

**Medical Terminology for Medical Assistants
Part III: The Respiratory System**

Overview of Structures, Combining Forms, and Functions of the Respiratory System

Major Structures	Related Combining Forms	Primary Functions
Nose	nas/o	Exchanges air during inhaling and exhaling; warms, moisturizes, and filters inhaled air.
Sinuses	sinus/o	Provide mucus, make bone of skull lighter, aids in sound production.
Pharynx	pharyng/o	Transports air back and forth between the nose and the trachea.
Larynx	laryng/o	Makes speech possible.
Epiglottis	epiglott/o	Closes off the trachea during swallowing.
Trachea	trache/o	Transports air back and forth between the pharynx and the bronchi.
Bronchi	bronch/o, bronchi/o	Transports air from the trachea into the lungs.
Alveoli	alveoli/o	Air sacs that exchange gases with the pulmonary capillary blood.
Lungs	pneum/o, pneumon/o, pulmon/o	Bring oxygen into the body and remove carbon dioxide and some water waste from the body.

Functions of the Respiratory System

The functions of the respiratory system are to:

- Bring oxygen-rich air into the body for delivery to the blood cells. The blood then delivers oxygen to body tissues.
- Expel waste products (carbon dioxide and some water waste) returned to the lungs by the blood.
- Produce the airflow through the larynx that makes speech possible.

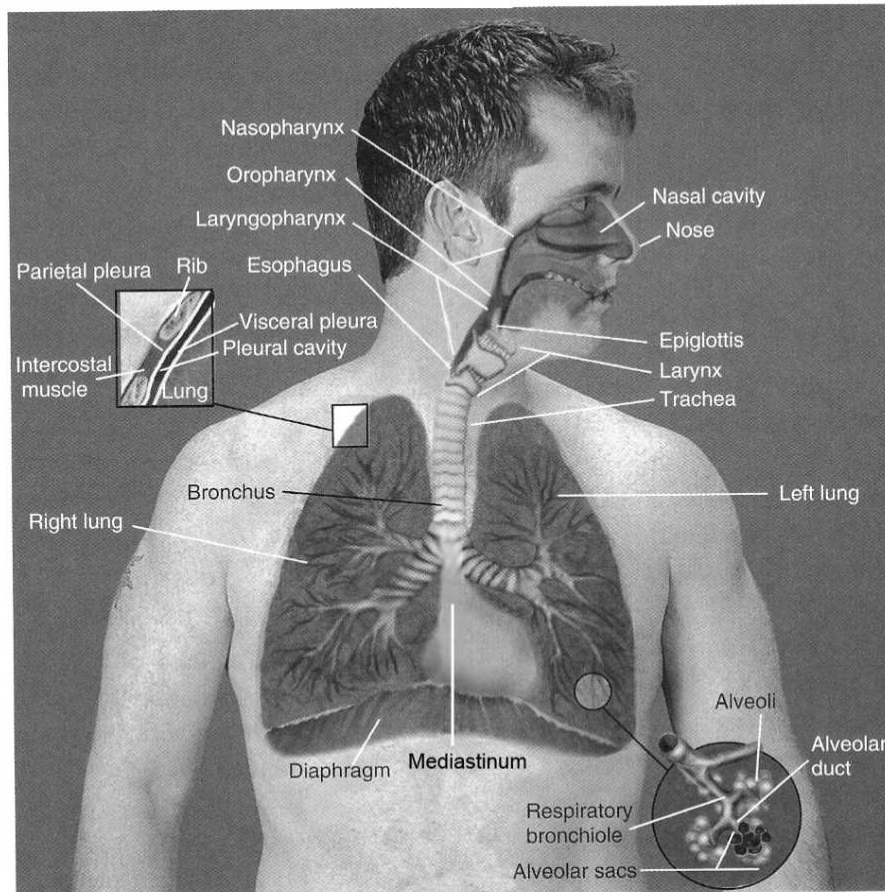


FIGURE 7.1 Structures of the respiratory system.

Structures of the Respiratory System

For descriptive purposes, the respiratory system is divided into upper and lower respiratory tracts.

- The **upper respiratory tract** consists of the nose, mouth, pharynx, epiglottis, larynx, and trachea.
- The **lower respiratory tract** consists of the bronchial tree and lungs. These structures are protected within thoracic cavity.

The Nose

Air enters the body through the nose and passes through the nasal cavity, which is the interior portion of the nose.

- The **nasal septum** (NAY-zal SEP-tum) is a wall of cartilage that divides the nose into two equal sections. A septum is a wall that separates two chambers.
- **Cilia** (SIL-ee-ah), the thin hairs located just inside the nostrils, filter incoming air to remove debris.
- **Mucous membranes** (MYOU-kus) are the specialized tissues that line the respiratory, digestive, reproductive, and urinary systems.
- **Mucus** (MYOU-kus), which is secreted by the mucous membranes, protects and lubricates these tissues. In the nose mucus helps to moisten, warm, and filter the air as it enters. Notice the different spellings. Mucous is the name of the tissue; mucus is the secretion that flows from the tissue.
- The **olfactory receptors** (ol-FACK-toh-ree) are nerve endings that act as the receptors for the sense of smell; they are also important to the sense of taste. These receptors are located in the mucous membrane in the upper part of the nasal cavity.

The Pharynx

After passing through the nasal cavity, the air reaches the **pharynx** (FAR-inks), which is commonly known as the throat. The pharynx is made up of three divisions.

The Larynx

The **larynx** (LAR-inks), also known as the **voice box**, is a triangular chamber located between the pharynx and the trachea.

Protective Swallowing Mechanics

The respiratory and digestive systems share part of the pharynx. During swallowing, there is the risk of a blocked airway or pneumonia caused by food or water entering the lungs instead of traveling into the esophagus. Two protective mechanisms act automatically during swallowing to ensure that *only* air goes into the lungs.

- During swallowing, the soft palate, which is the muscular posterior portion of the roof of the mouth, moves up and backward to close off the nasopharynx. This movement prevents food or liquid from going up into the nose.
- At the same time, the **epiglottis** (ep-ih-GLOT-is), which is a lid like structure located at the base of the tongue, swings downward and closes off the laryngopharynx so food does not enter the trachea and the lungs.

The Trachea

Air passes from the larynx into the **trachea** (TRAY-kee-ah), the airway into the lungs commonly known as the windpipe.

The Alveoli

Alveoli (al-VEE-oh-lye), also known as **air sacs**, are the very small grape-like clusters found at the end of each bronchiole (singular, **alveolus**). Each lung contains millions of alveoli, which are filled with air from the bronchioles.

The **lungs**, which are the organs of respiration, are divided into lobes.

- The **right lung** has three lobes: the superior, middle, and inferior.
- The **left lung** has only two lobes: the superior and inferior. It is slightly smaller than the right lung because of the space taken up by the heart.

The **diaphragm** (**DYE**-ah-**fram**) is the muscle that separates the thoracic cavity from the abdomen. It is the contraction and relaxation of this muscle that makes breathing possible.

Respiration is the exchange of the gases oxygen and carbon dioxide that is essential to life. This occurs in the lungs as external respiration and on a cellular level as internal respiration.

External respiration, commonly known as **breathing**, is the act of bringing air into and out of the lungs. A single respiration consists of one inhalation and one exhalation. The **intercostal muscles** (inter-**KOSS**-tul) move the rib cage during breathing (**inter-** means between, **cost** means ribs, and **-al** means pertaining to).

Internal respiration is the exchange of gases within the cells of all the body organs and tissues. In this process, oxygen passes from the bloodstream into the tissue cells. At the same time, carbon dioxide passes from the tissue cells into the bloodstream.

Upper Respiratory Diseases

- **Croup (KROOP)** is an acute respiratory syndrome, in children and infants characterized by obstruction of the larynx, hoarseness, and a barking cough.
- **Influenza (in-flew-EN-zah)**, also known as flu, is an acute, highly contagious viral respiratory infection that is spread by respiratory droplets and occurs most commonly in epidemics during the colder months. There are many strains of the influenza virus, some strains can be prevented by annual immunization.
- **Pertussis (per-TUS-is)**, also known as **whooping cough**, is a contagious bacterial infection of the upper respiratory tract that is characterized by recurrent bouts of a paroxysmal cough, followed by breathlessness, and a noisy inspiration. Pertussis can be prevented through immunization. *Paroxysmal* means sudden or spasm-like.
- **Bronchitis (brong-KYE-tis)** is an inflammation of the bronchial walls (**bronch** means bronchus and **-itis** means inflammation). Bronchitis is usually caused by an infection; however, it also can be caused by irritants such as smoking.

Pleural Cavity

- **Pleurisy (PLOOR-ih-see)**, also known as **pleuritis**, is an inflammation of the pleura that produces sharp chest pain with each breath. Pleurisy can be caused by influenza or by damage to the lung beneath the pleura (**pleur** means pleura and **-isy** is a noun ending).

Lungs

- **Severe acute respiratory syndrome (SARS)**, which first appeared in China in 2003, is a sometimes fatal viral respiratory disorder that begins with a fever and progresses to a dry nonproductive cough and severe breathing difficulty.
- **Acute respiratory distress syndrome (ARDS)** is not a specific disease. Instead it is a form of sudden onset severe lung dysfunction affecting both lungs that makes breathing

extremely difficult. ARDS is caused by trauma (injury), sepsis (systemic infection), diffuse pneumonia, or shock.

Tuberculosis (too-ber-kew-LOH-sis), which is an infectious disease caused by *Mycobacterium tuberculosis*, usually attacks the lungs; however, it can also affect other parts of the body. A healthy individual can carry TB without getting the disease. TB occurs most commonly in individuals whose immune systems are weakened by another condition.

Pneumonia (new-MOH-nee-ah) is a serious infection or inflammation of the lungs in which the smallest bronchioles and alveoli fill with pus and other liquid (**pneumon** means lung and **-ia** means abnormal condition). There are two types of pneumonia that are named for the parts of the lungs affected:

- **Bronchopneumonia** (brong-koh-new-MOH-nee-ah) is the form of pneumonia that affects patches of the bronchioles throughout both lungs (**bronch/o** means bronchial tubes, **pneumon** means lung, and **-ia** means abnormal condition). This form of pneumonia is a danger to the elderly, the very young, and the chronically ill.
- **Lobar pneumonia** affects one or more sections, or lobes, of a lung. Double pneumonia is lobar pneumonia involving both lungs, and is usually a form of bacterial pneumonia.

More than 30 different causes of pneumonia have been identified. These are primarily bacteria, viruses, infectious agents such as fungi, and various chemicals.

- **Bacterial pneumonia**, which is often caused by *Streptococcus pneumoniae*, is the only form of pneumonia that can be prevented through vaccination.
- **Viral pneumonia**, which is caused by several different types of viruses, accounts for approximately half of all pneumonias.

Breathing Disorders

- **Eupnea** (youp-NEE-ah) is easy or normal breathing (**eu-** means good and **-pnea** means breathing). This is the baseline for judging some breathing disorders. Compare with *apnea*.
- **Tachypnea** (tack-ihp-NEE-ah) is an abnormally rapid rate of respiration usually of more than 20 breaths per minute (**tachy-** means rapid and **-pnea** means breathing). Compare with *bradypnea*.
- **Hyperventilation** (high-per-ven-tih-LAY-shun) occurs when an abnormally rapid rate of deep respiration results in a change in blood gas levels due to a decrease in carbon dioxide at the cellular level (**hyper-** means excessive and **-ventilation** means breathing). Compare with *hyperpnea*.
- **Bradypnea** (brad-ihp-NEE-ah or brad-ee-NEE-ah) is an abnormally slow rate of respiration, usually of less than 10 breaths per minute (**brady-** means slow and **-pnea** means breathing). Compare with *tachypnea*.
- **Apnea** (AP-nee-ah or ap-NEE-ah) is the absence of spontaneous respiration (**a-** means without and **-pnea** means breathing). Compare with *eupnea*.
- **Cheyne-Stokes respiration** (CHAYN-STOHKS) is a pattern of alternating periods of hypopnea (slow breathing) or apnea (the absence of breathing), followed by hyperpnea (rapid breathing).

- **Dyspnea** (DISP-nee-ah), also known as **shortness of breath**, is difficult or labored breathing (**dys-** means painful and **-pnea** means breathing). Shortness of breath is frequently one of the first symptoms of heart failure. It can also be caused by strenuous physical exertion or can be due to lung damage that produces dyspnea even at rest.
- **Asphyxiation** (ass-fick-see-AY-shun), also known as suffocation, is any interruption of breathing resulting in asphyxia. Asphyxiation can be caused by an airway obstruction, drowning, smothering, choking, or inhaling gases such as carbon monoxide.
- **Cyanosis** (sigh-ah-NOH-sis) is a bluish discoloration of the skin caused by a lack of adequate oxygen (**cyan** means blue and **-osis** means abnormal condition).

Diagnostic Procedures of the Respiratory System

- A **pulse oximeter** (ock-SIM-eh-ter) is an external monitor placed on the patient's finger or earlobe. The sensor measures the oxygen saturation level in the blood (**ox/i** means oxygen and **-meter** means to measure). In a normal reading, 95 to 100 percent of the blood is saturated by oxygen.
- **Spirometry** (spy-ROM-eh-tree) is a noninvasive test in which a patient breathes into a device that measures airflow, the length of time of each breath, and air volume (**spir/o** means to breathe and **-metry** means to measure).
- A **peak flow meter** is a handheld device often used to test those with asthma to measure how quickly they can expel air.
- **Phlegm** (FLEM) is thick mucus secreted by the tissues lining the respiratory passages. When phlegm is ejected through the mouth, it is called *sputum*.

Treatment Procedures of the Respiratory System

- A **bronchodilator** (brong-koh-dye-LAY-tor) is an agent that expands the opening of the passages into the lungs. At the first sign of an asthma attack, the patient uses a metered dose inhaler to self administer the bronchodilator.
- A **metered dose inhaler** (MDI) mixes a single dose of the medication with a puff of air and pushes it into the mouth via a chemical propellant. Compare with *nebulizer*.
- A **nebulizer** (NEB-you-lye-zer) dispenses larger doses of medication in the form of a mist that is inhaled via a face mask or mouthpiece. Compare with *metered dose inhaler*.
- An **antitussive** (an-tih-TUSS-iv) is administered to prevent or relieve coughing (**anti-** means against, **tuss** means cough, and **-ive** means performs).

Trachea

- A **tracheotomy** (tray-kee-OT-oh-mee) is usually an emergency procedure in which an incision is made into the trachea to gain access to the airway below a blockage (**trache** means trachea and **-otomy** means surgical incision). This opening is usually temporary.

Respiratory Therapy

- **Supplemental oxygen** can be administered through a nasal cannula, using either a rebreather or non-rebreather mask. A nasal cannula is a small tube that divides into two nasal prongs. In a rebreather mask, the exhaled breath is partially reused. A non-rebreather mask allows higher levels of oxygen to be added to the air taken in by the patient.

- **Postural drainage** is a procedure in which the patient is tilted head or chest downward to allow gravity to help drain secretions from the lungs. It is used with cystic fibrosis patients as well as those who have trouble coughing up sputum, such as post surgical patients.
- A **ventilator** is a mechanical device for artificial ventilation of the lungs that is used to replace or supplement the patient's natural breathing function. The ventilator forces air into the lungs; exhalation takes place passively as the lungs contract.
- A **respirator** is a machine used for prolonged artificial respiration. For example, when a spinal cord injury destroys the natural breathing mechanism, the patient can continue to breathe through the use of a respirator. Note that the term *respirator* refers to any device controlling the quality of the air a person inhales, and therefore it can also mean a disposable dust mask or a piece of scuba diving equipment.

Abbreviations Related to the Respiratory System

acute respiratory distress syndrome = ARDS	ARDS = acute respiratory distress syndrome
asthma, asthmatic = AA	AA = asthma, asthmatic
bronchitis = BR, br	BR, br = bronchitis
bronchodilator = BD	BD = bronchodilator
Cheyne-Stokes breathing = CSB	CSB = Cheyne-Stokes breathing
chronic obstructive pulmonary disease = COPD	COPD = chronic obstructive pulmonary disease
cystic fibrosis = CF	CF = cystic fibrosis
diphtheria = diph	diph = diphtheria
emphysema = EMP	EMP = emphysema
hyperventilation = HVT	HVT = hyperventilation
laryngitis, laryngoscopy = laryn	laryn = laryngitis, laryngoscopy
lower respiratory tract = LRT	LRT = lower respiratory tract
pneumonia = PN, pn, PNA, pneu, pneum	PN, pn, PNA, pneu, pneum = pneumonia
pulmonary function test = PFT	PFT = pulmonary function test
respiration = R, Resp	R, Resp = respiration
respiratory failure = RF	RF = respiratory failure

respiratory rate = RR	RR = respiratory rate
severe acute respiratory syndrome = SARS	SARS = severe acute respiratory syndrome
sudden infant death syndrome = SIDS	SIDS = sudden infant death syndrome
trachea = trach	trach = trachea
tuberculosis = TB	TB = tuberculosis
tuberculin skin testing = TST	TST = tuberculin skin testing
upper respiratory infection = URI	URI = upper respiratory infection
upper respiratory tract = URT	URT = upper respiratory tract

Matching Word Parts 1

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
3.1 enlargement	_____	atel/o
3.2 voice box	_____	bronch/o
3.3 windpipe	_____	cyan/o
3.4 blue	_____	-ectasis
3.5 incomplete	_____	laryng/o

Matching Word Parts 2

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
3.6 lung	_____	ox/o
3.7 oxygen	_____	pharyng/o
3.8 multilayered membrane	_____	phon/o
3.9 throat	_____	pleur/o

3.10 voice or sound _____ pneum/o

Matching Word Parts 3

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
3.11 windpipe	_____	-pnea
3.12 rapid	_____	pulmon/o
3.13 lung	_____	tachy-
3.14 chest	_____	-thorax
3.15 breathing	_____	trache/o

Abbreviation Identification

In the space provided, write the words that each abbreviation stands for.

3.16 ARDS	_____
3.17 COPD	_____
3.18 SARS	_____
3.19 SIDS	_____
3.20 URI	_____

True / False

If the statement is true, write T on the line. If the statement is false, write F on the line.

- 3.21. _____ A pulse oximeter is an internal monitor that measures the amount of oxygenated blood in the circulatory system.
- 3.22. _____ In atelectasis the lung fails to expand because air cannot pass beyond the bronchioles that are blocked by secretions.
- 3.23. _____ Croup is an allergic reaction to airborne allergens.

3.24. _____ Hypoxemia is the condition of below normal oxygenation of arterial blood.

3.25. _____ Emphysema is a chronic obstructive pulmonary disease.

Challenge Word Building

These terms are *not* found in this chapter; however, they are made up of the following familiar word parts. You may want to look in the textbook glossary or use a medical dictionary to check your answers.

bronch/o **-itis**

epiglott/o **-ologist**

laryng/o **-plasty**

pharyng/o **-plegia**

pneumon/o **-rrhagia**

trache/o **-rrhea**

-scopy

-stenosis

3.26. The term meaning an abnormal discharge from the pharynx is _____.

3.27. The term meaning inflammation of the lungs is _____.

3.28. The term meaning a specialist in the study of the larynx is a/an _____.

3.29. The term meaning bleeding from the larynx is _____.

3.30. The term meaning inflammation of both the pharynx and the larynx is _____.

3.31. The term meaning the abnormal narrowing of the lumen of the trachea is _____.

3.32. The term meaning the surgical repair of a bronchial defect is _____.

3.33. The term meaning an inflammation of the epiglottis is _____.

3.34. The term meaning the inspection of both the trachea and bronchi through a bronchoscope is _____.

3.35. The term meaning paralysis of the walls of the bronchi is _____.

Medical Terminology for Medical Assistants
Part IV: The Muscular System

Overview of Structures, Combining Forms, and Functions of the Muscular System

Major Structures	Related Combining Forms	Primary Functions
Muscles	my/o, myos/o	Make body movement possible, hold body erect, move body fluids, and produce body heat.
Fascia	fasci/o	Cover, support, and separate muscles.
Tendons	ten/o, tend/o, tendin/o	Attach muscles to bones.

Tendons

- A **tendon** is a narrow band of non-elastic, dense, fibrous connective tissue that attaches a muscle to a bone.
- For example, the **Achilles tendon** attaches the gastrocnemius muscle (the major muscle of the calf of the leg) to the heel bone.
- Be careful not to confuse tendons with ligaments. Ligaments connect bone to bone.

Skeletal Muscles

- **Skeletal muscles** are attached to the bones of the skeleton. These muscles make body motions, such as walking, possible.
- Skeletal muscles are also known as **striated muscles** (**STRYE**-ayt-ed) because the dark and light bands in the muscle fibers create a striped appearance. Striated means striped.
- Skeletal muscles are also known as **voluntary muscles** because we have conscious (voluntary) control over these muscles.

Myocardial Muscle

- **Myocardial muscle** (**my**-oh-**KAR**-dee-al), also known as **cardiac muscle**, forms the muscular wall of the heart (**my/o** means muscle, **cardi** means heart, and **-al** means pertaining to).
- This muscle is often referred to as the **myocardium** (**my**-oh-**KAR**-dee-urn) (**my/o** means muscle, **cardi** means heart, and **-um** is a noun ending).
- The **myocardium** is specialized tissue that is like striated muscle in appearance but similar to smooth muscle in its action. It is the contraction and relaxation of this muscle that causes the heartbeat.

Characteristics of Muscles

Kinesiology (kih-**nee**-see-**OL**-oh-jee) is the study of muscular activity and the resulting movement of body parts (**kinesi** means movement and **-ology** means the study of).

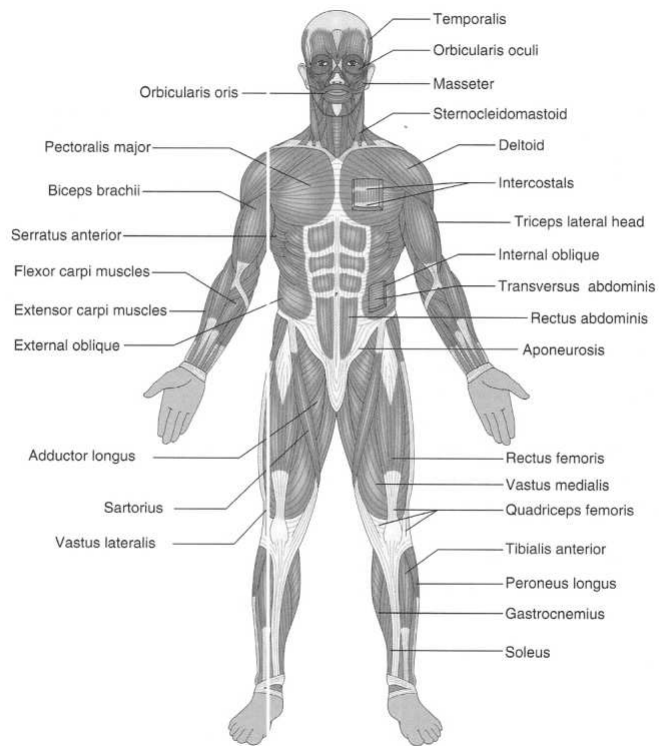


FIGURE 4.9 Major muscles of body (anterior view).

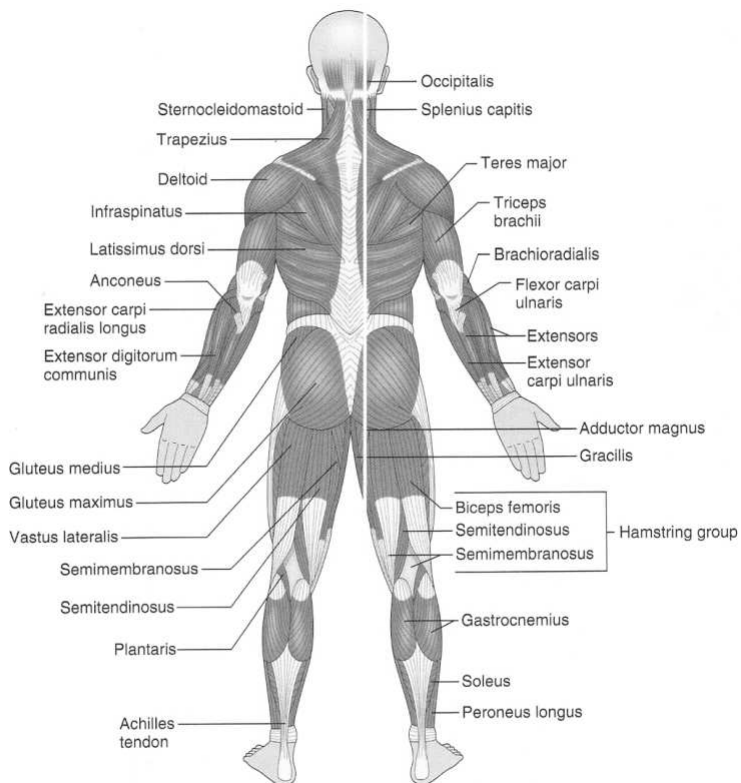


FIGURE 4.10 Major muscles of body (posterior view).

Contraction and Relaxation

- Muscles are made up of specialized cells that can change length or shape by contracting and relaxing. These contrasting actions make motion possible.
- **Contraction** is the tightening of a muscle. As the muscle contracts, it becomes shorter and thicker, causing the belly (center) of the muscle to enlarge.
- **Relaxation** occurs when a muscle returns to its original form. As the muscle relaxes it becomes longer and thinner and its belly is no longer enlarged.
- When one muscle of a pair contracts, the other usually relaxes.
- **Muscle tone**, also known as **tonus** (**TOH**-nus), is the normal state of balanced muscle tension (contraction and relaxation) that makes normal posture and coordination possible.

Muscles Named for Fiber Direction

Some muscles are named for the direction in which their fibers run.

- **Rectus** (**RECK**-tus) means straight. For example, **rectus abdominis** is an abdominal muscle in straight alignment with the vertical axis of the body.
- **Oblique** (oh-**BLEEK**) means slanted or at an angle. For example, the **external abdominal oblique** is an abdominal muscle that slants outward, at an oblique angle, away from the midline.
- **Transverse** (trans-**VERSE**) means in a crosswise direction. For example, the **transverse abdominis** is an abdominal muscle with a crosswise alignment.
- A **sphincter** (**SFINK**-ter) is a ringlike muscle that tightly constricts the opening of a passageway. A sphincter is named for the passage involved. For example, the **anal sphincter** closes the anus.

Fibers, Fascia, and Tendons

- **Fasciitis** (**fas**-ee-**EYE**-tis) is inflammation of a fascia (**fasci** means fascia and **-itis** means inflammation). Note: This term is spelled correctly with a double *i*; however, *fascitis* is also an acceptable spelling.
- **Tenodynia** (**ten**-oh-**DIN**-ee-ah) is pain in a tendon (**ten/o** means tendon and **-dynia** means pain).
- **Tendonitis** (**ten**-doh-**NIGH**-itis) is an inflammation of the tendons caused by excessive or unusual use of the joint (**tendon** means tendon and **-itis** means inflammation). The terms *tendinitis*, *tenonitis*, and *tenonitis* all have the same meaning.

Muscles

- An **adhesion** (ad-**HEE**-zhun) is a band of fibrous tissue that holds structures together abnormally. Adhesions can form in muscles or internal organs as the result of an injury or surgery.
- **Atrophy** (**AT**-roh-fee) means weakness or wearing away of body tissues and structures. **Muscle atrophy** can be caused by pathology or by disuse of the muscle over a long period of time.
- **Myalgia** (my-**AL**-jee-ah) is muscle tenderness or pain (**my** means muscle and **-algia** means pain).

- **Myolysis** (my-**OL**-ih-sis) is the degeneration of muscle tissue (**my/o** means muscle and **-lysis** means destruction or breaking down in disease). *Degeneration* means deterioration or breaking down.
- **Myomalacia** (my-oh-mah-**LAY**-shee-ah) is abnormal softening of muscle tissue (**my/o** means muscle and **-malacia** means abnormal softening). Compare with *myosclerosis*.
- **Myorrhexis** (my-oh-**RECK**-sis) is the rupture of a muscle (**my/o** means muscle and **rrhexis** means rupture).
- **Myosclerosis** (my-oh-skleh-**ROH**-sis) is abnormal hardening of muscle tissue (**my/o** means muscle and **-sclerosis** means abnormal hardening). Compare with *myomalacia*.
- **Myositis** (my-oh-**SIGH**-tis) is the inflammation of a skeletal muscle (**myos** means muscle and **-itis** means inflammation).
- **Polymyositis** (pol-ee-my-oh-**SIGH**-tis) is the inflammation of several skeletal muscles at the same time (**poly-** means many, **myos** means muscle, and **-itis** means inflammation).
- **Sarcopenia** (sar-koh-**PEE**-nee-ah) is the age-related reduction in skeletal muscle mass in the elderly (**sare/o** means flesh and **-penia** means deficiency). A weight or resistance training program can significantly improve muscle mass and slow, but not stop, this process.

Hernias

- A **hernia** (**HER**-nee-ah) is the protrusion of a part or structure through the tissues normally containing it.
- A **myocele** (**MY**-oh-seel) is the protrusion of a muscle through its ruptured sheath or fascia (**my/o** means muscle and **-cele** means a hernia).

Muscular Dystrophy

Muscular dystrophy (**DIS**-troh-fee) is a group of inherited muscle disorders that cause muscle weakness without affecting the nervous system. There are more than 20 specific genetic disorders considered to be MD. The two most common forms are Duchenne's muscular dystrophy and Becker's muscular dystrophy.

TREATMENT PROCEDURES OF THE MUSCULAR SYSTEM

Medications

- An **anti-inflammatory**, such as ibuprofen (Motrin) relieves inflammation. It also acts as an analgesic.
- An **anticholinergic drug** (**an-tih-koh-lin-ER-jik**), also known as an antispasmodic, is administered to control spasmodic activity of smooth muscles such as those of the intestine.
- A **muscle relaxant**, such as diazepam (Valium), acts on the central nervous system to relax the muscle tone and relieve spasms of skeletal muscles. Many of these medications also relieve anxiety and tension.

Physical Therapy

Physical therapy (**PT**) is treatment to prevent disability or to restore functioning through the use of exercise, heat, massage, and other methods to improve circulation, flexibility, and muscle strength.

Abbreviations Related to the Muscular System

Achilles tendon = AT

AT = Achilles tendon

atrophy = atr

atr = atrophy

carpal tunnel syndrome = CTS

CTS = carpal tunnel syndrome

muscular dystrophy = MD

MD = muscular dystrophy

neuromuscular = nm

nm = neuromuscular

physical therapy = PT

PT = physical therapy

repetitive motion disorder = RMD

RMD = repetitive motion disorder

repetitive stress disorder = RSD

RSD = repetitive stress disorder

spinal cord injury = SCI

SCI = spinal cord injury

Matching Word Parts 1

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
4.1 movement, motion	_____	-cele
4.2 hernia, swelling	_____	fasci/o
4.3 fibrous connective tissue	_____	fibr/o
4.4 fascia	_____	-ia
4.5 condition, state of	_____	kinesi/o

Matching Word Parts 2

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
4.6 tone, tension, stretching	_____	my/o
4.7 tendon	_____	-rrhexis

4.8	rupture	_____	tax/o
4.9	muscle	_____	tend/o
4.10	coordination	_____	ton/o

Matching Muscle Directions and Positions

Write the correct answer in the middle column.

	Definition	Correct Answer	Possible Answers
4.11	cross-wise	_____	lateralis
4.12	ring-like	_____	oblique
4.13	slanted at an angle	_____	rectus
4.14	straight	_____	sphincter
4.15	toward the side	_____	transverse

Challenge Word Building

These terms are *not* found in this chapter; however, they are made up of the following familiar word parts. You may want to look in the textbook glossary or use a medical dictionary to check your answers.

poly-	card/o	-algia
	fasci/o	-desis
	herni/o	-ectomy
	my/o	-itis
	sphincter/o	-necrosis
		-otomy
		-pathy
		-rrhaphy

4.16. The term meaning any abnormal condition of skeletal muscles is _____.

- 4.17. The term meaning pain in several muscle groups is _____.
- 4.18. The term meaning the death of individual muscle fibers is _____.
- 4.19. The term meaning the surgical suturing of torn fascia is _____.
- 4.20. The term meaning a surgical incision into a muscle is a/an _____.
- 4.21. The term meaning suturing fascia to a skeletal attachment is _____.
- 4.22. The term meaning inflammation of the muscle of the heart is _____.
- 4.23. The term meaning the surgical removal of fascia is a/an _____.
- 4.24. The term meaning the surgical suturing of a defect in a muscular wall, such as the repair of a hernia, is a/an _____.
- 4.25. The term meaning an incision into a sphincter muscle is a/an _____.

**Medical Terminology for Medical Assistants
Part V: The Integumentary System**

Overview of Structures, Combining Forms, and Functions of the Integumentary System

Major Structures	Related Combining Forms	Primary Functions
Skin	cutane/o, dermat/o, derm/o	Intact skin is the first line of defense for the immune system. Skin also waterproofs the body and is the major receptor for the sense of touch.
Sebaceous Glands	seb/o	Secrete sebum (oil) to lubricate the skin and discourage the growth of bacteria on the skin.
Sweat Glands	hidr/o	Secrete sweat to regulate body temperature and water content and excrete some metabolic waste.
Hair	pil/i, pil/o	Aids in controlling the loss of body heat.
Nails	onych/o, ungu/o	Protect the dorsal surface of the last bone of each finger and toe.

Functions of the Integumentary System

The **integumentary system** (in-teg-you-MEN-tah-ree), which makes up the outer covering of the body and includes the related structures, serves many important functions beyond appearance.

Functions of the Skin

- The skin waterproofs the body and prevents fluid loss.
- Intact (unbroken) skin plays important roles in the immune system.
- Skin is the major receptor for the sense of touch.
- Skin helps the body synthesize (manufacture) vitamin D from the sun's ultraviolet light, while screening out some harmful ultraviolet radiation.

Functions of Related Structures

- **Sebaceous glands** (seh-BAY-shus), also known as **oil glands**, secrete **sebum**, a lipid (oil) that lubricates the skin and discourages the growth of bacteria on the skin.

- **Sweat glands** help regulate body temperature and water content by secreting sweat. Also, a small amount of metabolic waste is excreted through the sweat glands.
- **Hair** helps control the loss of body heat.
- **Nails** protect the dorsal surface of the last bone of each toe and finger

Abbreviations Related to the Integumentary System

basal cell carcinoma = BCC

BCC = basal cell carcinoma

cauterization = caut

caut = cauterization

contact dermatitis = CD

CD = contact dermatitis

eczema = Ez

Ez = eczema

histamine = HA, Hi, hist

HA, Hi, hist = histamine

incision and drainage = I & D

I & D = incision and drainage

malignant melanoma = MM

MM = malignant melanoma

psoriasis = PS, Ps

PS, Ps = psoriasis

sun protection factor = SPF

SPF = sun protection factor

systemic lupus erythematosus = SLE

SLE = systemic lupus erythematosus

transdermal = TD

TD = transdermal

HOMEWORK

Look up the following in your medical dictionary and complete the following definitions:

bull (BULL-ah)

carbuncle (KAR-bung-kul)

cellulitis (sell-you-LYE-tis)

eczema (ECK-zeh-mah)

hematoma (hee-mah-TOH-mah)

ichthyosis (ick-thee-OH-sis)

keratosis (karr-ah-TOH-sis)

lipoma (lih-POH-mah)

lupus erythematosus (LOO-pus er-ih-thee-mah-TOH-sus)

malignant melanoma (me-l-ah-NOH-mah)

onychomycosis (on-ih-koh-my-KOH-sis)

pediculosis (pee-dick-you-LOW-sis)

purulent (PYOU-roo-lent)

scabies (SKAY-beez)

scleroderma (sklehr-oh-DER-mah or skleer-oh-DER-mah)

**Medical Terminology for Medical Assistants
Part VI: The Cardiovascular System**

Overview of Structures, Combining Forms, and Functions of the Cardiovascular System

Major Structures	Related Combining Forms	Primary Functions
Heart	card/o, cardi/o	Pumps blood into the arteries.
Blood Vessels	angi/o, vas/o	Transport blood to and from all areas of the body.
<ul style="list-style-type: none"> • Arteries 	arteri/o	Transport blood away from the heart to all parts of the body.
<ul style="list-style-type: none"> • Capillaries 	capill/o	Permit the exchange of nutrients and waste products between the blood and the cells.
<ul style="list-style-type: none"> • Veins 	phleb/o, ven/o	Return blood from all body parts to the heart.
<ul style="list-style-type: none"> • Blood 	hem/o, hemat/o	Brings oxygen and nutrients to the cells and carries away waste.

Functions of the Cardiovascular System

Cardiovascular (CV) means pertaining to the heart and blood vessels (**cardi/o** means heart, **vascul** means blood vessels, and **-ar** means pertaining to).

Structures of the Cardiovascular System

The major structures of the cardiovascular system are the heart, blood vessels, and blood.

The Heart

The heart is a hollow muscular organ located between the lungs. It is a very effective pump that furnishes the power to maintain the blood flow needed throughout the entire body.

The Pericardium

- The **pericardium** (pehr-ih-**KAR**-dee-um) is the double-walled membranous sac that encloses the heart (**peri-** means surrounding, **cardi**, means heart, and **-um** is a singular noun ending). *Membranous* means pertaining to a thin layer of pliable tissue that covers or encloses a body part.

- **Pericardial fluid** found in the space between the layers of the pericardium prevents friction when the heart beats.

The Walls of the Heart

The walls of the heart are made up of three layers: the epicardium, myocardium, and Endocardium.

- The **epicardium** (ep-ih-**KAR**-dee-um) is the external layer of the heart and also is part of the inner layer of the pericardial sac (**epi-** means upon, **cardi**, means heart, and **-um** is a singular noun ending).
- The **myocardium** (my-oh-**KAR**-dee-um) is the middle and thickest of the three layers and it consists of specialized cardiac muscle (**my/o-** means muscle, **cardi**, means heart, and **-um** is a singular noun ending).
- The **endocardium** (en-doh-**KAR**-dee-um) is the lining of the heart (**endo-** means within, **cardi**, means heart, and **-um** is a singular noun ending). This lining, which is the inner surface of the heart, comes in direct contact with the blood as it is being pumped through the heart.

The Blood Supply to the Myocardium

- The myocardium, which beats constantly, *must* have continuous supply of oxygen and nutrients and prompt waste removal.
- The **coronary arteries and veins** supply the blood needs of the myocardium. If this blood supply is disrupted, the myocardium in the affected area dies.

The Heart Chambers

The heart is divided into left and right sides. Each side is subdivided, thus forming four chambers.

- The **atria** (**AY**-tree-ah) are the two upper chambers of the heart. They are the receiving chambers and all blood vessels coming into the heart enter here. (singular, **atrium**).
- The atria are separated by the **interatrial septum** (**SEP**-tum). A *septum* is a wall that separates two chambers.
- The **ventricles** (**VEN**-trih-kuhls) are the two lower chambers of the heart. All blood vessels leaving the heart emerge from the ventricles. The term *ventricle* describes a normal body cavity and refers to the ventricles of both the heart and the brain.
- The ventricles, which are separated by the **interventricular septum**, are the pumping chambers. The ventricular walls are thicker than the atrial walls because the ventricles pump blood longer distances. *Ventricular* means pertaining to the ventricles.
- The **cardiac apex** is the narrow tip of the heart.

The Heart Valves

The flow of blood through the heart is controlled by four valves: the tricuspid, pulmonary semilunar, mitral, and aortic semilunar valves. If any of these valves is not working correctly, blood does not flow properly through the heart and cannot be pumped effectively to all parts of the body.

- The **tricuspid valve** (try-**KUS**-pid) controls the opening between the right atrium and the right ventricle. *Tricuspid* means having three cusps (points) and this valve is shaped with three points.

- The **pulmonary semilunar valve** (**sem-ee-LOO-nar**) is located between the right ventricle and the pulmonary artery. *Semilunar* means half-moon and this valve is shaped like a half-moon.
- The **mitral valve** (**MY-tral**), also known as the **bicuspid valve**, is located between the left atrium and left ventricle. *Bicuspid* means having two cusps (points) and this valve is shaped with two points.
- The **aortic semilunar valve** (**ay-OR-tick sem-ee- LOO-nar**) is located between the left ventricle and the aorta.

The Heartbeat

- To pump blood effectively throughout the body, the contraction and relaxation (beating) of the heart must occur in exactly the correct sequence.
- The rate and regularity of the heart beat is determined by **electrical impulses** from nerves that stimulate the myocardium of the chambers of the heart.
- Also known as the **conduction system**, these electrical impulses are controlled by the sinoatrial (S-A) node, atrioventricular (A-V) node, and bundle.

The Arteries

The arteries are large blood vessels that carry blood away From the heart to all regions of the body.

- **Endarterial** (**end-ar-TEE-ree-al**) means pertaining to the lining of an artery (**end-** means within. **arter** means artery, and **-id** means pertaining to).
- The **aorta** (**ay-OR-tah**), which is the largest blood vessel in the body, is the main trunk of the arterial system and begins from the left ventricle of the heart.
- The **coronary arteries** (**KOR-uh-nerr-ee**) branch from the aorta and divide again to supply blood to the myocardium.
- The **arterioles** (**ar-TEE-ree-ohiz**), which are the smaller thinner branches of arteries, carry blood to the capillaries throughout the body.

The Capillaries

- Capillaries are the anatomic units that connect the arterial and venous circulatory systems. Capillaries, which are only one epithelial cell in thickness, are the smallest blood vessels in the body.
- Blood flows rapidly through the arteries and veins. However, this flow is much slower through the expanded vascular bed provided by the network of capillaries.
- This slower flow allows time for the exchange of oxygen, nutrients, and waste materials between the tissue fluids and the surrounding cells.

The Veins

The veins form a low-pressure collecting system to return the oxygen-poor blood to the heart.

- The walls of the veins are thinner and less elastic than those of the arteries. The flow of blood through the veins toward the heart is assisted by the contractions of the skeletal muscles.
- Veins have valves that enable blood to flow only toward the heart but prevent it from flowing away from the heart.

- **Venules** (VEN-youls) are small veins that join to form the larger veins.
- **Superficial veins** are located near the body surface. **Deep veins** are located within the tissues and away from the surface.

The Venae Cavae

- The **venae cavae** (VEE-nee KAY-vee) are the two large veins that return blood into the heart (singular, **vena cava**).
- The **superior vena cava** (VEE-nah KAY-vah) brings blood from the upper portion of the body.
- The **inferior vena cava** brings blood from the lower portion of the body.

Pulse and Blood Pressure

- The **pulse** is the rhythmic pressure against the walls of an artery caused by the contraction of the heart.
- **Blood pressure** is the measurement of the amount of pressure exerted against the walls of the vessels.
- **Systolic pressure** (sis-TOL-ick), which occurs when the ventricles contract, is the highest pressure against the walls of the blood vessels. The term *systole* means contraction of the heart and *systolic* means pertaining to this contraction phase.
- **Diastolic pressure** (dye-ah-STOL-ick), which occurs when the ventricles are relaxed, is the lowest pressure against the walls of the blood vessels. The term *diastole* means relaxation of the heart and *diastolic* means pertaining to this relaxation phase.

Plasma

Plasma (PLAZ-mah) is a straw-colored fluid that contains nutrients, hormones, and waste products. Plasma is 91 percent water. The remaining nine percent consists mainly of proteins including the clotting proteins.

- **Fibrinogen** (figh-BRIN-oh-jen) and **prothrombin** (proh-THROM-bin) are the clotting proteins found in plasma. They have an important role in clot formation to control bleeding.
- **Serum** (SEER-um) is plasma with these clotting proteins removed.

Formed Elements of the Blood

The formed elements, also known as blood corpuscles, include the erythrocytes (red blood cells), leukocytes (white blood cells), and thrombocytes (platelets).

Erythrocytes

Erythrocytes (eh-RITH-roh-sights), also known as **red blood cells (RBCs)**, are mature red blood cells (erythr/o means red and -cytes means cells).

- **Hemoglobin** (hee-moh-GLOH-bin) is the iron containing pigment of the erythrocytes. The role of hemoglobin is to transport oxygen from the lungs to all of the body tissues.

Leukocytes

Leukocytes (LOO-koh-sites), also known as **white blood cells (WBCs)**, protect the body against harmful invaders such as bacteria (**leuk/o** means white and **-cytes** means cells).

Thrombocytes

Thrombocytes (**THROM**-boh-sights), the smallest formed elements of the blood, play an important role in the clotting of blood (**thromb/o** means clot and **-cytes** means cells).

- Also known as **platelets**, when a blood vessel is damaged, these cells are activated and become sticky. This action causes the platelets to clump together to form a clot that stops the bleeding.

Blood Types

The four major blood types are A, AB, B, and O. The A, AB, and B groups are based on the presence of the A and or B antigens on the red blood cells. In type O blood, both antigens are absent.

Cardiac Arrhythmia and Fibrillation

- **Cardiac arrhythmia** (ah-**RITH**-mee-ah), also known as **dysrhythmia** (dis-**RITH**-mee-ah), is a change in the rhythm of the heartbeat.
- **Fibrillation** (**fi**h-brih-**LAY**-shun) describes rapid, random, quivering, and ineffective contractions of the heart.

Altered Heartbeat Rates

- **Bradycardia** (**brad**-ee-**KAR**-dee-ah) is an abnormally slow heartbeat (**brady**- means slow, **card** means heart, and **-ia** means abnormal condition). This term is usually applied to rates less than 60 beats per minute. Compare with *tachycardia*.
- **Tachycardia** (**tack**-ee-**KAR**-dee-ah) is an abnormally rapid heartbeat (**tachy**- means rapid, **card** means heart, and **-ia** means abnormal condition). This term is usually applied to rates greater than 100 beats per minute. Compare with *bradycardia*.
- **Palpitation** (**pal**-pih-**TAY**-shun) is a pounding or racing heart with or without irregularity in rhythm. This is associated with certain heart disorders; however, it also may be a response accompanying a panic attack.

Veins

- **Phlebitis** (fleh-**BYE**-tis) is the inflammation of a vein (**phleb** means vein and **-itis** means inflammation). This usually occurs in a superficial vein.
- **Varicose veins** (**VAR**-ih-kohs **VAYNS**) are abnormally swollen veins, usually occurring in the legs.

Thrombosis

A **thrombosis** (throm-**BOH**-sis) is the abnormal condition of having a thrombus (**thromb** means clot and **-osis** means abnormal condition) (plural, **thromboses**).

Cholesterol

Cholesterol (koh-**LES**-ter-ol) is a waxy fat like substance that travels in the blood in packages called lipoproteins. Some cholesterol in the blood is necessary; however, excessively high levels can lead to heart disease.

Leukemia

Leukemia (loo-**KEE**-mee-ah) is a malignancy characterized by a progressive increase in the number of abnormal leukocytes (white blood cells) found in hemopoietic tissues, other organs,

and in the circulating blood (**leuk** means white and **-emia** means blood condition). This condition is usually treated with bone marrow transplants.

Anemias

Anemia (ah-NEE-mee-ah) is a disorder characterized by lower than normal levels of red blood cells in the blood (**an-** means without or less than and **-emia** means blood condition).

Hypertension

Essential hypertension, also known as **primary** or **idiopathic hypertension**, is consistently elevated blood pressure of unknown cause. *Idiopathic* means of unknown cause.

Hypotension

Hypotension (**high**-poh-TEN-shun) is lower than normal arterial blood pressure. Symptoms may include dizziness, lightheadedness, or fainting.

Angiography

Angiography (an-jee-OG-rah-fee) is a radiographic (x-ray) study of the blood vessels after the injection of a contrast medium (**angi/o** means blood vessel and **-graphy** means the process of recording). The resulting film is an **angiogram**.

Electrocardiography

Electrocardiography (ee-leck-troh-kar-dee-OG-rah-fee) is the process of recording the electrical activity of the myocardium (**electr/o** means electric, **cardi/o** means heart, and **-graphy** means the process of recording). An **electrocardiogram** (ee-leck-troh-KAR-dee-oh-gram) is the record produced by this process.

Antihypertensive Medications

An **antihypertensive drug** (an-tih-high-per-TEN-siv) is administered to lower blood pressure. The following are medications used for this purpose:

- **ACE inhibitors** (angiotensin converting enzyme) are administered to treat hypertension and congestive heart failure. ACE inhibitors act by interfering with the action of the kidney hormone renin that causes the heart muscles to contract.
- **Beta-blockers** reduce blood pressure by slowing the heartbeat.
- **Calcium channel blockers** reduce the contraction of the muscles that squeeze blood vessels tight. These medications are used to treat hypertension, angina, and arrhythmia.
- **Diuretics** (dye-you-RET-icks), which increase urine secretion to rid the body of excess sodium and water, are administered to treat hypertension and congestive heart failure (CHF).

Clearing Blocked Arteries

Percutaneous (per-kyou-TAY-nee-us) **transluminal coronary angioplasty** is also called **balloon angioplasty** (AN-jee-oh-plas-tee). In this procedure, a small balloon on the end of a catheter is used to open a partially blocked coronary artery by flattening the plaque deposit and stretching the lumen. After the plaque has been flattened, the balloon is deflated and the catheter and balloon are removed. *Percutaneous* means through the skin and *transluminal* means within the lumen of an artery.

Cardiac Dysrhythmias

- **Defibrillation** (dee-**fib**-rih-**LAY**-shun), also known as **cardioversion** (**kar**-dee-oh-**VER**-zhun), is the use of electrical shock to restore the heart's normal rhythm. This shock is provided by a **defibrillator** (dee-**fib**-rih-**LAY**-ter).
- An **automated external defibrillator (AED)**, which is designed for use by nonprofessionals, automatically samples the electrical rhythms of the heart. If necessary, the AED externally shocks the heart to restore a normal cardiac rhythm.
- A **pacemaker** is an electronic device that may be attached externally or implanted under the skin, with connections leading into the heart to regulate the heartbeat. Pacemakers are used primarily as treatment for bradycardia or atrial fibrillation.
- An **implantable cardioverter defibrillator (KAR- dee-oh-ver-ter dee-**fib**-rih-**LAY**-ter)** is a double- action pacemaker. (1) It constantly regulates the heartbeat to ensure that the heart does not beat too slowly. (2) If a dangerous dysrhythmia, such as tachycardia, occurs it acts as an automatic defibrillator.
- **Valvoplasty (VAL-voh-plas-tee)**, also known as **valvuloplasty (VAL- view-loh-plas-tee)**, is the surgical repair or replacement of a heart valve (**valv/o** means valve and **-plasty** means surgical repair).
- **Cardiopulmonary resuscitation** is an emergency procedure for life support consisting of artificial respiration and manual external cardiac compression.

Abbreviations Related to the Cardiovascular System

anticoagulant = AC	AC = anticoagulant
aneurysm = AN	AN = aneurysm
angina pectoris = AP	AP = angina pectoris
antihypertensive drug = AHD	AHD = antihypertensive drug
atrial fibrillation = AF	AF = atrial fibrillation
automated external defibrillator = AED	AED = automated external defibrillator
blood pressure = BP	BP = blood pressure
cholesterol = C	C = cholesterol
cardiopulmonary resuscitation = CPR	CPR = cardiopulmonary resuscitation
congestive heart failure = CHF	CHF = congestive heart failure
electrocardiogram = ECG, EKG	ECG, EKG = electrocardiogram

hemoglobin = Hb or HB

Hb or HB = hemoglobin

Hoter monitor = HM

HM = Hoter monitor

implantable cardioverter defibrillator = ICD

ICD = implantable cardioverter defibrillator

myocardial infarction = MI

MI = myocardial infarction

Raynaud's phenomenon = RP

RP = Raynaud's phenomenon

thrombosis = T

T = thrombosis

varicose veins = VV

VV = varicose veins

Matching Word Parts 1

Write the correct answer in the middle column.

	Definition	Correct Answer	Possible Answers
6.1	aorta	_____	angi/o
6.2	artery	_____	aort/o
6.3	plaque, fatty substance	_____	arteri/o
6.4	relating to blood or lymph vessels	_____	ather/o
6.5	slow	_____	brady-

Matching Word Parts 2

Write the correct answer in the middle column.

	Definition	Correct Answer	Possible Answers
6.6	blood or blood condition	_____	cardi/o
6.7	crown, coronary	_____	coron/o
6.8	heart	_____	ven/o
6.9	red	_____	-emia
6.10	vein	_____	erythr/o

Matching Word Parts 3

Write the correct answer in the middle column.

	Definition	Correct Answer	Possible Answers
6.11	white	_____	hem/o
6.12	vein	_____	leuk/o
6.13	fast, rapid	_____	phleb/o
6.14	clot	_____	tachy/o
6.15	blood, relating to blood	_____	thromb/o

Matching Structures

Write the correct answer in the middle column.

	Definition	Correct Answer	Possible Answers
6.15	a hollow muscular organ	_____	endocardium
6.17	cardiac muscle	_____	epicardium
6.16	external layer of the heart	_____	heart
6.19	inner lining of the heart	_____	myocardium
6.20	sac enclosing the heart	_____	pericardium