocked vessel.

_____

4. Dr. Anderson's specialty is repair of **AV** defects.

_____

5. Dr. Macken had difficulty visualizing the heart structures on the echocardiogram, so he ordered a **TEE**, a procedure in which the patient swallows the transducer, to obtain a different perspective.

_____

6. Angie Smith was diagnosed with **CAD** because of her ischemia.

_____

7. Mr. Javovich's heart valve was damaged after having **RHD** as a child.

_____

8. Mr. John's **GXT** was performed using a treadmill.

_____

9. Dr. Francis diagnosed Ms. Snyder with an **MI** caused by coronary artery occlusion.

_____

10. Mrs. Adkins was diagnosed with **PAD** through the use of Doppler sonography.

_____

Exercise 31

Match each abbreviation with the appropriate description.

DS	MUGA	MRA
MRI	ECG	

1. recording of the heart's electrical activity _____

2. imaging technique using magnetic fields and radiofrequency waves _____

3. MRI of the heart and blood vessels with an injection of dye _____

4. technique used to record velocity of blood flow _____

5. nuclear medicine technique used to assess ventricular function _____

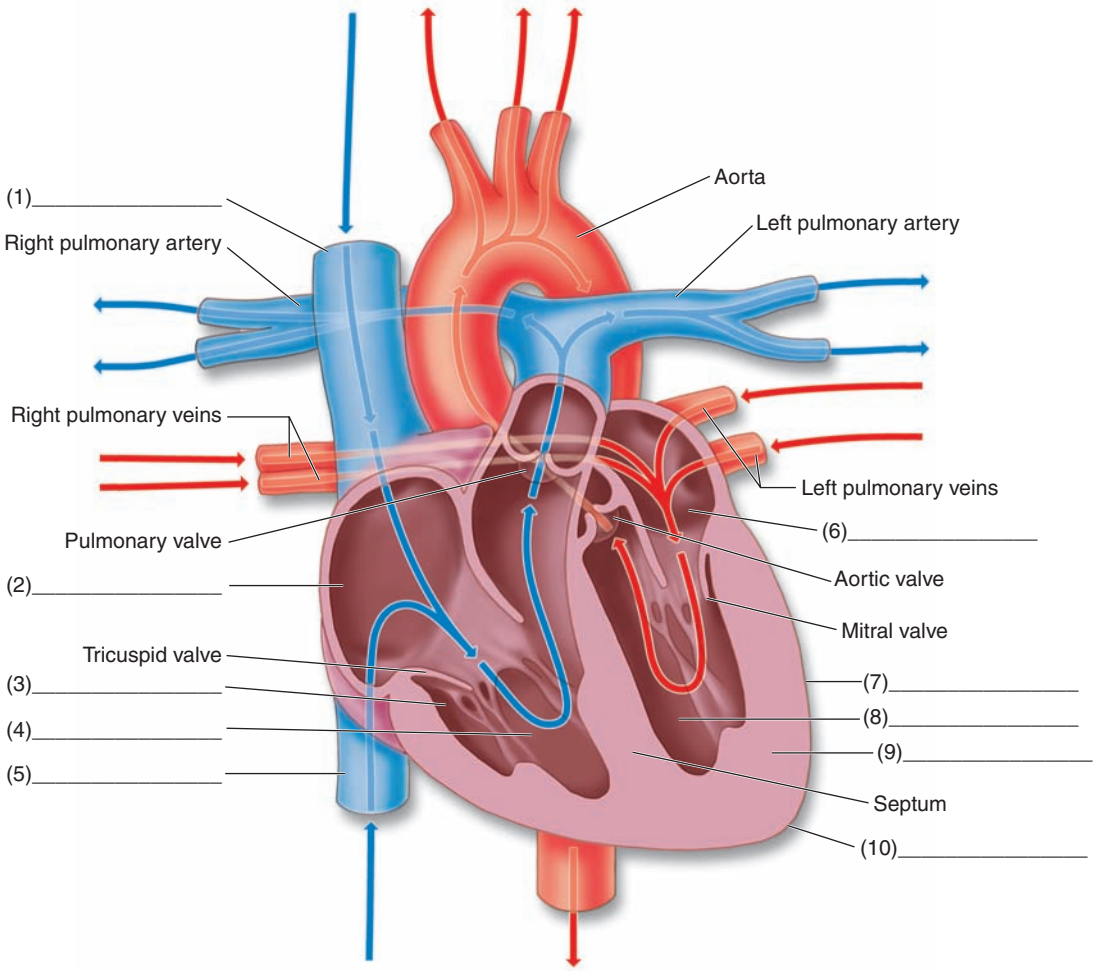
Chapter Review

Review of Terms for Anatomy and Physiology

Exercise 32

VISUAL

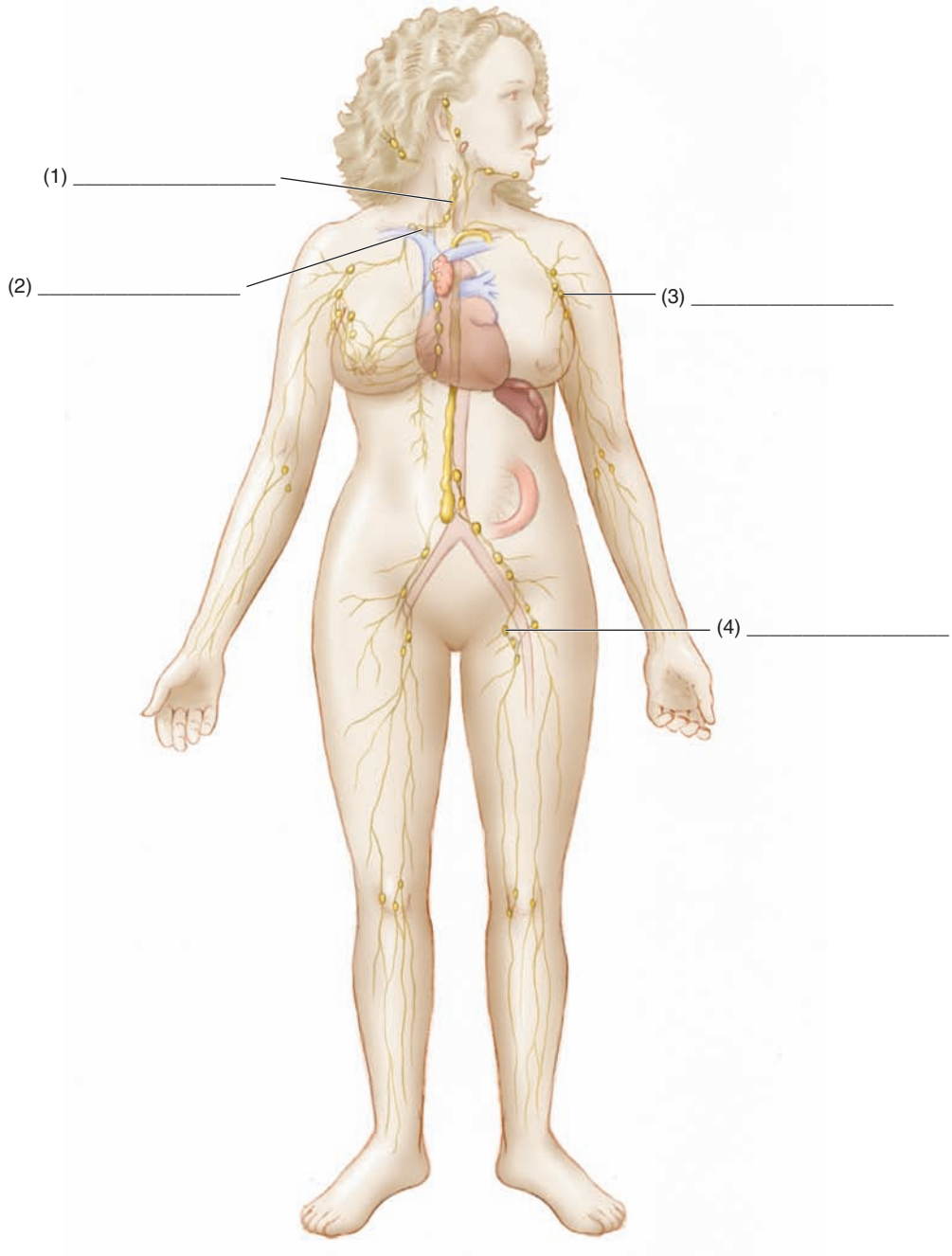
Write the correct terms on the blanks for the anatomic structures indicated.



VISUAL

Exercise 33

Write the correct terms on the blanks for the anatomic structures illustrated.



Understanding Term Structure

Exercise 34

Break the given medical term into its word parts and define each part. Then define the medical term. (Note: you may need to use word parts from other chapters.)

For example:

carditis
word parts: cardi/o / -itis
meanings: heart / inflammation
term meaning: inflammation of the heart

1. angiostenosis
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

2. phlebitis
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

3. electrocardiography
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

4. atrioventricular
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

5. tachycardia
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

6. interventricular
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

7. thrombosis
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

8. polyarteritis
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

9. thrombophlebitis
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

10. cardiomyopathy
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

11. arteriosclerosis
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

12. sphygmic
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

13. venography
word parts: _____ / _____
meanings: _____ / _____
term meaning: _____

14. bradycardia
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

15. atherosclerosis
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

16. myocardium
word parts: _____ / _____ / _____
meanings: _____ / _____ / _____
term meaning: _____

17. valvulotomy *word parts:* _____ / _____

meanings: _____ / _____

term meaning: _____

18. lymphadenopathy *word parts:* _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

19. lymphangiitis *word parts:* _____ / _____ / _____

meanings: _____ / _____ / _____

term meaning: _____

20. thrombolytic *word parts:* _____ / _____

meanings: _____ / _____

term meaning: _____

Comprehension Exercises


COMPREHENSION

Exercise 35

Fill in the blank with the correct term.

1. The _____ is located between the endocardium and epicardium.
2. The wall that separates the right and left parts of the heart is called the _____.
3. A(n) _____ is one who specializes in the study of the heart.
4. The heart valve between the right ventricle and the pulmonary artery is called the _____ valve.
5. The _____ carries oxygenated blood away from the heart.
6. When the ventricles are in the relaxation phase of the heartbeat cycle, it is referred to as _____.
7. Dilation of small terminal vessels is a condition called _____.
8. Swollen or twisted veins are referred to as _____.

9. A rhythm of rapid regular contractions of the atria is called atrial _____.

10. A rhythm of rapid irregular contractions of the ventricles is called ventricular _____.

11. _____ is the enlargement of the lower extremities due to worms blocking the lymph vessels.

12. Cramping of the legs due to lack of blood flow is called _____.

13. Lack of blood flow is a condition called _____.

14. When the heart muscle is deprived of oxygen or blood flow for a significant amount of time, tissue death may occur. Death of heart muscle is called a(n) _____.

15. Cardiac arrest is complete, sudden cessation of _____ activity.

16. Prolonged immobility during air travel can increase the risk of blood clot formation in the large veins, also called _____.

17. An early contraction of the ventricles is referred to as a(n) _____.

18. Abnormal heart sounds are also referred to as _____.

19. Patent means _____, such as in a patent ductus arteriosus where the fetal circulatory vessels fail to close.

20. C-reactive protein is a blood test used to measure the level of _____ in the body.

COMPREHENSION

Exercise 36

Write a short answer for each question.

1. Which type of drug stops the flow of blood within vessel? _____

2. The pulse is usually felt at which two points on the body? _____

_____

3. During vascular sonography, where is the catheter placed? _____

_____

4. What four substances are measured in a lipid panel? _____

_____

5. What is the difference between hypotension and hypertension? _____

_____

6. Blood pressure monitoring involves the use of what two instruments? _____

_____

7. The drug nitroglycerin is used to treat what condition? _____

8. What procedure might be used to treat fluid around the pericardium? _____

9. What physical activity does a physician perform during percussion? _____

10. Why might a SPECT scan be performed to diagnose arrhythmias? _____

_____

11. What two types of treatment might be done in cardioversion? _____

12. What is the opposite of tachycardia? _____

13. In what two situations might a defibrillation be performed? _____

_____

14. Which two procedures are done to bypass damaged coronary arteries? _____

_____

15. How does the balloon attachment function in a PTCA? _____

_____

Exercise 37

Circle the letter of the best answer in the following questions.

1. Which of the following would not be used to describe an abnormal heart beat?

   A. aneurysm
   B. dysrhythmia
   C. tachycardia
   D. palpitation

2. Using the plural form of the term, the two upper receiving chambers of the heart are called the:

   A. aorta
   B. atria
   C. arterioles
   D. atrium

3. Inflammation of the lymph vessels is referred to as:

   A. lymphangiitis
   B. lymphadenitis
   C. lymphedema
   D. lymphadenopathy

4. Edema that retains an indentation of a pressed finger is called:

   A. dissecting
   B. pitting
   C. ischemic
   D. stenotic

5. Cardiac tamponade is compression of the heart. Which procedure might be used to treat this condition?

   A. angioplasty
   B. cardioversion
   C. myocentesis
   D. pericardiocentesis

6. A patient with mitral valve stenosis might have previously had which condition?

A. rheumatic fever
B. Raynaud syndrome
C. murmur
D. peripheral arterial disease

7. Which of the following is not a diagnostic test designed to record arrhythmias?

A. lipid profile
B. graded exercise test
C. electrocardiogram
D. Holter monitor

8. ECG electrodes are usually placed at the precordial region or the:

A. abdomen
B. anterior left chest
C. anterior right chest
D. shoulders

9. CABG stands for:

A. coronary artery bypass graft
B. cardiac artery bypass graft
C. cerebrovascular accident bypass graft
D. aortocoronary bypass

10. During a PTCA, a catheter is advanced *through a vessel*. Which term pertains to the italicized phrase?

A. percutaneous
B. transluminal
C. coronary
D. angiogram

11. Which of the following is a hollow mesh tube used to keep a vessel patent?

A. pacemaker
B. valvotomy
C. defibrillation
D. stent

12. What substance is injected during a cardiac catheterization?

A. fluid
B. dye
C. blood
D. lymph

13. Which blood test diagnoses an acid-base or pH imbalance?

A. cardiac enzyme test
B. C-reactive protein
C. cardiac troponin
D. electrolyte panel

14. Filariae cause elephantiasis by blocking which type of vessels?

A. arteries
B. veins
C. lymph
D. capillaries

15. A patient who states that she can "feel her heartbeat" is experiencing:

A. palpitations
B. tachycardia
C. bradycardia
D. percussion

16. Vessels carrying blood to the heart might be tested using which diagnostic procedure?

A. arteriography
B. aortography
C. transesophageal echocardiography
D. venography

17. Which condition is not a heart rhythm or conduction disorder?

A bradycardia
B. tachycardia
C. phlebitis
D. dysrhythmia

18. Lack of blood flow to the lower limbs causes:

A. phlebitis
B. lymphangitis
C. intermittent claudication
D. thrombus

19. Which procedure treats the buildup of plaque or fatty paste inside arterial walls?

A. pericardiocentesis
B. atherectomy
C. valve replacement
D. aneurysmectomy

20. An ECG produces a recording of the heart's electrical activity in what type of format?

A. x-ray
B. three-dimensional image
C. sonogram
D. graph

Application and Analysis

CASE REPORTS


APPLICATION

Exercise 38

Read the case reports and circle the letter of your answer choice for the questions that follow.

CASE 7-1

Mr. Terrigo reported to the emergency room with complaints of chest pressure and palpitations. He has a history of a triple CABG done in March 2008 with a history of atrial fibrillation prior to surgery. He was doing well until this morning when he started feeling chest pressure and palpitations. Dr. Francis ordered an ECG that showed evidence of premature ventricular contractions and ST-segment depression. A cardiac catheterization and subsequent PTCA was performed on the stenotic right coronary artery.

1. What of the following best describes a CABG?

A. noninvasive procedure to open a clogged artery
B. surgical replacement or bypass of a damaged coronary artery
C. removal of a clot using catheterization
D. intravascular insertion of a hollow mesh tube

2. Atrial fibrillation is best described as:

A. rapid irregular rhythm of the lower heart chambers
B. rapid regular rhythm of the upper heart chambers
C. rapid irregular rhythm of the upper heart chambers
D. rapid regular rhythm of the lower heart chambers

3. Mr. Terrigo's symptoms could best be described as:

A. acute coronary syndrome
B. cardiac arrest
C. intermittent claudication
D. Raynaud disease

4. Which of the following are waves found on an ECG?

A. QRS waves
B. TUV waves
C. ultrasound waves
D. Doppler waves

5. Which of the following would typically *not* be true of stenotic coronary arteries?

A. caused by CAD
B. caused by a thrombus
C. caused by atherosclerosis
D. caused by lymphedema

6. All of the following are true for a PTCA *except*:

A. attempts to enlarge the vessel lumen
B. involves a cardiac catheter
C. involves the use of electric shock
D. uses a balloon catheter attachment

CASE 7-2

Mr. Peterson had symptoms of fatigue, cough, and a fever over the past few days. Last night he began experiencing chest pain radiating to his back, which was worse lying down and relieved by sitting up. During the precordial exam, Dr. Macken detected by auscultation a "squeaky leather" sound characteristic of a pericardial rub. An ECG and echocardiogram were performed. Mr. Peterson was diagnosed with pericarditis (Fig. 7-26) and placed on antiinflammatory drugs.

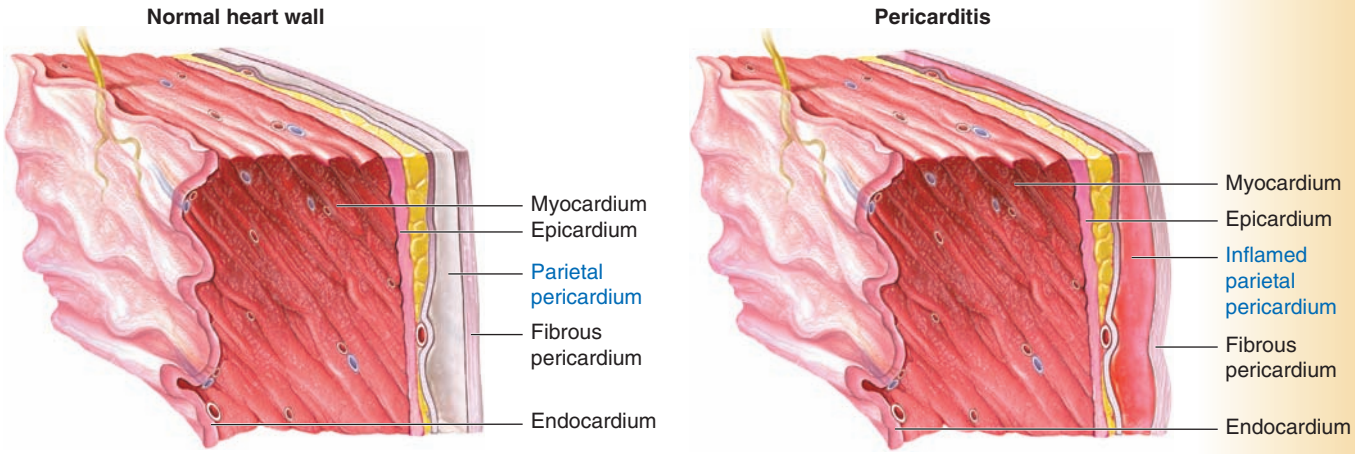


Figure 7-26 Tissue changes in pericarditis.

7. The pericardium is:

A. a membrane that protects the heart valves
B. the heart muscle
C. inside the heart
D. the sac surrounding the heart

8. Cardiac tamponade can occur if which condition progresses?

A. occlusion
B. chest pain
C. fatigue
D. pericarditis

9. Auscultation is an examination by:

A. microscope
B. viewing through a scope or tube
C. palpation
D. listening

10. The term precordial refers to the:

A. anterior right chest
B. anterior left chest
C. heart
D. lungs

11. An echocardiogram uses _____ to assess heart structure and function:

A. radiographic rays
B. electrical waves
C. ultrasound waves
D. nuclear imaging

MEDICAL RECORD ANALYSIS

MEDICAL RECORD 7-1

As a clinical medical assistant working in a cardiac clinic, you work directly with patients, measuring vital signs, assisting with examinations, and performing other procedures as directed by the physician. Last week one of the clinic's patients, Mr. Johnson, was admitted to the hospital for chest pain. He has now been discharged and is returning to the clinic. You are reviewing the history and physical from his hospital admission.

Medical Record

HISTORY AND PHYSICAL

HISTORY

CHIEF COMPLAINT: Chest pain.

HISTORY OF PRESENT ILLNESS: Mr. Johnson presents here today with complaints of chest pressure with pain radiating to left arm and jaw. Onset 4 days ago. These symptoms usually begin when he has been jogging for 1 to 2 miles and get worse when he runs uphill. The pain subsides if he slows down or rests. He has admitted to diaphoresis and shortness of breath during these episodes. He exercises five to seven times per week, usually running or jogging 3–5 miles per day. He is not on any medications at this time other than an over-the-counter daily vitamin.

PAST MEDICAL HISTORY: His family history is positive for heart disease because his father died at the age of 61 from a myocardial infarction.

SOCIAL HISTORY: Nondrinker, nonsmoker.

OCCUPATIONAL HISTORY: Has been working at the executive level for a land development company for 27 years.

REVIEW OF SYSTEMS: On review of systems, his medical history is unremarkable. He denies any cognitive, visual, auditory, musculoskeletal, digestive, or urinary problems.

PHYSICAL EXAM

GENERAL APPEARANCE: On examination this patient is a well-developed, well-nourished 57-year-old man in no acute distress.

VITAL SIGNS: BP 122/78, P 59 reg, R 12, T 98.8 Wt 190# Ht 6'1"

HEENT: Pupils are equal, round, and reactive to light and accommodation.

NECK: The neck is supple. Carotid pulses are strong. No masses or tenderness.

LUNGS: Clear to percussion and auscultation. Breath sounds are easily heard and normal.

HEART: The heart rate and rhythm are regular. Pulse is 59. No murmurs, gallops, or rubs.

EXTREMITIES: No clubbing, cyanosis, or edema.

DIAGNOSTICS: Chest x-ray: suggestive of slight left ventricular enlargement, ECG: positive for ST-segment depression, occasional PVC.

ASSESSMENT

IMPRESSION: Rule out ischemia, rule out cardiovascular disease

PLAN: CBC, chemistry profile, echocardiogram, and GXT today. If positive, schedule cardiac catheterization within a week. Instructions were given to patient to discontinue jogging until further notice. Patient was given a sample of sublingual nitroglycerin and instructed on its use.

APPLICATION

Exercise 39

Write the appropriate medical terms used in this medical record on the blanks after their meanings. Note that not all the terms appear in the chapter, but you should be able to identify these terms based on word parts that are included in this chapter.

1. pertaining to the heart and vessels _____

2. ultrasound recording of heart structure _____

3. GXT is an abbreviation for _____

4. death of heart tissue _____

5. pertaining to a ventricle _____

6. abnormal condition characterized by purple or blue discoloration _____

Bonus Questions

Atherosclerosis is a form of arteriosclerosis. These two medical terms sound similar but have two different meanings. Write in the correct term after each meaning:

7. hardening of the arteries _____

8. hardening of vessels due to plaque buildup _____

MEDICAL RECORD 7-2

A massage therapist uses touch to assist patients with various conditions.

You are a massage therapist seeing Mr. Vanden Berg for the first time for treatment of his lymphedema. He and his wife were missionaries for the past 10 years in Ethiopia, Africa, where he contracted filarial elephantiasis. He has brought his medical record from his last physician visit.

Medical Record

FOLLOW-UP FOR FILARIAL ELEPHANTIASIS

SUBJECTIVE: Patient returns for follow-up after starting chemotherapy for his condition. He complains of continued edema in both of his lower extremities. This is probably due to lymphangiitis and the interrupted flow of lymph and fluid buildup. He has symptoms of chills, fever, and general malaise, which are all to be expected for this stage of his illness.

OBJECTIVE: Lab results confirm the presence of a bacterial infection from adult filarial worms. His temperature is 100.5°F today. His weight has stayed around 210 lb, which is up 2 lb from last visit. On palpation of lower extremities, there is pitting edema and the right lower leg is erythematic.

ASSESSMENT:

1. Filarial elephantiasis
2. Lymphedema
3. Lymphangiitis
4. Fever
5. General malaise

PLAN:

1. Review appropriate hygiene plan
2. Continue with chemotherapy as prescribed
3. Begin massage therapy as tolerated for lymphedema
4. Follow up in 1 month to monitor signs of lymphadenitis or lymphadenopathy.

APPLICATION

Exercise 40

Read the medical report and circle the letter of your answer choice for the following questions. Note: Although some of the medical terms in these questions do not appear in this chapter, you should understand them from their word parts.

1. What is causing Mr. Vanden Berg's elephantiasis?

A. red clay soil
B. filariae
C. food poisoning
D. heat

2. What is lymphedema?

A. infection of a lymph node
B. inflammation of a lymph node
C. swelling due to blocked blood vessels
D. swelling due to blocked lymph vessels and fluid buildup

3. What are filariae?

A. worms
B. bacteria
C. germs
D. fleas

4. What is lymphangiitis?

A. infection of a lymph vessel
B. inflammation of a lymph node
C. inflammation of a lymph vessel
D. malignant tumor of lymph tissue

5. Which of the following statements about elephantiasis is *not* true?

A. it occurs most commonly in South America
B. filariae get into a body via mosquito bites
C. filariae block lymph vessels
D. lymphedema and lymphangiitis are common symptoms

Bonus Question

6. Although this chapter does not describe this term, what does the word *erythema* mean?

_____

Pronunciation and Spelling

AUDITORY

Exercise 41

Review the Chapter 7 terms in the Dictionary/Audio Glossary in the Student Resources and practice pronouncing each term, referring to the pronunciation guide as needed.

SPELLING

Exercise 42

Circle the correct spelling of each term.

1.	aneurism	anyerism	aneurysm
2.	lymphangeitis	lymphangiitis	lymphanitis
3.	valvoplasty	valvuplasty	valvloplasty

4.	telangietasia	telengiectasia	telangiectasia
5.	Dopplier	Dopler	Doppler
6.	sphygmomanometer	sphymonometer	sphymomenometer
7.	vasoconstricter	vasoconstrictor	vasoconstitor
8.	diastoli	diestole	diastole
9.	ascultation	ausultation	auscultation
10.	elephantiasis	elephanitis	elephantiosis
11.	paroxysmal	paroxismal	paroximal
12.	ischimic	iskemic	ischemic
13.	dysrhythmia	dysrrythmia	dysrythmia
14.	arrhythmia	arrythmia	arythmia
15.	claudication	claudacation	claudocation

Media Connection

Exercise 43

Complete each of the following activities available with the Student Resources. Check off each activity as you complete it, and record your score for the Chapter Quiz in the space provided.

Chapter Exercises

____ Flash Cards

____ Concentration

____ Abbreviation Match-Up

____ Roboterms

____ Word Builder

____ Fill the Gap

____ Break It Down

____ True/False Body Building

____ Quiz Show

____ Complete the Case

____  Medical Record Review

____  Image Matching

____  Look and Label

____  Spelling Bee

____ **Chapter Quiz** *Score:* _____%

Additional Resources

____  Animation: *Cardiac Cycle*

____  Animation: *Hypertension*

____  Dictionary/Audio Glossary

____ Health Professions Careers: Clinical Medical Assistant

____ Health Professions Careers: Massage Therapist